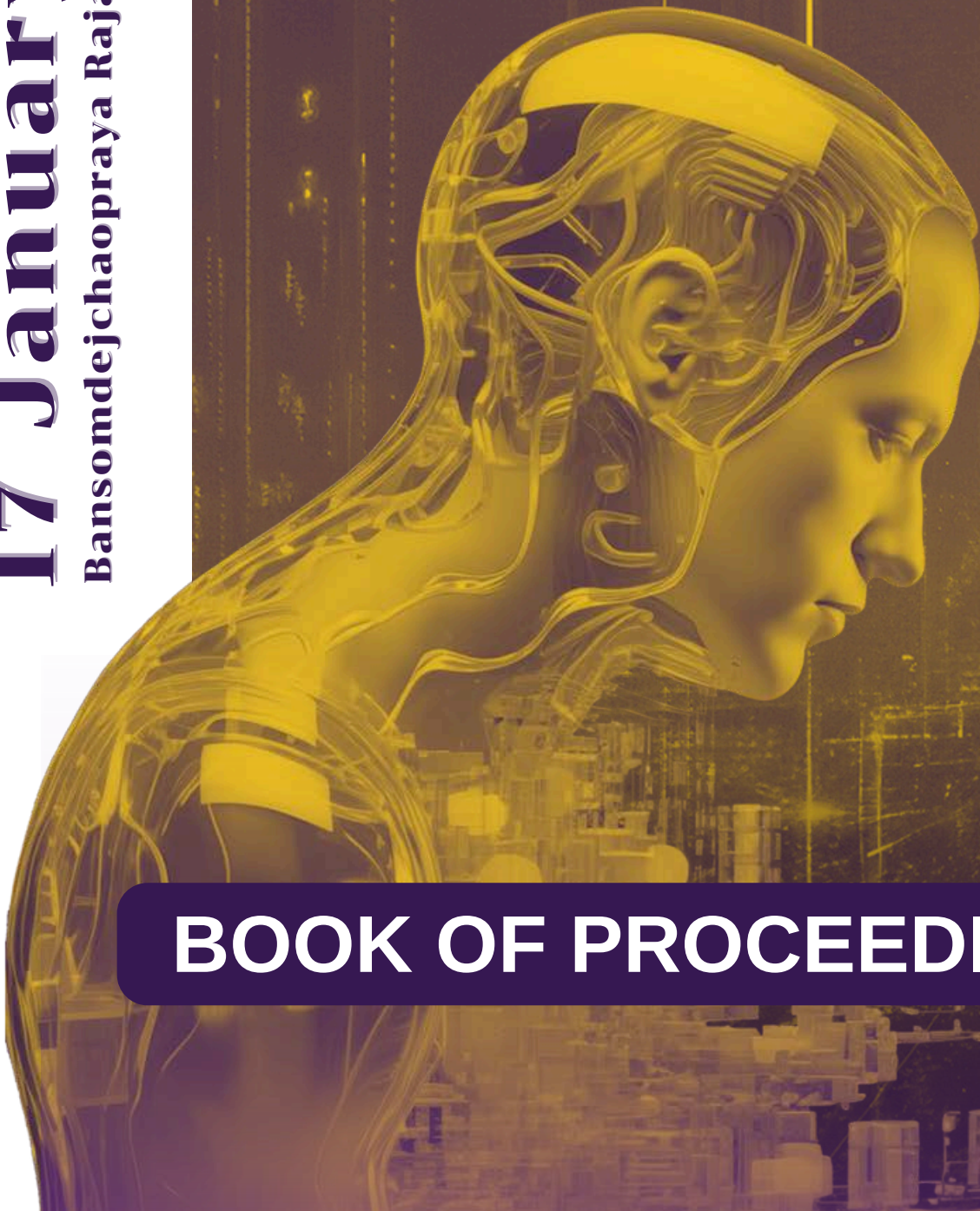**17 January 2025**
Bansomdejchaopraya Rajabhat University

The 1st Bansomdejchaopraya National and International Conference (BS2C 2025)

On "Synergy of Innovation, Technology and Creativity for Sustainable Prosperity"

BOOK OF PROCEEDINGS

FOREWORD

This **Book of Proceedings** has been prepared by Bansomdejchaopraya Rajabhat University to disseminate significant research contributions from both domestic and international researchers participating in

The 1st Bansomdejchaopraya National and International Conference (BS2C 2025). The conference, themed **"Synergy of Innovation, Technology, and Creativity for Sustainable Prosperity, "** will be held on **Friday, January 17, 2025,** at Bansomdejchaopraya Rajabhat University.

This book comprises 90 full articles of oral presentations organized into six key areas:

1. **Education** – 21st-century learning, Educational Innovation, Special Education, and related fields.

2. **Humanities and Social Sciences** – Geography, Linguistics, Political Science, Law, and related fields.

3. **Science and Technology** – Computer Science, Electronics, Engineering, Basic Technologies, Food Science, Environmental Science, Physical Sciences, and related fields.

4. **Health Sciences** – Occupational Health and Safety, Safety Management, Public Health, Nursing, Allied Health Sciences, Medical Biotechnology, and related fields.

5. **Business Administration and Management** – Economics, Logistics and Supply Chain Management, Transportation Management, Retail and Commerce, International Business, Mass Communication, and related fields.

6. **Fine Arts and Creativity** – Visual Arts, Performing Arts, Literature, and related fields.

Each Proceedings reflects the integration of innovation, technology, and creativity, highlighting collaboration among researchers, students, and organizations at both national and international levels to achieve sustainable prosperity.

We sincerely hope that this Book of Proceedings serves as an inspiration and valuable source of knowledge for researchers, students, and those interested in various fields of study and research.

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APPRECIATION
PRESIDENT OF BANSOMDEJCHAOPRAYA RAJABHAT UNIVERSITY

On behalf of Bansomdejchaopraya Rajabhat University, I am delighted to warmly welcome all participants, speakers, and organizers to The 1st Bansomdejchaopraya National and International Conference (BS2C 2025). This conference represents our shared dedication to advancing knowledge, driving innovation, and addressing the challenges of today's dynamic world.

Under the theme "Synergy of Innovation, Technology, and Creativity for Sustainable Prosperity,"

this event provides an excellent platform for exchanging ideas, presenting innovative research, and building interdisciplinary collaborations. I am confident that the discussions and interactions here will lead to meaningful solutions that have a lasting and positive impact.

I deeply appreciate the contributions of our keynote speakers, presenters, and participants, whose efforts make this event possible. Your involvement showcases the strength of our academic community and its commitment to progress through collaboration and shared expertise.

May this conference inspire fresh ideas, foster partnerships, and pave the way for innovations that contribute to the betterment of society. I wish you all a productive and enriching experience. Once again, welcome to Bansomdejchaopraya Rajabhat University and to this significant academic gathering.

Warm regards,

ASST. PROF. DR. KANAKORN SAWANGCHAROEN
PRESIDENT OF BANSOMDEJCHAOPRAYA RAJABHAT UNIVERSITY

APPRECIATION

PRESIDENT OF THAILAND SCIENCE RESEARCH AND INNOVATION

On behalf of the Thailand Science Research and Innovation (TSRI), it is my great honor to preside over the opening ceremony of the 1st Bansomdejchaopraya National and International Conference (BS2C 2025) under the theme "Synergy of Innovation, Technology, and Creativity for Sustainable Prosperity."

This academic conference highlights the critical role of integrating knowledge, technology, and creativity to address the rapidly changing challenges of our global society. The gathering of researchers, academics, and practitioners from diverse fields offers an excellent opportunity to foster collaboration and create meaningful and sustainable innovations.

I sincerely hope this conference will inspire new ideas and lead to successful research and innovations that promote sustainable prosperity in the future. May this gathering be fruitful and beneficial for everyone involved

Warm regards,

PROF. DR. SOMPONG KLAYNONGSRUANG
PRESIDENT OF THAILAND SCIENCE RESEARCH AND INNOVATION (TSRI)

APPRECIATION
PRESIDENT OF THE UNIVERSITY COUNCIL
BANSOMDEJCHAOPRAYA RAJABHAT UNIVERSITY

As the Chairman of the University Council of Bansomdejchaopraya Rajabhat University, it is my pleasure to present this national and international conference proceedings consisting of selected papers based on oral and social media presentations from the 1st Bansomdejchaopraya National and International Conference (BS2C 2025) under the theme "Synergy of Innovation, Technology, and Creativity for Sustainable Prosperity" .

This conference serves as an invaluable platform for the exchange of knowledge experiences, and the establishment of both national and international academic networks, contributing to sustainable development in various dimensions.

I would like to take this opportunity to thank all of the participants in the conference – invited speakers, presenters, and audience alike. I would also like to extend my gratitude to reviewers of the original abstracts and the papers submitted for consideration in this volume for having so generously shared their time and expertise. Last but not the least, I wish to express my congratulations and appreciation to the conference organizers for their dedication and efforts in accomplishing the conference's objectives.

Warm regards,

EMERITUS PROFESSOR
CHARTCHAI NA CHIANGMAI, PH.D.
PRESIDENT OF THE UNIVERSITY COUNCIL
BANSOMDEJCHAOPRAYA RAJABHAT UNIVERSITY

ASSOCIATION OF PROFESSIONAL DEVELOPMENT OF EDUCATIONAL ADMINISTRATION OF THAILAND

ASSOC.DR.JINAWATARA PAKOTUNG

PRESIDENT OF JOURNAL OF ASSOCIATION OF PROFESSIONAL
DEVELOPMENT OF EDUCATIONAL ADMINISTRATION
OF THAILAND

The Association for the Development of Educational Administration in Thailand was established with the objective of advancing the professional development of educational administrators. Its members include educational administrators, school executives, lecturers, and students pursuing undergraduate, master's, and doctoral degrees in educational institutions.

The Association collaborates annually with various universities to develop personnel, students, and educational administrators through agreements and joint initiatives. In hosting this Bansomdejchaopraya National and International Conference (BS2C 2025), the Association has partnered with Bansomdejchaopraya Rajabhat University to enhance educational administration in Thailand, aligning with its annual objectives.

> **I extend my best wishes for the success of this conference,
> and may it achieve all its goals seamlessly.**

With respect and best regards,
Assoc. Prof. Dr. Jinnawat Pakotang
President of Journal of Association of Professional
Development of Educational Administration of Thailand

THE SOCIAL SCIENCE ASSOCIATION OF THAILAND

PROF.DR.KRIENGSAK CHAREONWONGSAK
HONORARY PRESIDENT OF THE SOCIAL SCIENCE ASSOCIATION OF THAILAND

During this time, the world is facing challenges from rapidly evolving technological transition and accelerating environmental risks, including economic and social uncertainties that affect the stability of many countries. Integrating innovation, technology, and creativity is essential to building adaptability and sustainable development in all areas of society and the economy.

The 1st Bansomdejchaopraya National and International Conference (BS2C 2025) on "Synergy of Innovation, Technology, and Creativity for Sustainable Prosperity" is of great significance in an era where development cannot proceed without considering sustainability at all levels, whether it is resource management, climate change or dealing with social challenges. Integrating technology and innovation with creativity is, therefore, the key to sustainable development.

This event is not only a platform for knowledge exchange among scholars and experts in various fields but also an opportunity for us to jointly develop new ideas that can respond to the challenging global situation. Your participation in this event will help strengthen the approach to the efficient use of resources and create innovations that answer the question of sustainable development and can adapt to changes.

" **I believe this conference will play an important role in fostering stronger understanding and cooperation at the national and international levels so that we can jointly respond to changes in the world and create sustainable prosperity together.** "

With respect and best regards,

Prof.Dr.Kriengsak Chareonwongsak

Honorary President of The Social Science

Association of Thailand

PLENARY SPEAKER

KEYNOTE SPEAKER

Prof.Sompong Klaynongsruang, Ph.D.

Prof. Emeritus Chartchai Na Chiangmai, Ph.D.

Assoc.Prof.Shatrugha Prasad Gupta, Ph.D.

Prof.Kedar Prasad Rijal, Ph.D.

Driving Innovation Strategy: Shaping the Future of Research at Rajabhat Universities.

Research and Innovation towards a Sustainable Future for Thailand .

Changing Landscape of Academic Institutions: International Partnership for Innovation and Progress.

Sustainability Challenges of Community Colleges in Nepal.

SCHEDULE

The 1ˢᵗ Bansomdejchaopraya National and International Conference (BS2C 2025)

"Synergy of Innovation, Technology and Creativity for Sustainable Prosperity"

January 17, 2025

Main Auditorium, 4ᵗʰ Floor, Building 1, Bansomdejchaopraya Rajabhat University

Time	Activity
08:00 - 08:30	Registration.
08:30 - 08:45	The master of ceremonies welcomes the attendees and announces the program schedule.
08:45 - 08:50	Welcoming remarks by **Emeritus Professor Chatchai Na Chiangmai, Ph.D.** Chairman of the University Council, Bansomdejchaopraya Rajabhat University.
08:50 - 09:00	Report Address by **Assistant Professor Kanakorn Sawangcharoen, Ph.D.** President of Bansomdejchaopraya Rajabhat University.
09:00 - 09:15	Opening Speech by **Professor Sompong Klainongsuang, Ph.D.** President of Thailand Science Research and Innovation (TSRI).
09:15 - 09:30	Group Photo of Conference Participants.
09:30 - 10:00	Performance: **"BSRU Enlightenment: Local Research for Sustainability – The Musical"**
10:00 - 10:30	**Keynote Address:** "Driving Innovation Strategy: Shaping the Future of Research for Rajabhat Universities" **By Professor Sompong Klainongsuang, Ph.D.** President of Thailand Science Research and Innovation (TSRI).
10:30 - 11:00	Presentation of plaques and tokens of appreciation to main hosts, co-hosts, sponsors, and outstanding research award recipients.
11:00 - 11:20	**Keynote Address:** "Research and Innovation towards a Sustainable Future for Thailand" **by Emeritus Professor Chatchai Na Chiangmai, Ph.D.** Chairman of the University Council, Bansomdejchaopraya Rajabhat University.

(CONT.) SCHEDULE

The 1st Bansomdejchaopraya National and International Conference (BS2C 2025)
"Synergy of Innovation, Technology and Creativity for Sustainable Prosperity"
January 17, 2025

Main Auditorium, 4th Floor, Building 1, Bansomdejchaopraya Rajabhat University

Time	Activity
11:20 - 11:40	**Special Lecture:** "Changing Landscape of Academic Institutions: International Partnership for Innovation and Progress" **By Professor Kedar Prasad Rijal, Ph.D.** Registrar of Tribhuvan University.**(Keynote Speaker)**
11:40 - 12:00	**Special Lecture:** "Sustainability Challenges of Community Colleges in Nepal" **By Associate Professor Shatrughan Prasad Gupta, Ph.D.** President of Nepal Public Campus Association (NPCA) and Campus Chief Kathmandu Siksha Campus. **(Keynote Speaker)**
12:00 - 12:15	The master of ceremonies provides details about the afternoon session.
12:15 - 13:30	Lunch.
13:30 - 17:00	Parallel Sessions: Research oral presentations **Building 12 3rd and 4th Floor.**

Business Administration and Management

(10-EN-BAM)

Domestic Travel Intentions among Thai Residents in the Eastern Region: The Influence of Attitude in a Post-COVID-19 Context

JIttima Singhatam[1*]

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Abstract

This study investigates Thai tourists' attitudes toward domestic travel in the post-COVID-19 era, analyzing demographic factors including gender, age, marital status, and education level. It examines the relationship between attitudinal dimensions-cognitive and affective attitudes-and behavioral intentions in domestic travel. A total of 892 valid questionnaires were collected from Thai tourists residing in seven provinces in Thailand's Eastern region. Using descriptive statistics and ANOVA, this study explores differences in domestic travel attitudes across demographic groups, identifying variations in travel inclinations. Results reveal generally positive attitudes toward domestic travel across all groups, with significant differences by age, marital status, and education level, though not by gender. Younger adults (21–30 years), widowed or divorced individuals, and those with higher educational attainment exhibited the most favorable attitudes.

Multiple regression analysis indicated a significant model ($F = 285.074$, $p < .001$) explaining 39.1% of the variance in behavioral intention ($R^2 = .391$). Affective attitudes proved to be the stronger predictor ($\beta = .495$, $p < .001$) relative to cognitive attitudes ($\beta = .186$, $p < .001$), with both factors showing significant positive correlations with behavioral intention ($r = .607$ and $r = .484$, respectively, $p < .01$). These findings underscore the value of targeting specific demographic segments in domestic tourism marketing to facilitate tourism recovery. The results highlight the dominant role of emotional factors in travel decision-making, offering significant implications for tourism marketing strategies and service design. Overall, the study advances understanding of the psychological mechanisms driving travel behavior and provides actionable insights for tourism stakeholders aiming to develop more effective, emotion-focused destination marketing and management strategies.

Keywords: behavioral intention; domestic tourism; emotional attitudes; cognitive beliefs; travel decision-making

1. Introduction

The unprecedented COVID-19 pandemic has fundamentally transformed the global landscape, precipitating far-reaching consequences across economic, political, and societal domains (Carlsson-Szlezak, Reeves, & Swartz, 2020). Within the tourism sector, this crisis has heightened travelers' concerns about safety and risk, significantly altering their decision-making patterns and behavioral intentions (Wen, Kozak, Yang, & Liu, 2021). Risk perception emerges as a critical determinant in tourism behavior, substantially influencing travelers' attitudes, destination selections, and safety considerations (Perić, Dramićanin, & Conić, 2021). As countries navigate economic recovery, domestic tourism plays a pivotal role in revitalizing the travel industry. Consequently, understanding the factors that either encourage or inhibit travel intentions becomes crucial for economic rehabilitation and growth.

Attitude towards behavior refers to an individual's judgment or level of feeling when evaluating involvement in a specific behavior or action, including anticipating both positive and negative consequences. The formation of tourists' attitudes towards behavior is influenced by both internal and external factors, such as personal experiences, familiarity, motivation, trial, and interactions with various social groups. Exposure to information, sources of information, and the process of selecting and perceiving information about the attributes of tourist destinations and other related factors, combined through a process of evaluation, lead to learning, knowledge, beliefs, and feelings that contribute to an attitude towards behavior. These attitudes consist of two components: (1) cognitive, a rational evaluation reflecting an individual's thought process and knowledge about performing a behavior; and (2) affective, which refers to an individual's emotions towards something or an action. When combined, these components influence attitudes towards behavior (Prayag, Hosany, Muskat, & Del Chiappa, 2017). If an individual believes that an action will yield positive results, they are more likely to develop a positive attitude towards that action. Involvement in a specific behavior or action and its consequences contribute to behavioral intention (Han, Al-Ansi, Chua, Tariq, Radic, & Park, 2020) and are crucial for understanding and predicting behavior. Therefore, attitudes towards domestic travel are formed from beliefs and expectations of positive experiences, such as safety from infection and value for money, following the COVID-19 situation. Affective attitudes, on the other hand, refer to anticipated feelings such as relaxation, enjoyment, and happiness. Individuals perceive both positive and negative consequences, which influence their behavioral intentions (Hasan, Ismail, & Islam, 2017; Prayag et al., 2017)

Behavioral intention refers to an individual's willingness or readiness to engage in a specific behavior or action in the future. It represents a declaration within the decision-making process, indicating whether a particular behavior will occur. For instance, the awareness of intentions to travel or re-visit a destination serves as a crucial indicator of an individual's propensity to engage in the actual behavior (Joo, Seok, & Nam, 2020; Liu, Shi, Li, & Amin, 2021). Behavioral intention plays a significant role in destination selection, as actual behavior is determined by this intention (Afshardoost & Eshaghi, 2020; Bae & Chang, 2021; Perić et al., 2021). According to the Theory of Planned Behavior, attitudes toward the behavior, subjective norms, and perceived behavioral control are key factors influencing behavioral intention (Azhar, Ali, Hamid, Akhtar, & Rahman, 2022). The COVID-19 pandemic and its associated uncertainties have led to significant changes in tourist behavior during the outbreak. Health and safety concerns have increased, and tourists' perceived risk levels have risen (Office of the Permanent Secretary for Tourism and Sports, 2022)

Studies during the pandemic highlight the significance of health, hygiene, accommodation, healthcare systems, and health insurance for tourists (Perić et al., 2021). Health risk perception emerges as a crucial factor

influencing tourists' travel decisions, attitudes toward behavior, and behavioral intentions (Abraham, Bremser, Carreno, Crowley-Cyr, & Moreno, 2021; Liu et al., 2021). Wang, Yeh, Chen, & Huan (2022) investigated Chinese tourists' attitudes toward domestic travel behavior during the COVID-19 pandemic, assessing their perceptions of travel preferences, anticipated satisfaction levels, fun, and value for money. The findings revealed that external factors influenced these attitudes. Liu et al. (2021) explored the factors influencing Chinese tourists' intentions to travel abroad post-pandemic, measuring their attitudes towards overseas travel in terms of perceived goodness, value, interest, pleasantness, and liking. The results indicated that attitude-related variables were stronger predictors of travel intention than social norms and perceived self-control, as posited by the Theory of Planned Behavior. While significant research has been conducted on the global impact of COVID-19 on tourism, there are still several gaps, particularly in the context of domestic tourism in Thailand. The pandemic has had a significant impact on people's mental health. Research is needed to explore how this has affected tourists' travel attitude and intentions. By addressing these research gaps, we can gain a deeper understanding of the factors shaping domestic tourism in Thailand post-COVID-19 and develop effective strategies to promote sustainable and resilient tourism.
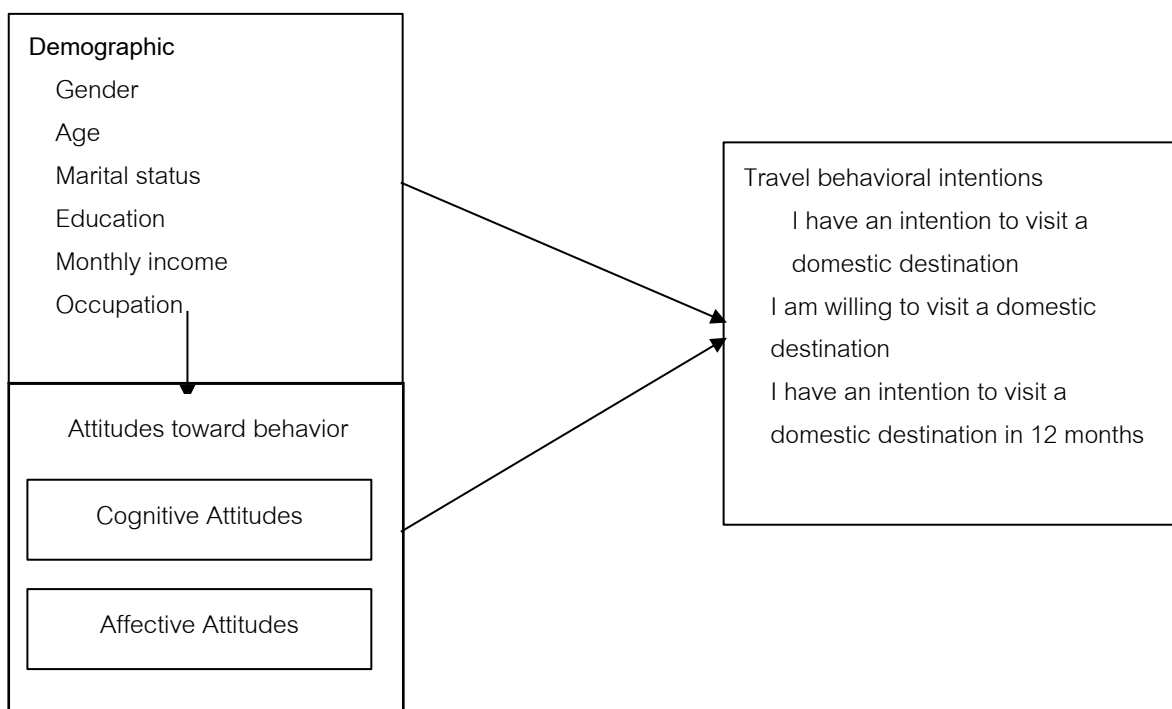
Figure 1 Research framework

2. Research Objectives

　　1.　To examine the demographic differences that influence attitudes toward domestic travel and behaviors among Thai tourists residing in the Eastern region.

　　2.　To assess the level of behavioral intentions for domestic travel among Thai tourists residing in the Eastern region.

　　3.　To identify the attitudinal factors that influence behavioral intentions for domestic travel among Thai tourists residing in the Eastern region.

3. Research Hypotheses

Hypothesis 1

Attitudes toward domestic tourism behavior are related to demographic variables.

H1a There is a significant difference in attitudes toward domestic travel among Thai tourists based on age.

H1b There is a significant difference in attitudes toward domestic travel among Thai tourists based on gender.

H1c There is a significant difference in attitudes toward domestic travel among Thai tourists based on marital status.

H1d There is a significant difference in attitudes toward domestic travel among Thai tourists based on education level.

H1e There is a significant difference in attitudes toward domestic travel among Thai tourists based on monthly income.

H1f There is a significant difference in attitudes toward domestic travel among Thai tourists based on occupation.

Hypothesis 2 Attitude toward travel behavior has a significant positive effect on tourists' behavioral intention to travel domestically.

H2a There is a significant positive relationship between cognitive attitude and tourists' behavioral intention to travel domestically.

H2b There is a significant positive relationship between affective attitude and tourists' behavioral intention to travel domestically.

4. Research Methodology

This study was based on surveys conducted in the Eastern region of Thailand. The empirical research took place across seven provinces: Chonburi, Chachoengsao, Rayong, Chanthaburi, Nakhon Nayok, Prachinburi, and Trat. A quantitative survey methodology was used to collect data on demographics, tourists' attitudes toward domestic travel (including cognitive beliefs and emotional components), and behavioral intentions. The questionnaire design was informed by relevant research and theoretical frameworks. The demographic characteristics were measured using categorical scales appropriate to each variable. The measurement instrument comprised multiple items assessing tourists' attitudes (cognitive beliefs and emotional components) and behavioral intentions. All items were measured using 5-point Likert scales ranging from the following: 1=strongly disagree, 2=disagree, 3=neutral, 4=agree, 5=strongly agree. The instrument was reviewed and refined by experts to enhance content validity, ensuring alignment with the constructs under investigation. Reliability analysis was subsequently conducted, yielding an acceptable Cronbach's alpha, indicating satisfactory internal consistency across the items. To further assess the instrument's applicability and clarity, a pilot study was conducted with a sample of 30 participants representative of the main study's target population. Insights from this pilot study informed several modifications to improve item clarity and overall comprehensibility, resulting in a finalized questionnaire that is both reliable and well-suited to the research objectives.

The researcher's sample criteria were Thai people aged 20 years and over, living in the eastern region of Thailand who have traveled or are planning to travel within the country. A convenience sampling was employed in this study due to its practicality and efficiency in recruiting participants. This technique allowed for

the swift collection of data from readily available individuals who met the specified criteria. Prospective participants provided informed consent before answering the research survey. A self-administered questionnaire was used to collect data. A total of 898 sets of data was collected during December 2023 - May 2024 using an online questionnaire to a sample group that was willing and convenient to answer the questionnaire through various networks. After elimination of invalid questionnaires, the final sample size was 892.

The data collected from the 892 participants were entered, scored, and analyzed using the SPSS software. The analysis followed a systematic approach employing multiple statistical techniques. First, descriptive statistics, including means and standard deviations, were calculated to understand the demographic characteristics and distribution of responses. Second, correlation analysis was conducted to examine the relationships between variables, with correlation coefficients determining the strength and direction of associations among the study variables. Third, the differences in attitudes toward behavior across demographic groups were assessed using one-way ANOVA. Finally, multiple linear regression analysis was performed to examine the predictive relationships between attitudinal factors (cognitive beliefs and emotional attitudes) and behavioral intention in domestic travel.

5. Research Results

5.1 Demographic Profile of Respondents

Most of the respondents were female (56.90 percent), aged 21–30 years, the most (44.20 percent), the highest level of education was a bachelor's degree (57.70 percent), monthly income was 15,001–30,000 baht (66.80 percent), occupation was a civil servant/government employee/state enterprise (35.70 percent), living in Chanthaburi Province (48.30 percent).

5.2 Descriptive Statistics and Correlations among Key Variables

The analysis of the importance of attitudes toward behaviors revealed that Thai tourists generally held positive attitudes towards domestic travel, with an overall high rating ($\underline{X}$= 4.20). Tourists place the greatest importance on their emotional response to travel behaviors ($\underline{X}$= 4.34), followed by their cognitive evaluations or beliefs ($\underline{X}$= 4.05). Among the beliefs about domestic travel, the highest-rated aspects, based on mean scores, include having impressive travel experiences ($\underline{X}$= 4.20), perceived value for money ($\underline{X}$= 4.03), and safety from COVID-19 infection ($\underline{X}$= 3.93). For emotional responses to travel behaviors, the highest-rated aspect was the happiness derived from traveling ($\underline{X}$= 4.35), followed by relaxation from work ($\underline{X}$= 4.34) and enjoyment ($\underline{X}$= 4.33) as shown in Table 1

Table 1 Component of attitude towards behavior (N=892)

Attitude towards behavior	$\underline{X}$	SD	Rank
1. Cognitive Attitudes	4.05	0.64	
1.1 Visiting a domestic destination will be an impressive experience.	4.20	0.67	4
1.2 Visiting a domestic destination will be safe from Covid-19 infection	3.93	0.78	6
1.3 Visiting a domestic destination will get value and time	4.03	0.76	5
2 Affective Attitudes	4.34	0.64	
2.1 For me, visiting a domestic destination would be relaxation from work	4.34	0.69	2
2.2 For me, visiting a domestic destination would be funny	4.33	0.67	3

Attitude towards behavior	X	SD	Rank
2.3 For me, visiting a domestic destination would be happiness	4.35	0.70	1
Overall	4.20	0.57	

Analysis of tourists' behavioral intentions toward domestic tourism in the Table 2 revealed strong positive across all measured dimensions. The overall behavioral intention score was notably high (X=4.27, SD = 0.66), indicating a robust propensity for domestic travel. Specifically, both general intentions to visit domestic destinations and willingness to engage in domestic tourism demonstrated equally strong positive responses (X=4.30, SD = 0.71 for both measures), falling into the highest category of intention. While still positive, the specific intention to visit domestic destinations within the next 12 months showed a slightly lower but still substantial mean score (X= 4.20, SD = 0.82). These findings suggest a strong overall disposition toward domestic tourism, with particularly robust immediate behavioral intentions and willingness to travel, though slightly moderated when considering specific time-bound commitments.

Table 2 Mean and Standard Deviation of Tourists' behavioral intention (N=892)

Tourists' behavioral intention	X	SD	Results
Intention to visit a domestic destination	4.27	0.66	
1. I have an intention to visit a domestic destination	4.30	0.71	Highest
2. I am willing to visit a domestic destination	4.30	0.71	Highest
3. I have an intention to visit a domestic destination in 12 months	4.20	0.82	High

The descriptive statistics and correlation analysis indicate significant relationships among the study variables, with all measures demonstrating satisfactory reliability. The mean scores reflect relatively high levels across all variables including cognition attitude : (X= 4.05, SD = 0.64), affective attitudes (X= 4.34, SD = 0.64), Behavioral intention (X= 4.26, SD = 0.67). Correlation coefficients reveal significant positive associations, with affective attitudes exhibiting the strongest correlation with behavioral intention (r= .607, p< .01), followed by cognition (r= .484, p < .01). Cognitive and affective attitudes also demonstrate a moderate correlation (r=0.601, p<0.01). The multicollinearity diagnostics reveal Tolerance (0.639) and VIF (1.565) values within acceptable limits (Tolerance > 0.1 and VIF < 10), indicating that the predictors are sufficiently independent to justify their inclusion in the regression model as shown in the Table 3.

Table 3 Mean, standard deviation, and correlations.

Key variables	Mean	SD	COG	AT	BEH	Tolerance	VIF
Cognition (COG)	4.05	0.64	1			0.639	1.565
Affective (AT)	4.34	0.64	.601**	1		0.639	1.565
Behavioral intention (BEH)	4.26	0.67	.484**	.607**	1		

** p <.01

5.3 Comparative Analysis by Demographic Factors

   The Table 4 provides a detailed analysis of attitudes toward domestic travel among Thai tourists in the post-COVID-19 period, segmented by demographic factors including gender, age, marital status, education level, Monthly income, and Occupation. Mean scores and standard deviations are presented for each demographic group, along with the results of ANOVA tests (F-values and p-values) to determine whether significant differences exist in travel attitudes across these groups. This analysis aims to highlight demographic variations in travel attitudes, helping to identify specific groups with higher or lower inclinations toward domestic tourism. The findings indicate that attitudes toward domestic travel in Thailand post-COVID-19 are generally positive across demographic groups, with significant variations based on demographic variables. Gender and occupation do not significantly impact these attitudes. However, younger adults, widowed/divorced individuals, and those with higher educational attainment tend to exhibit the most positive attitudes. Income levels also significantly influence attitudes, suggesting that these groups could be key segments in efforts to revitalize domestic tourism.

Table 4 Attitude toward Domestic Travel in the Post-COVID-19 Context by Demographic Factors.

Respondents' Demographic Profile	Items	attitude to visit domestic travel behavior in post-covid 19			
		Mean	SD	F	p-value
Gender	Male	4.22	0.57	0.630	0.533
	Female	4.18	0.57		
	Alternative gender	4.22	0.49		
Age	21 – 30	4.26	0.54	5.216	0.001
	31 – 40	4.14	0.62		
	41 – 50	4.08	0.56		
	51 or older	4.23	0.59		
Marital status	Single	4.21	0.57	2.938	0.02
	Have a partner/lover	4.19	0.54		
	Married, no children	4.16	0.61		
	Married, with children	4.14	0.56		
	Widowed/Divorced	4.46	0.64		
Education	High school	4.20	0.55	7.801	0.000
	Bachelor's degree	4.21	0.57		
	Master's degree	4.04	0.58		
	Above master's degree	4.58	0.57		
Monthly income	15,001 – 30,000 Bath	4.20	0.57	3.863	0.004
	30,001 – 45,000 Bath	4.08	0.58		
	45,001 - 60,000 Bath	4.37	0.53		
	60,001 – 75,000 Bath	4.14	0.63		
	75,000 Bath or more	4.34	0.52		
Occupation	Students	4.29	0.54	1.428	0.212

Respondents' Demographic Profile	Items	attitude to visit domestic travel behavior in post-covid 19			
		Mean	SD	F	p-value
	Self employed	4.17	0.62		
	Civil servants/government employees/state enterprises	4.20	0.58		
	Business Owners	4.12	0.53		
	Private company employees	4.15	0.59		
	Housewives/Housewives/Retired	4.19	0.44		

Table 5 showed that age-based comparisons revealed several significant differences in overall attitudes toward domestic travel behavior. Young adults aged 21-30 years exhibited significantly more positive attitudes compared to both the 31-40 age group (Mean difference = 0.127, p = .011) and the 41-50 age group (Mean difference = 0.187, p < .001). Notably, respondents aged 51 or older also demonstrated significantly more favorable attitudes toward domestic travel compared to both the 31-40 age group (Mean difference = 0.137, p = .024) and the 41-50 age group (Mean difference = 0.155, p = .017). These findings indicate a U-shaped pattern in domestic travel attitudes across age groups, where both younger adults (21-30) and older adults (51+) displayed more positive dispositions toward domestic travel compared to middle-aged groups. This pattern might be attributed to different life stages and responsibilities, where younger adults may have more flexibility and enthusiasm for travel, while older adults may have more disposable time and resources.

Table 5 Mean Difference and Standard Error for Different Age groups.

(I)	(J)	Mean Difference (I)-(J)	Std. Error Difference	p-value
21 – 30	31 – 40	.12703*	0.05015	0.011
21 – 30	41 – 50	.18741*	0.05244	0.000
31 – 40	51 or older	-.13665*	0.06035	0.024
41 – 50	51 or older	-.15492*	0.06481	0.017

*p < .01

Post-hoc analyses in the Table 6 revealed significant differences in behavioral attitudes across marital status groups, with widowed/divorced individuals consistently demonstrating more favorable attitudes compared to all other groups. Specifically, widowed/divorced respondents exhibited significantly higher attitude scores compared to those who were single (Mean difference = 0.246, p = .007), those in relationships (Mean difference = 0.272, p = .005), married without children (Mean difference = 0.295, p = .007), and married with children (Mean difference = 0.318, p = .001). The magnitude of these differences was most pronounced when comparing widowed/divorced individuals to those who were married with children. These findings suggest that marital status, particularly being widowed or divorced, is significantly associated with more positive behavioral attitudes, with the effect being consistent across all comparison groups.

Table 6 Mean Difference and Standard Error for Different Marital status.

(I)	(J)	Mean Difference (I)-(J)	Std. Error Difference	*p*-value
Single	Widowed/Divorced	-.24577*	0.09159	0.007
Have a partner/lover	Widowed/Divorced	-.27218*	0.09565	0.005
Married, no children	Widowed/Divorced	-.29533*	0.10957	0.007
Married, with children	Widowed/Divorced	-.31794*	0.09524	0.001

p < .01

Table 7 showed an analysis of educational differences revealed significant variations in attitudes across different educational levels. Individuals with education above the master's degree level demonstrated consistently higher scores compared to other educational groups. Specifically, those with above master's degree qualifications showed significantly higher scores compared to high school graduates (Mean difference = 0.382, p = .001), bachelor's degree holders (Mean difference = 0.367, p = .001), and master's degree holders (Mean difference = 0.537, p< .001). Interestingly, both high school graduates and bachelor's degree holders exhibited significantly higher scores compared to master's degree holders (Mean differences = 0.155 and 0.170 respectively, p< .05) as shown in Table 5. These findings suggest a non-linear relationship between educational attainment and attitudes, with the highest educational level (above master's degree) associated with markedly more positive attitudes, while master's degree holders demonstrated the least favorable attitudes among all educational groups. This pattern might reflect the complex interplay between educational achievement, career demands, and lifestyle preferences.

Table 7 Mean Difference and Standard Error for Different Educational levels

(I)	(J)	Mean Difference (I)-(J)	Std. Error Difference	*p*-value
High school	Master's degree	.15457*	0.06262	0.014
	Above master's degree	-.38230*	0.11162	0.001
Bachelor's degree	Master's degree	.16959*	0.05540	0.002
	Above master's degree	-.36728*	0.10774	0.001
Master's degree	Above master's degree	-.53687*	0.11594	0.000

p < .01

The analysis of income-level differences in the table 8 revealed significant variations in attitudes across different income levels. Respondents in the 15,001-30,000 baht income range showed significantly higher scores compared to those earning 30,001-45,000 baht (Mean difference = 0.113, p= .033), but demonstrated significantly lower scores compared to the 45,001-60,000 baht group (Mean difference = -0.171, p=.011). The 30,001-45,000 baht income group exhibited significantly lower scores compared to both the 45,001-60,000 baht group (Mean difference = -0.285, *p*< .001) and the 75,001 baht or more group (Mean difference = -0.255, p =.023). Additionally, respondents in the 45,001-60,000 baht bracket showed significantly higher scores compared to those earning 60,001-75,000 baht (Mean difference = 0.226, p= .039). These findings suggest a complex, non-linear relationship between income levels and attitudes, with notable variations across different income brackets rather than a straightforward linear progression. This suggests that income alone may not be

a straightforward predictor of attitudes, but rather interacts with other socio-economic factors to influence attitudes towards behavior.

Table 8 Mean Difference and Standard Error for Different Income Levels

(I)	(J)	Mean Difference (I)-(J)	Std. Error Difference	*p*-value
15,001 – 30,000	30,001 – 45,000	.11320*	0.05297	0.033
15,001 – 30,000	45,001 - 60,000	-.17135*	0.06682	0.011
30,001 – 45,000	45,001 - 60,000	-.28455*	0.07869	0.000
30,001 – 45,000	75,001 or more	-.25538*	0.11248	0.023
45,001 - 60,000	60,001 – 75,000	.22622*	0.10942	0.039

p < .01

5.4 Hypothesis Testing Summary

Table 9 Summary of hypothesis testing

Relationships	Supported/Rejected
H 1 Attitudes towards domestic tourism behavior are related to demographic variables.	
H1a There is a significant difference in attitudes toward domestic travel among Thai tourists based on gender.	Rejected
H1b There is a significant difference in attitudes toward domestic travel among Thai tourists based on age.	Supported
H1c There is a significant difference in attitudes toward domestic travel among Thai tourists based on marital status.	Supported
H1d There is a significant difference in attitudes toward domestic travel among Thai tourists based on education level.	Supported
H1e There is a significant difference in attitudes toward domestic travel among Thai tourists based on monthly income.	Supported
H1f There is a significant difference in attitudes toward domestic travel among Thai tourists based on occupation.	Rejected
Hypothesis 2 Attitude toward travel behavior has a significant positive effect on tourists' behavioral intention to travel domestically.	
H2a There is a significant positive relationship between cognitive attitude and tourists' behavioral intention to travel domestically.	Supported
H2b There is a significant positive relationship between affective attitude and tourists' behavioral intention to travel domestically.	Supported

In summary, the findings indicate differences across demographic groups, aligning with the results of previous studies (e.g., Floyd & Pennington-Gray, 2004; Neuburger & Egger, 2021). However, this study found that gender was not a significant factor in attitudes toward travel behavior, which contrasts with previous research (Floyd & Pennington-Gray, 2004; Lepp & Gibson, 2003).

5.5 Influence of Cognitive and Affective Attitudes on Behavioral Intentions: A Regression Analysis

The regression analysis in the Table 10 shows how both attitudinal dimensions influence behavioral intention. The model is significant and R^2 = .391, indicating that approximately 39.1% of the variance in behavioral intention is explained by the two attitudinal predictors. Both cognitive attitudes (β = .186, p < .001) and affective attitudes (β = .495, p < .001) emerged as significant predictors, with affective attitudes exhibiting a notably stronger influence as indicated by its larger standardized beta coefficient. The constant term (B = 1.239, p < .001) represents the baseline behavioral intention when all predictors are zero. The overall model fit is robust (F = 285.074, p < .001), and the positive unstandardized coefficients (B = 0.195 for cognitive attitudes; B = 0.515 for affective attitudes) suggest that increases in either attitudinal dimension are associated with increased behavioral intention, with affective attitudes having a relatively stronger impact per unit change.

Table 10 Summary of a regression analysis for the prediction of behavioral intention.

	B	Std. Error	Beta	*t*-statistics	*p*-value
Constant	1.239	0.129		9.571	0.000
Cognitive Attitude	0.195	0.034	0.186	5.679	0.000
Affective Attitude	0.515	0.034	0.495	15.129	0.000
R=.625, R^2=0.391, $AdjR^2$=0.389, F=285.074					

6. Recommendations

6.1 Theoretical implications

This study contributes to the existing literature by extending the Theory of Planned Behavior (TPB), specifically by examining how cognitive attitudes (COG), affective attitudes (AT), and behavioral intentions (BEH) interact within the context of domestic travel after COVID-19. The findings suggest that demographic factors such as age, marital status, educational level, and monthly income may have a greater influence on attitudes toward behavior than other demographic attributes. The analysis of attitude toward behavior in its two dimensions within the post-COVID-19 context enhances understanding of how emotional responses shape domestic travel behavior (Liu et al, 2021). This study responds to calls for further research into how emotional responses to attitudes toward behavior influence travel decisions. Additionally, it highlights the importance of exploring interactions among demographic variables to develop a more comprehensive understanding of behavioral patterns. Conducting longitudinal studies could further clarify how attitudes evolve across different life stages and circumstances.

6.2 Practical contributions

Develop age-specific marketing campaigns that appeal to both younger (21–30) and older (51+) demographics, acknowledging their distinct motivations and preferences. Create specialized programs and packages for widowed or divorced individuals, given their higher likelihood of positive travel attitudes. Design travel products that cater to various educational backgrounds, particularly addressing the unique preferences of those with advanced degrees. Implement flexible pricing strategies that accommodate diverse income levels, recognizing that income-related travel attitudes are not strictly linear.

These findings significantly enhance our understanding of the complex relationship between demographic factors and travel attitudes, offering valuable insights for both theoretical development and

practical applications in the tourism industry. Future research should aim to validate these patterns across different cultural contexts and investigate additional variables that may influence these relationships.

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(13-EN-BAM)

A Strategic Sustainability Management of Waste Materials in the BCG Model from Tobacco: Thai Tobacco Monopoly, Phra Nakhon Si Ayutthaya

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Abstract

The research is known as A Strategic Sustainability Management of Waste Materials in the BCG Model from Tobacco: Thai Tobacco Monopoly, Phra Nakhon Si Ayutthaya. The objectives are: 1) to examine the perceptions regarding the management of waste material sustainability strategies, sustainable business development, the BCG Model, and the performance of tobacco companies; 2) to investigate the impact of the management of waste material sustainability strategies, sustainable business development, the BCG Model, and the performance of tobacco companies; and 3) to propose a strategic management model for sustainability to enhance the image of tobacco companies concerning social and environmental responsibility. This study used a mixed-methods approach. A whole group of 597 participants responded to various questions based on the factors employed in this research, yielding a mean of 3.81 and a standard deviation of 0.59, signifying a high degree of experience. The highest mean was observed in Sustainable Business Development (Business) at a high level ($\bar{x}$ = 3.96, SD = 0.63), followed by Performance (Perform) at a high level ($\bar{x}$ = 3.87, SD = 0.68), Strategic Management of Sustainability of Waste Materials (Strategic) at a high level ($\bar{x}$ = 3.70, SD = 0.56), and Bio-Circular-Green Economy (BCG) at a high level ($\bar{x}$ = 3.70, SD = 0.65), respectively.

The management of waste material sustainability strategies and sustainable business development, as per the BCG Model, are essential instruments that can assist tobacco factories in establishing competitive advantages while enhancing financial performance, minimizing environmental impacts, and fostering a positive societal image. Strategic management frameworks for sustainability in enhancing the reputation of tobacco for social and environmental accountability encompass three methodologies: Enhancing the production process to be ecologically sustainable by employing technologies that mitigate air, water, and soil pollution, such as implementing standard wastewater treatment systems or machinery that lowers energy consumption, utilizing renewable energy sources, installing solar power systems or biomass energy in the facility, and repurposing waste materials from production, such as tobacco leaves, as biofuels. Additionally, adopting sustainable products through the development of packaging made from recycled or biodegradable materials, alongside research and development of products that minimize health and environmental impacts. Engaging and instilling confidence in consumers by elucidating the advantages of the BCG Model through public relations campaigns that emphasize a commitment to responsible business practices, exemplified by the "Green Tobacco Factory" initiative, and disseminating an annual sustainability report that delineates objectives and performance outcomes related to environmental and societal impact. Engaging in national and international networks through collaboration with governmental and private entities, partaking in joint initiatives aimed at fostering sustainability, such as the government's Circular Economy project, and executing environmental standard certifications, while

applying for international standards certifications, including ISO 14001 (Environmental Management) or Carbon Neutrality Certification.

Keywords: BCG; strategic sustainability; zero waste

1. Introduction

Utilizing the BCG economic model for the development of Thailand from 2021 to 2570. A framework has been formed for several agencies to collaborate in encouraging the development of the BCG economic model, which incorporates the Bio Economy, Circular Economy, and Green Economy, to advance Thailand in an equitable, sustainable, and balanced manner. The proliferation of the circular economy underscores the conservation of resource value via minimizing consumption. Repurpose and reclaim Alleviate pollution issues, reduce greenhouse gas emissions, and foster a new economy. (Division of Trade Policy and Strategy for Industrial Products and Services Office of Trade Policy and Strategy Ministry of Commerce 2023)

The Tobacco Board of Thailand has established significant policies and guidelines aimed at enhancing operational efficiency and societal benefits for stakeholders, specifically by promoting clean energy utilization and mitigating greenhouse gas (GHG) emissions through a sustained action plan. The Tobacco Board of Thailand implements a balanced management policy that promotes sustainable organizational growth while upholding responsibilities to the community, society, and environment. This is achieved by leveraging organizational expertise to develop projects that benefit the community and society at large, optimizing resource utilization, and mitigating environmental impacts resulting from organizational activities. (Annual Report of the Tobacco Authority of Thailand, 2022)

The Tobacco Authority of Thailand (TOAT) is a state-owned enterprise that generates billions of baht in annual revenue for the government, formerly known as the "Tobacco Factory" under the "Ministry of Finance." Produce and distribute cigarettes in Thailand, which has upheld a singular monopoly since 1939. The Tobacco Authority of Thailand presently holds around 1,000 tons of production waste materials, including tobacco dust, damaged cigarettes, compromised filter bottoms, cigarette packet foil paper, and rolling paper. The Tobacco Authority of Thailand must use an external entity for the transportation and disposal of tobacco at a financial deficit. The significant funds designated for tobacco do not completely exploit these byproducts.

Figure 1 byproducts of tobacco manufacturing Tobacco Manufacturing Facility, Phra Nakhon Si Ayutthaya

The Tobacco Authority of Thailand (TOAT) addressed the Global Sustainable Development Goals and the requirements and expectations of all stakeholder groups. This entails considering the criteria employed to assess business sustainability both nationally and globally, which tackle sustainability issues within the context of effective governance. Economic strategies to mitigate corporate risks and effects, while identifying methods to improve business operations and workflows to comprehensively manage sustainability issues in alignment with global sustainability objectives and standards. It is a state-owned industrial enterprise that manufactures and distributes tobacco products to create revenue for national development. The Triple Bottom Line framework is employed to assess organizational sustainability. The Triple Bottom Line idea categorizes sustainability into three domains: economic, social, and environmental, and is employed to assess company sustainability. The primary objective of TOAT is to attain sustainability across all three domains.

The organization possesses a solid and sustainable revenue stream, supported by an efficient business model governed by sound management practices and transparency. Societal Foster the physical and emotional health of personnel. Across the organization's supply chain and management. Mitigate pollution from industrial operations, promote sustainable agriculture, and diminish adverse effects on the environment and ecosystems.

Expenses (Baht)
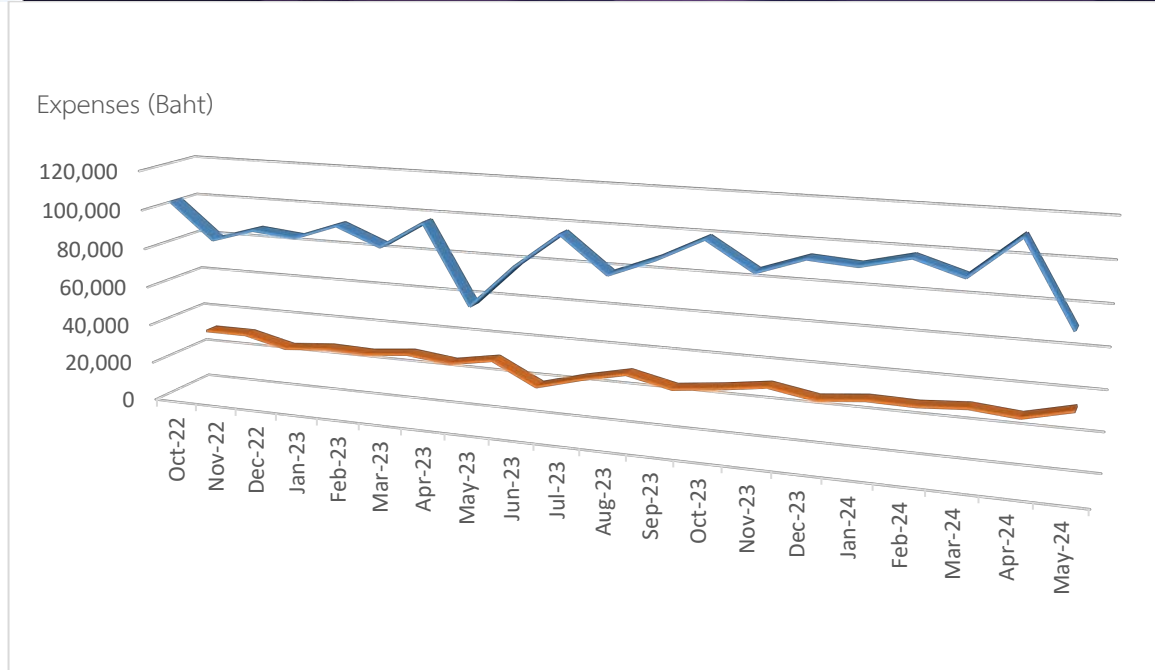
Figure 2 Data regarding the volume of waste generated from tobacco production and associated expenses

2. Research Objectives

1) To examine the extent of perspectives on waste material sustainability strategy management, sustainable company growth, the BCG Model, and tobacco performance.

2) to examine the impact of sustainable waste material management strategies. Sustainable business development, BCG Matrix, and tobacco industry performance

3) To develop a strategic management model for sustainability that enhances the tobacco industry's image regarding social and environmental responsibility, while offering theoretical and practical insights on the sustainable management of tobacco manufacturing waste materials.

3. Research Hypotheses

Hypothesis 1 (H1) (s): Waste materials sustainability strategy management has a positive direct influence on performance

Hypothesis 2 (H2): Managing waste materials sustainability strategies has a positive direct influence on sustainable business development

Hypothesis 3 (H3): Waste material sustainability strategy management has a direct and positive influence on the BCG Model

Hypothesis 4 (H4) 1.): Sustainable business development There is a positive direct influence on the BCG Model

Hypothesis 5 (H5): The BCG Model has a positive direct influence on performance

Hypothesis 6 (H6): Sustainable business development It indirectly has a positive impact on operating results by influencing it through the BCG Model

Hypothesis 7 (H7): Sustainable business development Indirectly and positively affecting Performance through the BCG Model

Hypothesis 8 (H8): Sustainable business development Indirectly, positively impacts performance through waste material sustainability strategy management

Hypothesis 9 (H9): Managing waste material sustainability strategies Through sustainable business development and the BCG Model, it indirectly has a positive impact on performance
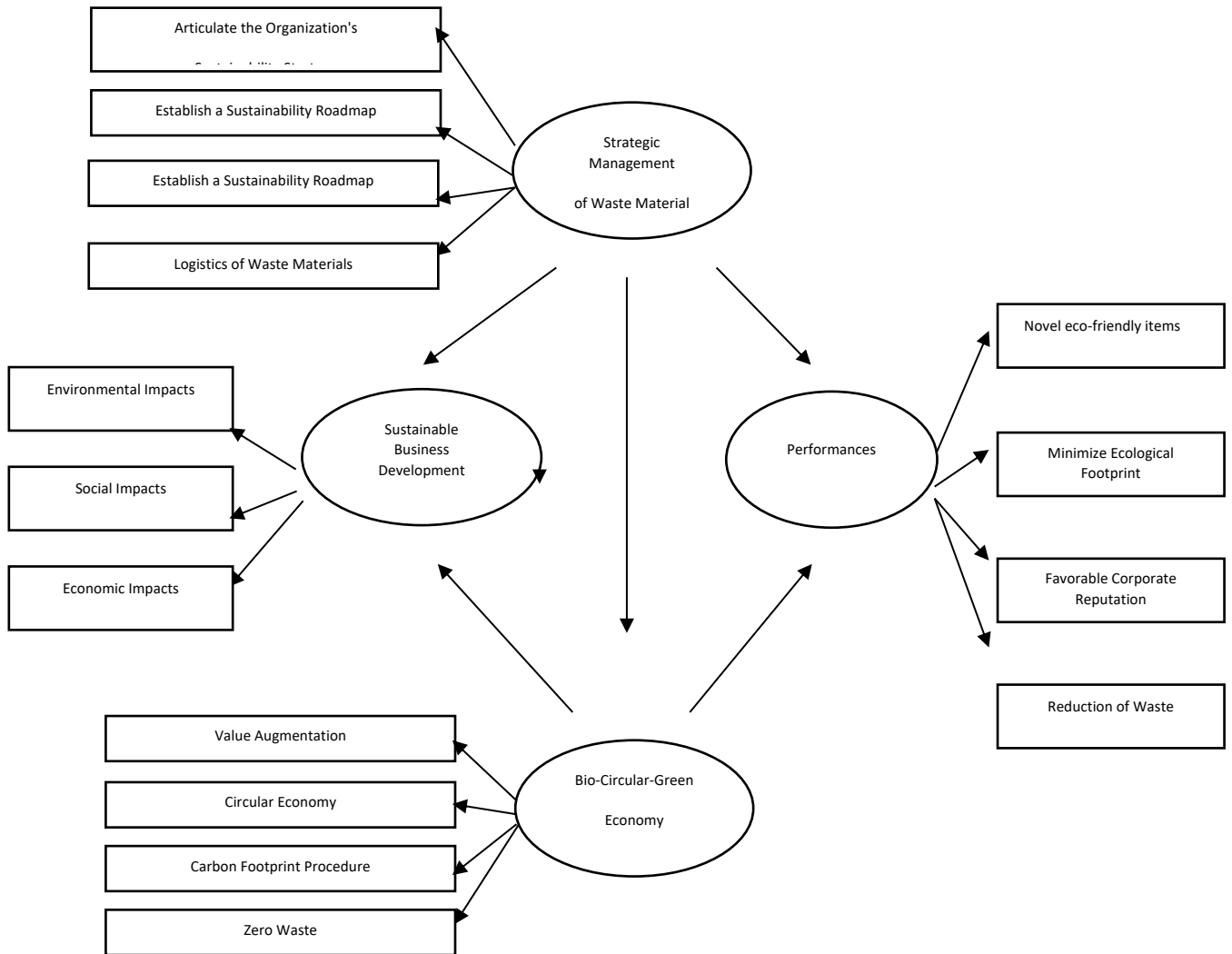
Figure 3 Research Conceptual Framework

4. Research Methodology

Investigation into the Strategic Management of Sustainability, BCG Framework: Byproducts of Tobacco Manufacturing, Tobacco Authority of Thailand, Phra Nakhon Si Ayutthaya I have examined the topic of This study employs a Mixed Methods Research approach, incorporating Quantitative Research through Structural Equation Modeling (SEM) to examine the causal relationships within the research model and TOWS Matrix, followed by qualitative research via in-depth interviews to facilitate content analysis that corroborates the quantitative findings. Consequently, to attain outcomes that align with the objectives of this research. The

researcher established the methodology for executing the research at each phase. The research process commences with the quantitative research approach, which gathers data through a questionnaire and subsequently employs statistical analysis to conduct an in-depth interview, adhering to the principles of qualitative research. To guarantee the accuracy of the responses by verifying the coherence of the content in relation to the questionnaire and its alignment with the information gathered from the interviews.

Quantitative research

Total staff count at the Thailand Tobacco Monopoly, Rojana Industrial Estate, Uthai District.Uthai, Phra Nakhon Si Ayutthaya ProvinceIn Phra Nakhon Si Ayutthaya, a total of 991 individuals were considered, from which a sample group of 597 was selected from the Office of Quality, Safety, and Environment, the Procurement and Inventory Management Department, the Leaf Production Department, and the Finished Product Production Department, utilizing an overall sample size of 380 individuals.

Qualitative research

In qualitative research, the researcher employed a purposive sample strategy to perform in-depth interviews with nine important informants. Cresswell (2018) suggests that focus group participants for studies concerning phenomenon description should consist of 3 to 10 individuals. This study utilized triangulation to juxtapose research findings from several sources and perspectives to validate the legitimacy and accuracy of the data or results.

Research operation procedures

This research's operational processes are structured into four distinct phases as outlined below:

Phase 1: Examination of Issues, Review of Literature, and Analysis of Problems

The researcher investigated the issue by interviewing production personnel at the Rojana Industrial Estate tobacco factory to comprehend the underlying problems and collect data on the management of tobacco production waste. The researcher also examined literature from research articles and academic papers to investigate pertinent concepts and theories from journals, books, and websites. The researcher sought information from studies published in the past decade from the Digital Research Information Center of the National Research Council of Thailand National Research Management System (website: https://www.nrms.go.th) and the digital library database of Suan Sunandha Rajabhat University (website: www.library.ssru.ac.th)

Phase 2: Formulate the research conceptual framework and execute the research.

The researcher examined relevant literature from related papers to synthesis the study variables and develop a conceptual framework to address the research topic. The conceptual framework comprises four primary components (latent variables), thirteen observable variables, and one hundred six sub-variables (of the observable variables).

Phase 3: Create research instruments, gather data, and conduct data analysis.

- The researcher has developed two categories of research instruments, specifically

1. The questionnaire was developed by synthesizing information from the literature review and summarizing the definitions of the research variables, incorporating factual data from the Rojana Industrial Estate tobacco producing facility.Uthai District, Ayutthaya ProvincePhra Nakhon Si Ayutthaya

2. Interview: This research initially disseminated a questionnaire, followed by a statistical summary and analysis of the findings. The findings from the study of components exhibiting the highest average values, along with the three most significant sub-variables of each component, were utilized to formulate an interview for comprehensive discussions. The researcher developed the questionnaire and submitted it to the adviser, subsequently having five experts assess and evaluate the instrument's quality using the Index of Item Objective Congruence (IOC), which must achieve a threshold of IOC >= 0.6.

The questionnaire's reliability was evaluated by administering it to 30 respondents outside the sample group. The collected data were subsequently utilized to assess the instrument's quality through the Cronbach's alpha coefficient, which must satisfy the reliability threshold of 0.70.

- Finalize the questionnaire and utilize it to get data from the sample group.

- Execute structured interviews that correspond with the top three questions from the questionnaire exhibiting the highest average scores, subsequently utilizing them to gather data from important informants.

Phase 4: Synthesizing and Analyzing the Research Outcomes

The researcher gathered data using questionnaires and interviews, then doing statistical and content analyses. The research results were encapsulated and analyzed. The findings will be disseminated in two formats: as an academic article at an international conference and as a research article in a TCI Group 1 publication.

5. Research Results and Discussion

Summary of research results

Strategic sustainability management, BCG framework, scraps from tobacco production: Tobacco Authority of Thailand, Phra Nakhon Si Ayutthaya Province. The researcher has collected data to address the objectives and research questions, stated in the subsequent order:

The study on the strategic management of sustainability, the BCG framework, and scraps from tobacco production by the Tobacco Authority of Thailand in Phra Nakhon Si Ayutthaya Province requires to solve issues, formulate strategies for waste elimination and management, thereby decreasing the amount of waste and minimizing multiple kinds of pollution. A multitude of techniques exists. An approach utilized in the research may enhance the economic value of waste materials obtained during production.

The objective is to modify Downcycle to optimize resource utility and enhance benefits through sustainability techniques aligned with the BCG (Bio-Circular-Green Economy) framework. Waste materials are utilized to manufacture new goods, enhancing processing operations, hence increasing revenue, minimizing waste, and achieving zero waste (Zero Waste). Generating value from waste materials necessitates a systematic approach to choosing and testing these materials, utilizing manufacturing byproducts, while simultaneously implementing sustainability initiatives incrementally and employing innovative thinking. Until the creation of innovative goods derived from tobacco industry waste materials.

The researchers have conducted experiments and evaluations on several waste materials, ultimately selecting those appropriate for the production of new items, including rolling papers, tobacco dust or leaves, and assorted waste papers. The design emphasizes functionality and minimizes waste. Products derived from waste materials must be practical and undergo quality testing to some degree, thereby enhancing the value of new products. This involves processing waste from tobacco production and identifying market opportunities to

generate sustainable income for the Tobacco Authority of Thailand. It can also play a significant role in minimizing waste materials, a primary contributor to pollution in the country today.

The research findings on the strategic management of waste material sustainability, obtained through interviews and questionnaires, are presented in relation to the research objectives, perspectives on strategic sustainability management, strategy impacts, sustainable business development, the BCG Model, and the proposal of a strategic management model for sustainability. The academics and their colleagues have developed a sustainability strategy for the Tobacco Authority of Thailand aimed at generating new products from tobacco production waste, minimizing waste, enhancing revenue, and fostering a positive atmosphere. To attain sustainable management, it might be marketed to create revenue for the community. The research engaged with government agencies and state enterprises to identify distribution channels and generate cash for the community.

This study examined the sustainability strategy for tobacco production waste utilizing the main search terms: Sustainable Strategic Management, Tobacco Waste Materials, Bio-Circular-Green Economy, and Performance. To establish a strategic management system for the recycling and reuse of waste materials from tobacco production, with the objective of identifying management indicators and strategic recommendations to enhance future management efficiency. The research findings indicate that the Tobacco Authority of Thailand generates approximately 1,000 tons of tobacco producing waste.

Furthermore, the Tobacco Authority of Thailand has yet to implement recycling for many forms of tobacco production waste, including rolling paper, filter remnants, and tobacco dust. Consequently, the category of recycling may be. The variability is contingent upon the type of waste material, the recycling operators, and market demand. Regarding the recycling of production waste materials.

Tobacco encompasses greasy paper from Thai Airways kitchens, transparent materials in dolls, and natural insect repellent sprays, among others. Moreover, wastewater generated during production can be recovered and repurposed in tobacco manufacturing.

The researchers discovered that the integration of strategic management can provide additional value for new goods derived from sustainable tobacco waste materials. It must incorporate the concept of a circular economy. It can also produce revenue to enhance the organization's reputation. Integration of tobacco production or processing, strategy development, and distribution, which may be extended to domestic sales and additional exportation.

6. Recommendations (If Applicable)

Recommendations for implementing research findings

The researchers offer recommendations for utilizing the findings of this study in comprehensive analytical data, highlighting the potential applications of tobacco waste materials across various domains, including reuse for consumption, manufacturing, and agriculture.

7. Acknowledgments

Researchers in waste management should prioritize the safety of the producer or processor while dealing with waste and waste products to ensure environmental sustainability. Furthermore, the study's scope must explicitly delineate the sort of output to be generated.

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Factors Influencing Customer Online Purchase Intention of Clothing Products on E-Commerce

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Abstract

This research aims 1) to explore the level of factors influencing customer online purchase intention of clothing products on e-commerce and 2) to analyze factors influencing customer online purchase intention of clothing products on e-commerce. This research employed a quantitative research methodology, with 400 questionnaires responded to customers who make purchases both in-store and through digital marketing channels established by the researchers. Descriptive analysis and multiple regression analysis were conducted using a statistical package program for data analysis.

Results exploring the level of factors influencing customer online purchase intentions showed that multiple factors significantly impact online purchase intention for clothing products on e-commerce platforms. Website usability was identified as the most influential factor, emphasizing the importance of a seamless shopping experience. Trust in the platform, shipping and return policies, and perceived product quality also play essential roles, highlighting consumers' needs for security, convenience, and assurance. Price sensitivity, brand image, and customer reviews were also found to influence purchase intention, underscoring the importance of value, reputation, and social proof. The results of the analysis of factors Influencing customer online purchase intention suggest that e-commerce businesses should prioritize user-friendly design, trust-building measures, reliable logistics, and customer engagement to enhance purchase intention.

Keywords: clothing; consumer behavior; E-commerce; online purchase intention

1. Introduction

In recent years, China has rapidly developed into one of the largest and most dynamic e-commerce markets globally. By December 2022, the country had reached 845 million online shoppers, representing 79.2% of its internet-using population (China Internet Network Information Center, 2022). Major e-commerce platforms such as Taobao, JD.com, and Pinduoduo dominate the market, offering a vast array of products from daily essentials to luxury items, meeting nearly all consumer needs. This growth has been fueled by continuous innovations in online shopping experiences, with features like live-stream shopping and cross-border e-commerce achieving remarkable success (Zhang & Zhang, 2021). Consequently, online shopping has become embedded in Chinese consumers' lifestyles, fostering intense competition among e-commerce platforms. To attract and retain consumers, these platforms are constantly evolving, launching new promotional strategies, enhancing user interfaces, and introducing diverse services (McKinsey & Company, 2021).

Within this e-commerce ecosystem, clothing has emerged as a significant category, highly impacted by the shift toward online shopping. The apparel sector has adapted swiftly, with many clothing brands expanding their presence on digital platforms to capitalize on the convenience of online shopping (Xu & Chen, 2020). By 2022, online apparel purchases accounted for 62.0% of total apparel consumption in China, signaling a notable shift in consumer preferences from in-store fitting rooms to virtual shopping carts (iResearch Global, 2022). This transition is influenced not only by the convenience of e-commerce but also by a growing consumer demand for fashion, quality, and personalized products. With increased access to global trends and information, Chinese consumers are more discerning and informed, leading apparel brands to innovate continuously to meet rising expectations and preferences (KPMG, 2021).

Despite extensive research on e-commerce design and its effects on consumer purchase intentions, studies focusing specifically on the clothing category remain limited. Clothing possesses unique attributes, including a wide range of sizes, materials, and styles that significantly impact purchasing behavior (Cai & Cude, 2021). Furthermore, the online shopping environment eliminates the tactile experience of in-store shopping, which increases consumer uncertainty and affects purchase decisions in the apparel category differently than in other product segments (Xu & Chen, 2020). As a result, online clothing retailers face the challenge of addressing these unique consumer concerns and designing effective interfaces that can mitigate uncertainties, enhance trust, and increase purchase intentions. Addressing these design requirements is essential for e-commerce platforms to remain competitive and successful in the clothing market. Lin & Qu (2019) found in their study on website design and its influence on consumers' intention to purchase clothing that visual design, navigation design, information design, interaction design, perceived stimuli, and trust all positively affect consumer online purchase intentions for clothing. Based on the findings of Lin & Qu (2019) and incorporating insights from other scholars, this study further analyzes and summarizes the factors on e-commerce platforms that influence consumers' intentions to purchase clothing products online. This study aims to bridge this gap by examining the specific factors in e-commerce design that influence online clothing purchase intentions, contributing valuable insights to the field of online apparel retail.

2. Research Objectives

1) To explore the level of factors influencing customer online purchase intention of clothing products on e-commerce

2) To analyze factors Influencing customer online purchase intention of clothing products on e-commerce
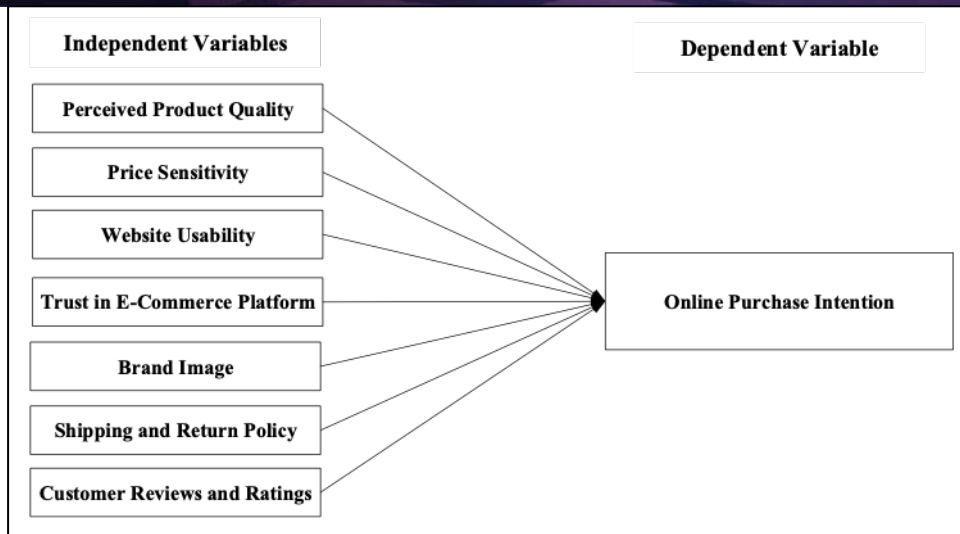
Figure 1 Research Framework

3. Research Hypotheses

H1: Perceived product quality has a positive impact on online purchase intention

H2: Price sensitivity has a positive impact on online purchase intention

H3: Website usability has a positive impact on online purchase intention

H4: Trust in e-commerce platform has a positive impact on online purchase intention

H5: Brand image has a positive impact on online purchase intention

H6: The shipping and return policy has a positive impact on online purchase intention

H7: Customer reviews and ratings have a positive impact on online purchase intention

4. Research Methodology

This study investigates the factors influencing customers' online purchase intention for clothing products on e-commerce platforms. A quantitative research methodology was employed to understand consumer behavior in the digital clothing market (Sekaran & Bougie, 2016). The study targeted a diverse population of online shoppers, with a sample of 400 respondents selected. This study focuses on Nanning City, the capital of the Guangxi Zhuang Autonomous Region in China, and employs a combination of online and offline methods to conduct a random sampling survey across the entire city. Data was gathered through a structured questionnaire distributed to consumers actively purchasing clothing online. Research instruments were developed based on expert insights, validated using the IOC index, and checked for reliability using Cronbach's alpha with a pilot group (Nunnally & Bernstein, 1994).

Data analysis utilized both descriptive and inferential statistics to examine the impact of various factors on customers' online purchase intention for clothing products on e-commerce platforms. Descriptive statistics provided means and standard deviations to summarize the data, while inferential statistics, particularly multiple regression analysis, evaluated the relationships between specific factors and online purchase intention (Hair et al., 2010). This approach also considered variables such as perceived usefulness and ease of use, which are central to technology acceptance (Davis, 1989), and the role of information trustworthiness in customer adoption behaviors (Hsu & Lin, 2016).

5. Research Results and Discussion

    5.1 Results

Table 1 Respondents' Characteristics

Variables		n	%
Gender			
	Male	169	42.25
	Female	231	57.75
	Total	400	100
Age			
	18 – 20 years	125	31.25
	21-30 years	239	59.75
	31-40 years	25	6.25
	41-50 years	10	2.25
	Above 50 years	1	0.50
	Total	400	100
Education level			
	High school and below	256	64.00
	Graduate	122	30.50
	Post-graduate	22	5.50
	Total	400	100

From Table 1, the general information of the respondents is as follows

The descriptive statistics was aimed at evaluating the demographic characteristics of the respondents. The factors evaluated were gender, age and education level of the respondents. The results presented in table below indicates that female was the majority represented by 57.75% while male was the least represented by 42.25%. Regarding gender, the largest age group among respondents was those aged 21-30 years (59.75%), followed by those aged 18-20 years (31.25%). Smaller percentages are represented by respondents aged 31-40 years (6.25%), 41-50 years (2.25%), and over 50 years (0.50%). Categories education level of high school or below (64.00%), while a notable portion is graduates (30.50%). A smaller percentage hold post-graduate degree (5.50%).

From Table 2, it is evident that the factor with the highest mean score is Perceived Product Quality (Mean = 3.82, S.D. = 1.286), Price Sensitivity (Mean = 3.82, S.D. = 1.068), and Online Purchase Intention (Mean = 3.82, S.D. = 1.314), all of which are at a high level. This indicates that consumers prioritize product quality, their price sensitivity, and their willingness to make purchases when considering online shopping, reflecting the significant impact of these factors on their attitudes and decision-making.

Following these, Brand Image (Mean = 3.81, S.D. = 1.043) and Shipping and Return Policy (Mean = 3.81, S.D. = 1.046) also scored at high level, showing that the reputation of the brand and the efficiency of the shipping and return policy are crucial in building consumer trust and satisfaction.

Additionally, Website Usability (Mean = 3.80, S.D. = 1.055), Trust in the E-Commerce Platform (Mean = 3.80, S.D. = 1.043), and Customer Reviews and Ratings (Mean = 3.80, S.D. = 1.037) were observed to be at a high level as well. These factors emphasize the importance of a user-friendly interface, consumer trust in the platform's security and reliability, and the influence of peer feedback on consumer behavior.

Overall, the results indicate that Perceived Product Quality, Price Sensitivity, and Online Purchase Intention are the most significant factors perceived by consumers, followed closely by Brand Image, Shipping and Return Policy, Website Usability, Trust in the Platform, and Customer Reviews and Ratings. This underscores the multifaceted nature of online shopping experiences, where product reliability, trust, ease of use, and consumer feedback collectively shape consumer attitudes and intentions.

Table 2 shows the mean and standard deviation of Total.

Total variables	$\overline{X}$	S.D.	MIN	MAX	Mean Interpretation Criteria
Perceived Product Quality	3.82	1.286	1.00	5	high level
Price Sensitivity	3.82	1.068	1.20	5	high level
Website Usability	3.80	1.055	1.40	5	high level
Trust in E-Commerce Platform	3.80	1.043	1.20	5	high level
Brand Image	3.81	1.043	1.40	5	high level
Shipping and Return Policy	3.81	1.046	1.2	5	high level

Total variables	$\overline{X}$	S.D.	MIN	MAX	Mean Interpretation Criteria
Customer Reviews and Ratings	3.80	1.037	1.0	5	high level
Online Purchase Intention	3.82	1.314	1	5	high level

Table 3 shows the results of the analysis of the regression coefficient

Model	Unstandardized Coefficients		Standardized Coefficients Beta	t	Sig.	Collinearity Statistics	
	B	Std. Error				Tolerance	VIF
(Constant)	0.383	0.192		1.994	0.047		
Perceived Product Quality	0.116	0.051	0.115	2.248	0.025	.210	4.76
Price Sensitivity	0.104	0.049	0.104	2.124	0.034	.211	4.73
Website Usability	0.166	0.050	0.164	3.310	0.001	.230	4.341
Trust in E-Commerce Platform	0.150	0.050	0.147	2.993	0.003	.223	4.49
Brand Image	0.112	0.051	0.110	2.212	0.028	.217	4.07
Shipping and Return Policy	0.144	0.052	0.141	2.784	0.006	.182	5.491
Customer Reviews and Ratings	0.107	0.054	0.104	1.977	0.049	.234	4.760

$R^2 = 0.760$, *P< .05, ***P< .01

From Table 3, The results of the analysis of the regression coefficient Perceived Product Quality, Price Sensitivity, Website Usability, Trust in E-Commerce Platform, Brand Image, Shipping and Return Policy, Online Purchase Intention (Y)

The analysis in Table 3 presents the regression coefficients showing how independent variables influence the dependent variable. The overall model has an R^2 value of 0.760, indicating that approximately 76% of the variance in the dependent variable is explained by the independent variables. The key findings are as follows:

Website Usability emerged as the strongest predictor of online purchase intention ($\beta = 0.164$, p = 0.001), suggesting that a one-unit improvement in website usability could increase purchase intention by 16.4%, while controlling for other factors. This finding emphasizes that e-commerce platforms should prioritize user-friendly interface design to enhance customer engagement and sales.

Trust in the E-Commerce Platform follows ($\beta = 0.147$, p = 0.003), suggesting that consumer trust in platform security and reliability is important, enhancing trust in the e-commerce platform by one unit is associated with a substantial 14.7% boost in the likelihood of customers making a purchase, all other factors

being equal. This result suggests that e-commerce platforms should focus on improving user trust to increase user transactions.

Shipping and Return Policy also has a notable effect (β = 0.141, p = 0.006), emphasizing the significance of clear and reliable shipping/return processes. This relationship indicates that a one-unit increase in website usability is linked to a 14.1% increase in the intention to purchase, controlling for other variables. It can be seen that improving the convenience of shipping and return policies can attract more users to choose.

Perceived Product Quality has a positive impact (β = 0.115, p = 0.025), indicating that product quality affects consumer behavior. This implies that for each one-unit enhancement in perceived product quality, there is an 11.5% increase in the intention to purchase, holding other variables constant. This result highlights that high-quality products are more likely to attract and retain customers, influencing their buying behavior.

Price Sensitivity shows a Beta of 0.104 (p = 0.034), with a significant impact, highlighting the role of price in consumer decisions. This highlights that a one-unit change in price sensitivity could influence a 10.4% change in the likelihood of making a purchase, while accounting for other variables. indicates that price competitiveness is a key determinant in customer purchase intention.

Brand Image has a Beta of 0.110 (p = 0.028), with a significant effect, underscoring its importance in shaping consumer perceptions, which indicates that a one-unit improvement in brand image could lead to an 11% increase in the intention to purchase, controlling for other factors. The data emphasizes that a strong brand image can enhance consumer loyalty and drive purchase intentions.

Customer Reviews and Ratings with a marginally significant impact of online purchase intention (β = 0.104, p = 0.049), suggests that a one-unit increase in the influence of customer reviews and ratings could result in a 10.4% increase in the propensity for customers to make a purchase, while considering other factors. This finding showing that consumer feedback contributes to decision-making. This finding reveals that social proof, in the form of reviews and ratings, plays a role in building trust and influencing consumer behavior towards purchases.

Collinearity statistics indicate that all variables have acceptable tolerance values and VIFs below 10, suggesting no multicollinearity issues.

In summary, Website Usability, Trust in the Platform, and Shipping and Return Policy are the most influential factors affecting the dependent variable, with Perceived Product Quality, Price Sensitivity, Brand Image, and Customer Reviews and Ratings also playing significant roles.

Y=0.383+0.116(X1)+0.104(X2)+0.166(X3)+0.150(X4)+0.112(X5)+0.144(X6)+0.107(X7)

Based on the results of the rational analysis above, we can further verify whether the hypotheses of this paper, H1, H2, H3, H4, H5, H6, H7 are valid, as shown in Figure 4.

Table 4 Summary table of study hypothesis validation results

number	research hypothesis	conclusion
H1	Perceived Product Quality has a positive impact on Online Purchase Intention	Accepted
H2	Price Sensitivity has a positive impact on Online Purchase Intention	Accepted

number	research hypothesis	conclusion
H3	Website Usability has a positive impact on Online Purchase Intention	Accepted
H4	Trust in E-Commerce Platform has a positive impact on Online Purchase Intention	Accepted
H5	Brand Image has a positive impact on Online Purchase Intention	Accepted
H6	Shipping and Return Policy has a positive impact on Online Purchase Intention	Accepted
H7	Customer Reviews and Ratings have a positive impact on Online Purchase Intention	Accepted

5.2 Discussion

The results of this study provide significant insights into the factors influencing online purchase intention for clothing products on e-commerce platforms. The findings indicate that various factors—namely, website usability, trust in the e-commerce platform, shipping and return policy, perceived product quality, price sensitivity, brand image, and customer reviews and ratings—positively impact consumer purchase behavior. These findings are consistent with previous literature and contribute to a more comprehensive understanding of consumer behavior in the digital apparel market.

Website Usability emerged as the most influential factor with a standardized coefficient Beta of 0.164, emphasizing the importance of a seamless and user-friendly online shopping experience. This result aligns with Davis's (1989) Technology Acceptance Model, which posits that perceived ease of use significantly affects user acceptance of technology. Improved website usability enhances the overall shopping experience, reduces consumer effort, and fosters positive attitudes toward purchasing, as demonstrated by similar findings in studies by Hsu and Lin (2016) and Li et al. (2020). Additionally, the significance of user-friendly interfaces is reflected in broader e-commerce trends observed by Muangmee et al. (2021), who found that ease of use and interface quality play a crucial role in consumer behavioral intentions for food delivery apps, especially during the COVID-19 pandemic.

Trust in the E-Commerce Platform was also found to be a significant predictor of purchase intention (Beta = 0.147). Trust plays a critical role in mitigating consumer concerns related to online transactions, such as data security and fraud. This outcome is consistent with research by Gefen et al. (2003), which highlights that consumer trust is essential for reducing perceived risk and fostering positive attitudes toward e-commerce. Muangmee (2019) emphasized the importance of building trust through sustainable strategies, which can be paralleled in the digital context to strengthen trust in e-commerce.

Shipping and Return Policy had a notable impact with a Beta of 0.141, showing that flexible and reliable shipping and return options are important for consumers when purchasing clothing online. This finding echoes the work of Xu and Chen (2020), who found that logistical convenience directly influences consumer satisfaction and purchase intention. Clear return policies provide reassurance and reduce perceived risks, contributing to consumer confidence in making purchases. This aligns with Muangmee (2020), who discussed the need for

operational efficiency in tourism, which can be extended to shipping and return practices in e-commerce for customer satisfaction.

Perceived Product Quality (Beta = 0.115) was another significant factor. This aligns with the study by Cai and Cude (2021), which suggested that product quality is a primary concern for consumers, particularly in categories where physical examination is impossible. High perceived product quality reduces the uncertainty associated with online shopping and increases the likelihood of purchase. This concept of quality assurance is mirrored in Muangmee et al. (2021), where product quality in the context of food delivery was critical for user satisfaction and repeat use.

Price Sensitivity (Beta = 0.104) was found to have a positive impact on purchase intention. This supports the findings of Chen et al. (2019), who noted that competitive pricing strategies are vital in attracting price-conscious consumers. The significant role of price sensitivity emphasizes that consumers actively seek value for money and are influenced by pricing when making online purchases. Muangmee et al. (2021) also noted that affordability and pricing structures influence consumer decision-making in digital commerce.

Brand Image (Beta = 0.110) also positively influenced purchase intention, confirming the results of prior research by Kim et al. (2013), which found that a strong brand image enhances consumer perceptions and trust, ultimately leading to higher purchase intention. Brand reputation reassures consumers about product quality and reliability, a point reflected in Muangmee's (2020) study on branding and strategic image building in the context of sustainable tourism.

Lastly, Customer Reviews and Ratings (Beta = 0.104) showed a marginally significant impact, consistent with the findings of Filieri et al. (2018), which demonstrated that user-generated content serves as social proof and reduces information asymmetry, thereby influencing purchase decisions. Positive reviews and ratings help alleviate consumer uncertainty and build confidence in the purchase process. This observation is in line with the work of Muangmee et al. (2021), who pointed out the impact of peer reviews and feedback on user behavior in the context of digital platforms.

Overall, these findings highlight the multifaceted nature of online shopping experiences, where usability, trust, quality, pricing, brand perception, and customer feedback collectively shape consumer attitudes and intentions. This study contributes to the existing body of knowledge by reinforcing the importance of these factors and providing actionable insights for e-commerce businesses aiming to enhance their strategies and engage consumers effectively.

5.3 Conclusion

This study concludes that multiple factors significantly influence online purchase intention for clothing products on e-commerce platforms. Website usability emerged as the most impactful, highlighting the importance of seamless, user-friendly shopping experiences. Trust in the platform, shipping and return policies, and perceived product quality also play crucial roles, reflecting consumers' need for security, convenience, and assurance in their purchases. Price sensitivity, brand image, and customer reviews further shape consumer behavior, underlining the importance of value, reputation, and social proof. These insights reinforce that e-commerce businesses must focus on enhancing usability, trust, product information, and customer interaction to foster consumer engagement and drive purchase intention.

5.4 Future Researches

Future studies could explore cultural differences and demographic influences in online shopping behavior to provide tailored recommendations across diverse consumer segments. These insights can help platforms refine strategies to better cater to customer preferences in specific market contexts.

6. Recommendations

Based on the research findings, several recommendations are suggested to enhance online purchase intention for clothing products on e-commerce platforms:

In terms of user experience, E-commerce platforms should focus on website usability: Website usability has a significant impact on user purchase intention, it is crucial to maintain an intuitive and user-friendly interface. Regular updates to improve navigation, search functions, and mobile compatibility can enhance the overall shopping experience.

In terms of products, platforms and merchants should implement competitive pricing strategies: Given the impact of price sensitivity, e-commerce platforms should employ dynamic pricing, discounts, and loyalty programs tailored to attract price-sensitive customers, especially in highly competitive clothing markets.

In terms of services, platforms should enhance trust-building mechanisms and optimize shipping and return policies: E-commerce platforms should prioritize robust security measures and clear privacy policies to foster consumer trust, which emerged as the most influential factor. This can include transparent communication on data protection and secure payment options. Flexible return policies and fast, reliable shipping options are recommended to reduce purchase risks. Clear, customer-friendly return policies tailored for clothing purchases, where fit is subjective, can improve customer satisfaction.

In terms of content, platforms and merchants should strengthen brand image and leverage customer reviews and ratings: Platforms can work with clothing brands to develop strong, recognizable images through consistent branding efforts. Partnerships with reputable brands and ensuring product quality can enhance brand credibility and customer trust. Platforms should encourage user-generated content, such as reviews and ratings, to boost credibility. Featuring verified reviews and incorporating rating summaries can help potential buyers make informed decisions.

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The Influence of Perceived Risk Factors on Consumer Attitude Towards Online Shopping

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Abstract

This research aims to 1) explore the level of the influence of perceived risk factors on consumer attitude towards online shopping and 2) analyze the influence of perceived risk factors on consumer attitude towards online shopping. This research employed a quantitative research methodology. 400 questionnaires responded to by Thai consumers who actively shop online were selected through stratified random sampling. Descriptive analysis and multiple linear regression analysis were conducted using a statistical package program for data analysis.

The results showed the significant influence of perceived risk factors on consumer attitudes toward online shopping in Thailand, with financial risk, product performance risk, privacy risk, time risk, and delivery risk showing statistically significant positive impacts ($R^2 = 0.710$). Among these, product performance risk demonstrated the strongest influence (B = 0.233, Beta = 0.452, $p < .001$), emphasizing consumer concerns over product reliability. Delivery risk had the highest unstandardized coefficient (B = 0.275, $p < .001$), highlighting the importance of dependable logistics. Financial risk (B = 0.260, p = .001) and privacy risk (B = 0.226, p = .002) underscored concerns over financial security and data protection, while time risk (B = 0.217, $p < .001$) reflected the impact of delays and complex return processes.

Keywords: e-commerce; consumer attitude; online shopping; perceived risk

1. Introduction

The rapid expansion of online shopping has transformed the retail landscape in Thailand, providing consumers with unmatched convenience, a diverse range of product choices, and the ability to easily compare prices and reviews. Despite these advantages, the perceived risks associated with online shopping continue to present significant challenges. These perceived risks encompass uncertainties about potential negative outcomes that consumers associate with online transactions, impacting their attitudes toward online shopping. Understanding these risks is crucial for businesses aiming to foster trust and improve consumer engagement with their e-commerce platforms (Nguyen et al., 2020).

Among these risks, financial risk is one of the most pressing concerns for Thai consumers. Issues such as potential monetary loss, fraudulent transactions, or not receiving the purchased product as expected contribute to consumer hesitancy and negative perceptions of online shopping (Katta & Patro, 2021). Additionally, product performance risk exacerbates consumer apprehension, especially when there are doubts about whether the product will meet its advertised quality or specifications. The inability to physically inspect products before purchase amplifies these concerns (Trivedi & Yadav, 2022).

Privacy risk is another critical factor influencing consumer attitudes. In an era where data privacy concerns are heightened, Thai consumers, like their counterparts globally, fear the misuse or vulnerability of their personal and financial information (Kesharwani & Tripathy, 2020). Reports of cybersecurity lapses on some platforms have heightened these concerns. Furthermore, time risk, related to delivery delays or cumbersome return processes, diminishes consumer confidence. In Thailand, where the reliability of delivery services may vary, such risks can be significant deterrents (Jin & Lim, 2022).

Delivery risk, involving the possibility of items being lost, damaged, or delayed, adds another layer of uncertainty for consumers. Past experiences or knowledge of such delivery issues can negatively influence consumers' willingness to continue shopping online (Trivedi & Yadav, 2022). These perceived risks collectively shape consumer attitudes, impacting whether they view online shopping as a convenient, positive experience or a risky and unreliable option.

This study aims to investigate how these perceived risk factors—financial, product performance, privacy, time, and delivery risks—affect consumer attitudes toward online shopping in Thailand. Addressing these research problems is crucial for businesses that seek to mitigate consumer concerns and build trust. By identifying the specific risks that most impact consumer attitudes, e-commerce businesses can develop targeted strategies to reduce these risks and improve the overall online shopping experience. This, in turn, can enhance consumer confidence and encourage sustainable growth in the Thai e-commerce sector.

2. Research Objectives

1) To explore the level of the influence of perceived risk factors on consumer attitude towards online shopping

2) To analyze the influence of perceived risk factors on consumer attitude towards online shopping
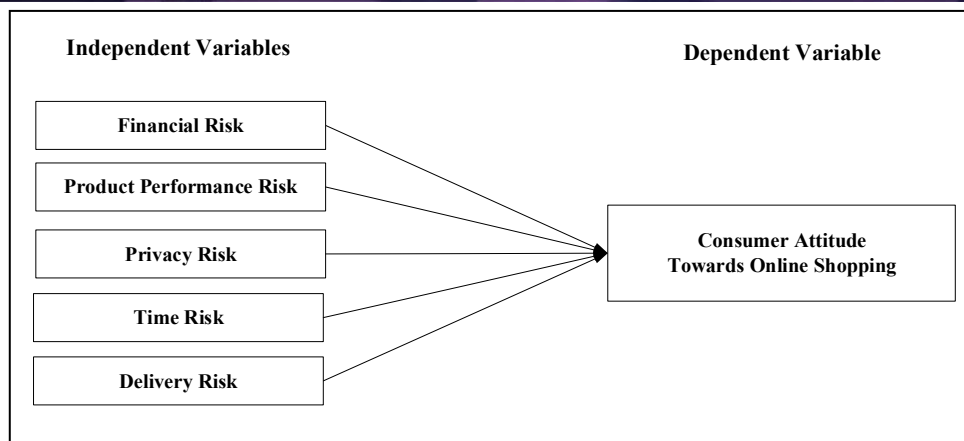
Figure 1 Research Framework

3. Research Hypotheses

H1: Financial Risk has a positive impact on Consumer Attitude towards Online Shopping

H2: Product Performance Risk has a positive impact on Consumer Attitude Towards Online Shopping

H3: Privacy Risk has a positive impact on Consumer Attitude Towards Online Shopping

H4: Time Risk has a positive impact on Consumer Attitude Towards Online Shopping

H5: Delivery Risk has a positive impact on Consumer Attitude Towards Online Shopping

4. Research Methodology

This study investigates the influence of perceived risk factors on consumer attitudes toward online shopping in Thailand. A quantitative research approach was adopted to gather comprehensive data and analyze the relationships between specific risk factors and consumer attitudes. The study focused on five main perceived risk factors: financial risk, product performance risk, privacy risk, time risk, and delivery risk.

Sample and Data Collection of Thai consumers who actively engaged in online shopping. Stratified random sampling was employed to ensure a representative sample of 400 Thai online shoppers, reflecting key demographic characteristics such as age, gender, and online shopping experience. The population was divided into strata based on categories such as age groups (e.g., 18–25, 26–35), gender, and shopping frequency (low, medium, high). A proportional allocation method ensured that each stratum was represented according to its proportion within the population. Respondents were then randomly selected within each group using a random number generator, minimizing bias. This approach enhanced the diversity and representativeness of the sample, enabling a more accurate analysis of how different demographics perceive risks and form attitudes toward online shopping. Data collection was conducted through a structured online questionnaire tailored to measure consumer perceptions and attitudes toward online shopping (Creswell & Creswell, 2018; Taherdoost, 2016; Etikan et al., 2016).

Research Instrument: The questionnaire was developed based on prior studies and expert input to ensure content validity. Each risk factor was assessed using a set of multiple-item scales, adapted from established research to maintain reliability and accuracy (Kesharwani & Tripathy, 2020; Trivedi & Yadav, 2022). Items were rated on a 5-point Likert scale, ranging from "strongly disagree" to "strongly agree." The instrument was validated using the Item-Objective Congruence (IOC) index, and reliability was confirmed through Cronbach's alpha, with pilot testing conducted on 30 respondents.

Data Analysis: Descriptive statistics, including means and standard deviations, were used to summarize the characteristics of the respondents and their general attitudes toward online shopping. To test the hypotheses and evaluate the relationships between perceived risk factors and consumer attitudes, multiple regression analysis was conducted (Hair et al., 2010). This statistical method helped identify the extent to which each risk factor impacted consumer attitudes and highlighted which variables had the most significant influence.

Control Variables: The study also controlled demographic variables such as age, gender, and online shopping experience to assess their potential moderating effects on the relationship between perceived risk factors and consumer attitudes.

By employing this research methodology, the study aimed to provide comprehensive insights into how perceived risks affect consumer attitudes toward online shopping in Thailand. The findings are expected to guide e-commerce businesses in developing targeted strategies to mitigate consumer concerns, enhance trust, and improve overall user experience in the Thai online market.

5. Research Results and Discussion

5.1. Results

From Table 1, the general information of the respondents is as follows

The demographic analysis of respondents revealed that the majority were female (59.25%, n=237), while males accounted for 40.55% (n=153), indicating a higher female representation. Most respondents were aged 21-30 years (59.75%, n=239), followed by 18-20 years (30.00%, n=120). Smaller groups included those aged 31-40 (5.50%, n=22), 41-50 (2.75%, n=11), and above 50 (2.00%, n=8), suggesting a predominantly young adult sample.

Education-wise, 85.00% (n=340) had completed high school or below, while 34.50% (n=138) held graduate degrees, and 5.50% (n=22) had post-graduate qualifications. This indicates a participant pool mainly with a basic educational background. Overall, the sample was primarily young adults, predominantly female, with most having a high school education or lower. This demographic context is important for interpreting the research findings

Table 1 Respondents' Characteristics

Variables		n	%
Gender			
	Male	153	40.55
	Female	237	59.25
	Total	400	100
Age			
	18 – 20 years	120	30.00
	21-30 years	239	59.75
	31-40 years	22	5.50
	41-50 years	11	2.75
	Above 50 years	8	2.00
	Total	400	100

Variables		n	%
Education level			
	High school and below	340	85.00
	Graduate	138	34.50
	Post-graduate	22	5.50
	Total	400	100

Table 2 shows the mean and standard deviation of Total.

Total variables	$\overline{X}$	S.D.	MIN	MAX	Mean Interpretation Criteria
Financial Risk	3.66	0.66	2.0	5.00	high level
Product Performance Risk	3.82	0.65	2.00	5.00	high level
Privacy Risk	3.66	0.72	2.00	5.00	high level
Time Risk	3.32	0.80	1.00	5.00	moderate level
Delivery Risk	3.18	0.77	1.00	5.00	moderate level
Consumer Attitude Towards Online Shopping	4.02	0.62	2.25	5.00	high level

From table 2, which presents the mean and standard deviation of the variables, the summary is as follows: Consumer Attitude Towards Online Shopping has the highest mean ($\overline{X}$ =4.02) with a standard deviation (S.D. = 0.62), indicating that consumers' attitudes toward online shopping are at a high level.

Product Performance Risk has a mean ($\overline{X}$ =3.82) and a standard deviation (S.D. = 0.65), showing a high level of risk perception regarding product performance.

Financial Risk has a mean ($\overline{X}$ =3.66) and a standard deviation (S.D. = 0.66), suggesting that respondents assess financial risk as high.

Privacy Risk also has a mean ($\overline{X}$ =3.66) with a standard deviation (S.D. = 0.72), indicating that privacy risk is perceived at a high level.

Time Risk has a mean of ($\overline{X}$ =3.32) and a standard deviation (S.D. = 0.80), indicating that it is perceived at a moderate level by respondents.

Delivery Risk has the lowest mean ($\overline{X}$ =3.18) with a standard deviation (S.D. = 0.77), which places it at a moderate level, indicating that respondents do not perceive delivery risk as very high.

Overall, the data shows that consumers perceive high risk in various aspects, except for delivery risk, which is moderate. Their overall attitude toward online shopping remains highly positive

Table 3 The results of the analysis of the regression coefficient Independent Variables affect Dependent Variable.

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	0.247	0.104		.162	.871		
Financial Risk	.260	.033	.094	11.67	.001	.234	4.75

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
Product Performance Risk	.233	.034	.452	9.94	.000	.224	4.54
Privacy Risk	.226	.045	.053	10.33	.002	.236	4.31
Time Risk	.217	.034	.294	7.43	.000	.253	4.55
Delivery Risk	.275	.047	.231	8.29	.000	.257	4.35

R2 = 0.710, *P< .05, ***P< .01

From Table 3 The regression analysis presented in Table 3 highlights the influence of several independent variables on the dependent variable. The overall model has a strong explanatory power, with an R^2 value of 0.710, indicating that 71.0% of the variance in the dependent variable is explained by the independent variables included.

Financial Risk: Shows a significant positive effect on the dependent variable with an unstandardized coefficient (B) of 0.260 and a standardized Beta of 0.094. The t-value is 11.67 (p = .001), indicating statistical significance. Collinearity statistics include a tolerance of 0.234 and a VIF of 4.75.

Product Performance Risk: Exhibits a strong positive impact with a B of 0.233 and a Beta of 0.452. The t-value is 9.94 (p < .001), confirming its significance. Tolerance and VIF values are 0.224 and 4.54, respectively.

Privacy Risk: Has a significant effect with a B of 0.226 and a Beta of 0.053, with a t-value of 10.33 (p = .002). Tolerance and VIF are 0.236 and 4.31, respectively.

Time Risk: Demonstrates a significant positive effect with a B of 0.217 and a Beta of 0.294. The t-value is 7.43 (p < .001), with a tolerance of 0.253 and VIF of 4.55.

Delivery Risk: Has the highest unstandardized coefficient (B) of 0.275 and a Beta of 0.231, indicating a significant impact. The t-value is 8.29 (p < .001), with a tolerance of 0.257 and VIF of 4.35.

Y=0.247+0.260(Financial Risk)+0.233(Product Performance Risk)+0.226(Privacy Risk)+0.217(Time Risk)+0.275(Delivery Risk)

All independent variables (financial risk, product performance risk, privacy risk, time risk, and delivery risk) have a statistically significant impact on the dependent variable, with product performance risk showing the highest standardized impact (Beta = 0.452). The multicollinearity diagnostics (tolerance and VIF values) are within acceptable limits, confirming the validity of the model.

Table 4 Summary table of study hypothesis validation results

number	research hypothesis	conclusion
H1	Financial Risk has a positive impact on Consumer Attitude Towards Online Shopping	Accepted
H2	Product Performance Risk has a positive impact on Consumer Attitude Towards Online Shopping	Accepted
H3	Privacy Risk has a positive impact on Consumer Attitude Towards Online Shopping	Accepted
H4	Time Risk has a positive impact on Consumer Attitude Towards Online Shopping	Accepted

number	research hypothesis	conclusion
H5	Delivery Risk has a positive impact on Consumer Attitude Towards Online Shopping	Accepted

5.2 Discussion:

Discussion of Research Results

The study confirmed the significant influence of perceived risk factors on consumer attitudes toward online shopping in Thailand. The findings indicated that financial risk, product performance risk, privacy risk, time risk, and delivery risk all have statistically significant positive impacts on consumer attitudes.

Financial risk was shown to have a notable positive effect (B = 0.260, p = .001), highlighting consumer concerns over potential financial losses and fraudulent activities. This is in line with research by Katta and Patro (2021), emphasizing the critical role of financial security in online shopping behavior. Muangmee et al. (2021) also found that consumer trust is key in e-commerce, especially when mitigating financial risks. This underscores the need for businesses to implement secure payment systems and transparent financial processes.

Product Performance Risk was one of the strongest influencing factors (B = 0.233, Beta = 0.452, p < .001). This supports the observations by Trivedi and Yadav (2022), who identified the inability to inspect products physically as a primary concern. Enhancing product details, reviews, and clear return policies can build consumer trust in product quality. Meekaewkunchorn et al. (2021) further confirmed that ensuring product reliability is essential for improving consumer perception and sustaining engagement.

Privacy Risk (B = 0.226, p = .002) significantly affected consumer attitudes, reflecting global concerns over data privacy and security. Kesharwani and Tripathy (2020) underscored similar issues, stating that increased consumer awareness regarding data misuse can deter online shopping. The findings align with studies by Wu et al. (2022), which indicated that the implementation of secure platforms directly enhances customer satisfaction. Companies should therefore emphasize robust data protection measures and transparently communicate these measures to consumers.

Time Risk (B = 0.217, p < .001) was also found to be significant, echoing Jin and Lim's (2022) findings that delays in delivery and complicated return processes reduce consumer confidence. Muangmee et al. (2022) discussed the need for efficient logistics and user-friendly return policies to mitigate this type of risk and enhance customer trust.

Delivery Risk had the highest unstandardized coefficient (B = 0.275, p < .001), underscoring its critical role in consumer decision-making. Trivedi and Yadav (2022) highlighted that delivery issues, such as delays or damage, can negatively impact the consumer experience. This is consistent with findings by Yang et al. (2024), which noted the importance of reliable delivery services for sustaining customer loyalty. Partnering with dependable logistics providers and implementing strict quality control measures can help alleviate delivery risk.

Overall Interpretation: The research validated all the proposed hypotheses (H1-H5), demonstrating that perceived risk factors significantly impact consumer attitudes toward online shopping. The high explanatory power of the model (R^2 = 0.710) indicates that these variables collectively explain a substantial portion of the variance in consumer attitudes. The strongest standardized impact was noted for product performance risk (Beta = 0.452), underlining the importance of product reliability.

Implications for Practice: E-commerce platforms should address these perceived risks by strengthening financial security, improving product descriptions, ensuring data protection, streamlining return

policies, and enhancing delivery services. Insights from Meekaewkunchorn et al. (2021) and Muangmee et al. (2021) highlight that strategic interventions targeting these risk factors can significantly boost consumer trust and engagement, fostering long-term growth in the Thai e-commerce sector.

The study sheds light on the multifaceted nature of perceived risks in online shopping and their impact on consumer attitudes. Addressing these risk factors through targeted business strategies can improve consumer engagement, build trust, and promote sustainable growth in Thailand's e-commerce landscape. The integration of findings from related studies by Muangmee et al. (2021, 2022) and other scholars further supports the relevance of these strategies for enhancing the online shopping experience.

5.3 Conclusion

This study confirmed that perceived risk factors—financial, product performance, privacy, time, and delivery risks—significantly impact consumer attitudes toward online shopping in Thailand. Product performance risk was found to have the most substantial effect, emphasizing the importance of product reliability. Financial and privacy concerns also played a critical role in shaping consumer trust. The research suggests that e-commerce businesses need to strengthen payment security, enhance product details and reviews, ensure robust data protection, simplify return policies, and partner with reliable delivery services to address these perceived risks. By implementing these strategies, businesses can foster trust, boost consumer engagement, and support sustainable growth in Thailand's e-commerce sector.

6. Recommendations

Enhance Product Quality and Transparency: Provide detailed product descriptions, high-quality images, customer reviews, and clear return policies to reduce product performance risk and build consumer trust.

Strengthen Financial and Data Security: Implement secure payment systems, multi-factor authentication, data encryption, and transparent privacy policies to mitigate financial and privacy risks.

Optimize Delivery and Returns: Partner with reliable logistics providers and streamline delivery and return processes to minimize time and delivery risks, ensuring timely and safe deliveries with real-time tracking.

Leverage Technology for User Experience: Use AI-driven customer support, predictive logistics, and personalized recommendations to reduce perceived risks and enhance the overall shopping journey.

Foster Transparent Communication and Trust: Maintain proactive, clear communication and obtain trust-building certifications to reassure consumers and promote confidence in online shopping.

These steps can help e-commerce businesses in Thailand address key perceived risks, boost consumer trust, and drive sustainable growth.

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A Model for Supporting Thai Y-Series in the Global Market

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Abstract

The research entitled "Guidelines for Promoting Thai Y-Series to the Global Market was a qualitative study that aimed to: 1) identify the key factors supporting the production of Thai Y-series for international markets, and 2) propose a conceptual model for developing Thai Y-series as a part of the creative industry. The study utilized textual analysis of secondary data in the form of documentary research and purposive sampling to select experts. These experts included policymakers, practitioners with relevant experience, and communication scholars involved in the creative industry and the production processes of Thai Y-series. Data collection was conducted through in-depth interviews, and the information was analyzed using content analysis.

The findings revealed that 1) key factors supporting the production of Thai Y-series for international markets included production funding, co-production opportunities with Thai and international companies, licensing original content, incorporating Thai culture and narratives, and gaining popularity and favorable audience reception; and 2) the proposed model emphasized pricing strategies for Y-series, conducting market research on Y-series audiences, collaborating with international creatives, leveraging online platforms for promotion, and building a sustainable brand with governmental support.

Keywords: creativity; international market; Thai Y-series; Y-series creative strategies

1. Introduction

The Y-series industry has elevated Thailand's recognition in the global film and series landscape, earning the reputation of being a leader in the Y-series genre. Thai Y-series have become a significant form of entertainment with a large audience base, generating revenue for producers through international sales, licensing, merchandise, and brand endorsements by lead actors. Furthermore, Thai actors have gained international fame with fan bases in countries like China, Japan, Taiwan, and South Korea.

The origins of Thai Y-series are diverse; many have been adaptations of novels, such as Love Sick: The Series and 2gether: The Series, while others are original series like I Told Sunset About You. Various viewing platforms have played a crucial role in popularizing the Y-series, particularly WeTV and iQIYI, Chinese streaming platforms that have rapidly grown in the Thai and Southeast Asian markets. For instance, TharnType: The Series on WeTV and KinnPorsche: The Series on iQIYI have gained immense popularity both domestically and internationally. Additionally, YouTube's GMMTV channel has served as a significant platform, with 2gether: The Series amassing over 10 million views per episode.

The global reach of Thai Y-series has extended to Japan, China, Taiwan, the Philippines, and Latin America, contributing to the Y-content market's estimated value of no less than 1 billion baht in 2023 and a projected increase to 2 billion baht in 2024. Content development has been key in advancing Thai Y-series to the next level. While most series traditionally focused on love stories in school or university settings, incorporating narratives on workplace challenges, family relationships, and professional growth has broadened audience appeal and enhanced emotional connection. Developing more profound storylines and characters, along with addressing social issues such as discrimination and LGBTQ+ rights, has added meaningful depth and memorability to the series.

Moreover, blending other genres such as mystery, thriller, or fantasy has diversified and enhanced the appeal of the Y-series. Despite the popularity and recognition of Thai Y-series, they have yet to grow into a major industry in Thailand. Most efforts have come from the private sector, which, while influential, remain insufficient. To position the Y-series as a revenue-generating industry and a Soft Power for Thailand, full-fledged support from the government has been essential. This research, therefore, aims to analyze and propose strategies to fully promote Thai Y-series in international markets, helping to generate revenue and enhance Thailand's global image. Through a creative industry with the potential to drive the Thai economy and culture globally, Thai Y-series have influenced audiences worldwide.

2. Research Objectives

2.1 To examine the factors supporting producers in creating Thai Y-series for international markets

2.2 To propose a model for supporting Thai Y-series as part of the creative industry

3. Research Framework

Factors for Creating Thai Y-Series for Global Market	A Model for supporting Thai Y-Series in the Global Market
- Funding - Co-Production - Licensing of Original Content - Incorporation of Thai Culture and Unique Storytelling - Popularity and Audience Reception	- Pricing Strategies for Y-Series - Market Research on Y-Series - Collaboration with International Creators - Promotion via Online Platforms - Brand Building with Government Support

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4. Research Methodology

This study employs qualitative research, utilizing textual analysis of secondary data in the form of documentary research. The research also involves identifying a group of experts with roles related to policymaking, experienced practitioners, and scholars in communication studies connected to the creative industry and the production process of Thai Y-series. The purposive sampling method was applied to select 10 experts, including 1) policymakers in the field of Thai Y-series creation, 2) directors of Thai Y-series, and 3) Communication studies scholars involved in Thai Y-series production.

Data was collected through in-depth interviews, and the gathered data were analyzed using content analysis. The interviews were complemented by document analysis to identify key issues leading to findings. These findings were then discussed and summarized as the study's results.

5. Research Results and Discussion

1. Factors Supporting Producers in Creating Thai Y-Series for the Global Market

1.1 Production Funding

The most crucial starting point for creating content such as TV dramas or films is funding. In countries like South Korea, there are organizations such as KOCCA (Korea Culture and Content Agency) that provide financial support to promote and create TV dramas, films, animations, music, etc. With a larger budget, the production standards are generally much higher.

In Thailand, interviews with experts in policy and communications concluded that both government and private sectors provide funding for the production of TV dramas or films. However, the funding is often scattered across various agencies, resulting in lower budgets for producers, which may not be sufficient to cover the entire production of a series or film. In addition to content production, marketing and publicity budgets are crucial to reach the target audience effectively.

In Thailand, funding is available through agencies such as the Ministry of Culture and the Safe and Creative Media Fund. Currently, the Thai government has important policies, with the National Soft Power Development Committee offering grants for TV series, documentaries, and animations. These include projects like the Thai Film Promotion Fund, Co-Production Funding, and funding for Thai Y-series production.

1.2 Co-Production

Co-production refers to the joint investment, sharing production costs, and mutual ownership of the work. The benefits of co-production for producers include better financial access (Financing), increased distribution opportunities, and access to foreign governments' incentives. Additionally, producers can benefit from filming in countries with fewer cultural restrictions. Thailand has an advantage in co-producing with foreign companies because of its highly skilled workforce, globally recognized production equipment, and relatively low filming costs. Thailand also offers beautiful filming locations and is particularly open to various genres, including LGBTQ+ content.

1.3 Licensing Original Content

The licensing of Thai Y-series is typically done through Over-the-Top (OTT) platforms. These services, often referred to as streaming TV, deliver content directly to viewers via internet-based video streaming, instead of traditional cable TV. OTT services include Video on Demand (VOD), which offers on-demand content like TV shows or movies for personal devices such as computers or internet-connected TVs. This service can be either

Advertising-Based Video on Demand (AVOD), which charges advertisers instead of viewers, such as YouTube, or Subscription-Based Video on Demand (SVOD), like Netflix or IQIYI.

1.4 Creative Content and Thai Culture

Thai Y-series have developed content that incorporates Thai culture, lifestyle, and values. This freedom of creation, aiming for uniqueness and acceptance, is greater in Thailand compared to other countries, especially in Asia, except for Taiwan. Initially, Thai Y-series focused on relationships among students in schools, later expanding to university students, young professionals, and incorporating genres like Muay Thai and supernatural horror.

Figure 1 Boy's Love (BL) Series Poster Broadcast in 2024

Source: [https://thestandard.co, 2024]

In 2024, Thai Y-series expanded beyond the typical Boy's Love (BL) genre to include Girl's Love (GL) content, reflecting broader audience preferences.

Figure 2 Girl's Love (GL) Series Poster Broadcast in 2024

Source: [https://thestandard.co, 2024]

1.5 Popularity and Audience Reception

According to data from World Population Review, the LGBT+ community globally made up approximately 8.0% of the population in 2021 and has been expected to increase as younger generations become more open to diverse sexual orientations. In Thailand, the National Economic and Social Development

Council reports that there are around 4 million LGBTQ+ individuals, or 6.0% of the Thai population. The introduction of the "Marriage Equality Act" (2024), which allows same-sex couples to marry, has been expected to further expand the market for Thai Y-content.

The research findings align with the study conducted by Sanpach Jiarananan (2019), which discussed the opportunities for Thai television dramas to be created in response to international market demands. The study highlighted the need for government support to ensure cost-effectiveness in production and sufficient volume of Thai television dramas for export to foreign markets. Licensing rights were also noted as an essential factor. Furthermore, television dramas can incorporate Thai culture or indirectly promote Thailand by portraying ordinary Thai lifestyles within the content. This approach aims to disseminate such portrayals to international audiences in the future.

2. A Model for Supporting Thai Y-series as Part of the Creative Industry

2.1 Pricing Thai Y-Series

Producers need a solid understanding of the entertainment media industry, especially in setting prices for Thai Y-series according to the market demand and supply. Factors affecting pricing include:

2.1.1 Script of the series

2.1.2 Actors

2.1.3 Production team

2.1.4 Post-production work

2.1.5 Marketing and publicity after production

When calculating the production cost, the strategy for generating profits includes selling the series content. Due to the growing number of independent producers meeting the high demand for Y-series, conditions for selling the series to both domestic and global markets require initial airing on free-to-air television or national networks to guarantee content quality and production standards before accepting international licensing deals.

Additionally, content sales may include selling international licensing rights, organizing fan meet-ups, hosting concerts, selling merchandise, advertising, and selling intellectual property (IP) rights, all of which contribute to expanding the Thai Y-series industry into a creative industry.

2.2 Market Research

Producers should analyze the demands of viewers in each country and adjust the content accordingly. Points to consider from interviews with relevant experts include:

2.2.1 **The script** should have an interesting and unique storyline that appeals to the target market.

2.2.2 **Actors** are crucial, particularly Thai actors who have distinctive characteristics and are well-known both domestically and globally.

2.2.3 **Understanding the type of series content accepted in different countries** is essential. For example, China may not accept horror or time-travel series or Y-content, while Japan, Taiwan, Indonesia, the Philippines, and Latin American countries are more open to Y-series. According to the Department of International Trade Promotion, Japan is currently the largest purchaser of Thai Y-content, followed by Taiwan.

2.3 Collaboration with Foreign Creators

Working with foreign experts or producers opens up opportunities to learn and develop diverse production methods, allowing Thai content to reach a global audience. International companies can act as representatives for content sales, assist with marketing and publicity, and provide distribution channels.

2.4 Promotion through Online Platforms

Thai producers can use social media to create platforms for communication and viewing, helping to build a strong community of viewers. Social media is a crucial tool for promoting Thai Y-series as it enables direct communication with target audiences and facilitates marketing activities like fan meetings.

2.5 Branding with Government Support

Collaboration between the government (such as the Ministry of Commerce) and the Thai Association of Boys Love Content helps promote Thai Y-content as part of the government's Soft Power initiatives. This collaboration can drive the Thai Y-series industry toward global recognition.

However, successful branding requires centralization. Currently, the support for budgeting or operations related to the film and series industry in Thailand remains fragmented, with responsibilities distributed across various agencies. This fragmentation of resources and budgets undermines the potential to create a significant impact on the creative media industry.

Interviews with directors and academic experts in communication sciences consistently highlight that Thai Y-series have gained significant traction as a global brand in international markets. This success is attributed to domestic factors, including creative freedom in content production, which is rarely constrained by cultural or traditional limitations. Thailand's traditions and culture provide favorable conditions for content creation. Notably, the recent parliamentary passage of the "Marriage Equality Act" has granted greater sexual freedom and inclusivity, which supports diverse LGBTQ+ content. This inclusivity has garnered admiration from other Asian countries, particularly those with established content production industries, such as South Korea and Japan, where societal acceptance of LGBTQ+ themes is less widespread.

Nevertheless, the Thai Y-series industry has not yet achieved a large-scale global impact due to the lack of a robust support system. This requires coordinated and consistent efforts from the government and all relevant agencies to operate under unified policies and systems. When this happens, it is anticipated that Thai Y-series will become one of the country's key export products, alongside other offerings such as traditional television dramas, tourism, food, arts, and culture. Together, these could penetrate the global market and generate substantial revenue for Thailand.

6. Recommendations

1. In addition to centralizing management by establishing a single authority with the power to oversee policies promoting the creative industry, efforts should focus on supporting the development of Thai Y-series films and dramas as a sustainable soft power.

2. There should be a study on the establishment of a fund to promote and support Thai films and series, which would provide financial resources for management without being tied to the national budget, which is subject to the Ministry of Finance's regulations. This would help to avoid delays and limitations in budget disbursement.

7. Acknowledgments

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Education

(6-EN-EDU)
Research Performance Management of Guangxi Public Undergraduate Universities

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Abstract

The purpose of this study is to investigate the four aspects of scientific research performance management in public undergraduate universities in Guangxi. The characteristics of the university where the teacher works. The personal characteristics of the teacher. the personal research ability of the teacher, and. The orientation of scientific research performance management in the university. The authority of university-level scientific research performance management. The research object is 455 teachers from five public undergraduate universities. The research tool is a 5-point rating scale. The statistical methods used for data analysis include percentage, mean, and standard deviation.

The research findings show that the overall level of scientific research performance management in public undergraduate universities in Guangxi is relatively high. The highest average score is in the university's goal-oriented scientific research performance and the personal research ability of teachers, followed by the personal characteristics of teachers, and the lowest average score is the characteristics of the university where the teacher works.

Keywords: Guangxi; public undergraduate universities research; performance management

1. Introduction

Universities shoulder the important mission of cultivating and innovating scientific research talents in the development of science and technology, and refined management plays a significant role in deepening the mechanism of scientific research management in universities. Based on the discussion of the key points of refined management, this article summarizes the achievements of scientific research management in universities, explores the bottlenecks faced in its development, and finally proposes a path for the integration of refined scientific research management in universities. (He Wenjun, 2024)

Research management plays an important role in university work, and research evaluation is directly related to the quality of university research. A mature and comprehensive scientific research management system is the key to enhancing the overall strength of universities. Therefore, universities should actively explore new ideas, approaches, and mechanisms for scientific research management, and further explore effective ways to improve the quality of scientific research management in the new era. (Mi Rui, 2024)

New quality productivity is a new form of productivity generated by the iterative upgrading of various factors of productivity driven by a new round of technological revolution and industrial transformation. The key to its formation and development is technological innovation and educational development. Universities are the strategic pivot for developing new quality productive forces, and their research management efficiency directly affects the level of scientific and technological innovation development in schools. By further improving the level of service and management in the allocation of scientific research resources, evaluation of scientific and technological achievements, and transformation of scientific and technological achievements, we aim to comprehensively enhance the efficiency of scientific research management in universities. (Zhang Yuanyuan, 2024)

Innovation is the source of technological development and the driving force for talent development. Talent is the main body of innovation and the first element driving technological development, and technological development cannot be separated from talent innovation. To enhance the ability of universities to serve social development and provide technological support for high-quality development, it is necessary to improve the level of scientific research management in universities and build a service-oriented scientific research management system. (Bu Fangyu, 2024)

The development of science and technology plays an important role in promoting economic growth and social progress. Universities aim to cultivate applied talents that meet the needs of industries, promote technological innovation and industrial development. Research management is of great significance for improving research level and promoting the integration of industry, academia, research and application. From the perspective of collaborative innovation, the research management model of application-oriented undergraduate universities also needs to be reformed. (Zhang Xiaojie, 2023)

With the development of higher education and scientific research, the management of scientific research in universities is constantly facing new challenges. Incentive mechanisms, as an important

management tool, play a crucial role in stimulating the innovative potential of researchers and improving their academic level. A reasonable incentive mechanism can effectively mobilize the enthusiasm of teachers and researchers, improve their personal and overall scientific research level and innovation ability in universities. (Sun Hongxin, 2023)

The long-standing problems of "tool view" and "utilitarianism" in the management of scientific research in universities have led to variations in management mechanisms, resulting in short-term behaviors such as "performance-based research", and affecting the correction of teachers' scientific research spirit. Universities must start from academic logic and scientific research laws, innovate assessment, supervision, evaluation, incentive, and organizational coordination mechanisms, and stimulate scientific research and innovation momentum. (Mao Ying, 2023)

In summary, the research and innovation capabilities of universities greatly affect the process of innovation driven development. In universities, teachers are the main body of scientific research work and the most fundamental and core force in promoting the development of scientific research in universities. At the same time, the research performance evaluation system for university teachers is the most specific manifestation of research performance evaluation, which is the main way for universities to motivate teachers' research creativity and enthusiasm. This article studies the satisfaction of research performance among university teachers and its influencing factors, aiming to provide better guidance for further improving the incentive mechanism for research performance of university teachers.

2. Research Objectives

To clarify the evaluation criteria of scientific research performance management in public undergraduate universities in Guangxi.

3. Research Methodology

Population

This study is based on 455 researchers from 5 public undergraduate   universities in Guangxi.

The research instrument

The instrument for collecting target data are questionnaires designed for management systems based on the following 5 aspects， Characteristics of the teacher's school, Personal characteristics of the teacher, Personal research ability of the teacher, The management authority of the research performance of the university. The goal orientation of the research performance of the university. The questionnaire is divided into two parts:

Step1 The personal information of the sample is surveyed and sorted by gender, work experience and professional level.

Step2 Research performance management system of public undergraduate universities in Guangxi. The data interpretation standards based on five-point Likert scale are as follows

Level5 indicates the highest management system level

Level4 Use high level to express the level of the management system

Level3 Use medium level to express the level of the management system

Level2 Use low level to express the level of the management system

Level1 indicates the lowest level of the management system

The process of constructing the Instrument

The instrument used in this research was a questionnaire. The researchers created the following steps.

1. Analyze the literature, concepts, theories and researches related to the scientific research performance management system in universities.

2. Construct a questionnaire on the status quo of research management system in Guangxi public undergraduate universities. Then the questionnaire outline will be sent to the thesis advisor, who will review and modify the content according to the suggestions.

3. The objective consistency index (IOC) of the questionnaire was tested by three experts. Objective congruence index (IOC)

4. Modify the questionnaire according to expert advice.

5. Sent to the researchers of 30 universities in Guangxi for sampling. The reliability of the questionnaire was obtained by Conbach's Alpha coefficient

6. A questionnaire survey was conducted among165 researchers from 5 public undergraduate universities in Guangxi.

Data collection

In order to achieve the purpose of the study, Select five public undergraduate universities in Guangxi and obtain relevant information through a combination of online questionnaire surveys and offline interviews.

Step1 The researchers asked the Graduate School of Bansomdejchaopraya Rajabhat University to collect data on 165 researchers from public undergraduate universities in Guangxi.

Step2 The researchers sent questionnaires to 165 researchers and returned the questionnaires. The second stage: provide guidance for the improvement of the research performance management system in Guangxi universities.

Statistics used in data analysis

After data collection, the researcher made statistical analysis of the data according to objectives. Information obtained from the academic administration study of Anubanchumphon Shool under the Chumphon Primary Educational Service Area 1 this time. The researchers analyzed the data using program as follows.

1. The personal information of the sample was analyzed by frequency and percentage, and categorized by gender, work experience and professional level.

2. Analyze the mean and standard deviation of the current situation of the research performance management system of public undergraduate universities in Guangxi from five aspects: the characteristics of the school, the personal characteristics of the teacher, the personal research ability of the teacher, the management authority of the research performance of the university, and the goal orientation of the research performance of the university. And the mean standard is given.

4.50-5.00 indicates the highest level

3.50-4.49 indicates a high level

2.50-3.49 indicates medium level

1.50-2.49 means low

1.00-1.49 indicates a low level

Step3 The content analysis method is used to conduct a structured interview on the improvement guidance of the research performance management system in Guangxi public undergraduate universities.

Step4 The mean method and standard deviation method are used to evaluate the suitability and feasibility of the guidance for improving the research performance management system of Guangxi public undergraduate universities. The mean value is adopted as follows;

4.50-5.00 indicates the highest level

3.50-4.49 indicates a high level

2.50-3.49 indicates medium level

1.50-2.49 means low

1.00 -1.49 is the lowest level

In this study, the researcher focused on reviewing the concepts, theories, and research methods related to scientific research performance management. as follows,1. The characteristics of the university where the teacher works. 2. The personal characteristics of the teacher.3. The teacher's individual research ability.4. The authority of university-level scientific research performance management.5.The university's goal-oriented scientific research performance.

4. Result

An analysis of the research performance management of public undergraduate universities in Guangxi was conducted using mean and standard deviation.

From Table 1, it can be seen that the overall level of scientific research performance management in Guangxi's public undergraduate universities is relatively high (μ = 4.77). From all aspects, the average value of university goal-oriented scientific research performance is the highest (μ = 4.78), followed by the

personal research ability of teachers (μ = 4.78), the personal characteristics of teachers (μ = 4.76), the scientific research performance management orientation of the school (μ = 4.75), and the lowest average value is the characteristics of the school where the teacher is from (μ = 4.74).

Table 1 shows the mean and standard deviation of research performance management for public undergraduate universities in Guangxi, divided into five aspects.

Research performance management of Guangxi public undergraduate universities	μ	σ	Level	Order
1. Characteristics of the school where teachers work	4.74	0.47	highest	5
2. Scientific research performance management authority of the university	4.75	0.49	highest	4
3. Personal characteristics of teachers	4.76	0.42	highest	3
4. Teachers' personal research ability	4.78	0.42	highest	1
5. Goal-oriented scientific research performance of the university	4.78	0.49	highest	2
Total	4.77	0.45	highest	5

5. Research Results and Discussion

Summary of research results

The study found that the overall level of scientific research performance management at public undergraduate universities in Guangxi is relatively high. From various aspects, the average level of university goal-oriented scientific research performance and teacher's individual research ability is the highest, followed by teacher's personal characteristics, school scientific research performance management orientation, while the average level of teacher's school characteristics is the lowest.

The details of the research results in each aspect as follows

The overall level of scientific research performance management in public undergraduate universities in Guangxi is relatively high, which is attributed to the joint efforts of various factors. Firstly, the outstanding performance of university-oriented scientific research performance and the research ability of teachers reflects that universities have invested a lot of energy and resources in scientific research direction and the cultivation of teachers' ability.

Secondly, the scores of individual research ability of teachers are also relatively high, which mainly includes subject knowledge, scientific method, academic exchange and other research abilities. These research abilities directly affect the evaluation of their scientific research performance and may affect their satisfaction with scientific research performance.

Thirdly, the personal characteristics of teachers, such as title, age, research experience, etc., are also

important factors affecting scientific research performance. The Guangxi project for the comprehensive improvement of the basic research and applied research capabilities of young and middle-aged teachers is specifically set up to improve the research capabilities of young and middle-aged teachers and support basic research and applied research that meet the needs of regional economic and social development.

Finally, although the average level of the characteristics of teachers' schools is relatively low, it does not mean that it is unimportant. The characteristics of the school, such as subject advantages, scientific research platforms, and corporate cooperation, are all important factors affecting scientific research performance.

Discussion

The university's goal-oriented research performance and the highest score of teachers' individual research ability indicate that enhancing the research performance satisfaction of universities and improving the research ability of teachers are the key to improving the research performance satisfaction. Some scholars believe that the reform efforts of university research performance evaluation need to be strengthened, especially the need to pay attention to individual development, job tenure, research type, age, salary and treatment, and administrative positions of teachers, which are key factors affecting the satisfaction of the research performance evaluation system of teachers. (Shi Xiu, 2018) conducted a survey of the current practice of research performance evaluation of college teachers and believes that the individual characteristics of college teachers and the intensity of research incentives in their schools directly affect the research performance satisfaction.

The personal research capabilities of teachers, including subject-specific knowledge, scientific method, academic exchange, etc., have a direct impact on their satisfaction with their research performance evaluation. For example, (Shi Xiu, 2018) analyzed the satisfaction with the research performance evaluation system of teachers from the micro, meso, and macro levels, and analyzed the influence of factors such as work experience, research nature, and salary on the teacher's personal research ability on their satisfaction with research performance.

The personal characteristics of teachers, such as title and age, are also important factors that affect their satisfaction with research performance. For example, (Li Linlin, 2010) discussed the situation, characteristics, and laws of scientific performance itself, and believes that the personal characteristics of teachers, including title and research experience, have a significant impact on scientific performance. (Zhang Wenhong et al., 2024) discussed the relationship between scientific research networks and scientific performance, and believes that the personal characteristics of teachers such as title and experience have a significant impact on scientific performance.

The characteristics of the school where the teacher is located, such as the discipline situation, the current situation of scientific research platform construction, and the level of cooperation with enterprises, are also important factors that affect the satisfaction with research performance. For example, (Wang

Weixing, 2017) believes that the influencing factors of college scientific research performance include human resources, financial resources, and external cooperation, and the influence effect of external cooperation on scientific research performance satisfaction is obvious.

6. Recommendations

Implications

Based on the research findings, the following policy recommendations are proposed to enhance the research performance management of public undergraduate universities in Guangxi.

1. Strengthen the construction of the research team. The factors of the research team have a significant positive impact on the practical effectiveness of teachers' research. Schools should pay attention to the construction of the research team, especially the cultivation of research leaders, so as to play a leading role for the majority.

2. Deepen the research atmosphere and institutional construction. At the school level, a good research atmosphere should be actively created, and research institutions and team construction should be established, which has a significant positive impact on the researchers' enthusiasm and effectiveness.

3. Research awareness and recognition. The prerequisite factor for improving teachers' research performance is that teachers have a certain research awareness and recognize the role of research work in their own development and the promotion of the school.

4. Stimulate teachers' research motivation. Teachers' research motivation is related to their individual factors as well as the actual research environment in the school, so it needs to be effectively stimulated from the perspective of both internal and external factors.

5. Promote the combination of research practice and teaching. Teachers should integrate research and teaching closely, improve teaching quality and effectiveness through research, and achieve mutual promotion between teaching and research.

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(8-EN-EDU)

Study on Research Capability of Teachers in Public Universities in Guangxi

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Abstract

The objectives of this research were to study the current situation of the research capability of teachers in public universities in Guangxi in four areas as follows: 1) Planning and scheduling, 2) Data collection and analytical Capabilities, 3) Problem solving and application capabilities, 4) Academic writing skills. The population of this research was 1486 teachers from 8 public universities at the graduate level in Guangxi. The sample group for this research consisted of 306 teachers from 8 universities in Guangxi. The research instrument was a 5-point Likert scale questionnaire. The statistics used for the data analysis were percentage, mean, and standard deviation. Results indicated that the research capability of teachers in public universities in Guangxi was high in all four aspects. Considering the research results, the mean scores ranged from highest to lowest as follows: Planning and Scheduling, Academic Writing Skills, and Problem Solving and Application Capabilities.

Keywords: public universities in Guangxi; research capability; university teacher

1. Introduction

Higher education has become ubiquitous around the world, and young faculty are playing an increasingly important role in academic research. The Ministry of Education of China is committed to enhancing teachers' research capability and has implemented comprehensive policies and in-depth support measures. (Ministry of Education, 2019) To promote teachers' research capability, the Ministry offered extensive support, including customized professional development training and specially designed research training programs for young teachers, aiming at rapidly and effectively enhancing their research capabilities. (Ministry of Education, 2020) These initiatives not only aim to increase teachers' research awareness and encourage them to innovate in educational research but also focus on strengthening the construction of the educational research team. Since 2008, the Chinese government has formulated the National Professional Standards for Teachers from kindergarten to university education in response to the domestic situation, clarifying the level of professional skills that teachers should achieve and clarifying the direction for the development of young teachers.

The Chinese government's strategic initiatives to bolster teachers' research capabilities, as outlined by the Ministry of Education, are not just about individual professional development; they are integral to the broader educational mission of fostering innovation, updating knowledge, and driving educational reform, as emphasized by Jaspers' perspective on the role of university teachers as researchers and educators. Jaspers (1991) discusses the essence of education, which I have translated from the Chinese edition as follows: A university teacher should be a researcher first and foremost...... University teachers should guide and motivate students to study hard, and the best researchers are the best teachers. (p. 145, translated by me). The importance of improving teachers' research capability is undeniable, as it has profound and far-reaching positive impacts on the education file, which is closely tied to the substantial improvement in the quality of education, ensuring that educational content evolves with the times and that knowledge is continuously updated and expanded. Fostering teachers' research capability can spark students' creative thinking and practical skills, and lay a solid foundation for nurturing the innovative talents essential for the future. Moreover, it is a key driver of educational reform, providing powerful momentum for the innovation and development of the education system. Currently, enhancing teachers' research capability faces multiple challenges. Natasha Kenny and Frederick Evers (2011) delve into the intricacies of how educators engaged in the Scholarship of Teaching and Learning (SoTL) integrate their pedagogical experiences with scholarly research endeavors, subsequently disseminating these insights to enhance pedagogical quality within higher education. They identify five primary challenges that impede the active involvement of faculty in the SoTL domain.These challenges include: Limited Expertise, Graduate Culture,Terminology Misunderstanding, Rewards and Recognition and Time Constraints. Additionally, Fawzi and Al-Hattami(2017) studied the challenges faced by faculty at the University of Bahrain in writing and publishing research papers, while Workload pressure, Lack of Time and Administrative Work pressure served

as the primary factors impacting research productivity. Similarly, Daou and El Hajj (2023) examined the difficulties and opportunities facing students and teachers in higher education and mentioned that challenges faced by teachers include heavy workloads, limited resources, pressure to publish papers, and the need for professional development. These studies collectively underscore the multifaceted nature of the challenges in academic research and the need for targeted solutions to support educators and researchers, and highlight critical areas in educational research that urgently need improvement and reinforcement of teachers' research capability.

University and its administration have made it a priority to improve teachers' research capabilities, in order to help young faculty members quickly adapt to academic work and enhance their research capabilities. There are many successful cases and models of improving teachers' research capability in the world, such as Harvard University's Faculty Development Program, Stanford University's Faculty Career Development Program, MIT's Faculty Innovation Program, Oxford University's Academic Mentoring System, Cambridge University's Interdisciplinary Research Centers, Peking University's Young Faculty Research Support Program, and Tsinghua University's Faculty Development Center. Chinese Universities attach great importance to the training of teachers in scientific research and the transformation of scientific research results. For teachers at different levels, in addition to academic conferences, seminars, training courses and other forms, universities have also set up special institutions, such as the University Teacher Development Center, to provide all-round guidance for the development of young teachers. In response to the difficulties faced by young faculty members in applying for external funding at an early stage, Chinese universities have made efforts to support young faculty members to continue to publish their research results through government grants, corporate partnerships, and special on-campus research funds. In the United States, Universities have implemented a mentorship system to help young teachers find senior teachers in their professional fields as professional mentors, and to establish an equal and cooperative mentoring relationship between young teachers and senior teachers. (Liu 2015) Research shows that "effective mentorship emerges when older teachers take the time to evaluate the academic work of young teachers, give them the means to obtain research grants, introduce them to professional societies and academic circles, engage in research and teaching cooperation with them, arrange for them to organize academic salons or guide them to complete papers presented at academic conferences". (Moody, J.A, 2004, 47-52) These examples demonstrate how various universities and institutions enhance teachers' research capability through different strategies and measures.

In conclusion, this research aims to investigate the research capabilities of teachers at eight public universities in Guangxi to inform strategies for enhancing their research capabilities. To be more specific, this research delves into the multifaceted dimensions of research capability among teachers in public universities in Guangxi, assessing their strengths in planning and scheduling, data collection and analytical capabilities, problem-solving and application capabilities, and academic writing skills. The findings, which

reveal a high level of research capability across all areas, underscore the importance of continued support and development in these critical areas. As we transition from the overview of the current situation to a detailed examination of the data, we will explore the implications of these results for the individual teachers and the broader educational community in Guangxi. The insights gained from this study will inform targeted interventions aimed at further enhancing the research capabilities of university teachers, thereby contributing to the ongoing mission of fostering innovation and driving educational reform in higher education. This research serves as a foundation for understanding the current state of affairs and a catalyst for the development of strategies that will equip teachers with the necessary skills to meet the challenges of the future, ensuring that Guangxi's public universities remain at the forefront of academic excellence and research innovation.

2. Research Objectives

To investigate the current situation of the research capability of teachers in public universities in Guangxi, assessing their strengths in planning and scheduling, data collection and analytical capabilities, problem-solving and application capabilities, and academic writing skills.

3. Research Framework

Research capability encompasses the array of skills, knowledge, and behaviors essential for academic research. It empowers scholars and researchers to execute research tasks effectively, with a focus on the excellence and caliber of their performance. This capability extends beyond mere possession of abilities to include the practical wisdom and experience required to apply those abilities adeptly within specific research contexts. This includes identifying the key data needed, successfully finding and detailing these findings, and communicating them to others. In particular, the execution of a research project entails a multifaceted approach that includes the comprehensive review and critical analysis of extant literature, the synthesis of empirical findings, the formulation and execution of experimental or survey methodologies, the collection and rigorous analysis of data, and the composition of scholarly articles for academic dissemination. Therefore, according to study on the concept, theory, research related to research capability, Trigwell & Shale (2004), Hativa & Marincovich, (1995), Boud & Lee (2005), Ramsden (2003), Shen (2018), Stark (2019), Wright (2020), Jones (2021) the research capability of teachers in public universities should be carried out from the following dimensions:

1. Planning and Scheduling
2. Data Collection and Analytical Capabilities
3. Problem Solving and Application Capabilities
4. Academic Writing Skills.

4. Research Methodology

4.1 Population and the Sample Group

The population of this research consisted of 1486 graduate-level teachers from 8 public universities in Guangxi. To select a representative sample, stratified random sampling was employed to ensure proportionate representation from each university. Subsequently, random sampling was used to select 306 participants from the stratified population, following Krejcie and Morgan's (1970) sampling table

4.2 Research Instruments

The instrument to collect the data for objective was the questionnaire designed based on the research capability in following aspects: Planning and Scheduling, Data Collection and Analytical Capabilities, Problem Solving and Application Capabilities, Academic Writing Skills. The questionnaire was divided into two parts:

Part 1: Survey about personal information of sample, classified by gender, working experience and professional rank.

Part 2: Survey about the current situation of the research capability of teachers in public universities in Guangxi though questionnaire. The criteria for data interpretation based on five-point Likert's scale, as follow;

5 express the level of the research capability at highest level

4 express the level of the research capability at high level

3 express the level of the research capability at medium level

2 express the level of the research capability at low level

1 express the level of the research capability at lowest level

Criteria of mean as follow;

4.50 – 5.00 expressed highest level

3.50 – 4.49 expressed high level

2.50 – 3.49 expressed medium level

1.50 – 2.49 expressed low level

1.00 – 1.49 expressed lowest level

4.3 Constructing a questionnaire process

The construction process of the questionnaire was as follows:

Step 1: Reviewing and analyzing documents, concepts, theories, and research related to the research capability of teachers.

Step 2: Constructing the questionnaire about the current situation of the research capability of teachers in public universities. Then sending the questionnaire outline of questionnaire to the thesis advisors to review and revise the contents according to the suggestions.

Step 3: The index of objective congruence (IOC) of the questionnaire was examined by three experts. The index of objective congruence (IOC) . The IOC value of the questionnaire should be 1.00.

Step 4: Revise the questionnaire based on the experts' suggestions.

Step 5: The questionnaire was distributed to 35 administrators in universities in Guangxi for a pilot test. The reliability of the questionnaire, as measured by Cronbach's Alpha, was found to be excellent at 0.968.

Step 6: The questionnaire was applied to 306 teachers in 8 public universities in Guangxi.

4.4 Data Collection

To achieve the research objectives, the researcher collected the required data according to the type and steps of the research instruments as follows procedures:

Step 1: The researcher requested requirement letter form the graduate school, Bansomdejchaopraya Rajabhat University for requiring to collect the data from 306 teachers in 8 public universities in Guangxi.

Step 2: The researcher distributed the questionnaire to 306 teachers and returned the questionnaires.

4.5 Data Analysis

Data and information collected form 306 teachers in 8 public universities in Guangxi, the researcher statistic and analyze data according to objectives as follow;

Step 1: The personal information of the sample were analyzed by frequency and percentage, classified by gender, working experience and professional rank.

Step 2: The current situation of research capability of teachers in public universities in Guangxi in following aspects: Planning and scheduling, Data collection and analytical Capabilities, Problem solving and application capabilities, Academic writing skills, were analyzed by mean and standard deviation. And criteria of mean as follow;

4.50 – 5.00 expressed highest level

3.50 – 4.49 expressed high level

2.50 – 3.49 expressed medium level

1.50 – 2.49 expressed low level

1.00 – 1.49 expressed lowest level

5. Research Results and Discussion

5.1 Summary of research results

This research was to study the current situation of the research capability of teachers in public universities in Guangxi. The data analysis result could be presented as follows.

The analysis result about personal information of respondents, classified by gender, working experience and professional rank. Presented the data in the form of frequency and percentage. According to data, showed that the majority respondents were 224 females, accounting for 73.2%, and 82 males, accounting for 26.8%. The working experience of respondents was mainly 11-15 years for 91 people, accounting for 29.74%, followed by 6-10 years for 85 people, accounting for 27.78%, followed by 1-5 years for 71 people, accounting for 23.2%, and more than 15 years was the lowest level for 59 people, accounting for 19.28%. The major of respondents was mainly Medium grade for 144 people, accounting for 47.06%, followed by High grade for 89 people, accounting for 29.08%, and Primary grade was the lowest level for 73 people, accounting for 23.86%.

The analysis of the current research capabilities of teachers in Guangxi's public universities has been commented on, with the data presented in terms of mean and standard deviation.

Table 1 Basic information of respondents

	Personal Information	Frequency	Percentage
Gender	Male	82	26.8
	Female	224	73.2
	Total	306	100
Working experience	1-5 years	71	23.2
	6-10 years	85	27.78
	11-15 years	91	29.74
	More than 15 years	59	19.28
	Total	306	100
Professional rank	High grade	89	29.08
	Medium grade	144	47.06
	Primary grade	73	23.86
	Total	306	100

Table 2 The mean and standard deviation of the current situation of the research capability of teachers in public universities in Guangxi in four aspects. (n = 306)

Research capability of teachers	$\overline{x}$	S.D.	level	Order
1. Planning and scheduling	3.68	0.83	high	1
2. Data collection and analytical capabilities	3.56	0.82	high	3
3. Problem solving and application capabilities	3.52	0.88	high	4
4.Academic writing skills	3.58	0.81	high	2
Total	3.59	0.84	high	

The overall research capability of teachers in public universities in Guangxi was rated as high ($\overline{x}$ = 3.59). In terms of specific dimensions, Planning and Scheduling was rated highest $\overline{x}$ = 3.68), followed by Academic Writing Skills ($\overline{x}$ = 3.58), with Problem Solving and Application Capabilities being rated lowest ($\overline{x}$ = 3.52).

The study's results demonstrate that educators at Guangxi's public universities exhibit a noteworthy research capability, averaging a score of 3.59 on a scale of 5, which denotes a robust overall performance. The research on the current situation of the research capability of teachers in public universities in Guangxi reveals that it can be assessed across four key aspects, all of which are considered to be at a high level. The analysis of the findings indicates a hierarchy in the mean scores of these aspects, with the highest mean attributed to "Planning and Scheduling." This is followed closely by "Academic Writing Skills," suggesting a strong proficiency in these areas among the teaching staff. However, the aspect with the lowest mean score is "Problem Solving and Application Capabilities," which indicates a comparatively weaker performance in this domain. This suggests that while teachers in public universities in Guangxi demonstrate a robust research capability overall, there is room for improvement, particularly in enhancing problem-solving and application skills.

The highest average score was noted in the domain of planning and scheduling of the research capability of teachers in public universities, signifying the educators' capability in structuring their research endeavors and establishing precise goals. Planning and Scheduling refer to the capacity of researchers to effectively plan and schedule their research activities, projects, and tasks to achieve their research goals and objectives in a timely and efficient manner in academic research. Planning and scheduling skills enable researchers to manage time and resources efficiently, ultimately leading to the accomplishment of research goals. Such capability the research capability of teachers in public universities is pivotal for the successful implementation of research initiatives and underscores a solid grounding in research management competencies.

Data collection and analytical capabilities of the research capability of teachers in public universities rated at a high level, with an average score of 3.56, showing teachers in public universities are

adept at using various data collection techniques, such as surveys, interviews, observations, and archival research, and capable of critically evaluating the data, identifying patterns, and making inferences that are logically sound and supported by evidence. In essence, while data collection is the act of gathering the necessary materials for research, analytical capabilities are the tools used to make sense of that data. Both are indispensable for university teachers in Guangxi as they engage in scholarly activities, contribute to academic discourse, and advance their fields through research. By honing these skills, university teachers in Guangxi can enhance their research capacity, producing work that is not only methodologically sound but also intellectually rigorous and innovative.

Problem solving and application capabilities of the research capability of teachers in public universities rated at a high level, with an average score of 3.52, which is with the highest mean, indicating that the range of individual fluctuations is minimal because the performance of different teachers at different levels is high and low, and a composite indicator that encompasses all levels will reconcile these differences and bring the overall external performance of difference. Problem-solving and application capabilities are multifaceted skills that are vital for university teachers in Guangxi engaged in research. Problem solving and application capabilities of the research capability of teachers in public universities are not static but evolve with the research process, requiring adaptability, creativity, and a commitment to continuous learning and improvement. These capabilities are the bridge that connects research with practical application, enabling university teachers in Guangxi to contribute meaningfully to their fields and to society.

Academic writing capability also rated highly, with an average score of 3.58, indicating the educators' adeptness at effectively conveying their research outcomes. This capability is vital for the propagation of knowledge and the enrichment of the scholarly community. Conversely, the lowest average score of 3.52 was identified in problem-solving and application skills, indicating a potential need for enhanced development and support in this area.

5.2 Discussion

The analysis of the data further revealed that the majority of participants had between 11 to 15 years of professional experience, with the most common academic rank being at the intermediate level. This suggests that educators with intermediate experience and qualifications form the core of research activities within the university in Guangxi. The relatively lower prevalence of those with over 15 years of experience and those at the entry-level rank may indicate areas for recruitment and professional growth.

The high overall scores in research capabilities of teachers of public universities in Guangxi suggest a robust foundation in academic research among the teaching staff. This indicates a positive prognosis for the public universities, as it implies that faculty are well-prepared to engage in scholarly discourse and foster innovation within their respective disciplines.

The highest mean score in "Planning and Scheduling" indicates that teachers of public universities in Guangxi are proficient in organizing their research activities effectively. This skill is critical, as it facilitates the efficient use of time and resources, potentially leading to more productive research outcomes.

The strong performance in "Academic Writing Skills" of teachers of public universities in Guangxi is significant, as it is the primary means through which research findings are communicated to the academic community and the public. Effective academic writing is crucial for the dissemination of knowledge and the enhancement of scholarly reputation.

The comparatively lower score in "Problem Solving and Application Capabilities" suggests teachers of public universities in Guangxi needing further development. This skill is essential for translating research into practical applications and addressing real-world problems through research. It is recommended that professional development programs of public universities in Guangxi prioritize enhancing these skills among faculty.

While the research capability of educators in Guangxi's public universities is praiseworthy, there is scope for enhancement, particularly in problem-solving and application skills. The study's findings imply that strategic interventions and professional development initiatives could significantly bolster the research competencies of educators, thereby facilitating the progression of scholarly research in the region (Ramsden, 2003)

There is a continued need for investment in professional development programs that enhance teacher's research capabilities of public universities in Guangx, particularly in problem-solving and application capabilities. These programs should be tailored to meet the needs of various faculty groups, such as early-career teachers or those in specific disciplines. The high scores in planning and scheduling and academic writing suggest that current support structures in these areas are effective. These practices should be sustained and shared with other institutions as exemplary models. The variation in research capabilities across different levels of experience and professional rank suggests the necessity for personalized support. Early-career teachers might benefit from more intensive training in research methods and application, while more experienced faculty might require support in staying current with emerging research trends.To further elaborate on the recommendations for enhancing research competencies among educators in Guangxi's public universities, it is crucial to consider the following implications:

To further enhance the research capabilities of educators in Guangxi's public universities, it is imperative to focus on targeted professional development programs that are not only tailored to the specific areas where improvement is needed, but also designed to inspire and engage the academic community.

Firstly, the implementation of targeted research capabilities initiatives should be tailored to the specific needs of the educators in Guangxi's public universities. This could involve workshops, seminars, and courses that focus on the latest research methodologies, data analysis techniques, and technological tools

that are essential for conducting high-quality research (Jones, 2021). By providing such opportunities, educators can stay abreast of the evolving trends in their respective fields and enhance their research capabilities (Boud & Lee, 2005). For instance, workshops and seminars led by renowned experts in various fields could be organized, offering hands-on experience and practical knowledge that educators can apply directly to their research and teaching practices. A series of interactive sessions where educators work alongside these experts, grapple with real-world problems and emerging trends in their disciplines. This immersive approach would not only enhance their problem-solving and application capabilities but also foster a deeper understanding of the practical implications of their research.

Secondly, fostering collaborative research projects between different professional rank, for instance, more experienced High grade teachers serving as the mentor of Primary or Medium grade teachers could prove beneficial. This mentorship model would not only help in skill transfer but also create a supportive environment that encourages continuous learning and professional growth. We also notice that some of Guangxi's public universities are fostering collaborative research requires creating platforms and networks that encourage interdisciplinary and cross-institutional partnerships, but the work is still in its infancy, and results are being observed in the future. Picture a scenario where junior faculty members are paired with seasoned researchers, working side by side on cutting-edge projects. The exchange of ideas and expertise in such a setting would be invaluable, nurturing a new generation of scholars equipped with the skills necessary to tackle complex challenges.Universities can establish research centers or consortiums that bring together experts from diverse backgrounds to work on complex problems. These collaborative efforts not only leverage the strengths of each institution but also provide a rich environment for knowledge exchange and innovation.

Moreover, institutional support is also crucial in this endeavor. Universities should allocate resources to facilitate access to the latest research tools and technologies, as well as provide funding for research projects. This support would enable educators to stay at the forefront of their fields and conduct high-quality research that contributes to both academic discourse and practical applications. Consider a well-equipped research lab, stocked with state-of-the-art equipment and software, where educators can explore new methodologies and technologies (Ramsden, 2003). The availability of such resources would not only enhance the quality of research but also attract top talent to these institutions. Public universities in Guangxi now allocates a portion of their budget specifically for research activities and create an environment that supports a healthy work-life balance for researchers. However, this support should be crucial for sustaining long-term research projects and fostering a culture of inquiry and discovery.

Furthermore, establishing partnerships with other academic institutions, both domestically and internationally, can provide valuable opportunities for knowledge exchange and collaborative research. These partnerships can lead to joint publications, shared research projects, and academic conferences that not only enhance the research profile of the educators but also bring global recognition to the institutions

(Trigwell & Shale, 2004). There a network of universities across the province, working together on international research initiatives in some public universities in Guangxi. The cross-cultural exchange and shared learning that result from such collaborations would enrich the academic environment and open new horizons for innovation. By leveraging external resources and expertise, Guangxi's public universities can enhance their research impact and relevance, and provide access to specialized equipment and expertise, and create opportunities for joint publications and grant applications.

Finally, it is essential to recognize and reward research excellence (Murray, 2006). Instituting awards and recognitions for outstanding research contributions can motivate educators to strive for higher standards and push the boundaries of their scholarly work. This culture of recognition can also inspire a sense of pride and accomplishment among educators, further fueling their commitment to research and academic writing. Guangxi's public universities indeed implement a comprehensive system of recognition that includes regular feedback, peer reviews, and opportunities for career advancement based on research achievements. This continuous recognition can sustain motivation and commitment among educators, ensuring that research remains a priority in their academic careers. However, at present, this system has a unified rating standard in Guangxi public universities, and the lack of regular feedback has little effect on the improvement of teachers' scientific research ability.

In conclusion, while the educators in Guangxi's public universities have demonstrated commendable research capabilities, there is room for improvement, especially in problem-solving and application skills. By implementing targeted professional development initiatives, fostering collaborative research, providing institutional support, establishing partnerships, and recognizing research excellence, the universities can significantly enhance the research competencies of their educators. This holistic approach will not only bridge the existing gaps but also cultivate a robust research culture that contributes to the advancement of scholarly research in the region.

6. Recommendations

Building on the above analysis of the current state of teachers' research capabilities in Guangxi's public universities, the some recommendations are proposed to further enhance and sustain academic excellence. A longitudinal study could track the development of research capabilities over time, particularly among early-career teachers, to understand the long-term effects of professional development programs.

This approach would offer valuable insights into the sustainability and evolution of the skills and competencies identified in our study. The variation in research capabilities of teachers in public universities in Guangxi among respondents with different levels of experience and professional rank may also influence research performance. Future research could also explore the impact of these factors on research performance and the need for targeted support for different groups. In addition, it is crucial to anticipate and prepare for the ethical implications of new research directions (Stark, 2019). As artificial intelligence,

genetic engineering, and data analytic continue to advance, universities must ensure that ethical considerations are integrated into the research process (Wright, 2020). A more diverse and representative sample could provide a broader understanding of research capabilities across the teaching population, ensuring that the findings are applicable to all teachers in public universities in Guangxi. By implementing these recommendations, we can foster a more robust and responsive academic environment that meets the evolving needs of both educators and students.

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(21-EN-EDU)

Strategies for Enhancing Work Motivation of Administrative Staff in Guangxi Private Universities

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Abstract

The objectives of this research were to study the current situation of work motivation of administrative staff in Guangxi private universities. The sample group was 338 administrative staff in Guangxi private universities, selected by stratified random sampling, the universities used as the unit of sampling, and simple random sampling was also used in this research. The research instrument was 5-point scale questionnaires. The statistics used for data analysis included percentage, mean, and standard deviation. The research results show that the current situation of work motivation of administrative staff in Guangxi private universities in five aspects was at a high level, with the mean of 3.66 and standard deviation of 0.52. The results of this research ranged from the highest to the lowest mean: the highest mean was job security and stability with the mean of 3.76 and standard deviation of 0.53, followed by work environment, with the mean of 3.67 and standard deviation of 0.56, and compensation and welfare was the lowest mean, with the mean of 3.55 and standard deviation of 0.66.

Keywords: administrative staff; Guangxi private universities; strategies; work motivation

1. Introduction

Nowadays, the world is changing rapidly, and to keep China abreast with global changes, either a public or private sector, educational organizations are an important force to develop society to be better. As announced by the Ministry of Education of the People's Republic of China regarding "Main missions of Department of Higher Education in 2023". The main idea mentioned in this policy is to promote innovation and high-quality of education in public and private higher education, to resolve the issues that restrict the development of higher education for building a strong country and setting the new direction of higher education development. (Ministry of Education of the People's Republic of China, 2023)

However, educational staff, also known as administrative staff, is an importance force in driving educational organizations to achieve its goals. Therefore, the organization should pay attention to incentive mechanism to motivate staff to work hard and efficiently, consider factor affecting work motivation, especially the compensation policy, the work environment and performance evaluation which directly affect the payment. The fair compensation in line with the cost of living and can motivate employees to work. (Sakon Bunsin, 2016). This is related to the theory of Maslow's Hierarchy of Needs, his theory has been widely recognized and a huge number of researcher have accepted and applied it in their studies since 1950s, Abraham Maslow (1954) suggests that the central to this theory consisted of five main needs: physiological, safety/security, social/affiliation, self-esteem and self-actualization. In the case of administrative staff's work motivation, the physiological needs are related to the salary and workplace conditions, the safety needs express the administrative staff can assure that their job is guaranteed and secured. The belonging needs are about the satisfaction with colleagues, willing to participate with others and making decision about policy and work procedures. According to Maslow's concepts, the self-esteem needs involve that the recognition of their abilities and competencies. The last requirement is the self-actualization needs, which includes the need to maintain their competencies, success by having either short-term and long-term of training and career development such as workshops, seminars and conferences. (Nipaporn Chalermnirundorn, 2018; Reference from Abraham Maslow, 1954)

However, compare with public universities, incentive mechanisms, which are the basic needs and motivation for staff in Guangxi private universities, are not appropriate for the scope of works. This leads to the problem of high potential staff leaving private universities and resign to apply for jobs at public or private universities in other cities, causing private universities in Guangxi to lack strong management teams. Lack of motivation, staff may not be committed to performing to the organization's standards. According to the above reason, weather Guangxi private universities lack a strong management team to drive the organization, it affects the development of the organization to be in accordance with the desired conditions. Furthermore, due to the lack of organizational attention, private universities disregard the incentive mechanisms for management team, which results administrative staff lack of work motivation. This has had

a significant negative impact on the administrative staff's motivation and productivity, as well as the overall growth of private universities. (Chen Fuhua, 2003).

Based on this, this research focused on the work motivation of administrative staff in private universities. To provide strategies for efficient work motivation for staff and ensure private universities' steady and sustainable growth, it's important to have high-quality management teams and teams with a suitable incentive mechanism. This can have a significant positive impact on the motivation and productivity of administrative staff and the overall growth of private universities.

2. Research Objectives

To study the current situation of work motivation of administrative staff in Guangxi private universities.

3. Research Methodology

The population

The population of this research was 2654 administrative staff from 12 private universities in Guangxi.

The sample group

According to Krejcie and Mogan's sample table (1970), the sample group was 338 administrative staff from 5 private universities located in five cities in Guangxi, selected by stratified random sampling, the universities used as the unit of sampling, and simple random sampling was also used in this research.

The research instruments

Questionnaire

The instrument used to collect the data was 5-point scale questionnaires. The questionnaire was designed based on work motivation in five aspects (Maslow, A., & Lewis, K. J., 1987): 1) compensation and welfare, 2) job security and stability, 3) work environment, 4) honors and awards, and 5) career growth. The questionnaire was divided into two parts:

Part 1: The personal information of respondents, classified by gender, age, marital status, educational background, work experiences, job position, and income.

Part 2: The current situation of work motivation of administrative staff in Guangxi private universities.

Constructing a questionnaire process

Step 1: Reviewed and analyzed the documents, concepts, theories, and research related to work motivation.

Step 2: Construct the questionnaire about the current situation of work motivation of administrative staff in Guangxi private universities, sent the questionnaire outline to thesis advisors and revised the contents according to the suggestions.

Step 3: The researcher invited 5 experts to examine validity of the questionnaire. The index of objective congruence (IOC) of the questionnaire was 0.88-1.00.

Step 4: Revised the questionnaire according to the suggestions of five experts.

Step 5: The questionnaires were distributed to 30 administrative staff in private universities in Guangxi for try-out. The reliability of the questionnaire was 0.959.

Step 6: The questionnaire was applied to 338 administrative staff in 5 private universities in Guangxi.

Data Collection

The data collection for the current situation of work motivation of administrative staff in Guangxi private universities is as follows:

Step 1: The researcher requested a requirement letter form from the graduate school, Bansomdejchaopraya Rajabhat University, for collecting the data from 338 administrative staff in 5 private universities in Guangxi.

Step 2: The researcher distributed the questionnaire to 338 administrative staff by online method and successfully collected from all respondents, achieving a 100% response rate.

Data Analysis

The data analysis in this research, the researcher analyzed the data by package program, as follows:

Step 1: The personal information of the respondents was analyzed by frequency and percentage, classified by gender, age, marital status, educational background, work experiences, job position, and income.

Step 2: The current situation of work motivation of administrative staff in Guangxi private universities in five aspects was analyzed by mean and standard deviation.

4. Research Results and Discussion

Research Results

The research results about the current situation of work motivation of administrative staff in Guangxi private universities in five aspects: 1) compensation and welfare, 2) career growth, 3) honors and awards, 4) work environment, and 5) job security and stability. The data was presented in the form of mean and standard deviation.

Table 1 Mean and standard deviation of the current situation of work motivation of administrative staff in Guangxi private universities in five aspects. (n=338)

No	Work motivation of administrative staff in Guangxi private universities	$\overline{X}$	SD	level	order
1	Compensation and welfare	3.55	0.66	high	5
2	Job security and stability	3.76	0.53	high	1
3	Work environment	3.67	0.56	high	2
4	Honors and awards	3.67	0.58	high	3
5	Career growth	3.62	0.64	high	4

No	Work motivation of administrative staff in Guangxi private universities	$\overline{X}$	SD	level	order
	Total	3.66	0.52	high	

From table 1, found that the current situation of work motivation of administrative staff in Guangxi private universities in five aspects was at a high level, with the mean of 3.66 and standard deviation of 0.52. Considering the results of this research aspects ranged from the highest to lowest mean were as follows: the highest mean was job security and stability with the mean of 3.76 and standard deviation of 0.53, followed by work environment, with the mean of 3.67 and standard deviation of 0.56, and compensation and welfare was the lowest mean, with the mean of 3.55 and standard deviation of 0.66.

Compensation and welfare were at a high level, the research results found that the university provides benefits such as subsidies for further study, business trip allowances, housing subsidies, transportation subsidies, and insurance to reduce employees' financial risk. In addition to having a suitable salary system, the universities also provide benefits that help work-life balance, such as holidays, vacations, maternity leave. However, the university should reset a reasonable overtime pay system to meet the needs of staff.

Career growth was at a high level, the research results showed that the university regularly arranges training or workshops to promote self-improvement for staff and supports staff to improve professional skills and participate in various trainings. Additionally, the administrators assign work based on staff's knowledge and abilities, as well as support staff to improve academic potential and focused on their career growth. However, the university should survey staff' career development needs and provides regular career development guidance and support.

Honors and awards were at a high level. Considering the results of this research, found that the university regularly holds commendation conferences or activities to publicly recognize the achievements and contributions of outstanding staff, and provides other forms of incentives besides material rewards, such as remuneration, career development opportunities, etc. Moreover, the universities support staff to fully utilize their capabilities and ensures that the quality of their work is recognized. While there is a fair and a transparent performance evaluation system, but staff are need recognized by leaders and colleagues and have appropriate promotion opportunities.

Work environment was at a high level. The results showed that staff always consult or discuss work issues without conflicting with colleagues, and feel free to share lives, values, customs, or activities with colleagues. Staff can fully utilize their expertise and abilities to help the team and solve problems while working and provide an opinion or suggestion about decision-making in the work process. However, staff is still needing more opportunity to meet and participate in the activities with leaders to strengthen the relationships.

Job security and stability were at a high level. The results showed that the university provides a safe workplace for staff and appropriate equipment to ensure the smooth conduct of work. In case of make a mistake, the university avoid dismissing the staff unfairly, take steps to prevent verbal and physical violence at work, so that staff feel safe in their career. However, the university should give decision-making power to the staff, so that staff to feel like they are part of the organization.

Discussion

The discussion about the current situation of work motivation of administrative staff in Guangxi private universities in five aspects: 1) compensation and welfare, 2) career growth, 3) honors and awards, 4) work environment, and 5) job security and stability.

The current situation of work motivation of administrative staff in Guangxi private universities in five aspects was at a high level. Among the results, the highest mean was job security and stability, followed by work environment, and compensation and welfare were the lowest mean. This is because the university provides a safe workplace for staff and provides sufficient and appropriate equipment to ensure the smooth conduct of work. Staff can consult or discuss work issues with colleagues at any time without conflicting with them and feel free to share lives, values, customs, or activities with colleagues.

Compensation and welfare were at a high level. This is because the university provides benefits such as subsidies for further study, business trip allowances, housing subsidies, transportation subsidies, etc., provides benefits that help balance work and life, such as holidays, vacations, and maternity leave, and supports flexible working hours. Mary Makena Muguongo, Andrew T. Muguna, Dennis K. Muriithi (Muguongo, M. M., Muguna, A. T., & Muriithi, D. K., 2015) show that teachers' basic pay and allowances should be reviewed by the teacher's service commission from time to time to reflect changes in the economic landscape of the country. The government reviews the teachers' compensation to be commensurate with the services rendered. It is hoped that the findings of this study could assist education planners in formulating compensation policies that would enable teachers to achieve job satisfaction.

Career growth was at a high level. The reason is the university regularly arranges training or workshops to promote self-improvement for staff and supports staff in pursuit of knowledge and participation in various trainings. Assign work based on staff's knowledge and abilities. This is related to promoting career advancement and career stability for the caregiver (Someran L., Am-Ugsor S., Sastsara S., Supaphol S., 2018) shows that personal factors, organizational factors, performance factors, and work quality factors affect career growth and stability of staff. The administrators should allow the staff to fully demonstrate their abilities and recognize their outstanding abilities so that the staff is most motivated to work and emphasize rewards that are not just in the form of money, such as opportunities for career growth, knowledge development in various fields, and employee appreciation.

Honors and awards were at a high level. The reason is the university regularly holds commendation conferences or activities to publicly recognize the achievements and contributions of outstanding staff, and

the university provides other forms of incentives besides material rewards, such as remuneration, career development opportunities, etc. This is related to Wang Chenya, Pan Yuelin, and Sun Tianci (Wang C. Y., Pan Y. L., & Sun T. C., 2024) show that the teacher honor system is relatively well-established, and internal optimization is needed, Honor system helps improve teachers perceived social status, The teacher honor system has significant direct and indirect effects on teachers' social status.

Work environment was at a high level. The reason is staff can consult or discuss work issues with colleagues at any time without conflicting with them and feel free to share lives, values, customs, or activities with colleagues. The university cares about the staff's well-being and takes steps to improve staff job satisfaction. This is related to Prasert Chatchaisak, cited in Thiankhwan Sraptanamun and Laddawan Petchroj (Sraptanamun, T., & Petchroj, L., 2022) shows that the work environment helps to promote a good working atmosphere. Materials and equipment used for work are sufficient and clean, creating a good working atmosphere. The administrators of large private primary schools can allocate teachers' working hours to meet appropriate standards, which will create satisfaction in their work.

Job security and stability were at a high level. The reason is that the university provides a safe workplace for staff and provides sufficient and appropriate equipment to ensure the smooth conduct of work. The university avoids laid-off staff to maintain staff's job security. The university takes steps to prevent verbal and physical violence in the workplace. This is related to Margaret Funke FAREMI (Faremi, M. F., 2017), which shows a significant relationship between teacher turnover and job security in schools. It was therefore recommended that teacher retention strategies should include prompt payment of salary, workers' welfare packages, a good working environment and conditions, and the provision of basic work requirements in schools to ensure job security and stability in private secondary schools. C. P. Akpan (C. P. Akpan, 2013) places job security and job satisfaction jointly and significantly predict the organizational commitment of academic staff. It would apply to staff who perceive their job as being secure. Therefore, job security is concepts that affect job attitudes and organizational commitment of university staff. Related to promoting career advancement and career stability for the caregiver (Someran L., Am-Ugsor S., Sastsara S., Supaphol S., 2018) the research results show that the administrators should emphasize rewards that are not just in the form of money, such as opportunities for career growth, knowledge development in various fields, and employee appreciation and avoiding layoffs or furloughs, which will affect existing staff and leave them feeling insecure.

5. Recommendations

Implication

In order of compensation and welfare, the administrators should provide a reasonable overtime pay system to meet the needs of staff and pay staff based on how well they achieve their goals. Using a performance-based salary increases system to motivate staff to improve themselves.

In order of career growth, the administrators should provide equal career growth and promotion opportunities. Emphasize and provide rewards other than financial incentives, such as career development opportunities. The administrators should survey staff's career development needs and provide career development guidance and support regularly.

In order of honors and awards, the administrators should recognize the abilities of staff and provide appropriate promotion opportunities. Respect personal work decisions and only monitor their work results rather than interfering with the work process to ensure staff feel they are valued members of the organization.

In order of work environment, the administrators should provide the opportunity to meet and participate in the activities with leaders to strengthen the relationships. Support the staff feeling part of the organization and welcomed and appreciated by leaders and colleagues.

In order of job security and stability, the administrators should listen to staff's opinions and involve them in setting work goals and decentralize decision-making power to give staff a sense of responsibility and decision-making ability. Encourage staff to reach their full potential and make them willing to contribute to the success of the organization.

Future research

1. Further studies in work motivation of staff in different sample group, such as administrative staff in different cities or college, administrative staff in public university, so that the research can compare work motivation of administrative staff who work in different context and future reset relevant policies.

2. This research focused on the current situation, in future research, should focus on expected situation and survey of administrative staff's opinion, to achieve an approach that satisfies all parties.

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The relationship between Interpersonal Relationships and social anxiety among Students of Liaoning Normal College

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Abstract

The research objectives were: 1) To study the interpersonal relationships among students of Liaoning Normal College, 2) To study the social anxiety among students of Liaoning Normal College, 3) To study the relationship between interpersonal relationships and social anxiety among students of Liaoning Normal College. The sample group of this study was 297 students in Liaoning Normal College. The research instruments included 5 points of rating scales and questionnaires. The data was analyzed by finding percentile, average value, and standard deviation. The research showed that: 1) The interpersonal relationship among students in Liaoning Normal University was at a high level. 2) The social anxiety among students of Liaoning Normal College was at a high level. 3) The correlation between interpersonal relationships and social anxiety among students of Liaoning Normal College was statistical significance at .01 level.

Keywords: interpersonal Relationships; Liaoning normal college; social anxiety

1. Introduction

Interpersonal relationship is an important social relationship. Interpersonal relationship is the communication relationship between us and others. In college students, interpersonal relationships have an extremely important impact on personal growth and academic development. It is of special significance to college students who are preparing for professional development. College students are at an important stage of education and professional socialization, when they are exposed to the adult world and ready to enter society. Because students spend most of their time in school, the interpersonal relationship between them and the people around them directly affects the psychological development and personality formation of students. Students' interpersonal disturbance is considered to be the most important cause of mental disorders and mental diseases. Some studies have shown that improving students' interpersonal skills is helpful to improve their mental health level. (Zhang Shu, Liu Tuo, Xia Fangjing, 2020)

Interpersonal communication is a need for college students' physical and mental development, and an important way to maintain physical and mental health. For young college students, they are active in thought, rich in feelings, especially the demand for interpersonal communication is extremely strong, we all try to get friendship through interpersonal communication to meet their material and spiritual needs. Generally speaking, students with good interpersonal relationships can maintain a cheerful character, so as to correctly understand and deal with various practical problems and solve various contradictions in study and life. On the contrary, if there is a lack of positive interpersonal communication and cannot treat oneself and others correctly, it is easy to form great spiritual and psychological pressure, and it is difficult to solve psychological contradictions. In serious cases, it may also lead to pathological psychology, such as depression. (Wang Xihua, Zhang Zhen, 2014)

Interpersonal communication is an important way to exchange information and acquire knowledge. College students can communicate and exchange information and achievements with each other, constantly improve their own experience, broaden their horizons, and activate their thinking. Interpersonal communication is actually a social activity of acquiring and exchanging knowledge and information. In today's information-based society, students who are not willing to interact with others are bound to build barriers between themselves and society, thus becoming ignorant. Therefore, interpersonal communication can not only broaden the horizon of knowledge, but also the communication of information is bound to become a successful agent on the road of college students. (Yang Jinshi, Zhang Baozhong,2021)

The current research on interpersonal relationship mainly focuses on two aspects: the investigation of the current situation of interpersonal relationship and the study of interpersonal relationship distress. A lot of research on the status of interpersonal relationships is intuitively expressed by survey data. Some studies have found that the degree of peer relationship distress in interpersonal relationships is significantly related to students' mental health level, and with the growth of grade, the degree of peer relationship distress also increases; The interpersonal relationship of college freshmen is not optimistic, interpersonal

relationship is positively correlated with mental health, and mental health has a significant predictive effect on interpersonal relationship. Individual interpersonal relationship and mental health are closely related, and they influence each other. (Wang Xihua, Zhang Zhe,2010)

Social anxiety is a kind of negative emotion produced by individuals in the process of social communication, accompanied by symptoms such as blushing and rapid heartbeat, which will interfere with the smooth progress of social activities. Social anxiety is manifested as the fear of negative evaluation and the tendency to avoid social occasions. When it is unavoidable, anxiety will appear and accompanied by certain physiological reactions. It often appears in college students and affects their daily social and mental health. The College stage is an important watershed in personality and psychological development, which requires rebuilding a sense of self-identity and interpersonal relationships, and being recognized by new environments and new roles. However, social anxiety of college students will cause them to have interpersonal relationship troubles, and they always hold a negative and evasive attitude towards uncertain situations in the future, which also conforms to the negative reinforcement emotional processing model, that is, when negative emotions come, individuals will choose addictive behaviors to avoid such adverse emotional experience. There is evidence that Chinese college students have a high level of social anxiety, 27.2% of them are in a state of high anxiety, and 14.1% of them are highly fearful of communication. Social anxiety will affect the physical and mental health of college students, and even reduce individual happiness, academic and social interaction. (Xu Yunhong, Zhang Jiaying, Li Yuying 2023)

After college students get out of the relatively closed environment of high school, they have to face various problems independently. If they can't solve these problems properly, they are prone to mental health problems such as anxiety. With the social transformation and change bringing more confusion and pressure to this emerging group, the psychological problems exposed are more serious than that of ordinary college students. There are more studies on the correlation between interpersonal relationship and social anxiety in middle school students and college students, but few studies on vocational students. Therefore, it is of great significance to study and analyze the interpersonal relationship and social anxiety of college students, and to carry out effective and targeted promotion of mental health education. (Wu Caizhi, Jiang Guangrong, Duan Wenting.2018)

This paper focuses on the relationship between interpersonal relationship and social anxiety of vocational college students, aiming to explore the relationship between these two variables in the group of vocational college students, and make more scientific and practical suggestions for the guidance of mental health of college students in view of these relationships and the problems presented.

2. Research Objectives

1. To study the interpersonal relationships among students of Liaoning Normal College.

2. To study the social anxiety among students of Liaoning Normal College.

3. To study the relationship between interpersonal relationships and social anxiety among students of Liaoning Normal College.

3. Research Methodology

Population and the Sample Group

Population

The research subjects are 1251 students from Liaoning Normal College.

The Sample Group

The sample group of this study is 297 students in Liaoning Normal College by Accident random sampling, according to Krejcie and Mogan table (1970).

Research Variables

1. Interpersonal relationships

2. Social anxiety

Research Instruments

Questionnaire Survey

This research of this study is the questionnaire on interpersonal relationship and social anxiety of students in Liaoning Normal College. Its design is based on five small variables of the following two main variables: Classmate relationship, Teacher-student relationship, Friendship, Family factors, Environmental factor, the questionnaire is divided into two parts.

Part 1: Basic information of the respondents, including gender, age, grade, family members and other basic information.

Part 2: This research about interpersonal relationship and social anxiety, including: questions for basic information,5 questions for Classmate relationship,5 questions for teacher-student relationship,5 questions for Friendship, a total of 15 problems.

Part 3: This research about social anxiety, including: 5 questions for Family factors,5 questions for Environmental factors, a total of 10 problems.

Data Collection

Questionnaire data collection

In order to collect useful data for this study, we believe that the researchers took the following steps.

1. Send survey questionnaires to students at Liaoning Normal College and inform them of the purpose of the survey.

2. Collect survey questionnaires from respondents.

3. Filter collected data and exclude invalid data survey forms

4. Organize data and start data analysis

Data Analysis and Statistics used

1. Analyze the current level of psychological feedback among vocational college students. In order to achieve the research objectives, researchers collected data, analyzed the basic situation, described the psychological status of students, and provided an overall description of the student questionnaire. The overall description and statistics of the survey questionnaire were analyzed, and the survey results were obtained.

2.The research objective is to carry out mental health work for school students. For the purpose of the study, researchers used data analysis to analyze the coefficients of interpersonal relationships and social anxiety and obtained the research results.

The data interpretation for average value is based on Rensis Likert (1932). The data interpretation is as follows:

Mean score between 4.50 – 5.00 refers to students' interpersonal relationships are at the highest level.

Mean score between 3.50 – 4.49 refers to students' interpersonal relationships at high level.

Mean score between 2.50 – 3.49 refers to students' interpersonal relationships at medium level

Mean score between 1.50 – 2.49 refers to refers to students' interpersonal relationships at low level

Mean score between 1.00 – 1.49 refers to refers to students' interpersonal relationships at the lowest level

3. The relationship between interpersonal relationships and social anxiety was analyzed by using the Pearson Product Moment Correlation Coefficient (r). which have been compared according to the criteria of Hinkle, William & Stephen (1998). The correlation coefficient description as follows:

Correlation value between 0.91 - 1.00 shows very high correlation.

Correlation value between 0.71 - 0.90 shows high level of relationship.

Correlation value between 0.51 - 0.70 shows medium or moderate relationship.

Correlation value between 0.31 - 0.50 shows low level of relationship.

Correlation value between 0.00 - 0.30 shows a very low level of relationship.

Data analysis results

Part 1. The Data analyze on the personal information of the respondents.

The personal information of the respondents is analyzed according to the number and percentage, and classified according to Gender, Major, Grade, Student leader, Hometown, Living Status, Family Size.

According Table 4.1, of the 297 respondents, 279 students are female, accounting for 93.94 percentage. The number of students majoring in preschool education is the highest, with 189 students, accounting for 63.64 percentage. The highest number of sophomores is 176 students, accounting for 59.26 percentage. There are 72 student cadres, accounting for 24.24 percentage. The number of students from small and medium-sized cities in their hometowns is the highest, with 106 students, accounting for 35.69 percentage. The number of students living with friends in dormitories is the highest, with 149 students. Accounting for 50.16percentage. The number of students with a family size of 4-6 is the highest, with 163 students, accounting for 54.88 percentage.

Table 4.1 Basic Information of Student

Basic Information of Student	Frequency	Percentage
1. Gender		
1.1 Male	18	6.06
1.2 Female	279	93.94
Total	**297**	**100.00**
2. Major		
2.1 Preschool Education (Teacher Training)	189	63.64
2.2 Advertising art design	6	2.02
2.3 Drama, film and television performance	7	2.36
2.4 Musical performance	6	2.02
2.5 Dance performance	6	2.02
2.6 Early Education (Teacher Training)	59	19.87
2.7 Infant care services and management	24	8.08
Total	**297**	**100.00**
3. Grade		
3.1 Freshmen	121	40.74
3.2 Sophomore	176	59.26
Total	**297**	**100.00**
4. Student leader		
4.1 Yes	72	24.24
4.2 No	225	75.76
Total	**297**	**100.00**
5. Hometown		
5.1 Big city	34	11.45
5.2 Small and medium city	106	35.69
5.3 County seat	78	26.26
5.4 Rural area	79	26.60
Total	**297**	**100.00**
6. Living status		
6.1 Living with family	146	49.16
6.2 Living with friend in Dormitory	149	50.16
6.3 Living with other people	2	0.67
Total	**297**	**100.00**

Basic Information of Student	Frequency	Percentage
7. Family size		
7.1 2-3 persons	117	39.39
7.2 4-6 persons	163	54.88
7.3 More than 6 persons	17	5.72
Total	297	100.00

Part 2. The data analyze on the interpersonal relationships and social anxiety among students of Liaoning Normal College.

To analyze the interpersonal relationships among students of Liaoning Normal College. Using the Method of Mean and Standard Deviation to Analyze the Classmate relationship, teacher-student relationship, friendship of students in Liaoning Normal College. The results of the data on interpersonal relationship of students in Liaoning Normal College. in Schedule 4.2.

Table 4.2 The average value and standard deviation of the interpersonal relationships among students of Liaoning Normal College.

The interpersonal relationships	$\bar{x}$	SD	Level	Ranking
1.Classmate relationship	3.82	1.17	high	4
2.Teacher-student relationship	3.85	1.29	high	3
3.Friendship	4.07	1.06	high	2
Total	3.91	1.18	high	

As can be seen in Table 4.2, the overall mean of the interpersonal relationships among students of Liaoning Normal College is at a high level ($\bar{X}$=3.91, SD=1.18).

The findings of these 3 dimensions are as follows: the highest-ranking is "Friendship" ($\bar{X}$=4.07, SD=1.06), indicating a high level. This was followed by "Teacher-student relationship" ($\bar{X}$=3.85, SD=1.29), while "Classmate relationship" was the lowest ranking ($\bar{X}$=3.82, SD=1.17).

Part 3. The data analyze on the social anxiety among students of Liaoning Normal College.

To analyze the social anxiety among students of Liaoning Normal College. Using the Method of Mean and Standard Deviation to Analyze the family factors, environmental factors of students in Liaoning Normal College. The results of the data on social anxiety of students in Liaoning Normal College. in Schedule 4.3.

Table 4.3 The average value and standard deviation of the social anxiety among students of Liaoning Normal College.

Social Anxiety	$\overline{x}$	SD	Level	Ranking
1.Family factors	4.25	1.01	high	1
2.Environmental factors	3.51	1.37	high	5
Total	**3.88**	**1.26**	**high**	

As can be seen in Table 4.6, the overall mean of the social anxiety among students of Liaoning Normal College is at a high level ($\overline{\mathbf{X}}$=3.88, SD=1.01).

The findings of these 2 dimensions are as follows: the highest-ranking is "Family factors" ($\overline{\mathbf{X}}$=4.25, SD=1.01), while "Environmental factors" was the lowest ranking ($\overline{\mathbf{X}}$=3.51, SD=1.37).

Part 4. The data analyze on the relationship between interpersonal relationships and social anxiety among students of Liaoning Normal College. in Schedule 4.4.

Table 4.4 The coefficients between interpersonal relationships and social anxiety are shown.

The interpersonal relationships (X)	The social anxiety (Y)		
	Family Factor	Environmental Factor	Ytt
Classmate Relationship	0.596**	0.583**	0.655**
Teacher-student relationship	0.663**	0.612**	0.708**
Friendship	0.752**	0.636**	0.770**
Xtt	0.734**	0.667**	0.778**

** represents statistical significance at .01 level

On the basis of the hypothesis of this study, it was found that the correlation between interpersonal relationships and social anxiety among students of Liaoning Normal College was statistical significance at .01 level. The coefficient was 0.778** (r=0.778**). On this basis, the largest relationship was between friendship and family factor (r=0.752), followed by the relationship was between teacher-student relationship and family factor (r=0.663), and the lowest relationship was between classmate relationship and family factor (r=0.583).

4. Research Results and Discussion

Research Results

The results of this study are consistent with the purpose of this study. Through the analysis of standard deviation and mean of interpersonal communication and social anxiety, the following three conclusions can be drawn:

1. The interpersonal relationship among students in Liaoning Normal University is at a high level. The highest-ranking is "Friendship", indicating a high level. This was followed by "Teacher-student relationship", while "Classmate relationship" was the lowest ranking.

2. The social anxiety among students of Liaoning Normal College is at a high level. The findings of these 2 dimensions are as follows: the highest-ranking is "Family factors", while "Environmental factors" was the lowest ranking.

3. It was found that the correlation between interpersonal relationships and social anxiety among students of Liaoning Normal College was statistical significance at .01 level. The coefficient was 0.778**. The largest relationship was between friendship and family factor. followed by between teacher-student relationship and family factor. and the lowest relationship was between classmate relationship and family factor.

Discussion

The relationship between Interpersonal Relationships and social anxiety among Students of Liaoning Normal College is discussed as follows:

1.The interpersonal relationship among students in Liaoning Normal University is at a high level. The highest-ranking is "Friendship", indicating a high level. This was followed by "Teacher-student relationship", while "Classmate relationship" was the lowest ranking. The detail in discussion are as follows:

1.1 The overall mean of the Classmate relationship is at a high level. Considering the results of this research aspect are as follows: the highest ranking is" Students respect their classmates' opinions on group work.", followed by " Students are willing to help classmates with group work and stretch their classmates' ideas to complete group assignments." While " When a classmate does something unpleasant, students will not blame him." and " When a classmate does something unpleasant, students will not blame him." is the lowest ranking. The reason is that college students have a deeper understanding of the concept of friendship. Friends are not simply like-minded, and they no longer talk about topics of common interest. What is more important is to think about each other, such as physical health, study and work, economic interests and so on. The results of this study are consistent with those of Zhang Xueliang (2010). In school the friendship between two people is simple, two people because of the same interests or have a common topic of friendship. College students have a deeper understanding of the concept of friendship. Friends are not simply like-minded, nor are they talking about common topics of interest: more importantly, they are thinking about each other, such as physical health, study and work, economic interests and so on. Everyone

has their own understanding, the establishment of friendship, is to exchange with each other, can be a material exchange, can also be a spiritual exchange, whether it is utilitarian and interpersonal relations have a high impact.

1.2 The overall mean of the Teacher-student relationship is at a high level. Considering the results of this research aspect are as follows: the highest ranking is" Students sincerely respect their teacher both with them or without them." followed by "Students trust teachers to discuss problems with them." while "Students are afraid to consult their teachers when students have personal problems." is the lowest ranking. The reason is related to the fact that the students in our school are normal college students, and the nature of their future career development determines that they have a higher understanding of the teaching profession than students in other majors in their daily study, and they have a higher sense of affinity with teachers and a higher communication and interaction with teachers. The results of this study are the same as those of Wei Yaoyang (2020). Normal college students in the ordinary learning, more professional training of teacher skills, they through the stage trial, Putonghua training, etc., show gradually confident, so their inferiority level is lower than other professional college students. In terms of interpersonal security score, the overall score is lower than the norm score, indicating that the subjects in this study have a higher sense of interpersonal security than other subjects. Through professional skills training, normal college students appear more confident in interpersonal communication, and their hostility, suspicion and distrust in interpersonal communication will be reduced, so they have a higher degree of interpersonal security than students in other majors.

1.3 The overall mean of the Friendship is at a high level. Considering the results of this research aspect are as follows: the highest ranking is" "Reading a book with a group of friends is a valuables thing.", followed by "When friends express different opinions, Students listen and accept their opinion another way to find out." while "Working with friends is better than working alone." is the lowest ranking. The reason is because in the process of communicating with classmates. Sometimes they are silent, emotional, cold and isolated, but they also have a strong need for communication, and they are eager to get along with others to be recognized, but they lack initiative. The results of this study are consistent with those of Ma Yanping (2007). When communicating with classmates, first of all, we should respect each other, understand each other, learn to "exchange roles", understand and accept each other reasonably; Secondly, try to get familiar with each other, approach each other with practical actions, and shorten the distance between each other; Third, with enthusiasm, concern, intimate attitude, to infect, influence and drive them to feel that they are valued; Fourth, we should get along with them with modesty, patience and understanding.

2. The social anxiety among students of Liaoning Normal College is at a high level. The findings of these 2 dimensions are as follows: the highest-ranking is "Family factors", while "Environmental factors" was the lowest ranking. The detail in discussion are as follows:

2.1 The Family factors is at a high level. Considering the results of this research aspect are as follows: the highest ranking is" Students have a happy and complete family. Followed by "Students have open-minded parents.", while "To discuss these issues, Students tell parents about what students do in school." is the lowest ranking. The reason is because the family environment is crucial to the formation of a sound personality and mental health. Some foreign studies have found that bad parenting styles, such as severe punishment, denial, excessive involvement and protection, are the causes of social anxiety caused by certain personality disorders, and similar reports have also been reported in China. The results of this study are consistent with those of Zhu Kongxiang et al. (2003). The study found that the lack of warmth and emotional communication in the family is closely related to the occurrence of adolescent psychological disorders, and the importance of mutual care, support, understanding and help among family members for the mental health of boos. On the contrary, if there is a lack of love in the family, there is no mutual care and help, instead of contradictions and conflicts, it is easy for children to lack a sense of security in social interaction, and then produce neuroticism, sensitive paranoia, anxiety, depression and other bad mentality; The lack of free, democratic and equal harmonious atmosphere and cultural and recreational activities in the family environment will hinder the development of individual independence and social ability, resulting in feelings of inferiority and shame; Social anxiety is caused by the fear that one's words and deeds will be negated.

2.2 The overall mean of the Environmental factors is at a high level. Considering the results of this research aspect are as follows: the highest ranking is" Students are not tense mixing in a group", followed by "When mixing in a group, Students find themselves not worrying I will be ignored.", while " When mixing socially, Students are comfortable." is the lowest ranking. The reason is that college students with social anxiety are more reluctant to participate in social activities. When they have to participate in group activities, they often do not take the initiative to communicate with others, which further leads to their poor social skills. The results of this study are consistent with those of Li Menghan and Shi Changjun (2023). With the progress of science and technology and the rapid development of society, the society has higher and higher requirements for talents, the competition for resources in all aspects is fiercer, and the occurrence rate of social anxiety is gradually increasing. Social anxiety, which is one of the main psychological problems of college students, refers to the negative emotional states such as tension and fear experienced in the social interaction activities with others.

3. It was found that the correlation between interpersonal relationships and social anxiety among students of Liaoning Normal College was statistical significance at .01 level. The coefficient was 0.778**. The largest relationship was between friendship and family factor. followed by between teacher-student relationship and family factor. and the lowest relationship was between classmate relationship and family factor. The reason is that before going to college, many students communicate more with their families, so that family factors determine the development of students. After going to college, as I get older and spend

more time with my friends, the influence of my friends will gradually rise and even exceed the influence of my parents. In college, the influence of friends has been great, because they are more reference to friends, communicate with friends, a lot of things have been rarely said to their parents. The results of this study are consistent with those of Sun Shan (2018). To avoid students' compensatory escape from peer group due to daily interpersonal relationship and social anxiety, it is necessary to strengthen their psychological counseling and self-esteem and confidence training. Schools should create an atmosphere of tolerance, diversity, and encouragement to show their unique selves, so that students' self-esteem and confidence are more based on their internal standards. Specifically, the voices of young people can be listened to through multiple channels, and platforms for self-expression and display can be provided for them besides learning. Strengthen psychological counseling, support and expand the healthy interaction of various peer groups with the goal of interest development and self-presentation.

5. Recommendations

The suggestions for the application of the research results are as follows:

1. Among the students of Liaoning Normal College, the relationship between teachers and students has a great influence, which indicates that the relationship between teachers and students is a field that college students pay more attention to and have a relatively great influence on. As administrators and teachers of colleges and universities, we need to pay attention to the individual mental health of college students and the ideological and political education in school, and at the same time improve the overall quality of teachers and enhance the interaction between teachers and students. Further strengthen the relationship between teachers and students.

2. Among the students in Liaoning Normal College, the influence of family factors is the greatest, which indicates that family factors are the field that college students need to pay attention to. From this point of view, as college administrators, we should pay more attention to students' family situation, establish a home-school communication mechanism, and grasp the psychological factors that affect students' family situation in time. As the student management departments of colleges and universities, when establishing institutions, they should focus on those who have the ability to manage students' mental health education behind closed doors, and select those who are responsible for students and can provide care and help to students.

3. Although environmental factors are at the bottom of the list, their impact is still relatively large. Social anxiety can cause them to be afraid to attend social events, avoid interacting with strangers, feel lonely easily, and lose opportunities to meet new people. Social anxiety makes college students show tension and embarrassment in social interaction, which further intensifies their social fear and avoidance. As administrators of colleges and universities, we should organize some activities appropriately, plus

appropriate guidance, and let students participate in them. Only in this way can students establish healthy, positive and rich interpersonal relationships in college life.

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An Analysis of the Current and Expected Situation of Students' Sustainable Learning Abilities in Higher Vocational Colleges in Guangdong Province

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Abstract

The objectives of this mixed-method study were to analyze the current and expected situations of students' sustainable learning abilities in higher vocational colleges in Guangdong Province. The sample group consisted of 384 students in the academic year 2024. The sample size was determined by applying the Krejcie and Morgan table. The samples were selected through multi-stage random sampling: 164 students from the Pearl River Delta (PRD), 48 students from Eastern Guangdong (EGD), 86 students from Western Guangdong (WGD), and 86 students from Northern Guangdong (NGD) were included. The informants were selected from the top schools among the higher vocational colleges. Data were collected using a 5-point Likert scale questionnaire that demonstrated content validity, with an IOC index ranging from 0.60 to 1.00, a discrimination power between 0.42 and 0.89, and a reliability index of 0.88. Statistical analyses included percentage, mean, standard deviation, and $PNI_{Modified}$.

The study found three key components of students' sustainable learning abilities in higher vocational colleges in Guangdong Province: school environment, teacher, and student factors. The current level of these abilities was rated as moderate, while the expected level was rated as the highest. The group with high $PNI_{Modified}$ values, comprising student factors ($PNI_{Modified}$ = 0.24) and teacher factors ($PNI_{Modified}$ = 0.23), was identified as a weakness in the development of students' sustainable learning abilities.

Keywords: current and expected situations; students' sustainable learning abilities; sustainable learning

1. Introduction

In the 21st century, sustainable learning abilities are essential for personal, organizational, and societal growth, particularly in the context of China, where human resources are central to sustainable development (Xianghua, 2010). Higher vocational education must cultivate lifelong learning skills, enabling students to adapt, innovate, and continuously engage with learning as societal and technological demands evolve (Chen Xiaoyan, 2023; Shi, 2018).

Sustainable learning emphasizes self-directed, inquiry-based learning and cognitive strategies, which are critical for lifelong adaptability (Shan Ronglin, 2011). Recognized by UNESCO, these abilities are linked to self-efficacy and contribute to achieving educational goals and social progress (Wang Zhencun & Zhang Qingyu, 2023). However, vocational students in China often lack intrinsic motivation and active learning opportunities, highlighting the need for enhanced educational strategies.

Amid rapid technological and social changes, sustainable learning equips students with the problem-solving and inquiry skills necessary for lifelong growth, enhancing both vocational competencies and broader personal development (Barnett, as cited by Xu, Jialu & Li, 2023). This has made the cultivation of sustainable learning abilities a key focus of educational reform, aligning education with modern societal demands.

Recognizing the importance of sustainable learning abilities in preparing students to contribute meaningfully to society and the workforce, this study, titled "An Analysis of the Current Situation of Students' Sustainable Learning Abilities in Higher Vocational Colleges in Guangdong Province," aims to guide educational institutions and teachers in fostering these skills. By implementing effective strategies, the study seeks to empower students to think critically, solve problems, and thrive in the 21st century. Ultimately, it aims to support sustainable national development and provide guidelines for educational management strategies to enhance students' sustainable learning abilities in Higher Vocational Colleges

2. Research Questions

What are the current and expected situations of students' sustainable learning abilities in Higher Vocational Colleges?

3. Research Objectives

To analyze the current and expected situations of students' sustainable learning abilities in Higher Vocational Colleges

4. Research Framework

Students' sustainable learning abilities comprise three core factors: School Environment: A supportive institutional setting with appropriate infrastructure, resources, and curricula fosters critical thinking and lifelong learning. Teachers: Educators play a vital role in guiding and motivating students while developing

their cognitive and problem-solving skills, essential for independent learning (Zimmerman, 2002). Students: Learners' self-regulation, intrinsic motivation, and metacognitive skills are crucial for sustaining long-term learning (Pintrich, 2000). These factors collectively shape students' capacity for continuous, self-directed learning. the conceptual framework as illustrated in Figure 1.
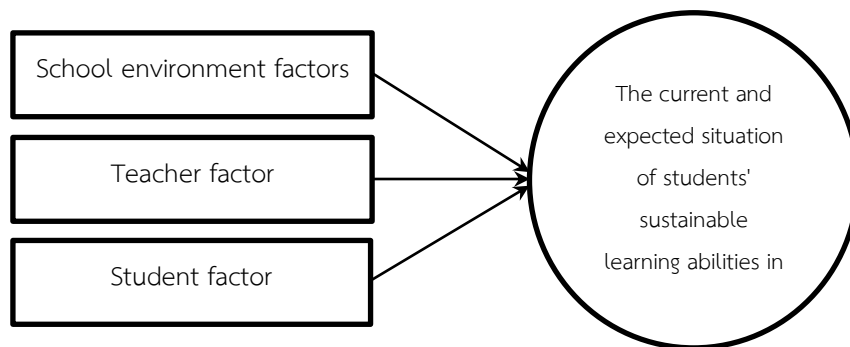
Figure 1 Research Framework

5. Definition of terms

5.1 Current situation refers to the level of implementation regarding students' sustainable learning abilities in higher vocational colleges in Guangdong Province, covering aspects related to the School environment, teachers, and students

5.2 Expected situation refers to needs and expectations for educational management in developing students' sustainable learning abilities at Higher Vocational Colleges in Guangdong Province

5.3 Higher education management refers to the management of an educational system that combines human and physical resources to oversee, plan, strategize and implement structures that enforce the educational system

5.4 Sustainable learning ability is the capacity of an individual to master effective cognitive strategies based on a certain level of cultural knowledge and to learn continuously and autonomously

5.5 Higher Vocational Institutions (HVIs) are colleges that provide higher vocational education, typically offering a three-year, full-time program focused on specialized skills. The goal of these institutions is to develop highly skilled technical and applied specialists who possess both theoretical knowledge and strong practical abilities, along with well-rounded personal qualities and business skills. HVIs primarily aim to produce graduates at the specialist level, preparing them for advanced technical roles in various industries

5.6 Students' sustainable learning abilities refer to students' capacity for continuous, self-directed learning, involving critical thinking, problem-solving, adaptability, self-regulation, and applying knowledge to new contexts. These abilities support lifelong learning and success. This study focuses on three key factors: management, teachers, and students.

6. Research Methodology

This study employs a mixed-method approach, incorporating qualitative research through field studies with in-depth interviews and quantitative research through survey methods. The research process is divided into three main steps:

Step 1: Document Review

The researcher conducted a comprehensive review of various documents, publications, electronic media, research studies, and other resources. Content analysis was employed to identify both the current and expected situations regarding students' sustainable learning abilities in the higher vocational colleges of Guangdong Province.

Step 2: In-depth Interviews

To further explore the current and expected situations regarding students' sustainable learning abilities, in-depth interviews were conducted with eight experts selected through purposive sampling. These experts included full-time teachers and teaching administrators from four higher education institutions, chosen based on the following criteria: 1) A minimum of five years of experience at their institution. 2) Familiarity with institutional development plans, teaching management, and student development processes. 3) Willingness to participate in structured and recorded interviews. And 4) Agreement to review and validate their interview transcripts.

Research Instrument

The research instrument used was a structured interview guide developed by the researcher, focusing on the current and expected situations of students' sustainable learning abilities in higher vocational colleges in Guangdong Province.

Data Collection

The researcher coordinated with the interviewees to schedule interviews at mutually convenient times. Data from the interviews were recorded and compiled for analysis.

Data Analysis

The interview data were analyzed using content analysis to categorize and summarize information, addressing the current and expected situations of students' sustainable learning abilities in higher vocational colleges in Guangdong Province.

Step 3: Studying the current situation, expected situation that enhance of students' sustainable learning abilities in higher vocational colleges in Guangdong Province.

Studying the current situation, and expected situation that enhance of students' sustainable learning abilities in higher vocational colleges in Guangdong Province. had details as:

The Population/Sample group

Population

Guangdong Province currently has 93 higher vocational colleges, with a total of 1.254 million students and approximately 50,000 educational administrators and teachers.

Sample Group

The study's sample comprises 384 students selected using purposive sampling from four top higher vocational colleges in Guangdong Province, representing the Pearl River Delta, Eastern Guangdong, Western Guangdong, and Northern Guangdong. These colleges were chosen based on regional conditions and represent 5% of the population from 92 institutions, with sampling guided by Krejcie and Morgan's table (1970). The sampling details are provided in Table 1.

Table 1 Sample size table of this survey

No	Education Institutions	Population	Sample Group	Reason
1	Shenzhen Vocational and Technical College	33,475	164	The best vocational colleges in the PRE
2	Shanwei Vocational and Technical College	9,786	48	The best vocational colleges in the EGD
3	Maoming Vocational and Technical College	17,599	86	The best vocational colleges in the WGD
4	Heyuan Vocational and Technical College	17,664	86	The best vocational colleges in the NGD
	Total	78,524	384	

Research Instrument

The research instrument was a questionnaire developed by the researcher based on the research framework. The questionnaire underwent a content validity check by five experts using the Index of Item-Objective Congruence (IOC), with values ranging from 0.60 to 1.00. It was then piloted (tryout), showing a discrimination power between 0.42 and 0.89 and a reliability score of 0.88 for the entire questionnaire.

Questionnaire design

Part 1: Respondent Information: This section gathered demographic data, including gender, age, educational background, and professional details.

Part 2: Current and Expected Situations: This section focused on assessing the current and expected situations of students' sustainable learning abilities in higher vocational colleges in Guangdong Province. The questionnaire covered three aspects: 1) School environment, 2) Teachers and 3) Students

Interpretation of Data

The data were interpreted using a five-point Likert scale with the following criteria:

5: Indicates that the current/expected situation is at the highest level.

4: Indicates that the current/expected situation is at a high level.

3: Indicates that the current/expected situation is at a medium level.

2: Indicates that the current/expected situation is at a low level.

1: Indicates that the current/expected situation is at the lowest level.

The interpretation criteria for the scores are based on the method proposed by Best (1984: 179–184), categorized into five levels:

Average score 4.51 – 5.00: Represents the current/expected situation at the highest level.

Average score 3.51 – 4.50: Represents the current/expected situation at a high level.

Average score 2.51 – 3.50: Represents the current/expected situation at a moderate level.

Average score 1.51 – 2.50: Represents the current/expected situation at a low level.

Average score 1.00 – 1.50: Represents the current/expected situation at the lowest level.

Data Collection

1. The researcher requested a letter from the Graduate School of Bansomdejchaopraya Rajabhat University for requiring to collect the data from 384 students from four higher vocational colleges in Guangdong Province.

2. The researcher distributed questionnaires to 384 students in 4 higher vocational colleges in Guangdong Province to ensure that the recovery rate of the questionnaires is 100%.

Data Analysis

The demographic variables were analyzed using descriptive statistics, including frequency and percentage. The current and expected situations of students' sustainable learning abilities in higher vocational colleges in Guangdong Province were analyzed using descriptive statistics, such as mean and standard deviation (S.D.), along with the priority needs index modified (PNI $_{Modified}$). These analyses aimed to identify the current and expected situations and assess students' sustainable learning abilities, which were then utilized in a SWOT analysis to develop future strategies.

7. Research Results and Discussion

Research Results

1. From the research process, Step 1 involved studying relevant documents and research, and Step 2 consisted of interviews with 8 experts. The findings revealed that the key factors in developing students' sustainable learning abilities consist of three main aspects: School factors, Teacher factors, and student factors. The researcher used the synthesis results from Steps 1 and 2 as the basis for conducting Step 3,

which aimed to study the current and expected situations of students' sustainable learning abilities in higher vocational colleges in Guangdong Province.

2. The results of studying the current and expected situations of students' sustainable learning abilities in higher vocational colleges in Guangdong Province are summarized in Table 2 – 6.

Table 2 Analysis of the personal information and participants. (n=384)

Personal Information		Frequency	Percentage
Total		384	100
1. School:	1. Shenzhen Vocational and Technical University	164	42.70
	2. Shanwei Vocational and Technical College	48	12.50
	3. Maoming Vocational and Technical College	86	22.40
	4. Heyuan Vocational and Technical College	86	22.40
2. Gender:	1. Male	159	41.40
	2. Female	225	58.60
3. Grade:	1. First year of university	148	38.50
	2. Second year of university	128	33.30
	3. Third year of university	108	28.10

According to Table 2, this study found that among the 384 respondents, the majority were students from Shenzhen Vocational and Technical University, accounting for 164 individuals (42.70%). Following this group were students from Maoming Vocational and Technical College and Heyuan Vocational and Technical College, with 86 individuals (22.40%). Most respondents were female, comprising 159 individuals (41.40%). Regarding their academic year, the majority were first-year university students, totalling 148 individuals (38.50%), followed by second-year university students with 128 individuals (33.30%), and third-year university students with 108 individuals (28.10%), respectively.

Table 3 Studying of the current situation and expected situation of students' sustainable learning abilities in higher vocational colleges in Guangdong Province : School environment factors

Students' sustainable learning abilities : School environment factors	Current Situation(D)			Expected condition			PNI	Rank
	$\overline{\mathrm{X}}$	S.D.	Level	$\overline{\mathrm{X}}$	S.D.	Level		
1. The school should give students the initiative in learning and encourage them to ask questions, participate in discussions, and explore independently.	3.76	0.82	High	4.48	0.72	High	0.19	5
2. The school should design open-ended courses to guide students to acquire knowledge through independent inquiry and develop the ability to analyze and solve problems.	3.79	0.84	High	4.55	0.70	Highest	0.20	4
3. The school should connect learning content with real life and allow students to design and implement projects independently, reflect on their experiences, and evaluate their progress to deepen and broaden their learning.	3.83	0.92	High	4.52	0.75	highest	0.18	6
4. The Schools should provide a variety of learning resources and tools, such as library resources, equipment, networks, online learning platforms, field trips, etc., to meet the different learning needs and preferences of students.	3.87	0.93	High	4.54	0.74	Highest	0.17	7
5. The school should provide a good autonomous learning space where students can focus on their studies without interruption.	3.80	0.83	High	4.58	0.73	Highest	0.21	3
6. The school should integrate the concept of autonomous learning into its culture and establish relevant regulations and measures.	3.80	0.86	High	4.54	0.71	Highest	0.19	5

Table 3 Studying of the current situation and expected situation of students' sustainable learning abilities in higher vocational colleges in Guangdong Province : School environment factors (cont.)

Students' sustainable learning abilities : School environment factors	Current Situation(D)			Expected condition			PNI	Rank
	$\overline{X}$	S.D.	Level	$\overline{X}$	S.D.	Level		
7. The school should encourage students to participate in school management and provide a platform for them to express their opinions.	3.77	0.93	High	4.51	0.75	Highest	0.20	4
8. The school should work with parents to explore ways to cultivate students' autonomous learning ability and reach a consensus on educational philosophy and methods.	3.70	0.86	High	4.53	0.73	Highest	0.22	2
9. The school should guide parents to change their traditional "filling-in-the-blanks" style of education and instead encourage their children to learn independently and respect their children's learning interests and characteristics.	3.73	0.86	High	4.51	0.73	Highest	0.21	3
10. The school should integrate community learning resources to effectively enhance the quality of students' education.	3.63	0.85	High	4.49	0.76	High	0.24	1
Total	3.77	0.62	High	4.53	0.48	Highest	0.20	

Table 3 reveals that the current state of students' sustainable learning abilities in higher vocational colleges in Guangdong Province, under school environment factors, was rated high overall ($\overline{X}$ = 3.77, S.D. = 0.62). The highest-rated aspect was providing diverse learning resources and tools ($\overline{X}$ = 3.87, S.D. = 0.93), followed by connecting learning content with real life ($\overline{X}$ = 3.83, S.D. = 0.92), providing autonomous learning spaces ($\overline{X}$ = 3.80, S.D. = 0.83), and integrating autonomous learning concepts into school culture ($\overline{X}$ = 3.80, S.D. = 0.86).

Expected situations, school environment factors were rated at the highest level overall ($\overline{X}$ = 4.53, S.D. = 0.48). The top-rated expectation was providing autonomous learning spaces ($\overline{X}$ = 4.58, S.D. = 0.73),

followed by designing open-ended courses ($\overline{X}$ = 4.55, S.D. = 0.70), providing diverse learning resources ($\overline{X}$ = 4.54, S.D. = 0.74), and integrating autonomous learning concepts ($\overline{X}$ = 4.54, S.D. = 0.71).

The prioritization of needs showed the highest urgency for integrating community learning resources (PNI$_{Modified}$ = 0.24), followed by working with parents to cultivate autonomous learning (PNI$_{Modified}$ = 0.22), providing autonomous learning spaces (PNI$_{Modified}$ = 0.21), and guiding parents to encourage independent learning (PNI$_{Modified}$ = 0.21).

Table 4 Studying of the current situation and expected situation of students' sustainable learning abilities in higher vocational colleges in Guangdong Province : **Teachers** factors

Students' sustainable learning abilities : Teachers factors	Current Situation(D)			Expected condition			PNI	Rank
	$\overline{X}$	S.D.	Level	$\overline{X}$	S.D.	Level		
1. Teachers should pay attention to the thinking, exploration, cooperation, etc., in the learning process of students, not just the end result.	3.70	0.90	High	4.51	0.74	Highest	0.22	4
2. Teachers should use a variety of evaluation methods, such as classroom performance, homework completion, project results, self-reflection, etc., to comprehensively evaluate students' learning.	3.73	0.92	High	4.53	0.75	Highest	0.21	5
3. Teachers should give timely feedback to students to help them understand their learning situation and make improvements based on the feedback.	3.73	0.83	High	4.53	0.75	Highest	0.21	5
4. A teacher? We should encourage students to learn, communicate and cooperate with each other, establish a good relationship between teachers and students, and make students feel safe, trusted and respected.	3.76	0.86	High	4.54	0.68	Highest	0.21	5

Table 4 Studying of the current situation and expected situation of students' sustainable learning
abilities in higher vocational colleges in Guangdong Province : **Teachers** factors (cont.)

Students' sustainable learning abilities : Teachers factors	Current Situation(D)			Expected condition			PNI	Rank
	$\overline{\mathrm{X}}$	S.D.	Level	$\overline{\mathrm{X}}$	S.D.	Level		
5. Teachers should provide students with the opportunity to try and make mistakes, and cultivate students' creativity and exploration spirit.	3.69	0.89	High	4.55	0.72	Highest	0.23	3
6. What do teachers want? Organize students to participate in field trips, combine theoretical knowledge with practice, and enhance students' learning interest and understanding ability.	3.61	0.84	High	4.47	0.74	High	0.24	2
7. Teachers should strengthen the study and research of independent learning theory, constantly improve teaching ability and teaching methods, and guide students to carry out independent learning.	3.70	0.82	High	4.57	0.69	Highest	0.24	2
8. Teachers should adopt a variety of teaching modes, such as flipped classroom, blended teaching, etc., in order to better stimulate students' learning interest and independent learning ability.	3.54	0.85	High	4.44	0.76	High	0.25	1
9. Teachers should strengthen team cooperation, learn from each other, communicate and cooperate, and jointly explore and practice effective strategies for independent learning	3.56	0.86	High	4.45	0.77	High	0.25	1

Table 4 Studying of the current situation and expected situation of students' sustainable learning abilities in higher vocational colleges in Guangdong Province : **Teachers** factors (cont.)

Students' sustainable learning abilities : Teachers factors	Current Situation(D)			Expected condition			PNI	Rank
	$\overline{X}$	S.D.	Level	$\overline{X}$	S.D.	Level		
10. Teachers should actively learn and master new knowledge and technology, keep pace with the development of The Times, and provide students with better learning resources and guidance	3.66	0.83	High	4.50	0.74	Highest	0.23	3
Total	3.67	0.64	High	4.51	0.52	Highest	0.23	

Table 4 reveals that Current Situations: Teacher factors were rated as high overall ($\overline{X}$ = 3.67, S.D. = 0.64). The highest-rated aspect was Teachers should encourage students to learn, communicate, and cooperate with each other, establishing a safe, trusted, and respectful teacher-student relationship. ($\overline{X}$ = 3.76, S.D. = 0.86). Other highly rated aspects included diverse evaluation methods ($\overline{X}$ = 3.73, S.D. = 0.92), timely feedback ($\overline{X}$ = 3.73, S.D. = 0.83), attention to the learning process ($\overline{X}$ = 3.70, S.D. = 0.90), and strengthening independent learning theory and methods ($\overline{X}$ = 3.70, S.D. = 0.82).

Expected Situations: Teacher factors were rated at the highest level overall ($\overline{X}$ = 4.51, S.D. = 0.52). The most anticipated aspect was "Teachers should strengthen independent learning theory, improve teaching methods, and guide students toward independent learning" ($\overline{X}$ = 4.57, S.D. = 0.69). Other expectations included encouraging creativity and exploration ($\overline{X}$ = 4.55, S.D. = 0.72) and fostering communication and cooperation between teachers and students ($\overline{X}$ = 4.54, S.D. = 0.68).

Prioritization of Needs: The most urgent development needs, based on the $PNI_{Modified}$ values (0.21–0.25), included: Adopting varied teaching modes such as flipped classrooms and blended teaching to enhance students' interest and independent learning abilities ($PNI_{Modified}$ = 0.25), and Strengthening team collaboration among teachers to explore and implement effective strategies for fostering independent learning ($PNI_{Modified}$ = 0.25). Organizing field trips to integrate theoretical knowledge with practice ($PNI_{Modified}$ = 0.24).

Table 5 Studying of the current situation and expected situation of students' sustainable learning abilities in higher vocational colleges in Guangdong Province : Student factors

Students' sustainable learning abilities : Student factors	Current Situation(D)			Expected condition			PNI	Rank
	$\overline{\mathrm{X}}$	S.D.	Level	$\overline{\mathrm{X}}$	S.D.	Level		
1. Students should arrange their time reasonably, improve their learning efficiency, avoid procrastination and establish good learning habits.	3.65	0.86	High	4.51	0.72	Highest	0.24	3
2. Students should have effective learning strategies, such as reading skills, note-taking methods, review methods, etc., to improve learning efficiency and effectiveness.	3.63	0.87	High	4.48	0.74	High	0.23	4
3. Students should have the ability of information retrieval, learn to use a variety of channels to obtain information, and to screen and judge information.	3.73	0.79	High	4.58	0.66	Highest	0.23	4
4. Students should think independently, dare to question, and critically analyze to form their own opinions and judgments.	3.63	0.90	High	4.44	0.76	High	0.22	5
5. Students should learn self-motivation and self-management, maintain a positive learning attitude and good learning habits	3.71	0.83	High	4.56	0.70	Highest	0.23	4
6. Students should regularly reflect on their learning process, sum up their learning experience, find out their shortcomings in learning, and adjust their learning strategies according to the evaluation results to continuously improve their learning ability.	3.64	0.87	High	4.48	0.73	High	0.23	4

Table 5 Studying of the current situation and expected situation of students' sustainable learning abilities in higher vocational colleges in Guangdong Province : Student factors (cont.)

Students' sustainable learning abilities : Student factors	Current Situation(D)			Expected condition			PNI	Rank
7. Students should be willing to try and make mistakes, learn from mistakes, and constantly improve their learning methods.	3.59	0.88	High	4.49	0.77	High	0.25	2
8. Students should set clear learning goals and formulate specific learning plans according to the goals to make learning more directional and purposeful.	3.70	0.80	High	4.57	0.69	Highest	0.24	3
9. Students should overcome the difficulties and setbacks in the learning process, persevere in learning, actively seek help, and constantly improve their learning ability.	3.48	0.89	Medium	4.37	0.78	High	0.26	1
10. Students should maintain a positive and optimistic attitude, enjoy the process of learning, believe that they can learn well, and get fun and sense of achievement from learning, so as to love learning more.	3.63	0.86	High	4.49	0.77	High	0.24	3
Total	3.64	0.48	High	4.51	0.43	Highest	0.24	

Current Situations: Student factors were rated high overall ($\overline{X}$ = 3.73, S.D. = 0.79). The highest-rated aspect was the ability to retrieve, screen, and judge information ($\overline{X}$ = 3.73, S.D. = 0.79), followed by self-motivation and self-management with positive learning habits ($\overline{X}$ = 3.70, S.D. = 0.80).

Expected Situations: Student factors were rated at the highest level overall ($\overline{X}$ = 4.51, S.D. = 0.43). The most anticipated aspect was improving information retrieval and judgment skills ($\overline{X}$ = 4.58, S.D. = 0.66), followed by self-motivation and self-management ($\overline{X}$ = 4.56, S.D. = 0.70), and efficient time management to avoid procrastination ($\overline{X}$ = 4.51, S.D. = 0.72).

Prioritization of Needs: The most urgent development need was students overcoming learning difficulties, seeking help, and improving their abilities ($PNI_{Modified}$ = 0.26). Other priorities included learning

from mistakes ($PNI_{Modified}$ = 0.25), time management ($PNI_{Modified}$ = 0.24), and setting clear goals with actionable plans ($PNI_{Modified}$ = 0.24).

Table 6 Studying of the current situation and expected situation of students' sustainable learning abilities in higher vocational colleges in Guangdong Province

Students' sustainable learning abilities	Current Situation(D)			Expected condition			PNI	Rank
	$\overline{\mathrm{X}}$	S.D.	Level	$\overline{\mathrm{X}}$	S.D.	Level		
1. School environment factors	3.77	0.62	High	4.53	0.48	Highest	0.20	3
2. Teacher factors	3.67	0.64	High	4.51	0.52	Highest	0.23	2
3. Student factors	3.64	0.48	High	4.51	0.43	Highest	0.24	1
Total of all factors	3.69	0.49	High	4.52	0.39	Highest	0.22	

According to Table 6, From the analysis of the current situation, the expected situation, and the prioritization of needs for the development of students' sustainable learning abilities, the overall consideration was based on the mean of the needs, represented by the $PNI_{Modified}$ value. Consequently, the mean of the needs was classified into two groups: high $PNI_{Modified}$ values and low $PNI_{Modified}$ values. The group with high $PNI_{Modified}$ values, comprising Student factors ($PNI_{Modified}$ = 0.24) and Teacher factors ($PNI_{Modified}$ = 0.23), was identified as a weakness in the development of students' sustainable learning abilities. This serves as essential information for proposing strategies to eliminate or mitigate these weaknesses. Meanwhile, the group with low $PNI_{Modified}$ values, namely School environment factors ($PNI_{Modified}$ = 0.20), was identified as a strength in the development of students' sustainable learning abilities. This provides a basis for proposing strategies to reinforce these strengths. The results will be synthesized as input for drafting educational management strategies to improve students' sustainable learning abilities in Higher Vocational Colleges in Guangdong Province in subsequent steps.

Discussion

1. Based on the documents, related research, and interviews with experts, it can be concluded that students' sustainable learning abilities in higher vocational colleges in Guangdong Province consist of three main components: 1) School environment factors, 2) Teacher factors, and 3) Student factors

The findings of this study highlight the critical role of three main factors : school environment factors, teacher factors, and student factors. In influencing students' sustainable learning abilities in higher vocational colleges in Guangdong Province. The identification of these factors and their sub-components aligns with the theoretical framework of sustainable education, which emphasizes a holistic approach to fostering learning environments that promote long-term knowledge retention, adaptability, and personal growth.

School Environment Factors

The results reveal that the school environment factors serve as a strength ($PNI_{Modified}$ = 0.20), underscoring the importance of well-resourced facilities, supportive policies, and a conducive learning atmosphere. This aligns with studies emphasizing the role of physical and institutional environments in enhancing learning outcomes (Smith & Jones, 2016). The strength of these factors suggests a foundation upon which strategies can be built to sustain and amplify students' learning capabilities.

Teacher Factors

The teacher factors ($PNI_{Modified}$= 0.23) emerged as a challenge, pointing to the need for professional development, innovative teaching methodologies, and effective teacher-student interactions. Previous research has consistently demonstrated the impact of teacher quality on student engagement and sustainable learning (Williams & Brown, 2017). Addressing these weaknesses requires targeted training programs and resources to empower teachers in creating dynamic and supportive learning experiences.

Student Factors

Similarly, the student factors ($PNI_{Modified}$ = 0.24) were identified as another area requiring improvement. These findings suggest that students' intrinsic motivation, self-regulation, and resilience need to be cultivated to enhance their sustainable learning abilities. Research by Johnson et al. (2018) supports this perspective, highlighting the importance of fostering students' self-efficacy and autonomy in achieving long-term academic success.

Implications for Educational Strategies

Synthesizing these findings, the proposed educational management strategies should focus on strengthening the school environment while simultaneously addressing the weaknesses identified in teacher and student factors. A balanced approach that incorporates the enhancement of institutional support, teacher competencies, and student empowerment is essential for achieving sustainable learning outcomes.

2. The study revealed significant insights into the current and expected situation of **students' sustainable learning abilities** in higher vocational colleges in Guangdong Province, focusing on three key factors: **school environment**, **teacher**, and **student factors.**

School Environment Factors

The current state of school environment factors was rated high with the provision of diverse learning resources and tools scoring the highest. However, integrating community learning resources was identified as a weakness, indicating room for improvement. Expected situations for these factors were rated at the highest level, with the most anticipated aspect being the provision of autonomous learning spaces. The prioritization of needs ($PNI_{Modified}$ = 0.24) confirmed the urgent necessity of integrating community resources, reflecting findings by Smith and Brown (2018), which emphasize the role of community engagement in enhancing learning outcomes.

Teacher Factors

Teacher factors were rated high in the current situations, with the highest aspect being encouragement of safe, trusted, and respectful relationships. The least practiced element was adopting varied teaching methods, such as flipped classrooms. Expected situations were rated the highest overall, emphasizing the need to improve teaching methods and foster independent learning. The most urgent development need was adopting diverse teaching strategies ($PNI_{Modified}$ = 0.25). This aligns with the findings of Williams and Taylor (2020), highlighting the importance of innovative teaching strategies in fostering engagement and self-directed learning.

Student Factors

Student factors in the current state were rated high, with the ability to retrieve and evaluate information receiving the highest score. The least practiced behavior was overcoming learning difficulties and seeking help. The expected state was rated the highest overall, with improving information skills being most anticipated. The most urgent need was helping students overcome challenges and improve their learning abilities ($PNI_{Modified}$ = 0.26), reflecting the findings of Johnson et al. (2019) that highlight the role of resilience and support systems in sustainable learning.

Conclusion

These findings suggest that while the current state of sustainable learning abilities in students is relatively high, significant gaps remain in areas such as community resource integration, adoption of innovative teaching strategies, and resilience in students. Addressing these weaknesses through targeted strategies will strengthen sustainable learning outcomes.

8. Recommendations

8.1 Recommendations for Applying Research Findings

1) **Develop Strategic Educational Policies** : Utilize the findings to create policies that prioritize integrating community learning resources and enhancing teacher training programs to address identified weaknesses and improve sustainable learning abilities.

2) **Implement Professional Development Programs** : Design workshops and training sessions for teachers focusing on innovative teaching methods, such as flipped classrooms and blended learning, to stimulate students' interest and foster independent learning.

3) **Strengthen Student Support Systems** : Establish student support programs that focus on resilience-building, problem-solving skills, and access to diverse learning resources to address the challenges students face in their learning process.

8.2 Recommendations for Future Research

1) Explore Interventions for Weak Areas : Investigate specific strategies or interventions to address identified weaknesses, such as integrating community learning resources and adopting innovative teaching methods, to enhance sustainable learning abilities.

2) Longitudinal Studies : Conduct longitudinal research to evaluate the long-term impact of improved teaching strategies, community engagement, and resilience-building initiatives on students' sustainable learning outcomes.

3) Cross-Context Comparisons : Expand the scope to compare sustainable learning abilities across different provinces or educational systems, providing insights into contextual influences and best practices for broader applications.

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(35-EN-EDU)

A Study on the Factors Affecting the Comprehensive Quality Evaluation System for Higher Vocational College Students in Guangdong China

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Abstract

This research aimed to investigate the factors influencing the comprehensive quality evaluation system for students in higher vocational colleges in Guangdong. The researcher employed a questionnaire as the research tool, achieving a consistency value between 0.50 and 1.00, and a confidence value of 0.96 for the entire test. The findings revealed that the factors affecting the comprehensive quality evaluation system for higher vocational college students in Guangdong include four main variables: evaluation subjects (personnel), evaluation content, evaluation methods, and feedback on evaluation results and their application. After analyzing the questionnaire survey data, it was found that all four aspects of the evaluation system were rated at a high level. The evaluation method received the highest score, followed by feedback on evaluation results and their application, while the evaluation subject (personnel) received the lowest score.

Keywords: evaluation system; higher vocational colleges

1. Introduction

The economic globalization and internationalization of higher education have provided opportunities for the development of Chinese higher education in the new era. This has led to Chinese higher education facing a larger and more open stage, initiating the all-around opening of education and teaching. However, this opportunity has also brought competition in talent resources and quality. As a result, Chinese universities are compelled to cultivate a new generation of highly professional college students at higher rates. Consequently, it is necessary to reevaluate and reconsider the quality of talent training in colleges and universities to meet the new needs of the times and social development (Zhang, 2006).

In the preliminary study, the researchers found that the comprehensive quality evaluation system of students in five higher vocational colleges including Heyuan Polytechnic has deficiencies in terms of subject, method, content, result feedback and application. Specifically, there are deficiencies in the evaluation content. There is a certain lag, poor connection with real social needs, the evaluation method is too single, and the evaluation result feedback is not operable enough. Many domestic scholars believe that the imperfection of the comprehensive quality evaluation system for higher vocational students will have a great impact on the effectiveness of higher vocational talent training (Wang Wenwen, 2020). At the same time, the backwardness and singleness of evaluation concepts and methods cannot keep up with the level of national education reform and development. It is believed that the problems existing in the comprehensive quality evaluation system of higher vocational colleges need to be solved urgently. To this end, the researcher chose the students' comprehensive quality evaluation system to conduct research.

Higher vocational education is a crucial part of higher education. Vocational colleges have the important task of cultivating highly skilled talents in production, construction, management, and service for the country. Currently, colleges and universities serve as the primary institutions for nurturing high-quality talents across various industries. However, evaluating the comprehensive quality of college students in a comprehensive, objective, and scientific manner has become a significant challenge for educational institutions striving to promote quality education. Vocational colleges, as integral parts of higher education institutions, also face this serious issue (Wang, Feng & Xiao, 2019)

The comprehensive quality evaluation system faces some issues. As we work on improving the "diagnosis and reform" plan, it's crucial to promptly and systematically initiate the quality assurance process (Cao, 2017). Currently, the comprehensive quality evaluation system in higher vocational institutions is underdeveloped. It's primarily not being effectively implemented. As a researcher responsible for teaching and learning management in higher vocational colleges, there is an intention a study of the factors influencing the comprehensive quality evaluation system for students in higher vocational colleges in Guangdongs.to use the research results as information for the parent agency in planning and finding ways to support the effective management of national education.

2. Research Objectives

To examine the factors influencing the comprehensive quality evaluation system for students in higher vocational colleges in Guangdong.

3. Research Methodology

This research is an integrated study that combines both quantitative and qualitative research methods. The details of the research are as follows:

Step 1: Document Review

The researcher conducted a comprehensive review of various documents, publications, electronic media, research studies, and other resources. Content analysis was utilized to identify the factors influencing the comprehensive quality evaluation system for students in higher vocational colleges in Guangdong.

Step 2: In-depth Interviews

To gain deeper insights into the factors affecting a comprehensive quality assessment system for higher vocational colleges, in-depth interviews were conducted with experts. These experts included full-time teachers and teaching administrators selected based on the following criteria: 1. A minimum of five years of experience at their institution.2. Familiarity with institutional development plans, teaching management, and student development processes.3. Willingness to participate in structured and recorded interviews.4. Agreement to review and validate their interview transcripts.

Step 3: Study of the Factors in a Comprehensive Quality Assessment System for Higher Vocational College Students in Guangdong Province

The population / Sample Group

The Population

The research population includes 70,800 people related of the Comprehensive Quality Evaluation System Strategies for Higher Vocational Colleges Students in North of Guangdong. classified as:

1.62,300 Students

2.2,700 teachers

3.580 administrators

The Sample Group

According to Krejcie & Morgan 's sample table, the sample of this study is 382 students from five higher vocational colleges in north of Guangdong. These five higher vocational colleges are Heyuan Polytechnic, Guangdong Meizhou Polytechnic, Qingyuan Polytechnic, Guangdong Songshan Polytechnic, Luoding Polytechnic.

Table 1 Lists of higher vocational colleges and sampling size

NO	Higher Vocational Colleges	Population	Sample Group
1	Heyuan Polytechnic	13820	86
2	Guangdong Meizhou Polytechnic	6000	37
3	Qingyuan Polytechnic	11600	71
4	Guangdong Songshan Polytechnic	16700	102
5	Luoding Polytechnic	13820	86
Total		62300	382

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The data collection tool is a comprehensive quality assessment system factor questionnaire for students of higher vocational colleges in Guangdong Province, consisting of two parts:

Part 1: General information of the respondents is a checklist consisting of gender, grade and major.

Part 2: The factors of the comprehensive quality assessment system for students of higher vocational colleges in Guangdong Province are based on a five-level rating scale according to the Likert method .

1.Study and research relevant documents and research papers on the factors of a comprehensive quality assessment system for students of higher vocational colleges in Guangdong Province. The students studied the factors of the quality assessment system, including documents related to questionnaire creation and questioning techniques, and then set a framework for preparing the questionnaire draft and updating the questionnaire to cover the variables according to the conceptual framework.

2.Bring the generated query Proposal to the oualified person (5 people) to check the integrity of the content by finding the conformance index. The index of Item Objective Congruence (IOC) of the question, was found to be between 0.50 and 1.00.

3. A questionnaire was used to try out 30 students from higher vocational colleges in Guangdong Province who were not part of the sample group in the research to the propose was determine the by finding Cronbach's Alfa-Coefficient coefficient, which was found to be equal to 0.96.

Data Collection

The researcher requested a letter from the Graduate School to the school administrators to ask for permission to collect data from educational institutions in higher vocational colleges in Guangdong Province by sending it by mail and Google Form.

Data Analysis

1. Analyze the data in Part 1: General information of the respondents by distributing the frequency and percentage.

2. Analyze the factor level of the comprehensive quality assessment system for students of higher vocational colleges in Guangdong Province by finding the mean ($\bar{x}$) and standard deviation (SD).

4.50-5.00 indicates the highest level

3.50-4.49 indicates a high level

2.50-3.49 indicates a moderate level

1.50-2.49 indicates a low level

1.00-1.49 represents the lowest level

4. Research Results and Discussion

The researcher analyzed the data in two sections as follows:

Section 1: The analysis results regarding the personal information of respondents in vocational colleges in Guangdong, classified by gender, grade and major.The data is presented in the form of frequency and percentage

Table 2 Personal Information of Respondents

No.	Personal information	Number of People	Percentage (%)
1. Gender	Male	182	47.64
	Female	200	52.36
	Total	**382**	**100.00**
2. Grade	Freshman	121	31.68
	Sophomore	141	36.91
	Junior	120	31.41
	Total	**382**	**100.00**
3. Major	Liberal Arts	100	26.18
	Science	102	26.70
	Engineering	99	25.92
	Art	81	21.2
	Total	**382**	**100.00**

According to the statistical results in Table 2, the distribution of five colleges respondents of questionnaires. The gender distribution of respondents is as follows: there are 182 male students, accounting for about 47.64% of the total number of students surveyed, and 200 female students, accounting for about 52.36% of the total. The ratio of men to women is basically equal. The grade distribution of respondents is as follows: there are 121 freshmen, accounting for 31.68%, 141 sophomores, accounting for 36.91%, and 120 juniors, accounting for 31.41%. The ratio of grade is basically equal. The major distribution of respondents as follows: There are 100 liberal arts students, accounting for 26.18%, 102 science students, accounting for 26.70%, 99 engineering students, accounting for 25.92%, and 81 art students, accounting for 21.2 %. The ratio of major is basically equal.

Section 2: The analysis presents the data from the questionnaire on the current situation of the comprehensive quality evaluation system for higher vocational college students in Guangdong in the form of average value and standard deviation.

The aim of this section is to examine the factors affecting the comprehensive quality evaluation system for higher vocational college students in Guangdong. To accomplish this, a survey questionnaire was developed by the researcher. After conducting exploratory factor analysis and testing the reliability and validity of the questionnaire, it was found that the survey questionnaire met the standards of measurement science. Using the results of the questionnaire survey, the research analyzed the data on the current state of the comprehensive quality evaluation system for students in higher vocational colleges in the northern region of Guangdong from four perspectives: evaluation subjects (personnel), evaluation content, evaluation methods, and feedback and application of evaluation results. Through the survey, the researcher gained a deeper understanding of the challenges faced by the comprehensive quality evaluation system for students in higher vocational colleges in the northern region of Guangdong, providing crucial data to support the development of strategies to enhance the comprehensive quality evaluation system for the students. The specific survey results are as follows:

Table 3: Analysis of the factors affecting the comprehensive quality evaluation system for higher
vocational college students in Guangdong.

Factors of the comprehensive quality evaluation system for higher vocational colleges students in Guangdong	$\bar{X}$	SD	Level	Order
1.Evaluation subject (personnel)	3.83	0.82	high	4
2.Evaluation contents	3.95	0.81	high	3
3.Evaluation method	4.04	0.73	high	1
4.Evaluation results feedback and application	4.03	0.75	high	2
Total	3.96	0.78	high	

According to Table 3 the data showed that the interviewees' overall evaluation of the comprehensive quality evaluation system for higher vocational colleges students was at high level ($\overline{X}$=3.95). Among the four sub dimensions, the highest level was evaluation method ($\overline{X}$=4.04). Next was evaluation results feedback and application ($\overline{X}$=4.03), and the lowest level was evaluation subject (personnel) ($\overline{X}$= 3.83).

Conclusion

The purpose of this research was to examine the factors influencing the comprehensive quality evaluation system for students in higher vocational colleges in Guangdong The study found that the factors affecting the comprehensive quality evaluation system for higher vocational college students in Guangdong consists of four main variables: evaluation subject (personnel), evaluation contents, evaluation method, and evaluation results feedback and application. After analyzing the questionnaire survey data, it was observed that the average value of the comprehensive quality evaluation system for higher vocational college students in Guangdong was high in all four aspects. The study also revealed that the evaluation method ranked highest, followed by evaluation results feedback and application, while the evaluation subject (personnel) ranked lowest.

Discussion

A survey investigating the factors influencing the comprehensive quality evaluation system for students in higher vocational colleges in Guangdong revealed several issues within the evaluation components, including the evaluation subjects (personnel), evaluation content, evaluation methods, and the feedback and application of evaluation results. By analyzing the average values and standard deviations of these components, it was found that they were rated at a high level but still required improvement.

In terms of evaluation subjects (personnel), the current status of evaluation subjects within the comprehensive quality evaluation system for students in higher vocational colleges in Guangdong is at a high level but has not yet reached its peak. The primary reason for this is that colleges often do not adequately consider students' interests. In the reform of educational evaluation at higher vocational colleges, it is essential for students to actively participate in the evaluation process. Many institutions have over 10,000 students, making it challenging to conduct evaluations centered around students. This situation not only complicates the evaluation process but also increases associated costs. While higher vocational colleges exist in northern Guangdong, their financial resources often fall short of what is required to support the necessary reforms in student evaluation. As a result, the role of students as key evaluators is frequently overlooked, diminishing their motivation to engage in comprehensive quality evaluations. This approach contradicts the viewpoints expressed by (Liu & Su, 2014). , who advocate for students to be the focal point of evaluation and involved throughout the entire evaluation process. It is crucial to recognize the

importance of student participation in the reform of comprehensive quality evaluations. However, due to a lack of professional evaluation knowledge and experience, colleges often neglect to include students in the evaluation process. This oversight fails to meet students' needs as evaluators. In the student comprehensive quality evaluation system, involving students as evaluation subjects can fulfill their psychological needs, such as a sense of achievement, belonging, respect, and recognition. Therefore, it is not enough to merely categorize students as evaluation subjects; we must fully consider their interests and provide reasonable satisfaction for them

In terms of evaluation contents. the current status of the student comprehensive quality evaluation system in Guangdong is relatively high, but it has not yet reached its full potential. There are two main reasons for this: 1. Student Perspectives: Many students feel that the evaluation criteria do not accurately reflect their overall quality. The evaluation content lacks comprehensiveness, and there is no consensus in the academic community regarding the specific components that should be included. Various studies highlight that evaluations need to consider multiple aspects, a viewpoint supported by (Yao Xiaoyu ,2018). 2. Practical Considerations: Higher vocational colleges must align their evaluations with industry demands because they are closely linked to industry development. Therefore, student evaluations must adapt to the evolving needs of society and industry, as emphasized by (Duan, 2019). In summary, the discrepancies in evaluation content and the absence of practical, clear guidance contribute to students' confusion about the comprehensive quality evaluation process. This lack of clarity adversely affects their development of essential quality skills.

In terms of evaluation methods, the comprehensive quality evaluation system for students in higher vocational colleges in Guangdong Province is at a high level but has not reached the highest level. The reason is mainly related to the unreasonable evaluation methods, evaluation tools, evaluation means, etc. This is consistent with the view of (Zhou & Zhu, 2023) once pointed out that although the evaluation system has been improved to a certain extent, in actual operation, the evaluation methods and tools are still unreasonable, resulting in the inability to fully reflect students' true abilities. This view has been basically recognized by current Chinese scholars. However, in addition to these reasons, current evaluation methods are too focused on the examination of theoretical knowledge, which brings some significant limitations. First, the examination of theoretical knowledge mainly relies on written examinations, and other forms. Although this method can measure students' mastery of basic theory, it often ignores practical ability, which is not fully consistent with the goals and positioning of vocational education. The educational goal of higher vocational colleges is to cultivate skilled talents with practical operation ability and problem-solving ability. Students must not only master theoretical knowledge during school but also be able to apply this knowledge to practical work. However, current evaluation methods cannot fully reflect students' performance in practical sessions. Since the evaluation of practical ability is usually complex and requires special equipment, venues, and the guidance of professional teachers, many institutions have deficiencies

in the assessment methods of practical ability. Therefore, in addition to written examinations, diversified evaluation methods such as project-based assessments, field tasks, and case analysis can be used to comprehensively examine students' theoretical and practical abilities, thereby improving their overall quality.

In terms of evaluation result feedback and application, the status of feedback on evaluation results and the application of the comprehensive quality evaluation system for students in higher vocational colleges in Guangdong is considered high, but it has not yet reached its maximum potential. Upon investigation, the main issue appears to be related to how evaluation results are presented and the insufficient involvement of teachers in the evaluation process. This aligns with the views expressed by (Chen, 2014). Despite having a relatively mature feedback mechanism for evaluation results, the actual implementation is hindered by the ineffective presentation of these results and the limited role of teachers, which affects the effective use of evaluation outcomes. It is essential To encourage teachers to actively participate in the evaluation process, use the feedback to guide their teaching, and engage in meaningful communication with students to help them better understand the feedback. to effectively utilize evaluation results, both students and teachers should confront the results in an active and objective manner, employing them rationally.

5. Recommendations

1. Recommendations for applying the research results

Schools should provide essential support for external organizations to participate in student evaluations. This will enable students to fully utilize their potential and understand the importance of third-party assessments.

2. Recommendation for the next research

A detailed study on factors affecting the student quality evaluation system, which can also lead to further research on student development and growth in the future.

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(60-EN-EDU)

Research on Innovative Leadership of Middle-level Administrators in Higher Vocational Colleges of Finance and Economics in Guangxi

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Abstract

This research objective was to study the innovative leadership of middle-level administrators in higher vocational colleges of finance and economics in Guangxi in 4 areas as follows : 1) Innovative vision., 2) Innovative creative skills , 3) Creative problem-solving methods, 4) Use of information and communication technology skills. The research instrument was a 5 level rating scales questionnaire. The statistics used for the data analysis were percentage, mean, and standard deviation.The research result found that the innovative leadership of middle-level administrators in higher vocational colleges of finance and economics in Guangxi in overall at the high level. Innovative vision had the highest mean, follow by innovative creative skills, and the lowest mean was use of information and communication technology skills.

Keywords: innovative Leadership; higher vocational colleges of finance and economics; middle-level administrators

1. Introduction

In Kissinger's view, the important ability of leaders is to learn to grasp the information and knowledge they know (from the past) and their intuition about the future (which is inherently uncertain), and through their courage and unique character, choose a direction in a complex environment, and set goals and formulate strategies accordingly. At the same time, a truly good leader must also have the temperament of an educator and an artist, and know how to communicate, eliminate doubts, gather support, and shape the future.(Kissinger's 《Leadership》 2022).

The importance of leadership lies in its driving force for the development of organizations and society. Leadership is not only the cornerstone of personal success, but also the key factor in driving the entire organization and even the wider society forward. From organizations to individuals, and then to the entire society, the cultivation and application of leadership is everywhere, and its importance is constantly emphasized and re-evaluated. (Chen Long, 2018)

The importance of university leadership lies in its far-reaching impact on the school's development direction, education quality, modernization of governance capabilities and social contribution. University leadership is not only related to the school's internal management and operation, but also to the quality of higher education, innovation capabilities and the country's future scientific and economic development. (Yuan Jianmin,2019).University leadership is also of great significance for promoting the modernization of university governance capabilities. In the context of the new era, the modernization of university governance capabilities is not only a need to improve internal management levels, but also an inevitable choice to enhance the overall competitiveness of the school and adapt to the requirements of social development. (Zhuo Qingmin, 2019)

There are many problems with leadership, including personality bias, cognitive bias, poor decision-making, poor communication, and lack of in-depth leadership development. Solving these problems requires not only self-improvement of managers, but also systematic training and internal support from the company. (LIN Wei-min, 2018)

The leadership of middle-level managers in higher vocational financial and economic colleges also has many problems, such as personality bias, cognitive bias, poor decision-making, poor communication, and lack of in-depth leadership development. We should pay attention to the existence of these problems. (Xu MengYang, 2021)

The innovative leadership of middle-level managers in universities can be enhanced in many ways, including cultivating innovative thinking, strengthening teamwork, promoting educational reform, enhancing problem-solving capabilities, and supporting scientific research innovation.(Wu YongLi,2021)

In summary, the leadership of middle-level administrators in universities is an important part of the higher education system, and it is crucial to improve the comprehensive development of university administrators. Facing the challenges of the information age and the requirements of higher education reform, this paper

conducts an in-depth study on the innovative leadership of middle-level administrators in universities, aiming to provide better guidance for improving the innovative leadership of middle-level administrators in universities under the new situation and promote the improvement of innovative leadership of university administrators.

2. Research Objectives

To study the current status of innovative leadership of middle-level administrators in Guangxi's higher vocational colleges of finance and economics.

3. Research Framework

Innovative Leadership

1.Innovative vision.

2.Innovative creative skills.

3.Creative problem-solving methods.

4.Use of information and communication technology skills.
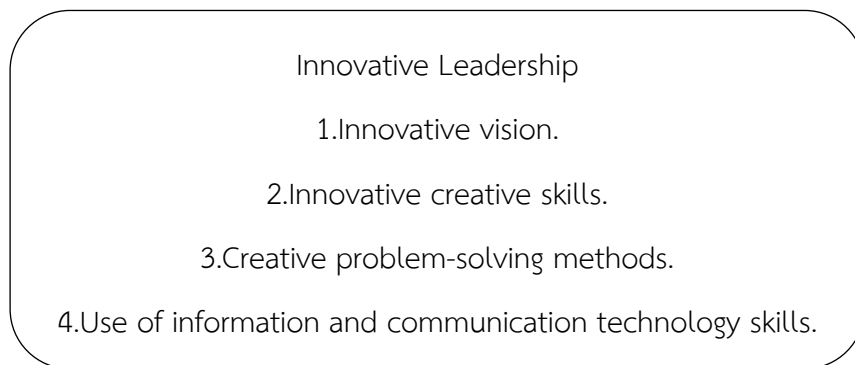
4. Research Methodology

Population

The research subjects of this study are 300 administrators from five vocational colleges of finance and economics in Guangxi.

The Sample Group

According to the sampling table of Krejcie and Morgan, the sample group of this study is 169 administrators from five vocational colleges of finance and economics in Guangxi. The systematic random sampling and sample random sampling methods are adopted.

Table 1 Lists of College and sample size

No	The name of college	Population	Sample group
College 1	Guangxi Vocational and Technical College of Finance	54	30
College 2	Guangxi Vocational College of Technology and Business	65	37
College 3	Guangxi Economic and Trade Vocational Institute	41	23

No	The name of college	Population	Sample group
College 4	Guangxi International Business Vocational College	53	30
College 5	Guangxi Economic Vocational College	87	49
	Total	300	169

The instrument to collect the data for objective was the questionnaire designed based on management system in 4 following aspects:1)Innovative vision, 2)Innovative creative skills, 3)Creative problem-solving methods, 4) Use of information and communication technology skills.The questionnaire was provided into two parts:

Part 1: Survey about personal information of sample, classified by gender, working experience and professional rank.

Part 2: Survey about the current situation of innovative leadership of middle-level administrators in Guangxi Vocational Colleges of Finance and Economics. The criteria for data interpretation based on five-point Likert's scale, as follow;

5 express the level of creative communication skills at highest level

4 express the level of creative communication skills at high level

3 express the level of creative communication skills at medium level

2 express the level of creative communication skills at low level

1 express the level of creative communication skills at lowest level

The process of constructing the Instrument

The construction process of questionnaire were as follows:

Step 1: Review and analyze the literature, concepts, theories and research results related to the innovative leadership of middle-level administrators in higher vocational colleges.

Step 2: Construct a questionnaire on the current status of innovative leadership of middle-level administrators in Guangxi vocational colleges of finance and economics. Then send the questionnaire outline to the thesis advisor to review and modify the content according to the suggestions.

Step 3: The index of objective congruence (IOC) of the questionnaire was examined by three experts. The index of objective congruence (IOC) .

Step 4: Revise the questionnaire based on the experts' suggestions.

Step 5: The questionnaire was distributed to 30 administrators from Guangxi vocational colleges of finance and economics for trial training. The reliability of the questionnaire was obtained by Conbach's Alpha Coefficient.

Step 6: The questionnaire was applied to 169 administrators in higher Vocational Colleges of Finance and Economics.in Guangxi.

Data Collection

To achieve the research objectives, the researcher collected the required data according to the type and steps of the research instruments as follows procedures:

Step 1: The researcher requested requirement letter form the graduate school, Bansomdejchaopraya Rajabhat University for requiring to collect the data from 169 administrators in higher Vocational Colleges of Finance and Economics.in Guangxi.

Step 2: The researcher distributed the questionnaire to 169 administrators and returned questionnaires.

Statistics used in data analysis

After data collection, the researcher statistic and analyze data according to objective as follow;

Step 1: The personal information of the sample were analyzed by frequency and percentage, classified by gender, working experience and professional rank..

Step 2: The current situation of innovative leadership of middle-level administrators in higher vocational colleges of finance and economics in Guangxi in four following aspects:1) Innovative vision., 2) Innovative creative skills , 3) Creative problem-solving methods, 4) Use of information and communication technology skills were analyzed by mean and standard deviation. And criteria of mean as follow;

4.50 – 5.00 expressed highest level

3.50 – 4.49 expressed high level

2.50 – 3.49 expressed medium level

1.50 – 2.49 expressed low level

1.00 – 1.49 expressed lowest level

5. Research Results and Discussion

Result

An analysis of information about innovative leadership of middle-level administrators in higher vocational colleges of finance and economics in Guangxi is presented in terms of average and standard deviation.

Table 1 shows the mean and standard deviation of innovative leadership of middle-level administrators in higher vocational colleges of finance and economics in Guangxi, in 4 aspects.

Research on Innovative Leadership of Middle-level Administrators in Higher Vocational Colleges of Finance and Economics in Guangxi.	$\bar{x}$	S.D.	Level	Order
1. Innovative vision	3.59	0.85	high	1
2. Innovative creative skills	3.51	0.77	high	2

Research on Innovative Leadership of Middle-level Administrators in Higher Vocational Colleges of Finance and Economics in Guangxi.	$\bar{x}$	S.D.	Level	Order
3. Creative problem-solving methods	3.49	0.96	medium	3
4. Use of information and communication technology skills	3.44	0.91	medium	4
Total	3.51	0.87	high	

From Table 1, it was found that innovative leadership of middle-level administrators in higher vocational colleges of finance and economics in Guangxi in overall at the high level ($\bar{x}$=3.51). Consider by each aspect , it was the highest mean of innovative vision ($\bar{x}$=3.59), follow by innovative creative skills ($\bar{x}$=3.51), creative problem-solving methods ($\bar{x}$=3.49) and the lowest mean was use of information and communication technology skills ($\bar{x}$=3.44).

Conclusion and Discussion

Summary of research results

The research found that innovative leadership of middle-level administrators in higher vocational colleges of finance and economics in Guangxi in overall at the high level. Considered by each aspect , it was the highest mean of innovative vision, follow by innovative creative skills, Creative problem-solving methods and the lowest mean was use of information and communication technology skills.

The details of the research results in each aspect as follows.

Innovative vision of innovative leadership of middle-level administrators in higher vocational colleges of finance and economics in Guangxi. Innovative vision is high. The report found that middle-level administrators recognize innovative vision, followed by the following : middle-level administrators at the school strongly embrace the vision of innovation to promote innovation in school leadership. middle-level administrators can actively have a vision of innovation and ensure that leadership innovation is not the lowest average.

Innovative creative skills of innovative leadership of middle-level administrators in higher vocational colleges of finance and economics in Guangxi. Innovative creative skills is high. Considering the report, middle-level administrators in higher vocational colleges of finance and economics are also very appreciative of innovative creative skills, because they believe that innovative creative skills are essential and necessary to improve or improve innovative leadership.

Creative problem-solving methods of innovative leadership of middle-level administrators in higher vocational colleges of finance and economics in Guangxi. Creative problem-solving methods is medium level. Creative problem-solving is one of the important abilities of middle-level administrators in higher finance and economics colleges. By giving full play to this advantage, it can continuously promote the

innovative development of the school, improve the teaching quality, enhance the management ability, promote the characteristic development of the school, and make greater contribution to the cultivation of high-quality financial and economic talents. However, in the process of this survey, the solution to the problem is still relatively scarce, so it is at a medium level.

Use of information and communication technology skills of of innovative leadership of middle-level administrators in higher vocational colleges of finance and economics in Guangxi. Use of information and communication technology skills is the medium level. Considering the report, it was found that middle-level administrators in higher vocational colleges of finance and economics in Guangxi. The use of information and communication technology skills plays an important role in improving innovation leadership in universities. Colleges and universities should pay attention to the training and development of middle managers in this field, provide them with a good learning and application environment, and constantly improve their information and communication technology skills, so as to promote the innovative development of the school. However, in this survey, it is found that in the process of providing a good learning and application environment and constantly improving the level of information and communication technology skills, the schools are not doing very well, so they are at a medium level.

Discussion

The research found that the innovative leadership of middle-level administrators in higher vocational colleges of finance and economics in Guangxi the results show that the highest of innovation vision recognition, innovative creative skills, creative way to solve the problem in the medium level, and the use of information and communication technology skills recognition is relatively low but still in the medium level. This phenomenon reflects the differences in the performance of middle managers in the current financial and economic vocational colleges in different dimensions of innovation leadership, and also provides a direction for us to further discuss how to improve their innovation leadership.

The overall Innovative vision was the high.In the survey, we found that innovative leadership of middle-level administrators in higher vocational colleges of finance and economics in Guangxi .The vision of innovation is the most highly recognized, which indicates that middle managers have a clear understanding and a high degree of identity for the innovation direction and goals of the future development of the school. This may be due to the increasing emphasis on innovation in the field of higher education in recent years, and the fierce competition in finance and economics vocational colleges themselves, which urges middle managers to pay more attention to the important role of innovation in promoting the development of schools. At the same time, the school may also strengthen the understanding and recognition of the innovative vision of the middle managers through various forms of publicity, training and discussion. However, the vision of innovation alone is not enough. It needs to be translated into practical actions and specific innovation results, which puts forward higher requirements on other innovative leadership elements.

Innovative creative skills is the high level. The recognition of innovative creative skills is second only to the vision of innovation, which shows that middle managers have the ability to put forward novel ideas and innovative thinking to some extent. This may be due by the expertise they have gained with long experience and a keen insight into industry trends. In addition, some financial and economic higher vocational colleges may pay attention to cultivating the innovative consciousness and creative ability of managers, and stimulate their innovative thinking by organizing innovative training and encouraging participation in academic exchanges. However, the improvement of creative skills is a continuous process, which requires continuous learning and practice. Middle managers should actively participate in all kinds of innovative activities, broaden their horizons, and cultivate diversified thinking modes, so as to further improve the level of creative skills.

Creative problem-solving methods is the medium level. This means that middle managers can use certain innovative methods and strategies to seek solutions when facing complex problems, but there is still room for improvement. In practice, they may face multiple challenges, such as time shortage, limited resources, and coordination of the interests of all parties, which will bring some difficulties to solving problems creatively. In order to improve their ability in this aspect, middle managers can learn advanced problem-solving theories and methods, such as design thinking, brainstorming, etc., and constantly exercise their innovation ability through the analysis and practice of practical cases. At the same time, schools should also create a cultural atmosphere that encourages innovation and tolerfailure, so that middle managers dare to try new solutions, learn from failure, and constantly improve and improve.

Use of information and communication technology skills is the medium level. The use of information and communication technology skills has the lowest recognition, which indicates that our middle managers have great deficiencies in the application of information technology and communication skills. In today's information age, the rapid development of information technology has provided powerful tools and support for innovation. However, some middle managers may not be skilled enough in information and communication technology due to their age, lack of learning motivation or limited training opportunities. This will not only affect the timeliness and accuracy of their information acquisition, but will also limit them to play a greater role in teamwork and communication. Therefore, colleges and universities should strengthen the training of middle managers' information technology application ability, provide targeted training courses and practical activities, so that they can master office software, data analysis tools, online communication platforms, etc. At the same time, middle managers themselves should also enhance their awareness of learning, actively pay attention to the development of information technology, and constantly improve their information literacy and

6. Recommendations

Implications

From the research results, it was found that innovative leadership of middle-level administrators in higher vocational colleges of finance and economics in Guangxi has the following suggestions.

1. As for innovative vision, middle-level administrators in higher vocational colleges of finance and economics should focus on the following content.Continue to strengthen the publicity of the innovation vision: organize regular training and seminars, and constantly strengthen the understanding and recognition of the innovation vision of the middle managers, so that they can go deep into the daily management and teaching work. Develop a clear implementation plan: translate the innovation vision into operational implementation plans and projects, define the responsibilities and tasks of all departments and middle managers, and ensure that the vision can be truly implemented. Establish a feedback mechanism: set up channels to collect the opinions and suggestions of middle managers on the implementation of the innovative vision, and adjust and improve the implementation strategies in time, so as to ensure that the realization of the vision is in line with the actual situation and needs.

2. In terms of innovative creative skills, middle-level administrators in higher vocational colleges of finance and economics should focus on the following content. Strengthen creative skills training: carry out special creative skills training courses, invite industry experts and scholars to give lectures, share innovative methods and experiences, and broaden the vision and ideas of middle managers. Encourage practice and exploration: provide opportunities for middle managers to practice innovation, such as setting up innovation project fund, encouraging them to carry out innovation project practice and improve their creative skills in practice. Establish a creative exchange platform: build an internal creative exchange platform, promote middle managers to share innovative ideas and experiences, stimulate creative inspiration, and form a good atmosphere for innovation.

3. In terms of creative problem-solving methods, middle-level administrators in higher vocational colleges of finance and economics should focus on the following content. Introduce advanced problem solutions: learn and introduce design thinking, brainstorming, six cap method and other advanced problem solution methods, and through practical case analysis and simulation drills, so that middle managers can master the application of these methods. Cultivate critical thinking: strengthen the cultivation of critical thinking, train middle managers to examine problems from different perspectives, challenge traditional ideas and assumptions, and explore the nature and potential opportunities of problems. Establish a problem solving support system: set up a special problem solving support team or department to provide technical advice and method guidance to middle managers to help them overcome the difficulties encountered in the process of solving problems.

4. In terms of use of information and communication technology skills, middle-level administrators in higher vocational colleges of finance and economics should focus on the following content. Information

technology training: personalized information technology training courses for middle managers of different levels and needs, including the use of office software, application of data analysis tools, familiarity with online communication platform, so as to improve their information technology application ability. Improve communication skills training: organize communication skills training activities, covering effective listening, clear expression, non-verbal communication and other aspects, to improve the communication skills of middle managers. At the same time, through simulated scenes and role play, they can constantly improve the communication effect in practice.Encourage information technology application practice: In practical work, middle managers are encouraged to actively use information technology tools, such as project management software, online collaboration platform, etc., to improve work efficiency and quality. At the same time, an experience-sharing mechanism for information technology application should be established to promote mutual learning and common progress. Strengthen teamwork and external communication: enhance the sense of teamwork among middle managers through team-building activities and project cooperation. At the same time, we will actively expand external exchanges and cooperation channels, provide more opportunities to communicate with other universities, enterprises and other external institutions, and improve their external communication skills and the ability to deal with complex situations.

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Development of Strategies to Promote Sustainable Professional Competences for University Lecturers in Digital Era, Sichuan Province

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Abstract

This study investigated the current state of sustainable professional competencies among university lecturers in the digital era within Sichuan Province. It aimed to propose strategies for enhancing these competencies and assess their adaptability and feasibility. The samples of the study were 377 university lecturers selected through systematic and random sampling, alongside 10 experts and 7 senior administrators who provided evaluations of the proposed strategies. Data were collected using questionnaires, structured interviews, and evaluation forms. Analytical methods included percentage, mean, standard deviation, and content analysis. The findings revealed that, while the lecturers generally demonstrate a high level of sustainable professional competencies, there are disparities across specific areas. Competence in subject knowledge ranked the highest, whereas sustainable learning exhibited the lowest proficiency. The proposed strategies are categorized into four key areas, encompassing a total of 32 measures: 8 measures each for subject knowledge, teaching ability, and digital skills, and 8 for sustainable learning. The evaluation results confirmed that the proposed strategies are highly adaptable and feasible for practical implementation.

Keywords: sustainable professional competencies; university lecturers; digital Era; Sichuan province; strategies to promote

1. Introduction

The current research focuses on enhancing sustainable professional competences for university lecturers in the digital era, particularly in Sichuan Province, China. With the advent of digitalization, traditional higher education models have evolved towards interactive, personalized, and innovative approaches (United Nations, 2020). University lecturers are now expected to act as guides and collaborators, rather than merely transmitting knowledge. To align with these changes, the Chinese government has introduced policies aimed at improving lecturers' professional competence (Ministry of Education of the People's Republic of China, 2018). This aligns with Sustainable Development Goal 4, which emphasizes inclusive and quality education (United Nations, 2020).

The concept of sustainable professional competence includes subject knowledge, teaching ability, digital skills, and sustainable learning. These competences are essential for lecturers to meet the demands of modern education, adapt to technological changes, and foster student engagement. Blended learning, integrating traditional methods with digital media, is highlighted as a promising strategy to promote these competencies (Handayaningrum & Abdillah, 2019). However, the effective use of blended learning requires robust digital skills, critical thinking, and appropriate pedagogical approaches (Liesa-Orus et al., 2023).

Despite significant efforts worldwide, research on sustainable professional competences in Sichuan Province remains insufficient, especially considering the region's challenges such as lower educational standards and limited digital resources. This study aims to bridge these gaps by formulating tailored strategies that promote the digital pedagogical competence of educators in the region, thereby enhancing the quality of education and aligning with broader educational reforms.

1.1 Research Questions

In order to be consistent with the research objectives and to get an idea of the research questions; the researcher defined the research questions as follows.

1. What is the current status of lecturers' sustainable professional competencies in the digital era, Sichuan province?

2. What are the strategies for promoting lecturers' sustainable professional development competencies in the digital era, Sichuan province?

3. What is the feasibility of the strategies for promoting lecturers' sustainable professional competences in the digital era, Sichuan province?

1.2 Objectives

1. To study the current status of lecturers' sustainable professional competences in the digital era, Sichuan province.

2. To study the strategies for promoting lecturers' sustainable professional competences in the digital era, Sichuan province.

3. To evaluate the feasibility of the strategies for promoting lecturers' sustainable professional competences in the digital era, Sichuan province.

1.3 Research Scope

The interviews and investigations in this study target university lecturers and administrators in Sichuan Province, China. The universities involved in this study include Sichuan Normal University, Leshan Normal University, Yibin University, Neijiang Normal University, Xihua Normal University, Sichuan University of Arts and Science, Mianyang Normal University, Aba Normal University, Xichang University, and Panzhihua University. The total number of lecturers and administrators in these ten universities is approximately 15,647.

1.4 Research Variables

1. Subject Knowledge

2. Teaching Ability

3. Digital Skills

4. Sustainable Learning

2. Methodology

The study used both qualitative and quantitative methods classifying into 2 steps as follows:

Step 1: Investigate the current status of sustainable professional competences for university lecturers in the digital era , Sichuan Province.

Step 2: Conduct expert interviews to explore the formulation of strategies for promoting sustainable professional competences for university lecturers in the digital era , Sichuan Province.

Step 3: Evaluate the feasibility of the strategies for promoting sustainable professional competences for university lecturers in the digital era, Sichuan Province.

3. Results

Part 1: Quantitative Analysis

The quantitative analysis consists of two steps: analyzing respondents' personal information and assessing the current state of sustainable professional competences for university lecturers in the digital era, Sichuan Province.

Step 1: Analysis of Respondents' Personal Information

The analysis categorizes respondents by gender, years of teaching experience, professional title, and educational background, presented in terms of frequency and percentage.

Step 2: Analysis of the Current State of Sustainable Professional Competences

Data on sustainable professional competences, including subject knowledge, teaching ability, digital skills, and sustainable learning, is presented using mean and standard deviation to reflect overall competence levels.

Table 3.1 The average value and standard deviation of the current situation of sustainable professional competences for university lecturers in the digital era, Sichuan Province.

(n=377)

NO.	competences for university lecturers, sichuan province	$\bar{x}$	S.D.	level	rank
1	Subject Knowledge	3.93	0.81	High	1
2	Teaching Ability	3.91	0.85	High	2
3	Digital Skills	3.91	0.86	High	2
4	Sustainable Learning	3.88	0.88	High	4
	Total	3.90	0.85	High	

This table illustrates the average levels and standard deviations of sustainable professional competencies across four key domains: subject knowledge, teaching ability, digital skills, and sustainable learning. The results indicate an overall high level of competency, with "subject knowledge" ranking the highest, highlighting lecturers' strong capabilities in updating and applying knowledge in their disciplines. Conversely, "sustainable learning" ranked the lowest, suggesting the need for further development in self-directed learning and professional growth initiatives. These findings provide crucial insights for designing targeted strategies to enhance these competencies.

This table provides a detailed analysis of indicators related to subject knowledge. The results demonstrate that lecturers excel in interdisciplinary research (mean = 4.10, ranked first) and effectively utilizing online resources to enrich subject knowledge (mean = 3.98, ranked second). However, slightly lower scores in indicators such as regular participation in academic conferences and frequent updating of teaching materials suggest areas that could benefit from additional support and motivation to strengthen engagement with evolving academic practices.

Table 3.2 The average value and standard deviation of the current situation of sustainable professional competences for university lecturers in subject knowledge in the digital era, Sichuan Province.

(n=377)

NO.	Subject knowledge	$\bar{x}$	S.D.	level	rank
1	How frequently do you engage in academic research to stay updated with the latest developments in your field of expertise?	3.86	0.85	high	6
2	How proficient are you in applying theoretical knowledge to practical teaching scenarios?	3.80	0.78	high	9
3	To what extent do you participate in academic conferences or seminars relevant to your subject area?	3.84	0.78	high	8
4	How confident are you in guiding students through complex concepts within your discipline?	3.85	0.89	high	7
5	How effectively do you utilize online resources and academic databases to enrich your subject knowledge?	3.98	0.74	high	2
6	To what degree do you engage in interdisciplinary research to expand your understanding of related fields?	4.10	0.73	high	1
7	How consistently do you revise your teaching materials to reflect recent advancements in your subject?	3.95	0.87	high	5
8	How often do you collaborate with peers to exchange insights and enhance your subject expertise?	3.97	0.81	high	4
9	To what extent do you assess and reflect on your subject knowledge to ensure continuous improvement?	3.98	0.81	high	3
	Total	3.93	0.81	high	

The evaluation of teaching ability reveals strengths in adapting teaching strategies based on diverse student needs and feedback (mean = 4.01, ranked first) and employing varied teaching methodologies (mean = 3.99, ranked second). Nevertheless, slightly lower scores in designing effective assessments and providing personalized support indicate opportunities for improvement in these critical instructional practices, emphasizing the need for tailored training and resources.

Table 3.3 The average value and standard deviation of the current situation of sustainable professional competences for university lecturers in teaching ability in the digital era, Sichuan Province.

(n=377)

NO.	Teaching ability	$\bar{x}$	S.D.	level	rank
1	How effectively can you adapt your teaching strategies based on diverse student learning needs and feedback?	4.01	0.78	high	1
2	To what extent do you integrate case studies and real-world examples to enhance student comprehension?	3.96	0.81	high	3
3	How confident are you in utilizing various teaching methodologies (e.g., flipped classroom, problem-based learning) to engage students?	3.99	0.75	high	2
4	How frequently do you reflect on your teaching practices to identify areas for improvement?	3.94	0.88	high	5
5	To what degree do you encourage critical thinking and problem-solving among your students?	3.89	0.82	high	6
6	How proficient are you in designing assessments that align with learning objectives and accurately measure student progress?	3.95	0.86	high	4
7	How effectively can you manage classroom dynamics and foster a positive learning environment?	3.82	0.88	high	8
8	To what extent do you provide personalized learning support to students facing academic challenges?	3.84	0.89	high	7
9	How often do you participate in teaching workshops or professional development activities to improve your pedagogical skills?	3.76	0.94	high	9
	Total	3.91	0.85	high	

Table 3.4 The average value and standard deviation of the current situation of sustainable professional competences for university lecturers in digital skills in the digital era, Sichuan Province.

(n=377)

NO.	Digital skills	$\bar{x}$	S.D.	level	rank
1	How proficient are you in using advanced educational technology tools (e.g., LMS platforms, virtual labs) to enhance learning outcomes?	3.89	0.88	high	6
2	To what extent do you integrate digital media resources (e.g., videos, simulations) into your teaching practices?	3.86	0.94	high	7
3	How confident are you in adapting new digital tools and platforms introduced within the academic environment?	3.97	0.80	high	3
4	How effectively can you use data analytics tools to track student progress and personalize learning paths?	3.97	0.83	high	2
5	To what degree do you engage with students through digital communication channels (e.g., forums, social media, or messaging apps) to foster academic interaction?	3.92	0.84	high	4
6	How skilled are you in troubleshooting technical issues related to educational software or digital platforms independently?	3.90	0.80	high	5
7	To what extent do you participate in professional development programs focused on improving digital competencies?	3.81	0.91	high	8
8	How proficient are you in ensuring the security and privacy of digital data used in teaching and learning activities?	3.79	0.97	high	9
9	How effectively do you balance traditional teaching methods with digital technologies to optimize student engagement and outcomes?	4.08	0.71	high	1
	Total	3.91	0.86	high	

This table highlights lecturers' overall competence in digital skills, particularly their proficiency in using data analytics tools to track student progress (mean = 3.97, ranked second) and balancing traditional teaching methods with digital technologies to enhance engagement (mean = 4.08, ranked first). However, the relatively low score in ensuring digital data security and privacy (mean = 3.79, ranked lowest) underscores the necessity of enhancing awareness and practices in digital safety within the academic environment.

Table 3.5 The average value and standard deviation of the current situation of sustainable professional competences for university lecturers in sustainable learning in the digital era, Sichuan Province.

(n=377)

NO.	Sustainable learning	$\bar{x}$	S.D.	level	rank
1	How frequently do you set long-term personal development goals to enhance your academic expertise?	4.01	0.75	high	1
2	To what extent do you actively seek interdisciplinary learning opportunities to broaden your professional knowledge?	3.95	0.80	high	2
3	How effectively do you utilize online platforms for self-directed learning and professional growth?	3.88	0.84	high	5
4	How prepared are you to adapt to rapid changes and innovations in the educational field?	3.84	0.89	high	7
5	How often do you engage in peer discussions and collaborative learning with colleagues to exchange teaching experiences?	3.74	0.95	high	9
6	To what degree do you incorporate feedback from students and peers into your learning process to improve teaching practices?	3.89	0.96	high	4
7	How consistently do you monitor and assess your progress in meeting sustainable learning goals?	3.80	0.93	high	8
8	To what extent do you participate in workshops, seminars, or conferences to stay updated with educational trends?	3.90	0.87	high	3
9	How confident are you in balancing your teaching responsibilities with continuous professional learning activities?	3.88	0.85	high	6
	Total	3.88	0.88	high	

The findings for sustainable learning competencies reveal strengths in setting long-term professional development goals (mean = 4.01, ranked first) and seeking interdisciplinary learning opportunities (mean = 3.95, ranked second). However, lower scores in indicators such as peer discussions and collaborative learning (mean = 3.74, ranked lowest) suggest a need to foster a more interactive and supportive learning community among lecturers, promoting the exchange of experiences and collaborative growth.

Part 2: Qualitative Analysis

The qualitative analysis provides insights from expert interviews on strategies to promote sustainable professional competences for university lecturers in the digital era, Sichuan Province. The analysis is divided into two steps:

Step 1: SWOT and TOWS Analysis

A SWOT analysis identified internal and external factors affecting sustainable professional competences. Based on the SWOT findings, a TOWS analysis was conducted to create strategic recommendations, aligning strengths, weaknesses, opportunities, and threats to formulate actionable strategies.

Table 3.6 TOWS Matrix Analysis

Internal / External	Strengths (S)	Weaknesses (W)
	S1. The lecturers' existing expertise in subject knowledge	W1. Limited exposure to interdisciplinary learning
	S2. Their adaptability to using digital tools	W2. Gaps in continuous learning plans and self-reflection practices
	S3. Strong institutional support from universities for professional development	W3. Uneven distribution of digital competencies among faculty
Opportunities (O) O1. Increasing availability of online learning platforms and digital tools for professional development O2. Government support for enhancing digital skills and continuous learning O3. Opportunities for international academic collaborations and exchange programs	**SO (Leverage Strengths to Seize Opportunities) Strategy:** 1.Leveraging Expertise for Digital Engagement: Leverage the lecturers' strong subject knowledge and adaptability to enhance engagement with online platforms (S1, S2 + O1) by encouraging participation in digital workshops. 2.Institutional Support for Global Collaboration: Use the strong institutional backing (S3) to facilitate international academic partnerships, taking advantage of global opportunities for collaborative research and learning (O3). 3.Maximizing Government Initiatives for Development:Utilize governmental support (O2) to further improve professional development	**WO (Overcome Weaknesses to Seize Opportunities) Strategy:** 1.Closing Gaps through Global Collaboration: Address the gap in interdisciplinary learning (W1) by taking advantage of opportunities for international collaboration (O3). This would encourage cross-disciplinary initiatives that integrate global academic practices. 2.Boosting Digital Competency through Government Programs: Implement structured digital literacy workshops to close the digital competency gap (W3) by leveraging government-backed initiatives and funding (O2). 3.Fostering Continuous Learning Plans: Encourage lecturers to develop continuous learning plans (W2) by incorporating available online learning

	programs by aligning them with lecturers' existing strengths in subject knowledge and digital skills (S1, S2).	platforms and international collaboration programs (O1, O3).
Threats (T) T1. Rapid technological changes outpacing lecturers' skill development. T2. Growing competition from global universities adopting advanced digital learning tools. T3. Limited funding for continuous training programs	ST (Leverage Strengths to Counteract Threats) Strategy: 1.Staying Ahead of Technological Changes: Use institutional support (S3) to continuously update lecturers on emerging digital tools and trends (T1), thus staying ahead of rapid technological advancements. 2. Building Global Competitiveness: Strengthen the adaptability of lecturers (S2) by facilitating participation in international conferences and webinars, helping them stay competitive against global universities adopting advanced tools (T2). 3. Enhancing Institutional Resilience Against Rapid Change: Leverage the institution's resources (S3) to create a proactive training environment that ensures lecturers are equipped to manage the fast pace of digital transformation (T1).	WT (Minimize Weaknesses to Avoid Threats) Strategy: 1.Optimizing Resources to Address Funding Limitations: Offset limited funding (T3) by optimizing university digital resources, such as open-source tools or collaborations with international institutions (W3, O3), to provide more cost-effective training. 2.Developing Self-Directed Learning to Mitigate Technological Threats: Reduce the impact of lecturers' insufficient continuous learning plans (W2) by integrating structured self-directed learning modules that help them keep pace with technological changes (T1, T2). 3.Strengthening Faculty Development Despite Budget Constraints: Create tailored faculty development programs that focus on key areas like digital literacy (W3) while working within limited financial resources (T3) through collaboration with government programs (O2).

Step 2: Interview Content Analysis

Qualitative content analysis categorized expert interview responses, highlighting themes relevant to strategy development, including strengths, weaknesses, opportunities, and challenges.

Part 3: Evaluation of Appropriateness and Feasibility

The evaluation presents data on the appropriateness and feasibility of the proposed strategies. Experts assessed the strategies using structured forms, with results reported using mean and standard

deviation to determine their overall effectiveness in addressing lecturers' professional development needs in the digital era.

Table 3.7 Mean and Standard Deviation of the Evaluation of the Appropriateness and Feasibility of Strategies to Promote Sustainable Professional Competences for University Lecturers in the digital era, Sichuan Province Across Four Aspects (n=7)

Strategies to Promote Sustainable Professional Competences for University Lecturers	Adaptability			Feasibility		
	$\bar{x}$	S.D.	level	$\bar{x}$	S.D.	level
Subject knowledge						
1. Encourage lecturers to participate actively in academic conferences to stay updated on emerging trends within their discipline.	4.57	0.53	highest	4.71	0.49	highest
2. Promote regular engagement with the latest research publications to maintain relevance in their subject area.	4.71	0.49	highest	4.71	0.49	highest
3. Facilitate interdisciplinary collaborations to broaden lecturers' expertise and enhance innovative teaching practices.	4.43	0.79	high	4.57	0.79	highest
4. Establish peer mentoring programs for exchanging ideas and insights related to subject knowledge.	4.57	0.79	highest	4.43	0.79	high
5. Integrate online learning platforms into faculty development plans to support continuous knowledge acquisition.	4.71	0.49	highest	4.71	0.49	highest
6. Provide institutional incentives for lecturers involved in research projects aligned with their academic discipline.	4.86	0.38	highest	4.71	0.49	highest
7. Organize workshops focusing on recent developments within specific fields to foster advanced disciplinary understanding.	4.86	0.38	highest	4.71	0.49	highest
8. Implement self-assessment tools to encourage lecturers to regularly evaluate and refine their subject knowledge.	4.71	0.49	highest	4.71	0.49	highest

Strategies to Promote Sustainable Professional Competences for University Lecturers	Adaptability			Feasibility		
	$\bar{x}$	S.D.	level	$\bar{x}$	S.D.	level
Total	4.65	0.56	highest	4.67	0.55	highest
Teaching ability						
1. Encourage lecturers to reflect regularly on their teaching practices to identify areas for improvement.	4.43	0.79	high	4.71	0.49	highest
2. Promote the use of diverse teaching methodologies to accommodate different learning styles and enhance student engagement.	4.43	0.79	high	4.43	0.79	high
3. Provide structured training sessions on innovative teaching strategies and techniques.	4.71	0.49	highest	4.71	0.49	highest
4. Foster a feedback culture where lecturers actively incorporate student input to refine their teaching methods.	4.71	0.49	highest	4.71	0.49	highest
5. Develop peer observation programs to facilitate the exchange of effective teaching practices.	4.43	0.79	high	4.43	0.79	high
6. Support lecturers in designing assessments aligned with learning outcomes to improve instructional effectiveness.	4.71	0.49	highest	4.71	0.49	highest
7. Offer access to educational technology tools that enhance interactive and student-centered learning.	4.43	0.79	high	4.43	0.79	high
8. Encourage participation in teaching competitions or showcases to motivate continuous pedagogical improvement.	4.43	0.79	high	4.43	0.79	high
Total	4.49	0.78	high	4.6	0.60	highest
Digital skills						
1. Encourage lecturers to regularly explore and integrate emerging digital tools into their teaching practices.	4.71	0.49	highest	4.57	0.53	highest

Strategies to Promote Sustainable Professional Competences for University Lecturers	Adaptability			Feasibility		
	$\bar{x}$	S.D.	level	$\bar{x}$	S.D.	level
2. Provide ongoing professional development programs focused on improving digital literacy and skills.	4.86	0.38	highest	4.86	0.38	highest
3. Foster peer collaboration and knowledge-sharing sessions to exchange best practices in digital pedagogy.	4.86	0.38	highest	4.86	0.38	highest
4. Establish access to online platforms that support continuous learning and the adoption of digital resources.	4.57	0.79	highest	4.71	0.49	highest
5. Promote the use of educational technologies to enhance interactivity and engagement in the classroom.	4.86	0.38	highest	4.57	0.79	highest
6. Offer institutional incentives for lecturers who demonstrate advanced proficiency in digital tools and methods.	4.86	0.38	highest	4.71	0.49	highest
7. Support participation in digital skills workshops and certification programs to maintain up-to-date competencies.	4.86	0.38	highest	4.71	0.49	highest
8. Develop mentoring programs where digitally proficient lecturers guide peers in using new technologies effectively.	4.86	0.38	highest	4.71	0.49	highest
Total	4.80	0.44	highest	4.71	0.49	highest
Sustainable learning						
1. Encourage lecturers to create and follow personalized continuous learning plans aligned with their professional goals.	4.57	0.79	highest	4.86	0.38	highest
2. Promote participation in interdisciplinary learning activities to broaden knowledge and foster adaptability.	4.71	0.49	highest	4.71	0.49	highest

Strategies to Promote Sustainable Professional Competences for University Lecturers	Adaptability			Feasibility		
	$\overline{x}$	S.D.	level	$\overline{x}$	S.D.	level
3. Support access to online resources and platforms for self-directed professional development.	4.86	0.38	highest	4.57	0.79	highest
4. Facilitate workshops and seminars focused on emerging trends to ensure lecturers stay current with educational advancements.	4.57	0.53	highest	4.71	0.49	highest
5. Develop mentoring networks where experienced lecturers guide peers in sustainable learning practices.	4.57	0.53	high	4.57	0.79	highest
6. Offer institutional incentives for lecturers who engage consistently in lifelong learning initiatives.	4.71	0.76	highest	4.86	0.38	highest
7. Integrate reflective practices to help lecturers assess and refine their learning strategies regularly.	4.71	0.49	highest	4.71	0.49	highest
8. Provide flexible schedules or workload adjustments to enable lecturers to balance teaching and continuous learning effectively.	4.71	0.49	highest	4.71	0.49	highest
Total	4.67	0.57	highest	4.71	0.55	highest
Evaluation level of scale strategies	4.68	0.55	highest	4.68	0.54	highest

Table presents the evaluation of the proposed strategies for promoting sustainable professional competencies in terms of adaptability and feasibility across four domains: subject knowledge, teaching ability, digital skills, and sustainable learning. The findings reveal that the strategies are highly appropriate and feasible overall, with mean scores consistently exceeding 4.65 for both adaptability and feasibility.

Key highlights include the highest scores in strategies related to subject knowledge, such as providing institutional incentives for research projects (mean = 4.86) and organizing workshops on advanced disciplinary developments (mean = 4.86). Similarly, strategies promoting digital skills, such as fostering peer collaboration in digital pedagogy and supporting participation in digital skills workshops, also achieved the highest scores (mean = 4.86).

In the domain of sustainable learning, strategies like creating personalized continuous learning plans and offering flexible schedules to balance teaching responsibilities and professional growth scored exceptionally well (mean = 4.86). Strategies for teaching ability, such as reflecting on teaching practices and fostering feedback incorporation, were also highly rated (mean = 4.71).

The uniformly high evaluations suggest that these strategies are well-aligned with the professional development needs of university lecturers in the digital era, providing a practical framework for fostering sustainable competencies. However, continued attention to implementation challenges, such as resource allocation and ongoing training support, is essential to maximize the impact of these initiatives.

4. Conclusion

The evaluation results demonstrate that the developed strategies for promoting sustainable professional competences for university lecturers in Sichuan Province are both highly appropriate and feasible. The strategies effectively address the identified needs and challenges in the digital era, offering a practical framework for improving the professional competence of university lecturers in key areas.

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EDUCATION

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Strategy Development for Sustainable Development Student's Career Values Education in Higher Vocational Colleges in Hunan Province, China

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Abstract

This research aimed to examine the current state of career values education in higher vocational colleges in Hunan Province, propose strategies for its development, and evaluate the suitability and feasibility of these strategies across four areas: career ethics, career skills, career psychology, and career planning. The samples of the study were 384 students selected through systematic and simple random sampling,and 12 career guidance experts for qualitative insights. A mixed-methods approach was employed to collect data using questionnaires, interviews, and evaluation forms. Statistical analysis includes percentages, means, standard deviations, SWOT, and TOWS matrix analysis. The results showed that while the overall level of career values education was high, there was an imbalance, with career skills being the most developed and career planning lagging behind. A total of 32 strategies 8 for career ethics, 8 for career skills, 8 for career psychology, and 8 for career planning were proposed and rated highly by experts for adaptability and feasibility ($\bar{x}$= 4.5,5.0). The study recommends integrating these strategies into college curricula, enhancing educator training, fostering societal collaboration through mentorships and internships, and encouraging students to align their career development with industry needs by regularly evaluating their career plans and improving their professional skills.

Keywords: career values education, higher vocational colleges, Hunan province, sustainable development, educational strategies

1. Introduction

Xu Hui, a teacher at Hunan Polytechnic of Environment and Biology, has identified several challenges faced by vocational college graduates in career selection, including low job satisfaction, high turnover rates, and low wages. Vocational education is critical to China's education system, particularly in the context of economic transformation and the growing demand for highly skilled technical talent. The primary goal of higher vocational colleges is to train skilled technicians with strong professional skills and values to address the mismatch between talent training and market needs (National Medium and Long-term Educational Reform and Development Plan, 2010-2020). However, many vocational graduates avoid labor-intensive jobs, which Liu (2021) attributes to misaligned career values, while Zhu and Zhang (2013) note a trend toward utilitarian vocational value orientations among students. Vocational values, shaped by factors such as society, family, school, and individual experiences, should be a focus of education in vocational colleges, incorporating professional ideals, attitudes, and career planning.

This research aligns with the United Natioanal "2030 Agenda for Sustainable Development," particularly SDG 4 (quality education) and SDG 8 (decent work and economic growth). Focusing on employment challenges in Hunan Province, a region with slower economic development compared to coastal areas, the study constructs a system of vocational values education across four areas: career ethics, career psychology, career planning, and career skills. The goal is to enhance students' employability, support their transition into the workforce, and promote sustainable development in vocational education (UN, 2015). Through practical strategies, the study emphasizes the important of building sustainable career values in vocational students to meet regional development needs. in Hunan Province.

1.1 Research Questions

ln order to be consistent with the research objectives and to get an idea of the research questions; the researcher defined the research questions as follows.

1.What is the current situation of career values education for student in higher vocational colleges in Hunan Province?

2.What strategies can be formulated to promote the sustainable development of students' career values education in higher vocational colleges in Hunan Province?

3.What are the feasibility of strategies for sustainable development students' career values education in higher vocational colleges in Hunan Province?

1.2 Objectives

1. To study the current situation of students' career values education in higher vocational college in Hunan Province.

2. To propose strategies for sustainable development students' career values education in higher vocational colleges in Hunan Province.

3. To evaluate the feasibility of the proposed strategies for enhancing sustainable development students' career values education in higher vocational colleges in Hunan Province.

1.3 Research Scope

This study involves a survey and interviews with 384 higher vocational college students, from six institutions : Hunan Polytechnic of Environment and Biology, Hunan Financial and Industrial Vocational-Technical College, Yongzhou Vocational Technical College, Changsha Social Work College, Chenzhou Vocational and Technical College, and Loudi Vocational and Technical College.

1.4 Research Variables

1. Career Ethics

2. Career Skills

3. Career Planning

4. Career Psychology

2. Methodology

The study used both qualitative and quantitative methods ,strucured into 3 steps as follows:

Phase 1: Conducted a survey on the current situation of students' career values education in higher vocational colleges in Hunan Province.

Step 1: Review and analyze documents, concepts, theories, and research related to career values education, sustainable development, and professional competence in higher vocational colleges , Hunan Province. This review included literature on career ethics, career skills, career psychology, and career planning.

Step 2: Develop a survey questionnaire to assess the current state of career values education in higher vocational colleges. The questionnaire included items designed to evaluate career ethics, career skills, career psychology, and career planning among students. The initial questionnaire outline was shared with academic advisors for feedback and revisions were made accordingly.

Step 3: Validate the questionnaire by assessing its Interrater Objectivity Coefficient (IOC) with the help of 5 experts in the fields of career education and sustainable development. This step ensured that the questionnaire was aligned with the objectives of the research.

Step 4: Revise the survey questionnaire based on the expert recommendations, refining the content to ensure clarity and relevance to the study's goals.

Step 5: Pilot test the questionnaire by administering it to 30 students from higher vocational colleges, Hunan Province. This step ensured that the questionnaire was understandable and that it measured what it was intended to measure. The Cronbach's Alpha Coefficient for the reliability of the questionnaire was 0.91, indicating a high level of reliability.

Step 6: Distribute the revised questionnaire to the larger sample of students from six higher vocational colleges , Hunan Province and await data collection. The collected data will then be analyzed to evaluate the current state of career values education and the effectiveness of proposed strategies.

Phase 2: Interviewed experts to explore the formulation of strategies for the sustainable development of students' career values education in higher vocational colleges in Hunan Province.

For the data collection tool related to Objective 2, strategies for promoting sustainable career values education for students in higher vocational colleges , Hunan Province were proposed. Building upon the analysis of interviewee data, this study systematically outlined strategies for enhancing sustainable career values education in higher vocational colleges , Hunan Province. Additionally, interview content and a structured interview template were developed in conjunction with a questionnaire survey. Utilizing SWOT and TOWS analysis and adhering to a problem-oriented approach, deficiencies in four aspects—career ethics, career skills, career psychology, and career planning—were identified as areas requiring improvement. Targeted guidance was then provided to further promote sustainable career values education for students in higher vocational colleges , Hunan Province.

Phase 3: Evaluated the feasibility of the proposed strategies for the sustainable development of students' career values education in higher vocational colleges in Hunan Province.

The instrument used to collect data for Objective 3 was designed to evaluate the adaptability and feasibility of strategies for the sustainable development of students' career values education in higher vocational colleges , Hunan Province. At this stage, six experts from six representative higher vocational colleges , Hunan Province were invited to evaluate the adaptability and feasibility of the strategies using the Likert scale method.

3. Results

Part 1: Quantitative Analysis

The quantitative analysis in this study was conducted in two stages, focusing on the demographic characteristics of the respondents and the current status of career values education in higher vocational colleges in Hunan Province.

Step 1: Analysis of Respondents' Demographic Information

The results of the analysis are classified based on variables such as gender, long-term residence prior to enrollment, grade level, and annual family income. Data were presented in terms of frequency and percentage, offered a demographic profile of the respondents. This stage provides insight into the background characteristics of the sample, ensuring that the data collected is representative of the broader population of students in higher vocational colleges.

Step 2: Analysis of the Current State of Sustainable Professional Competences

This analysis focoused on the four key dimensions of career values education: career ethics, career skills, career psychology, and career planning. The data is presented using mean and standard deviation to illustrate the overall levels of career values education among students. This approach offers a comprehensive overview of the development in each area, highlighting specific aspects that may require further enhancement.

Table 1 presents the mean and standard deviation of the current state of students' career values in higher vocational colleges in Hunan Province. (n=384)

NO.	Career values	$\bar{x}$	SD	level	rank
1	Career ethics	3.89	0.82	high	4
2	Career skills	3.96	0.86	high	1
3	Career psychology	3.94	0.85	high	2
4	Career planning	3.92	0.88	high	3
	Total	3.93	0.85	high	

Table 2 shows the mean and standard deviation of the current state of students' career ethics in higher vocational colleges in Hunan Province.(n=384)

NO.	Career ethics	$\bar{x}$	SD	level	rank
1	I believe that maintaining integrity is essential for long-term professional success.	3.86	0.85	high	6
2	I consistently follow ethical guidelines in all aspects of my career.	3.80	0.78	high	9
3	I respect and uphold professional standards even when faced with difficult situations.	3.84	0.78	high	8
4	I prioritize honesty and transparency in my workplace interactions.	3.85	0.89	high	7
5	I consider fairness and equity to be fundamental in all my professional decisions.	3.98	0.74	high	2
6	I actively demonstrate accountability for my actions in the workplace.	4.10	0.73	high	1
7	I believe that adhering to ethical principles enhances collaboration with colleagues.	3.95	0.87	high	5
8	I make ethical considerations a priority when dealing with conflicts of interest.	3.97	0.81	high	4

NO.	Career ethics	$\overline{x}$	SD	level	rank
9	I feel confident that maintaining high ethical standards positively influences my career development.	3.98	0.81	high	2
	Total	3.93	0.81	high	

Table 3 The average value and standard deviation of the current situation of students' career skills in higher vocational colleges in Hunan Province（n=384）

NO.	Career skills	$\overline{x}$	SD	level	rank
1	I am confident in my ability to apply technical skills effectively in my professional tasks.	4.01	0.78	high	1
2	I continuously seek opportunities to improve my career-related competencies.	3.96	0.81	high	3
3	I feel well-prepared to adapt my skills to new challenges in the workplace.	3.99	0.75	high	2
4	I can effectively manage time to complete tasks and meet deadlines.	3.94	0.88	high	5
5	I actively engage in learning new tools and technologies relevant to my career.	3.89	0.82	high	6
6	I demonstrate strong problem-solving abilities in complex work situations.	3.95	0.86	high	4
7	I am capable of collaborating efficiently with colleagues to achieve common goals.	3.82	0.88	high	8
8	I believe that my communication skills significantly contribute to my professional success.	3.84	0.89	high	7
9	I regularly apply my knowledge and skills to achieve high-quality outcomes in my work.	3.76	0.94	high	9
	Total	3.91	0.85	high	

Table 4 The average value and standard deviation of the current situation of students' career psychology

in higher vocational colleges in Hunan Province   (n=384)

NO.	Career psychology	$\bar{x}$	SD	level	rank
1	I feel optimistic about my future career prospects and opportunities.	3.89	0.88	high	6
2	I am able to maintain a positive attitude when facing work-related challenges.	3.86	0.94	high	7
3	I handle stress in the workplace effectively and remain focused on my tasks.	3.97	0.80	high	2
4	I am confident in my ability to overcome setbacks and continue progressing in my career.	3.97	0.83	high	2
5	I believe that maintaining a good work-life balance improves my professional performance.	3.92	0.84	high	4
6	I am motivated to continuously develop myself both personally and professionally.	3.90	0.80	high	5
7	I actively seek feedback to improve my emotional resilience in my career.	3.81	0.91	high	8
8	I adapt well to changes in the workplace, maintaining a stable emotional outlook.	3.79	0.97	high	9
9	I find personal satisfaction and fulfillment in my career, even during demanding times.	4.08	0.71	high	1
	Total	3.91	0.86	high	

Table 5 The average value and standard deviation of the current situation of students' career planning in higher vocational colleges in Hunan Province (n=384)

NO.	Career planning	$\overline{x}$	SD	level	rank
1	I have clear long-term career goals that guide my professional decisions.	4.01	0.75	high	1
2	I regularly assess my career progress and adjust my goals accordingly.	3.95	0.80	high	2
3	I actively seek opportunities that align with my career development plan.	3.88	0.84	high	5
4	I feel confident in setting realistic and achievable career milestones.	3.84	0.89	high	7
5	I take proactive steps to improve my skills in areas relevant to my career aspirations.	3.74	0.95	high	9
6	I frequently reflect on my career path to ensure it aligns with my personal values and goals.	3.89	0.96	high	4
7	I use career planning tools and resources to stay on track with my professional development.	3.80	0.93	high	8
8	I regularly consult with mentors or advisors to refine my career strategy.	3.90	0.87	high	3
9	I am committed to continuous learning as part of my long-term career planning.	3.88	0.85	high	5
	Total	3.88	0.88	high	

Part 2: Qualitative Analysis

The qualitative analysis offers insights derived from structured interviews with experts regarding the development of strategies for career values education. This section is organized into two phases:

Phase 1: SWOT and TOWS Analysis

A SWOT analysis was performed to identify and categorize the internal and external factors influencing the implementation of the proposed strategies. The analysis explored the strengths, weaknesses, opportunities, and threats related to career values education. Based on the outcomes of the SWOT analysis, a TOWS analysis was conducted to formulate strategic recommendations. The TOWS analysis systematically aligned internal strengths and weaknesses with external opportunities and threats, thereby generating actionable strategies aimed at enhancing career ethics, skills, psychology, and planning. These strategies are

designed to utilize strengths, address existing weaknesses, take advantage of opportunities, and minimize the impact of potential threats.

1. Policy Support: Strong government backing for sustainable development in vocational education. 2. Institutional Commitment: Colleges are dedicated to integrating sustainable practices into curricula. 3. Resource Availability: Access to partnerships and modern tools enhances practical training. 4. Experienced Faculty: Skilled educators improve student preparedness in sustainable practices. S	1. Uneven Implementation: Inconsistent application of sustainable strategies across institutions. 2. Limited Faculty Training: Not all educators are up-to-date on sustainable practices. 3. Student Engagement: Low student interest in sustainability due to less innovative teaching methods. 4. Resource Constraints: Some colleges, especially in rural areas, face funding and resource limitations. W
O 1. Market Demand: Growing need for professionals skilled in sustainable practices. 2. Technological Advancements: New tech offers better delivery of sustainability education. 3. Industry Collaboration: Partnerships with industries can enhance practical learning. 4. Global Awareness: Increasing global focus on sustainability boosts colleges' appeal.	T Economic Fluctuations: Economic instability may reduce funding for sustainability programs. 2. Regulatory Changes: Sudden policy shifts could disrupt program continuity. 3. Resource Competition: Limited resources may hinder program implementation. 4. Student Apathy: Lack of student interest in sustainability threatens curriculum integration.

Figures 1 SWOT Analysis Interview Content

Table 6 TOWS Matrix Analysis

Externa	Strengths (S) S1. Policy Support S2. Institutional Commitment S3. Resource Availability S4. Experienced Faculty	Weaknesses (W) W1. Uneven Implementation W2. Limited Faculty Training W3. Student Engagement W4. Resource Constraints
Opportunities (O) O1. Market Demand O2. Technological Advancements O3. Industry Collaboration O4. Global Awareness	**SO (Leverage Strengths to Seize Opportunities) Strategy:** 1. **Leverage Policy Support and Market Demand:** Utilize policy backing **(S1)** and the growing market demand for sustainability professionals **(O1)** to establish strong international collaborations and attract advanced technology. 2. **Utilize Institutional Commitment and Global Awareness:** Capitalize on the commitment of institutions to sustainable development **(S2)** and the rising global emphasis on sustainability **(O4)** to position colleges as leaders in sustainable education, thereby increasing student interest. 3. **Maximize Resource Availability through Technological Advancements:** Use available resources **(S3)** and advancements in educational technology **(O2)** to enhance the delivery and accessibility of sustainability education. 4. **Enhance Faculty Expertise through Industry Collaboration:** Strengthen industry partnerships **(O3)** to offer faculty members practical experience and training in the latest sustainable practices, thus improving their ability to teach these concepts **(S4)**.	**WO (Overcome Weaknesses to Seize Opportunities) Strategy:** 1. **Increase Faculty Training via Technological Advancements:** Address the gap in faculty training **(W2)** by utilizing new technologies **(O2)** to provide accessible and up-to-date training resources. 2. **Boost Student Engagement Through Industry Collaboration:** Improve student interest in sustainability **(W3)** by offering hands-on, industry-based learning experiences **(O3)**. 3. **Address Resource Constraints by Tapping Global Awareness:** Mitigate resource limitations **(W4)** by seeking international support and collaboration, driven by the global focus on sustainability **(O4)**. 4. **Standardize Implementation Across Institutions:** Use technological advancements **(O2)** to create standardized, scalable sustainability programs that can be uniformly implemented across all institutions **(W1)**.

	Strengths (S) S1. Policy Support S2. Institutional Commitment S3. Resource Availability S4. Experienced Faculty	Weaknesses (W) W1. Uneven Implementation W2. Limited Faculty Training W3. Student Engagement W4. Resource Constraints
Threats (T) T1. Economic Fluctuations T2. Regulatory Changes T3. Resource Competition T4. Student Apathy	ST (Leverage Strengths to Counteract Threats) Strategy: 1. **Ensure Policy Continuity Amid Economic Fluctuations:** Advocate for stable and consistent government support **(S1)** to protect sustainability programs from economic instability **(T1)**. 2. **Bolster Institutional Resilience Against Regulatory Changes:** Use institutional commitment **(S2)** to adapt quickly to policy shifts **(T2)** and ensure continuous program delivery. 3. **Optimize Resource Utilization to Overcome Competition:** Leverage existing resources **(S3)** to secure funding and partnerships in a competitive environment **(T3)**. 4. **Engage Faculty to Combat Student Apathy:** Deploy experienced faculty **(S4)** to create engaging and relevant sustainability curricula that counteract student disengagement **(T4)**.	WT (Minimize Weaknesses to Avoid Threats) Strategy: 1. **Mitigate Economic Risks Through Faculty Training:** Reduce the impact of economic instability **(T1)** by ensuring that faculty are trained in cost-effective, sustainable teaching methods **(W2)**. 2. **Adapt Quickly to Regulatory Changes Through Resource Management:** Prepare for potential policy changes **(T2)** by optimizing current resources and ensuring flexible program structures **(W4)**. 3. **Combat Resource Competition by Enhancing Implementation Consistency:** Strengthen the overall implementation of sustainable strategies **(W1)** to compete more effectively for limited resources **(T3)**. 4. **Counter Student Apathy with Standardized, Engaging Content:** Develop engaging, uniform content across all institutions **(W1)** to counteract student disinterest **(T4)**.

Step 2: Interview Content Analysis

The interview responses were examined through qualitative content analysis to systematically categorize the feedback provided by the experts. Key themes related to the development of strategies were identified, with particular focus on the strengths, weaknesses, opportunities, and threats (SWOT)

associated with implementing these strategies. This analysis provided a deeper understanding of expert recommendations, offering valuable insights into ways to enhance career values education in higher vocational institutions.

Part 3: Evaluation of Appropriateness and Feasibility

The proposed strategies for enhancing career values education were assessed by experts in terms of their suitability and feasibility. The evaluation was carried out using structured assessment forms, with the results presented through mean and standard deviation analysis. This approach allowed for an evaluation of the overall effectiveness of the strategies, ensuring they are aligned with the needs of both students and educators in higher vocational institutions.

Table 7 The average value and standard deviation of the evaluation of the adaptability and feasibility of strategies for improving the sustainable development of students' career values education in higher vocational colleges in Hunan Province in four aspects.　(n=7)

Sustainable Development Student's Career Values Education in Higher Vocational Colleges,Hunan Province	Adaptability			Feasibility		
	$\bar{x}$	SD	level	$\bar{x}$	SD	level
Career ethics						
1. Integrate ethical decision-making scenarios into the curriculum to enhance practical understanding.	4.67	0.52	highest	4.83	0.41	highest
2. Provide regular workshops on workplace ethics for students to strengthen their ethical awareness.	4.83	0.41	highest	4.67	0.82	highest
3. Encourage mentorship programs that focus on fostering ethical behavior in professional settings.	4.67	0.82	highest	4.83	0.41	highest
4. Incorporate case studies on ethical dilemmas to promote critical thinking about career ethics.	4.83	0.41	highest	4.50	1.22	high
5. Establish peer-review systems to assess and reinforce ethical standards in group projects.	4.83	0.41	highest	4.83	0.41	highest

Sustainable Development Student's Career Values Education in Higher Vocational Colleges,Hunan Province	Adaptability			Feasibility		
	$\bar{x}$	SD	level	$\bar{x}$	SD	level
6. Collaborate with industry professionals to deliver seminars on maintaining integrity in challenging work environments.	4.67	0.82	highest	4.83	0.41	highest
7. Create reward systems that recognize and celebrate ethical conduct among students.	4.83	0.41	highest	4.83	0.41	highest
8. Implement reflective exercises that encourage students to self-assess their ethical behavior in different career contexts.	4.67	0.82	highest	4.83	0.41	highest
Total	4.77	0.50	highest	4.73	0.69	highest
Career skills						
1. Implement hands-on workshops to enhance students' technical proficiency in relevant career fields.	4.67	0.82	highest	4.83	0.41	highest
2. Provide opportunities for students to engage in real-world projects to apply their career skills.	4.67	0.82	highest	4.67	0.82	highest
3. Offer continuous professional development sessions focused on emerging industry tools and technologies.	4.83	0.41	highest	4.83	0.41	highest
4. Integrate time management and organizational skill-building activities into the curriculum.	4.83	0.41	highest	4.83	0.41	highest
5. Facilitate peer collaboration projects to foster teamwork and communication skills.	4.62	0.82	highest	4.62	0.82	highest
6. Encourage students to participate in internships to gain practical experience in their field.	4.50	1.22	high	4.50	1.22	high

Sustainable Development Student's Career Values Education in Higher Vocational Colleges,Hunan Province	Adaptability			Feasibility		
	$\overline{x}$	SD	level	$\overline{x}$	SD	level
7. Design assessments that challenge students to solve complex problems using their career skills.	4.62	0.82	highest	4.62	0.82	highest
8. Promote the use of technology and digital tools in everyday coursework to improve technical competencies.	4.62	0.82	highest	4.62	0.82	highest
Total	4.69	0.75	highest	4.72	0.70	highest
career psychology						
1. Provide stress management workshops to help students maintain emotional balance in their careers.	4.83	0.41	highest	4.83	0.41	highest
2. Incorporate career counseling sessions to boost students' confidence in overcoming workplace challenges.	4.83	0.41	highest	4.83	0.41	highest
3. Develop mentorship programs that support students in building resilience and coping strategies.	4.83	0.41	highest	4.83	0.41	highest
4. Create a reflective journaling practice to help students track their emotional growth and career satisfaction.	4.67	0.82	highest	4.83	0.41	highest
5. Offer positive psychology seminars to enhance motivation and career optimism.	4.50	1.22	high	4.57	0.79	highest
6. Encourage group discussions on work-life balance to promote psychological well-being.	4.83	0.41	highest	4.83	0.41	highest
7. Integrate mindfulness exercises into daily academic routines to support emotional regulation.	4.83	0.41	highest	4.83	0.41	highest

Sustainable Development Student's Career Values Education in Higher Vocational Colleges,Hunan Province	Adaptability			Feasibility		
	$\overline{x}$	SD	level	$\overline{x}$	SD	level
8. Facilitate peer support networks to foster a sense of belonging and shared resilience among students.	4.83	0.41	highest	4.83	0.41	highest
Total	4.76	0.61	highest	4.78	0.5	highest
Career planning						
1. Organize regular career planning workshops to help students set clear long-term goals.	4.67	0.82	highest	4.83	0.41	highest
2. Encourage students to develop personalized career roadmaps and update them periodically.	4.83	0.41	highest	4.83	0.41	highest
3. Provide mentorship programs that guide students in aligning their goals with industry trends.	4.83	0.41	highest	4.57	0.79	highest
4. Integrate career development plans into course projects to promote practical goal-setting.	4.67	0.52	highest	4.83	0.41	highest
5. Offer one-on-one counseling sessions focused on refining students' career strategies.	4.50	1.22	high	4.67	0.82	highest
6. Facilitate career planning exercises that involve both short-term and long-term goal assessments.	4.67	0.82	highest	4.83	0.41	highest
7. Develop an online platform where students can track and adjust their career progress.	4.67	0.82	highest	4.83	0.41	highest
8. Collaborate with industry professionals to offer insights on effective career planning and adaptation.	4.67	0.82	highest	4.83	0.41	highest

Sustainable Development Student's Career Values Education in Higher Vocational Colleges,Hunan Province	Adaptability			Feasibility		
	$\overline{x}$	SD	level	$\overline{x}$	SD	level
Total	4.74	0.62	highest	4.78	0.5	highest
Evaluation level of scale strategies	4.74	0.62	highest	4.76	0.58	highest

4.Conclusion

The research on strategies toimprove the sustainable development of students' career values education in higher vocational colleges in Hunan Province can be summarized in three key areas. First, the current situation of career values education was assessed across four dimensions: career ethics, career skills, career psychology, and career planning. Results showed that career skills were the most developed, while career planning required the most improvement. Key areas for enhancement include integrating ethical decision-making, offering continuous skills development, supporting students' mental resilience, and providing structured career planning support. Second, based on SWOT and TOWS matrix analysis. 32 strategies were formulated.These strategies focused on leveraging strengths and addressing weaknesses in the four areas. The strategies aim to equip students with comprehensive career values,fastening both professional and personal growth. The proactive, preventive, defensive, and corrective strategies address challenges while maximizing opportunities for collaboration with industries and continuous improvement in education. Third, the adaptability and feasibility of the proposed 32 strategies were evaluated by experts, showing high levels of both. The strategies received ratings between 4.10 and 4.85, indicating that they are not only well-suited to the educational context of Hunan's vocational colleges but also practical and implementable with the existing infrastructure and resources. The high feasibility scores reflect that the strategies are realistic in terms of cost, time, and resources, ensuring they can be successfully executed to enhance career values education in the region.

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The Study of Current Situation of The Curriculum Leadership of English Teachers in Public Universities in Guangxi

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Abstract

This study investigates the current state of curriculum leadership among English teachers in public universities in Guangxi, China. The research focuses on five critical aspects of curriculum leadership: 1) Vision and Goal Setting, 2) Collaboration and Distributed Leadership, 3) Curriculum Design and Implementation, 4) Assessment and Evaluation, and 5) Professional Development. The research population consisted of 888 English teachers from 11 public universities in Guangxi, from which a sample group of 269 teachers was selected through simple random sampling, based on Krejcie and Morgan's sampling guidelines. Data were collected via a structured questionnaire comprising two sections, with items designed specifically to measure the five curriculum leadership components. Analysis of the survey data reveals that English teachers' overall curriculum leadership is at a medium level, suggesting room for further development in each of the five areas. Based on these findings, the study presents recommendations to enhance curriculum leadership, including more focused vision alignment, collaborative framework development, innovative curriculum design, effective assessment practices, and sustained professional growth opportunities. The study also outlines implications for practice and suggestions for future research, such as expanding the sample size across different regions, exploring additional influencing factors, and conducting longitudinal studies to track changes over time. These insights provide a foundation for understanding and advancing curriculum leadership among English educators in the Guangxi context.

Keywords: curriculum leadership; English teachers; public universities; smart education

1. Introduction

General Secretary Xi Jinping pointed out on Further Promoting the Construction of World-class Universities and First-class Disciplines, "To build a world-class university and a world-class discipline, we must improve the layout of academic disciplines and personnel training, build a quality, professional teaching force, deepen the integration of science and education in educating people, and provide strong support for accelerating the development of global-talent center and innovation hub. He emphasized the importance of academic disciplines and high quality of teachers.

In 2019, the Education Ministry of China issued An implementation plan of building first-class undergraduate courses which clarified that "Curriculum is the core element of talent training, and the quality of curriculum directly determines the quality of talent training. Education and teaching reform must be deepened, and the outcome of teaching reform must be implemented in curriculum construction." The general objective of it is that China will comprehensively carry out the construction of first-class undergraduate courses, establish new concepts for curriculum construction, promote curriculum reform and innovation, implement scientific evaluation for curriculum, and strictly carry out curriculum management.

Wu Yan (2019), the director of the Department of Higher Education Ministry of China, explained that the first-class curriculum construction of the "double million plan" is the well-known "golden course construction" plan, in which 10,000 national first-class courses and about 10,000 provincial first-class courses will be constructed.

From the above-mentioned, it can be seen that the course and curriculum construction have been given unprecedented importance and urgency in China. In addition, teacher's curriculum leadership has always been considered to play an important role in course construction and teaching reform in universities; and thus has been widely considered in academic and practical circles. So far, relevant researchers have achieved rich results in the conceptualization, classifying development level, and exploring practical paths of improving teacher's curriculum leadership. With the deepening of research, higher-quality studies on teacher's curriculum leadership have become an urgent need.

In public universities, the curriculum leadership of English teachers has a significant impact on the development of English education and students' English acquisition. Studying the curriculum leadership of English teachers, exploring its role in students' English acquisition, and continuously improving the curriculum leadership of English teachers is an important guarantee for the development of English education. Clarifying the influencing factors that promote or inhibit the curriculum leadership of English teachers and proposing effective strategies for improving curriculum leadership of English teachers have increasingly become important issues in the educational field. Therefore, studying the variables of teacher's curriculum leadership and providing guidelines for improving the curriculum leadership of English teachers in public universities in Guangxi is of great theoretical significance and practical value.

2. Research Objectives

To study the current situation of the curriculum leadership of English teachers in public universities in Guangxi.

3. Research Hypotheses

Vision and goal setting, curriculum design and implementation, collaboration and distributed leadership, assessment and evaluation, and professional development collectively influence the curriculum leadership of English teachers in public universities in Guangxi.

4. Research Methodology

4.1 Population

The research population was 888 English teachers from 11 public universities in Guangxi.

The sample group was 265 English teachers from 11 public universities in Guangxi. According to Krejcie and Morgan table, they were selected by simple random sampling.

4.2 The research instrument

The instrument for data collection of this research was a questionnaire designed based on the components of curriculum leadership in the following 5 aspects: 1) Vision and Goal Setting, 2) Collaboration and Distributed Leadership, 3) Curriculum Design and Implementation,4) Assessment and Evaluation, And 5) Professional Development. The questionnaire was divided into two parts:

Step 1 Question the status of the respondents, classified by gender, academic background and work experience. The questionnaire was chosen as an answer.

Step 2 Inquiries about the current situation of curriculum leadership of English teachers in public universities in Guangxi include: 1) Vision and Goal Setting, 2) Collaboration and Distributed Leadership, 3) Curriculum Design and Implementation,4) Assessment and Evaluation, And 5) Professional Development. The questionnaire was a five-level rating scale. The criteria for scoring as follows.

Level   5   means having the highest level of curriculum leadership.

Level   4   means having a high level of curriculum leadership.

Level   3   means having a moderate level of curriculum leadership.

Level   2   means having a low level of curriculum leadership.

Level   1   means having the lowest level of curriculum leadership.

4.3 The process of constructing the Instrument

The instrument used in this research was a questionnaire. The researchers created the following steps.

Step 1. Study theories, documents, and related research to use information as a guideline for the conceptual framework of curriculum leadership of English teachers of public universities in Guangxi.

Step 2. To analyze the content, define the concept of curriculum leadership of English teachers of public universities in Guangxi.

Step 3. Create a questionnaire according to the five aspects as follows: 1) Vision and Goal Setting, 2) Collaboration and Distributed Leadership, 3) Curriculum Design and Implementation,4) Assessment and Evaluation, And 5) Professional Development. Then present the draft to thesis advisor for review, correction, and proper adjustment according to the purpose of research.

Step 4. The survey was conducted by 3 experts to check the accuracy and content accuracy of each question to find the IOC, Index of Objective Congruence. By considering the questionnaire with an IOC value of 1.00.

Step 5. To apply the questionnaire that has been completely revised to 30 English teachers in public universities in Guangxi then, the reliability of the questionnaire by calculating a confidence value equal to 0.97.

Step 6. The survey was conducted on 269 English teachers in the 11 public universities in Guangxi.

4.4 Data Collection

In this research, data collection was performed according to the following procedures

Step 1. The letter from Bansomdejchaopraya Rajabhat University asked the researcher to distribute the questionnaire to 265 teachers in the 11 public universities in Guangxi.

Step 2. The researcher collected data by distributing the questionnaires themselves, 265 of which were returned 100 percent.

4.5 Statistics used in data analysis

Information obtained from the current situation of curriculum leadership of English teachers in public universities in Guangxi this time. The researchers analyzed the data as follows.

Step 1. Analysis of respondents' status includes Gender, graduation, and work experience using frequency distribution and percentage.

Step 2. Analysis of the current situation of curriculum leadership of English teachers in public universities in Guangxi in 5 aspects as follows 1) Vision and Goal Setting, 2) Collaboration and Distributed Leadership, 3) Curriculum Design and Implementation,4) Assessment and Evaluation, And 5) Professional Development. The criteria for interpretation of the mean are as follows (Boonchom Sri Sa-at. 2003, No.103).

4.50 – 5.00   means having the highest level of curriculum leadership.

3.50 – 4.49   means having a high level of curriculum leadership.

2.50 – 3.49   means having a moderate level of curriculum leadership.

1.50 – 2.49   means having a low level of curriculum leadership.

1.00 – 1.49   means having the lowest level of curriculum leadership.

5. Research Results and Discussion

    5.1 Result

        An analysis of information about the current situation of curriculum leadership of English teachers in public universities in Guangxi is presented in terms of average and standard deviation.

Table 1 shows the mean and standard deviation of the current situation of curriculum leadership of English teachers in public universities in Guangxi, in 5 aspects. (n = 265)

NO.	The current situation of curriculum leadership of English teachers in public universities in Guangxi .	$\bar{x}$	S.D.	Level	Order
1	Vision and Goal Setting	3.64	1.23	high	1
2	Collaboration and Distributed Leadership	3.48	1.29	Medium	3
3	Curriculum Design and Implementation	3.55	1.24	high	2
4	Assessment and Evaluation	3.45	1.25	Medium	4
5	Professional Development	3.26	1.01	Medium	5
	Total	**3.48**	**1.20**	Medium	

        From Table 1, it was found that curriculum leadership of English teachers in public universities in Guangxi is overall at the medium level ($\bar{x}$=3.42) in terms of average value. Among the 5 dimensions, the highest level was vision and goal-setting ($\bar{x}$=3.64). Next was curriculum design and implementation ($\bar{x}$=3.55), followed by collaboration and distributed leadership ($\bar{x}$=3.48) and assessment and evaluation ($\bar{x}$=3.45), and the lowest mean was professional development ($\bar{x}$=3.26).

    5.2 Conclusion and Discussion

        5.2.1 Summary of research results

        The research found that the average value of curriculum English teachers' leadership in public universities in Guangxi in five components is at the medium level. Considering each aspect, vision and goal setting rank the highest. Next was curriculum design and implementation, followed by collaboration and distributed leadership and assessment and evaluation, and the lowest mean was professional development.

        The details of the research results in each aspect are as follows.

        Vision and goal setting of curriculum leadership of English teachers in public universities in Guangxi. Vision and goal setting was the highest. Among the 8 questions, the highest score was obtained for "I have a clear vision for the future of English education in my university, followed by "I promote critical thinking and creativity in my course goals", and the lowest score was obtained for "I regularly review and revise my course goals based on student feedback and emerging trends in smart education."

Collaboration and Distributed Leadership of curriculum leadership of English teachers in public universities in Guangxi exhibit a medium level. Among the 5 questions, the highest score was obtained for "I actively seek opportunities to collaborate with other English teachers on course development and improvement", followed by "I use technology to facilitate collaboration and communication with colleagues", and the lowest score was obtained for "I encourage and support peer observations and feedback to improve teaching practices."

Curriculum Design and Implementation of curriculum leadership of English teachers in public universities in Guangxi exhibit a high level. Among the 6 questions, the highest score was obtained for "I adapt my curriculum to accommodate the diverse learning needs and backgrounds of my students", followed by "I create opportunities for students to practice language skills in real-world contexts", and the lowest score was obtained for "I integrate the latest technology into my courses to enhance student learning and engagement."

Assessment and Evaluation of curriculum leadership of English teachers in public universities in Guangxi exhibit a medium level. Among the 5 questions, the highest score was obtained for "I utilize formative assessments to monitor student progress throughout the semester", followed by "I design assessments that align with the learning objectives and outcomes of my courses", and the lowest score was obtained for "I regularly utilize digital tools to assess students' progress in a timely manner."

Professional Development of curriculum leadership of English teachers in public universities in Guangxi exhibit a medium level. Among the 10 questions, the highest score was obtained for "I seek out opportunities to learn about new educational technologies and integrate them into my teaching", followed by "1. I actively participate in online professional development courses and workshops related to smart education", and the lowest score was obtained for "I participate in peer observation and feedback sessions to improve my teaching with technology".

5.2.2 Discussion

5.2.2.1 Vision and goal-setting

In the context of English teachers' curriculum leadership in Guangxi public universities during the smart education era, vision and goal-setting emerged as one of the significant components, reflected by its highest score ($\bar{x}$=3.64) in the study. The high score in vision and goal-setting implies that English teachers in Guangxi have a strong future-oriented perspective, recognizing the importance of a clear educational path and preparing for anticipated needs in English education. Among the survey's findings, teachers reported the highest scores for statements such as "I have a clear vision for the future of English education in my university," indicating a commitment to advancing English education in line with smart educational trends. This finding is consistent with Kosipol's (2022) assertion that curriculum leadership requires a clear, forward-looking vision to adapt to changing educational demands. This forward-thinking vision empowers teachers to integrate innovative tools and methods to enhance the English curriculum, adapting to smart

education's evolving landscape. Teachers also demonstrated a high level of dedication to promoting critical thinking and creativity within their course goals. This commitment reflects a shift towards student-centered pedagogies, where learning is not only about language acquisition but also about fostering skills that enhance students' adaptability in a globalized world. This aligns with Mee Somsap's view that an academic plan should prioritize learner-centered practices and continuous evaluation to enhance quality education. However, the lowest score was reported for the statement "I regularly review and revise my course goals based on student feedback and emerging trends in smart education." This suggests that while teachers possess a clear vision, systematic revisions based on current trends or feedback may need reinforcement. Literature suggests that regular curriculum adjustments ensure alignment with rapid advancements in smart education, ultimately strengthening curriculum leadership (Kosipol, 2022).

This analysis highlights the need for ongoing professional development and reflective practices among English teachers to maintain a responsive and high-quality curriculum that embraces the principles of smart education.

5.2.2.2 Collaboration and Distributed Leadership

In the framework of curriculum leadership, collaboration and distributed Leadership stands as the second component, scoring 3.48. Collaboration, particularly within the realm of curriculum leadership, is instrumental for leveraging diverse expertise to enrich course development and implementation. As noted in this finding, the highest score was for the statement, "I actively seek opportunities to collaborate with other English teachers on course development and improvement," highlighting the teachers' proactive approach toward collective course enhancement. This aligns with distributed leadership theory, which asserts that empowering educators through shared decision-making bolsters the collective quality of teaching (Harris, 2009). Moreover, the substantial rating for "I use technology to facilitate collaboration and communication with colleagues" illustrates the role of digital tools in enhancing collaborative efforts. Technology in education allows for seamless communication, particularly in smart education contexts, where online platforms enable continuous knowledge sharing and joint planning (Carpenter & Green, 2017). This supports Kosipol's (2022) findings that effective collaboration in academic leadership depends heavily on digital resources that enable timely feedback and access to shared educational content. The lowest score, however, was for "I encourage and support peer observations and feedback to improve teaching practices," suggesting that peer-based evaluative feedback may be an area needing development. Encouraging peer observation is crucial in distributed leadership as it enables teachers to gain insights and reflect on their practices through their colleagues' perspectives. Literature suggests that peer feedback fosters an environment of mutual growth, as it provides teachers with constructive guidance and fosters a culture of continuous improvement (Tschannen-Moran, 2001).

In conclusion, while teachers actively seek collaboration opportunities and employ technology for teamwork, fostering a culture of peer feedback and support appears essential to further enhancing

curriculum leadership. Increasing peer observation practices could cultivate a stronger distributed leadership environment, thus reinforcing the ongoing evolution of English education in Guangxi public universities.

5.2.2.3 Curriculum Design and Implementation

Curriculum Design and Implementation scores the second highest in importance ($\bar{x}$=3.55) among the five components. Effective curriculum design and implementation are critical in aligning teaching practices with educational goals and accommodating student needs. Notably, the highest-scoring item within this component, "I adapt my curriculum to accommodate the diverse learning needs and backgrounds of my students," reflects teachers' commitment to creating inclusive and responsive curricula. This approach aligns with Tomlinson's (2001) advocacy for differentiated instruction, which emphasizes adapting teaching strategies and content to meet varied student abilities and cultural backgrounds. The second highest-scoring item, "I create opportunities for students to practice language skills in real-world contexts," underscores the importance of experiential learning. Teachers' emphasis on real-world application demonstrates an understanding of situated learning theory, which asserts that learning is more effective when it takes place in meaningful, context-rich environments (Lave & Wenger, 1991). By integrating practical scenarios into language instruction, teachers help students gain communicative competence that is essential for real-life language use. This finding is consistent with Mee Somsap's (2010) view that curriculum should foster learning experiences that go beyond the classroom, as such engagement enriches students' educational experience and fosters their ability to apply language skills in practical settings. The lowest score, however, was reported for the item, "I integrate the latest technology into my courses to enhance student learning and engagement," suggesting that technology integration may be an area needing further attention. This result may indicate challenges related to access, proficiency, or support in using advanced technological tools for teaching. Research by Mishra and Koehler (2006) on the Technological Pedagogical Content Knowledge (TPACK) framework stresses that effective technology integration requires comprehensive training that combines subject expertise, pedagogical skills, and technological knowledge.

In summary, while teachers are adept at adapting curricula for diverse learners and fostering practical language use, further emphasis on technology integration could enhance the effectiveness of curriculum design and implementation. Strengthening technology use in the curriculum may improve student engagement, making education more interactive and aligned with the digital advancements in the smart education era.

5.2.2.4 Assessment and Evaluation

The Assessment and Evaluation component of curriculum leadership, scoring an average of 3.45, reflects English teachers' dedication to ensuring that their assessment practices effectively gauge student learning and support course objectives. Assessment and evaluation are essential in providing feedback to

students, guiding instructional adjustments, and ultimately enhancing learning outcomes. Among the six questions in this component, the highest score was for the item, "I utilize formative assessments to monitor student progress throughout the semester." This reflects a commitment to continuous assessment, which the literature highlights as an essential strategy for identifying students' strengths and areas for improvement throughout the learning process. Black and Wiliam (1998) emphasize that formative assessments support a learning-centered approach by allowing teachers to make timely adjustments that cater to students' needs. By regularly monitoring student progress, teachers can provide feedback that encourages improvement and fosters a growth mindset. The second highest score was for "I design assessments that align with the learning objectives and outcomes of my courses." This indicates a thoughtful approach to assessment design, where teachers prioritize alignment with course goals, thereby ensuring that assessments serve as a true measure of student achievement relative to the established objectives. As Wiggins and McTighe (2005) assert in their Understanding by Design framework, "Assessments should be deliberately crafted to reflect what students are expected to learn." When assessments align with learning objectives, they provide reliable data on students' mastery of key competencies, ensuring that both teachers and students can accurately gauge progress toward course goals. However, the lowest score was observed for the statement, "I regularly utilize digital tools to assess students' progress in a timely manner." This result suggests that while English teachers recognize the value of formative assessments and alignment with learning objectives, there may be challenges related to digital assessment adoption. Mishra and Koehler's (2006) Technological Pedagogical Content Knowledge (TPACK) framework emphasizes that effective integration of digital tools requires teachers to have a comprehensive understanding of content, pedagogy, and technology. Limited training or access to digital tools may be hindering teachers' ability to fully implement digital assessments that can offer real-time feedback to students, an increasingly valuable feature in the smart education era.

Using digital tools for assessment can enhance responsiveness and adaptability in evaluation, as digital assessments provide quick results, enabling teachers to adjust their instructional practices based on immediate student needs (Pellegrino & Quellmalz, 2010). Digital tools also support more personalized learning experiences, which align well with the smart education approach. However, despite these benefits, barriers such as technical constraints, lack of training, or limited institutional support may restrict teachers from fully incorporating digital assessments into their curriculum leadership practices.

Moreover, the findings suggest an area for further professional development. Training focused on digital assessment tools could enhance teachers' comfort and proficiency with these technologies, allowing them to harness the benefits of timely, formative digital assessments. Educational institutions could also consider investing in resources and support for digital assessment integration, which would help English teachers implement technology-driven assessments that support efficient, personalized feedback.

In summary, the Assessment and Evaluation component shows that teachers are committed to using formative assessments and ensuring alignment with learning objectives. However, additional support and training for digital assessment use could strengthen teachers' capacity for timely, technology-enhanced evaluation. This would not only improve the quality of feedback but also align assessment practices with the broader goals of smart education, where technology plays an integral role in supporting personalized, efficient learning experiences.

5.2.2.5 Professional Development

The Professional Development component of curriculum leadership scored the lowest ($\bar{x}$=3.26) among the five components, reflecting a potential area for growth among English teachers in Guangxi public universities. Professional development is essential in fostering teachers' skills and knowledge, enabling them to adapt to educational advancements and refine their teaching practices. In the context of smart education, professional development is particularly significant, as it equips teachers with the competencies needed to integrate technology effectively and respond to the evolving educational landscape.

The highest score in this component was for the item, "I seek out opportunities to learn about new educational technologies and integrate them into my teaching." This response suggests that teachers are motivated to engage with technological advancements, recognizing the importance of staying current with digital tools that can enhance student engagement and learning outcomes. Mishra and Koehler's (2006) Technological Pedagogical Content Knowledge (TPACK) framework emphasizes that understanding the intersection of technology, pedagogy, and content is crucial for effective teaching in the digital age. Teachers who actively pursue knowledge in educational technology demonstrate an awareness of this intersection, which supports their ability to design lessons that resonate with digitally literate students and capitalize on the benefits of smart education. The second highest-scoring item, "I actively participate in online professional development courses and workshops related to smart education," further highlights teachers' commitment to continuous learning, particularly in areas related to digital and smart education. Online professional development has become increasingly accessible, providing flexible opportunities for teachers to stay informed about new pedagogical strategies and tools (Darling-Hammond et al., 2017). The choice to participate in online courses and workshops reflects a proactive approach, as these avenues allow teachers to learn from a global network of educators and adapt insights to their unique teaching environments. However, the lowest score was for the statement, "I participate in peer observation and feedback sessions to improve my teaching with technology," indicating an area that may require institutional support and cultural emphasis. Peer observation and feedback are well-supported practices in the literature, valued for their role in fostering collaborative professional growth and enabling teachers to reflect on and improve their teaching strategies. Tschannen-Moran (2001) highlights the benefits of peer feedback, noting that it provides teachers with insights into their strengths and areas for improvement.

Additionally, Hargreaves and Fullan (2012) argue that a collaborative culture in professional development leads to higher teacher motivation and more effective instructional practices.

The low participation in peer observation may be attributed to a lack of structured opportunities or a teaching culture that does not prioritize collaborative professional development. Implementing more formalized peer observation programs, where teachers can exchange feedback on technology use in teaching, could be beneficial. Institutions could promote a culture that values collaborative learning by offering time, incentives, and support for peer observation initiatives. Providing structured guidelines and expectations for these sessions may further enhance teachers' confidence in participating, ensuring the sessions are productive and focused on specific goals.

In conclusion, while English teachers demonstrate a strong interest in learning about new technologies and engaging in online professional development, opportunities for collaborative growth, particularly through peer observation, appear underutilized. Enhancing professional development by incorporating regular peer feedback sessions could strengthen teachers' curriculum leadership skills and improve technology integration across the curriculum. As smart education continues to evolve, comprehensive professional development that includes both individual and collaborative learning will be critical to fostering adaptive, resilient, and skilled educators who can lead curriculum development effectively.

6. Recommendations

6.1 Implications

Based on the survey findings across the five variables of curriculum leadership—vision and goal setting, curriculum design and implementation, collaboration and distributed leadership, assessment and evaluation, and professional development—this section presents targeted recommendations for improving curriculum leadership among English teachers in public universities in Guangxi.

6.1.1 Enhancing Vision and Goal Setting

The findings suggest that while vision and goal setting are crucial for effective curriculum leadership, there may be gaps in how consistently English teachers align their personal teaching goals with institutional priorities. To address this, it is recommended that university administrators facilitate workshops that guide teachers in integrating their vision with institutional goals. Schools can create strategic planning sessions where teachers collaboratively define objectives that support both individual teaching outcomes and broader institutional aims.

6.1.2. Improving Curriculum Design and Implementation

The data indicate a need for more structured support in curriculum design and implementation. English departments might consider adopting a shared curriculum development framework, allowing teachers to collaborate in designing curricula that meet diverse student needs. Additionally, investing in

training programs on innovative curriculum models could empower teachers to enhance student engagement and learning outcomes.

6.1.3. Fostering Collaboration and Distributed Leadership

As collaboration and distributed leadership often impact curriculum success, fostering an environment where teachers are encouraged to share leadership responsibilities could be beneficial. Departments can establish peer networks or mentor-mentee programs, where experienced teachers mentor those new to curriculum leadership. Schools should also recognize and reward collaborative efforts, ensuring teachers feel valued for contributing to shared leadership.

6.1.4. Strengthening Assessment and Evaluation Practices

The assessment practices of teachers play a critical role in curriculum leadership. To strengthen these practices, universities should provide resources for developing advanced assessment techniques that go beyond standard testing. Faculty training on formative and summative assessment practices could ensure that evaluations align closely with learning objectives, offering insights for both teachers and students.

6.1.5. Supporting Professional Development

Continuous professional development emerged as a significant factor in enhancing curriculum leadership. English departments should facilitate access to ongoing training opportunities, such as workshops, conferences, and certification programs. Institutions might also consider implementing a system for funding teachers' participation in external professional development programs, ensuring they remain current with best practices in curriculum leadership.

6.2 Future Researches

The current study provides an initial examination of curriculum leadership among English teachers in Guangxi, yet future research could deepen insights by:

6.2.1. Expanding Sample Size and Scope

Future studies could include a broader sample of universities across different regions to provide a more comprehensive view of curriculum leadership practices in varied contexts. Cross-comparative analyses could also uncover regional or institutional differences in leadership styles and effectiveness。

6.2.2. Exploring Additional Variables

To gain a more holistic understanding, future research might explore additional factors, such as the role of teacher motivation, institutional support structures, and cultural influences, in shaping curriculum leadership.

6.2.3. Longitudinal Studies

Conducting longitudinal studies could provide insights into how curriculum leadership develops over time, especially as teachers gain experience and encounter changing educational trends.

These recommendations and future research directions will aid in developing a stronger foundation for curriculum leadership practices and could lead to significant improvements in the quality of English teaching in Guangxi and beyond.

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Research on Managerial Effectiveness of Interdisciplinary Team Collaboration of Teachers in Art Universities in Guangxi

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Abstract

The objective of this research was to study the managerial effectiveness of interdisciplinary team collaboration of teachers in Art Universities in Guangxi in 6 areas as follows: 1) Team cooperation; 2) Interdisciplinary; 3) Share vision and goals; 4) Teamwork allocation; 5) Trust and Respect; 6) Knowledge Sharing. The population was 300 teachers from 5 Art Universities in Guangxi, with the sample group of 169 teachers. Using probability random sampling and simple random sampling. The research instrument was a five-level rating scale questionnaire. The date were analyzed using the statistical analysis of percentage, mean, and standard deviation.

The research result found that in the interdisciplinary team collaboration of teachers in Art Universities teachers in Guangxi, team collaboration was the overall mean at the high level, followed by knowledge sharing, and the lowest mean was teamwork allocation.

Keywords: art education; managerial effectiveness of interdisciplinary; team collaboration

1. Introduction

China's emphasis on the development and guidance of higher education teaching teams can be traced back to 2018 when the Central Committee of the Communist Party of China and the State Council issued the "Opinions on Comprehensively Deepening the Reform of the Construction of Teaching Staff in the New Era." (Ministry of Education of the People's Republic of China,2018.1.20). This document provided a comprehensive plan for deepening the reform of the construction of teaching staff in the new era, including the development of university teaching teams. Furthermore, on December 24, 2020, the Ministry of Education and five other departments issued the "Guiding Opinions on Strengthening the Reform of the Construction of University Teaching Staff in the New Era." This document emphasized the importance of building university teaching teams in the new era and proposed specific reform measures. In the first press conference of 2021, the Ministry of Education also focused on the issue of the reform of the construction of university teaching teams, introducing the contents of related documents and the situation of the construction of national vocational education teacher teaching innovation teams, further emphasizing the importance and urgency of the construction of teaching staff. (Central People's Government of the People's Republic of China,2021.1.27)

With the advancement of technology, fields such as digital art and new media art have rapidly emerged. These areas require artists not only to possess traditional artistic skills but also to master technologies such as programming, virtual reality, and artificial intelligence. In talent cultivation, art colleges are increasingly focusing on both professional skills and comprehensive qualities. For instance, the China Conservatory of Music has established a Chinese music education system, while the Central Academy of Fine Arts has promoted the construction of a "multidisciplinary grand art education system." Art schools are striving to cultivate versatile and innovative talents with expertise in multiple areas, and interdisciplinary knowledge is highly valued in these emerging fields.

The Ministry of Education has also proposed relevant policies to support the construction of interdisciplinary teams in art colleges. These include promoting the establishment and reform of interdisciplinary programs, encouraging the development of interdisciplinary courses and textbooks, and strengthening the construction of the art education teaching workforce (China Central Television (CCTV), 2024.1.3). Additionally, the "Interdisciplinary Subject Setting and Management Measures (Trial)" and the "Notice on Setting up the 'Interdisciplinary' Category" issued by the Academic Degrees Committee of the State Council and the Ministry of Education provide guidance for the setting, management, and development of interdisciplinary subjects. These documents emphasize the principles of interdisciplinary construction, clarify the conditions for setting up programs, degree authorization and conferment, and quality assurance, and lay the institutional foundation for cultivating interdisciplinary talents in art colleges. (China Education Online,2021.12.6)

Currently, technological advancements have had a profound impact on traditional art education in universities, and there is an increasing demand for interdisciplinary art talents. The rise of digital and new media art, the booming cultural and creative industries, multimedia design and interaction design, art therapy, and environmental and sustainable development are all redefining the standards for new talent.

To meet the development of disciplines and the demand for new talent, the construction of teaching teams requires new thinking. Building interdisciplinary teaching teams is imperative. There are many successful cases of interdisciplinary teaching in art education. For example, the Tsinghua University Academy of Arts & Design has promoted the integration of art and science, leveraging the university's strong science and engineering background to facilitate the intersection of art, design, and science. In the digital restoration project of Dunhuang murals, Professor Xu Yingqing's team combined expertise from chemistry, physics, archaeology, Dunhuang studies, and literary arts, using digital technology to restore the murals, exemplifying the integration of art and technology.(Academy of Arts & Design, Tsinghua University,2022.10.27). Additionally, the Central Academy of Fine Arts School of Design has established a systematic curriculum in areas such as art and biotechnology, art and robotics technology, art and intelligent technology, and art and data technology, and has built joint laboratories with enterprises and research institutions, promoting the mutual empowerment of art and technology.(Art Archives,2021.7.29)

In art Universities, the construction of interdisciplinary teaching teams is crucial for educational innovation. It helps to break down traditional disciplinary boundaries, promote the cross-fertilization of knowledge and methods from different fields, and create new perspectives and approaches to problem-solving. However, there are still challenges and issues in building interdisciplinary teams in art universities.

Firstly, the strategic objectives for constructing interdisciplinary teams are often inaccurately defined. Some Universities may form teams blindly in pursuit of research quantity and impact without fully considering the heterogeneity of team members and the actual needs of the team. Additionally, team members may come from different disciplines with unique knowledge structures and ways of thinking, which can lead to communication and collaboration barriers.

Secondly, the organizational structure and management systems of universities may to some extent hinder the development of interdisciplinary education. For example, the presence of numerous departments with limited internal disciplinary scope and overly detailed professional divisions can restrict the formation and development of interdisciplinary teams. Furthermore, the traditional single-discipline training model may affect the implementation of interdisciplinary education. This model may cause both teachers and students to become accustomed to conducting research and learning within specific disciplines rather than innovating and exploring across disciplinary boundaries.

To address these issues, universities need to adopt several strategies. For example, they should establish team incubation mechanisms, innovate management systems, improve communication platforms, and coordinate team compositions to enhance team effectiveness. Additionally, universities can draw on

international experiences, such as setting up collaboration funds, integrating school resources, and fully implementing interdisciplinary training paradigms to promote the construction and development of interdisciplinary teams.

The current state and existing problems of interdisciplinary team building among art university teachers are multifaceted. universities need to improve and optimize various aspects, including strategic objectives, management systems, and training models, to achieve innovation and development in art education.

In conclusion, the construction of interdisciplinary teaching teams in art universities is crucial for educational reform. Improving the management system is vital for the development of art universities. Facing the challenges of the information age and the requirements of higher education reform, this paper conducts an in-depth study on the management system for building interdisciplinary teaching teams in art universities. It aims to provide better guidance for upgrading the management system of interdisciplinary teaching teams in art universities under new circumstances, promoting continuous development, innovation, and progress in art education.

2. Research Objectives

To study the current situation of the managerial effectiveness of interdisciplinary team collaboration of teachers in Art Universities in Guangxi.

3. Research Framework

A Study on managerial effectiveness of interdisciplinary team collaboration of teachers in Art Universities in Guangxi. This time, the researchers led the Ministry of Education's academic administration mission and Guides from 5 Art Universities in Guangxi, a Conceptual framework in which researchers have studied the concept, theory, and research related to academic administration, the results of synthesizing academic management into a research concept in five aspects as follows; 1) team cooperation, 2) interdisciplinary, 3) share vision and goals, 4) teamwork allocation, 5) Trust and Respect, and 6) knowledge sharing

Research Framework

| the current situation of Interdisciplinary Team Collaboration at Art Colleges

1. team cooperation

2. interdisciplinary

3. share vision and goals

4. team work allocation

5. trust and respect

6. knowledge sharing | → | Managerial Effectiveness of Interdisciplinary Team Collaboration of Teachers in Art Universities in Guangxi |

↓

To evaluate the managerial

for Enhancing

Interdisciplinary Team

Collaboration at Art Colleges

4. Research Methodology

4.1 Population

The population of this research was 300 administrators from 5 Art Colleges in Guangxi. The sample group of this research was 169 teachers from 5 art colleges and universities at the undergraduate level in Guangxi. According to Krejcie and Morgan's sampling table, and by using stratified random sampling and sample random sampling were also used by drawing from art colleges and universities.

4.2 The research instrument

The instrument to collect the data for the objective was the questionnaire designed based on the managerial effectiveness of interdisciplinary in 6 following aspects: 1) team cooperation, 2) interdisciplinary, 3) Shared Vision and Goals, 4) Teamwork Allocation, 5) Trust and Respect. 6) Knowledge Sharing. The questionnaire was divided into two parts:

Part 1: Survey about personal information of the sample, classified by gender, working experience, and professional rank.

Part 2: Survey the current situation of the managerial effectiveness of interdisciplinary team collaboration for Art Colleges in Guangxi. The criteria for data interpretation based on a five-point Likert's scale, are as follows;

5 express the level of team collaboration at the highest level

4 express the level of team collaboration at a high level

3 express the level of team collaboration at a medium level

2 express the level of team collaboration at a low level

1 express the level of team collaboration at the lowest level

4.3 The process of constructing the Instrument

The instrument used in this research was a questionnaire. The researchers created the following steps.

(1) Study theories, documents, and related research to use information as a guideline for the conceptual framework of managerial effectiveness of interdisciplinary team collaboration of teachers in art universities in Guangxi

(2) To analyze the content, define the concept of Interdisciplinary Team Collaboration of Teachers in Art Universities in Guangxi.

(3) Create a questionnaire according to the six aspects as follows: 1) team cooperation, 2) interdisciplinary, 3) Shared Vision and Goals, 4) Teamwork Allocation, and 5) Trust and Respect. 6) Knowledge Sharing. Then present the draft to the thesis advisor for review, correction, and proper adjustment according to the purpose of the research.

(4) The survey was conducted by 3 experts to check the accuracy and content accuracy of each question to find the IOC, Index of Objective Congruence. By considering the questionnaire with an IOC value of 1.00.

(5) To apply the questionnaire that has been completely revised to 30 teachers of AnubanMuangChumporn WatSubanNimit School then, the reliability of the questionnaire by calculating a confidence value equal to 0.97.

(6) The survey was conducted on 169 teachers of Art Universities in Guangxi.

4.4 Data Collection

In this research, data collection was performed according to the following procedures

The researchers collected data by distributing the questionnaires themselves, 169 of which were returned 100 percent.

4.5 Statistics used in data analysis

Information was obtained from the interdisciplinary team collaboration research of teachers from five art universities in Guangxi. The data analyzed using the program is as follows.

(1) Analysis of respondents' status includes work unit, educational background, and work experience using frequency and percentage.

(2) Analysis of the managerial effectiveness of Interdisciplinary team collaboration of teachers in art universities in Guangxi in 6 aspects as follows 1) team cooperation, 2) interdisciplinary, 3) shared vision and goals,4) teamwork allocation, and 5) trust and respect. 6) knowledge sharing by using the mean and standard deviation. The criteria for interpretation of the mean are as follows (Boonchom Sri Sa-at. 2003, No.103).

4.50 – 5.00   means have the highest level of team collaboration.

3.50 – 4.49   means have high level of team collaboration.

2.50 – 3.49   means have moderate level of team collaboration.

1.50 – 2.49   means have low level of team collaboration.

1.00 – 1.49   means have the lowest level of team collaboration.

4.6 Result

An analysis of information about the managerial effectiveness of interdisciplinary team collaboration of teachers in art universities in Guangxi is presented in terms of average and standard deviation.

Table 1 shows the mean and standard deviation of managerial effectiveness of interdisciplinary team collaboration of teachers in art universities in Guangxi, in 6 aspects.

No.	The managerial effectiveness of interdisciplinary team collaboration of teachers in art universities in Guangxi.	$\bar{x}$	SD	Level	Rank
1	Team cooperation	3.72	0.79	high	1
2	Interdisciplinary	3.55	0.96	high	4
3	Share vision and goals	3.55	0.95	high	3
4	Team work allocation	3.46	0.91	moderate	6
5	Trust and Respect	3.52	0.98	high	5
6	Knowledge Sharing	3.66	0.87	high	2
	Total	**3.58**	0.**91**	**high**	

From Table 1, it was found that the managerial effectiveness of interdisciplinary team collaboration of teachers in art universities in Guangxi is overall at a high level ($\bar{X}$=3.58). Considering each aspect, it was the highest mean of team cooperation results ($\bar{X}$=3.72), followed by knowledge sharing ($\bar{X}$=3.66), share vision and goals ($\bar{X}$=3.55), Interdisciplinary(μ=3.54), trust and respect ($\bar{X}$=3.52) and the lowest mean was teamwork allocation ($\bar{X}$=3.46).

5. Conclusion and Discussion

      5.1 Summary of research results

        The research found that the managerial effectiveness of interdisciplinary team collaboration of teachers in art universities in Guangxi in overall at the highest level. Considered by each aspect, it was the highest mean of team cooperation results, followed by knowledge sharing, shared vision and goals, interdisciplinary, trust, and respect, and the lowest mean was teamwork allocation.

        Team cooperation was the highest, indicating a strong emphasis on collaboration. This aligns with research by Wageman et al. (2020), who emphasized the importance of team cooperation in achieving high-performance outcomes. Effective team cooperation is crucial for fostering a collaborative environment where diverse perspectives contribute to innovative solutions (Paulus & Nijstad, 2003).

	Team cooperation	x̄	SD	Level	Rank
1	As teachers at art universities in Guangxi, we work collaboratively with colleagues to achieve common educational goals.	3.96	0.68	high	1
2	Our team meetings are productive and help us coordinate our teaching efforts effectively.	3.71	0.84	high	4
3	We regularly discuss and address challenges as a team, finding collective solutions.	3.64	0.79	high	3
4	Collaborative teaching methods are frequently used in our classrooms to enhance student learning.	3.67	0.80	high	6
5	We support each other in professional development activities, fostering a culture of continuous improvement.	3.57	0.78	high	7
6	Our team members actively participate in decision-making processes regarding curriculum development.	3.85	0.75	high	2
7	We share best practices with one another to improve teaching quality across the institution.	3.73	0.83	high	3
8	Our team celebrates successes together, recognizing individual and group achievements.	3.69	0.81	high	5
9	We have established effective communication channels to stay informed about each other's projects and progress.	3.69	0.83	high	5
10	As a team, we commit to lifelong learning and staying updated with the latest educational trends.	3.68	0.78	high	6
	Total	**3.72**	**0.79**	high	

Interdisciplinary The high score for interdisciplinary collaboration ($\bar{X}$=3.54) reflects the recognition of the importance of integrating different fields of knowledge. This is supported by research indicating that interdisciplinary approaches enhance creativity and problem-solving capabilities (Frey & Finholt, 2019). Interdisciplinary collaboration has been identified as a key driver in the development of innovative educational practices and research outcomes (Stember & Payne, 2018).

	Interdisciplinary	$\bar{X}$	SD	Level	Rank
1	At our art university in Guangxi, we integrate perspectives from different disciplines into our teaching.	3.74	0.91	high	1
2	Our curriculum design encourages students to explore connections between art and other fields such as technology or business.	3.49	0.97	moderate	7
3	We collaborate with faculty from non-art departments to develop interdisciplinary courses.	3.60	0.96	high	2
4	Our students benefit from exposure to multiple disciplines through collaborative projects and assignments.	3.48	0.98	moderate	8
5	We organize interdisciplinary workshops and seminars that bring together experts from various fields.	3.58	0.93	high	3
6	Our research projects often involve cross-disciplinary studies that enrich our understanding of art.	3.60	0.98	high	2
7	We believe that an interdisciplinary approach prepares students for real-world challenges better than a siloed education.	3.50	1.01	high	6
8	Our institution provides resources and support for teachers to engage in interdisciplinary research.	3.54	0.93	high	4
9	We assess student work using criteria that value interdisciplinary thinking and application.	3.52	0.98	high	5
10	Our academic publications often feature interdisciplinary research that combines insights from art with other disciplines.	3.44	0.96	moderate	9
	Total	**3.55**	**0.96**	**high**	

Share Vision and Goals The high mean score for sharing vision and goals ($\bar{X}$=3.55) suggests that there is a clear alignment among team members regarding their objectives. This is consistent with literature

that highlights the importance of a shared vision for guiding team actions and ensuring alignment (Senge, 1990). A shared vision is essential for maintaining team cohesion and focus, especially in interdisciplinary settings where goals may vary widely (Gilson et al., 2005).

	Share Vision and Goals	$\bar{x}$	SD	Level	Rank
1	As teachers at art universities in Guangxi, we align our teaching objectives with the institution' s mission and vision.	3.70	0.89	high	1
2	Our team has a shared vision for fostering creativity and innovation among our students.	3.54	0.95	high	5
3	We regularly revisit and refine our goals to ensure they remain relevant and achievable.	3.58	0.97	high	2
4	Our shared goals guide our curriculum planning and instructional strategies.	3.49	0.96	moderate	7
5	We communicate our vision and goals clearly to students, ensuring they understand the purpose of their education.	3.58	0.94	high	2
6	Our team sets measurable outcomes based on our shared goals to track progress and impact.	3.56	1.01	high	4
7	We celebrate milestones that reflect our progress towards achieving our shared vision and goals.	3.51	0.94	high	6
8	Our vision includes preparing students for global citizenship, emphasizing cultural awareness and sensitivity.	3.47	0.92	moderate	8
9	We involve students in discussions about their educational journey, encouraging them to set personal goals aligned with our vision.	3.57	0.94	high	3
10	Our shared vision extends beyond academic excellence, encompassing social responsibility and ethical practice in the arts.	3.56	0.95	high	4
	Total	**3.55**	**0.95**	**high**	

Teamwork Allocation The moderate score for teamwork allocation ($\bar{X}$=3.46) indicates that there is room for improvement in how tasks are distributed and managed within teams. This is echoed in the work of Cohen and Bailey (1997), who emphasize the importance of clear role definitions and task allocation for

the success of interdisciplinary teams. Effective allocation of tasks is crucial for ensuring that all team members contribute optimally to the team's goals (Mathieu et al., 2000).

	Teamwork Allocation	x̄	SD	Level	Rank
1	As teachers at art universities in Guangxi, we distribute tasks based on individual strengths and expertise within our team.	3.62	0.85	high	1
2	Our workload is evenly divided among team members, ensuring no one is overburdened.	3.41	0.90	moderate	6
3	We rotate leadership roles within the team to promote diverse perspectives and skills development.	3.50	0.91	high	3
4	Our project timelines are well-managed, with clear deadlines and responsibilities assigned to each team member.	3.36	0.95	moderate	7
5	We hold regular check-ins to review task progress and reallocate work if necessary.	3.52	0.95	high	2
6	Each team member brings unique skills to the table, contributing to a balanced workload distribution.	3.42	0.91	moderate	5
7	We use digital tools to track task completion and manage our workflow efficiently.	3.42	0.94	moderate	5
8	In case of conflicts or misunderstandings, we have mechanisms in place to reassign tasks and resolve issues promptly.	3.48	0.92	moderate	4
9	Our team leader ensures that everyone's workload is manageable and that there is room for flexibility when needed.	3.42	0.90	moderate	5
10	We recognize and appreciate each other's efforts, regardless of the size or nature of the task performed.	3.50	0.90	high	3
	Total	**3.58**	**0.91**	**moderate**	

Trust and Respect The high score for trust and respect (x̄=3.52) indicates a strong foundation for collaboration. This is crucial, as trust has been identified as a key factor in facilitating open communication

and reducing conflicts within teams (Zand, 1972). Trust and respect are foundational for creating a safe environment where team members can express their ideas freely and feel valued (Dirks & Ferrin, 2002).

	Trust and Respect	x̄	SD	Level	Rank
1	As teachers at art universities in Guangxi, we operate in an environment where trust and respect are fundamental values.	3.66	0.94	high	1
2	We trust each other's professional judgment and rely on each other's expertise in our respective areas.	3.53	0.93	high	5
3	Respectful communication is a cornerstone of our interactions, both in private and in team settings.	3.41	1.00	moderate	9
4	We acknowledge and celebrate each other's accomplishments, fostering a positive and supportive atmosphere.	3.55	1.03	high	4
5	Differences in opinion are welcomed and respected, leading to richer discussions and decisions.	3.48	1.00	moderate	7
6	We treat all team members equitably, without bias or favoritism.	3.59	0.96	high	2
7	Our team members feel valued and understood, which enhances collaboration and productivity.	3.56	1.00	high	3
8	We maintain confidentiality regarding sensitive information shared within the team.	3.46	0.96	moderate	8
9	We provide constructive feedback to one another, aimed at mutual growth and improvement.	3.51	1.01	high	6
10	Trust and respect are evident in how we handle conflicts, seeking resolutions that honor everyone's perspectives.	3.5	0.99	high	10
	Total	**3.58**	0.98	**high**	

Knowledge Sharing The high score for knowledge sharing (x̄=3.66) reflects the importance placed on the exchange of ideas and information within the teams. This is supported by literature that shows knowledge sharing as a key component of effective interdisciplinary collaboration, leading to increased innovation and improved problem-solving (Nonaka & Takeuchi, 1995). Effective knowledge sharing

mechanisms are essential for leveraging the diverse expertise within interdisciplinary teams (Husted & Michailova, 2002).

	Knowledge Sharing	x̄	SD	Level	Rank
1	As teachers at art universities in Guangxi, we actively share knowledge and resources within our team.	3.89	0.81	high	1
2	We organize regular workshops and seminars where team members present their research findings and teaching strategies.	3.60	0.85	high	7
3	Our team maintains a shared digital repository of teaching materials, research papers, and useful links.	3.71	0.84	high	3
4	We encourage peer observation of classes to exchange ideas and techniques that enhance student engagement.	3.65	0.94	high	5
5	Knowledge sharing extends beyond our immediate team, involving collaboration with other departments and institutions when possible.	3.7	0.84	high	4
6	We utilize social media platforms and internal newsletters to disseminate valuable insights and updates among team members.	3.63	0.85	high	6
7	New teachers are paired with experienced mentors to facilitate knowledge transfer and professional growth.	3.54	0.91	high	9
8	Our team values lifelong learning, attending conferences and workshops together to stay current in our fields.	3.59	0.88	high	8
9	We incorporate feedback from knowledge-sharing sessions into our teaching practices, continually refining our approaches.	3.60	0.86	high	7
10	Success stories and innovative practices from within our team are highlighted during staff meetings to inspire and educate the broader community.	3.73	0.88	high	2
	Total	**3.58**	**0.87**	**high**	

6. Discussion

The research result found that the interdisciplinary team collaboration of teachers in Art Universities teachers in Guangxi, team collaboration in overall at the highest level, In terms of measuring evaluating, and transferring results had the highest mean, followed by knowledge sharing, and the lowest mean was teamwork allocation.

This indicates that we are paying more and more attention to the collaboration of university teaching teams, which is of great significance for improving teaching quality, promoting education reform, fostering teachers' professional growth, and adapting to the needs of scientific research and development.

（1）Improving the teaching quality：Collaboration among teachers can enhance teaching efficiency and quality by leveraging collective wisdom and sharing resources. Team members can learn from each other, improve together, and ensure high standards of teaching.

(2) Promoting education reform：Collaboration among teacher teams provides a platform for teachers to learn, communicate, and grow together. Through collaboration, teachers can enhance their teaching and research abilities, and achieve professional development.

(3) Fostering teachers' professional growth：Collaboration among teacher teams helps to build a high-quality, professional teacher team with high moral standards, excellent skills, reasonable structure, and vitality, which is the foundation of university construction.

(4) Promote education reform and innovation：Collaboration among teachers can promote educational reform, drive innovation in education, and create a higher-level talent development system through collective efforts and wisdom.

(5) Adapt to the scientific research paradigm of change：With the increasing complexity and integration of scientific issues, teacher-team collaboration has become necessary to adapt to the paradigm shift in scientific research, solving complex scientific problems through interdisciplinary and cross-disciplinary collaboration.

(6) Reduce resource consumption and work duplication：Collaboration among teachers can facilitate the integration of resources, minimize redundant and low-level research conducted by individual researchers, and enhance their capacity to transform resources and achievements.

(7) Promote the growth of young teachers：Collaboration among teachers can provide a platform for novice educators to cultivate and flourish. By working together, inexperienced teachers can receive ample support and guidance, which allows them to become proficient contributors in the fields of education and research.

In the realm of educational management, the management effectiveness of university teachers in interdisciplinary team collaboration is a complex and multidimensional phenomenon, involving aspects

such as team cooperation, interdisciplinary, share vision and goals, teamwork allocation, trust and respect, and knowledge sharing.

In this survey, the mean ranking of team cooperation is the highest, indicating that the research subjects attach great importance to it, as it is the foundation of knowledge sharing. During the process of teamwork, members need to communicate and share information frequently, which facilitates the flow and sharing of knowledge. Effective teamwork can enhance trust among members, thereby encouraging open and honest knowledge exchange.

The mean ranking of share vision and goals is third, indicating that the research subjects have a high level of agreement on the consistency of team cooperation goals. Share vision and goals serve as the guiding force for team cooperation. A clear vision and goals that are commonly recognized by team members can motivate members to work towards the same direction, enhancing the cohesion and efficiency of team cooperation.

In the analysis of the research subjects, the mean rankings of interdisciplinary, trust and respect, and teamwork allocation are relatively lower, indicating that there is still room for improvement in the actual operation of team building. With the progress of society, the boundaries between disciplines are becoming increasingly blurred, making interdisciplinary learning modes more necessary. However, within the traditional framework of team collaboration, we still need to deepen the guidance of theory and practice to promote mutual trust and respect among different disciplines. The key lies in how to achieve reasonable work arrangements for team members from different disciplinary backgrounds. These elements are closely related and collectively determine the management effectiveness of university teachers in interdisciplinary team collaboration. Therefore, when developing effective management strategies, it is essential to comprehensively consider these elements in order to promote teamwork, facilitate knowledge sharing, achieve common visions and goals, respect the uniqueness of interdisciplinary collaboration, nurture a culture of trust and respect, and ensure the fair distribution of teamwork.

In this study, five representative art universities in Guangxi were selected. In the interdisciplinary teacher team collaboration, they closely followed policy guidance, combined with the actual situation of running schools, and carried out effective interdisciplinary team building.

(1) Policy support and guidance：

According to the "Opinions on Promoting High-Quality Development of Arts and Cultural Vocational Education in the New Era" (Cultural and Tourism Science and Education Development [2022] No. 48), the government encourages art colleges to deepen the integration of production and education, support cultural and art vocational colleges to carry out in-depth cooperation with cultural and tourism enterprises, explore the Chinese-style apprenticeship system, and optimize the "order-based" training mode. This provides policy support for art universities and promotes interdisciplinary team collaboration and knowledge sharing.(Government of China,2022.4.15)

(2) Interdisciplinary practice and innovation：

"The Integration of Art and Interdisciplinarity: Exploring New Pathways for Future Art Education," a document from Xibei University Modern College, mentions that interdisciplinary collaborative practices in art-related disciplines are becoming an important direction for innovation in art education. This practice can break down disciplinary boundaries, form new perspectives and problem-solving methods through cross-fertilization, and cultivate students' innovative thinking and practical abilities. (Modern College of Northwest University，2024.5.30)

(3) Example of case：

In the team building work of the five universities, we can build efficient teacher teams according to the needs of talent training.

Taking Guangxi Art University as an example has innovatively implemented the studio system and gathered teachers with specific expertise to conduct in-depth research work in professional fields. In addition, the university has implemented a teaching model known as "Projects in Classroom," which incorporates social practice projects closely related to the major into the curriculum, allowing for collaborative guidance by faculty members from multiple disciplines. In this process, students not only gain a broad perspective beyond their specialized knowledge but also cultivate independent thinking abilities through practice. They purposefully explore the realm of knowledge in related fields, thereby fueling their enthusiasm and initiative for learning.

For example, Guangxi University for Nationalities emphasizes communication and collaboration among students from different backgrounds in teaching practice. Incorporating programming training and modeling methods in the classroom, helps students understand the terminology and working methods of different professionals, enabling them to better adapt to a team collaboration environment. This teaching method helps students effectively allocate teamwork in future interdisciplinary projects. It leverages the strengths and tensions of each participant while maintaining individual differences. This educational philosophy helps build trust and respect within teams, fostering effective collaboration among team members.

After analyzing the above, it is evident that art colleges place significant emphasis on policy guidance, interdisciplinary practice, teamwork, and knowledge sharing, as well as fostering trust and respect when managing diverse relationships. These are all crucial factors that facilitate collaboration among university faculty teams.

7. Recommendations

7.1 Implications

From the research results, the following suggestions are made for the interdisciplinary team construction of teachers in art universities in Guangxi:

(1) Clear strategic objectives：

Precisely define the strategic goals of interdisciplinary team building to ensure that team formation is not blindly pursuing research quantity and impact, but truly meets the diversity of team members and the actual needs of the team.

(2) Improve the organizational structure and management system：

Adjust the organizational structure and management system of universities, reduce departmental barriers, encourage interdisciplinary cooperation, break the traditional single-discipline training mode, and promote the implementation of interdisciplinary education.

(3) Establish a team incubation mechanism：

Establish a team incubation mechanism to enhance team efficiency through innovative management, improved communication platforms, and coordinated team composition.

(4) International experience：

Drawing on international experience, such as establishing cooperation funds, integrating school resources, and fully implementing interdisciplinary training models, to promote the construction and development of interdisciplinary teams.

(5) Strengthen trust and respect：

Cultivate a culture of trust and respect within the team, providing a safe environment for team members to freely express ideas and feel valued.

(6) Promote knowledge sharing：

Establish an effective knowledge sharing mechanism to leverage the diverse expertise of team members, and enhance the team's innovation and problem-solving capabilities through communication and collaboration.

(7) Improve the efficiency of task allocation：

Improve the allocation and management of tasks within the team to ensure that all team members can make the best contribution to achieving team goals.

(8) Policy support and guidance：

Based on policy guidance, deepen the integration of production, education, and research, support deep cooperation between art colleges and cultural tourism enterprises, and optimize talent training models.

(9) Interdisciplinary practice and innovation：

Promote interdisciplinary collaboration, break down disciplinary boundaries, form new perspectives and problem-solving methods through interdisciplinary exchanges, and cultivate students' innovative thinking and practical abilities.

8. Future Research

(1) Interdisciplinary Team Performance Assessment：

In-depth research on evaluation criteria and methods for interdisciplinary team effectiveness, providing scientific assessment tools for team building

(2) Dynamic disciplinary team：

Study the dynamic management mechanisms of interdisciplinary teams, including team member mobility, role transitions, and adjustments to team structure.

(3) Interdisciplinary team culture construction：

Explore how to build a team culture that supports interdisciplinary collaboration, including fostering trust, respect, and open communication.

(4) Interdisciplinary team and educational reform：

Research on how interdisciplinary teams drive educational reform, especially in the field of arts education

(5) Interdisciplinary team and scientific research and innovation：

Explore the role of interdisciplinary teams in research innovation, especially in emerging fields such as digital art and new media art.

(6) Interdisciplinary team and student development：

Study the impact of interdisciplinary teams on the comprehensive development of students, including the improvement of professional skills and overall qualities.

By following these suggestions and research directions, we can further promote the construction and development of interdisciplinary teams of art university teachers, and enhance the quality of education and research innovation.

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Strategies for improving Administrators and teachers Leadership of public universities in Guangxi

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Abstract

The objective of this study is to investigate the strategies for enhancing the leadership of administrators and teachers in public universities in Guangxi. The research covers the following six areas: 1) influence, 2) decision-making, 3) effective communication, 4) team building, 5) strategic planning, and 6) risk management. The study population consists of 800 teachers from schools in the region. The research instrument is a questionnaire with a 5-point Likert scale. The statistical methods used for data analysis include percentages, means, and standard deviations.

The research found that, overall, the leadership of administrators and teachers in Guangxi's public universities is at the highest level.

Keywords: administrator; Guangxi; leadership strategies; public universities

1. Introduction

General Secretary Xi Jinping emphasized at the 22nd meeting of the Central Committee for Comprehensively Deepening Reforms: "It is necessary to establish a principal responsibility system under the leadership of party organizations in primary and secondary schools, and to integrate political standards and political requirements into all aspects of the entire process of running schools, teaching and educating people. , insist on educating people for the party and the country, and ensure that the party's education policy and the party's central committee's decisions and arrangements are implemented in primary and secondary schools." (Xinhua News Agency, 2021) .

There is no strong teachingWithout teacher leadership, it is impossible to achieve principal leadership, let along School sustainable development. To build a strong country in education, principals must build good schools and guide teachers to teach good students. We must base ourselves on our national conditions,To follow the laws of educational development and achieve the strategic goal of strengthening the country through education, we must Emphasis on educational leadership. Every educator must follow the educational family standards, cultivate and develop educational leadership, only in this way can we achieve Now make the transition from following, running, and running together to leading, thereby leading and ensuring The school develops healthily and rapidly, laying a solid foundation for realizing a powerful country in education.Base. "Manage people well "Education that satisfies the people" is not an empty slogan, but must have a strong Only with strong educational leadership as a guarantee can we persist in the new era People-centered development of education and education as a priority development strategy position, use the needs of the masses to drive school development, and use the masses' evaluations to measure achieve academic results, truly stand from the people's standpoint, and scientifically plan educational reform and development develop a major strategy and resolve to resolve hot issues of concern to the people. issues and continue to meet the people's new expectations for education. (Yan Shouxuan, 2023)

The Ministry of Education of China pointed out in the "Opinions of the Ministry of Education on Deepening the Reform of Undergraduate Education and Teaching to Comprehensively Improve the Quality of Talent Training" that: Strict education and teaching management, deepening the reform of the education and teaching system, guiding teachers to devote themselves to education and strengthening organizational guarantees, etc., in order to cultivate morality and intelligence Socialist builders and successors with comprehensive development of body, art, and labor. (Ministry of Education of the People's Republic of China, 2019)

Leadership is essentially a special kind of interpersonal influence. Each of us has leadership factors. (Hu Yuexing, 2022) Leadership is the combined force of various factors interacting with each other. It is a special influence that leaders demonstrate in achieving leadership goals. (Zhou Zhenguo, 2019) The so-called educational leadership refers to the sum of the ability and strength formed by school educators in

the process of striving to achieve the school's development goals, based on their job roles and their own qualities, to guide and motivate teachers or students to follow them consciously. (Yan Shouxuan, 2023)

China has also made relevant efforts and explorations in improving educational leadership. In 2010, the Outline of the National Medium- and Long-Term Education Reform and Development Plan (2010-2020) proposed in a special chapter that we should strengthen organizational leadership and improve the leadership system to deepen comprehensive reforms in the field of education and promote the scientific development of education. To explore and build educational leadership with Chinese characteristics, Chinese style and Chinese style, we must seek the support of China's excellent traditional cultural genes. In China's excellent traditional culture, there are rich and unique management wisdom and educational concepts. Drawing wisdom from China's excellent traditional culture and management philosophy will surely become an important source for building China's educational leadership. (Wang Minglu, 2016)

Focusing on "educational leadership" is the result of deepening international cooperative research, and it is also a proposition that educators in China and the United States pay great attention to and urgently need to answer from theory to practice. First, governments and citizens of various countries attach great importance to education, which is reflected in the continuous strengthening of education and the continuous strengthening and improvement of educational leadership. Secondly, the harmonious development of economy and society, the overall improvement of national comprehensive strength and national quality have put forward higher requirements for education, which is reflected in the enhancement and innovation of educational leadership. Thirdly, the fairness, quality and efficiency of education constitute three dimensions that support each other and are interrelated, and become the basic elements and basic guarantees for the comprehensive, balanced and sustainable development of education; and the integration and harmony of fairness, quality and efficiency requires educational leadership to run through them. (Li Fang, 2016)

In summary, the development and improvement of leadership is an important part of the higher education management system, and the improvement of its management system is crucial to the overall development of higher education. Facing the challenges of the information age and the requirements of higher education reform, this paper conducts an in-depth study on the leadership development strategies of university managers and teachers, aiming to provide better guidance for the improvement of leadership development strategies in higher education under the new situation and promote the continuous innovation and progress of higher education management systems.

2. Objectives

1. To study the current state of Administrators and teachers Leadership of public universities in Guangxi.

2. To provide the Strategies for improving Administrators and teachers Leadership of public universities in Guangxi.

3. To evaluate the adaptability and feasibility of Strategies for improving Administrators and teachers Leadership of public universities in Guangxi.

3. Research Framework

The objective of this study is to investigate the strategies for enhancing the leadership of administrators and teachers in public universities in Guangxi. The research is guided by the conceptual framework from the Ministry of Education's Strategies for Improvement, and the researchers have examined relevant concepts, theories, and studies related to academic administration, including works by(Ministry of Education of the People's Republic of China, 2019). (Yan Shouxuan, 2023). (Wang Minglu, 2016). (Zhou Zhenguo, 2019). (Wang Minglu, 2016). (Li Fang, 2016). the results of Strategies for improving Leadership

4. Research Methodology

Population

The population of this research was 800 Administrators and teachers come from 6 public universities in Guangxi.

The research instrument

The instrument to collect the data for objective was the questionnaire designed based on leadership strategies in 6 following aspects: 1) influence, 2) decision-making, 3) effective communication, 4) team building, 5) strategic planning, 6) risk management The questionnaire was provided into two parts:

Part I: Personal information of the survey sample, classified by gender, years of work experience and professional level.

Part II: Survey on the current status of leadership strategies of administrators and teachers in Guangxi universities. The data interpretation standard adopts a five-point Likert scale, as follows:

5 indicates the highest level of leadership strategy

4 indicates a high level of leadership strategy

3 indicates a medium level of leadership strategy

2 indicates a low level of leadership strategy

1 indicates the lowest level of leadership strategy

The mean standard is as follows:

4.50 – 5.00 indicates the highest level

3.50 – 4.49 indicates a high level

2.50 – 3.49 indicates a medium level

1.50 – 2.49 indicates a low level

1.00 – 1.49 indicates the lowest level

The process of constructing the Instrument

The questionnaire preparation process is as follows:

Step 1: Review and analyze the literature, concepts, theories, and research results related to university leadership strategies.

Step 2: Prepare a questionnaire on the current status of strategies for improving administrators and teachers leadership of public universities in Guangxi. Then send the questionnaire outline to the thesis instructors, who will review and modify the questionnaire content based on their suggestions.

Step 3: Three experts reviewed the objective consistency index (IOC) of the questionnaire. Objective consistency index (IOC)

Step 4: Modify the questionnaire based on the experts' suggestions.

Step 5: Distribute the questionnaire to 30 Administrators and teachers in Guangxi universities for trial use. The reliability of the questionnaire is calculated using Conbach's Alpha coefficient

Step 6: Distribute the questionnaire to 260 Administrators and teachers in Guangxi universities.

Data Collection

To achieve the research objectives, the researcher collected the required data according to the type and steps of the research instruments as follows procedures:

Step1: The researcher requested requirement letter form the graduate school, Bansomdejchaopraya Rajabhat University for requiring to collect the data from 200 Administrators and teachers in Guangxi universities.

Step2: The researcher distributed the questionnaire to 260 administrators and returned questionnaires.

Statistics used in data analysis

After data collection, the researcher statistic and analyze data according to objective 1, 2 and 3 as follow;

Step 1: The personal information of the sample were analyzed by frequency and percentage, classified by gender, working experience and professional rank..

Step 2: The current situation of Strategies for improving administrators and teachers leadership of public universities in Guangxi in six following aspects: 1)influence, 2)decision-making,3)effective

communication,4)team building,5)strategic planning, 6)risk management were analyzed by mean and standard deviation. And criteria of mean as follow;

4.50 – 5.00 expressed highest level

3.50 – 4.49 expressed high level

2.50 – 3.49 expressed medium level

1.50 – 2.49 expressed low level

1.00 – 1.49 expressed lowest level

5. Result

An analysis of information about Strategies for improving Administrators and teachers Leadership of public universities in Guangxi is presented in terms of average and standard deviation.

Table 1 displays the mean and standard deviation of leadership enhancement strategies of administrators and teachers in public universities in Guangxi across 6 aspects.

	Strategies for improving Administrators and teachers Leadership of public universities in Guangxi	μ	σ	Level	Order
1	Influence	3.72	1.27	highest	1
2	Decision-making	3.68	1.32	highest	5
3	Effective communication	3.72	1.30	highest	2
4	Team building	3.71	1.33	highest	3
5	Strategic planning	3.70	1.33	highest	4
6	Risk management	3.66	1.16	highest	6
	Total	3.70	1.16	highest	

From Table 1, it was found that the strategies for improving the leadership of administrative personnel and teachers in public universities in Guangxi generally show a high level (mean μ=3.70). Specifically, Influence and Effective communication have the highest mean values (μ=3.72), followed by Team building (μ=3.71), Strategic planning (μ=3.70), Decision-making (μ=3.68), and the lowest mean is Risk management (μ=3.66).

6. Conclusion and Discussion

Summary of research results

The research found that strategies for improving the leadership of administrative personnel and teachers in public universities in Guangxi generally show a high level Considered by each aspect , Respondents generally believe that school leadership enhancement strategies have a high correlation with various aspects of the school, especially with the school's influence, which is the closest relationship.

There is a significant divergence in respondents' views on the relationship between school leadership enhancement strategies and school decision-making.

The evaluations from respondents tend to cluster around lower scores, with no extreme high or low scores, indicating a more conservative assessment.

The distribution of evaluations is relatively flat, with fewer extreme values, suggesting that respondents' assessments are more concentrated and show no obvious extreme tendencies.

The details of the research results in each aspect as follows.

The influence of strategies for improving the leadership of administrative personnel and teachers in public universities in Guangxi is significant. The influence was found to be the highest. The report indicated that university administrators and teachers primarily focused on the school's influence within the region, followed by the following aspects: the school provided the necessary conditions to cultivate and enhance the leadership of its members. The school also conducted activities to improve the leadership levels of teachers, which had the lowest mean score.

Decision-making of Strategies for improving Administrators and teachers Leadership of public universities in Guangxi, Decision-making in management systems is the highest. Considering the report, Higher education institutions have the highest average score in leadership learning facilities, followed by: institutions conducting teaching for managers at different levels, while the focus on individual learning has the lowest average score.

Effective communication of Strategies for improving Administrators and teachers Leadership of public universities in Guangxi, the learning process development is the highest. The school plans to properly organize communication activities for administrative staff and teachers, with the highest average score. School administrators and teachers are consistently encouraged to provide feedback on current leadership enhancement strategies, with the lowest average score.

Team building of Strategies for improving Administrators and teachers Leadership of public universities in Guangxi at the highest level. Considering the report, It has been observed that the school implements various activities to enhance team cohesion. In addition, school team building also involves shaping the team's culture and values, ensuring that the team's actions and decisions are aligned with the organization's vision and mission. Furthermore, school team building includes the assessment and feedback on team performance to identify areas for improvement and to develop corresponding action plans; these policies have the lowest average score.

Strategic planning of trategies for improving Administrators and teachers Leadership of public universities in Guangxi. Considering the report, school will clarify its vision and goals, helping leaders to define the organization's long-term vision and short-term objectives, ensuring that all team members have a clear understanding of these goals and work towards a common direction. Following this is the allocation of school resources; through strategic planning, leaders can allocate resources more effectively, ensuring

that key areas and projects receive the necessary support to achieve organizational goals. As for the integration of culture and values in strategic planning, the average score in this area is the lowest.

Risk management of Strategies for improving Administrators and teachers Leadership of public universities in Guangxi, In the risk management of the leadership enhancement strategies for administrative staff and teachers in Guangxi's public universities, identifying and assessing risks is the most critical. Leaders need to recognize potential risks that could affect the achievement of organizational goals and evaluate the likelihood and impact of these risks, with this item having the highest average score. Performance evaluation is linked to risk, and leaders include risk management performance as part of the assessment of team and individual performance, ensuring that risk management measures are executed. This item has the lowest average score.

7. Discussion

The research found that under the Strategies for improving Administrators and teachers Leadership of public universities in Guangxi, the overall high level is Influence. The second highest is Effective communication, and the lowest is Risk management. This may be because schools with greater influence place more emphasis on enhancing the leadership of their members, as it is important for improving student management methods. In leveraging school influence to enhance leadership, school administrators, together with teachers and departments, plan and formulate a series of strategies for leadership enhancement. To improve the leadership of administrative staff and teachers, more resources are invested, and leadership assessment results are compared for reference and verification. In addition, assessment results are also used to improve the work efficiency of administrative staff and teachers, such as how administrative staff can lead to improve the work efficiency of their departments, and how teachers can improve students' learning efficiency through leadership. Moreover, experiences are exchanged with public universities in other regions. Additionally, the school's leadership enhancement is developing courses, encouraging a leadership enhancement process centered on managers, and providing a quality control system to meet internal quality assurance standards and educational standards. Additionally, according to the concept of Xumin (2008, No. Z2), the development of educational media and technology has also been promoted to facilitate teaching and quality enhancement. The specific conditions for the generation and strategies for enhancing school leadership are as follows:1)Enhancing the Principal's Leadership Ability: The principal's leadership ability is the logical origin of school leadership.2)Optimizing the Leadership Team Structure: By constructing a reasonable leadership team structure, the coordination and complementarity of the team are strengthened.3)Building Effective Institutional Management: Scientific and democratic management styles and systems are used to ensure the operation of leadership.4)Creating a Positive Organizational Climate: The organizational climate has a significant impact on the direction, magnitude, and process of the role played by school leadership.The article emphasizes that school leadership is not only

about individual leadership abilities but also about the combined force generated within the school organization. It has dynamic characteristics of generation and internalization and can play guiding, cohesive, normative, and radiating functions. Strategies for enhancing school leadership involve improving the principal's leadership abilities, optimizing the leadership team structure, adjusting school management systems, and creating a positive organizational climate.

The influence of schools is the highest in the enhancement of leadership, as schools with influence can have more resources and talent. The process of leadership enhancement mainly relies on the school's curriculum planning and investment, thereby facilitating the development of teachers and administrative staff. The results are based on the leadership assessment of personnel and the improvement of efficiency in administrative departments and teaching classes. In addition, schools need to enhance their authoritative influence. It involves having a macro perspective, applying control appropriately, and having the correct understanding and attitude. These strategies for enhancing leadership are consistent with the concepts of Majianxin (2017, pp. 48-49). He said that leadership is a special kind of interpersonal influence, the ability of a leader to affect and change the psychology and behavior of others in their interactions. Leaders are key figures in planning, organizing, supervising, controlling, communicating information, delegating tasks, and taking responsibility. Effective leadership mainly refers to the influence of leaders, which is divided into power-based influence and non-power-based influence. Power-based influence: formed by the position, status, and power that society bestows upon individuals, with legal, compulsory, and irresistible characteristics. The elements include traditional factors, position factors, and seniority factors.

Team building is considered the highest priority. This may be because the quality of team building is crucially related to the enhancement of leadership skills among teachers, improving the leadership of teachers and administrators within the team. Schools need to provide a systematic learning management process, focusing on the leadership capabilities of members within their own teams and the development of the entire team centered around managers. The five key roles of team building in enhancing leadership skills are:1)Establishing a common vision: Leaders should help the team establish a shared vision and inspire team members to strive for this common vision.2)Forming good cooperative relationships: Leaders should promote good team cooperation, enhancing the team's cohesion.3)Cultivating team spirit: Leaders should foster a sense of belonging and achievement within the team, leading to high morale.4) Stimulating work enthusiasm: Leaders should ignite the team's passion for work, transforming enthusiasm into a driving force for progress.5)Adapting to the external environment: Leaders should assist the team in adapting to the external environment, acting as a bridge and for communication between the team and the outside world.These concepts are in line with those of Fan Xiaoxuan (2006).

8. Recommendations

Implications

From the research results, the strategies for improving the leadership of administrative personnel and teachers in public universities in Guangxi:

1. In terms of influence, it is necessary to enhance the school's influence. Set an example by demonstrating values and expectations through one's own actions and decisions, leading by example.

Secondly, establish trust by consistently acting with honesty and transparency to build team trust. Enhance persuasiveness. Learn effective persuasion skills, including logical argumentation and emotional appeal. Finally, cultivate relationships by building personal connections and networks to expand influence.

2. In terms of decision-making, first, information collection is needed to ensure that all necessary information and data are gathered before making decisions. Secondly, provide a diverse range of perspectives by encouraging team members to offer different viewpoints and suggestions for a comprehensive view. Risk assessment involves considering potential risks and consequences in the decision-making process. Most importantly, be prepared for rapid response by making decisions quickly when needed and being ready to adjust strategies.

3. In terms of strengthening effective communication, it means expressing oneself clearly to ensure that information is conveyed concisely and to avoid misunderstandings; at the same time, actively listen to the opinions and needs of team members, demonstrating good listening skills. In addition, adjust communication styles and methods according to the characteristics of different communication partners to adapt to various communication styles. Finally, establish an effective feedback mechanism to promptly improve communication methods and execution effectiveness.

4. In terms of team building, to promote team building, leaders should ensure that team members have a clear understanding and firm commitment to common goals, allocate roles and responsibilities based on each member's abilities and interests, encourage teamwork and collaboration to achieve these common goals, and promptly identify and resolve internal team conflicts to maintain team harmony and efficiency.

5. In terms of strategic planning implementation, implementing strategic planning requires leaders to have a long-term vision, set clear long-term and short-term goals, and allocate resources reasonably to ensure the achievement of these goals. At the same time, leaders need to maintain flexibility, adjust strategic plans in a timely manner according to changes in the external environment, and continuously monitor the execution of strategies to make necessary adjustments to ensure the successful implementation of strategies.

6. In terms of strengthening risk management, strengthening risk management involves identifying potential risks that may affect organizational goals, assessing the likelihood and potential impact of these risks, developing corresponding prevention and response strategies, and preparing emergency plans to

ensure a rapid and effective response when risks occur, thereby protecting the organization from adverse effects.

9. Future Researches

1．Leadership enhancement should be studied in educational institutions by referring to various aspects of thought, such as influence, decision-making, effective communication, team building, strategic planning, and risk management.

2. Research on the enhancement of leadership among university teachers and administrators should aim to further optimize and strengthen the effectiveness of management.

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Research On Improving Transformational Leadership of Administrators of Universities in Guangxi

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Abstract

The transformational leadership theory, as an important branch of leadership studies, provides a solid theoretical foundation and practical guidance for the innovation of college leadership models. Leaders inspire their subordinates' positive and creative attitudes through their personal charm and high-level values, driving the organization to achieve change and development.

This research objective was to study the current situation of Transformational Leadership of Administrators of universities in Guangxi.The population of this research were 1500 teachers from 5 universities in Guangxi. According to Krejcie and Morgan sampling table, the sample group of this research were 306 teachers from 5 universities in Guangxi .By using systematic random sampling and sample random sampling.The research instrument was a 5-level rating scale questionnaire. The statistics used for the data analysis were percentage, mean, and standard deviation.

The research result found that the current situation of the Transformational Leadership of Administrators of universities in Guangxi in four aspects was at high level. Ranged from the highest to the lowest mean as follows: Intellectual Stimulation, Idealized Influence, Individualized Consideration, Inspirational Motivation.

Keywords: leadership model for higher education; transformational leadership theory

1. Introduction

In the 14th Five-Year Plan, "reform" and "innovation" and other keywords are mentioned many times. With the diversified development of leadership theory and the gradual completion of digital transformation, transformational leadership, as a member of the emerging leadership, has attracted wide attention due to its distinctive characteristics and uniqueness. As a new type of management idea, the management idea of "change" has gradually entered everyone's vision. Moreover, the influence of innovation on innovation

behavior is also increasing. At present, the research on the influence of transformational leadership on innovation behavior is mostly limited to the corporate culture, especially the independent innovation industries such as chip and artificial intelligence with high-tech industries as the main body. The prosperity of innovation-oriented industry depends on the innovation behavior of talents, while the cultivation of innovative talents, the expansion of thinking and the output of scientific research achievements cannot be separated from the cultivation and support of transformational leaders.(Wang qianying, 2024)

Since the transformational leadership theory was put forward, it has become an important part of the leadership theory research, and scholars have carried out extensive practice and exploration on it.Bass (1985) proposed a four-dimensional model of transformational leadership: including leadership charisma, charisma, intellectual stimulation and personalized care.Podsakoff (1990) believes that transformational leadership has a direct contribution to employee organizational commitment and organizational performance.Avolio (1993) pointed out that the personalized care, charming leadership and intellectual motivation of transformational leaders have a promoting role in the realization of team goals and performance improvement.Li Chaoping and Shi Kan (2005) adopted the inductive method to determine the four dimensions of transformative leadership behavior in China: virtue model, vision motivation, leadership charm and personalized care.Sun Jianguo (2010) studied the relationship between transformational leadership and organizational culture, and proposed a positive correlation between transformational leadership and the innovative culture of the organization.Meng Hui (2013) believes that the transformational leadership structure developed by western scholars is suitable for the Chinese situation, and she has developed a transformative leadership evaluation scale.Xu Bing (2014) proposed that transformative leadership behavior has a positive impact on team creativity; leaders should constantly shape their own transformative leadership style, implement team boundary management, and enable the team to reflect on their own behavior, so as to improve team creativity.Wang Zhen (2015) pointed out that transformational leaders have a positive impact on employee work engagement; and positive emotions play an intermediary role between transformational leadership behavior and work engagement.Wang Canhao, Duan Yufeng (2018)Transformational leadership behavior has a positive and significant impact on the exploratory innovation of organizations, while knowledge accumulation plays a complete intermediary role between transformative leadership and exploratory innovation.

In February 2019, the CPC Central Committee and The State Council promulgated a programmatic document on education, "China's Education Modernization 2035", which provides overall strategic arrangements for China's education reform and development. In order to adapt to the new programmatic requirements, schools must change themselves to meet the needs of modernization. (Jia ning ,2020)

In colleges and universities, transformational leadership is the leadership process and behavior that effectively promote the development and innovation of college education management. The content of university management mechanism innovation mainly includes management concept innovation,

management system innovation, management system innovation and so on. The form of innovation is not only a single, continuous, gradual management innovation that can improve the efficiency of resource allocation, but also an innovation that includes inquiry, rigorous attitude and changes the management structure and system. Transformational leadership plays an important role in the formation and operation of university management innovation mechanism, and there is a close connection between transformational leadership and other driving factors. Therefore, transformational leadership is the core force to promote university management innovation. (Liu man,Song gaimin 2016)

To sum up, As an important branch in the field of leadership research, the transformational leadership theory provides a solid theoretical foundation and practical guidance for the innovation of university leadership model. Through the influence of their own personality charm and high-level values, leaders stimulate the enthusiasm and creativity of their subordinates, and promote the change and development of the organization.This paper discusses the concept of transformational leadership theory, core assumptions and value analysis, and puts forward the specific leadership model innovation strategy, in the management practice in colleges and universities, using the transformational leadership theory can effectively improve the leadership level of university leaders, promote the modern management system and management ability of colleges and universities, power high quality development in colleges and universities.

2. Research Objectives

To study the current situation of Transformational Leadership of Administrators of universities in Guangxi.

3. Research Methodology

Population

The population of this research were 1500 teachers from 5 universities in Guangxi.

The Sample Group

The sample group of this research were 306 teachers from 5 universities in Guangxi. According to Krejcie and Morgan sampling table, and by using stratified random sampling and sample random sampling.

The research instrument

According to the analyzed of related theories and researches, the research of Transformational Leadership of Administrators should be carried out from the following dimensions:1.)Intellectual Stimulation 2.)Idealized Influence 3.)Individualized Consideration 4.)Inspirational Motivation. The questionnaire was divided into two parts:

Part 1: Survey about personal information of sample, classified by gender, working experience and professional rank.

Part 2: Survey about the current situation Transformational Leadership of Administrators of universities in Guangxi. The criteria for data interpretation based on five-point Likert's scale, as follow;

5 express the level of Transformational Leadership of Administrators at highest level

4 express the level of Transformational Leadership of Administrators at high level

3 express the level of Transformational Leadership of Administratorsat medium level

2 express the level of Transformational Leadership of Administrators at low level

1 express the level of Transformational Leadership of Administrators at lowest level

Constructing a questionnaire process

The construction process of questionnaire were as follows:

Step 1: Reviewing and analyzing documents, concepts, theories, and researches related to Transformational Leadership of Administrators

Step 2: Constructing the questionnaire about the current situation of Transformational Leadership of Administrators of universities in Guangxi. Then sending the questionnaire outline of questionnaire to the thesis advisors to review and revise the contents according to the suggestions.

Step 3: The index of objective congruence (IOC) of the questionnaire was examined by three experts. The index of objective congruence (IOC)

Step 4: Revise the questionnaire based on the experts' suggestions.

Step 5: The questionnaire was distributed to 5 administrators in universities in Guangxi for try-out. The reliability of the questionnaire was obtained by Conbach's Alpha Coefficient

Step 6: The questionnaire was applied to 306 teachers from 5 universities in Guangxi.

Data Collection

To achieve the research objectives, the researcher collected the required data according to the type and steps of the research instruments as follows procedures:

Step1: The researcher requested requirement letter form the graduate school, Bansomdejchaopraya Rajabhat University for requiring to collect the data from 306 teachers from 5 universities in Guangxi.

Step 2: The researcher distributed the questionnaire to 306 teachers and returned questionnaires.

Data analysis

The researchers analyzed the data using the program as follows:

Step 1: The personal information of the sample were analyzed by frequency and percentage, classified by gender, working experience and professional rank.

Step 2: The current situation of Transformational Leadership of Administrators of universities in Guangxi in four following aspects: 1) Intellectual Stimulation, 2) Idealized Influence, 3) Individualized Consideration,4) Inspirational Motivation And criteria of mean as follow;

4.50 – 5.00 expressed highest level

3.50 – 4.49 expressed high level

2.50 – 3.49 expressed medium level

1.50 – 2.49 expressed low level

1.00 – 1.49 expressed lowest level

4. Research Results and Discussion

The analysis about the current situation of the current situation of Transformational Leadership of Administrators of universities in Guangxi. was presented in the form of mean and standard deviation.

Table 1 Mean and standard deviation of the current situation of the current situation of Transformational Leadership of Administrators of universities in Guangxi in four aspects.

No	The current situation of Transformational Leadership of Administrators of universities in Guangxi	$\bar{x}$	S.D.	Level	Order
1	Intellectual Stimulation	3.75	0.80	high	1
2	Idealized Influence	3.57	0.97	high	3
3	Individualized Consideration	3.58	0.96	high	2
4	Inspirational Motivation	3.55	0.99	high	4
	Total	3.61	0.93	high	

From Table 1, it was found that the the current situation of Transformational Leadership of Administrators of universities in Guangxi in four aspects was at high level ($\bar{x}$ = 3.61, 0.93). Ranged from the highest to the lowest mean as follows: Intellectual Stimulation was the highest mean ($\bar{x}$ = 3.75, 0.80), followed by Individualized Consideration ($\bar{x}$ = 3.69, 0.88), and Inspirational Motivation was the lowest mean ($\bar{x}$ = 3.55, 0.99).

Summary of research results

The current situation of Transformational Leadership of Administrators of universities in Guangxi in four aspects was at high level ($\bar{x}$ = 3.61, 0.93). Ranged from the highest to the lowest mean as follows: Intellectual Stimulation was the highest mean ($\bar{x}$ = 3.75, 0.80), followed by Individualized Consideration ($\bar{x}$ = 3.69, 0.88), and Inspirational Motivation was the lowest mean ($\bar{x}$ = 3.55, 0.99).

The details of the research results in each aspect as follows.

The efficiency of Transformational Leadership of Administrators of universities in Guangxi in **Intellectual Stimulation** was the highest mean. Ranged from the highest to the lowest mean as follows: "Utilize people wisely and stimulate latent intelligence." was the highest mean, followed by "Embrace mistakes and

encourage self-reflection."and "Embrace innovation and create learning opportunities." was the lowest mean.

The efficiency of Transformational Leadership of Administrators of universities in Guangxi in **Individualized Consideration** was the highest mean. Ranged from the highest to the lowest mean as follows: "Help the leader to determine the direction of personal efforts."Increase the psychological capital investment of the led."Create a sense of community among the led."and "Embrace innovation and create learning opportunities." was the lowest mean.

The efficiency of Transformational Leadership of Administrators of universities in Guangxi in **Idealized Influence** was the highest mean. Ranged from the highest to the lowest mean as follows: "Improve character and enhance influence."Enrich knowledge and enhance influence"Cultivate emotional intelligence to increase impact."and "Embrace innovation and create learning opportunities." was the lowest mean.

The efficiency of Transformational Leadership of Administrators of universities in Guangxi in **Inspirational Motivation** was the highest mean. Ranged from the highest to the lowest mean as follows: "Give appropriate tasks and motivate work enthusiasm""Provide reasonable rewards and punishments to meet individual needs"and "Strengthen education and training to achieve self-motivation" was the lowest mean.

Discussion

British psychologist Spearman believes that intelligence is composed of general factors (G factors) and special factors (S factors), so it is called the two-factor theory. The completion of any kind of homework is determined by two factors, G and S. In the intellectual structure G and S, the most important factor is the general factor G, which represents the ordinary ability of individuals and is the subject of all intellectual activities. The S factor represents an individual's special ability and is associated with only a few activities. In transformational leadership activities, leaders should use organizational work to tap the potential intelligence of organization members and develop their special abilities. Intelligence can be stimulated, which will also help the organization explore talents and improve work efficiency.

Leaders' individual care for employees will have a positive impact on the behavior of organization members. Individual care for employees will have a significant impact on employees' altruistic behavior, sense of responsibility, civic virtue and civility. Personalized care will make members have a strong sense of belonging, can see their own value in the organization, and trigger members to consciously follow.

Ideal influence refers to some behaviors that can make employees worship, respect and trust, such as good moral character, dare to take risks, and be good at considering the needs of employees. Transformational leadership has perfect quality and morality, is the model and example of the leader, and has a certain influence on the followers. When it comes to inspiring followers, transformational leadership has very high requirements for leaders, not only to set an example, but also to act as a leader. Leaders use

high ethical and moral standards and strong personal charm to inspire followers to consciously follow, or worship. In this way, in the work, the leaders will devote themselves to the realization of the organizational vision, and realize self-progress and continuous improvement from low level to high level.

Motivation is the process of motivating and inspiring people to work toward organizational goals. Motivation can stimulate the internal motivation of the staff, improve the enthusiasm of work, and give full play to their talents, so as to improve organizational performance. Motivation is considered "the greatest management principle". In transformational leadership, motivation undoubtedly plays an important role. As the people-oriented management gradually comes into everyone's vision, the management and leadership methods that rely on prompting criticism are no longer effective. If leaders want to inspire followers, they must be good at making the led have a sense of gain and satisfaction by relying on encouraging incentives.

5. Recommendations

Implications

From the research results, guidelines to Improving Transformational Leadership of Administrators of Universities in Guangxi has the following suggestions:

1.Shape the spirit of excellence.First, establish a transformational and supportive management culture. There is a high coincidence between the characteristics of transformational leadership behavior and the orientation of innovative and supportive culture development, and the two have a mutual improvement effect on team efficiency. Build a supportive enterprise, such as attaching importance to employee participation, giving them social responsibility obligations and nutritional guidance, paying attention to the growth and development of each subordinate and giving personalized care, and enhancing the collective identity of employees within the management system to the organization.

2.Promote positive leadership.As the saying goes, "do not have, ask yourself." In the face of management difficulties, managers should improve their own leadership and cultivate innovative leadership character. An innovation The leaders should follow the moral example; With ideals into the cause; Good at target guidance, and employees to establish common goals, transmit common ideals, adhere to common struggle, form a "up and down the same desire to win" environment; Through wisdom enlightenment, guide employees to break through the original mental siege, cultivate a growth mental system, enhance the active consciousness, and strive to be a "natural person"; Through differentiated management methods, humanized care for employees.

3.improve the professional leveln research units, the expert level of transformational management can be maximized when it is recognized by subordinates, and effective management can be achieved with excellent experts. Peace is inseparable. Therefore, on the one hand, to become a change manager, one should go into the front line of departments, management and technology as far as possible, and understand the basic skills and qualities required by related occupations. On the other hand, we should

also have the courage to learn, continue to track the forefront of professional technology, continue to learn from benchmarking employees, and improve our professional quality.

4.Pay attention to subordinates' psychologyTransformational leadership adjusts leadership performance through subordinates' psychological changes. Give full play to the positive influence of transformational leadership and pay close attention to the mental health of employees. One is Mobilize the internal enthusiasm of employees. Leaders promptly perceive the emotional and ability needs of employees, and provide necessary tools, materials, talents and emotional protection to enable them to exert their work initiative; Give challenging tasks to employees, let them feel the task benefits and victory; Start with talent needs, develop career planning, combine individual tasks with team work, and mobilize their problem-solving ability. The second is to enhance employees' self-efficacy. Through goal setting and the cultivation of workplace environment spirit, we promote the transformation of value orientation from "livelihood type" to "career type" and "mission type", and deeply explore the value of employees.

Future Research

The four dimensions of transformational leadership that Bass summarizes are critical to inspiring followers and the long-term prosperity of an organization: Ideal impact emphasizes that leaders demonstrate a high degree of empowerment Ethics, courage and values, lead by example, be a role model for team members; Motivational motivation involves the leader's ability to inspire followers' enthusiasm and motivation for their work; Intellectual inspiration emphasizes the leader's ability to inspire team members to innovate and think; Personalized care emphasizes the leader's attention to the individual needs and development of each team member. These four dimensions play a key role in transformational leadership. They not only help leaders effectively guide their teams to success, but also foster team members' motivation, creativity, and development potential. By balancing and integrating these dimensions, transformational leaders can better respond to challenges and achieve more significant results in times of change.

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(73-EN-EDU)

Guidelines for Improving Management of art student unions in Guangxi Agricultural Vocational and Technical University

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Abstract

This article aims to explore the current management status, challenges, and future development strategies of university art groups. The research scope covers aspects such as the organizational structure of art groups, member selection and training, daily management, and event planning. Through literature review and case analysis, this article finds that university art groups play a significant role in enhancing the campus cultural atmosphere and promoting the all-round development of students, but they also face issues such as insufficient funding, lack of professional guidance, and high member turnover. In response to these problems, this article proposes strategies such as improving the management system, strengthening faculty team building, optimizing member selection mechanisms, and enriching activity content, with the aim of providing references for the sustainable development of university art groups.

Keywords: challenges; future development; management status; university art groups

1. Introduction

Strengthen the infiltration of aesthetic education. Cultivate students' aesthetic sense and help them enhance their ability to discover, feel, express, appreciate, and create beauty. Strengthen the support of specialized institutions and departments for school aesthetic education work to aesthetic education clubs, and support student organizations to organize healthy and elegant campus cultural activities such as campus cultural and artistic festivals, campus singer competitions, and the introduction of high art into schools. Encourage college student art troupes, literary clubs, and other organizations to create original art works. Actively introducing external aesthetic education resources, conducting public welfare performances, aesthetic education lectures, etc. (Central Committee of the Communist Youth League, Ministry of Education, 2024)

With the improvement of quality cultivation, the focus of cultural education in China has gradually shifted to cultivating students' comprehensive qualities. Artistic literacy and spiritual civilization are very important parts of students' comprehensive literacy. However, at present, vocational colleges still have some shortcomings in cultivating students' artistic literacy and improving their spiritual civilization. Therefore, vocational colleges should focus on building college student art troupes and play their important role in the construction of campus spiritual civilization(Chen Yi, 2020)

Mr. Peng Jixiang has been engaged in the research of aesthetic education theory since 1990, and has a history of 27 years. In 1990, when he served as the director of the Art Center at Peking University, the school gave him three tasks: first, to teach aesthetic education courses well, and second, to manage and organize the student art team at Peking University. The Student Art Troupe of Peking University consists of several branches such as a choir and a dance troupe. All students come from various departments of the university, not from the art school, and some are admitted to Peking University by recruiting art talents. Over the past 27 years, the Peking University Student Art Troupe has developed very well, not only winning awards in domestic and international competitions, but also cultivating a group of talents. For example, the two Peking University student hosts, Sa Beining and Li Sisi, who are currently active on CCTV, are both students recruited by Mr. Peng Jixiang himself. Sa Beining sings very well. Peng Jixiang recruited him to sing in the Peking University Choir and has taken Sa Beining to perform in many places such as Taiwan and the United States. Li Sisi is a member of the Peking University Dance Troupe. They have not studied broadcasting and hosting, but because of their artistic talent, artistic quality, and cultural influence from Peking University. He became a very popular host on CCTV today.(Peng Jixiang, 2017)

To sum up, the art student unions are an important component of the aesthetic education system in universities, and the improvement of its management system is crucial to the overall development of the university. Facing the challenges of the information age and the requirements of higher education reform, this paper conducts in-depth research on the management of art student unions in Guangxi universities, aiming to provide a better guide for the upgrading of the management of art student unions in

Guangxi universities under the new situation, and to promote the continuous development of the art student unions. Innovation and progress.

2. Research Objectives

2.1. To Study the current situation of the development of the practical ability of art student unions in Guangxi Agricultural Vocational and Technical University.

2.2. To Provide guidelines to improve the development of the practical ability of art student unions in Guangxi Agricultural Vocational and Technical University.

2.3. Guidelines to evaluate and improve the development of the practical ability of art student unions in Guangxi Agricultural Vocational and Technical University.

3. Research Hypotheses

School major settings: If school's major settings are positively correlated with the quality and level of the art troupe. That is to say, the richer and more complete the professional settings of the school, the higher the performance level and innovation ability of the art troupe.

Teaching staff: If teaching staff is an important factor affecting the management effectiveness of art troupes, having a high-level teaching staff can significantly improve the teaching quality and performance level of art troupes.

School support policies: If school support policies have a significant impact on the development of art troupes. Specifically, the more funding, venues, equipment, and other resources provided by the school, the better the development of the art troupe.

Commercial value: If introducing commercial value can bring more opportunities and challenges to the art troupe. Through commercial operation, art troupes can attract more audiences and sponsors, thereby obtaining more resources and support.

Management mode: If t different management modes have a significant impact on the operational efficiency of the art troupe and the enthusiasm of its members. Specifically, adopting a scientific and reasonable management model can improve the operational efficiency of the art troupe and the work enthusiasm of its members.

4. Research Methodology

This research focuses on improving the management of art student unions in Guangxi Agricultural Vocational and Technical University. To study the current situation and provide guidelines and evaluation guidelines for improving the management system of art student unions in Guangxi Agricultural Vocational and Technical University.The researcher have the following procedures.

4.1. The population / Sample group

4.2. Research Instruments

4.3. Data Collection

4.4. Data analysis

5. Research Results and Discussion

This study delves into the current management status and influencing factors of university art troupes. Based on five key variables: school major settings, faculty strength, school support policies, commercial value, and management models, a questionnaire was set up and the results were comprehensively analyzed. By comprehensively applying relevant theories such as organizational behavior and educational management, this study reveals the profound impact of these variables on the management of art troupes in universities. Research has found that the highest proportion considers school support policies to be the most important, and school support policies provide necessary resource guarantees and development space for art troupes. The professional settings and teaching staff of schools are the foundation for improving the quality and level of art troupes. At the same time, introducing commercial value has brought more opportunities and challenges to art troupes, while different management models determine the operational efficiency of art troupes and the enthusiasm of members. I believe that the management of art troupes in universities needs to comprehensively consider these key variables in order to achieve sustainable development of art troupes. This study is of great significance for promoting the prosperity and development of art education in universities, and provides useful reference and inspiration for managers of art troupes in universities.

6. Recommendations (If Applicable)

6.1 Improve the management system: Establish a sound art troupe management system, clarify the responsibilities and work processes of each position, and ensure the efficient operation of the art troupe. At the same time, establish a scientific assessment and evaluation mechanism to regularly evaluate the performance of members, motivate outstanding members, and promote the overall improvement of their level.

6.2 Strengthen the construction of the teaching staff: Hire teachers with rich teaching experience and professional background to serve as guidance teachers for the art troupe, and improve the quality of teaching. At the same time, encourage existing teachers to participate in professional training and academic exchange activities, continuously improving their professional competence and teaching ability.

6.3 Optimize the member selection mechanism: Develop scientific and reasonable member selection criteria, focusing on assessing students' professional skills, artistic literacy, and teamwork abilities. Through open selection, interviews, and other methods, select students who truly love art and have potential to join the art troupe.

6.4 Enrich activity content: Plan diverse art activities based on school characteristics and student needs, such as concerts, dance competitions, theatrical performances, etc. At the same time, encourage

art troupes to participate in various art exchange activities both on and off campus, broaden their horizons, and enhance their visibility.

6.5 Strengthen cooperation with external institutions: actively seek opportunities for cooperation with professional art groups, cultural institutions, and other external institutions, introduce advanced artistic concepts and resources, and inject new vitality into the development of art groups. At the same time, by collaborating on events, participating in competitions, and other means, the professional level and influence of the art troupe can be enhanced.

6.6 Emphasize the development of commercial value: While ensuring the quality of art, actively explore commercial operation models, raise funds through ticket sales, sponsor cooperation, and other means, and provide economic support for the development of the art troupe. Meanwhile, utilizing social media and other platforms to promote and publicize the activities and achievements of the art troupe, attracting more attention and support.

6.7 Strengthen team culture construction: Focus on cultivating the team spirit and cohesion of the art troupe, and enhance the sense of belonging and responsibility among members through organizing team building activities, conducting themed education, and other methods. At the same time, we advocate for a team culture that respects differences and embraces diversity, inspiring members' innovative spirit and creativity.

In summary, the development of university art troupes needs to start from multiple aspects, including improving management systems, strengthening faculty construction, optimizing member selection mechanisms, enriching activity content, strengthening cooperation with external institutions, emphasizing commercial value development, and strengthening team culture construction. These measures will help promote the sustainable development of university art troupes, enhance their overall level and influence.

7. Acknowledgments

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(75-EN-EDU)

The Current Teacher Professional Situation of Young Teachers in Public Universities in Ethnic Minority Areas of Yunnan Province

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Abstract

This research objective was to study the current situation of teachers professional of young teachers in public universities in ethnic minority areas of Yunnan Province in 5 aspects as follows: 1) Educational and Teaching Competence, 2) Professional Ethics, 3) Research and Academic Competence, 4) Personal Qualities, and 5) Continuous Development and Professional Growth. The population were 420 young teachers from 8 public universities in ethnic minority areas of Yunnan Province in this research. The research instrument was a questionnaire designed based on the above 5 aspects, which was divided into two parts for collecting personal information and surveying the professional situation. The criteria for data interpretation were based on a five-point Likert's scale. The statistics used for the data analysis were frequency distribution, percentage, mean, and standard deviation.

The research result found that the overall professional situation of young teachers in public universities in ethnic minority areas of Yunnan Province was at a high level. Considered by each aspect, it had the highest mean in terms of Personal Qualities, followed by Professional Ethics, Continuous Development and Professional Growth, Educational and Teaching Competence, and the lowest mean was in Research and Academic Competence.

Keywords: ethnic minority areas of Yunnan province; public universities; teachers professional situation; young teachers

1. Introduction

China places significant importance on the professional development of teachers, recognizing it as a cornerstone of educational excellence. General Secretary Xi Jinping emphasize the critical role of education in national development, urging the enhancement of teacher quality to build a robust educational system (Xinhua News Agency, 2022). This national directive underscores the need for comprehensive professional development programs that equip teachers with the skills and knowledge to meet the evolving demands of the education sector. The Ministry of Education of the People's Republic of China has implemented several policies to enhance teacher training and development. The "Opinions on Comprehensively Deepening the Reform of the Construction of Teacher Team in the New Era," issued in 2018, highlights the importance of improving the quality of teacher education and training programs to cultivate a high-quality teacher workforce (Ministry of Education, 2018). Additionally, the "14th Five-Year Plan for National Economic and Social Development" emphasizes the continuous improvement of teachers' professional skills and ethical standards to ensure educational equity and quality (Central Committee of the Communist Party of China, 2021)

Yunnan Province, characterized by its rich ethnic diversity, presents unique challenges and opportunities for teacher professional development. The province's ethnic minority areas often face disparities in educational resources and quality compared to more developed regions. In response, the Yunnan Provincial Government has initiated several programs aimed at improving educational standards. The "Three-Year Action Plan for the High-quality Development of Education in Yunnan Province (2023-2025)" outlines measures to enhance teacher quality, to expand educational resources, and to promote equity in education (Yunnan Provincial Government, 2023). Yunnan's geographical and cultural diversity necessitates tailored professional development programs that address the specific needs of teachers in ethnic minority areas. The provincial government has emphasized the importance of culturally responsive teaching and the inclusion of ethnic minority languages and cultures in the curriculum to foster an inclusive and supportive learning environment (Yunnan Provincial Government, 2023). These efforts aim to bridge the educational gap and ensure that all students, regardless of their ethnic background, receive a high-quality education.

Public universities in Yunnan's ethnic minority areas face unique challenges in fostering the professional development of young teachers. These institutions often struggle with limited resources, insufficient funding, and a lack of access to professional development opportunities. Additionally, young teachers in these areas may encounter difficulties in adapting to the cultural and linguistic diversity of their student population. The professional development of young teachers in these universities is essential for improving the overall quality of education. High-quality teaching not only enhances student learning outcomes but also contributes to the personal and professional growth of teachers.

From the above, to study the teachers professional states of young teachers in public universities in ethnic minority areas of Yunnan province, can not only improve teachers professional of young teachers

in public universities in ethnic minority areas of Yunnan province, but also continuously improve the level of education and teaching, promote the young teachers to better serve the educational growth and academic success of ethnic minority students, and promote higher education the continuous development and progress of the business.

2. Research Objectives

To study the current situation of teacher professional of young teachers in public universities in ethnic minority areas of Yunnan Province.

3. Research Hypotheses

In the research on teacher professional development of young teachers in public universities in ethnic minority areas of Yunnan Province, guided by relevant national policies and provincial initiatives such as those emphasized by General Secretary Xi Jinping regarding the importance of education and teacher quality (Xinhua News Agency, 2022), the "Opinions on Comprehensively Deepening the Reform of the Construction of Teacher Team in the New Era" issued by the Ministry of Education in 2018 (Ministry of Education, 2018), and the "Three-Year Action Plan for the High-quality Development of Education in Yunnan Province (2023-2025)" by the Yunnan Provincial Government (Yunnan Provincial Government, 2023), the researchers have synthesized the concept of studying teacher professional situation of young teacher spacea research concept in five aspects as follow; 1) Educational and Teaching Competence, 2) Professional Ethics, 3) Research and Academic Competence, 4) Personal Qualities, and 5) Continuous Development and Professional Growth.

4. Research Methodology

Population

The population of this research was 420 young teachers from 8 public universities in ethnic minority areas of Yunnan province.

Research Instrument

The instrument used to collect the data for objective was the questionnaire designed based on teachers professional of young teachers in 5 following aspects: 1) Educational and Teaching Competence, 2) Professional Ethics, 3) Research and Academic Competence, 4) Personal Qualities 5) Continuous Development and Professional Growth. The questionnaire was provided into two parts:

Part 1: Survey personal information of the respondents. The information was investigated and classified by gender, age, major studied, and educational background

Part 2: Survey the current teacher professional situation of young teachers in public universities in ethnic minority areas of Yunnan province. The criteria for data interpretation based on five-point Likert's scale, as follow:

5 presents the level of teacher professional situation of young teachers at the highest level

4 presents the level of teacher professional situation of young teachers at high level

3 presents the level of teacher professional situation of young teachers at medium level

2 presents the level of teacher professional situation of young teachers at low level

1 presents the level of teacher professional situation of young teachers at the lowest level

The process of constructing the instrument

The construction process of the questionnaire was presented as follows:

Step 1: The documents , concepts, theories and researches related to teacher professional situation of young teachers were reviewed and analysed..

Step 2: The questionnaire about the current teacher professional situation of young teachers in public universities in ethnic minority areas of Yunnan province was constructed, the advisor's outline of questionnaire was sent to the thesis advisors to review and revise the contents according to the advisor's suggestions.

Step 3: The index of objective congruence (IOC) of the questionnaire was examined by three experts. The index of objective congruence (IOC)

Step 4: The questionnaire was revised based on the experts' suggestions.

Step 5: The questionnaire was distributed to 30 young teachers in public universities ethnic minority areas of Yunnan Province to try out. The reliability of the questionnaire was obtained by Conbach's Alpha Coefficient.

Step 6: The questionnaire was applied to 201 young teachers from 5 public universities in ethnic minority areas of Yunnan province.

Data Collection

In this research, data collection was performed according to the following procedures

1.The researchers sent a request to the relevant administrative departments of the 8 public universities in ethnic minority areas of Yunnan Province, asked them to assist in distributing the questionnaire to the target population of 420 young teachers.

2. The researchers themselves also directly distributed the questionnaires to the young teachers. A total of 420 questionnaires were distributed, and 415 of them were returned.

Data analysis

The information obtained from this research was focused on teacher professional situation of young teachers in public universities in ethnic minority areas of Yunnan province. The researchers analyzed the data using programs as follows:

1. The respondents' status including gender: Gender, age, major studied, and education background using frequency distribution and percentage.

2. The professional situation of young teachers in public universities in ethnic minority areas of Yunnan province.

4.50 – 5.00   presents the highest level of Educational and Teaching Competence.

3.50 – 4.49   presents high level Educational and Teaching Competence.

2.50 – 3.49   presents moderate level Educational and Teaching Competence.

1.50 – 2.49   presents low level of Educational and Teaching Competence.

1.00 – 1.49   presents the lowest level of Educational and Teaching Competence.

5. Research Results

Result

An analysis of information about teacher professional situation of young teachers in public universities in ethnic minority areas of Yunnan Province is presented in terms of average and standard deviation.

Table 1 The mean and standard deviation teacher professional situation of young teachers in public universities in ethnic minority areas of Yunnan Province, in 5 aspects.

	The professional situation of young teachers in public universities in ethnic minority areas of Yunnan Province	$\bar{X}$	S.D.	Level	Order
1	Educational and Teaching Competence	4.32	0.55	high	3
2	Professional Ethics	4.40	0.48	high	2
3	Research and Academic Competence	4.25	0.52	high	4
4	Personal Qualities	4.45	0.45	high	1
5	Continuous Development and Professional Growth	4.38	0.50	high	5
	Total	**4.43**	**0.50**	**high**	

From Table 1, it was found that the overall teacher professional situation of young teachers in public universities in ethnic minority areas of Yunnan Province was at a high level ($\bar{X}$ = 4.36). Considered by each aspect, it had the highest mean in terms of Personal Qualities ($\bar{X}$= = 4.45), followed by Professional Ethics ($\bar{X}$= = 4.40), Continuous Development and Professional Growth ($\bar{X}$= = 4.38), Educational and Teaching Competence ($\bar{X}$= = 4.32), and the lowest mean was in Research and Academic Competence ($\bar{X}$= = 4.25).

6. Conclusion and Discussion

Summary of research results

The research found that the overall teacher professional situation of young teachers in public universities in ethnic minority areas of Yunnan Province was at a high level. When considered by each aspect, it had the highest mean in terms of Personal Qualities, followed by Professional Ethics, Continuous Development and Professional Growth, Educational and Teaching Competence, and the lowest mean was in Research and Academic Competence.

The details of the research results in each aspect as follows are revealed:

Educational and Teaching Competence of young teachers in public universities in ethnic minority areas of Yunnan Province was at a relatively high level. The result found that young teachers mainly focused on improving their teaching methods to better engage students, followed by: They actively participated in curriculum design to align with the needs of ethnic minority students. However, they faced challenges in integrating modern educational technologies into their teaching was at the lowest mean in this aspect.

Professional Ethics of young teachers in public universities in ethnic minority areas of Yunnan Province was also at a high level. Considering the result, young teachers demonstrated a strong sense of responsibility towards their students' education and growth, followed by: They adhered to ethical guidelines in their interactions with colleagues and students. The lowest mean was that they sometimes struggled to handle complex ethical dilemmas that arose in the context of ethnic diversity.

Research and Academic Competence of young teachers in public universities in ethnic minority areas of Yunnan Province was at a high level but had the lowest mean among the aspects. Considering the result, young teachers were engaged in some research activities, but mainly focused on projects related to their teaching subjects. They faced difficulties in obtaining sufficient research funding and collaborating with other institutions, with the lowest mean in this aspect.

Personal Qualities of young teachers in public universities in ethnic minority areas of Yunnan Province had the highest mean. Considering the result, young teachers exhibited strong adaptability to the cultural and linguistic diversity of their student population, followed by: They showed great perseverance in dealing with the challenges of teaching in ethnic minority areas. With the lowest mean, they sometimes had to overcome personal biases that might affect their teaching.

Continuous Development and Professional Growth of young teachers in public universities in ethnic minority areas of Yunnan Province was at a high level. Considering the result, young teachers were aware of the importance of continuous learning and participated in professional development activities such as workshops and training courses. However, they faced limitations in accessing high-quality professional development resources with the lowest mean in this aspect.

Discussion

The research on teacher professional situation of young teachers in public universities in ethnic minority areas of Yunnan Province yielded several notable findings. Overall, the professional situation of these young teachers was found to be at a high level. However, when analyzed by each aspect, there were variations in the means, with Personal Qualities having the highest mean, followed by Professional Ethics, Continuous Development and Professional Growth, Educational and Teaching Competence, and Research and Academic Competence having the lowest mean. This may be due to a variety of factors related to the unique context of teaching in ethnic minority areas of Yunnan Province.

In terms of Educational and Teaching Competence, the relatively high level indicates that young teachers are making efforts to enhance their teaching. Their focus on improving teaching methods to engage students better and actively participating in curriculum design to meet the needs of ethnic minority students is commendable. However, the challenge of integrating modern educational technologies into their teaching might be attributed to limited access to technological resources and training opportunities in these areas. As education is evolving with the increasing importance of technology, the inability to fully utilize such tools could potentially limit the effectiveness of their teaching. This is in line with the national and provincial initiatives to improve teacher quality, which emphasize the need for teachers to be proficient in using modern educational technologies to provide a more engaging and effective learning experience for students.

Regarding Professional Ethics, the high level suggests that young teachers generally have a strong sense of responsibility towards their students' education and growth and adhere to ethical guidelines in their interactions with colleagues and students. The struggle with handling complex ethical dilemmas in the context of ethnic diversity could be due to the lack of specific training or guidance on dealing with such issues in a multicultural setting. Given the rich ethnic diversity in Yunnan Province, ethical considerations in teaching may involve unique situations that require more in-depth understanding and skills to navigate. This highlights the importance of providing targeted professional development programs that address these specific ethical challenges to further enhance the professional ethics of young teachers.

For Research and Academic Competence, although it was at a high level, having the lowest mean among the aspects indicates that there are areas for improvement. The fact that young teachers are mainly engaged in research related to their teaching subjects shows their attempt to combine research with teaching, which is beneficial for both their own professional growth and the improvement of teaching quality. However, the difficulties in obtaining sufficient research funding and collaborating with other institutions could be a significant hindrance. Limited funding restricts the scope and depth of their research activities, while the lack of collaboration opportunities may limit their exposure to different research perspectives and methodologies. This is contrary to the goals of promoting continuous improvement of

teachers' professional skills and ethical standards, as emphasized in national policies, which require teachers to be actively involved in research to contribute to the development of the education field.

When it comes to Personal Qualities, the highest mean reflects the strong adaptability of young teachers to the cultural and linguistic diversity of their student population and their perseverance in dealing with the challenges of teaching in ethnic minority areas. The need to overcome personal biases that might affect their teaching, despite having a high overall mean in this aspect, suggests that there is still room for growth in terms of self-awareness and cultural sensitivity. Teachers need to be fully aware of their own biases and work towards eliminating them to provide a more inclusive and equitable learning environment for all students, especially in a multicultural context like Yunnan Province's ethnic minority areas.

In the case of Continuous Development and Professional Growth, the high level indicates that young teachers recognize the importance of continuous learning and actively participate in professional development activities. However, the limitations in accessing high-quality professional development resources pose a challenge. This could be due to the limited resources and funding of the public universities in these areas, as well as the lack of connections with external professional development providers. Without access to high-quality resources, the effectiveness of their professional development may be compromised, which in turn could affect their long-term professional growth and the quality of education they provide.

In conclusion, the findings of this research highlight the need for targeted interventions to address the specific challenges faced by young teachers in public universities in ethnic minority areas of Yunnan Province. These interventions could include providing more training and resources for integrating modern educational technologies in teaching, offering specialized training on handling ethical dilemmas in a multicultural context, facilitating access to research funding and collaboration opportunities, enhancing self-awareness and cultural sensitivity training, and improving access to high-quality professional development resources. By addressing these issues, it is possible to further enhance the professional situation of young teachers, thereby improving the overall quality of education in these ethnic minority areas and contributing to the achievement of educational equity and quality goals as emphasized in national and provincial policies.

7. Recommendations

Implications

From the research results, it was found that the professional situation of young teachers in public universities in ethnic minority areas of Yunnan Province has the following suggestions:

1.As for Educational and Teaching Competence, universities and relevant departments should focus on providing more training and resources to help young teachers integrate modern educational technologies into their teaching. This could include organizing specialized training courses, workshops, or providing access

to relevant software and equipment. Additionally, support should be given to young teachers to further explore and innovate in curriculum design to better meet the specific needs of ethnic minority students.

2. In terms of Professional Ethics, targeted professional development programs should be designed and implemented to provide specific training and guidance on handling complex ethical dilemmas in a multicultural context. These programs could include case studies, discussions, and expert lectures to enhance young teachers' understanding and skills in dealing with ethical issues that arise in the diverse ethnic settings of Yunnan Province.

3.Regarding Research and Academic Competence, efforts should be made to facilitate young teachers' access to research funding. This could involve setting up special funding channels or collaborating with external funding agencies. Moreover, platforms and opportunities for collaborating with other institutions should be created to expand young teachers' research perspectives and methodologies, enabling them to engage in more comprehensive and in-depth research activities.

4. When it comes to Personal Qualities, training programs focused on enhancing self-awareness and cultural sensitivity should be offered. These programs could help young teachers to fully recognize and overcome their personal biases, thereby creating a more inclusive and equitable learning environment for all students. Such training could include cultural awareness workshops, self-reflection exercises, and group discussions.

5. In the case of Continuous Development and Professional Growth, steps should be taken to improve young teachers' access to high-quality professional development resources. This could involve establishing partnerships with external professional development providers, sharing resources among public universities in ethnic minority areas, or providing online learning platforms with rich and diverse content. Additionally, financial support could be provided to ensure that young teachers can participate in high-quality professional development activities without being hindered by cost factors

Future Research

1．The professional development of young teachers in public universities in ethnic minority areas of Yunnan Province should be further studied from the perspectives of university administrators, experienced senior teachers, and students, etc., to comprehensively understand the impact of different stakeholders on their professional growth.

2. Longitudinal studies should be conducted on the professional situation of young teachers in these areas to track their development over an extended period, in order to better identify trends and changes, and provide more targeted support and improvement measures for their continuous professional development.

3.Research could be carried out on the effectiveness of the various intervention measures recommended in this study to determine whether they can actually enhance the professional situation of

young teachers in public universities in ethnic minority areas of Yunnan Province and improve the overall quality of education in these areas.

4.Comparative studies could be made between the professional development of young teachers in ethnic minority areas of Yunnan Province and those in other regions with similar ethnic diversity characteristics, to learn from each other's experiences and further optimize the professional development paths for young teachers in Yunnan's ethnic minority areas.

5.The role of cultural factors in the professional development of young teachers in public universities in ethnic minority areas of Yunnan Province should be further explored, especially how to better utilize the unique ethnic cultures to promote their professional growth and improve their teaching effectiveness.

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Research on Technological Pedagogical Content Knowledge (TPACK) Abilities of Chemistry Teachers in Public Universities in Guangxi

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Abstract

This research objective was to study the Technological Pedagogical Content Knowledge (TPACK) abilities of chemistry teachers in public universities in Guangxi in 6 areas as follows: 1) Technological Knowledge (TK), 2) Pedagogical Knowledge (PK), 3) Content Knowledge (CK), 4) Pedagogical Content Knowledge (PCK), 5) Technological Content Knowledge (TCK), and 6) Technological Pedagogical Knowledge (TPK). The population of this research was 479 chemistry teachers from 6 public universities in Guangxi. Based on Krejcie and Morgan's sampling table, a sample group of 214 chemistry teachers was selected from six public universities in Guangxi using a combination of systematic random sampling and simple random sampling methods. The research instrument was a 5-level rating scale questionnaire. The statistics used for the data analysis were percentage, mean, and standard deviation.

The research result found that the TPACK abilities of chemistry teachers in public universities in Guangxi are overall high ($\overline{X}$ =3.57, **S.D**=0.91). Considering each aspect, it was the highest mean of TK abilities ($\overline{X}$ =3.78, **S.D**=0.80), followed by PCK abilities ($\overline{X}$ =3.66, **S.D**=0.92), PK abilities ($\overline{X}$ =3.54, **S.D**=0.95), TCK abilities ($\overline{X}$ =3.49, **S.D**=0.95), TPK abilities ($\overline{X}$ =3.48, **S.D**=0.89), and the lowest mean was CK abilities ($\overline{X}$ =3.46, **S.D**=0.92). Building on the findings of the survey analysis, recommendations are provided to enhance teachers' TPACK abilities.

Keywords: chemistry teachers; public universities; teacher professional development; TPACK abilities

1. Introduction

During the fifth collective study session of the Central Political Bureau, General Secretary Xi Jinping (2023) underscored that "*strengthening the construction of the teaching staff must be prioritized as a foundational pillar for building a strong education nation.*" He emphasized the need to enhance a teacher education system with distinct Chinese characteristics, focusing on the cultivation of a high-quality professional teaching workforce characterized by noble moral integrity, robust competencies, balanced composition, and dynamic vitality. Ren Youqun (2023), Director of the Teachers' Work Department of the Ministry of Education, highlighted the theme of Teachers' Day as "*Diligently Teaching and Strengthening the Nation with My Contribution.*" He emphasized that, in the context of the new era and new journey, efforts will be directed toward transitioning the development of the teaching workforce from quantitative expansion to qualitative enhancement. This shift aims to provide robust support for accelerating the modernization of education, building a strong education nation, and delivering high-quality education that meets the expectations of the people.

The Technological Pedagogical Content Knowledge (TPACK) abilities framework has had a strong influence on research and practice in teacher education and professional development. (Zhang, 2021) The TPACK framework represents the specialized competencies required by educators to effectively integrate technology into their teaching practices. It comprises three core knowledge domains: Content Knowledge (CK) abilities, Pedagogical Knowledge (PK) abilities, and Technological Knowledge (TK) abilities. Building upon these core elements, the framework also includes four intersecting knowledge areas: Pedagogical Content Knowledge (PCK) abilities, Technological Content Knowledge (TCK) abilities, Technological Pedagogical Knowledge (TPK) abilities, and Technological Pedagogical Content Knowledge (TPACK) abilities, as illustrated in Figure 1.
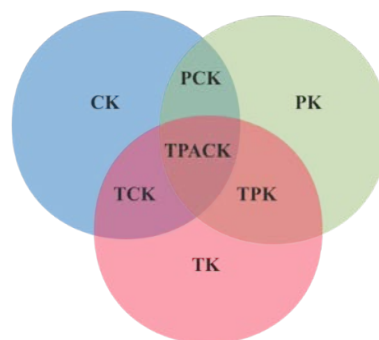
Figure 1 The essential component of TPACK abilities

The TPACK abilities of teachers have the following impacts: 1) The enhancement of teachers' TPACK abilities significantly contributes to their professional growth and development. The TPACK survey serves as a valuable tool for universities to offer tailored support and targeted professional development opportunities to enhance educators' ability to integrate technology into their teaching practices (Nguyen,

2024). Furthermore, professional development initiatives aimed at improving TPACK competencies have been shown to boost teachers' confidence in designing and delivering 21st-century lessons, facilitated by the meaningful integration of ICT. (Novita, 2022) The TPACK abilities can be regarded as a fundamental component of teachers' digital competence in the future, as it significantly impacts teaching practices and, consequently, directly influences students' learning and overall development (Niess, 2011). 2) Enhancing teachers' TPACK abilities play a crucial role in effectively improving students' learning outcomes and innovation skills, which encompass key indicators such as critical thinking, communication, collaboration, and creativity. (Sulistyarini,2022) 3) Enhancing the TPACK capabilities of undergraduate students in normal universities, as pre-service teachers, can significantly improve their self-efficacy, professional attitudes, and the depth of their professional knowledge in curriculum planning. (Zimmermann, 2021) . 4) Enhancing teachers' TPACK abilities is beneficial for fostering student engagement in online learning community activities, promoting knowledge exchange during classroom discussions, and supporting active participation in blended learning environments that combine both online and offline modalities. (Istiningsih, 2022) In the context of intelligent classroom environments, Zeng Hongyun (2022) develops evaluation indicators for teachers' TPACK abilities by leveraging software to create a TPACK evaluation system model. The study includes matrix consistency tests and data analysis to ensure the reliability and validity of the model. Through the implementation of this effective evaluation system, the research encourages teachers to innovate their teaching concepts, refine their instructional methods, and ultimately enhance teaching effectiveness. 5) Teachers' TPACK abilities can be influenced by factors such as their certification status and the accreditation level of the school. Based on the study's findings and discussion, it was concluded that there is a significant difference in the TPACK abilities of teachers between schools with A accreditation and those with B accreditation. (Busnawir, 2023)

Currently, universities are investing in technological infrastructure, providing access to devices, software, and online resources, while educators increasingly recognize the importance of TPACK abilities. As a result, numerous teachers are actively incorporating technology into their teaching practices and pursuing professional development opportunities to enhance their TPACK abilities. Consequently, researchers continue to explore effective strategies for technology integration, while various online communities and platforms provide valuable support and resources for teachers. (Yanti, 2024)

However, the development of teachers' TPACK abilities faces numerous challenges. Key issues include: 1) Lack of Confidence and Knowledge. Many pre-service teachers experience a lack of confidence in their ability to effectively integrate technology into their teaching practices. This is further exacerbated by inadequate training in pedagogically sound methods for using technology, resulting in suboptimal implementation within educational settings. (Adipat, 2021) 2) Variability in Teacher Training Programs. Teacher education programs often exhibit inconsistency in fostering strong TPACK abilities. This variability can be attributed to differences in the quality and content of these programs, many of which do not

adequately emphasize the integration of technology with pedagogy and content knowledge. (Voithofer, 2019) 3) Need for Longitudinal Studies. There is a significant gap in longitudinal research examining the long-term effects of TPACK-focused interventions on teaching practices. Most existing studies offer only short-term insights, thereby limiting our understanding of how TPACK abilities develop and evolve throughout a teacher's career.(Rodríguez, 2019) 4) Integration of TPACK in Different Contexts: The application of TPACK varies significantly across different educational contexts. For instance, while Content and Language Integrated Learning has shown potential in enhancing TPACK, it presents challenges related to its integrative nature and requires teachers to adapt traditional teaching methods. (Adipat, 2021)

To more effectively enhance the TPACK capabilities of chemistry teachers, Dinnah Raihanah investigated the TPACK abilities of both prospective chemistry teachers and in-service chemistry teachers. The results indicated that the TK, PK, TPK, TCK, and TPACK components were generally strong among both groups. However, the study also revealed that there is still room for improvement in certain areas, particularly in CK, and PCK. (Raihanah, 2024) Therefore, developing TPACK capabilities is a gradual process that involves acquiring new skills and knowledge essential for shaping professional teachers.

In summary, enhancing the TPACK abilities of chemistry teachers is vital for their professional development and plays a significant role in advancing student learning and progress in the field of chemistry. In response to the challenges of the information age and the evolving demands of higher education reform, this paper offers a thorough examination of the TPACK framework for chemistry teachers. The aim is to provide a comprehensive guide for improving this framework in the current educational context, thereby fostering the continuous development, innovation, and advancement of chemistry educators.

2. Research Objectives

This study aims to examine the current TPACK abilities of chemistry teachers in public universities in Guangxi.

3. Research Framework

In a study examining the TPACK abilities of chemistry teachers in public universities in Guangxi, the researchers guided the professional development of teachers through a conceptual framework. This framework was informed by a comprehensive review of concepts, theories, and existing research related to TPACK abilities. The study synthesized TPACK abilities into six key dimensions, as follows: 1) TK, 2) PK, 3) CK, 4) PCK, 5) TCK, and 6) TPK.

4. Research Methodology

4.1 Population

The population of this research was 479 chemistry teachers from 6 public universities in Guangxi.

The sample group of this research was 214 chemistry teachers from 6 public colleges and universities in Guangxi. Based on Krejcie and Morgan's(1970) sampling table, stratified random sampling and simple random sampling were employed to select participants from public colleges and universities.

4.2 The research instrument

The data collection instrument utilized in this study was a scale questionnaire comprising a total of 63 questions, systematically designed to evaluate TPACK abilities across six following aspects: 1) TK, 2) PK, 3) CK, 4) PCK, 5) TCK, and 6) TPK. The questionnaire was divided into two parts:

Step 1: Question the status of the respondents, classified by gender, academic background, and work experience. This section of the questionnaire consists of 3 questions.

Step 2: Inquiries about the TPACK abilities of chemistry teachers in public universities in Guangxi, specifically focusing on TK, PK, CK, PCK, TCK, and TPK. To comprehensively evaluate these six domains of TPACK abilities, this section of the questionnaire includes 10 questions for each domain, resulting in a total of 60 questions. The questionnaire employs a five-level Likert scale (Likert, 1932). The criteria for scoring are as follows.

Level	5	means having the highest level of TPACK abilities.
Level	4	means having a high level of TPACK abilities.
Level	3	means having a medium level of TPACK abilities.
Level	2	means having a low level of TPACK abilities.
Level	1	means having the lowest level of TPACK abilities.

4.3 The process of constructing the Instrument

The instrument used in this research was a questionnaire. The researchers created the following steps.

1. Study theories, documents, and related research to use information as a guideline for the conceptual framework of TPACK abilities of chemistry teachers of public universities in Guangxi.

2. To analyze the content, define the concept of TPACK abilities of chemistry teachers of public universities in Guangxi.

3. Create a questionnaire according to the six aspects as follows: 1) TK, 2) PK, 3) CK, 4) PCK, 5) TCK, 6) TPK. Then present the draft to the thesis advisor for review, correction, and proper adjustment according to the purpose of the research.

4. The survey was conducted by 3 experts to check the accuracy and content accuracy of each question to find the IOC, Index of Objective Congruence. The final confirmation of the questionnaire's Item-Objective Congruence (IOC) value was 1.00, indicating that the questionnaire is suitable for implementation.

5. The revised questionnaire was administered to a sample of 30 chemistry teachers from public universities in Guangxi to assess its reliability. The reliability was determined using Cronbach's Alpha coefficient, yielding a value of 0.935.

6. The population of this research was 479 chemistry teachers from 6 public universities in Guangxi. Based on Krejcie and Morgan's (1970) sampling table, a sample of 214 chemistry teachers was selected from six public universities in Guangxi using a combination of systematic random sampling and simple random sampling methods.

Table 1 Lists of universities and sample size

No	The names of the universities	Population	Sample group
University 1	Guangxi University for Nationalities	88	39
University 2	Guangxi Normal University	129	57
University 3	Guangxi University	127	58
University 4	Hezhou University	41	18
University 5	Yulin Normal University	58	26
University 6	Baise University	36	16
	Total	**479**	**214**

4.4 Data Collection

In this research, data collection was performed according to the following procedures:

1. The letter from Bansomdejchaopraya Rajabhat University asked the Director of public universities in Guangxi to distribute the questionnaire to 214 chemistry teachers of public universities in Guangxi.

2. The researchers collected data by distributing the questionnaires themselves, 214 of which were returned 100 percent.

4.5 Statistics used in data analysis

Information obtained from the TPACK abilities of chemistry teachers study of public universities in Guangxi this time. The researchers analyzed the data using the program as follows.

1. Analysis of respondents' status includes Gender, work experience, and professional rank using frequency distribution and percentage.

2. Analysis of the TPACK abilities of chemistry teachers at the level of public universities in Guangxi in 6 aspects as follows 1) TK, 2) PK 3) CK, 4) PCK, 5) TCK, 6) TPK by using the mean and standard deviation. The criteria for data interpretation based on the mean are as follows (Sri Sa- ard. 2003).

4.50 – 5.00   means having the highest level of TPACK abilities.

3.50 – 4.49   means having high-level TPACK abilities.

2.50 – 3.49   means having medium-level TPACK abilities.

1.50 – 2.49   means having a low level of TPACK abilities.

1.00 – 1.49   means having the lowest level of TPACK abilities.

5. Research Results and Discussion

5.1 Result

The researcher analyzed the data in 2 parts as follows:

Part 1: The analysis results of the personal information of respondents, classified by gender, working experience, and professional rank. Presented the data in the form of frequency and percentage.

Table 2 Number of people and percentage of respondents

	Personal Information	Frequency	Percentage
Gender	Male	102	47.66
	Female	112	52.34
	Total	**214**	**100**
Working experience	1-5 years	38	17.76
	6-10 years	103	48.13
	11-15 years	42	19.63
	More than 15 years	31	14.49
	Total	**214**	**100**
Professional rank	High grade	41	19.16
	Medium grade	115	53.74
	Primary grade	58	27.10
	Total	**214**	**100**

Table 2 shows that the majority of respondents were 112 females, accounting for 52.34%, and 102 males, accounting for 47.66%. The working experience of respondents was mainly 6-10 years for 103 people, accounting for 48.13%, followed by 11-15 years for 42 people, accounting for 19.63%, followed by 1-5 years for 38 people, accounting for 17.76%, and more than 15 years was the lowest level for 31 people, accounting for 14.49%. The majority of respondents was mainly Medium grade for 115 people, accounting for 53.74%, followed by Primary grade for 58 people, accounting for 27.10%, and High grade was the lowest level for 41 people, accounting for 19.16%.

Part 2: The analysis results of the current situation of the TPACK abilities of chemistry teachers in public universities in Guangxi. Presented the data in the form of mean and standard deviation.

Table 3 the mean and standard deviation of the TPACK abilities of chemistry teachers in public universities in Guangxi, in 6 aspects. (n = 214)

The TPACK abilities of chemistry teachers		$\overline{X}$	S.D	Level	Order
1	Technological Knowledge (TK) abilities	3.78	0.80	high	1
2	Pedagogical Knowledge (PK) abilities	3.54	0.95	high	3
3	Content Knowledge (CK) abilities	3.46	0.92	medium	6
4	Pedagogical Content Knowledge (PCK) abilities	3.66	0.92	high	2
5	Technological Content Knowledge (TCK) abilities	3.49	0.95	medium	4
6	Technological Pedagogical Knowledge (TPK) abilities	3.48	0.89	medium	5
	Total	**3.57**	**0.91**	**high**	

From Table 3, it was found that the TPACK abilities of chemistry teachers in public universities in Guangxi are at a high level overall ($\overline{X}$=3.57, **S.D**=0.91). Considering each aspect, it was the highest mean of TK abilities ($\overline{X}$=3.78, **S.D**=0.80), followed by PCK abilities ($\overline{X}$=3.66, **S.D**=0.92), PK abilities ($\overline{X}$=3.54, **S.D**=0.95), TCK abilities ($\overline{X}$=3.49, **S.D**=0.95), TPK abilities ($\overline{X}$=3.48, **S.D**=0.89), and the lowest mean was CK abilities ($\overline{X}$=3.46, **S.D**=0.92).

5.2 Conclusion and Discussion

5.2.1 Summary of research results

The research found that the TPACK abilities of chemistry teachers in public universities in Guangxi are at a high level overall. Considering each aspect, it was the highest mean of TK, followed by PCK, PK, TCK, and TPK, Management of teaching in an educational institution and the lowest mean was CK. The details of the research results in each aspect are as follows.

Table 4 found that the current situation of TPACK abilities of chemistry teachers in public universities in Guangxi in the TK abilities was at a high level ($\overline{X}$ = 3.78). Considering the results of this research aspects ranged from the highest to lowest mean were as follows: the highest mean was "Teachers' mastery of the future development trends of technological tools. ($\overline{X}$ = 4.00)", followed by "Teachers' understanding of the working principles of technological equipment. ($\overline{X}$ = 3.88)".The lowest mean was "Teacher's proficiency in selecting appropriate technical tools based on actual needs" was the lowest mean ($\overline{X}$ = 3.66)".

Table 4 The mean and standard deviation of the current situation of the TK abilities of chemistry teachers in public universities in Guangxi. (n = 214)

	The TK abilities of chemistry teachers	$\overline{X}$	S.D	Level	Order
1	Teachers' mastery of the future development trends of technological tools.	4.00	0.67	high	1
2	Teachers' proficiency in utilizing various technological tools and resources.	3.72	0.78	high	8
3	Teachers' understanding of the working principles of technological equipment.	3.88	0.79	high	2
4	Teacher's mastery of troubleshooting and maintenance skills.	3.77	0.85	high	5
5	Teacher's proficiency in selecting appropriate technical tools based on actual needs.	3.66	0.83	high	10
6	Teachers' level of mastery in applying technology to their work.	3.73	0.82	high	7
7	Teachers' guidance on others' mastery of technology use.	3.76	0.80	high	6
8	Teachers' mastery in guiding others to use technology for innovative thinking and problem-solving.	3.79	0.78	high	3
9	Teacher's mastery of assessing the effectiveness and appropriateness of different technological solutions.	3.79	0.84	high	3
10	Teachers' mastery of the use of monitoring technology.	3.68	0.81	high	9
	Total	**3.78**	**0.80**	**high**	

Table 5 The mean and standard deviation of the current situation of the PK abilities of chemistry teachers in public universities in Guangxi. (n = 214)

	The PK abilities of chemistry teachers	$\overline{X}$	S.D	Level	Order
1	Teachers' grasp of future trends in teaching development.	3.67	0.89	high	1
2	Teachers' grasp of the latest teaching and learning theories.	3.51	0.94	high	6
3	Teachers' mastery of using various teaching methods and strategies.	3.51	0.94	high	6
4	Teachers' proficiency in organizing learning activities and establishing communication platforms.	3.53	0.93	high	5
5	Teacher's proficiency in effective classroom management skills.	3.43	0.96	medium	10
6	Teachers' grasp of the ability to carry out differentiated teaching according to different needs.	3.47	0.95	medium	9
7	Teacher's level of mastery in dealing with various unexpected events in teaching.	3.48	0.97	medium	8
8	Teachers' mastery of using various assessment methods to evaluate learning outcomes and form assessment summaries.	3.60	1.00	high	2
9	Teacher's mastery of teaching is based on the feedback and guidance of the teaching evaluation results.	3.57	0.93	high	4
10	Teachers' grasp of the use of reflection to continuously improve teaching methods.	3.58	0.99	high	3
	Total	**3.54**	**0.95**	**high**	

Table 5 found that the current situation of TPACK abilities of chemistry teachers in public universities in Guangxi in the PK abilities was at a high level ($\overline{X}$ =3.54). Considering the results of this research aspects ranged from the highest to lowest level were as follows: the highest mean was "Teachers' grasp of future trends in teaching development.($\overline{X}$ =3.67)", followed by "Teachers' mastery of using various assessment methods to evaluate learning outcomes and form assessment summaries. ($\overline{X}$ = 3.60)", "Teacher's proficiency in effective classroom management skills" was the lowest mean ($\overline{X}$ =3.43).

Table 6 The mean and standard deviation of the current situation of the CK abilities of chemistry teachers in public universities in Guangxi. (n = 214)

	The CK abilities of chemistry teachers	$\overline{\text{X}}$	S.D	Level	Order
1	Teachers' grasp of the future development trends of the subject.	3.60	0.86	high	1
2	Teachers' grasp of basic facts and information within the subject domain.	3.51	0.87	high	2
3	The teacher's mastery of the core concepts and principles of in-depth subject analysis	3.49	0.92	medium	4
4	Teacher's level of mastery in understanding and constructing an overall knowledge system of the subject.	3.40	0.96	medium	8
5	Teachers' mastery of the language and symbol systems specific to the subject.	3.44	0.93	medium	5
6	Teacher's mastery of research methods and logic in applied disciplines.	3.42	0.95	medium	7
7	Teacher's mastery of the development history of the subject.	3.50	0.94	high	3
8	Teacher's mastery of the practical application value of the subject.	3.43	0.95	medium	6
9	Teacher's mastery of integrating their subject with other disciplines in an interdisciplinary manner.	3.40	0.97	medium	8
10	Teacher's mastery of the application of the subject in practical teaching.	3.39	0.90	medium	10
	Total	**3.46**	**0.92**	**medium**	

Table 6 found that the current situation of TPACK abilities of chemistry teachers in public universities in Guangxi in the CK abilities was at medium level ($\overline{\text{X}}$ = 3.46). Considering the results of this research aspects ranged from the highest to lowest level were as follows: the highest mean was "Teachers' grasp of the future development trends of the subject. ($\overline{\text{X}}$ = 3.60)", followed by "Teachers' grasp of basic facts and information within the subject domain. ($\overline{\text{X}}$ = 3.51)", "Teacher's mastery of the application of the subject in practical teaching" was the lowest mean ($\overline{\text{X}}$ = 3.39).

Table 7 The mean and standard deviation of the current situation of the PCK abilities of chemistry teachers in public universities in Guangxi. (n = 214)

	The PCK abilities of chemistry teachers	$\overline{\mathrm{X}}$	S.D	Level	Order
1	Teacher's grasp of understanding students' prior knowledge, learning styles, interests, and motivations.	3.83	0.86	high	1
2	Teachers' mastery of the preconceptions, misconceptions, and potential learning difficulties concerning specific subject matter topics and their ability to differentiate instruction for students from diverse backgrounds and abilities.	3.55	0.98	high	9
3	Teacher's mastery of expressing subject content in a way that is easily understood by students.	3.66	0.93	high	4
4	Teachers' mastery of in-depth analysis of course objectives, textbook content, and how to use textbooks.	3.63	0.94	high	5
5	Teacher's mastery of using teaching materials and other teaching resources to support teaching.	3.55	0.95	high	9
6	Teachers' mastery of content processing, transformation, expression, and teaching, is closely related to specific subject matter content.	3.63	0.91	high	5
7	Teachers' mastery of selecting effective teaching strategies and methods for specific teaching content.	3.62	0.95	high	7
8	Teachers' ability to adjust teaching methods based on specific teaching scenarios.	3.60	0.86	high	8
9	Teachers' mastery of integrating the experience and lessons learned in practice into teaching.	3.79	0.91	high	2
10	Teacher's mastery of reflection and self-evaluation of their own teaching practice.	3.71	0.95	high	3
	Total	**3.66**	**0.92**	**high**	

Table 7 found that the current situation of TPACK abilities of chemistry teachers in public universities in Guangxi in the PCK abilities was at a high level ($\overline{\mathrm{X}}$ = 3.66). Considering the results of this research aspects ranged from the highest to lowest level were as follows: the highest mean was "Teacher's grasp of understanding students' prior knowledge, learning styles, interests, and motivations.($\overline{\mathrm{X}}$ = 3.83)", followed by "Teachers' mastery of integrating the experience and lessons learned in practice into teaching. ($\overline{\mathrm{X}}$ = 3.79)", "Teachers' mastery of the preconceptions, misconceptions, and potential learning difficulties

concerning specific subject matter topics and their ability to differentiate instruction for students from diverse backgrounds and abilities" and "Teacher's mastery of using teaching materials and other teaching resources to support teaching" were the lowest mean ($\overline{X}$ = 3.55).

Table 8 The mean and standard deviation of the current situation of the TCK abilities of chemistry teachers in public universities in Guangxi. (n = 214)

	The TCK abilities of chemistry teachers	$\overline{X}$	S.D	Level	Order
1	Teachers' proficiency in their selection of appropriate technological tools to support teaching in various subjects.	3.63	0.89	high	1
2	Teachers' mastery of fusion technology and subject content.	3.48	0.94	medium	5
3	Teachers' grasp of using technology to promote student interaction and participation.	3.55	0.98	high	2
4	Teachers' mastery of using technology to support students' personalized learning needs.	3.44	0.96	medium	9
5	Teacher's mastery of acquiring and managing online teaching resources to aid instruction.	3.46	0.91	medium	7
6	Teachers' consideration of the level of mastery of technology when designing teaching activities.	3.47	0.95	medium	6
7	Teachers' level of understanding and strategies for dealing with technical problems.	3.54	0.91	high	3
8	Teachers' mastery of fusion technology and subject content.	3.42	0.99	medium	10
9	Teacher's mastery of using technology tools for student learning assessment and feedback.	3.49	1.00	medium	4
10	Teachers' grasp of professional development needs and willingness for continuous learning in the integration of blended technology and subject content.	3.46	0.95	medium	7
	Total	3.49	0.95	medium	

Table 8 found that the current situation of TPACK abilities of chemistry teachers in public universities in Guangxi in the TCK abilities was at medium level ($\overline{X}$ = 3.49). Considering the results of this research aspects ranged from the highest to lowest level were as follows: the highest mean was "Teachers' proficiency in their selection of appropriate technological tools to support teaching in various subjects. ($\overline{X}$ = 3.63)", followed by "Teachers' grasp of using technology to promote student interaction and participation.

($\overline{X}$ = 3.55)", "Teachers' mastery of fusion technology and subject content" was the lowest mean ($\overline{X}$ = 3.42).

Table 9 The mean and standard deviation of the current situation of the TPK abilities of chemistry teachers in public universities in Guangxi. (n = 214)

The TPK abilities of chemistry teachers		$\overline{X}$	S.D	Level	Order
1	Teachers' proficiency in using technology to support instructional strategies and activities.	3.64	0.81	high	1
2	Teacher's mastery of the design and implementation of learning and teaching activities using technology.	3.48	0.92	medium	6
3	Teachers' mastery of using technology to enhance student engagement and motivation.	3.37	0.92	medium	9
4	Teachers' grasp of ensuring that the use of technology is consistent with teaching objectives and learning outcomes.	3.53	0.87	high	2
5	Teachers' mastery of selecting and integrating technology resources and applying them to teaching.	3.43	0.91	medium	8
6	Teacher's proficiency in using technology to meet the diverse learning needs of students.	3.35	0.93	medium	10
7	Teacher's mastery of flexibly handling problems when encountering technical issues.	3.53	0.87	high	2
8	Teachers' mastery of keeping pace with the times and continuously trying to apply technology to teaching.	3.50	0.84	high	4
9	Teachers' mastery of using technology to assess and provide feedback on student learning.	3.50	0.91	high	4
10	Teachers' understanding of the professional development needs for integrating technology into teaching and their demand for technical support.	3.44	0.88	medium	7
	Total	3.48	0.89	medium	

Table 9 found that the current situation of TPACK abilities of chemistry teachers in public universities in Guangxi in the TPK abilities was at a medium level ($\overline{X}$ = 3.48). Considering the results of this research aspects ranged from the highest to lowest level were as follows: the highest mean was "Teachers' proficiency in using technology to support instructional strategies and activities. ($\overline{X}$ = 3.64)", followed by "Teacher's mastery of flexibly handling problems when encountering technical issues. ($\overline{X}$ = 3.53)",

"Teacher's proficiency in using technology to meet the diverse learning needs of students" was the lowest mean ($\overline{X}$ = 3.35).

5.2.2 Discussion

The study evaluated the TPACK abilities of chemistry teachers in public universities in Guangxi. Among the assessed domains, TK abilities exhibited the highest proficiency level. PCK abilities ranked second in terms of mean score, while CK abilities recorded the lowest mean score. This may be due to school policies and training, personal attitudes, teaching experience, teaching environment, and subject characteristics. These factors work together to affect teachers' abilities and performance in each component of TPACK abilities. On the one hand, to enhance the TK abilities of chemistry teachers, universities place significant emphasis on the transfer of technical knowledge through teacher education and training programs. They provide abundant technological tools and resources, foster a teaching environment that encourages the use and innovation of technology, and support chemistry teachers in integrating technology into their practice. This approach leverages their teaching experience, familiarity with technology, and positive attitudes toward its application. On the other hand, to strengthen the PCK abilities of chemistry teachers, universities implement targeted teacher education and training programs. These initiatives are designed to enhance teachers' awareness of PCK, deepen their understanding of its multidimensional framework, and promote adherence to student-centered teaching philosophies. Additionally, universities facilitate teaching research activities emphasizing instructional design and simulation, continuous teaching practice accompanied by reflective processes, interactive teaching and observation, and the systematic refinement and advancement of PCK measurement and evaluation methodologies. However, insufficient teaching resources and institutional support may hinder chemistry teachers from updating and deepening their subject knowledge. This limitation can reduce their motivation for continuous learning and self-improvement, leading to a tendency to neglect the dissemination of CK and the cultivation of its practical applications. Furthermore, they may struggle with effectively applying and reflecting on subject knowledge within teaching practices. Implementing a robust evaluation and feedback mechanism could assist chemistry teachers in recognizing, addressing, and rectifying deficiencies in their CK, thereby facilitating continuous improvement and professional growth.

Additionally, building upon Yamtinah's (2024) conceptual framework, the development and evaluation of a TPACK scaffolding system aim to enhance the TPACK abilities of chemistry teachers. This initiative seeks to support effective teaching practices and foster advancements in instructional quality through the following components: 1) TPACK-Integrated Syllabus and Lesson Plan: These resources provide illustrative examples of learning designs for various chemistry topics, demonstrating the appropriate integration of each TPACK component. 2) TPACK Integration Matrix: This matrix offers detailed descriptions and practical examples of how each TPACK component can be effectively incorporated into instructional

design. 3) TPACK Activity Section: Hosted on the website, this section features learning activities designed for preservice teachers, providing opportunities to gain practical experience, develop necessary skills, and deepen their understanding of integrating TPACK into chemistry instruction. 4) TPACK Scaffolding Tool: A practical resource to assist chemistry teachers in effectively integrating TPACK into their teaching methodologies. 5) TPACK Abilities Enhancement: The scaffolding framework serves as a pivotal mechanism for improving chemistry teachers' TPACK abilities, thereby enhancing the quality of chemistry education and learning outcomes. Therefore, chemistry teachers require comprehensive guidance on planning, studying, practicing, receiving feedback, engaging in discussions, and pursuing professional development. The enhancement of TPACK abilities significantly contributes to the advancement of chemistry teachers' professional expertise. In light of these considerations, the results are as follows:

The overall level of TK abilities was found to be high, likely due to the support provided by the University Teacher Development Center, which offers a comprehensive technical support system for chemistry teachers. This system fosters sustained engagement in professional development activities, thereby enhancing teachers' technical knowledge and competencies. The primary pathway for technology learning encompasses a progression from awareness and exploration to application, integration, innovation, and ultimately to becoming a leader and lifelong learner in the use of technology. Furthermore, the university benefits from access to advanced educational media, technology, and learning resources, which collectively provide substantial support for the enhancement of chemistry teachers' technical knowledge. On the one hand, higher education teachers should focus on emerging development trends and the application of technological tools, particularly within K-12 classrooms. These tools include computer simulations, virtual laboratories, mobile devices, robotics, educational games, and digital photography and drawing technologies. Therefore, to effectively align with the advancements in information technology, educators have increasingly engaged in learning the operational principles of technological devices, experimenting with various technological tools and resources, and incorporating them into their teaching and professional development. They utilize technology to cultivate innovative thinking and problem-solving skills, while also evaluating the efficacy and applicability of diverse technological solutions. Concurrently, many educators are striving to acquire fundamental troubleshooting and maintenance skills for these devices, ensuring their optimal and sustained use in educational settings. On the other hand, to optimize the alignment of technological tools with professional needs, teachers strategically select tools based on practical requirements and systematically evaluate their effectiveness. As the scope and demands of their roles evolve, teachers must continuously identify and adopt more suitable technologies, rigorously assess their application outcomes, and utilize these evaluations to inform subsequent decision-making processes. This iterative approach fosters the development of a dynamic, self-regulating ecosystem that adapts to both technological advancements and evolving educational needs. These findings align with international educational trends that emphasize student-centered, adaptable, and innovative teaching methodologies.

As a result, teachers are faced with the challenge of helping students view technological instruments not as transparent and neutral devices that simply "depict reality", but as powerful epistemic tools that help co-constitute the reality being investigated, often (re)shaping what counts as "real" in revolutionary ways. (Oliveira, 2019).

The overall level of PK abilities is notably high, which can be attributed to the university's emphasis on strengthening teaching quality through systematic initiatives. These include regular inspections of teaching practices, targeted educational training programs, and the organization of skill-based competitions to enhance instructional proficiency. Additionally, at the individual level, educators engage in in-depth research and the practical application of pedagogical content, further contributing to the high PK levels observed. On the one hand, the chemistry teachers interviewed in this study exhibited strong competencies in anticipating future trends in educational development and applying effective methods for assessing student learning outcomes. This proficiency reflects their commitment to continuous professional growth and adaptability, which aligns with the global shift toward student-centered learning environments. In such settings, teachers assume the roles of facilitators and guides, promoting collaborative and engaging classroom dynamics. On the other hand, areas for improvement were identified in classroom management and the implementation of differentiated instruction. Addressing these aspects is essential to further enhance teaching efficacy and student engagement. Research suggests that differentiated learning strategies based on the theory of multiple intelligences significantly contribute to the development of critical thinking skills among university students. This approach, as highlighted by Alhamuddin (2023), offers a promising alternative pedagogical framework for fostering critical thinking and academic growth. These findings resonate with global educational trends that emphasize student-centered, flexible, and innovative teaching practices, underscoring the need for a balanced approach to fostering both pedagogical and managerial competencies. In conclusion, PK abilities are fundamental to the effectiveness of university education, particularly in the contemporary educational landscape, which prioritizes innovation and student-centered approaches. To meet evolving educational demands, universities must allocate resources toward enhancing teacher professional development, fostering innovative teaching strategies, and promoting personalized instructional practices.

The overall CK abilities were assessed at a moderate level. This may be attributed to strengths in mastering foundational knowledge and research methodologies, contrasted with challenges in applying disciplinary knowledge to practical contexts and conducting in-depth analyses. These shortcomings could stem from limited opportunities for practical application training, interdisciplinary integration, and the development of advanced analytical skills. Self-assessment data from the surveyed chemistry teachers revealed strong performance in understanding core facts and information within their discipline but highlighted deficiencies in translating subject knowledge into real-world applications. These findings resonate with global trends in higher education, which increasingly emphasize the utility and innovation of

knowledge. On the one hand, selecting context-based tasks in chemistry education enhances student engagement, critical thinking, and practical application skills by linking abstract concepts with real-world scenarios, thereby increasing the relevance of learning and promoting interdisciplinary understanding (van, 2021). This approach aligns with the respondents' high ratings in recognizing future trends in the development of the discipline, reflecting teachers' sensitivity and adaptability to the evolving frontiers of the subject. On the other hand, chemistry, as a discipline positioned at the intersection of science, technology, engineering, mathematics, and medicine (STEMM), fosters interdisciplinary collaboration (Hardy, 2021). Through this collaboration, students are encouraged to apply theoretical knowledge to real-world problem-solving. This contrasts with the respondents' moderate ratings in practical application, highlighting areas within university education that require further enhancement. In summary, CK abilities are pivotal in university education. Enhancing CK abilities is essential for improving educational quality and fostering students' capacity for innovation, equipping them to adapt effectively to the demands of future societies.

The overall PCK abilities are assessed as high. Teachers' self-assessment of their Pedagogical Content Knowledge (PCK) revealed notable strengths in understanding student characteristics and engaging in reflective teaching practices. This high self-evaluation can be attributed to the institution's emphasis on professional development programs, systematic teaching evaluations, and an increasing focus on student-centered pedagogies, all of which foster continuous professional growth and enhance teachers' self-awareness and adaptability in the classroom. However, they demonstrated challenges in adapting teaching methods flexibly to varying contexts and utilizing teaching resources effectively. These limitations may stem from insufficient targeted training and practice opportunities, as well as a lack of robust peer communication and feedback mechanisms. This aligns with global educational trends that emphasize the importance of adaptability and innovation in teaching. On the one hand, To address the existing challenges, Baise University in Guangxi could implement a range of strategic measures to enhance teaching effectiveness. Firstly, the development of context-specific training programs that simulate diverse instructional scenarios—such as managing heterogeneous classroom dynamics and integrating emerging technologies—would be beneficial. These programs should incorporate experiential learning techniques, including role-playing and live teaching demonstrations, to foster practical skill development. Furthermore, enhancing peer collaboration through the establishment of Professional Learning Communities (PLCs) or interdisciplinary teaching teams would promote regular dialogue, the exchange of best practices, and constructive feedback. Structured initiatives, such as monthly peer workshops or annual interdisciplinary symposiums, could help cultivate a culture of sustained collaboration. Finally, the incorporation of cutting-edge educational technologies, including virtual simulations and interactive teaching platforms, should be embedded within routine faculty development initiatives to expand educators' methodological approaches and pedagogical strategies. On the other hand, Lesson study, the analysis of classroom artifacts, and the construction of CoRe (Conceptual Knowledge Resources) and PaPer (Pedagogical and Professional Reflection) have proven

to be instrumental in advancing teachers' professional development. (Barut, 2020) This framework underscores the critical role of teachers' experiential knowledge, while also emphasizing the necessity of active participation in collaborative-reflective practices within professional development initiatives to effectively enrich their Pedagogical Content Knowledge (PCK).

The overall TCK abilities are assessed at a moderate level. Teachers demonstrate notable strengths in selecting appropriate technology tools and facilitating student interaction. This proficiency can be attributed to enhanced professional development opportunities, increased access to user-friendly digital tools, and a pedagogical shift toward student-centered approaches that prioritize engagement and collaborative learning. However, teachers are relatively weak in the deep integration of technology and subject content to create new learning experiences and the management of online teaching resources. The relative weakness in the deep integration of technology with subject content and the management of online teaching resources may be attributed to insufficient professional development, a lack of expertise in blending technology with pedagogy, and limited institutional support for effectively managing digital teaching tools. However, teachers exhibit relative weaknesses in the profound integration of technology with subject content to foster innovative learning experiences and in the effective management of online teaching resources. This limitation may stem from insufficient professional development opportunities, a lack of specialized expertise in seamlessly blending technology with pedagogy, and inadequate institutional support for the efficient management and utilization of digital teaching tools. On the one hand, to advance teachers' TCK competencies, Baise University in Guangxi should implement a holistic strategy that emphasizes targeted professional development, institutional support from technology organizations, and the seamless integration of technology with academic disciplines. This can be accomplished by designing specialized training programs that align technology with subject content, while providing educators with accessible digital tools and resources, such as virtual reality (VR), augmented reality (AR), and online MOOCs. Establishing collaborative opportunities through virtual research groups, course study teams, and interdisciplinary projects is also critical. Furthermore, the university should allocate dedicated time for teachers to experiment with digital tools in their pedagogical practices and offer support for the effective management of online resources. By fostering a culture of continuous reflection and feedback, coupled with strong institutional backing for technology integration, the university can empower educators to merge technological innovations with teaching methodologies, thereby enriching students' learning experiences. For instance, the School of Chemical Engineering employs virtual simulation technology in its chemical engineering and process courses, allowing for the delivery of practical content that would otherwise be unattainable due to constraints such as time, space, cost, and safety, thus enhancing the technological expertise of chemistry teachers. On the other hand, teachers' Technological Pedagogical Knowledge (TPK) abilities can be evaluated through various methods utilizing digital modules, with strategies for enhancing TPK formulated based on the assessment outcomes. The content of this module encompasses four core

dimensions of scientific literacy: science as a body of knowledge, science as an investigative method, science as a mode of thinking, and science as the interaction between science, technology, and society. (Hayati, 2023) In conclusion, TCK abilities not only facilitate the advancement of educational informatization and the innovation of teaching methodologies but also enhance teaching quality and foster educational equity.

The overall TPK abilities are assessed at a moderate level, indicating that teachers generally exhibit confidence in utilizing technology. This proficiency may be attributed to the expanding availability of digital tools and resources within higher education institutions in Guangxi, alongside concerted efforts by universities to enhance their technological infrastructure. Institutions like Guangxi University have made substantial investments in the development of digital learning environments and in professional development programs aimed at supporting educators in effectively integrating technology into their pedagogical practices. However, the ability to utilize technology to enhance student engagement remains relatively underdeveloped, suggesting a gap in teachers' capacity to actively involve students in the learning process through technological means. This limitation may be attributed to insufficient training on the effective use of specific technologies, such as gamification tools or interactive platforms, which can significantly enhance student motivation. Additionally, teachers may lack the pedagogical strategies necessary to leverage technology in fostering a more engaging and dynamic learning environment. To address this issue, universities should organize targeted workshops and professional development programs designed to equip educators with the requisite knowledge and skills to create interactive, student-centered learning experiences through the integration of technology. On the one hand, to enhance the effectiveness of information technology in supporting student learning, Baise University in Guangxi has developed a comprehensive technical support system that provides teachers with timely technical consultation and troubleshooting services, ensuring the seamless execution of teaching activities. By adopting the "flipped classroom" teaching model, the university highlights the positive impact of TCK in innovating teaching methods and improving instructional quality. This model maximizes the use of information technology, fostering increased student initiative and participation, while also promoting enhanced interaction and communication between teachers and students. This demonstrates that through the effective integration of technological resources, educators can better address students' individual learning needs and improve overall teaching outcomes. To enhance student engagement and optimize the selection and integration of digital resources, Guangxi University encourages faculty to engage in interdisciplinary collaboration and research. This initiative promotes the integration of information technology with various academic disciplines, fostering the exploration of innovative teaching models and new research directions. On the other hand, the transition to emergency remote teaching, implemented as a new educational policy from late 2019 to early 2022, was adopted by most educational institutions in China in response to the outbreak of the Coronavirus Disease (COVID-19). Through collaborative efforts across multiple departments, a range of measures, and comprehensive mobilization, the goal of ensuring "no suspension of classes" was successfully

achieved through online teaching, thereby safeguarding the vital educational interests of students in a scientific and effective manner. Yang (2023) identified three primary factors contributing to the success of distance learning during the pandemic. First, the utilization of the national smart education public service platform provided critical support for the digital transformation of education. Second, emphasis was placed on enhancing digital literacy among both teachers and students, along with the formulation of targeted policies to support the digital transformation. Third, the integration of online and offline teaching modalities was prioritized, with a layered approach to designing the overall digital education transformation plan. In conclusion, TPK abilities facilitate the comprehensive advancement of technology-enhanced teaching practices.

6. Recommendations

6.1 Implications

From the research results, it was found that the TPACK abilities of chemistry teachers in public universities in Guangxi have the following suggestions.

1. In terms of TK abilities, chemistry teachers should focus on actively engaging in professional development programs to enhance their technical knowledge and competencies, taking full advantage of the comprehensive support systems offered by institutions like the University Teacher Development Center. They should prioritize emerging technological trends and tools, including computer simulations, virtual laboratories, mobile devices, and robotics, integrating these innovations into their teaching practices to cultivate students' innovative thinking and problem-solving abilities. Additionally, teachers must acquire essential troubleshooting and maintenance skills to ensure the continued effectiveness of technological devices in educational settings. To optimize the alignment of technology with pedagogical goals, teachers should strategically select and evaluate tools based on their practical needs, ensuring these technologies remain adaptable to the evolving demands of teaching. Furthermore, teachers should guide students to recognize technology not just as tools that depict reality, but as epistemic instruments that actively shape and co-construct knowledge, thus promoting a deeper understanding of how technology influences the learning process and knowledge creation. This reflective and adaptive approach will ensure that technology is utilized effectively to meet both educational objectives and technological advancements.

2. In terms of PK abilities, chemistry teachers should focus on engaging in ongoing professional development initiatives, such as targeted educational training programs and skill-based competitions, to further enhance their pedagogical knowledge and instructional effectiveness. Teachers should embrace their roles as facilitators and guides within student-centered learning environments, fostering collaboration and active student participation. To enhance teaching effectiveness, educators should prioritize improving classroom management techniques and implementing differentiated instruction, particularly through strategies rooted in the theory of multiple intelligences, to cultivate critical thinking and academic growth.

Furthermore, teachers must continuously refine their teaching methods to stay aligned with evolving educational trends, promoting flexibility and innovation in their practices. Universities should prioritize sustained investment in professional development resources, enabling educators to continuously refine their pedagogical competencies and deliver personalized, effective teaching strategies.

3. In terms of CK abilities, chemistry teachers should focus on enhancing their ability to translate disciplinary knowledge into practical applications. While they demonstrate a solid foundational understanding, there is a need to seek additional opportunities for practical application training and greater interdisciplinary integration. Incorporating context-based tasks into teaching practices can foster student engagement and critical thinking by connecting abstract chemical concepts with real-world scenarios. Teachers should also prioritize interdisciplinary collaboration, particularly within the STEMM fields, to encourage students to apply theoretical knowledge to solve complex problems. Furthermore, it is essential for teachers to continuously adapt their pedagogical approaches to align with evolving global educational trends, thus promoting innovation and preparing students to address the challenges of future societies. By focusing on these areas, teachers can enhance their content knowledge and its practical application, ultimately improving educational quality and fostering students' capacity for innovation.

4. In terms of PCK abilities, chemistry teachers should focus on enhancing their adaptability in applying teaching methods to a variety of educational contexts and optimizing the use of available teaching resources. While teachers demonstrate notable strengths in understanding student characteristics and engaging in reflective teaching practices, there is a need for targeted professional development to refine flexible teaching strategies and improve resource utilization. To address these challenges, institutions like Universities should consider implementing context-specific professional development programs that simulate diverse teaching scenarios, including managing heterogeneous classrooms and integrating emerging technologies. These programs should incorporate experiential learning strategies, such as role-playing and live teaching demonstrations, to promote the development of practical pedagogical skills. Additionally, fostering peer collaboration through the establishment of Professional Learning Communities (PLCs) or interdisciplinary teaching teams would facilitate the exchange of best practices and provide opportunities for constructive feedback. The integration of advanced educational technologies, including virtual simulations and interactive teaching platforms, should be incorporated into ongoing faculty development initiatives to broaden pedagogical approaches. Finally, utilizing frameworks such as Lesson Study, classroom artifact analysis, and the creation of Conceptual Knowledge Resources (CoRe) and Pedagogical and Professional Reflection (PaPer) would support teachers in advancing their PCK by emphasizing reflective and collaborative practices within professional development activities.

5. In terms of TCK abilities, chemistry teachers should focus on better integrating technology with subject content to foster innovative learning experiences. While proficient in using technology tools and facilitating student interaction, there is a need for targeted professional development to effectively merge

technology with pedagogy. Universities should offer training programs that align technology with discipline-specific content and provide access to advanced tools like virtual reality (VR), augmented reality (AR), and online MOOCs. Creating collaborative platforms and providing time for teachers to experiment with digital tools, along with support for managing online resources, will enhance teaching practices. By fostering a culture of reflection and feedback, the university can help teachers integrate technology into pedagogy, enriching students' learning and improving teaching quality.

6. In terms of TPK abilities, chemistry teachers should focus on enhancing their use of technology to engage students and create interactive, student-centered learning environments. While proficient in using technology, there is a gap in applying tools like gamification and interactive platforms to boost motivation. Universities should offer targeted professional development to help educators integrate these tools effectively. Universities can provide technical support and encourage interdisciplinary collaboration to optimize digital resources. Adopting models like the "flipped classroom" can further enhance student interaction and teaching quality, fostering better learning outcomes.

6.2 Future Researches

1. The examination of TPACK abilities within universities should be informed by the perspectives of diverse stakeholders involved in student development and educational administration, including students, civil servants, educators, educational personnel, and parents.

2. Examining the issues and challenges associated with TPACK competencies in universities is crucial for advancing student learning outcomes, strengthening institutional capacity, and promoting the professional growth of educators.

3. The TPACK framework serves as a theoretical model for teacher professional development. Future advancements should focus on the deeper integration of technology and pedagogy, the personalization of teaching practices, the enhancement of teachers' professional expertise, and the adoption of innovative training methodologies. These developments are crucial for adapting to the rapid advancements in educational technology and the evolving demands of education.

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(78-EN-EDU)

Improving the Career Development Program for Students Major in Preschool Education in Jinghong City

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Abstract

This article focused on improving the career development program for preschool education majors in Jinghong City in light of the new Vocational Education Law. It begins by highlighting the law's impact on vocational and general education equivalence and the need for career development program enhancement. The research involved 440 students from 3 vocational schools, with a sample of 205. Data was collected using a structured interview form covering aspects like students' learning, reactions, income, social recognition, and promotion. Results showed disparities in learning among schools, mixed reactions from students, varying income and social recognition, and limited promotion opportunities. Recommendations include strengthening teaching staff and facilities for institutions, resource allocation and guideline updates for policy makers, and resource utilization and career planning for students.

Keywords: Career development; preschool education; Jinghong city; vocational education

1. Introduction

On April 20, 2022, the new Vocational Education Law was revised and passed, and it will be implemented from May 1. The biggest change is to open up the "secondary school-college-undergraduate" promotion channel, and to classify vocational education and general education as equivalent. As an important position, vocational school students have equal opportunities with ordinary school students at the same level in terms of further education, employment, and career development. Article 14 of the newly revised Vocational Education Law of the People's Republic of China (hereinafter referred to as the new Vocational Education Law) states: "The state optimizes the educational structure, scientifically allocates educational resources, and promotes vocational education according to local conditions at different stages after compulsory education. Coordinated development of education and general education". The coordinated development of vocational education and general education is a time-honored topic, and the relevant provisions of the new Vocational Education Law have further highlighted its importance, and it is of great significance to discuss this topic.

The implementation of the new Vocational Education Law brings new opportunities and challenges to the career development program for students major in preschool education. In Jinghong City, it is crucial to improve this system to ensure that students major in preschool education can fully benefit from the changes brought about by the law.

Firstly, improving the career development program can help students better adapt to the new promotion channel and seize the opportunities for further education and career development. By providing targeted training and guidance, students can acquire the necessary skills and knowledge to excel in their chosen fields.

Secondly, it is essential to ensure the equivalence between vocational education and general education in terms of career development. This requires aligning the training system with the requirements of the job market and providing students with practical experiences and internships to enhance their employability.

Furthermore, the coordinated development of vocational education and general education emphasizes the need for a comprehensive and integrated approach. This includes strengthening the connection between schools and enterprises, promoting industry-education integration, and ensuring that the training system meets the actual needs of the preschool education industry.

In conclusion, improving the career development program for students major in preschool education in Jinghong City is not only in line with the requirements of the new Vocational Education Law but also crucial for the sustainable development of the preschool education sector and the career prospects of students. It is necessary to take active measures to optimize the training system and provide students with better support and opportunities.

The purpose is to ensure that these students can fully leverage the opportunities provided by the law to enhance their skills, knowledge, and competencies, thereby improving their career prospects. By tailoring the training system to the specific needs of students major in preschool education, we aim to equip them with the tools necessary to succeed in a rapidly evolving educational landscape. This will not only benefit the individual students but also contribute to the overall quality and development of the preschool education sector in Jinghong City, ultimately providing better educational experiences for young children.

2. Research Objectives

To study the situation of career development program for students major in preschool education in Jinghong city.

3. Research Hypotheses

The current career development program for preschool education majors in Jinghong City may not fully align with the requirements of the new Vocational Education Law.

4. Research Methodology

The Population

There were 440 students majoring in preschool education from 3 secondary vocational schools in Jinghong city.

The Sample Group

The sample group of this research were 205 students majoring in preschool education from 3 secondary vocational schools in Jinghong city. According to Krejcie and Morgan sampling table, and by using stratified random sampling and sample random sampling was also used by drawing from the 3 secondary vocational schools.

Table1 Lists of university and sample size

Institutes	population	samples
Xishuangbanna Vocational and Technical Institute	130	60
Jinghong Vocational High School	220	103
Gasa Vocational High School	90	42
Total	440	205

Structured Interview Form

The instrument to collect the data for objective was the questionnaire designed based on career development program in 5 following aspects: 1) students' learning, 2) students' reactions, 3) students'

income after graduate, 4) students' social recognition, 5) promotion to the next level. Interview questions can be reviewed by experts in the field and suggestions for improvement can be made.

Part 1: Survey about personal information of sample, classified by gender, and professional rank.

Part 2: Survey about the current situation of the career development program for students major in preschool education. The criteria for data interpretation based on five-point Likert's scale, as follow;

5 express the level of management system at highest level

4 express the level of management system at high level

3 express the level of management system at medium level

2 express the level of management system at low level

1 express the level of management system at lowest level

Criteria of mean as follow;

4.50 – 5.00 expressed highest level

3.50 – 4.49 expressed high level

2.50 – 3.49 expressed medium level

1.50 – 2.49 expressed low level

1.00 – 1.49 expressed lowest level

Research steps and methods

Step 1: To summarize the current situation and level of career development program for students major in preschool education in Jinghong city

Step 2: To invite experts to conduct structured interviews.

Step 3: To conduct interviews according to the contents and steps of the interview outline.

Step 4: After summary the interview results, a comprehensive guideline was developed to improving the career development program for students major in preschool education in Jinghong city. The data obtained from the interviews was presented in tabular form.

Data Collection

The researcher carried out data collection according to the types and steps of research instruments.

The data collection for objective 2: to provide guideline for improving the career development program for students major in preschool education in Jinghong city.

Step 1: To collect personal information of experts participating in structured interviews.

Step 2: To collect each expert's response to the interview outline questions.

Step 3: To sort out and summarize the content of each expert's answer to form a guideline.

5. Research Results and Discussion

The research on the career development program for preschool education majors in Jinghong City reveals several key findings. Regarding students' learning, there were disparities among vocational schools, with some providing better teaching and resources while others lag. Students' reactions were mixed; some were satisfied, but many express concerns about practical experiences and career paths. Income after graduation varies widely, depending on school and training. Social recognition also differs, influenced by school reputation and education quality. Promotion opportunities were limited for some due to lack of development and unclear paths. These results indicated the need for improvements in multiple aspects of the career development program to better align with the new Vocational Education Law and meet students' needs.

6. Recommendations

For educational institutions, it was recommended to enhance the teaching staff, improve learning facilities, establish stronger enterprise connections, and clearly define career progression paths. Policy makers should allocate more educational resources to vocational schools, review and update program guidelines to match the law and industry needs, and encourage industry-education integration. Students themselves should utilize available resources, actively seek professional development opportunities, and stay informed about the career development program to effectively plan their careers.

7. Acknowledgments

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The Relationship Between Growth mindset And Learning Styles On Students of Yulin Normal University, Guangxi Zhuang Autonomous Region in China

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Abstract

The objectives of this study were 1) To study the level of growth mindset on college students , 2) To study the level of learning styles on college students, 3)To study the relationship between growth mindset and learning styles on college students. The sample group of the study is 297 freshmen in Yulin Normal University. The research instruments included 5 points of rating scales and questionnaires. The data was analyzed by finding percentile, average value, standard deviation, and Pearson's correlation Product moment. The research showed that: 1)The overall average freshman's growth mindset at Yulin Normal College is at a high level. 2) The overall average of the learning styles of the freshmen of Yulin Normal University is at a high level. 3) The overall relationship between growth mindset and learning style has a positive correlation at the high level with statistical significance level at .01.

Keywords: growth-mindset; learning style; Yulin normal university

1. Introduction

Higher education is also changing with the trend of the times. China's domestic colleges and universities for college students' education and management innovation mainly starts from innovation and entrepreneurship-related competitions and focuses on strengthening the education and innovation ability of college students in higher education institutions. In the author's research on student learning innovation, the issue of student learning innovation cannot be separated from the influence of various internal and external factors such as students' own personality traits, whether students have a growth mindset, the school environment, students' families and other factors on student learning.

From Blackwell's study, it was found that holders with fixed and growth mindsets interpreted effort differently (Blackwell et al., 2007). People with a fixed mindset believe that the more effort they put into something, the less intelligent they are enough to perform. Whereas people with growth mindset would believe that they are only more likely to be successful the more effort they put in. At the same time, his research found that a growth mindset makes it easier for students to be interested in learning, and that students are able to choose to actively engage in their studies. This research will be of great help in solving the problem of modern students' inability to be interested in learning. According to Tromp (2021), a growth mindset consists of the following six elements: intellectual development, facing challenges, overcoming setbacks, effort, accepting criticism and inspiration.

To summarize the above belongings, this study believes that the elements of learning styles contain seven elements: Visual Learning, Auditory learning, Verbal learning, Logical learning, Kinesthetic learning, social learning, Solitary Learning., which determine learners' preferences and personality characteristics in learning styles. By studying and exploring different learning styles, we will have a more intuitive understanding of the characteristics of college students' learning styles in order to achieve the goal of enhancing learning effectiveness.

Students with a growth mindset may perform better than students with a fixed mindset because they strive to reach their full potential rather than staying stagnant in their comfort zone. Students with a growth mindset may also experience higher levels of well-being because their positive perceptions of failure and challenge can reduce an individual's own anxiety (Dweck and Yeager, 2019). It can be seen that anxiety can affect students' personal perceptions and, to some extent, their behavior to change their learning styles. Therefore, this study concludes that there is a positive influence of growth mindset and learning style.

In order to study the growth mindset of the students in order to study the learning styles of the majority of the students the relational nature of the two, the impact between them is positive. Blackwell's study found that fixed and growth mindset holders interpreted effort differently (Blackwell et al., 2007). People with a fixed mindset believe that the more effort they put into something, the less intelligent they are enough to perform. Whereas people with growth mindset would believe that the more effort they put in represents that they are more likely to be successful. Huang Y M (2015) used the social media acceptance

model to examine college students' behavioral willingness to learn and studied the factors influencing their willingness to use social media, which showed that students' behavioral willingness to use social media for learning is influenced by their learning styles. And understanding students' learning styles can provide insights for developing better interventions that target students' needs.

2. Research Objectives

1. To study the level of growth mindset on college students of Yulin Normal University in Guangxi Zhuang Autonomous Region.

2. To study the level of learning styles on college students of Yulin Normal University in Guangxi Zhuang Autonomous Region.

3. To study the relationship between growth mindset and learning styles on college students of Yulin Normal University in Guangxi Zhuang Autonomous Region.

3. Research Hypothesis

Growth mindset and learning style show the positive relationship with statistic significant at 0.5 level.

4. Research Methodology

Population and Sample

The object of the study is mainly 1262 freshmen in Yulin Normal University, Guangxi, China. According to Krejcie and Morgan's sampling table (1970), the sample group of this study was more than 297 freshmmen of various facuties in 3 facuties first year of university at in Yulin Normal University in Guangxi.

Research Variables

1. Growth mindset. There are 6 factors: intellectual development, facing challenges, overcoming setbacks, effort, accepting criticism and inspiration.

2. Learning style. There are 7 styles: Visual Learning, Auditory learning, Verbal learning, Logical learning, Kinesthetic learning, social learning, Solitary Learning.

Research Instruments

The research instruments include 5 points of rating scales and questionnaires.

Data Collection

The data collection for

Step 1: Use the Questionnaire Star website to conduct survey research, website links:

https://www.wenjuan.com/

Step 2: The questionnaire was sent to 379 first-year students of Yulin Normal University, who were majoring in related fields in their first year of study, via WeChat, QQ, Weibo and other Internet software.

Step 3: A questionnaire corresponding to the influencing factors was developed by studying the relevant literature and seeking expert opinion.

Step 4: Out of the 400 distributed questionnaires with 379 valid responses, 379 were indeed validated. The data was collected by the researcher through simple random sampling.

Step 5: The researcher collected the questionnaires for statistical analysis.

Step 6: A sample of 30 questionnaires are collated as trial to test reliability and validity.

Data Analysis and statistic

Analyze the data obtained by the researcher from the questionnaire. The researcher selected the complete questionnaire. The data were analyzed using a computer program with statistical values according to the following objectives.

1. The information on the personal status of the respondents in section 1 of the questionnaire was analyzed by calculating frequencies and percentages and presented herewith in the form of a table.

 2. Part 1 and Part 2 of the questionnaire were analyzed about the growth mindset and learning style by finding the mean , standard deviation (S.D.) and interpreting the meaning according to the boundary criteria of the mean according to the Likert concept as follows:

Mean score between 4.50 – 5.00 refers to agree at the highest level.

Mean score between 3.50 – 4.49 refers to agree at high level.

Mean score between 2.50 – 3.49 refers to agree at moderate level.

Mean score between 1.50 – 2.49 refers to agree at low level.

Mean score between 1.00 – 1.49 refers to agree at the lowest level.

3. The relationship between growth mindset and learning style was analyzed by using the Pearson Product Moment Correlation Coefficient (r). which have been compared according to the criteria of Hinkle, William & Stephen (1998). The correlation coefficient description as follows :

Correlation value between 0.91 - 1.00 shows a very high correlation.

Correlation value between 0.71 - 0.90 shows a high level of relationship.

Correlation value between 0.51 - 0.70 shows a moderate relationship.

Correlation value between 0.31 - 0.50 shows a low level of relationship.

Correlation value between 0.00 - 0.30 shows a very low level of relationship

Research Findings

Part 1. Data analysis of students' growth mindset through a data survey study of freshmen at Yulin Normal University in Guangxi Zhuang Autonomous Region.

As can be seen in Table 4.2, the total mean of growth mindset of freshmen at Yulin Normal College is at a high level ($\overline{x}$=3.39, S.D.=0.92).

The findings of these 6 dimensions are as follows: the highest ranked dimension is "Accepting criticism" ($\overline{x}$=3.87, S.D.=0.82), indicating a high level. This was followed by "Inspiration" ($\overline{x}$=3.65, S.D.=0.88), while "Effort" ranked the lowest ($\overline{x}$=3.05, S.D.=0.98).

Table 1 The mean ($\overline{x}$) and standard deviation (S.D.) of growth mindset on freshmen of Yulin Normal University in Guangxi Zhuang Autonomous Region in six aspects

Growth mindset	$\overline{x}$	S.D.	Level	Ranking
1.Intellectual development	3.39	0.91	high	3
2.Facing challenges	3.32	0.93	high	4
3.Overcoming setbacks	3.39	0.93	high	5
4.Effort	3.05	0.98	high	6
5.Accepting criticism	3.87	0.82	high	1
6.Inspiration	3.65	0.88	high	2
Total	**3.39**	**0.92**	**high**	

Part 2. Data analysis of students' learning style through a data survey study of freshmen at Yulin Normal University in Guangxi Zhuang Autonomous Region.

Table 2 The mean($\overline{x}$) and standard deviation(S.D.) of learning style on freshmen of Yulin Normal University in Guangxi Zhuang Autonomous Region in seven aspects(n=297)

Learning style	$\overline{x}$	S.D.	Level	Ranking
1.Visual Learning	3.61	0.95	high	3
2.Auditory learning	3.66	0.93	high	1
3.Verbal learning	3.62	0.92	high	2
4.Logical learning	3.53	0.90	high	4
5.Kinesthetic learning	3.28	1.02	high	5
6.Social learning	3.25	0.99	high	6
7.Solitary Learning	2.93	1.06	high	7
Total	**3.41**	**0.94**	**high**	

As can be seen from Table 2, the total mean of the learning styles of the freshmen of Yulin Normal University is at a high level ($\overline{\boldsymbol{X}}$=3.41, S.D.=0.94).

The findings of these seven dimensions are as follows: the highest ranked dimension is "Auditory learning" ($\overline{\boldsymbol{X}}$=3.66, S.D.=0.93), which indicates that it is at a high level. This was followed by "Verbal learning" ($\overline{\boldsymbol{X}}$=3.62, S.D.=0.92), while "Solitary Learning" ranked the lowest ($\overline{\boldsymbol{X}}$=2.93, S.D.=1.06).

Part 3 The data analysis on studying the relationship between growth mindset and learning styles on freshmen of Yulin Normal University in Guangxi Zhuang Autonomous Region.

The result of data analysis on the relationship between growth mindset and learning style is shown in the Table 3. The data analysis on the relationship between growth mindset and learning style by using Pearson's correlation coefficient method. the symbols are used to analyze the data as follows.

Table 3 The relationship between Students' Growth mindset and Learning style.

Learning style (Y)	Students' Growth mindset (X)						
	Intellectual development	Facing challenges	Overcoming setbacks	Effort	Accepting criticism	Inspiration	growth mindset
Visual Learning	00.51**	0.56**	0.62**	0.48**	0.59**	0.73**	0.74**
Auditory learning	00.49**	0.54**	0.60**	0.47**	0.68**	0.69**	0.74**
Verbal learning	00.48**	0.50**	0.58**	0.43**	0.65**	0.68**	0.71**
Logical learning	00.61**	0.60**	0.63**	0.49**	0.51**	0.70**	0.75**
Kinesthetic learning	0.51**	0.61**	0.48**	0.53**	0.43**	0.52**	0.65**
Social learning	0.48**	0.51**	0.53**	0.44**	0.45**	0.44**	0.59**
Solitary Learning	0.21**	0.35**	0.33**	0.54**	0.10	0.18**	0.35**
Learning style	0.63**	0.69**	0.71**	0.63**	0.64**	0.75**	**0.85****

** refers to statistical significance level at .01

From table 3, it is shown that the overall relationship between growth mindset and learning style has a positive correlation at the high level with statistical significance level at .01 (r=0.85).

5. Conclusion and Discussion

The results of this study will be discussed in terms of the order of results according to the purpose of the study:

1. The overall average freshmen's growth mindset freshmen at Yulin Normal University is high. The results of the study take into account these six aspects: the highest ranking is "Accepting criticism", followed by "Inspiration" . However, "Effort" was the lowest ranked. This study provides valuable insights into the factors influencing growth mindset of Yulin Normal University freshmen of different majors and genders. The results of this study are consistent with Dweck's definition of growth mindset, which is the quality of an individual's belief in his or her own intelligence, potential, and ability to achieve growth mindset is the quality of an individual's belief in his or her own intelligence, potential, and ability to achieve purpose through his or her own subjectivity, utilising practice, persistence, effort, and effective work-based learning strategies.

This is also in agreement with Tromp's (2021) theoretical study that growth mindset has the following six elements: intellectual development, facing challenges, overcoming setbacks, effort, accepting criticism, and inspiration, which is consistent with the findings of the present study findings. This suggests that growth mindset shows consistent outward manifestations across different populations with extremely high correlations.

2. The overall average level of factors affecting the learning styles of new students at Yulin Normal University is high. The results of the study take into account seven aspects: the highest ranking is "Auditory learning", followed by "Verbal learning", "Solitary Learning" was the lowest ranked. This study provides valuable insights into the factors influencing the learning styles of Yulin Normal University freshmen of different majors and genders. Students rated "auditory learning""the highest because in auditory learning, students are stimulating their senses through musical stimulation or sound, thus increasing the effect of memorizing knowledge in the process, which is more interesting compared to other learning; while students rated "solitary learning""the lowest evaluation, because loneliness itself is a relatively negative state, human beings have social nature, so in carrying out a variety of activities, including learning, all need social characteristics to meet their emotional needs, memorization of knowledge is the same reason.The results of this study are consistent with James Keefe's (1987) theory that learning styles are learner-specific cognitive, affective, and physiological behaviors that reflect how learners perceive external information and interact with the learning environment in order to respond to it in a relatively stable manner.

3.The overall relationship between growth mindset and learning style has a positive correlation at the high level with statistical significance level at .01. From the findings of the study, the impact scores of growth mindset showed a positive correlation with learning styles, i.e., the scores of growth mindset increased and the corresponding scores of learning styles also increased.

Hongzhen Fu (2019) found that the intervention of growth mindset can change the status quo of education and enable learners to reconceptualize themselves in the process of exploring knowledge, thus improving learning efficiency. This also confirms the mutual influence relationship between learning styles and growth mindset. A longitudinal tracking study of more than 300 samples found that at the secondary school level, the scores of growth mindset students gradually increase, while the scores of fixed mindset students gradually decrease (Huang, Aiyun, 2020). This is because learners seek and improve their learning styles, and therefore they are more efficient in their learning styles.

6. Recommendations

6.1 For Curriculum Content:Enhance the interactivity of the course and increase the activity of the course, which can be achieved by reforming the links in the course lectures, utilizing innovative educational technology to increase teacher-student interaction, stimulating students' interest, enhancing the formation of students' growth mindset, and helping students to determine their own learning style in the classroom, so as to enhance the learning effect.

6.2 For School Support:applying a growth mindset to improve the school's orientation, increasing financial support for the school, expanding the school's business, increasing the school's cooperation with enterprises or other social sectors, and expanding the school's influence. From the social external environment to help students to improve their understanding of learning styles, improve their ability to think in a growth mindset, and improve innovation.

6.3 For student motivation: (c) Improve the system of academic assessment of students and strengthen the training of educators. It is important to look not only at students' test scores, but also at their physical and mental development; students' learning styles and growth mindsets are also largely influenced by their own mentality. A good mindset can ensure that students' motivation to learn is maintained and their learning efficiency is improved.

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Research on Creative Communication Skills of School Administrators of the Universities in Guangxi

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Abstract

This research objective was to study the creative communication skills of school administrators of the universities in Guangxi in 4 areas as follows : 1) Fostering positive relationships, 2) Active listening , 3) Reflective thinking, 4) Encouragement. The population were 217 school administrators of the universities in Guangxi. By using systematic random sampling and sample randomsampling were also used by drawing from public universities.The research instrument was a 5 level rating scales questionnaire. The statistics used for the data analysis were percentage, mean, and standard deviation.The research result found that the creative communication skills of school administrators of the universities in Guangxi in overall at the high level($\bar{x}$ = 3.50). Reflective thinking($\bar{x}$ = 3.57) had the highest mean, follow by fostering positive relationships ($\bar{x}$ = 3.50), encouragement($\bar{x}$ =3.48)and the lowest mean was active listening ($\bar{x}$ = 3.43).

Keywords: active listening; creative communication skills; encouragement; fostering positive relationships; reflective thinking; school administrators; university

1. Introduction

The five development concepts of "innovation, coordination, green development, openness and sharing" proposed by the Fifth Plenary Session of the 18th CPC Central Committee have pointed out the direction for the modernization of the higher education system and governance capacity. These five concepts are important guiding ideas for university teaching management personnel to improve their creative communication skills. For example, "innovation" requires teaching management personnel to continuously explore new ideas for education and teaching reform; "coordination" emphasizes the effective coordination of all aspects in teaching management. The practice of these concepts will help improve the creative communication skills of school administrators, thereby promoting the improvement of the overall management level of universities. (Communist Party of China, 2015)

Findings from previous studies underscore three critical factors that emphasize the importance of sharing perspectives in creative communication within organizations: active listening, reflective thinking, and encouragement. These factors contribute to the construction of a high-quality organizational culture (Men & Yue, 2019). Fostering positive relationships by reducingconflict is another vital aspect in organizational dynamics (Tontrong et al., 2022). In educational institutions, creative communication skills are particularly effective in shaping relationships between school administrators and subordinates.

Recognizing the significance of creative communication skills, the Department of Education, Bangkok Metropolitan Administration (BMA), has developed a training program for school administrators. Standard professional qualifications are expected to yield effective solutions to problems, with creative communication playing a key role (Department of Education, BMA, 2021). Effective communication for school administrators is deemed critical for successful change management. Integrating positive communication into conversations fosters positive relationships and enhances engagement with subordinates, propelling the educational system forward in the global economy.

At present, the teaching management work in colleges and universities is inefficient, and the communication between various management links is not smooth or disconnected. This is directly related to the fact that school administrators cannot communicate with each other in time or lack communication skills. In other words, effective communication and exchange are needed between teaching management personnel.Communication, a pivotal aspect of human life, stands alongside physiological needs as essential for survival. While not directly tied to basic survival, communication becomes integral in the pursuit of physiological needs. In essence, it functions as a fundamental tool for humans to navigate and fulfill their survival requirements. Particularly in the realm of creative communication, where innovative thinking and open-mindedness play a crucial role, understanding the needs and perspectives of others is key to building human relationships. (Phaenpha, C., & Piatanom, P. (2024))

In general, the creative communication skills of university school administrators are an important part of their professional ability and are crucial to their daily work and long-term development. Facing the

challenges of the information age and the requirements of higher education reform, this paper conducts in-depth research on the creative communication skills of school administrators of the universities, aiming to provide a better guide for school administrators of the universities under the new situation. Through continuous learning, practice and innovation, and by constantly improving their communication skills, school administrators can not only solve problems encountered at work more effectively, but also play a greater role in promoting the comprehensive development of universities.

2. Research Objectives

This study aims to explore the current situation regarding thecreative communication skills of school administrators at universities in Guangxi.

3. Research Framework

Creative Communication Skills: refers to the ability to use innovative thinking and diverse expressions to effectively convey information, express ideas or solve problems in unique or unconventional ways. This skill includes flexibly adjusting communication strategies in different situations, using visual and multimedia tools, and storytelling to make communication more influential and resonant. Creative Communication Skills emphasizes breaking the routine in the communication process and coping with challenges in an innovative way, which is particularly suitable for occasions where communication is required in complex or multicultural environments.

1.Fostering Positive Relationships

2.Active Listening

3.Reflective Thinking

4.Encouragement

4. Research Methodology

Population

The population of this research were 500 school administrators from 3 public colleges and universities at undergraduate level in Guangxi.

The Sample Group

The sample group of this research were 217 school administrators from 3 public colleges and universities at undergraduate level in Guangxi. According to Krejcie and Morgan (1970) sampling table, and

by using stratified random sampling and simple random sampling was also used by drawing from public colleges and universities.

Table Lists of Universities and sample size

No	The name of university	Population	Sample group
University 1	Yulin Normal University	156	68
University 2	Guangxi Normal University	175	76
University 3	Nanning Normal University	169	73
	Total	500	217

The research instrument

The instrument to collect the data for objective was the questionnaire designed based on creative communication skills in 4 following aspects: 1) Fostering Positive Relationships, 2) Active Listening, 3) Reflective Thinking, 4) Encouragement. The questionnaire was provided into two parts:

Part 1: Survey about personal information of sample, classified by gender, working experience and professional rank.

Part 2: Survey about the current situation of creative communication skills of school administrators of Universities in Guangxi. The criteria for data interpretation based on five-point Likert's scale, as follow;

5 express the level of creative communication skills at highest level

4 express the level of creative communication skills at high level

3 express the level of creative communication skills at medium level

2 express the level of creative communication skills at low level

1 express the level of creative communication skills at lowest level

The process of constructing the Instrument

The construction process of questionnaire were as follows:

Step 1: Reviewing and analyzing documents, concepts, theories, and researches related to creative communication skills of school administrators of Universities.

Step 2: Constructing the questionnaire about the current situation of creative communication skills of school administrators of the universities in Guangxi. Then sending the questionnaire outline of questionnaire to the thesis advisors to review and revise the contents according to the suggestions.

Step 3: The survey was conducted by 3 experts to check the accuracy and content accuracy of each question to find the IOC, Index of Objective Congruence. By considering the questionnaire with an IOC value of 1.00.

Step 4: Revise the questionnaire based on the experts' suggestions.

Step 5: The questionnaire was distributed to 30 administrators in Universities in Guangxi for try-out, the reliability of the questionnaire by calculating a confidence value equal to 0.927.

Step 6: The questionnaire was applied to 217 school administrators from 3 public colleges and universities at undergraduate level in Guangxi.

Data Collection

To achieve the research objectives, the researcher collected the required data according to the type and steps of the research instruments as follows procedures:

Step 1: The researcher requested requirement letter form the graduate school, Bansomdejchaopraya Rajabhat University for requiring to collect the data from 217 school administrators from 3 public colleges and universities at undergraduate level in Guangxi.

Step 2: The researcher distributed the questionnaire to 217 school administrators and returned questionnaires.

Statistics used in data analysis

After data collection, the researcher statistic and analyze data according to objective as follow;

Step 1: The personal information of the sample were analyzed by frequency and percentage, classified by gender, working experience and professional rank..

Step 2: The current situation of creative communication skills of school administrators of the universities in Guangxi in four following aspects: 1) Fostering Positive Relationships, 2) Active Listening, 3) Reflective Thinking, 4) Encouragement were analyzed by mean and standard deviation. And criteria of mean as follow;

> 4.50 – 5.00 expressed highest level
>
> 3.50 – 4.49 expressed high level
>
> 2.50 – 3.49 expressed medium level
>
> 1.50 – 2.49 expressed low level
>
> 1.00 – 1.49 expressed lowest level

5. Research Results and Discussion

Result

An analysis of information about creative communication skills of school administrators of the universities in Guangxi is presented in terms of average and standard deviation.

Table 1 The mean and standard deviation of creative communication skills of school administrators of the universities in Guangxi, in 4 aspects.

Aspects of creative communication skills		$\bar{x}$	S.D.	Level	Order
1	Fostering Positive Relationships	3.50	0.77	high	2
2	Active Listening	3.43	0.91	medium	4
3	Reflective Thinking	3.57	0.85	high	1
4	Encouragement	3.48	0.96	medium	3
	Total	3.50	0.87	high	

From Table 1, it was found that creative communication skills of school administrators of the universities in Guangxi in overall at the high level ($\bar{x}$=3.50). Among the four aspects, it was the highest mean of reflective thinking ($\bar{x}$=3.57), follow by fostering positive relationships ($\bar{x}$=3.50),encouragement ($\bar{x}$=3.48) and the lowest mean was active listening ($\bar{x}$=3.43).

Conclusion and Discussion

Summary of research results

The research found that creative communication skills of school administrators of the universities in Guangxi in overall at the high level ($\bar{x}$=3.50). Among the four aspects , it was the highest mean of reflective thinking, follow by fostering positive relationships, encouragement and the lowest mean was active listening.

 The details of the research results in each aspect as follows.

Fostering positive relationships of creative communication skills of school administrators of the universities in Guangxi. Fostering positive relationships was high. The report found that school administrators recognize and appreciate the efforts and achievements of both students and staff, followed by the following : The school administrators maintain open communication channels to promote transparency and trust within the school community. The school administrators actively listen to staff, students, and parents, ensuring all voices are heard, with the lowest mean.

Active listening of creative communication skills of school administrators of the universities in Guangxi. Active listening is medium. Considering the report, the school administrators have the highest average of create a safe space where staff, students, and parents feel comfortable expressing their thoughts and emotions, followed by: School administrators avoid interrupting staff, students, or parents when they are speaking, while school administrators focus fully on speakers, avoiding distractions during conversations with the lowest mean.

Reflective thinking of creative communication skills of school administrators of the universities in Guangxi. Reflective thinking is the high. Considering that school administrators encourage reflective thinking

within the school community, promoting a culture of continuous improvement, the following are: The school administrator consider alternative approaches or perspectives when reflecting on past experiences. As for school administrators, regularly review and reflect on their past actions and decisions to identify areas for improvement, with the lowest mean.

Encouragement of creative communication skills of school administrators of the universities in Guangxi at the medium level. Considering the report, it was found that school administrators promote a positive mindset by focusing on strengths and progress rather than failures. In addition, the school administrators use encouraging words and actions to inspire others to overcome challenges. In addition, the school administrations provide positive feedback to staff and students to acknowledge their efforts and achievements with the lowest mean.

Discussion

The research found that the creative communication skills of school administrators of the universities in Guangxi. Overall, it was the highest level of reflective thinking. The second mean is fostering positive relationships, and the lowest mean was active listening. Effective communication is critical in educational leadership because it ensures that administrators can convey their vision, motivate staff, and foster an inclusive environment for learning. Han Chuanjiang (2009) emphasizes that effective communication is integral to the efficient functioning of higher education institutions, as it directly influences decision-making, conflict resolution, and the alignment of institutional goals with staff and student needs. In the context of Guangxi universities, this overall high level of communication skill suggests that the administrators are generally effective in navigating complex academic and administrative challenges, ensuring that they foster a collaborative work environment. However, while the overall score indicates high performance, it is essential to delve deeper into the individual components of creative communication to understand how specific skills are developed and utilized by administrators. Reflective thinking stands out as a major strength, while other areas, such as active listening and encouragement, provide opportunities for further development. Each of these components plays a crucial role in determining the effectiveness of an educational leader's communication strategies, and understanding their performance in each area is essential for future improvements. Considering each aspect, the results appear as follows.

The overall Fostering positive relationships was the high, as school administrators had the process of school administrators in Guangxi universities perform well in establishing positive relationships with teachers, students, and other staff. An important aspect of educational leadership is to create and maintain a positive work environment, and the foundation of this environment is a good relationship between school administrators and their team members. Goleman's (1995) emotional intelligence theory points out that a core element of emotional intelligence is the ability of school administrators to handle interpersonal relationships, which directly affects teamwork, trust, and overall work efficiency.Establishing positive relationships with teachers and students not only helps to improve job satisfaction, but also promotes

better communication and understanding. Especially in a university environment, school administrators need to be able to maintain good communication with academic staff and administrative staff to ensure the smooth implementation of educational goals. In addition, research shows that the quality of the relationship between leaders and team members directly affects the health of the work environment. When leaders are able to interact effectively with their team members, team members tend to show higher levels of engagement and work enthusiasm (Mayer et al., 2008). Among school administrators in Guangxi universities, high scores indicate that they have the ability to handle these relationships, which not only helps teamwork but also reduces conflicts and misunderstandings. However, despite the high score on this variable, there is still room for further improvement. As the educational environment continues to change, school administrators need to continuously improve their communication skills to cope with diverse challenges. For example, with the increasing popularity of online education and remote work models, school administrators need to learn how to maintain positive relationships with teachers and students through virtual platforms. This puts new demands on communication skills, especially in terms of emotional expression and non-verbal communication. Kouzes and Posner (2002) pointed out that leaders must have the ability to go beyond traditional face-to-face interactions and be able to establish and maintain high-quality interpersonal relationships through technological means. This shows that although school administrators of Universities in Guangxi perform well in promoting positive relationships, they still need to continue to develop and improve under new forms of communication.Promoting positive relationships is one of the areas where school administrators of Universities in Guangxi perform more prominently in their communication skills. This ability not only helps to create a positive work environment, but also promotes teamwork and the overall efficiency of school management. By continuously learning and adapting to emerging communication methods, school administrators can further improve this skill to ensure their continued success in a complex and changing educational environment.

Active listening is the medium level. This is because school administrators often get good feedback from listening so that they can make better decisions. Although school administrators performed well in active listening, there is still obvious room for improvement compared with other communication skills. Active listening is the cornerstone of effective communication. It is not only a process of receiving information, but also a key link in understanding and responding to the feelings of the other party. Through active listening, school administrators can better understand the needs and concerns of team members, so as to make more targeted adjustments in the decision-making process.In university management, school administrators' listening ability is crucial to building and maintaining trust relationships. University teachers often have high autonomy and independent thinking ability. School administrators need to understand teachers' academic needs and career development goals through listening and provide them with corresponding support. When teachers feel that their opinions are valued, their job satisfaction and sense of identity with the school will be significantly improved. However, if school administrators ignore the

importance of listening, teachers and other employees may feel ignored, resulting in decreased morale and work efficiency (Whitney, 2013).In addition, active listening is equally important in student management. School administrators need to understand students' learning experiences and life needs by listening to their opinions and feedback. Especially in universities with increasing multiculturalism and internationalization, school administrators must have the ability to listen to the voices of students from different backgrounds. Kim and Lee (2009) found that school administrators' listening skills are directly related to student satisfaction. The more school administrators can listen and respond to students' needs, the higher the students' identification and loyalty to the school.Although school administrators in Guangxi universities performed moderately in active listening, the results show that there is still a need to strengthen this skill. Effective listening includes not only understanding what the other party said, but also demonstrating one's understanding through feedback and actions. To improve this skill, school administrators can learn how to show stronger empathy and concern in communication by participating in specialized communication skills training. Active listening plays a vital role in university management. Although school administrators in Guangxi performed well in this regard, further improving this skill will help them achieve greater success in school management. By strengthening their listening skills, administrators can better meet the needs of teachers and students, thereby promoting the overall educational quality and management efficiency of the school.

Reflective thinking is the high. This may be because school administrators in Guangxi universities often reflect on themselves in their daily work and adjust their management strategies through this reflection. Reflective thinking is of great significance in educational management. It can help school administrators identify the causes of success and failure by reviewing past experiences and make more effective decisions accordingly. Especially for leaders, reflective thinking is a key ability to continuously improve self-and organizational performance.In educational management, the role of reflective thinking is reflected in many aspects. First, reflection helps school administrators evaluate their leadership style and decision-making process, identify the advantages and disadvantages, and make corresponding adjustments in future management. For example, when school administrators find that certain decisions fail to achieve the expected results, reflection can help them find the root cause of the problem and adopt a more appropriate strategy for the next decision. Schon's (1983) "reflective practice" theory further pointed out that reflection is not just a simple review of past experience, but also a dynamic learning process. Through reflection, school administrators can constantly adjust their actions to adapt to changing environments and needs.In addition, reflective thinking can also promote the joint learning of the team. In the university environment, school administrators not only need to conduct personal reflection, but also encourage teachers and students to conduct collective reflection. This collective reflection can promote communication and collaboration among team members and enhance their innovation and problem-solving abilities. Leithwood et al. (2008) showed that reflective leadership can stimulate the creativity and

self-management ability of the team, thereby promoting the overall development of the school.Although school administrators of Guangxi universities have performed well in reflective thinking, there is still room for further development. With the increasing complexity of the educational environment, school administrators need to reflect on a broader level, especially in how to deal with technological changes, social and cultural changes, and educational policy adjustments. Senge (1990) proposed that leaders in learning organizations should have the ability of systematic thinking, which can help school administrators reflect from a global perspective and identify and solve deep-seated problems in the organization. Reflective thinking is a strength of school administrators of Universities in Guangxi, which helps them continuously improve their own and their schools' management efficiency in their work. By further developing this skill, administrators can remain flexible and adaptable in a rapidly changing educational environment, ensuring the continued success and progress of their schools.

Encouragement is the medium. This may be due to school administrators can help teachers and students overcome difficulties in their work and enhance their sense of belonging and identity with the school by encouraging them.Although school administrators have made some efforts in encouragement, there is still room for improvement. Herzberg's two-factor theory (1959) pointed out that motivational factors in work have an important impact on employee satisfaction and work performance, and encouragement, as a non-material incentive, can effectively improve employees' work enthusiasm and commitment. In an educational environment, encouragement is particularly important. Teachers' work is not only academic, but also full of emotional challenges. They need to maintain a positive attitude in busy teaching tasks and constantly improve their teaching ability. Through encouragement, school administrators can help teachers build confidence and provide necessary support to improve their teaching quality. Patterson's (2003) research shows that encouragement can significantly improve employees' innovation and problem-solving abilities, especially when faced with complex educational tasks. Teachers often show higher autonomy and creativity after being encouraged.In addition, student encouragement is also an important part of university management. Students are the core group of the school, and their learning motivation and academic performance directly affect the overall performance of the school. By encouraging students to participate in various activities in the school, school administrators can enhance their sense of self-efficacy and social responsibility. Bandura's (1977) self-efficacy theory points out that when individuals feel that they are competent for a task, their participation and persistence will be significantly improved. Therefore, school administrators should focus on encouragement and praise in student management to help students overcome difficulties in learning and stimulate their potential.Although school administrators in Guangxi universities perform moderately in encouragement, data show that this skill still needs to be further improved. School administrators should use encouragement as a management tool more frequently, especially when facing challenges from teachers and students. Through regular praise and motivation, school administrators can effectively improve teachers' job satisfaction and students' academic

achievement. Encouragement is not just verbal praise, but should also include practical actions, such as providing more professional development opportunities for teachers and creating more academic support channels for students.Encouragement plays an important role in university management. Although school administrators in Guangxi universities perform well in this regard, further development will help improve the overall performance of the school. Through more systematic and frequent encouragement, administrators can better inspire the potential of teachers and students and promote the continuous improvement and development of the school.

6. Recommendations

Implications

From the research results, it was found that Creative Communication Skills of School administrators of the universities in Guangxi has the following suggestions.

1. As for fostering positive relationships, school administrators should continue to engage in regular self-reflection and share their insights with their teams. This can be enhanced by incorporating reflective practice sessions into professional development programs, which encourage administrators to evaluate past decisions and strategies, and adjust their approaches accordingly. By doing so, they can maintain their high performance and adapt to the evolving educational landscape.

2. In terms of active listening, school administrators should explore new communication modalities to maintain these relationships, especially in the context of remote work and online education. They should consider implementing virtual team-building activities and utilize digital platforms to foster interaction and collaboration. This will help bridge the gap created by physical distance and ensure that positive relationships are sustained.

3. In terms of reflective thinking, school administrators should undergo targeted training to enhance their listening skills. This could include workshops on empathetic communication and feedback techniques, which are essential for understanding and addressing the needs of both staff and students. By improving active listening, administrators can build stronger trust and rapport, leading to more effective decision-making and conflict resolution.

4. In terms of encouragement, school administrators should actively seek opportunities to provide constructive feedback and recognition to their staff and students. They can develop structured programs that promote a positive and supportive culture, such as regular appreciation sessions and incentive systems that reward effort and improvement. By integrating encouragement into their management style, administrators can boost morale and motivation, ultimately contributing to a more engaged and high-performing educational community.

Future Researches

1. The creative communication skills of school administrators should be further studied from the perspectives of various stakeholders, including faculty members, administrative staff, and students, to gain a more comprehensive understanding of how these skills impact the overall academic environment.

2. Future research should focus on identifying the challenges and barriers that school administrators face in applying creative communication skills in different educational contexts, with the aim of developing targeted strategies to improve communication and leadership effectiveness in universities.

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Research on Improving the Collaboration in Educational Management of Teachers in Chongqing Private University

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Abstract

This research objective was to study the collaboration in educational management of teachers in Chongqing Private University in 3 areas as follows : 1) Willingness to collaborate, 2) Common purpose , 3) Communication of information. The sample group of this research were 367 administrators and teachers from the private universities in Chongqing. The research instrument was a 5 level rating scales questionnaire. The statistics used for the data analysis were percentage, mean, and standard deviation.

The research result found that the collaboration in educational management of teachers in Chongqing Private University in overall at the high level. In terms of willingness to collaborate had the highest mean, follow by common purpose, and the lowest mean was communication of information.

Keywords : private university; the collaboration in educational management

1. Introduction

In China's Education Modernization 2035 released by the Chinese government in 2019, it is clearly proposed to promote the modernization of the education governance system and governance capacity, which specifically mentions encouraging private schools to carry out reform and innovation of the modern school system in accordance with the two organizational attributes of non-profit and for-profit. In 2022 at the 20th National Congress of the Communist Party of China (CPC), General Secretary Xi Jinping emphasized requirements in higher education such as scientific and technological innovation and talent cultivation, put forward guidance and standardization of the development of private education for private schools, and put forward requirements in the field of education such as deepening comprehensive reforms and improving the system of school management and education evaluation.

The transformation of private colleges and universities to connotative and high-quality development in the stage of popularization of Chinese higher education is of great significance for private colleges and universities to take the road of connotative, characteristic, high-end and sustainable development. The high-quality development of private colleges and universities puts forward more profound requirements on the quality and effectiveness of school management. Therefore, private colleges and universities as a formal organization, the organization must maintain the stability and continuity of the writing collaboration system in order to ensure the effectiveness and efficiency of the organization. To this end, Barnard proposes the theory of collaborative systems to support individuals to establish collaborative relationships with others, in order to meet the basic conditions for the establishment of the organization as a collaborative system; at the same time, it proposes the theory of organizational equilibrium within the organization, in order to provide a guarantee that the organization can be a long-term healthy existence of the constituent elements.

Barnard points out that the essence of an organization is a collaborative system, and that the formal organizational entities of everyday life, such as government agencies, the military, businesses, schools, hospitals, etc., are writing systems composed of material, technological, human, and social relationships, among other aspects or parts. He believes that organizations are systems constituted by human activities or effectiveness i.e. human behavior and what is being explored is not the form of the organization but the substance of the organization, i.e. human behavior. Organizations are therefore systems of interaction between people, i.e. collaborative systems.

However, in private colleges and universities, due to the imperfect collaboration system, there are often contradictions and misunderstandings between managers and teacher groups in teaching management, which affects the efficiency of collaboration in the organization of private colleges and universities. Therefore, there is a need to study the collaborative relationship between administrators and teachers and continuously improve the collaborative relationship to make a guide for the effective operation of college organizations.

2. Research Objectives

To study the collaboration in educational management of teachers in Chongqing Private University.

3. Research Framework

The management system

1. Willingness to collaborate

2. Common purpose

3. Communication of information

4. Research Methodology

4.1 Population and Sample Group

The research population were 8501 teachers from 8 private universities in Chongqing.

The sample group of this research were 367 administrators and teachers from the private universities in Chongqing. According to Krejcie and Morgan sampling table, and by using stratified random sampling and sample random sampling was also used by drawing from 8 private universities.

Table Lists of university and sample size

No	The name of university	Population	Sample group
University 1	Chongqing Institute of Technology	1600	65
University 2	Chongqing University of Science and Technology	1500	60
University 3	Chongqing University of Humanities and Technology	1300	56
University 4	Chongqing University of Foreign Languages	900	35
University 5	Chongqing Institute of International Trade and Economics	801	35
University 6	Chongqing University of Finance and Economics	900	39
University 7	Pais College of Chongqing Technology and Business University	700	30
University 8	Chongqing Mobile University	1100	47
	Total	8501	367

4.2 The research instrument

The instrument for data collection of this research was a questionnaire for teachers from the private universities in Chongqing, which includes three aspects were Willingness to collaborate, Common purpose, Communication of information.

Step 1 Survey about personal information of sample, classified by gender, working experience and professional rank.

Step 2 Survey about the current situation of the collaboration in educational management of administrators and teachers in Chongqing Private University. The criteria for data interpretation based on five-point Likert's scale, as follow;

Level   5   means have the highest level.

Level   4   means have high level.

Level   3   means have moderate level.

Level   2   means have low level.

Level   1   means have the lowest level.

4.3 The process of constructing the Instrument

The instrument used in this research was a questionnaire. The researchers created the following steps.

Step 1: Reviewing and analyzing documents, concepts, theories, and researches related to the collaboration in educational management of teachers in Chongqing Private University.

Step 2: Constructing the questionnaire about the current situation of the collaboration of teachers in educational management in Chongqing Private University. Then sending the questionnaire outline of questionnaire to the thesis advisors to review and revise the contents according to the suggestions.

Step 3: The index of objective congruence (IOC) of the questionnaire was examined by three experts. The index of objective congruence (IOC)

Step 4: Revise the questionnaire based on the experts' suggestions.

Step 5: The questionnaire was distributed to 30 teachers in Chongqing private university for try-out. The reliability of the questionnaire was obtained by Conbach's Alpha Coefficient.

Step 6: The questionnaire was applied to 367 teachers from the private universities in Chongqing.

4.4 Data Collection

To achieve the research objectives, the researcher collected the required data according to the type and steps of the research instruments as follows procedures:

Step 1: The researcher requested requirement letter form the graduate school, Bansomdejchaopraya Rajabhat University for requiring to collect the data from 367 teachers from the private universities in Chongqing.

Step 2: The researcher distributed the questionnaire to 367 teachers, then returned questionnaires.

4.5 Statistics used in data analysis

Information obtained from the collaboration in educational management of teachers in Chongqing Private University. The researchers analyzed the data using program as follows.

4.5.1. Analysis of respondents' status includes: Gender, graduation, work experience using frequency distribution and percentage.

4.5.2. Analysis of the collaboration in educational management of teachers in Chongqing Private University in 3 aspects as follows 1) Willingness to collaborate, 2) Common purpose, 3) Communication of information. The criteria for interpretation of the mean are as follows (Boonchom Sri Sa-at. 2003, No.103).

4.50 – 5.00   means have the highest level.

3.50 – 4.49   means have high level.

2.50 – 3.49   means have moderate level.

1.50 – 2.49   means have low level.

1.00 – 1.49   means have the lowest level.

5. Research Result

An analysis of information about the collaboration in educational management of teachers in Chongqing Private University is presented in terms of average and standard deviation.

Table 1 shows the mean and standard deviation of the collaboration in educational management of teachers in Chongqing Private University, in 3 aspects.

	the collaboration in educational management of teachers in Chongqing Private University	$\bar{\mathbf{X}}$	Sd.	Level	Order
1	Willingness to collaborate	4.13	0.98	high	1
2	Common purpose	3.74	1.17	high	2
3	Communication of information	3.55	1.17	high	3
	Total	3.81	1.11	high	

From Table 1, it was found that the collaboration in educational management of teachers in Chongqing Private University in overall at the high level ($\bar{\mathbf{X}}$=3.81). Consider by each aspect , it was the high mean of willingness to collaborate ($\bar{\mathbf{X}}$=4.13), follow by common purpose ($\bar{\mathbf{X}}$=3.74) and the lowest mean was communication of information ($\bar{\mathbf{X}}$=3.55)

6. Research Conclusion and Discussion

6.1 Summary of research results

The research found that the collaboration in educational management of teachers in Chongqing Private University in overall at the high level. Considered by each aspect , it was the highest mean of the collaboration, follow by common purpose and the lowest mean was communication of information.

The details of the research results in each aspect as follows.

Willingness to collaborate in educational management of teachers in Chongqing Private University. Willingness to collaborate was the high. According to the survey respondents generally showed a strong willingness to collaborate. The standard deviation is relatively small, indicating that the majority of respondents are more consistent in their willingness to collaborate, and there is no significant differentiation. This reflects that there may be a better collaborative atmosphere and team spirit among members within the organization, which is essential for the stability and development of the organization.

Common purpose in educational management of teachers in Chongqing Private University. Common purpose was the high. According to the survey The majority of respondents have some knowledge of and agreement with the organization's common goal, but there may still be some ambiguity or uncertainty. The organization needs to strengthen the promotion and explanation of the common goal to ensure that every member clearly understands and agrees with it. By enhancing the clarity and actionability of the common goal, the organization's cohesion and sense of direction can be further enhanced.

Communication of information in educational management of teachers in Chongqing Private University. Communication of information was the high. The organization is close to the lower limit of the interval in terms of information exchange and communication, although at a high level. This indicates that there may be some deficiencies in information linkage, such as untimely information transmission, distorted information or poor communication channels. In order to improve the level of information linkage in the organization, it is necessary to establish a more efficient and transparent information transfer mechanism, strengthen internal communication, and ensure the accurate transfer of information and timely feedback.

6.2 Discussion

The research found that the collaboration in educational management of teachers in Chongqing Private University in overall at the high level. it was the highest level of terms of willingness to collaborate. The second mean is common purpose, and the lowest mean was communication of information.

Teachers generally felt that there was a strong collaborative atmosphere within the organization and that departments and teachers were able to collaborate positively with each other. However, some administrators felt that the willingness to collaborate was not sufficiently stimulated, and that there was miscommunication and resistance to collaboration. Therefore, the following points should be emphasized in this regard: 1.Importance of communication mechanism: Barnard's social systems theory emphasizes that

willingness to collaborate is the basis of organizational effectiveness. Therefore, it is crucial to strengthen communication between administrators and teachers. Through regular meetings and the establishment of feedback mechanisms, it is important to ensure that both parties are able to engage in in-depth exchanges on collaboration issues and work together to find solutions. 2.Enhance teacher participation: In order to stimulate teachers' willingness to collaborate, schools should provide more opportunities and resources for collaboration so that teachers can feel their value and importance in collaboration. At the same time, teachers should be incentivized to participate more actively in collaboration by recognizing and rewarding collaborative achievements. 3.Create a culture of collaboration: Schools should work to create a culture that encourages collaboration and respects diversity. By organizing team-building activities and training, teachers can enhance trust and cohesion among themselves, thereby promoting a willingness to collaborate.

There were also significant differences between administrators and teachers regarding common goals. Administrators believed that common goals were essential to organizational development and were widely shared by teachers. However, some teachers reported that they did not have a deep enough understanding of the common goals and even had doubts and confusion. Therefore, the following points should be emphasized in this regard: 1.Clarifying Goal Consensus: Barnard's Social Systems Theory identifies shared goals as the driving force behind organizational collaboration. Therefore, schools should ensure that all teachers have a clear understanding and appreciation of common goals. By organizing seminars and goal presentations, teachers can be helped to clarify the meaning and value of common goals, thus enhancing their sense of belonging and responsibility. 2.Refinement of goal decomposition: In order to ensure the feasibility of the common goal, schools should decompose the goal into more specific and actionable sub-goals. By setting milestones and assessment criteria, teachers can clearly see their contributions and achievements in realizing the common goals. 3.Establishing a feedback mechanism: Schools should establish a feedback mechanism on the implementation of the goals, and collect and analyze teachers' opinions and suggestions on a regular basis. By making timely adjustments to goals and strategies, it is ensured that the realization of the common goals is consistent with teachers' expectations and needs.

Differences between administrators and teachers were equally significant with regard to information linkages. Administrators believe that the information transfer mechanism within the organization is sound and ensures timely transfer and sharing of information. However, some teachers reported difficulties in accessing information, such as untimely transmission of information and distortion of information. Therefore, the following points should be emphasized in this regard: 1.Optimizing the information transfer mechanism: Barnard's social systems theory emphasizes that information linkage is the basis of organizational collaboration. Therefore, schools should optimize the existing information transfer mechanism to ensure timely and accurate information transfer. The efficiency and quality of information transfer can be improved by adopting modern communication tools and establishing an information sharing

platform. 2.Enhancing information transparency: To ensure information transparency, schools should establish an information disclosure system and release relevant information and developments on a regular basis. By letting teachers know about the organization's decision-making process, project progress, etc., their sense of trust and belonging is enhanced. 3.Cultivating information awareness: Schools should strengthen the cultivation of information awareness among teachers, so that they can realize the importance of information for personal growth and organizational development. By providing training and learning opportunities, teachers should be helped to improve their ability to acquire, analyze and utilize information.

7. Recommendations

From the research results, it was found that academic management of Anubanchumphon School under the Office of Chumphon Primary Educational Service Area 1 has the following suggestions

7.1 In terms of willingness to collaborate, the following recommendations are made

7.1.1 Enhancing willingness to collaborate among teachers

First of all, establishing an exchange platform for teachers: Encourage exchanges and sharing among teachers, and promote cooperation and learning among teachers by organizing activities such as teaching seminars and experience exchange meetings. Secondly implement teamwork teaching mode: Promote teamwork teaching mode, such as collective lesson planning and co-design of teaching programs, to enhance the willingness to collaborate and team spirit among teachers. Third setting up a reward mechanism for collaboration: recognizing and rewarding outstanding teacher teams or individuals to motivate teachers to actively participate in collaboration.

7.1.2 Enhance the willingness of management and teachers to collaborate

First of all, establish a two-way communication mechanism: management should actively listen to teachers' opinions and suggestions, and teachers should actively feedback teaching and management problems, so that both sides can work together to improve the efficiency of collaboration. Secondly implement participatory management: Encourage teachers to participate in the management and decision-making process of the school, such as through the staff council, to enhance their sense of belonging and willingness to collaborate.

7.1.3 Strengthening the willingness to collaborate between the school, the community and parents

First of all, carrying out home-school cooperation activities: organizing regular parent-teacher conferences and home-school interaction days to enhance parents' understanding of and trust in the school and to promote home-school cooperation. Secondly, establishing cooperative relationships with the community: making use of community resources, such as libraries and cultural centers, to carry out off-site educational activities and strengthen ties and collaboration with the community.

7.2 In terms of common goals, the following are suggested

7.2.1 Clarify school development goals

First of all, formulate a clear development plan: Schools should formulate long-term and short-term development plans based on their actual situation, with clear development goals. Secondly Publicize school development goals: Through various channels, such as the school newspaper, website and parent-teacher conferences, publicize the school's development goals to teachers, students, parents and the community to form a consensus.

7.2.2 Establish common teaching goals

First of all, setting up uniform teaching standards: Uniform teaching standards and requirements should be set for each grade and subject to ensure the stability and consistency of teaching quality. Secondly, promote the target teaching method: Teachers are encouraged to adopt the target teaching method, clarify the teaching objectives of each lesson and the learning objectives of students, and promote the realization of the teaching objectives.

7.2.3 Promote the common development of teachers and students

First of all, focus on students' overall development: Schools should pay attention to students' overall development, not only in terms of academic performance, but also in terms of mental health and career planning. Secondly establishment of teacher-student joint growth programs: Through the establishment of mentorships and student clubs, schools should promote communication and cooperation between teachers and students to achieve joint growth.

7.3 In terms of information linkages, the following recommendations are made

7.3.1 Enhance the flow of information within the campus

First of all, establish an information management system: introduce or upgrade the campus information management system to informatize teaching, management and services and improve work efficiency. Secondly, promote electronic office: Encourage teachers and administrators to use electronic office methods such as e-mail and instant messaging tools to enhance information exchange and collaboration.

7.3.2 Promote home-school information communication

First of all, establishing home-school communication platforms: Utilizing social media platforms such as Wechat Group and QQ Group to establish home-school communication channels to deliver school information and parental feedback in a timely manner. Secondly, regularly publish school news: Through the school newspaper, website and other channels, regularly publish school news and teaching achievements to enhance parents' understanding of and trust in the school.

7.3.3 Strengthening information links with the community

First of all, establish an information exchange mechanism with the community: Establish a regular information exchange mechanism with the community to understand the community's needs and resources, and jointly carry out off-site educational activities. Secondly, make use of social resources for information sharing: Make use of social resources such as libraries and cultural centers to carry out information sharing activities and enhance the visibility and influence of the school.

8. Future Researches

Compare and contrast the differences in organizational cooperativeness between domestic and foreign private schools, analyze the formation mechanisms and influencing factors of school organizational cooperativeness in different cultural contexts, and provide international perspectives and lessons for enhancing the organizational cooperativeness of private schools in China.

Representative private schools are selected as research samples to implement the enhancement strategies suggested above, and the implementation effects of the strategies are regularly tracked and evaluated, including changes in teacher and student satisfaction, teaching quality, and management efficiency. Evaluating the effectiveness of strategies for improving organizational cooperativeness in private schools

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(106-EN-EDU)

Developing the English Speaking Skills of Grade 10 Students at Samut Sakhon Wittayalai School Using the GPAS 5 Steps Process

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Abstract

This research aimed to: 1) To compare speaking skills before and after learning through the GPAS 5 Steps learning process, and 2) study the satisfaction of these students with the GPAS 5 Steps learning process. The sample group consisted of 42 students from class 10/6 of Samut Sakhon Wittayalai School, located in Mueang Samut Sakhon District, Samut Sakhon Province, during the second semester of the 2022 academic year, selected by purposive sampling.

The research instruments included: 1) six lesson plans for teaching English-speaking skills using the GPAS 5 Steps, each plan lasting 50 minutes, 2) a 20-item pre-test and post-test to assess English-speaking achievement, 3) a role-play assessment for English-speaking skills before and after the lessons, and 4) a satisfaction questionnaire on the GPAS 5 Steps learning process. The statistical methods used for data analysis were: 1) percentage, 2) mean 3) standard deviation (S.D.), 4) content validity of the questionnaire using the Index of Item-Objective Congruence (IOC), and 5) hypothesis testing using a t-test for comparing achievement scores.

The research results can be summarized as follows: The English-speaking achievement of the 10th-grade students at Samut Sakhon Wittayalai School who participated in the GPAS 5 Steps learning process significantly improved after the lessons at the 0.05 level. Students spoke English more fluently than before, and their satisfaction with the GPAS 5 Steps learning process was rated at a very high level.

Keywords: English speaking; GPAS 5 Steps process

1. Introduction

Thailand's education system in the era of Thailand 4.0 incorporates several important concepts. Dr. Teerakiat Jareonsettasin (2016), in his special lecture on "Education Reform & Entrance 4.0," emphasized that education in Thailand 4.0 involves more than preparing or educating people. It is about developing people into human beings who not only acquire knowledge but also have a love for learning, moral values, and the ability to coexist with others. This means creating people with 21st-century skills, particularly critical thinking skills. At the same time, Thailand 4.0 aims to modernize the country, increase income, and escape the middle-income trap by relying on innovations as a foundation for national development and fostering international trade and communication.

Speaking skills are especially important in second language learning, as learners need to develop the ability to communicate effectively. Despite its importance, English speaking instruction in the classroom has often been neglected, with teachers relying on memorization and repetition of dialogues. In today's world, however, the goal of teaching English speaking skills is to equip students with effective communication abilities. Only through this approach can students demonstrate their listening and speaking abilities in English while learning to follow the social and cultural norms of native speakers in each communication context. Therefore, in teaching English speaking skills to learners in an EFL (English as a Foreign Language) context, speaking activities play a crucial role in helping teachers confidently manage language instruction in the classroom, along with providing recommendations for teachers who instruct in English speaking (Prayong Klannerit, 2021).

From the teaching of English listening and speaking in the second semester of the 2022 academic year for Grade 10 students, the researcher found that students performed moderately well in exams. However, in oral assessments with teachers, students displayed only satisfactory communication abilities and were often hesitant to converse with native English-speaking teachers due to concerns over pronunciation and grammar, which diminished their confidence. Upon surveying students' satisfaction with their English listening and speaking classes, feedback indicated a need for teachers to improve the instructional approach by diversifying activities and reducing lecture-based methods. Although the use of technology in lessons was somewhat unstable, students reported a lack of interest in teacher-centered, lecture-heavy instruction. These findings suggest that the issues in English listening and speaking classes stem partially from teachers and partially from the students themselves.

The GPAS 5 Steps—Goal setting, Planning, Acting, Showing, and Reflecting—is highly suitable for developing English-speaking skills as it aligns with theoretical frameworks in language acquisition and self-regulated learning. Rooted in Zimmerman's (2002) self-regulation theory, this structured approach empowers learners to set specific speaking goals, plan their practice, and reflect on performance, fostering autonomy and metacognitive awareness. According to Nation and Newton (2009), goal-oriented and task-based learning facilitates communicative fluency by providing meaningful contexts for language use.

Furthermore, research supports the efficacy of such frameworks. Suwandi et al. (2021) found that reflective cycles improve learners' self-evaluation and speaking accuracy. Similarly, a study by Nguyen and Nguyen (2020) demonstrated that structured speaking tasks improve fluency and reduce anxiety. Finally, Rahimi and Katal (2012) highlighted that self-regulation strategies significantly enhance speaking proficiency by increasing learners' confidence and reducing speech hesitation. Together, these findings affirm that the GPAS 5 Steps provides a holistic and evidence-based strategy for fostering English-speaking skills.

Given these circumstances, the researcher aims to improve students' English speaking skills in Grade 10 by implementing the GPAS 5 Steps learning process. The GPAS 5 Steps is a structured thinking process focused on guiding students to construct knowledge independently through data collection and selection of relevant information, organizing data into groups and categories, and classifying it to obtain the desired knowledge. Students then apply this knowledge in real-world situations to solve problems. The conclusions derived from this process become ingrained in the students' character and personality, leading to self-directed learning over time. Teachers continuously stimulate students' thinking at each step by using questions, thus enabling students to develop better speaking, communication, and response skills.

2. Research Objectives

1. To compare the English-speaking achievement of Grade 10 students at Samut Sakhon Wittayalai School before and after learning through the GPAS 5 Steps.

2. To examine the satisfaction of Grade 10 students at Samut Sakhon Wittayalai School with the GPAS 5 Steps learning process.

3. Research Hypothesis

The English-speaking achievement of Grade 10/6 students at Samut Sakhon Wittayalai School who learn through the GPAS 5 Steps process is higher after learning compared to before.

Glossary of Terms

GPAS 5 Steps Process refers to a teaching and learning activity framework aimed at developing thinking processes or skills through five specific steps, known as GPAS 5 Steps. The steps in the teaching activity process are as follows:

1.1 Gathering: This is the stage where students gather and select important information to use in developing innovations or conducting various projects. Teachers encourage students to learn to gather information through sensory perception, in line with the objectives. This stage involves selecting relevant information, recording data, and recalling prior knowledge as needed.

1.2 Processing: This step involves organizing information to give it meaning through selection, adding value, morals, and values, creatively designing, and deciding on directions toward success. Teachers

should design diverse activities to help students filter and classify essential information, such as categorizing, comparing, connecting, and rationally reflecting on it.

1.3 Applying: This step has two phases. In the first phase (Applying 1), students work together to plan, implement, and troubleshoot various issues to advance learning toward innovation. In the second phase (Applying 2), students summarize their knowledge at different levels up to principles and can present it systematically. Teachers encourage students to select relevant information, understand their knowledge creatively, expand their knowledge base, analyze, synthesize, decide, and adapt their knowledge, as well as analyze, critique, and solve problems appropriately.

1.4 Self-Regulating or **Self-Directed Learning**: This step involves evaluating the overall innovation or project to direct thinking and expand values to a broader social and environmental scope, enabling students to learn independently. Teachers facilitate students' ability to monitor and control their thinking processes, establish personal thinking values, and develop unique thinking habits.

Achievement in English Speaking Skills: This term refers to the knowledge, skills, and attitudes developed through the GPAS 5 Steps learning process. It is measured through an English speaking skills achievement test, assessing students' ability to engage in conversations appropriately and effectively in various situations. Assessment is based on conversation exercises and an English-speaking ability rubric created by the researcher.

Students: Refers to those studying in Grade 10, Class 6, Semester 2, Academic Year 2022, at Samut Sakhon Wittayalai School, Maha Chai Subdistrict, Mueang Samut Sakhon District, Samut Sakhon Province.

In this research, the researcher studied relevant research documents to enhance the English speaking skills of Grade 10 students at Samut Sakhon Wittayalai School through the GPAS 5 Steps learning process. The researcher conducted a literature review to gather information on education and research, including research documents related to the research topic. The details are divided as follows:

Documents on Speaking for Communication

2.1 Communication through speech is the act of conveying thoughts, knowledge, feelings, and needs from the speaker to the listener. It relies on the use of words, tone of voice, gestures, and various expressions to ensure that the listener perceives and understands the speaker's intent, as well as responds accordingly in line with the desired objective. Definition of Speaking for Communication

2.2 Importance of Speaking. Speaking is an essential skill for people in daily life, as it is a straightforward form of communication that can convey the speaker's message or intent more clearly than writing or body language. Additionally, speaking is like a double-edged sword, so it is important to think carefully before saying anything.

2.3 Components of Speaking. Speaking consists of three key components: the speaker, the listener, and the message used in communication. For effective speaking, the speaker should have a clear objective, allowing the listener to understand easily. The message should be as simple as possible, ensuring that the speaker and listener share a common understanding.

2.4 Assessment of Speaking for Communication Skills.The assessment and evaluation of English speaking ability can be conducted in various ways, allowing evaluators to choose and adapt methods for assessing English speaking skills as appropriate.

Learning Management Using the GPAS Process

3.1 Principles/Concepts of Learning Management Using the GPAS Process

3.2 Thinking Skills in the GPAS Structure

3.3 GPAS Process Structure

3.4 Organizing Learning Processes According to the GPAS Method

4. Research Methodology

In this research on "The Development of English Speaking Skill Achievement of Grade 10 Students at Samut Sakhon Wittayalai School through the GPAS 5 Steps Learning Process," the researcher followed these steps:

1. Population: The population for this research consisted of 517 Grade 10 students at Samut Sakhon Wittayalai School during the second semester of the 2022 academic year, across 13 classes.

2. Sample Selection: Out of 13 classes, 42 students from Grade 10/6 were obtained through cluster sampling as they were learners with varied academic achievement levels i.e. high-achieving, average, and low-achieving groups

Research Instruments

The research tools for data collection included:

1. Learning Plans: Six English-speaking learning plans based on the GPAS 5 Steps process, with each session lasting 50 minutes.

2. Data Collection Tools:

○ Pre- and post-tests assessing English speaking achievement, consisting of 20 questions.

○ A satisfaction questionnaire regarding the GPAS 5 Steps learning process.

Both tools were validated for Index of Congruence (IOC) by three English teaching experts, with an acceptable validity threshold of ≥0.50. The validation results indicated an average IOC of 0.75 for the learning plan and 1.00 for both the pretest, posttest, and questionnaire.

Development and Quality Assessment of Research Instruments

Learning Plans Development:

1. Reviewed literature on the GPAS 5 Steps process in educational activities.

2. Analyzed the Basic Education Core Curriculum B.E. 2551 (A.D. 2008) standards for the English language.

3. Developed six learning units for topics such as "Giving Directions" and "Shopping," organized into three sessions each.

4. Expert validation was conducted by three English teaching experts, who evaluated the content validity with an Index of Item-Objective Congruence (IOC) value

1. Achievement Test Creation: Created a 20-question test on English-speaking skills, reviewed by experts, and adjusted based on their feedback. An IOC of 0.5 or higher was achieved for each question.

2. Student Satisfaction Evaluation: Developed a satisfaction scale on the GPAS 5 Steps learning process using a 5-point Likert scale. Expert validation ensured content accuracy and clarity

Data Collection

1. Conducted a quasi-experimental one-group pretest-posttest design (T1 X T2), where T1 represents the pretest, T2 the posttest, and X the GPAS 5 Steps teaching method.

2. Preparation phase: The researcher briefed students on the GPAS 5 Steps learning approach and English-speaking skill assessment.

3. Implementation phase: The researcher facilitated the learning activities and collected data during the second semester of the 2022 academic year.

Analysis Results

Research on Developing English Speaking Skills Achievement of 10th Grade Students at Samut Sakhon College Using the GPAS 5 Steps Process

The objectives of this study were:

1. To compare English speaking skills achievement before and after learning through the GPAS 5 Steps process among 10th-grade students at Samut Sakhon College.

2. To assess the satisfaction of 10th-grade students at Samut Sakhon College with the GPAS 5 Steps learning process.

Following the teaching and learning process using the GPAS 5 Steps, the researcher presented the analysis results as follows:

4.1 Symbols Used in Data Analysis The researcher defined the following symbols for data analysis:

- **n**: Number of students in the sample group

- **(X-bar)**: Mean score of the sample group
- **S.D.**: Standard deviation
- **t**: Statistic used in the experiment (t-distribution)
- **p-value**: Statistical significance level at .05

$$\bar{x} = \frac{\sum x}{N} \tag{1}$$

$$S.D. = \frac{\sqrt{n\sum x^2}(\sum x)^2}{n(n-1)} \tag{2}$$

$$t = \frac{\sum D}{\sqrt{\frac{N\sum D^2 - (\sum D)^2}{N-1}}} \tag{3}$$

$$P = \frac{F}{N} \times 100 \tag{4}$$

4.2 Presentation of Analysis Results The researcher conducted data analysis in the following steps:

1. Basic information on the sample group, categorized by gender
2. Test scores of English speaking ability after teaching using the GPAS 5 Steps process
3. Pre-test and post-test scores
4. Analysis of English speaking skills achievement after teaching using the GPAS 5 Steps process
5. Satisfaction of 10th-grade students at Samut Sakhon College with the GPAS 5 Steps learning process

4.3 Data Analysis Results

Section 1: Results of the Speaking Ability Test Scores after Instruction Using the GPAS 5 Steps Process

The researcher conducted a test to assess the ability to speak English after instruction using the GPAS 5 Steps process. The test was given both before and after the instruction to the sample group of students. The scores obtained were then analyzed using a t-test for dependent samples, as shown in Table 1.

Table 1 Comparison of MEAN and *t*-test Analysis Results between before and after Learning Speaking Skill through GPAS 5 Steps.

Test	n	X	S.D.	t	p-value
Pretest	42	8.33	2.22	17.87	0.00
Posttests	42	16.19	1.74	17.87	0.00

From the analysis results in Table 1, it was found that the English speaking skill achievement of the 10th grade students, who received instruction using the GPAS 5 Steps process, had a post-test score average higher than the pre-test by 7.86. When considering the t-test to test the research hypothesis, the p-value was found to be .00, indicating that the post-test score was significantly higher than the pre-test at the 0.05 level.

Section 2: Satisfaction of Grade 10 students at Samut Sakhon Wittayalai School with the GPAS 5 Steps learning process

Results of the Study on Student Satisfaction of 10th Grade Students at Samut Sakhon Vocational College After Receiving Instruction Using the GPAS 5 Steps Process. The researcher collected satisfaction scores from the 10th grade students at Samut Sakhon Vocational College using a satisfaction survey regarding the teaching process with the GPAS 5 Steps. The evaluation was conducted after the teaching session, and the satisfaction scores were then calculated to analyze the mean and standard deviation (S.D.). The analysis results are shown in Table 2.

Table 2 Analysis Results of Students' Satisfaction towards Learning Speaking Skill through GPAS 5 Steps

Satisfaction Issues	$\bar{x}$	S.D.	Satisfaction Level	Range
1. Content	4.89	0.30	Most Satisfied	1
2. Teaching Methodology	4.74	0.40	Most Satisfied	4
3. Student Behavior	4.83	0.41	Most Satisfied	2
4. Assessment and evaluation	4.82	0.40	Most Satisfied	3
Average	**4.83**	**0.38**	**Most Satisfied**	

It is found that the satisfaction of the 10th/6 grade students at Samut Sakhon Wittayalai School toward the teaching management using the GPAS 5 Steps process, based on each aspect, is as follows:

Content Aspect: The 10th/6 grade students have the highest level of satisfaction with the teaching management using the GPAS 5 Steps process in all aspects. The highest ranking is that students are satisfied with the content matching their interests ($\bar{x}$ = 4.91, S.D. = 0.15). The second ranking is that students are satisfied with the content matching the development of their speaking skills ($\bar{x}$= 4.91, S.D. = 0.22). The last ranking is that students are satisfied with the content being applicable in their daily lives ($\bar{x}$= 4.67, S.D. = 0.43).

Teaching Method Aspect: The 10th/6 grade students have the highest level of satisfaction with the teaching management using the GPAS 5 Steps process in all aspects. The highest ranking is that students are satisfied with the learning management that focuses on hands-on activities ($\bar{x}$= 5.00, S.D. = 0.22). The next ranking is that students are satisfied with the learning management that aligns with their daily lives ($\bar{x}$= 4.84, S.D. = 0.43). Following that, students are satisfied with the activities that engage their interest through

enjoyable activities ($\overline{x}$= 4.79, S.D. = 0.43). Next, students are satisfied with the variety of teaching activities ($\overline{x}$= 4.77, S.D. = 0.43). Finally, students are satisfied with the opportunity to learn independently ($\overline{x}$= 4.74, S.D. = 0.43).

Student Behavior Aspect: The 10th/6 grade students have the highest level of satisfaction with the teaching management using the GPAS 5 Steps process in all aspects. The highest ranking is that students are satisfied with the freedom to research and learn independently ($\overline{x}$= 5.07, S.D. = 0.34). The next ranking is that students are satisfied with the opportunity to demonstrate their abilities according to their interests ($\overline{x}$= 5.05, S.D. = 0.34). Following that, students are satisfied with their ability to appropriately show leadership skills ($\overline{x}$= 4.93, S.D. = 0.43). Finally, students are satisfied and actively participate in activities ($\overline{x}$= 4.84, S.D. = 0.50).

Assessment Aspect: The the10th/6 grade students have the highest level of satisfaction with the teaching management using the GPAS 5 Steps process in all aspects. The highest ranking is that students are satisfied with the number of questions on the test ($\overline{x}$= 5.16, S.D. = 0.15). The next ranking is that students are satisfied with the test questions being aligned with the content they have studied ($\overline{x}$= 4.98, S.D. = 0.43). Finally, students are satisfied with the testing method, which involves one-on-one testing with the teacher ($\overline{x}$= 4.98, S.D. = 0.50).

5. Summary of Research Findings, Discussion, and Recommendations

The research phases and findings are summarized as follow

5.1 Research Objectives

1. To compare English speaking skills achievement before and after learning through the GPAS 5 Steps process among 10th-grade students at Samut Sakhon College.

2. To study the satisfaction level of Grade 10 students at Samut Sakhon Wittayalai School toward the GPAS 5 Steps learning process.

5.2 Research Instruments

The instruments for data collection comprised two types:

1. English speaking lesson plans using the GPAS 5 Steps, with six plans, each lasting 50 minutes, totaling six sessions.

2. Data collection instruments:

2.1 A 20-item pre-test and post-test for English speaking skills.

2.2 A role-play-based assessment of English speaking skills before and after instruction.

2.3 A 15-item satisfaction questionnaire regarding the GPAS 5 Steps teaching process.

5.3 Research Procedure

1. **Preparation Stage**: Introducing the GPAS 5 Steps teaching process and explaining the English speaking assessment and in-class activities.

2. **Implementation Stage**: The researcher conducted the learning activities and collected data in the second semester of the academic year 2022, following these steps:

2.1 Conducted a 20-item pre-test on English speaking skills.

2.2 Tested the sample group with a role-play scenario-based pre-test.

2.3 Implemented the six lesson plans over six weeks with 42 students in Grade 10/6 at Samut Sakhon Wittayalai School, with each session lasting 50 minutes.

2.4 Conducted a post-test with the same sample group using the same test content as the pre-test.

3. Post-Teaching Stage:

3.1 Conducted a post-test on English speaking skills.

3.2 Assessed students' satisfaction with the GPAS 5 Steps learning process.

3.3 Analysed English speaking achievement scores to test the hypothesis.

5.4 Data Analysis

The study's findings on developing English speaking skills among Grade 10 students at Samut Sakhon Wittayalai School with the GPAS 5 Steps were analyzed using statistical tools, including mean ($\bar{X}$), percentage (P), standard deviation (S.D.), and independent sample t-test.

5.5 Research Summary

The study included 42 Grade 10/6 students, selected from a pool of 517 Grade 10 students across seven classes at Samut Sakhon Wittayalai School in the second semester of the academic year 2022. The objectives were to improve students' English speaking skills using the GPAS 5 Steps. Data was collected over six weeks, one session per week. The post-test scores were significantly higher than the pre-test scores at a 0.05 statistical significance level, indicating notable improvement in speaking skills after instruction (pre-test average: 8.33, post-test average: 16.19, an increase of 7.86).

5.6 Discussion of Results

The GPAS 5 Steps learning process, which includes steps for data gathering, knowledge processing, application, and self-regulation, proved effective in improving English speaking skills. These findings align with prior research by Sunanta Kaewpanchaung (2008), Phummarin Yailert (2013), and Tuangthip Solossaowapak (2015), who all found that practical activities and role-playing improve speaking abilities in English, fostering students' confidence and engagement.

5.7 Recommendations

From this research, the following recommendations are offered:

1. For Teaching Practice:

1.1 Teachers should prepare the lesson in advance, practice correct pronunciation, and select suitable teaching materials.

1.2.1 Content should be age-appropriate and engaging for the students.

2. For Future Research:

2.1 Explore additional techniques or innovations to enhance English vocabulary learning.

2.2 Investigate integrated teaching methods to improve students' ability to understand unfamiliar vocabulary

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Effects of AI-Based Reading Tools on Critical Reading Skills among Thai EFL Secondary School Students in Public Schools

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Abstract

This study aimed to investigate the effectiveness of AI-based reading tools in enhancing critical reading skills among Thai EFL learners. Given the challenges faced by Thai students, such as limited exposure to authentic texts and traditional teacher-centered instruction, the study addressed the need for innovative approaches to foster deeper engagement with reading. A quasi-experimental design was used, involving 100 Grade 10 students from two Bangkok public schools. Participants were divided into experimental and control groups and each group consisted of 50 students, with the former utilizing AI-based tools and the latter receiving traditional instruction. Instruments included pre- and post-tests to measure reading comprehension, and questionnaires to assess student engagement. Quantitative data were analyzed using a paired sample t-test, revealing that the experimental group showed significantly greater improvement in post-test scores compared to the control group ($p < .001$), indicating the efficacy of AI tools in promoting critical reading. Qualitative findings from questionnaires supported this, with students and teachers noting enhanced engagement and autonomy. These results suggest that AI-based reading tools can effectively address limitations in traditional EFL instruction and provide personalized support to improve critical reading skills. The study's findings have implications for integrating AI technologies into the Thai educational system to foster learner autonomy and critical thinking.

Keywords: AI-based reading tools; critical reading skills; english language education; personalized learning; Thai EFL learners

1. Introduction

1.1 Background of the Study

Reading skills play a vital role in English as a Foreign Language (EFL) education, serving as the foundation for learners to develop language proficiency, critical thinking, and overall academic success. For EFL learners, reading is not only a tool for acquiring knowledge but also a key medium through which language acquisition takes place (Grabe, 2009). In many EFL contexts, such as Thailand, reading is often emphasized as a core skill within language curricula due to its importance in comprehension, vocabulary development, and grammar knowledge (Richards & Renandya, 2002). However, despite its significance, many Thai learners struggle with reading proficiency, particularly in critical reading skills, which are necessary for understanding and analyzing complex texts (Seedanont & Pookcharoen, 2019).

In Thailand, the focus on reading in English education has been driven by national policies that emphasize English as a tool for global communication (Baker, 2008). Yet, challenges remain, as Thai students often face difficulties in reading comprehension, which is attributed to limited exposure to authentic English texts, over-reliance on rote memorization, and inadequate critical thinking practice in classrooms (Boonkit, 2010). These challenges highlight the need for more effective pedagogical strategies that can enhance learners' reading abilities beyond surface-level comprehension, fostering skills such as inference, evaluation, and synthesis (Day & Bamford, 1998).

The integration of technology, particularly artificial intelligence (AI), has been proposed as a potential solution to address these challenges by providing personalized reading experiences, offering real-time feedback, and helping students engage more deeply with texts (Xu, 2024). With the increasing availability of AI-based reading tools, there is growing interest in exploring how these technologies can support the development of critical reading skills, which are essential for academic success and lifelong learning in the digital age (Darwin et al., 2023). Therefore, this study aims to investigate the role of AI-based tools in enhancing critical reading skills among Thai EFL learners, addressing both the existing challenges in the Thai educational context and the opportunities presented by technological advancements.

1.2 Statement of the Problem

Despite the central role of reading skills in EFL education, many Thai students face significant challenges in developing critical reading abilities. One of the primary barriers is their limited exposure to authentic English texts, which hinders their ability to engage with diverse linguistic structures, vocabulary, and cultural contexts necessary for effective comprehension (Seedanont & Pookcharoen, 2019). In many Thai schools, English reading materials tend to focus on simplified, textbook-based texts that do not provide the depth or variety needed to build advanced reading skills (Khamkhien, 2010). This lack of exposure to authentic texts, such as newspapers, novels, and academic articles, limits students' ability to apply reading strategies such as inference, interpretation, and evaluation, which are essential for critical reading.

Another challenge Thai students encounter is their struggle with comprehension, particularly when dealing with complex texts. Many Thai learners are accustomed to surface-level reading, where the focus is on understanding basic content rather than analyzing or synthesizing information (Boonkit, 2010). This often results from an educational system that emphasizes rote memorization and test preparation over critical thinking and problem-solving skills (Rusmin et al., 2024). As a result, students may find it difficult to engage in higher-order thinking tasks, such as identifying an author's purpose, evaluating arguments, or synthesizing multiple sources of information, which are essential components of critical reading (Grabe, 2009).

Moreover, traditional teaching methods in Thai EFL classrooms often fail to adequately support the development of critical reading skills. Classroom instruction in Thailand tends to be teacher-centered, with a heavy reliance on grammar translation methods and limited opportunities for students to engage in interactive or student-led activities that promote critical thinking (Baker, 2008). This instructional approach not only limits students' ability to practice reading strategies but also reduces their motivation to read critically. Teachers may also face challenges in providing individual feedback due to large class sizes and limited resources, further impeding students' ability to improve their reading skills (Khamkhien, 2010). These factors underscore the need for innovative teaching approaches, such as the integration of AI-based tools, to support students in overcoming these challenges and enhancing their critical reading abilities.

1.3 Significance of the Study

This study is crucial for advancing EFL education in Thailand, specifically in addressing the persistent challenges Thai students face in developing critical reading skills within an Outcome-Based Education (OBE) framework. By examining the impact of AI-based tools on reading comprehension, the study provides valuable insights into how personalized, technology-enhanced learning can bridge gaps left by traditional, teacher-centered methods (Grabe, 2009). Aligning with Thailand's national policies on student-centered learning (Karanjakwut, 2024), the findings offer practical recommendations for integrating AI into English curricula, thereby enabling differentiated instruction, real-time feedback, and enhanced critical thinking (Xu, 2024; Hwang et al., 2015). This approach supports the shift toward learner autonomy, promoting active engagement and creating more effective, tailored learning environments for Thai EFL learners.

Moreover, this study contributes to the broader body of research on technology-enhanced language learning (TELL), specifically within the EFL context. It builds on previous studies that have demonstrated the potential of AI and digital tools in promoting learner engagement, improving reading comprehension, and fostering critical literacy skills (Amin, 2023). The study can further encourage the adoption of AI-enhanced pedagogical practices, particularly in resource-limited settings like Thailand, where large class sizes and limited teacher capacity often hinder individualized instruction (Khamkhien, 2010). As such, this research can have a far-reaching impact on EFL teaching practices, providing a model for integrating technology to improve critical reading skills and overall language competence. Therefore, the

study aimed to 1) explore the effectiveness of AI-based reading tools in enhancing critical reading skills, and 2) identify specific challenges Thai students face in using AI tools for reading comprehension. The following are research questions of the study:

1. How effective were AI-based reading tools in improving critical reading skills among Thai EFL learners?

2. What challenges did students encounter while using AI tools?

2. Literature Review

2.1 Overview of Critical Reading Skills:

Critical reading is an essential component of language acquisition that goes beyond mere comprehension, requiring readers to engage actively with texts by evaluating arguments, identifying biases, and synthesizing information (Wallace, 2003). For EFL learners, developing critical reading skills is particularly important, as it fosters a deeper understanding of both language and content, equipping students with the ability to navigate complex texts in academic and real-world contexts (Grabe & Stoller, 2013). In Thailand, the need for fostering such skills is pressing, as many students are still confined to surface-level comprehension, largely due to traditional teaching approaches and limited access to authentic English texts (Wiriyachitra, 2002). Critical reading in EFL not only improves reading proficiency but also enhances learners' analytical thinking, which is critical for success in academic environments and the global workforce (Li, 2017).

2.2 Challenges in Teaching Critical Reading in Thailand:

The development of critical reading skills in Thai EFL classrooms faces numerous obstacles. One major challenge is the focus on rote memorization and teacher-centered instruction, which limits students' opportunities to engage in independent, analytical thinking (Bancha & Bamrung, 2023). Thai students often lack exposure to reading strategies that promote deeper understanding, such as making inferences, evaluating evidence, and synthesizing information from multiple sources (Boonkit, 2010). Furthermore, large class sizes and limited teacher resources restrict the ability of educators to provide individualized feedback, which is crucial for developing students' critical reading abilities (Wiriyachitra, 2002). As a result, many Thai learners struggle to engage with texts beyond basic comprehension, preventing them from attaining the higher-order thinking skills necessary for critical analysis and interpretation (Grabe, 2009).

Moreover, the lack of exposure to authentic English materials further complicates the development of critical reading skills. Most Thai EFL curricula rely on simplified textbooks that do not challenge students to interact with diverse, complex texts, which are crucial for improving reading comprehension and critical thinking (Khamkhien, 2010). Authentic materials, such as newspapers, academic articles, and literary texts, can provide the necessary linguistic and cultural contexts to enhance students' reading skills. However, access to such materials is often limited in Thai classrooms, leading to a reliance on formulaic and exam-focused reading instruction (Richards & Renandya, 2002).

2.3 AI-Based Tools in Education:

The AI integration in education has garnered considerable attention for its potential to enhance learning outcomes, particularly in language acquisition. AI-based reading tools can offer personalized learning experiences by adapting reading materials to individual learners' proficiency levels and providing immediate feedback on comprehension (Xu, 2024). These tools can support critical reading by guiding students through more complex texts, prompting them to make inferences, ask questions, and evaluate information critically (Hwang et al., 2015). In EFL education, AI tools have been shown to enhance engagement, promote deeper learning, and improve reading comprehension by providing tailored resources and real-time feedback (Zainuddin, 2024).

In the Thai context, AI-based reading tools present a promising solution to the challenges faced by students and teachers in developing critical reading skills. By leveraging AI technologies, educators can offer students exposure to authentic reading materials and scaffold their understanding through interactive features, such as vocabulary assistance, comprehension checks, and adaptive questioning (Xu, 2024). Moreover, AI tools can alleviate the burden on teachers by providing automated feedback, allowing educators to focus on facilitating discussions and promoting higher-order thinking in the classroom (Hwang et al., 2015). As the use of technology continues to expand in education, understanding the role of AI in promoting critical reading skills is essential for advancing EFL teaching practices in Thailand and beyond.

2.4 AI in EFL Learning

Artificial Intelligence (AI) plays a pivotal role in transforming English as a Foreign Language (EFL) education by personalizing learning experiences, providing real-time feedback, and tracking student progress. In EFL classrooms, AI has the potential to tailor reading materials to individual learners' needs and proficiency levels, which is especially important in diverse classrooms where students often have varying degrees of language ability. AI-based systems, such as intelligent tutoring platforms and adaptive learning applications, can analyze a student's current reading level and recommend appropriate texts that gradually increase in complexity as the learner improves (Tan et al., 2022). This personalized approach ensures that students are consistently challenged without being overwhelmed, promoting steady improvement in reading comprehension and critical thinking.

The ability of AI to provide real-time feedback is another crucial advantage in EFL learning. In traditional classroom settings, immediate, individualized feedback is difficult to achieve due to large class sizes and time constraints. However, AI-powered tools can offer instant corrections and suggestions, helping students identify mistakes and reinforce learning immediately (Jamshed et al., 2024). For example, AI applications can highlight grammatical errors, suggest alternative vocabulary, and pose comprehension questions that prompt students to reflect more deeply on the text. Such feedback not only helps improve language accuracy but also encourages students to engage more critically with the material. In Thai EFL classrooms, where teachers may be unable to

provide consistent individual attention due to limited resources, these AI tools can serve as valuable supplements to traditional instruction, offering continuous learning support (Khamkhien, 2010).

AI also plays a significant role in tracking student progress over time. By collecting and analyzing data on students' reading habits, performance, and engagement, AI systems can generate detailed progress reports that help both students and teachers understand areas of strength and weakness (Xu, 2024). These reports allow teachers to make more informed instructional decisions, such as adjusting reading materials, focusing on particular skills, or providing additional support where necessary. For students, this data-driven approach offers insights into their own learning process, empowering them to take more control over their language development (Hwang et al., 2015). This is particularly beneficial in Thai EFL education, where standardized testing often fails to capture the nuances of individual student progress. By tracking students' growth in reading comprehension and critical thinking over time, AI systems can foster a more holistic and individualized approach to language learning.

3. Research Methodology

3.1 Research Design

This study adopted a quasi-experimental design with a pre-test and post-test structure to examine the effects of AI-based reading tools on the critical reading skills of Thai EFL learners. A control group and an experimental group were used to compare traditional reading instruction methods with AI-enhanced approaches. The experimental group utilized an AI-based reading platform that offered personalized reading materials, real-time feedback, and progress tracking, while the control group continued with conventional reading instruction that involved teacher-guided reading comprehension activities and printed texts.

The study lasted for 8 weeks, during which time the experimental group engaged with AI-based tools during their reading sessions in English classes, while the control group followed a teacher-led reading curriculum. Quantitative data were gathered through pre-test and post-test assessments to measure the students' progress in critical reading skills. Additionally, qualitative data were collected through student questionnaires to provide deeper insights into how AI tools influenced students' reading experiences and perceptions of learning.

3.2 Participants

The participants of the study consisted of 100 Grade 10 students (ages 15-17) from two public high schools in Bangkok, Thailand. These students were enrolled in English as a Foreign Language (EFL) classes. Fifty students from each school were selected to participate in the study, with one class from each school randomly assigned to the experimental group (AI-based reading tools) and the other class assigned to the control group (traditional reading instruction).

Participants were chosen through purposive sampling based on their similar English proficiency levels, as determined by their recent midterm English test results, which ranged from A2 to B1 according

to the Common European Framework of Reference for Languages (CEFR). This ensured that the groups were relatively homogeneous in terms of their initial reading proficiency, enabling a clearer comparison of the intervention's effectiveness.

3.3 Instruments

3.3.1 AI-Based Reading Tool (Platform X)

The AI-based platform used for the experimental group was "Platform X," a commercially available tool designed for English language learners. The platform provided personalized reading recommendations based on students' performance, real-time feedback on reading comprehension exercises, and tracked students' progress over time. The tool also included features such as vocabulary suggestions, critical reading prompts, and interactive comprehension questions. The selection of Platform X was guided by its alignment with the study's objectives and its proven effectiveness in prior research studies.

3.3.2 Achievement Test (Pre-Test and Post-Test)

Both the control and experimental groups took a standardized reading comprehension test designed to assess critical reading skills such as identifying main ideas, making inferences, analyzing arguments, and evaluating the author's purpose. The tests were adapted from the Cambridge English Proficiency Exam (Reading Section) and modified for the Thai EFL context to ensure cultural and linguistic relevance.

To establish the validity of the test, content validity was evaluated by a panel of three experts in English language teaching and assessment. The test items were reviewed for alignment with the study's objectives and were revised based on expert feedback. Difficulty levels and discrimination indices of the test items were calculated during a pilot study conducted with 30 students similar to the target population. The reliability of the test was measured using Cronbach's alpha, yielding a reliability coefficient of 0.86, which indicates high internal consistency.

The final version of the test included 80 multiple-choice questions, covering both literal comprehension and higher-order critical thinking skills. Each question was carefully calibrated to ensure an appropriate balance of difficulty levels and cognitive demands.

3.3.3 Questionnaires

A post-intervention questionnaire was administered to all participants to assess their perceptions of their reading experiences, engagement, and confidence in their critical reading abilities. The questionnaire consisted of 15 items using a 5-point Likert scale, covering students' satisfaction with their learning experience, the perceived effectiveness of the reading strategies, and the level of engagement they felt during the sessions.

The questionnaire's validity was established through expert review, with three specialists evaluating its content and relevance to the research objectives. A pilot test was conducted with a sample of 20 students to refine the questionnaire items based on clarity and reliability. The Cronbach's alpha for the final version of the questionnaire was 0.89, indicating strong internal consistency. Additionally, the questionnaire included an open-ended section for qualitative feedback, allowing students to elaborate on their experiences with the intervention.

3.4 Data Collection

3.4.1 Achievement Test

At the beginning of the 8-week study, both the experimental and control groups took the pre-test. This provided baseline data on the students' critical reading skills and allowed for comparison between the two groups. At the end of the intervention, both groups completed the post-test to measure any improvements in critical reading skills. The results were compared with the pre-test scores to determine the effectiveness of the AI-based tools versus traditional instruction.

3.4.2 Intervention (8 weeks)

The experimental group spent 3 English periods per week (50 minutes each) using the AI-based reading tool in the school's computer lab. Students read texts selected by the AI system based on their individual reading levels and engaged in AI-guided reading activities, including comprehension checks and critical thinking exercises.

The control group followed traditional reading instruction, where the teacher selected texts from the standard curriculum, guided the class through reading passages, and conducted group discussions focused on comprehension and text analysis.

3.3.4 Questionnaire

After the post-test, students from both groups completed a questionnaire to identify challenges in using AI tools for reading comprehension and gauge their engagement, satisfaction, and perceived improvements in reading.

3.5 Data Analysis

3.5.1 Quantitative Data Analysis

For the achievement test, paired sample t-tests were used to compare the pre-test and post-test scores within each group to assess improvements in critical reading skills. An independent samples t-test compared the mean scores between the experimental and control groups to evaluate the impact of AI tools versus traditional methods.

For the questionnaire data, descriptive statistics (mean, standard deviation) were used to analyze responses to the Likert-scale questions, providing insights into students' perceptions of the learning experience and engagement levels.

3.5.2 Qualitative Data Analysis

For open-ended questionnaire responses, qualitative data from open-ended responses in the questionnaires were also subjected to thematic analysis to further understand students' experiences and perceptions of AI-based reading tools.

3.6 Ethical Considerations

Prior to the study, written informed consent was obtained from all participants and their parents or guardians, ensuring they were fully informed about the study's purpose, procedures, potential benefits, and the voluntary nature of participation, with the option to withdraw at any time without consequences. To maintain confidentiality, all participant data, including test scores and questionnaire responses, were anonymized, with unique IDs assigned and securely stored in password-protected files. The intervention enhanced current practices using AI-based tools integrated into regular class hours, ensuring no new or untested methods were introduced, and no physical or psychological harm was expected. Finally, at the study's conclusion, students and teachers were debriefed on the findings, with feedback collected to inform future teaching practices and research.

4. Research Results and Discussion

The study aimed to examine the impact of AI-based reading tools on the critical reading skills of Thai EFL learners by comparing the performance of an experimental group using AI tools and a control group using traditional methods. The data were collected from 100 students (50 in each group) through pre-test and post-test assessments, and student questionnaires. The results are presented below in two parts: quantitative analysis of the test scores and qualitative findings from the questionnaires.

4.1 Quantitative Analysis

4.1.1 Achievement Test's Scores

The pre-test and post-test scores were analyzed to determine whether there were significant improvements in the critical reading skills of both groups. Table 1 summarizes the descriptive statistics for both groups.

Table 1 Pretest and Posttest Scores and Paired Sample T-Test Results (*N* = 50)

Group	Pre-Test (*SD)*	Post-Test (*M*)	Post-Test (*SD*)	*df*	*t*-value
Experimental Group	7.80	72.85	6.45	49	-15.88***
Control Group	8.15	64.45	7.20	49	-9.35***

****p*-value at < .001

The experimental group, which used AI-based reading tools, showed a notable improvement in their post-test scores, with the mean score rising from 56.12 to 72.85. The control group also improved, but to a lesser extent, with the mean score increasing from 55.90 to 64.45.

The study's quantitative analysis showed that the experimental group, using AI-based reading tools, achieved significantly higher post-test scores in critical reading than the control group, which followed traditional methods. The mean score for the experimental group rose from 56.12 to 72.85, while the control group's scores increased from 55.90 to 64.45 (*p* < .001), indicating the AI tools' effectiveness in enhancing critical reading. This aligns with findings by Chun et al. (2016), who emphasized that AI tools enable personalized learning paths, making complex reading tasks more accessible to language learners

A paired sample t-test was conducted to assess whether the improvements within each group were statistically significant, and it indicates that both groups showed statistically significant improvements from pre-test to post-test (*p* < .001). However, the improvement in the experimental group was more substantial, as reflected in the higher t-value.

To compare the post-test scores between the experimental and control groups, an independent samples t-test was conducted. The results are shown in Table 2.

Table 2 Independent Samples T-Test Results (Post-Test Scores)

Comparison	*df*	*t*-value	*p*-value
Post-Test (Experimental vs. Control)	98	6.82	< .001 ***

****p*-value at < .001

The independent samples t-test revealed a statistically significant difference in the post-test scores between the experimental and control groups (*p* < .001), indicating that the AI-based reading tools had a more significant impact on improving critical reading skills than traditional methods.

4.1.2 Improvement in Critical Reading Skills

To further analyze the effect of the intervention, the improvement scores (post-test minus pre-test) were calculated for both groups. The mean improvement score for the experimental group was

16.73, while the control group had a mean improvement score of 8.55. These results demonstrate that the experimental group experienced nearly twice the improvement in critical reading skills compared to the control group.

Furthermore, the experimental group's mean improvement score of 16.73 was nearly double that of the control group's 8.55. This significant difference suggests that AI tools offer targeted scaffolding and feedback, which fosters engagement and skill acquisition—a trend consistent with research by Hwang et al. (2015), who found that mobile technology and AI tools in flipped classrooms allowed for seamless, self-paced learning experiences that are crucial for EFL students' reading development

4.2 Qualitative Findings

The post-intervention questionnaire was administered to gather students' perceptions of their learning experience. Table 3 summarizes the responses from the experimental group.

Table 3 Experimental Group's Questionnaire Responses (N = 50)

Questions	Perception Scores
The AI tool helped me understand the texts better.	4.40
The feedback I received was useful for improving my reading.	4.52
The AI reading tool was easy to use.	4.35
I felt more confident in my reading abilities after using the AI tool.	4.30
The AI tool made reading more engaging and enjoyable.	4.45

The results from the questionnaire indicate that students had a positive experience with the AI-based reading tool. Most participants agreed or strongly agreed that the tool helped them understand texts better (M = 4.40) and provided useful feedback for improving their reading (M = 4.52). Additionally, students felt more confident in their reading abilities after using the tool (M = 4.30) and found the tool engaging (M = 4.45).

Student questionnaires revealed a positive reception to AI-based reading tools, with scores indicating that students found the tools helpful for understanding texts (M = 4.40) and felt more confident in their reading abilities (M = 4.30). These results reflect the findings of Darwin et al. (2023), who reported that AI applications in the classroom could enhance student confidence and engagement by providing interactive, immediate feedback tailored to each student's performance.

Additionally, students noted that the tools made reading more enjoyable (M = 4.45). This enthusiasm supports the hypothesis that AI technologies can mitigate the limitations of traditional teacher-centered Thai classrooms by promoting autonomous, engaging learning experiences—a claim substantiated by Xu (2024), who highlighted the motivational benefits of incorporating AI into EFL settings.

5. Recommendations and Conclusion

Based on the study's findings, it is recommended that Thai EFL programs incorporate AI-based reading tools to bolster critical reading skills. These tools provide personalized learning experiences that foster greater engagement and critical thinking, addressing gaps in traditional, teacher-centered methods. Limitations include the need for technological resources and training for effective tool use, as well as challenges in adapting AI platforms for diverse classroom settings. Future research should explore the long-term impact of AI on various language skills and examine the specific types of reading strategies that best enhance critical thinking. For classroom application, teachers should receive training to integrate AI tools effectively, ensuring that all students benefit from tailored reading support.

The study concluded that AI-based reading tools significantly improve critical reading skills in Thai EFL students, compared to traditional instruction methods. The experimental group, which used AI tools, demonstrated notable gains in engagement and comprehension, as well as an increased ability to analyze and synthesize information critically. These findings highlight the potential of AI technology to revolutionize EFL teaching by making learning more student-centered and personalized. Integrating AI tools into language instruction could, therefore, play a crucial role in overcoming existing educational challenges and fostering critical thinking skills among Thai EFL learners.

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The Impact of AI-Assisted Tools on Reducing Reading Anxiety and Enhancing Engagement in Thai EFL Learners

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Abstract

This study aimed to explore the effects of AI-assisted reading tools on reducing reading anxiety and enhancing confidence and engagement in English reading tasks among Thai EFL high school students. Sixty students from a high school in Bangkok, Thailand, participated in the study. They represented varying levels of English proficiency and completed a pre-intervention questionnaire to establish baseline levels of reading anxiety, confidence, and motivation. Following this, students were introduced to four AI tools—ReadAI, Lexia, Speakify, and SmartRead—which provided personalized support through features like real-time feedback, vocabulary assistance, and interactive reading prompts. Over a ten-week intervention period, students used these tools for assigned reading tasks. Post-intervention results, measured through a follow-up questionnaire, revealed a significant reduction in reading anxiety, with students reporting increased comfort and reduced nervousness in tackling English texts. Additionally, findings indicated a marked improvement in students' confidence and motivation, with participants expressing greater interest and willingness to engage in reading tasks both inside and outside the classroom. These results suggest that AI tools hold promise for creating supportive learning environments that alleviate anxiety and foster positive attitudes toward reading in EFL contexts. This study provides valuable insights for teachers seeking innovative approaches to enhance reading proficiency and engagement in EFL classrooms.

Keywords: reading anxiety; reading confidence; student engagement; Thai EFL learners

1. Introduction

1.1 Background

Overview of reading anxiety among Thai EFL (English as a Foreign Language) learners, its causes, and its impact on reading performance. Reading anxiety has been recognized as a significant issue among Thai EFL learners, which negatively affects their reading performance. This form of anxiety is linked to several factors, including unfamiliar vocabulary, complex sentence structures, and the fear of making mistakes when interpreting the text (Saito et al., 1999). Additionally, reading in a foreign language often triggers heightened anxiety, especially when students lack confidence in their reading abilities, leading to avoidance behaviors and poor comprehension (Song, 2024). In the Thai context, EFL learners experience unique challenges, such as limited exposure to English outside the classroom, contributing to their anxiety when reading English texts. Research has shown that the anxiety is further compounded by cultural expectations, where students are often hesitant to admit difficulties, fearing judgment from peers and teachers (Kalra & Siribud, 2020). Such anxiety can hinder their ability to engage with reading materials and diminish their overall academic success. Several studies have highlighted the relationship between reading anxiety and academic performance, with anxious learners often showing lower scores in reading comprehension tests (Wijayati et al., 2021). Moreover, the emotional discomfort associated with reading anxiety can lead to a lack of motivation and reduced participation in reading activities, creating a vicious cycle of underachievement (Ramirez et al., 2018). Addressing these factors is crucial for improving reading proficiency and reducing anxiety levels among Thai EFL learners.

1.2 Statement of the Problem

Reading anxiety is a well-documented challenge among Thai EFL (English as a Foreign Language) learners, significantly impacting their ability to comprehend and engage with English texts. In Thai classrooms, students often experience heightened anxiety when reading in a foreign language due to a combination of factors, including a lack of vocabulary, unfamiliar grammar structures, and cultural differences in text (Torudom & Taylor, 2017). This anxiety tends to reduce students' confidence, which in turn hinders their reading performance, creating a cycle of anxiety and poor comprehension (Abubakar, 2020). The prevalence of reading anxiety in Thai educational contexts is a growing concern. Recent studies highlight that Thai students exhibit high levels of anxiety when approaching English reading tasks, particularly due to unfamiliarity with content and fear of making mistakes in front of peers (Tiang-uan, 2024). While traditional methods of teaching reading are still widely used, these methods may not be sufficient in addressing the deep-seated fears and anxieties that many learners face (Maher & King, 2023). As a result, there is a pressing need for innovative teaching approaches that directly target these anxieties and build students' confidence in reading. Integrating artificial intelligence (AI) into reading instruction offers a promising solution. AI tools can provide personalized feedback and tailored support, potentially reducing

anxiety by allowing students to practice in a non-judgmental, interactive environment (Hawanti & Zubaydulloevna, 2023). However, limited research has explored how AI can specifically address reading anxiety in Thai classrooms, signaling a gap that this study aims to address. Investigating the role of AI in easing reading anxiety could provide new insights into effective teaching practices that foster both confidence and engagement in Thai EFL learners.

1.3 Significance of the study

Reading anxiety was highly prevalent among Thai students, primarily due to linguistic and cultural barriers, which resulted in limited exposure to English (Torudom & Taylor, 2017). This anxiety significantly hindered their performance and motivation to engage with reading materials, thereby affecting their overall language proficiency and academic outcomes (Maher & King, 2023). Given the rise in digital learning tools, incorporating artificial intelligence (AI) into the learning process represented a promising avenue for mitigating reading anxiety. AI-driven platforms offered personalized learning experiences that adapted to students' individual needs, enabling them to practice at their own pace and reduce the fear of failure in front of peers (Das et al., 2023). This study, therefore, explored how AI could not only reduce anxiety but also foster student engagement and confidence, ultimately contributing to improved reading performance. The findings provided teachers with innovative tools and strategies for addressing this issue, while potentially reshaping reading instruction in Thai EFL contexts.

Therefore, this study aimed to identify the relationship between AI use and reading anxiety reduction and to evaluate how AI can improve students' confidence in reading. The following are research questions of the study:

1. How does AI influence reading anxiety in Thai EFL learners?
2. In what ways does AI build confidence and engagement in reading tasks?

2. Literature Review

2.1 Reading Anxiety in EFL Contexts

Reading anxiety has become a growing concern in the field of English as a Foreign Language (EFL), particularly among non-native speakers who face linguistic and cultural challenges when engaging with English texts. Saito et al. (1999) first identified the concept of foreign language reading anxiety, emphasizing that EFL learners often experience heightened anxiety when reading due to unfamiliar vocabulary, complex grammatical structures, and cultural references within the text. This anxiety can lead to avoidance behaviors, where learners refrain from engaging with reading tasks, which subsequently impacts their overall reading comprehension and academic success. In the Thai EFL context, this issue is especially pronounced. A study by Torudom and Taylor (2017) found that a significant proportion of Thai learners report high levels of reading anxiety, which they attributed to limited exposure to English outside the classroom and the pressure of performance in a high-stakes educational system. The rigid, exam-driven nature of the Thai

education system creates additional stress for learners, as students fear making mistakes, which further inhibits their willingness to participate in reading activities (Kalra & Siribud, 2020). This reading anxiety often results in decreased motivation, negatively affecting students' long-term academic performance.

2.2 The Impact of Reading Anxiety on Academic Performance

Research has consistently shown that reading anxiety has a detrimental impact on learners' reading proficiency and overall language performance. Jafarigohar and Behrooznia (2012) found that EFL learners with higher levels of anxiety performed significantly worse on reading comprehension tests compared to their less anxious peers. The emotional discomfort associated with reading anxiety impairs students' ability to focus on and process the content of the text, which leads to poorer comprehension outcomes. In the Thai context, where students already face linguistic barriers, reading anxiety exacerbates these difficulties, making it even harder for learners to achieve language proficiency (Guzman, 2022). Moreover, Zhao, Guo, and Soares et al. (2023) highlighted that reading anxiety not only affects comprehension but also discourages learners from developing autonomous reading habits, which are crucial for language development. This phenomenon is particularly problematic in Thailand, where English exposure outside of formal educational settings is often limited, and students are largely dependent on classroom instruction for language acquisition.

3. Research Methodology

3.1 Participants

The study involved a total of 60 high school EFL students from a high school in Bangkok, Thailand. These students were purposefully sampled to represent a range of English proficiency levels—beginner, intermediate, and advanced—ensuring that the study captured diverse perspectives on reading anxiety, confidence, and engagement. Each proficiency level group included students who had been assessed and categorized based on their English performance records and teacher evaluations. The sample consisted of both male and female students, with ages ranging from 15 to 18, covering an important period in secondary education when language acquisition can significantly influence academic success.

3.2 Instrument

The questionnaire used in this study was designed to assess the effects of AI tools on Thai EFL learners' reading anxiety, confidence, engagement, and motivation. The instrument consisted of 17 items categorized into three main constructs: Reading Anxiety, Confidence in Reading, and Engagement and Motivation in Reading. Each item was rated on a Likert scale from 1 (Strongly Disagree) to 5 (Strongly Agree), allowing for a detailed analysis of students' perceptions and attitudes before and after the AI intervention (Dörnyei & Taguchi, 2010).

Part 1: Reading Anxiety (Items 1-7): This section comprised items designed to measure students' anxiety levels related to reading in English, focusing on factors such as nervousness, concern about comprehension, and fear of encountering unfamiliar vocabulary. The items were adapted from the Foreign Language Reading Anxiety Scale (FLRAS), developed by Saito, Garza et al. (1999), to suit the specific context of AI-assisted reading in EFL classrooms. By tailoring these items to the AI-enhanced learning environment, the study aimed to capture how technology integration might alleviate or exacerbate traditional sources of reading anxiety in language learners.

Part 2: Confidence in Reading (Items 8-12): This category focused on measuring students' self-perceived confidence in managing English reading tasks with the support of AI tools. Items in this section were based on confidence-related constructs from established language learning frameworks, specifically adapting elements from the Self-Efficacy for Reading Scale (Schunk & Pajares, 2005). The objective was to capture the degree to which AI tools could enhance students' reading self-efficacy by providing support and facilitating comprehension. By assessing confidence in various reading scenarios, this section aimed to evaluate how effectively AI-assisted learning environments could foster a stronger sense of capability and independence in students.

Part 3: Engagement and Motivation in Reading (Items 13-17): The final section of the questionnaire examined students' engagement and motivation when reading English texts with AI support. This set of items was informed by established engagement frameworks in second language acquisition, particularly the work of Dörnyei (2001) on motivational strategies and Ryan and Deci's (2000) Self-Determination Theory, which emphasizes intrinsic motivation and sustained interest. The items were designed to assess the extent to which AI tools could promote a lasting interest in English reading, encouraging students to engage with texts both inside and outside the classroom. This section aimed to capture how AI-assisted reading might transform the learning experience by making it more enjoyable, stimulating, and relevant to students' personal learning goals.

3.3 Procedure

The study was conducted in two distinct phases: a pre-intervention phase and a post-intervention phase, structured to evaluate the impact of multiple AI reading tools—ReadAI, Lexia, Speakify, and SmartRead—on students' reading anxiety, confidence, and motivation.

3.3.1 Pre-Intervention Phase

At the outset, students were briefed on the study's purpose and procedure, and consent was obtained to ensure ethical standards were met. In this phase, all 60 participating students completed an initial questionnaire designed to measure baseline levels of reading anxiety, confidence, and engagement with English reading tasks. The questionnaire, which consisted of 17 items rated on a five-point Likert scale, provided a baseline of students' perceptions without AI assistance. Students completed the questionnaire

individually, with a researcher available to clarify any questions regarding the statements to ensure accurate responses.

3.3.2 Introduction to AI Tools and Training

After the pre-intervention questionnaire, students were introduced to the AI reading tools used in the study: ReadAI, Lexia, Speakify, and SmartRead. Each tool offered unique features tailored to assist students in different aspects of reading comprehension and engagement:

1) ReadAI provided real-time feedback on vocabulary and comprehension.

2) Lexia offered interactive reading prompts and adaptive reading support based on students' proficiency.

3) Speakify included features for pronunciation and fluency, allowing students to practice reading aloud and receive corrective feedback.

4) SmartRead presented personalized reading recommendations and comprehension quizzes.

A brief training session was held for each tool, ensuring that students understood how to access and navigate each feature. During the session, students practiced using each tool in a controlled environment to build familiarity and confidence.

3.3.3 Intervention Period

Over the ten-week intervention period, students were instructed to use ReadAI, Lexia, Speakify, and SmartRead for their English reading tasks, both in class and as part of independent study. Students were encouraged to explore all four tools to complete reading assignments, allowing researchers to observe the cumulative impact of multi-tool AI assistance on students' reading experiences. Teachers and researchers monitored students' usage and engagement with the tools, answering questions and encouraging consistent use. This ensured students could use the tools' different strengths, such as reducing anxiety with real-time feedback (ReadAI) and enhancing motivation through personalized reading experiences (SmartRead).

3.3.4 Post-Intervention Phase

After the ten-week intervention, students completed the same 17-item questionnaire to assess changes in reading anxiety, confidence, and motivation following their exposure to the AI tools. The questionnaire was administered under similar conditions to the pre-intervention phase, ensuring consistency in data collection. This phase allowed students to reflect on their experiences and provided insights into how each tool influenced their reading attitudes. In addition, a debriefing session was held where students could discuss their experiences with each AI tool, offering qualitative insights that complemented the quantitative data.

3.4 Ethical Considerations

The study adhered to ethical standards by ensuring informed consent, with parental consent obtained for participants under 18, detailing the study's purpose, procedures, and the right to withdraw without penalty. Confidentiality was maintained through the use of pseudonyms and exclusion of identifying details in publications, with data securely stored in password-protected files accessible only to the research team. Participation was voluntary, guaranteeing that students' grades or class standing remained unaffected by their involvement or withdrawal. Data security protocols included encrypting digital data on a secure server retained for five years before deletion, with physical documents kept in a locked cabinet in the researcher's office.

4. Research Results

4.1 AI Influencing Reading Anxiety in Thai EFL Learners

The research results on the impact of AI-assisted tools on Thai EFL learners provide valuable insights into how these technologies influence reading-related challenges. Sections 4.1 explore how AI interventions help alleviate reading anxiety, showing measurable reductions in students' nervousness, concerns about comprehension, and discomfort with complex texts.

The table 1 presents the pre- and post-intervention mean scores (M) and standard deviations (SD) for statements related to reading anxiety among Thai EFL students, evaluated through a questionnaire before and after the use of AI tools. Each statement captures a specific aspect of reading anxiety, such as nervousness, worry about comprehension, and discomfort with long texts. For instance, the mean score for the statement "I feel nervous when I am reading in English without any assistance" decreased from 4.0 (SD = 0.7) to 2.8 (SD = 0.8), indicating a significant reduction in anxiety when AI support was provided. Similarly, concerns about understanding main ideas and unfamiliar vocabulary also showed marked decreases, with mean scores dropping from 3.7 to 2.6 and 3.9 to 2.7, respectively. Statements addressing general discomfort with reading in English also reflect this downward trend, with notable reductions across all items. In contrast, statements reflecting comfort and reduced anxiety when using AI tools showed significant increases. For example, the mean score for "I feel more comfortable reading in English when I have AI assistance" rose from 2.8 (SD = 0.8) to 4.1 (SD = 0.7), suggesting that students felt more at ease with AI support. Likewise, the statement "Using AI tools in reading tasks makes me less anxious about misunderstanding the content" increased from 2.9 (SD = 0.8) to 4.2 (SD = 0.6). Overall, these results, supported by significant t-test values, indicate that AI tools effectively reduced reading anxiety and enhanced students' comfort and confidence in reading tasks**.**

Table 1 Reading Anxiety Among Thai EFL Learners Using AI Tools

Statement	Pre-Intervention		Post-Intervention		*t*-test
	M	*SD*	*M*	*SD*	
Reading Anxiety					
1. I feel nervous when I am reading in English without any assistance.	4.0	0.7	2.8	0.8	*t*(59) = 9.8
2. I worry about understanding the main ideas in English reading tasks.	3.7	0.8	2.6	0.7	*t*(59) = 9.3
3. I feel anxious when I come across unfamiliar vocabulary in English texts.	3.9	0.6	2.7	0.6	*t*(59) = 10.2
4. I avoid reading long English texts due to fear of not understanding them.	3.6	0.9	2.5	0.8	*t*(59) = 8.5
5. Reading in English feels overwhelming for me.	3.8	0.7	2.7	0.7	*t*(59) = 9.4
6. I feel more comfortable reading in English when I have AI assistance.	2.8	0.8	4.1	0.7	*t*(59) = 11.6
7. Using AI tools in reading tasks makes me less anxious about misunderstanding the content.	2.9	0.8	4.2	0.6	*t*(59) = 12.0

To answer the research question 1, how does AI influence reading anxiety in Thai EFL learners?

The data indicates a significant reduction in reading anxiety among Thai EFL learners after the intervention with AI tools. Table 1 shows that students' reported anxiety levels decreased across all items related to reading anxiety. For instance, the mean score for feeling nervous when reading in English dropped from 4.0 (SD = 0.7) pre-intervention to 2.8 (SD = 0.8) post-intervention. Similarly, anxiety related to encountering unfamiliar vocabulary decreased from a mean of 3.9 (SD = 0.6) to 2.7 (SD = 0.6). Notably, students also reported feeling less overwhelmed with English reading tasks when supported by AI, with this item's score reducing from 3.8 (SD = 0.7) to 2.7 (SD = 0.7). The statement "Using AI tools in reading tasks makes me less anxious about misunderstanding the content" saw an increase in comfort, from 2.9 (SD = 0.8) pre-intervention to 4.2 (SD = 0.6) post-intervention, indicating that AI tools provided reassurance and helped mitigate reading anxiety effectively.

4.2 AI Building Confidence and Engagement in Reading Tasks

In section 4.2, the focus shifts to the role of AI in building confidence and engagement. The findings demonstrate that AI tools significantly boost students' confidence in reading English by enhancing their ability to tackle challenging texts. Additionally, these tools increase motivation, making reading activities more enjoyable and fostering sustained engagement.

Table 2 Confidence in Reading Among Thai EFL Learners Using AI Tools

Statement	Pre-Intervention		Post-Intervention		t-test
	M	SD	M	SD	
Confidence in Reading					
8. I feel confident in my ability to understand English texts with the help of AI tools.	3.0	0.7	4.3	0.6	$t(59) = 12.4$
9. Using AI tools helps me understand the meaning of English texts better.	2.9	0.7	4.1	0.5	$t(59) = 11.2$
10. I feel more capable of tackling difficult English reading tasks with AI assistance.	2.8	0.8	4.2	0.5	$t(59) = 12.1$
11. AI tools make me feel more comfortable and confident in reading English.	3.1	0.6	4.3	0.5	$t(59) = 11.7$
12. I am more willing to read English materials when I have access to AI tools.	3.0	0.6	4.2	0.5	$t(59) = 11.3$

The table 2 presents pre- and post-intervention mean scores (M) and standard deviations (SD) for statements related to confidence in reading among Thai EFL learners after using AI tools. Each statement addresses an aspect of students' confidence in reading English with AI support. For instance, the mean score for the statement "I feel confident in my ability to understand English texts with the help of AI tools" increased from 3.0 (SD = 0.7) pre-intervention to 4.3 (SD = 0.6) post-intervention, indicating a significant improvement in students' confidence. Similarly, the statement "Using AI tools helps me understand the meaning of English texts better" showed an increase from a pre-intervention mean of 2.9 (SD = 0.7) to a post-intervention mean of 4.1 (SD = 0.5). Other statements also reflect this positive trend, such as "I feel more capable of tackling difficult English reading tasks with AI assistance," which rose from 2.8 (SD = 0.8) to 4.2 (SD = 0.5), and "AI tools make me feel more comfortable and confident in reading English," which improved from 3.1 (SD = 0.6) to 4.3 (SD = 0.5). The final statement, "I am more willing to read English materials when I have access to AI tools," also saw an increase from 3.0 (SD = 0.6) to 4.2 (SD = 0.5). These findings suggest that AI tools significantly enhanced students' confidence in reading tasks, making them feel more capable and comfortable with English reading materials.

Table 3 Engagement and Motivation in Reading Among Thai EFL Learners Using AI Tools

Statement	Pre-Intervention		Post-Intervention		t-test
	M	SD	M	SD	
Engagement and Motivation in Reading					
13. I enjoy reading English texts more when I use AI tools for assistance.	3.0	0.7	4.3	0.6	t(59) = 12.0
14. AI tools make reading English texts more interesting and engaging.	2.9	0.8	4.2	0.5	t(59) = 11.9
15. With AI assistance, I am more motivated to read English texts outside of class.	2.7	0.8	4.1	0.5	t(59) = 11.8
16. I pay more attention and am more engaged when reading English with AI tools.	2.8	0.9	4.1	0.6	t(59) = 10.5
17. I would prefer to continue using AI tools in future reading tasks.	3.1	0.7	4.4	0.6	t(59) = 12.5

The table 3 displays pre- and post-intervention mean scores (M) and standard deviations (SD) for statements related to engagement and motivation in reading among Thai EFL learners after using AI tools. Each statement explores an aspect of how AI tools impacted students' enjoyment, interest, motivation, and engagement in reading English texts. For example, the mean score for the statement "I enjoy reading English texts more when I use AI tools for assistance" increased from 3.0 (SD = 0.7) to 4.3 (SD = 0.6), indicating that students found reading more enjoyable with AI support. Similarly, "AI tools make reading English texts more interesting and engaging" rose from a mean of 2.9 (SD = 0.8) to 4.2 (SD = 0.5), showing a marked increase in interest. Other statements also demonstrated significant improvements, such as "With AI assistance, I am more motivated to read English texts outside of class," which increased from 2.7 (SD = 0.8) to 4.1 (SD = 0.5), and "I pay more attention and am more engaged when reading English with AI tools," which rose from 2.8 (SD = 0.9) to 4.1 (SD = 0.6). The final statement, "I would prefer to continue using AI tools in future reading tasks," increased from 3.1 (SD = 0.7) to 4.4 (SD = 0.6), indicating a strong preference for continued AI use. Overall, these findings suggest that AI tools significantly enhanced students' engagement and motivation in English reading activities.

To answer the research Question 2) In what ways does AI build confidence and engagement in reading tasks?

The results demonstrate a notable increase in students' confidence and engagement in reading tasks when supported by AI. As shown in Table 2, confidence in reading improved substantially. For example, the mean score for "I feel confident in my ability to understand English texts with the help of AI

tools" rose from 3.0 (*SD* = 0.7) to 4.3 (*SD* = 0.6). Additionally, the belief that AI tools made difficult English reading tasks more manageable increased from a mean of 2.8 (*SD* = 0.8) to 4.2 (*SD* = 0.5). Table 3 highlights improvements in engagement and motivation. The statement "I enjoy reading English texts more when I use AI tools for assistance" increased from 3.0 (*SD* = 0.7) to 4.3 (*SD* = 0.6), suggesting that AI tools made reading tasks more enjoyable. Similarly, motivation to read English outside the classroom increased from 2.7 (*SD* = 0.8) to 4.1 (*SD* = 0.5). The preference for continued AI use in reading tasks also rose, with the statement "I would prefer to continue using AI tools in future reading tasks" scoring an increase from 3.1 (*SD* = 0.7) to 4.4 (*SD* = 0.6).

5. Conclusion, Discussion and Implications

5.1 Conclusion

The findings of this study underscore the significant role of AI-assisted tools—ReadAI, Lexia, Speakify, and SmartRead—in transforming the reading experiences of Thai EFL learners. Each tool provided distinct yet complementary support mechanisms that collectively addressed critical challenges in reading. ReadAI excelled in real-time feedback and vocabulary support, alleviating learners' anxiety over complex texts. Lexia's interactive prompts and adaptive features promoted incremental skill development, enhancing comprehension and self-assurance. Speakify encouraged active engagement through pronunciation practice and fluency feedback, building confidence in oral reading. Finally, SmartRead's personalized recommendations and comprehension quizzes sparked motivation and fostered sustained interest in reading tasks. Collectively, these AI tools created a supportive, engaging, and learner-centered environment that not only reduced reading anxiety but also bolstered confidence and enthusiasm, demonstrating their potential as powerful adjuncts to traditional EFL teaching methods. These results highlight the promise of AI-driven innovations in creating inclusive and dynamic learning ecosystems.

5.2 Discussion

The findings from this study indicate that AI tools positively influence reading anxiety and engagement among Thai EFL learners, creating an encouraging environment for language learning by addressing critical affective and motivational aspects of reading in a foreign language. AI reading tools have a transformative impact on teaching and learning paradigms. Teachers transition from being primary sources of knowledge to facilitators of learning, using AI to personalize support for students. In addition, AI tools empower students to take a more active role in their learning, promoting autonomy and self-efficacy. This shift necessitates teacher training in effectively integrating AI into curricula to maximize its benefits. Using AI for teaching reading skills, therefore, helps reduce students' reading anxiety and enhance their confidence and engagement.

5.2.1 Reduction of Reading Anxiety

The results suggest that AI tools effectively reduce reading anxiety by providing learners with real-time feedback, vocabulary support, and comprehension assistance, which help them tackle challenging texts with greater ease. This aligns with findings from studies that emphasize how digital tools create a more supportive environment by minimizing anxiety-inducing factors such as unfamiliar vocabulary and lack of immediate clarification (Guo & Wang, 2024; Chen, 2022). The alleviation of reading anxiety among EFL learners is particularly critical, as anxiety has been shown to correlate negatively with reading comprehension and motivation (Sparks & Ganschow, 1991; Zhao et al., 2023). By reducing apprehension, AI tools enable students to engage with reading tasks without the fear of misunderstanding or failure, supporting previous research that highlights the role of technology in reducing language anxiety (Hongnaphadol & Attanak, 2022). These tools, therefore, create a low-stakes environment where learners can experiment and interact with texts more freely, which is essential for lowering anxiety in EFL contexts (Yang, 2023).

5.2.2 Enhancement of Confidence and Engagement

The data also indicates that AI tools substantially enhance students' confidence in reading, empowering them to engage with English texts more actively. Confidence is crucial in EFL learning, as higher self-efficacy in language tasks directly correlates with improved performance and persistence in learning activities (Bandura, 1997). In line with this, students in the study reported feeling more capable of handling complex reading tasks with AI support, likely due to the personalized assistance and adaptive feedback provided by the AI tools (Hubbard, 2023). These tools' ability to provide individualized, consistent support encourages independent reading and nurtures autonomy, reducing reliance on teacher assistance, a finding consistent with earlier studies that highlight the role of digital tools in fostering learner independence (Stevenson & Phakiti, 2013).

Furthermore, the study's findings reflect a marked increase in engagement and motivation. The use of AI tools made reading tasks more interactive and appealing, which aligns with research suggesting that personalized and adaptive learning technologies enhance intrinsic motivation by making tasks more relevant and enjoyable for learners (Ryan & Deci, 2000). Motivation is essential in sustaining engagement with reading tasks outside the classroom, which in turn supports autonomous learning—a key factor for success in language acquisition (Dörnyei, 2001). The study's results reinforce the broader consensus in language pedagogy that technology can serve as a motivational tool by making learning more interactive and accessible (Al-Shehab, 2020).

5.3 Implications

The study demonstrates that AI tools can significantly reduce reading anxiety and enhance confidence and engagement in Thai EFL learners. The positive effects of AI-assisted tools imply that integrating these technologies into EFL classrooms could offer valuable support for students struggling with

reading tasks, fostering a more inclusive and motivating environment. Teachers could consider incorporating AI tools into their curriculum to provide personalized feedback and assistance, which may help students overcome common language learning barriers. Future research could explore the long-term impacts of AI on reading skills and investigate how these tools might benefit other language competencies, such as writing or speaking, across diverse EFL contexts.

In addition, the results of this study suggest a new classroom model for AI-assisted reading, integrating AI tools across instruction stages to enhance learning. Firstly, pre-class preparation step uses tools like ReadAI and Speakify for vocabulary, comprehension, and fluency practice, reducing anxiety and boosting confidence. Secondly, for the in-class step, teachers act as facilitators, using AI insights to guide discussions and group problem-solving, fostering collaboration and engagement. Lastly, for the post-class step, students independently complete personalized tasks, summarize key ideas, and practice fluency, promoting autonomy and retention. Finally, AI analytics and student feedback help evaluate progress and refine teaching strategies, creating an adaptive and effective learning environment.

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The Role of Artificial Intelligence (AI) in Enhancing Secondary School Students' Mastery of Simple, Compound, Complex, and Compound-Complex Sentences

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Abstract

This study examines the role of Artificial Intelligence (AI) in enhancing secondary school students' comprehension of simple, compound, complex, and compound-complex sentences. AI-powered learning tools provide personalised feedback and adaptive learning, which increases grammatical accuracy and interest. This experimental study included 80 students by using purposive sampling and divided into two groups: 40 students of experimental group using AI tools and 40 students of control group that received traditional education. The instruments included AI platforms like Grammarly and ProWritingAid, as well as pre- and post-tests and questionnaires. Data were collected over an eight-week period using interactive AI sessions for the experimental group and normal teacher-led grammar classes for the control group. The findings indicated that the post-test total mean score was higher than the pre-test mean score with a significant level of .01. The experimental group outperformed the control group in sentence structure mastery, with a significant effect size (Cohen's d = 1.02). This improvement emphasises AI's capacity to provide fast, personalised feedback that improves learning outcomes. The findings suggest that AI-based tools can be a valuable supplement to traditional grammar instruction, promoting both skill development and student engagement. The study underscores the potential of AI to revolutionize grammar teaching by offering real-time and individualized learning experiences.

Keywords: AI-powered learning tools; grammar instruction; secondary school students; sentence structure mastery

1. Introduction

1.1 Background of the study

In recent years, artificial intelligence (AI) has become increasingly prominent in educational contexts, transforming how learners engage with content, receive feedback, and master complex linguistic concepts. The application of AI in language learning is particularly promising, as it offers personalized learning pathways and instantaneous feedback, which can support the acquisition of essential language skills. English is employed in various fields, including international relations, politics, commerce, technology, entertainment, and education (Charunsri & Sripicharn, 2023). One area where AI demonstrates significant potential is in grammar instruction, specifically in helping students master different sentence structures, such as simple, compound, complex, and compound-complex sentences. Sentence structure plays a fundamental role in language proficiency and effective communication, and mastering it can contribute to improved writing clarity and coherence (Garg & Sharma, 2020).

Students learning English as a second language (ESL) or English as a foreign language (EFL) often struggle with syntactic complexity due to differences in sentence structure between English and their native languages (Anderson, & Anderson, 2003). These syntactic challenges may lead to common grammatical errors, which in turn impact the clarity and effectiveness of students' written and spoken English. Studies have shown that explicit instruction on sentence types can improve students' syntactic awareness, which is essential for both academic success and communicative competence (Ellis, 2009). However, traditional methods of grammar instruction, which often rely on rote memorization and limited contextual application, can fail to engage students or address individual learning gaps. In response, educators are exploring AI-driven tools that can provide more interactive and adaptive grammar instruction, catering to the diverse needs of students and allowing for immediate, formative feedback.

AI has a notable impact on language learning by facilitating personalized experiences. For example, AI tools offer tailored feedback on sentence construction, allowing students to focus on their specific areas of difficulty (Mallillin, 2024). Furthermore, interactive AI platforms have been shown to increase student engagement in language classes, contributing to a greater mastery of complex sentence structures (Yun, 2024). The integration of AI in education not only provides timely feedback but also promotes positive attitudes toward learning, resulting in marked improvements in writing skills (Kaharuddin et al., 2024).

Despite these benefits, challenges remain in balancing AI use with traditional teaching methods. Some educators' express concerns about students becoming overly dependent on technology, emphasizing the need for a balanced approach that integrates AI with human instruction (Yun, 2024). Additionally, the effectiveness of AI programs can vary depending on students' initial language proficiency and their level of engagement with the technology. These considerations suggest that while AI is a powerful tool, its success depends on thoughtful implementation alongside conventional teaching strategies.

1.2 Statement of the Problem

In Thailand, English is utilised as a foreign language, thus teachers try to discover the most effective way to help students strengthen their English skills for the purpose to meet international trends (Charunsri, 2019). Mastering sentence structure is a core aspect of language proficiency, yet students—especially those learning English as a second language (ESL) or foreign language (EFL)—often struggle with constructing sentences that are syntactically accurate and varied in complexity. In particular, students commonly face challenges when distinguishing and correctly applying different sentence types, such as simple, compound, complex, and compound-complex sentences. These four sentence types are foundational to clear and effective communication, as they allow writers to convey ideas with appropriate nuance, coherence, and emphasis. The inability to use a range of sentence structures not only hinders students' written expression but also impacts their reading comprehension and spoken communication, ultimately limiting their overall language development and academic success (Ellis, 2009).

Traditional grammar instruction methods, which often emphasize memorization and repetitive drills, have proven to be insufficient for fostering deep understanding and practical application of sentence structures. In conventional classroom settings, students may not receive the individualized attention and feedback needed to fully grasp the nuances of different sentence types (Chomsky, 2006). Additionally, teachers may struggle to provide timely, targeted feedback for every student, especially in larger classes where the diversity of skill levels further complicates individualized instruction. As a result, many students do not achieve mastery in constructing various sentence types, which leads to persistent grammatical errors and limits their ability to convey complex ideas effectively.

With the advent of artificial intelligence (AI) technologies in education, there is potential to address these limitations by offering interactive, adaptive, and personalized grammar instruction. AI-driven tools, such as intelligent tutoring systems and natural language processing applications, provide real-time feedback and customized exercises that adjust to each learner's proficiency level. However, despite AI's capabilities, there remains limited empirical evidence on its specific impact on students' ability to master sentence structures, particularly within the context of simple, compound, complex, and compound-complex sentences. Existing research on AI in language education has largely focused on vocabulary acquisition and reading comprehension, with fewer studies examining its effectiveness in grammar and syntax acquisition (Heffernan & Heffernan, 2014; Warschauer, 2007).

Thus, there is a need to investigate how AI tools can support students in mastering various sentence types, bridging the gap between theoretical knowledge and practical language skills. This study aims to address this gap by examining the effectiveness of AI-driven grammar instruction in enhancing students' syntactic abilities, with a focus on improving their understanding and application of simple, compound, complex, and compound-complex sentences. By exploring this problem, the research seeks to contribute

to the growing body of knowledge on AI in language learning and provide insights into how technology can be harnessed to improve grammatical proficiency in diverse learning contexts.

1.3 Significance of the Study

This study is significant for several reasons. First, it addresses a critical challenge in language education by exploring how AI can enhance students' mastery of sentence structure, specifically in constructing simple, compound, complex, and compound-complex sentences. Sentence variety and syntactic complexity are essential for clear and effective communication, particularly in academic and professional contexts where nuanced expression and structural flexibility are valued. Mastery of these sentence types can lead to improved writing clarity, coherence, and overall language proficiency, which are critical for students' academic and career success.

Additionally, this study contributes to the field of educational technology by examining the effectiveness of AI-driven tools in grammar instruction. While AI has been widely adopted in other areas of language learning—such as vocabulary acquisition and pronunciation practice—its specific application to syntax and sentence structure remains underexplored. By investigating AI's role in grammar instruction, this study offers insights into how technology can provide tailored, immediate feedback and adapt to individual learners' needs, enhancing the personalization of language education. This approach has the potential to address limitations in traditional grammar instruction, such as a lack of individualized feedback and limited engagement.

1.4 Literature Review

1.4.1 The Importance of Sentence Structure in Language Proficiency

Sentence structure mastery is a critical component of language proficiency, encompassing the ability to construct sentences that are grammatically correct, varied in complexity, and contextually appropriate. Research has shown that syntactic diversity—including the use of simple, compound, complex, and compound-complex sentences—enhances clarity and depth in written and spoken communication, enabling students to express ideas more effectively (Liu & Zhang, 2017). In ESL and EFL contexts, mastering sentence structure helps students develop nuanced, cohesive, and contextually rich communication skills. Chomsky's theories on syntax highlight that understanding grammatical structure goes beyond memorization; it requires internalizing linguistic patterns to enhance comprehension and production (Chomsky, 2006).

However, studies indicate that many students struggle with sentence variation, often defaulting to simpler structures or making errors when attempting more complex forms. This challenge can be especially pronounced in multilingual classrooms, where students' native languages may have different syntactic norms (Ellis, 2009). Addressing these challenges through tailored instruction could significantly improve students' language proficiency, underlining the importance of integrating structured sentence instruction into language education. This research aims to build on existing work by exploring whether AI tools can

address these instructional needs effectively, providing a dynamic approach to mastering sentence structures.

1.4.2 Challenges of Traditional Grammar Instruction

Traditional grammar instruction frequently emphasizes rote memorization, isolated drills, and rigid exercises, which do not adequately engage students or support meaningful language development. This approach often leads to a surface-level understanding of grammar rules, without fostering students' ability to apply these rules in authentic contexts (Chomsky, 2006). Instructors, especially in larger classes, may struggle to provide timely and personalized feedback that can address each student's unique errors and learning needs. Research has shown that grammar learning is more effective when students can actively engage with language through practice, experimentation, and contextualized feedback (Brown, 2021). Unfortunately, traditional methods often lack these interactive and adaptive elements, which are essential for developing proficiency in sentence structure. The challenges inherent in conventional grammar instruction highlight the need for innovative approaches that support differentiated learning and encourage active engagement. Addressing these challenges is particularly relevant in language classrooms where students exhibit varied skill levels, as personalized support can significantly impact their progress in mastering sentence structures.

1.4.3 Traditional vs. AI-Enhanced Grammar Instruction

Traditional grammar instruction methods, often characterized by rote learning and repetitive exercises, have been critiqued for their limited impact on students' ability to apply grammatical concepts in real-world contexts. Studies suggest that such methods may not adequately address individual learning needs or foster long-term retention (Liu & Zhang, 2019). Traditional instruction typically lacks the immediacy and adaptability that can effectively reinforce concepts such as sentence structure mastery, especially for complex syntactic forms. In contrast, AI-enhanced grammar instruction offers a personalized, interactive learning experience that can adapt to each student's pace, proficiency level, and specific challenges.

AI-driven tools can provide real-time feedback, helping students correct errors immediately and internalize grammatical structures through continuous practice (Tiang-Uan,2024). Research by Heffernan and Heffernan (2014) supports the use of AI in language learning, indicating that students benefit from tailored feedback and adaptive learning paths that traditional classrooms often cannot provide. By comparing these two instructional approaches, this study explores how AI can address the limitations of traditional grammar instruction, providing a more effective means for students to achieve syntactic mastery in sentence structure.

1.4.4 AI in Language Learning and Grammar Instruction

AI technology is revolutionizing language learning by providing personalized, interactive, and adaptive experiences that address students' unique linguistic challenges. In traditional classroom settings, students often face a one-size-fits-all approach to grammar instruction, where exercises and feedback are generalized

rather than tailored to each learner's specific needs. However, AI-driven language learning platforms introduce a new paradigm where instruction can be customized, addressing individual proficiency levels, learning speeds, and areas of difficulty. These AI tools are particularly useful in grammar instruction, where precise feedback and gradual skill-building are essential for mastery (Rebolledo & Fabian, 2023).

One of the primary ways AI enhances grammar instruction is through the use of intelligent tutoring systems, which simulate one-on-one tutoring by assessing each learner's performance in real time. These systems are designed to analyze students' language use and detect grammatical errors in sentence structure, such as incorrect syntax, misplaced modifiers, or inconsistent tense usage. For example, an AI system can immediately identify when a student misuses a complex sentence structure and provide corrective feedback that guides the student toward constructing a grammatically sound sentence. Research has shown that this type of timely, specific feedback is more effective than delayed correction, as students can instantly see where they went wrong and correct their understanding while it is still fresh (Heffernan & Heffernan, 2014).

Another critical advantage of AI in grammar instruction is adaptive learning. Unlike traditional methods, where students complete the same set of exercises regardless of their mastery level, AI systems can dynamically adjust the difficulty and type of exercises based on ongoing assessments of the student's abilities. For instance, a student who shows proficiency with simple sentence structures may be guided toward practicing compound or complex sentences, allowing them to gradually build syntactic complexity without becoming overwhelmed. Similarly, students struggling with compound-complex sentences may receive additional scaffolded practice that builds foundational skills step-by-step. This adaptive approach not only maintains engagement but also ensures that learners receive just the right level of challenge to promote growth without frustration (Schmidt & Strasser, 2022).

Natural language processing (NLP), a branch of AI, plays a crucial role in making these grammar instruction tools effective. NLP enables the system to "understand" the structure of language at a sophisticated level, making it possible to accurately evaluate sentence structure, word choice, and syntax in students' writing. Through NLP, AI-driven tools can offer feedback that goes beyond simple grammar checks and addresses more complex syntactical issues, such as whether a sentence's structure fits the intended meaning or maintains appropriate coherence. NLP also facilitates the system's ability to suggest alternative ways of phrasing sentences, helping students learn through exploration and comparison of different sentence structures (Khensous et al., 2023).

Despite these promising developments, research on AI's specific impact on grammar mastery, particularly with regard to constructing simple, compound, complex, and compound-complex sentences, is still limited. Most existing studies on AI in language learning focus on vocabulary acquisition, pronunciation, and reading comprehension, with grammar instruction receiving comparatively less attention (Warschauer, 2007). This gap highlights the importance of further investigation into how AI can support

grammar and syntax development, particularly for ESL/EFL students who may benefit most from this personalized, feedback-rich approach. By examining AI's effectiveness in improving sentence structure proficiency, this study seeks to contribute to the understanding of AI's potential to enhance language education, laying groundwork for future innovations in AI-driven grammar instruction.

2. Research Objectives

This research, The Role of AI in Enhancing Students' Mastery of Simple, Compound, Complex, and Compound-Complex Sentences, aimed to;

2.1 examine how AI-powered learning tools improve secondary school students' understanding and construction of simple, compound, complex, and compound-complex sentences compared to traditional methods.

2.2 investigate the opinions of students toward AI-based learning tools.

3. Research Methodology

3.1. Research Design

This study employed experimental research design to examine the impact of AI-powered learning tools on secondary school students' mastery of sentence structures. A pre-test/post-test design with a control group was used to compare the performance of students who receive AI-based instruction with those who receive traditional grammar instruction. The research is conducted over a period of eight weeks. Students will be divided into two groups: the experimental group, which used AI-powered tools for learning sentence structures, and the control group, which followed traditional classroom instruction. The performance of both groups was evaluated before and after the intervention using a pre-test and post-test that assesses their ability to identify and construct simple, compound, complex, and compound-complex sentences.

3.2. Participants

This study involved 80 secondary school students from the school located in an urban district in Thailand. The participants, ranging in age from 15 to 17 and in grades 10, had access to either computer labs or personal devices to use AI tools in the classroom. To ensure that the students were appropriate for the study, purposive sampling was employed. The selection criteria included intermediate proficiency in English, as determined by prior course grades or standardized English proficiency tests, and no prior extensive experience with AI-based grammar learning tools. The participants were divided into two groups for the study. The experimental group, consisting of 40 students, used AI-based learning platforms to enhance their mastery of sentence structures. Meanwhile, the control group, also consisting of 40 students, received traditional teacher-led grammar instruction. Both groups were carefully matched in terms of English proficiency, age, and gender to ensure that any observed differences in learning outcomes could be attributed to the AI tools rather than other variables.

3.3. Instruments

The instruments used for data collection included the following:

3.3.1 AI-Based Learning Tools

The AI-based tools for the experimental group included Grammarly and ProWritingAid, both of which provided real-time feedback on sentence structure and grammar. The students used these platforms during grammar lessons to practice constructing and identifying sentence types. The AI tools offered personalized suggestions and corrections, enabling students to engage in self-paced learning.

3.3.2 Pre-test and Post-test

To evaluate students' knowledge of sentence structures before and after the intervention, a researcher-designed test was administered. This test measured their ability to identify and construct simple, compound, complex, and compound-complex sentences. It consisted of 20 multiple-choice questions focused on identifying sentence types, providing a clear assessment of the students' understanding of different grammatical structures. In addition to multiple-choice questions, the test included sentence-completion tasks and writing exercises to further assess students' application of sentence structures. The sentence-completion section featured five tasks where students had to use appropriate conjunctions to complete given sentences. Additionally, two writing exercises required students to compose short paragraphs that incorporated various sentence types, offering insight into their practical use of sentence structures in writing. The test was validated by three experts using the index of Item Objective Congruence (IOC). The IOC score reached 0.81.

3.3.3. Questionnaire

After the post-test, a questionnaire was administered to the experimental group to gather opinion on using AI tools. The questionnaire included both Likert-scale items (ranging from 1 to 5). The questionnaire was validated by three experts. The result of Index of Item Objective Congruence (IOC) was equal to 0.89.

3.4. Data Collection

Data collection proceed as follows:

3.4.1. Pre-test

All participants took a pre-test at the beginning of the study to assess their baseline knowledge of simple, compound, complex, and compound-complex sentences. The test took approximately 45 minutes to complete and was administered in the classroom.

3.4.2. Intervention

In the experimental group, students used AI-powered platforms like Grammarly and ProWritingAid to practice sentence structure during their regular English classes. These students engaged in interactive exercises and received personalized feedback from the AI tools, which provided real-time corrections and suggestions as they constructed sentences. Each lesson focused on a different sentence type, ensuring comprehensive coverage of grammar topics. The intervention lasted eight weeks, with students utilizing the

AI tools for two 60-minute sessions per week, allowing ample time for practice and feedback. In contrast, the control group received traditional grammar instruction led by their English teacher. Instead of AI-based tools, these students relied on textbook exercises and teacher-led explanations to learn the same sentence structures. Over the eight-week period, the control group also had two 60-minute grammar sessions per week, but without the benefit of AI-generated feedback. This setup allowed for a direct comparison between the effectiveness of AI-supported learning and traditional teaching methods.

3.4.3. Post-test

After the eight-week intervention, both groups took a post-test identical in format to the pre-test. This measured improvements in simple, compound, complex, and compound-complex sentences. The test took approximately 45 minutes to complete and was administered in the classroom.

3.4.4. Questionnaire

At the end of the intervention, the experimental group completed a questionnaire regarding their experiences with the AI tools.

3.5. Data Analysis

Data from the pre-test, post-test, and questionnaire were analysed using the following methods:

3.5.1. Quantitative Data Analysis

To measure the improvement in students' mastery of sentence structures, both pre-test and post-test scores were analysed. A paired t-test was conducted within each group to assess the students' progress from the pre-test to the post-test, providing insight into how much each group had improved. Additionally, an independent t-test was used to compare the post-test scores between the experimental and control groups. This comparison helped determine whether the use of AI tools, such as Grammarly and ProWritingAid, led to significantly higher learning outcomes compared to traditional instruction. To further evaluate the impact of the AI intervention, Cohen's d was calculated to determine the effect size, or the magnitude of the difference between the groups. This calculation highlighted the practical significance of the AI-powered learning tools, indicating whether the observed improvements in the experimental group were substantial enough to suggest that the AI intervention was an effective method for enhancing students' sentence structure mastery. This analysis provided valuable insight into the overall effectiveness of integrating AI in learning.

3.5.2. Qualitative Data Analysis

To gain insights into students' perceptions of the AI tools, the study analyzed questionnaire responses using descriptive statistics for the Likert-scale items.

3.6. Ethical Considerations

The research strictly adhered to ethical guidelines designed to protect the rights and well-being of all participants involved in the study. One of the primary ethical considerations is informed consent. Before the study begins, written consent was obtained from all participants and their parents or guardians.

Participants received comprehensive information regarding the purpose of the research, the procedures involved, and their rights, including the ability to withdraw from the study at any time without facing any penalties.

Confidentiality is another key aspect of the ethical framework guiding this research. The identities of all participants were kept confidential, and all data collected was anonymized. Lastly, to promote equity and fairness, all students in the control group was granted access to the AI tools after the research is completed. This ensures that they benefit from the same learning opportunities as their peers in the experimental group. Additionally, the study prioritized the minimization of risk, ensuring that the intervention does not impose any psychological or academic harm. The AI tools was seamlessly integrated into regular classroom activities, minimizing disruptions to the students' typical learning routines and creating a supportive educational environment.

4. Research Results and Discussion

The data were analysed to compare the performance of the experimental and control groups. The pre-test and post-test results and questionnaire responses were used to assess the impact of AI-based tools on students' mastery of sentence structures.

4.1 Pre-Test and Post-Test Scores

4.1.1. Descriptive Statistics

Before the intervention, both groups completed a pre-test to assess their baseline knowledge of sentence structures. After the eight-week intervention, both groups completed a post-test to measure improvement. The results are presented in Table 1.

Table 1 Pre-Test and Post-Test Mean Scores

Group N = 40	Measure	Pre-Test Mean Score	Post-Test Mean Score	t-value	P- value	Effect Size (Cohen's d)
Experimental	Paired t-test	60.25	80.35	14.52	*0.001	1.02
Control	Paired t-test	59.85	70.75	7.90		
Comparison	Independent t-test (post-test scores)	-	-	6.30		

According to table1, a paired t-test was conducted to examine the improvement in pre-test and post-test scores for both the experimental and control groups. In the experimental group, the mean score significantly increased from 60.25 (SD = 9.35) to 80.35 (SD = 8.10), with a t-value of 14.52 and a p-value of less than 0.001, indicating a highly significant improvement. The control group also showed notable

progress, with their mean score rising from 59.85 (SD = 8.90) to 70.75 (SD = 7.80), yielding a t-value of 7.90 and a similarly significant p-value. However, the experimental group demonstrated a more substantial improvement in their mastery of sentence structures. An independent t-test comparing post-test scores between the groups revealed a statistically significant difference, t (78) = 6.30, p < 0.001, with the experimental group outperforming the control group. Cohen's d was calculated to be 1.02, indicating a large effect size, suggesting that the AI-based learning tools had a considerable impact on enhancing students' mastery of sentence structures.

4.2 Questionnaire Results

In this part, the findings from the questionnaire taken from the 5-point Likert scale used by the students in experimental group presented the mean score and standard deviation (SD) of the answers for every question. The 5-point Likert scale results of the questionnaire included strongly agree, agree, uncertain, disagree, and strongly disagree. The questionnaire items were statistically analyzed and interpreted by using the standardize criteria as follows:

4.51 – 5.00 strongly agree

3.51 – 4.50 agree

2.51 – 3.50 uncertain

1.51 – 2.50 disagree

1.00 – 1.50 strongly disagree

Table 2 The Opinions of Students Toward AI-Based Learning Tools

Item	Mean	SD	Interpretation
1. AI-based learning tools can be a valuable supplement to English learning.	4.57	0.51	strongly agree
2. AI-based learning tools develop mastery of your simple sentences.	4.43	0.50	agree
3. AI-based learning tools develop mastery of your compound sentences.	4.23	0.65	agree
4. AI-based learning tools develop mastery of your compound-complex sentences.	4.10	0.62	agree
5. AI-based learning tools promote students' engagement in classroom.	4.12	0.46	agree
6. AI-based learning tools provide real-time feedback.	4.32	0.69	agree
7. AI-based learning tools offer individualized learning experiences.	3.95	0.59	agree
Total	**4.24**	**0.57**	**agree**

According to table2, the participants agreed that AI-based learning tools can be a valuable supplement to English learning (M = 4.57; SD = 0.51), AI-based learning tools develop mastery of simple sentences (M = 4.43; SD = 0.50). AI-based learning tools develop mastery of compound sentences (M = 4.23; SD = 0.65). AI-based learning tools develop mastery of your compound-complex sentences (M = 4.10; SD = 0.62). AI-based learning tools promote students' engagement in classroom (M = 4.12; SD = 0.46). AI-based learning tools provide real-time feedback. (M = 4.32; SD = 0.69). In addition, they agreed that AI-based learning tools offer individualized learning experiences (M = 3.95; SD = 0.59).

5. Discussion

The findings from this study demonstrate that AI-powered learning tools significantly enhance secondary school students' mastery of sentence structures, particularly in constructing and identifying simple, compound, complex, and compound-complex sentences. When compared to the control group, which received traditional teacher-led instruction, the experimental group that used AI tools showed notably higher gains in sentence structure mastery. These results contribute to the growing body of research on the use of AI in education and align with the positive effects observed in previous studies.

5.1 Improvement in Sentence Structure Mastery

The significant improvement in sentence structure mastery observed in the experimental group (mean gain = 20.10) compared to the control group (mean gain = 10.90) supports the efficacy of AI-powered tools in enhancing grammar learning. This finding is consistent with previous research that highlights the benefits of AI tools in language learning. For example, Li and Xu (2021) found that AI-powered tools like Grammarly improved learners' writing accuracy by providing real-time feedback, allowing students to make immediate corrections and reflect on their errors. Similarly, research by Chang et al. (2021) reported that students using AI-based writing assistants demonstrated greater improvement in grammar and syntax accuracy compared to those receiving traditional instruction. The large effect size (Cohen's d = 1.02) further underscores the practical significance of the AI intervention. This finding suggests that AI tools offer a highly impactful way to support students in mastering complex sentence structures, a result that echoes other studies emphasizing the ability of AI tools to provide individualized and scalable grammar instruction (Bikowski & Vithanage, 2016).

5.2 Students' Opinions toward AI-Based Learning Tools

The questionnaire results provide insight into students' positive perceptions of AI-powered learning tools. Participants strongly agreed that these tools serve as valuable supplements to English learning (M = 4.57; SD = 0.51) and promote the mastery of sentence structures. The ability of AI tools to support engagement (M = 4.12; SD = 0.46) and provide real-time feedback (M = 4.32; SD = 0.69) highlights their interactive and responsive nature, which likely enhances students' motivation and understanding. Students also recognized the individualized learning experiences offered by these tools (M = 3.95; SD = 0.59), which

could cater to diverse learning paces and styles, further differentiating them from traditional teaching methods. This finding aligns with research by Sukamolson et al. (2019), who found that AI-based language platforms increased student engagement by offering interactive and personalized learning experiences. AI tools like Grammarly and ProWritingAid provide immediate, actionable feedback that empowers students to take control of their own learning, promoting active engagement rather than passive learning.

Moreover, the real-time nature of AI feedback helps foster a sense of autonomy and self-regulation in learners, a key factor in increasing motivation, as noted by Dörnyei (2001). The higher levels of engagement observed in this study are consistent with the self-regulated learning theory, which suggests that tools enabling students to monitor and control their learning process led to greater intrinsic motivation (Zimmerman, 2002). By allowing students to experiment with sentence structures and receive instant corrections, AI tools encourage a more interactive and motivating learning environment.

6. Implications for AI-Based Learning Tools

The findings of this study provide evidence that AI-powered tools can be a valuable supplement to traditional grammar instruction. The personalized, real-time feedback provided by AI tools appears to facilitate deeper learning by enabling students to immediately apply corrections and practice constructing more complex sentences. This aligns with research by Hind (2024), who found that AI-driven feedback systems helped students make more informed revisions, leading to long-term improvements in writing skills. Additionally, the increased engagement and motivation reported by students in the experimental group suggest that AI tools not only improve learning outcomes but also make grammar instruction more enjoyable. By integrating AI tools into classroom instruction, educators can create more dynamic and student-centered learning environments. This has important implications for the future of language education, particularly in contexts where individualized instruction is difficult to provide due to large class sizes or limited teaching resources.

7. Limitations and Future Study

Despite the positive results, several limitations must be acknowledged. First, the intervention period was relatively short (eight weeks), which limits the ability to assess the long-term effects of AI tools on sentence structure mastery. Future studies should extend the duration of the intervention to evaluate the sustained impact of AI-powered learning. Additionally, this study was conducted in an urban district in Thailand, so the results may not be generalizable to other contexts, such as rural schools or regions with different access to technology. Expanding research to diverse educational settings is crucial to understanding the broader applicability of AI tools in grammar instruction. Furthermore, this study focused exclusively on sentence structure mastery. Future research could explore the potential of AI tools in other areas of grammar, such as punctuation, verb tenses, and syntax. The ability of AI to provide personalized feedback

across a range of grammar topics could lead to more comprehensive improvements in students' writing and overall language proficiency.

8. Recommendations

Based on the results of this study, several recommendations emerge for educators, curriculum developers, and researchers aimed at enhancing grammar instruction. First, integrating AI-powered tools into English language curricula is essential, as the significant improvements in sentence structure mastery among students suggest that these tools can effectively complement traditional grammar instruction. By offering real-time, personalized feedback, AI tools enable students to identify and correct their errors, thereby enhancing their learning experience. Furthermore, both teachers and students should receive training on how to utilize these platforms effectively to maximize their benefits. Teachers need strategies to incorporate AI tools into their lessons, while students should learn how to use these tools to promote self-directed learning.

In addition to training, future instructional designs should extend the use of AI tools to cover other grammar topics, such as verb tenses, punctuation, and syntax. The personalized nature of AI feedback can be leveraged to address a broader range of grammatical challenges. Moreover, encouraging students to reflect on the feedback provided by AI tools, rather than passively accepting corrections, will promote deeper learning and metacognitive skills. Teachers can facilitate this by designing activities that require students to analyze their errors and articulate how the AI feedback has contributed to their improvement. Lastly, longer-term studies should be conducted to assess the retention of grammar proficiency improvements over time, as well as the independent use of AI tools by students to enhance their learning beyond the classroom. Expanding research to various educational contexts, including rural schools and different age groups, will help determine the broader applicability of AI-powered grammar learning tools.

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Using Conversational Agents to Improve Listening for Understanding in English Language Learning

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Abstract

The study investigates the role of using conversational agents in improving listening comprehension among secondary school English learners. This research is significant due to its focus on leveraging interactive AI technologies to enhance language acquisition, particularly listening skills, in educational settings. The objectives are to evaluate the effectiveness of these agents in improving listening comprehension and to examine their impact on students' ability to understand spoken English in diverse contexts. The study employed a quasi-experimental design, involving 80 students aged 14-16, divided into an experimental group using conversational agents tool, Chatbot, and a control group utilizing traditional listening materials. The intervention spanned eight weeks, with 30-minute listening sessions conducted thrice weekly. Data collection included pre-tests and post-tests, engagement questionnaires, and classroom observations. Quantitative data were analyzed using paired and independent t-tests, revealing that the experimental group exhibited significantly higher improvements in comprehension, motivation, and engagement. The study implies that integrating conversational agents into language instruction can significantly enhance student outcomes by offering personalized and adaptive learning experiences.

Keywords: conversational agents; English as a Foreign Language (EFL interactive learning); listening comprehension; secondary school students

1. Introduction

1.1 Background of the Study

The study of using conversational agents in English language learning has gained attention due to their potential to improve engagement and enhance language acquisition. These agents offer personalized feedback and interactive learning experiences, which are particularly valuable for developing listening skills. By providing real-time dialogue opportunities, conversational agents create a more dynamic learning environment that supports students' language comprehension and retention.

AI conversational agents have demonstrated significant efficacy in improving language skills across speaking, listening, reading, and writing (Andika, 2023). Research shows that students using AI tools in EFL classes experience increased participation and engagement, further emphasizing the effectiveness of these tools in language learning (Yun, 2024). However, while students generally find AI tools beneficial for language practice, certain limitations, such as difficulty managing complex interactions or generating irrelevant responses, can occasionally hinder the learning experience (Alrajhi, 2024).

Moreover, conversational agents are highly adaptable, offering personalized learning experiences that align with individual proficiency levels. These tailored interactions help motivate learners and support independent study, making AI a valuable tool for diverse educational needs (Lee & Lim, 2023). To fully leverage the benefits of AI tools, integrating them into the language curriculum is crucial, allowing learners to experience more adaptive, responsive, and engaging language learning opportunities (Andika, 2023).

1.2 Statement of the Problem

Using conversational agents to improve listening for understanding in English language learning offers a promising solution for enhancing listening comprehension. By simulating natural conversations, these agents provide learners with opportunities to practice and improve their skills in a supportive environment. This interactive approach allows students to develop their listening and speaking abilities through real-time dialogue, making the learning experience more engaging and effective. Conversational agents have the potential to transform language education by facilitating more personalized and adaptive learning experiences.

One of the key advantages of conversational agents is their ability to tailor interactions to learners' proficiency levels, maintaining motivation and interest (Lee & Lim, 2023). These agents enable practice in a variety of contexts, such as job interviews or daily conversations, which helps learners build real-world communication skills (Qian et al., 2019). This flexibility allows students to apply their language knowledge in practical situations, enhancing their ability to communicate effectively in different environments.

However, implementing conversational agents also comes with challenges. Spoken language understanding (SLU) remains an area of difficulty, as factors like ambient noise and ungrammatical utterances can interfere with effective communication (Qian et al., 2019). Additionally, the effectiveness of

different chatbots varies, with some providing positive learning experiences while others may cause frustration, negatively impacting learner engagement (Hakim & Rima, 2022). These issues highlight the need for continuous improvement in AI technology to ensure consistent and meaningful learning experiences.

Looking ahead, further research is required to optimize the design and functionality of AI-based conversational agents. Developers must focus on creating tools that address diverse learning needs and improve the overall user experience (Xiao et al., 2023; Du & Daniel, 2024). By refining these tools, conversational agents can become even more effective in supporting language acquisition and enhancing listening comprehension.

Therefore, this research, Using Conversational Agents to Improve Listening for Understanding in English Language Learning, aim to 1) evaluate the effectiveness of conversational agents in improving listening comprehension among secondary school students, and 2) analyze the impact of real-time interaction with conversational agents on students' ability to understand spoken English in different contexts.

1.3 Significance of the study

The study of using conversational agents in English language learning is significant due to their potential to enhance language acquisition, engagement, and learner autonomy. These agents provide personalized, interactive experiences that cater to individual learning needs, creating a more effective learning environment. Research shows that AI chatbots significantly improve proficiency in listening, speaking, reading, and writing by offering tailored feedback and adaptive learning pathways, enabling learners to progress at their own pace (Andika, 2023; Abusahyon et al., 2023). Additionally, AI tools have been linked to increased student motivation and reduced anxiety, particularly in speaking and listening contexts, helping learners feel more confident and supported (Du & Daniel, 2024; Luo, 2024). Positive student experiences, such as enhanced comprehension and reduced writing anxiety, further highlight the supportive role of these agents in fostering a conducive learning atmosphere (Alrajhi, 2024). However, despite their many advantages, challenges in design and implementation remain, emphasizing the need for further research to optimize their use in education (Abusahyon et al., 2023).

1.4 Definition of Terms

1.4.1 Conversational AI agents, or chatbots, are AI-driven programs that simulate human conversations through text or voice, offering interactive language practice for learners. These agents adapt to users' inputs, creating personalized learning experiences, and provide real-time feedback to enhance language acquisition. Through their interactive nature, chatbots support learners in improving their language skills effectively.

1.4.2 Listening comprehension refers to the ability to understand and process spoken language in real-time. This skill involves recognizing words and phrases, as well as grasping contextual meaning in various conversations or audio inputs. By developing effective listening comprehension, learners

can enhance their overall communication skills, enabling them to engage more meaningfully in discussions and improve their learning outcomes.

2. Literature Review

2.1 The Importance of Listening for Understanding in Language Learning

Listening is a foundational skill in language acquisition, playing a crucial role in the development of other language skills such as speaking, reading, and writing. Listening for understanding involves not only recognizing words and phrases but also interpreting meaning, tone, and context. In language learning, listening comprehension is often seen as a passive skill, but it is actually an active process that requires learners to interpret, synthesize, and evaluate information in real-time (Vandergrift, 2015). This skill is especially important for English language learners, who need to be able to understand spoken language in various contexts, such as conversations, lectures, and media.

2.2 Challenges in Teaching Listening Skills

Teaching listening comprehension presents several challenges, especially in large classroom settings where individualized attention is limited. Traditional listening instruction often involves the use of audio recordings or videos, which can be passive and lack opportunities for interactive practice (Rost, 2011). Furthermore, students may struggle with understanding different accents, speech speeds, and conversational nuances. Without real-time feedback, learners may find it difficult to identify and correct their listening mistakes. As a result, there is a growing need for more interactive and engaging methods to teach listening for understanding.

2.3 AI in Language Learning

Advancements in artificial intelligence (AI) have opened new possibilities for enhancing language learning. AI technologies such as natural language processing (NLP), speech recognition, and machine learning are increasingly being integrated into language education. These technologies can analyze large amounts of data, adapt to learners' needs, and provide personalized learning experiences. In the context of language learning, AI tools have been used to develop language-learning applications, virtual tutors, and interactive platforms that help students practice listening, speaking, and other language skills (Lu, 2018). AI's ability to provide real-time feedback, track learner progress, and offer adaptive learning experiences makes it a promising tool for improving listening comprehension. Additionally, AI can simulate real-life communication scenarios, giving learners opportunities to practice listening in authentic contexts (Hwang et al., 2020).

3. Research Methodology

3.1 Research Design

This study uses a quasi-experimental design to evaluate the impact of the conversational agents on students' listening comprehension skills. The design incorporates a pre-test/post-test approach, with an

experimental group uses conversational agents tools and a control group relying on traditional listening exercises. Both groups will undergo an 8-week intervention, where they will participate in 30-minute listening sessions, three times per week. The primary goal is to assess the effectiveness of conversational agents tool in improving students' listening skills by comparing their pre-test and post-test scores. This design allows for a controlled comparison of outcomes, with both quantitative and qualitative data being collected.

3.2 Participants

The participants for this study will be 80 secondary school students aged 14 to 16, recruited from three schools in Chiang Mai, Thailand. These schools were selected due to their strong English language programs and willingness to participate. The sample will be divided evenly, with 40 students in the experimental group and 40 students in the control group. Participants will be chosen using convenience sampling, and selection criteria will require students to have an intermediate proficiency in English, determined through a placement test. Only students without prior experience using conversational agents' language learning tools will be included in the study. Written consent will be obtained from both students and their parents/guardians before participation.

3.3 Instruments

For the experimental group, the primary instrument was conversational agents tool, "Chatbot," designed to simulate real-world conversations and provide adaptive feedback to enhance listening skills. In the field of Educational Technology, CA (Conversational Agent) is a system designed to interact with users using natural language, either through text or speech, to enhance learning experiences. These agents can function in both textual-based and speech-based dialogues, depending on their design and purpose. First, Textual-Based CAs: Typically, these are chatbots that interact via written text in messaging interfaces, often integrated into learning management systems or standalone applications. For example Homework Assistance, Negotiated Learner Modeling, Learning Reinforcement, and others. Second, Speech-Based CAs: These agents interact via spoken language, making them more immersive and accessible for auditory learners, such as Language Learning, Personalized Learning Support, Social Learning, and so on. (Kerly et al., 2021; Allouch et al., 2021). In this research used Textual-Based CAs. This tool offered a variety of listening scenarios, including everyday conversations, academic settings, and travel-related dialogues, to ensure a broad range of practice opportunities. The control group used traditional listening materials sourced from the British Council, which mirrored the complexity and topics covered by Chatbot Both groups were assessed using the Cambridge English Listening Test (B1 Level), which served as both the pre-test and post-test to measure listening comprehension. Additionally, students complete a questionnaire at the end of the intervention to assess engagement and perceptions of the learning process.

3.4 Data Collection

Data will be collected at three key points: pre-test, during the intervention, and post-test. The pre-test will be administered in the first week of the study to establish a baseline of students' listening comprehension. During the intervention, the experimental group will interact with Chatbot for 30 minutes per session, 3 times a week, while the control group will complete traditional listening exercises at the same frequency and duration. After the 8-week intervention, a post-test will be administered to both groups using the same Cambridge English Listening Test. In addition to test scores, data will be collected through student engagement questionnaires and classroom observations to gather qualitative insights into students' experiences with both learning methods.

3.5 Data Analysis

Quantitative data from the pre-tests and post-tests will be analyzed using a paired t-test to determine whether there is a significant improvement in listening comprehension within each group. To compare the performance between the experimental and control groups, an independent t-test will be conducted. The effect size will also be calculated using Cohen's d to assess the practical significance of any differences between the groups. For the qualitative data, responses from the student engagement questionnaires will be summarized using descriptive statistics to identify trends in student motivation and satisfaction. Thematic analysis will be applied to focus group discussions and observational data to explore students' experiences with the AI tool and its perceived effectiveness. It uses the level of implementation analysis by calculating the arithmetic mean ($\bar{x}$), standard deviation (S.D.), and interpreting the average value as follows:

5: Mean 4.51–5.00 indicates "Strongly agree"

4: Mean 3.51–4.50 indicates "Agree"

3: Mean 2.51–3.50 indicates "Neither Agree nor Disagree"

2: Mean 1.51–2.50 indicates "Disagree"

1: Mean 1.00–1.50 indicates "Strongly disagree"

3.6 Ethical Considerations

Ethical considerations are a fundamental aspect of this research. Informed consent will be obtained from all participants and their parents/guardians after explaining the purpose, procedures, potential risks, and benefits of the study. To ensure confidentiality, participants' identities will be anonymized, and all data will be securely stored. The intervention will be designed to minimize disruption to students' regular learning schedules, and both the conversational agents and traditional methods will use age-appropriate and culturally relevant content. In addition, after the study concludes, the control group will be provided access to Chatbot to ensure equitable access to the potential benefits of the AI tool. Finally, all data

collection and storage will comply with relevant data protection regulations to safeguard participants' privacy.

4. Research Results

4.1 Pre-test and Post-test Scores

The pre-test and post-test scores for both the experimental group (who used Chatbot) and the control group (who used traditional listening materials) were analyzed to assess the effectiveness of conversational agents tool in improving listening comprehension. Table 1, 2, and summarizes the results.

Table 1 Pre-test and Post-test (Mean Scores with Standard Deviation (S.D.) and T-Test Results) between Experimental Group (Chatbot) and Control Group (Traditional)

Group	Pre-test		t-Statistic	p-Value	Post-test		t-Statistic	p-Value
	$\bar{x}$	S.D.			$\bar{x}$	S.D.		
Experimental Group (Chatbot)	12.5	2.1	-0.444	0.658	18.9	1.8	7.82**	< 0.01
Control Group (Traditional)	12.2	2.0			15.5	2.2		

**Statistically significant at the 0.01 level

From Table 1, considering the pre-test scores of the experimental and control groups, it was found that there was no statistically significant difference at the 0.01 level. However, when examining the post-test scores of the experimental and control groups, there was a statistically significant difference at the 0.01 level, with the experimental group having a higher mean score ($\bar{x}$ = 18.9, S.D. = 1.8) compared to the control group ($\bar{x}$ = 15.5, S.D. = 2.2).

Table 2 Pre-test and Post-test (Mean Scores with Standard Deviation (S.D.) and T-Test Results) compared in Experimental Group (Chatbot) and compared in Control Group (Traditional)

Group	Pre-test		Post-test		Improvement		t-Statistic	p-Value
	$\bar{x}$	S.D.	$\bar{x}$	S.D.	$\bar{x}$	S.D.		
Experimental Group (Chatbot)	12.5	2.1	18.9	1.8	6.4	1.9	12.43**	< 0.01
Control Group (Traditional)	12.2	2.0	15.5	2.2	3.3	1.7	8.21**	< 0.01

**Statistically significant at the 0.01 level

From Table 2, considering the scores of the experimental group before and after the learning session, it was found that the pre-test and post-test scores differed significantly at the 0.01 level. The post-test scores ($\bar{x}$ = 18.9, S.D. = 1.8) were higher than the pre-test scores ($\bar{x}$ = 12.5, S.D. = 2.1). Similarly, for the control group, the pre-test and post-test scores also differed significantly at the 0.01 level, with the post-

test scores ($\bar{x}$ = 15.5, S.D. = 2.2) being higher than the pre-test scores ($\bar{x}$ = 12.2, S.D. = 2.0). Nonetheless, the scores of the experimental group ($\bar{x}$ = 18.9, S.D. = 1.8) were higher than those of the control group ($\bar{x}$ = 15.5, S.D. = 2.2).

It can be observed that both groups showed improvement from the pre-test to the post-test. However, the experimental group, which used of conversational agents, showed a significantly higher scores ($\bar{x}$ = 6.4, S.D. = 1.9) compared to the control group ($\bar{x}$ = 3.3, S.D. = 1.7).

A paired t-test was conducted to examine whether the differences in pre-test and post-test scores were statistically significant within each group. The results showed that the improvements in both groups were significant (p < 0.01 for both). To compare the effectiveness between the two groups, an independent t-test was conducted, revealing a statistically significant difference (p < 0.01), with the experimental group outperforming the control group.

4.2 Questionnaire/Survey Results

The post-study questionnaire assessed student motivation, engagement, perceived improvement, ease of use, and overall feedback with the learning methods.

Table 3: Motivation's mean with Standard Deviation (S.D.) and T-Test Results with the learning methods.

Survey Item	Experimental Group (Chatbot)			Control Group (Traditional)			t-Statistic	p-Value
	$\bar{x}$	S.D.	Meaning	$\bar{x}$	S.D.	Meaning		
Motivation								
1) felt motivated to participate in the listening activities.	4.6	0.5	Strongly agree	3.8	0.6	Agree		
2) The listening sessions kept me interested throughout.	4.5	0.4	Satisfied	3.7	0.5	Agree		
3) I felt encouraged to improve my listening skills through these activities.	4.7	0.4	Strongly agree	3.9	0.6	Agree	9.79**	< 0.01
Total	**4.6**	**0.43**	**Strongly agree**	**3.8**	**0.57**	**Agree**		

**Statistically significant at the 0.01 level

From Table 3, considering the aspect of motivation, it was found that the scores of the experimental group ($\bar{x}$ = 4.6, S.D. = 0.43) and the control group ($\bar{x}$ = 3.8, S.D. = 0.57) differed significantly at

the 0.01 level. Therefore, the motivation scores of the experimental group were higher than those of the control group.

It can be seen that in terms of motivation with the traditional method, the overall feedback level is at a agree level ($\bar{x}$ = 3.8, S.D. = 0.57). When considered, the highest ranking is 3) I felt encouraged to improve my listening skills through these activities ($\bar{x}$ = 3.9, S.D. = 0.6). Additional results are presented in the table.

Moreover, it can also be seen that in terms of motivation with the Chatbot method, the overall feedback level is at the highest ($\bar{x}$ = 4.6, S.D. = 0.43). It was found that the highest score is 3) I felt encouraged to improve my listening skills through these activities ($\bar{x}$ = 4.7, S.D. = 0.4) and other results can be found in the table.

Table 4 Perceived Improvement's mean with Standard Deviation (S.D.) and T-Test Results with the learning methods.

Survey Item	Experimental Group (Chatbot)			Control Group (Traditional)			t-Statistic	p-Value
	$\bar{x}$	S.D.	Meaning	$\bar{x}$	S.D.	Meaning		
Perceived Improvement								
1) I believe my listening skills have improved as a result of these activities.	4.6	0.5	Strongly agree	3.9	0.6	Agree		
2) I am more confident in understanding spoken English after participating.	4.5	0.5	Agree	3.8	0.7	Agree		
3) I can identify more words and phrases in spoken English than before.	4.4	0.6	Agree	3.7	0.7	Agree		
Total	4.5	0.53	Agree	3.8	0.67	Agree	8.57**	< 0.01

**Statistically significant at the 0.01 level

From Table 4, considering the aspect of perceived improvement, it was found that the scores of the experimental group ($\bar{x}$ = 4.5, S.D. = 0.53) and the control group ($\bar{x}$ = 3.8, S.D. = 0.67) differed significantly at the 0.01 level. Therefore, the perceived improvement scores of the experimental group were higher than those of the control group.

It can be seen that in terms of perceived improvement with the traditional method, the overall feedback level is at a agree level ($\bar{x}$ = 3.8, S.D. = 0.67). When considering the ranking highest is 1) I believe my listening skills have improved as a result of these activities ($\bar{x}$ = 3.9, S.D. = 0.6)

Furthermore, it can also be seen that in terms of perceived improvement with the Chatbot method, the overall feedback level is a satisfactory level ($\bar{x}$ = 4.5, S.D. = 0.53). When considering the highest is 1) I

believe my listening skills have improved as a result of these activities ($\bar{x}$ = 4.6, S.D. = 0.5). The remaining details can be found in the table.

Table 5 Engagement's mean with Standard Deviation (S.D.) and T-Test Results with the learning methods.

Survey Item	Experimental Group (Chatbot)			Control Group (Traditional)			t-Statistic	p-Value
	$\bar{x}$	S.D.	Meaning	$\bar{x}$	S.D.	Meaning		
Engagement								
1) The listening activities were engaging and enjoyable.	4.7	0.4	Strongly agree	3.6	0.5	Agree		
2) I was actively involved during each listening session.	4.6	0.5	Strongly agree	3.7	0.6	Agree		
3) I looked forward to each session and felt engaged throughout.	4.5	0.5	Agree	3.5	0.6	Neither Agree nor Disagree		
Total	**4.6**	**0.47**	**Strongly agree**	**3.6**	**0.57**	**Agree**	12.25**	< 0.01

**Statistically significant at the 0.01 level

From Table 5, considering the aspect of engagement, it was found that the scores of the experimental group ($\bar{x}$ = 4.6, S.D. = 0.47) and the control group ($\bar{x}$ = 3.6, S.D. = 0.57) differed significantly at the 0.01 level. Therefore, the engagement scores of the experimental group were higher than those of the control group.

It can be seen that in terms of engagement with the traditional method, the overall feedback is at a satisfactory level ($\bar{x}$ = 3.6, S.D. = 0.57). When considering the highest is 2) I was actively involved during each listening session ($\bar{x}$ = 3.7, S.D. = 0.6) as shown in the table.

It can also be seen that in terms of engagement with the Chatbot method, the overall feedback is at the highest ($\bar{x}$ = 4.6, S.D. = 0.47). When considering the highest is 1) The listening activities were engaging and enjoyable ($\bar{x}$ = 4.7, S.D. = 0.4) as detailed in the table.

Table 6 Ease of Use's mean with Standard Deviation (S.D.) and T-Test Results with the learning methods.

Survey Item	Experimental Group (Chatbot)			Control Group (Traditional)			t-Statistic	p-Value
	$\bar{x}$	S.D.	Meaning	$\bar{x}$	S.D.	Meaning		
Ease of use								
1) The learning materials or tools were easy to use.	4.4	0.5	Agree	3.5	0.6	Neither Agree nor Disagree		
2) I understood how to navigate and use the listening tools or materials.	4.5	0.4	Agree	3.6	0.5	Agree		
3) I had no technical difficulties that interfered with my learning experience.	4.3	0.5	Agree	3.4	0.6	Agree		
Total	**4.4**	**0.47**	**Agree**	**3.5**	**0.57**	**Agree**	11.02**	< 0.01

**Statistically significant at the 0.01 level.

From Table 6, considering the aspect of ease of use, it was found that the scores of the experimental group ($\bar{x}$ = 4.4, S.D. = 0.47) and the control group ($\bar{x}$ = 3.5, S.D. = 0.57) differed significantly at the 0.01 level. Therefore, the ease of use scores of the experimental group were higher than those of the control group.

It can be seen that in terms of ease of use with the traditional method, the overall feedback level is at a agree level ($\bar{x}$ = 3.5, S.D. = 0.57). When considering the highest ranking is 2) I understood how to navigate and use the listening tools or materials ($\bar{x}$ = 3.6, S.D. = 0.5). As shown in the table above.

In addition, it can also be seen that in terms of ease of use with the Chatbot method, the overall feedback level is at a agree level ($\bar{x}$ = 4.4, S.D. = 0.47). When considering the highest is 2) I understood how to navigate and use the listening tools or materials ($\bar{x}$ = 4.5, S.D. = 0.4). As shown in the table.

Table 7 Overall Satisfaction's mean with Standard Deviation (S.D.) and T-Test Results with the learning methods.

Survey Item	Experimental Group (Chatbot)			Control Group (Traditional)			t-Statistic	p-Value
	$\bar{x}$	S.D.	Meaning	$\bar{x}$	S.D.	Meaning		
Overall Satisfaction								
1) I am satisfied with the learning experience provided by the listening activities.	4.7	0.5	Strongly agree	3.7	0.6	Agree		
2) I would recommend these listening activities to others wanting to improve their English.	4.6	0.5	Strongly agree	3.6	0.7	Agree		
3) Overall, this was a positive learning experience for me.	4.7	0.5	Strongly agree	3.7	0.6	Agree		
Total	**4.67**	**0.5**	**Strongly agree**	**3.67**	**0.63**	**Agree**	21.21**	< 0.01

**Statistically significant at the 0.01 level

From Table 7, considering the aspect of overall satisfaction, it was found that the scores of the experimental group ($\bar{x}$ = 4.67, S.D. = 0.5) and the control group ($\bar{x}$ = 3.67, S.D. = 0.63) differed significantly at the 0.01 level. Therefore, overall satisfaction scores of the experimental group were higher than those of the control group.

It can be seen that in terms of overall satisfaction with the traditional method, the overall feedback level is at a agree level ($\bar{x}$ = 3.67, S.D. = 0.63). When considering the highest ranking is 1) I am satisfied with the learning experience provided by the listening activities ($\bar{x}$ = 3.7, S.D. = 0.6) and 3) Overall, this was a positive learning experience for me ($\bar{x}$ = 3.7, S.D. = 0.6). And other details as shown in the table.

Moreover, it can also be seen that in terms of overall satisfaction with the Chatbot method, the overall feedback level is at the highest ($\bar{x}$ = 4.67, S.D. = 0.5). When considering the highest is 1) I am satisfied with the learning experience provided by the listening activities ($\bar{x}$ = 3.7, S.D. = 0.6) and 3) Overall, this was a positive learning experience for me ($\bar{x}$ = 3.7, S.D. = 0.6). Additional details in the table.

Table 8: Questionnaire Results' mean with Standard Deviation (S.D.) and T-Test Results with the learning methods.

Survey Item	Experimental Group (Chatbot)		Control Group (Traditional)		t-Statistic	p-Value
	$\bar{x}$	S.D.	$\bar{x}$	S.D.		
Motivation	4.6	0.43	3.8	0.57		
Perceived Improvement	4.5	0.53	3.8	0.67		
Engagement	4.6	0.47	3.6	0.57		
Ease of Use	4.4	0.47	3.5	0.57		
Overall Satisfaction	4.67	0.5	3.67	0.63		
Total	**4.55**	**0.48**	**3.67**	**0.6**	17.92**	< 0.01

**Statistically significant at the 0.01 level

The survey results suggest that students in the experimental group generally found the conversational agents tool that ranked in descending order according to the mean scores respectively, as follows: the overall satisfaction ($\bar{x}$ = 4.67, S.D. = 0.5), more engaging ($\bar{x}$ = 4.6, S.D. = 0.47), more motivating ($\bar{x}$ = 4.6, S.D. = 0.43), more improvement ($\bar{x}$ = 4.5, S.D. = 0.53), and more easier to use ($\bar{x}$ = 4.4, S.D. = 0.47) compared to traditional methods that sorted in descending order as follows: the overall satisfaction ($\bar{x}$ = 4.67, S.D. = 0.5), motivation ($\bar{x}$ = 3.8, S.D. = 0.57), perceived improvement ($\bar{x}$ = 3.8, S.D. = 0.67), engagement ($\bar{x}$ = 3.6, S.D. = 0.57), and ease of use ($\bar{x}$ = 3.5, S.D. = 0.57).

Therefore, it can be concluded that the application of AI technology in teaching and learning management is beneficial and has positive effects on all aspects of learning. Moreover, it brings about changes in every aspect for those who implement it, as indicated by the above survey results.

4.3 Classroom Observations

Classroom observations were conducted to gather qualitative insights into how students interacted with the learning materials. Observers noted that students using Chatbot were more engaged during listening activities, frequently responding to AI feedback and asking questions about unclear points. In contrast, students using traditional listening materials often completed their tasks in silence, with less interaction or enthusiasm. Technical difficulties were minimal, with only 1 or 2 instances of minor issues during the conversational agents sessions.

5. Discussion

5.1 Improvement in Listening Comprehension

The experimental group's mean gain of 6.4 points in listening comprehension is in line with the results of prior studies that emphasize the positive impact of interactive and adaptive learning technologies on

language acquisition. For instance, Lu et al. (2018) found that AI-based conversational agents enhanced students' listening skills more effectively than conventional classroom-based approaches, with students showing improved comprehension and greater retention of audio content. Similarly, Hwang et al. (2020) reported that learners using AI-based systems scored significantly higher on listening comprehension tests than those using traditional methods. These studies suggest that AI tools, which provide instant feedback and adaptive learning pathways, are particularly effective at enhancing the understanding of spoken language, as seen in the present study.

The current study's findings also align with Chen and Hsu's (2019) research, which indicated that learners who used AI-based tools to practice listening showed better proficiency in recognizing main ideas and key details in conversations. Chatbot's interactive feedback mechanism, which allowed students to receive real-time corrections and guidance, likely contributed to the higher post-test scores. This confirms that one of the key strengths of AI conversational agents lies in their ability to simulate authentic language environments, facilitating more in-depth comprehension.

It can be observed that the development of English listening skills was not limited to the experimental group in the study but also had a positive impact on the learners in the control group. This is evident from the mean gain of 3.3 points in listening comprehension. From the researcher's perspective, it is hypothesized that the improvement in listening skills among the control group may be attributed to the following reasons: 1) using of English in the content and continuous learning in connection with new English-language content contributed to the improvement. 2) The learners already possessed a good foundational level of English listening skills, which facilitated further development in listening skills even though they did not employ the same methods as the experimental group. This finding is beneficial for guiding future research processes aimed at exploring answers and generating new insights.

5.2 Student Motivation and Engagement

The experimental group's significantly higher scores for motivation, engagement, and satisfaction (mean scores of 4.6, 4.7, and 4.7 respectively) further validate earlier findings on the motivational impact of technology-enhanced learning. According to Yeh and Lai (2021), students who engage with AI-based language learning systems demonstrate increased motivation and persistence compared to those who use traditional methods. The interactive nature of AI tools create a more engaging learning environment, allowing students to take an active role in their language practice, which may explain the higher engagement scores in the present study.

This engagement can also be attributed to the "gamification" and adaptive features of the conversational agents learning tools, which provide learners with immediate feedback and the chance to improve at their own pace. Ellis and Underwood (2019) argue that AI-driven tools offer personalized learning experiences that keep students more involved in the learning process, leading to improved outcomes in language acquisition.

This is consistent with the current study, where students in the experimental group were not only more motivated but also found the learning process more enjoyable, thus fostering greater engagement.

5.3 Traditional Methods vs. The Conversational Agents Learning

While both the control and experimental groups showed improvements in listening comprehension, the experimental group's mean gain (6.4 points) was nearly double that of the control group (3.3 points). This result supports the view that traditional methods, although useful, may not be as effective as conversational agents approaches for developing listening comprehension. Vandergrift (2015) points out that traditional listening exercises often lack interactivity and immediate feedback, which can limit their effectiveness, particularly for students who need additional guidance or practice.

By contrast, using conversational agents Chatbot provided personalized, real-time feedback and adaptive difficulty levels, features that are typically absent in traditional listening exercises. This adaptive nature of conversational agents tools, as emphasized by Smith and Meyer (2017), allows learners to practice at their individual level of proficiency, which may lead to greater improvements in skills. The present study supports these claims, demonstrating that using conversational agents tools offer advantages over traditional methods by making the learning process more tailored and responsive to individual needs.

5.4 Implications for Teaching Practice

The findings of this study have several implications for English language teaching, particularly in listening comprehension. First, conversational agents tools can serve as a highly effective supplement to traditional methods. Teachers can integrate these technologies into their lesson plans to provide students with more dynamic and interactive listening experiences. Second, the high levels of student engagement and satisfaction observed in this study suggest that conversational agents tools may also increase student motivation and reduce the cognitive load typically associated with listening tasks. As such, incorporating conversational agents tools into language learning can foster a more engaging and student-centered environment.

5.5 Limitations and Future Research

Although the results of this study are promising, several limitations should be noted. The sample size, while sufficient to detect significant differences, was relatively small and drawn from a specific age group of secondary school students. Future research should explore whether similar results can be obtained across different age groups and language proficiency levels. Additionally, longitudinal studies could investigate the long-term impact of the conversational agents tools on listening comprehension to determine whether the improvements observed here are sustained over time. Exploring the integration of conversational agents tools in combination with other language skills, such as speaking or writing, could also yield valuable insights.

6. Conclusion and Recommendations

6.1 Conclusion

In summary, this study confirms the effectiveness of using conversational agents like Chatbot in improving listening comprehension among secondary school students. The experimental group, which used conversational agents tool, showed significantly higher gains in listening comprehension, motivation, and engagement compared to the control group. These findings are consistent with previous research that highlights the advantages of using conversational agents tools to enhance language learning. As educational technologies continue to evolve, the use of conversational agents in language education holds great potential for transforming traditional pedagogical approaches and supporting more effective learning outcomes.

6.2 Recommendations

Based on the findings, educators should integrate conversational agents tools into language curricula to enhance student engagement and learning outcomes. Providing teacher training on the effective use of these technologies is crucial for maximizing their benefits. Additionally, future research should explore the application of AI in developing other language skills and investigate its long-term effectiveness across different proficiency levels. By adopting these recommendations, the potential of conversational agents tools in language learning can be fully realized.

7. References

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Guidelines for Development Teacher's Skills in the 21st Century at Business College of Guizhou City Vocational College

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Abstract

The objectives of this study are 1) to study Teacher's skills in the 21st century at Business College in Guizhou City Vocational College and 2) to provide suggestions to develop Teacher's skills in the 21st Century at Business College of Guizhou City Vocational College. The sample group of this study is 52 in-service teachers from the Business College of Guizhou City Vocational College. The main research tool used for data collection was the questionnaire and semi-structured interview. Data analysis covers various statistical measures such as percentages, frequencies, means, standard deviations, and Content analysis.

The research results found that:

1. The 21st century Teacher's skill level at Business College of Guizhou City Vocational College, China was high.

2. The suggestions for improving the skills of teachers in the Business College of Guizhou City Vocational College in the 21st century were multi-directional.

Keywords: 21st century teacher skills; collaboration skills; critical thinking; technology skills

1. Introduction

The quality of college teachers is an important factor affecting the quality of higher education. Young teachers in colleges and universities are the main force of teachers in colleges. In the future, the overall quality of teachers in higher education will be determined by their professional development. In 2018, the CPC Central Committee and The State Council issued Opinions on Comprehensively Deepening the Reform of the Construction of Teachers in the New Era, and in 2020, the Ministry of Education and six other departments issued Guidance on Strengthening the reform of the construction of college teachers in the New Era, which all point out that improving the professional quality and ability of teachers is the key to strengthen the construction of teachers.

With the rapid development of globalization, digitalization, and technological innovation, 21st century skills have become an increasing focus in the field of education. 21st century skills are not only the key for students to adapt to the future society but also a necessary requirement for teachers to continuously improve their professional quality.

The development goal of the Business College of Guizhou City Vocational College is to adhere to the fundamental task of moral education, strive to improve the quality of education, and increase the employment rate. The orientation of talent training is to meet the needs of regional economic and social development and cultivate high-level technical talents with strong practical ability and innovative spirit. In May 2021, the "Business and Enterprise Management Professional Group" of the School of Business successfully applied for the construction project of the provincial-level characteristic backbone professional group of the "Guizhou Vocational Education Enrichment Action Plan", and continued to vigorously promote the construction of the professional group, aiming to contribute to the construction goal of "strengthening the provincial capital" and cultivating a large number of excellent management and service talents.

From such importance, The researcher is therefore interested in studying "Guidelines for Development Teacher's Skills in the 21st Century at Business College of Guizhou City Vocational College" The results of the research can be used as guidelines for developing teacher skills in the 21st Century at Business College of Guizhou City Vocational College is in line with the needs of teachers to have quality and will affect the development of students to have quality in the future.

2. Literature Review

2.1 The Concept of Teacher Skills in the 21st Century

The 21st century teacher skills refer to the core abilities that teachers need to possess in a modern educational environment, covering the application of information technology, innovative thinking, critical thinking skills, communication and collaboration, emotional intelligence, and other abilities. Teachers not only need to master digital tools and teaching platforms and use technology to improve teaching effectiveness, but also have flexible teaching design and problem-solving abilities, and be able to encourage

students to think independently, innovate, and cooperate. At the same time, teachers need to constantly update their educational concepts, pay attention to students' personality development and emotional needs, promote students' all-round development through effective communication and cooperation, and cultivate their key abilities needed in the future society.

The literature on 21st century skills provides a comprehensive picture of the competencies considered necessary for success in the contemporary world. Scholars widely acknowledge the multifaceted nature of these skills, including critical thinking skills, collaboration, communication, creativity, self-direction, and proficiency in the use of technology (Annan-Brew, R.K, et al, 2024). 10 key teaching Skills that every teacher should have: communication and interpersonal skills, Organization and Alignment, Time management and Multitasking, Conflict management, Creative thinking and Innovation, Control and leadership, Technological skills, Teamwork, Patience, and Self-Evaluation (Divyansh Bordia.2020). The Hanover Research team looked into the key components of these frameworks for 21st century skills to identify the similarities and differences between them. The researchers examined the most and least popular skill types. The skills were categorized by frequency of use. The results revealed that out of 27 themes identified from the six sources, only four were common across all six sources. They were: Collaboration and Teamwork; Creativity; Imagination; Critical thinking skills; and Problem-solving (Swaran Singh, 2020).

2.2 The Importance of Teacher Skills in the 21st Century

Teachers in the 21st century need not only to impart knowledge but also to possess a variety of skills such as innovative thinking, the use of information technology, cross-cultural communication, and critical thinking skills. These abilities not only help teachers better adapt to the rapidly changing educational environment but also promote the all-round development of students. With the advancement of science and technology and the changes in society, teachers' skills are no longer limited to traditional teaching methods. Teachers need to continue to learn and improve themselves in order to better cope with the challenges of future education. Given the rapid global changes in the contemporary era, there is a recognized need for significant adjustments in teacher preparation programs to ensure that educators are adequately equipped to fulfill their roles effectively, In response to this evolving landscape, educators bear an increased responsibility to continually enhance their skills, stay updated on 21st-century challenges, and guide students in acquiring these crucial competencies (Annan-Brew, R.K, et al, 2024). Teachers in the 21st century face many challenges that require teachers to continuously improve their teaching skills to solve and cope with them. In today's era, traditional education can no longer meet the needs of students. Students need to master new skills to better adapt to the new needs of society. This requires new-age teachers in the 21st century to achieve this. To better perform their duties, teachers must continue to learn and improve their qualities and skills (Mervat Babair, 2023).

2.3 Research on teachers in the 21st century

Amin (2016) mentioned the essential role of teachers in the 21st century that teachers are expected to be leaders in technology and are not only responsible for teaching but also for the learning of students. Teachers are required to become facilitators who help students access learning resources, be open to learning new things, work as a team, and be a link between students and what students need to know so that students can learn effectively.

Jansen (2015) studied Teaching Practice in the 21st Century: Emerging Trends, Challenges and Opportunities. One of the results of this study is a model for teachers to use as a model for training students to teach and as a source of information for studying digital technology literacy. It is a guide for teaching students to practice in developing their digital technology literacy programs to meet the teaching needs of the 21st century.

McGuire (2015) presented the article 21st Century Standards and Curriculum: Current Research and Practice found that integrating Common Core State Standards (CCSS) and 21st Century Skills in the curriculum is not only beneficial to students and teachers but also necessary to prepare young people for future careers. Standardized tests that determine school success are essential to help students be creative and use the power of technology to support essential skills and learn in unique ways. Measuring students' creativity and understanding standards through content-based student work, can retain students' ideas through tangible and valuable demonstrations of work. The study needs to make changes to teaching and learning so that students can succeed as future innovators. Flexibility is not testing. 21st Century skills are defined and described in ways that help students develop essential skills. It can connect today's students' education with stimulating real-world experiences, as well as allow students to create and collaborate using the latest technology.

3. Methodology

3.1 Population and Sample Group

3.1.1 Population

56 teachers of Business College of Guizhou City Vocational College.

3.1.2 Sample Group

52 in-service teachers of Business College of Guizhou City Vocational College. According to Krejcie, R. V. and Morgan, D. W. (1970) sampling table by using simple random sampling.

3.2 Research Tools

3.2.1 Questionnaire

The questionnaire consists of the following two parts:

The first part is the questionnaire about the general situation of the interviewees. The survey items of this part are gender, age, education level, work experience in educational institutions, and the basic information of the interviewees is studied. The second part is a questionnaire survey on the current

status of 21st century teacher skills at the Business College in Guizhou City Vocational College.   It can be divided into five aspects: innovation skills, technical skills, communication skills, critical thinking skills, and collaborative skills. The questionnaire sets a 5-level scale to understand the current status of the respondents' 21st century teacher skills.

The questionnaire send to 3 experts to check their reliability and validity. According to the expert rating, the IOC values are 0.67-1.00. The reliability of the questionnaire was obtained by the Cronbach Alpha Coefficient (Cronbach, 1951), the reliability was 0.97.

Table 3.1 Questionnaire reliability analysis

Dimension	Cronbach's α	Items
Innovation skills	0.91	17
Technology skills	0.90	17
Communication skills	0.91	17
Critical thinking skills	0.91	17
Collaboration skills	0.93	17
Total	0.97	85

3.2.2 Interview

The interviewees for this study were 5 educational administrators from Guizhou City Vocational College. The selection criteria for interviewees are as follows: 1) At least 5 years of work experience, 2) Current school management staff.

3.3 Data collection

Questionnaires were distributed to 52 teachers of the Business College in Guizhou City Vocational College. The researcher collected a predetermined number of questionnaires, checked the accuracy and completeness of the questionnaires, and analyzed the collected data.

3.4 Data Analysis

The researchers checked the accuracy and completeness of the questionnaire instruments and selected valid questionnaires for data analysis. Through the analysis of the frequency, percentage, mean, and standard deviation.

4. Results of Analysis

Questionnaires were distributed to 52 teachers from the Business College of Guizhou City Vocational College, and a total of 52 questionnaires were collected, with a recovery rate of 100%.

4.1 The general data analysis results of the teachers.

The overall data analysis results of the teachers include gender, age, education level and work experience. In this study, the researchers conducted data analysis by using frequency distributions and percentages, as shown in Table 4.1.

Table 4.1 General information of the response

(n=52)

Items	Category	Frequency	Percentage (%)
Gender	Male	29	55.8
	Female	23	44.2
	Total	52	100
Age	20-30 years old	5	9.6
	31-40 years old	20	38.5
	41-50 years old	16	30.8
	51-60 years old	10	19.2
	Over 60 years old	1	1.9
	Total	52	100
Educational qualifications	College degree	9	17.3
	Bachelor's degree	26	50
	Master's degree	17	32.7
	Doctoral degree	0	0.0
	total	52	100
Working years	Less than 5 years	6	11.5
	5 -10 years	7	13.5
	11-20 years	26	50
	More than 20 years	13	25
	Total	52	100

Table 4.1 shows the results of the data analysis of the general information of the respondents. Among them, there are 29 male teachers, accounting for 55.8%, and 23 female teachers, accounting for 44.2%; the age of teachers is mainly 31-40 years old, accounting for 38.5%, followed by the number of teachers 41-50 years old, accounting for 30.8%; among the in-service teachers, most have a bachelor's degree, accounting for 50.0%, followed by a master's degree, accounting for 32.7%; the number of teachers with 11-20 years of teaching experience is relatively large, accounting for 50.0%, and the number of teachers with less than 5 years of teaching experience is relatively small, accounting for 11.5%.

4.2 Analysis of the Present Situation of the teachers' skills in the 21st century at Business College in Guizhou City Vocational College

The Business College teachers who participated in the survey were analyzed from five aspects: innovation skills, technology skills, communication skills, critical thinking skills, and collaborative skills. The researchers used the mean and standard deviation for the analysis, and the detailed analysis results are shown in Table 4.2-4.7.

Table 4.2 Statistical table for each variable

(n=52)

No.	Dimension	$\overline{x}$	S.D.	Level	Rank
1	Innovation skills	4.06	0.31	High	4
2	Technology skills	4.06	0.28	High	3
3	Communication skills	4.04	0.29	High	5
4	Critical thinking skills	4.07	0.29	High	2
5	Collaboration skills	4.13	0.28	High	1
	Total	4.07	0.29	High	

From table 4.2, this study found that the teachers' skills in the 21st century at the business college of Guizhou City Vocational College were at a high level ($\overline{x}$=4.07, S.D.=0.29). Among them, collaboration skills had the highest level ($\overline{x}$=4.13, S.D.=0.28), followed by critical thinking skills ($\overline{x}$=4.07, S.D.=0.29) and technology skills ($\overline{x}$=4.06, S.D.=0.28), respectively, and The side with the lowest mean value is communication skills ($\overline{x}$=4.04, S.D.=0.29).

Table 4.3 Questions classified by variables: 1. Innovation skills (n=52)

No.	Items	$\overline{x}$	S.D	Level	Rank
1	I actively explore with colleagues to develop new teaching and learning methods.	3.88	0.78	High	17
2	I can maintain a thirst for knowledge and a curiosity about new thin.gs.	4.08	0.76	High	8
3	I can actively learn the latest information concepts and technologies to improve my professional ability and level.	4.12	0.81	High	2
4	I can use media such as film, music, and the Internet to develop innovative teaching methods.	4.08	0.71	High	7
5	I respect students' innovative performance in many aspects (not only in learning) when I evaluate students.	4.06	0.96	High	13

No.	Items	$\overline{X}$	S.D	Level	Rank
6	I provide opportunities for students to express their creativity.	4.12	0.81	High	2
7	I can stimulate students' interest in learning and creativity through different tools in teaching tools.	4.12	0.83	High	5
8	I actively organize novel and interesting teaching activities.	3.92	0.97	High	16
9	In teaching, I actively explore new teaching methods.	4.08	0.84	High	9
10	I can change the teaching method according to the individual differences of students to improve their learning effect.	4.06	0.70	High	12
11	I encourage students to think of more useful solutions to their problems.	4.04	0.95	High	14
12	I explore interdisciplinary knowledge, promote cross-disciplinary integration, and provide diverse perspectives and rich resources for innovative teaching.	4.02	0.80	High	15
13	I participate in research and practice related to innovative skills to promote the improvement of my innovative capabilities.	4.12	0.81	High	2
14	I encourage students to try new learning styles and methods, guide them to think and explore new things, and thus cultivate their sense of innovation and creative spirit.	4.08	0.99	High	11
15	I organize students to participate in cultural activities and art exhibitions, so that students can feel the charm of different cultures and arts, thereby stimulating their creativity.	4.08	0.90	High	10
16	I can come up with creative work ideas.	4.10	0.80	High	6
17	I apply new work ideas to practical work.	4.12	0.78	High	1
	Total	4.06	0.31	High	

From Table 4.3, this study found that the overall innovative skills were at a high level ($\overline{x}$=4.06, S.D.=0.31). Among them, teachers apply new work ideas to practical work had the highest level ($\overline{x}$=4.12, S.D.=0.78), followed by teachers can actively learn the latest information concepts and technologies to improve their professional ability and level and teachers provide opportunities for students to express their creativity equal to teachers participate in research and practice related to innovative skills to promote the improvement of their innovative capabilities ($\overline{x}$=4.12, S.D.=0.81), respectively. And the side with the lowest mean value was teachers actively explore with colleagues to develop new teaching and learning methods ($\overline{x}$= 3.88, S.D.= 0.78).

Table 4.4 Questions classified by variables: 2. Technology skills. (n=52)

No.	Items	$\overline{x}$	S.D	Level	Rank
1	I can use multimedia teaching software to complete teaching.	4.17	0.76	High	5
2	I use electronic whiteboards, projectors, and other teaching media to teach.	4.23	0.90	High	2
3	I understand and can use various online teaching platforms and tools.	3.94	0.85	High	12
4	I use social media (such as WeChat, QQ, etc.) for teaching.	3.88	0.83	High	14
5	I can appropriately select technologies and resources to provide students with rich learning opportunities and personalized learning experiences.	4.19	0.69	High	3
6	I can skillfully use Word, PPT, browser, and other software to support classroom teaching.	4.19	0.69	High	3
7	I use information technology to conduct tests and exercises.	4.17	0.79	High	6
8	I assess students' performance through their digital work.	3.92	0.79	High	13
9	I use information technology to monitor and evaluate students' learning processes.	3.88	0.94	High	16
10	I can skillfully access the digital resources I need from the Internet to support my professional learning.	3.83	0.83	High	17
11	I learn about the characteristics, applications, and development trends of different types of media by reading relevant books and articles and attending relevant seminars or academic exchange meetings.	3.88	0.83	High	14
12	I not only pay attention to traditional media (such as TV, newspapers, radio, etc.), but also pay attention to emerging media (such as Weibo, WeChat, TikTok, etc.) to understand the similarities and differences between different media.	4.17	0.83	High	7
13	I guide students to use information technology to solve the difficulties they encounter in learning.	4.00	0.91	High	11
14	I communicate and collaborate with colleagues and subject experts through online learning platforms.	4.23	0.70	High	1

Table 4.4 Questions classified by variables: 2. Technology skills. (n=52) (Cont.)

No.	Items	$\bar{x}$	S.D	Level	Rank
15	I can use teaching spaces, network disks and other tools to share teaching resources for students to study on their own.	4.02	0.80	High	10
16	I use technology tools to guide and help students learn information technology courses in an information environment.	4.13	0.84	High	8
17	I can use the learning platform to monitor students' learning behavior and provide real-time feedback and guidance.	4.12	0.76	High	9
	Total	4.06	0.28	High	

From Table 4.4, this study found that the overall of Technology skills were at a high level ($\bar{x}$ = 4.06, S.D.=0.28). Among them, teachers communicate and collaborate with colleagues and subject experts through online learning platforms had the highest level ($\bar{x}$=4.23, S.D.=0.70), followed by teachers use electronic whiteboards, projectors, and other teaching media to teach ($\bar{x}$=4.23, S.D.=0.90) and teachers can appropriately select technologies and resources to provide students with rich learning opportunities and personalized learning experiences equal to teachers can skillfully use Word, PPT, browser, and other software to support classroom teaching ($\bar{x}$=4.19, S.D.=0.69), respectively. And the side with the lowest mean value was teachers can skillfully access the digital resources I need from the Internet to support my professional learning ($\bar{x}$=3.83, S.D.=0.83).

Table 4.5 Questions classified by variables: 3. Communication skill (52)

No.	Items	$\bar{x}$	S.D	Level	Rank
1	I can talk to students and let them feel the teacher's care.	4.02	0.70	High	11
2	I can ask parents about their children's performance at home.	4.15	0.70	High	1
3	I talk to students about issues other than academics.	4.06	0.87	High	9
4	I can communicate with parents about their children's performance at school.	4.00	0.86	High	14
5	I can use diagrams and text on the blackboard to teach.	4.10	0.72	High	3
6	I can regularly exchange teaching experiences with my colleagues, discuss teaching problems together, and improve teaching standards together.	4.06	0.80	High	8
7	I can actively listen to students.	4.10	0.75	High	4
8	I can communicate with students in a clear and logical manner and have good written communication skills.	4.06	0.75	High	6

Table 4.5 Questions classified by variables: 3. Communication skill (n = 52) (cont.)

No.	Items	$\overline{x}$	S.D	Level	Rank
9	I can express understanding, encouragement, and enthusiasm through eye contact.	4.02	0.78	High	12
10	I can contact parents or students through some commonly used social software, such as QQ, WeChat, etc.	3.85	0.83	High	17
11	I can set up thought-provoking questions in class to guide students in expressing their own opinions and ideas.	3.92	0.79	High	16
12	I encourage interaction and discussion among students so that they can communicate more confidently.	4.02	0.80	High	13
13	I test students' listening comprehension skills by asking questions and guiding them to actively listen and understand other people's perspectives.	4.10	0.82	High	5
14	I write diaries, reflections, reports, and other documents to improve my written expression skills.	4.06	0.78	High	7
15	I participate in speech contests, reading contests, and other activities to improve my language expression skills.	4.04	0.66	High	10
16	I read books, newspapers, etc. to improve my language comprehension and reasoning skills.	3.96	0.82	High	15
17	I can use certain conversation skills, such as first praising and then criticizing, when I am communicating with others.	4.15	0.75	High	2
	Total	4.04	0.29	High	

From Table 4.5, this study found that the overall of communication skills was at a high level ($\overline{x}$ =4.04, S.D.=0.29). Among them, teachers can ask parents about their children's performance at home had the highest level. ($\overline{x}$ =4.15,S.D.=0.70), followed by teachers can use certain conversation skills, such as first praising and then criticizing, when I am communicating with others ($\overline{x}$ =4.15, S.D.=0.75) And teachers can use diagrams and text on the blackboard to teach ($\overline{x}$ =4.10, S.D.=0.72), respectively. And the side with the lowest mean value was teachers can contact parents or students through some commonly used social software, such as QQ, WeChat, etc. ($\overline{x}$ =3.85, S.D.=0.83).

Table 4.6 Questions classified by variables: 4. Critical thinking skills (n=52)

No.	Items	$\overline{x}$	S.D	Level	Rank
1	I can correctly analyze the characteristics of the course and choose the appropriate teaching method.	3.79	0.82	High	17
2	I can organize my thoughts easily.	4.17	0.65	High	4
3	I can develop organized plans to solve complex problems.	4.27	0.79	High	1
4	I ask students to use mind maps (such as tree diagrams, flow charts, etc.) to sort out the learning content.	3.98	0.73	High	12
5	I can make different decisions based on different situations when facing problems.	4.08	0.81	High	10
6	I can do my best to find all the relevant information when faced with a big decision.	3.98	0.70	High	11
7	I can make fair decisions when colleagues or students ask me to make them.	4.21	0.80	High	3
8	I encourage students to question other people's opinions in class.	4.15	0.78	High	7
9	I ask students to highlight the key information of the questions when reviewing them.	4.25	0.71	High	2
10	I can pay more attention to whether the student can provide sufficient evidence to prove whether his answer is correct.	3.92	0.68	High	14
11	I can reflect on my teaching work and effectively improve my shortcomings.	4.17	0.71	High	5
12	I can accurately find valuable content from a large amount of information.	4.17	0.76	High	6
13	I can make appropriate adjustments to the chapters in the textbook to help students understand better.	3.96	0.84	High	13
14	I can guide students to consult relevant materials in the library and on the Internet and provide real cases and practical experience.	4.12	0.96	High	9
15	I can guide students to learn and apply different research methods, helping them to better analyze problems and discover the essence of the problems.	4.13	0.84	High	8

Table 4.6 Questions classified by variables: 4. Critical thinking skills (n=52) (cont.)

No.	Items	$\overline{x}$	S.D	Level	Rank
16	I can find educational value in happenstance events.	3.92	0.90	High	16
17	I consider facts and evidence that contradict my own views when my views are rejected.	3.92	0.86	High	15
	Total	4.07	0.29	High	

From Table 4.6, this study found that the overall of Critical thinking skills the mean was at a high level ($\overline{x}$=4.07, S.D.=0.29). Among them, teachers can develop organized plans to solve complex problems had the highest level ($\overline{x}$=4.27, S.D.=0.79), followed by teachers ask students to highlight the key information of the questions when reviewing them ($\overline{x}$=4.25, S.D.=0.71), and teachers can make fair decisions when colleagues or students ask me to make them ($\overline{x}$=4.21, S.D.=0.80), respectively. And the side with the lowest mean value was teachers can correctly analyze the characteristics of the course and choose the appropriate teaching method ($\overline{x}$=3.79, S.D.=0.82).

Table 4.7 Questions classified by variables: 5. Collaborative skills (n-52)

No.	Items	$\overline{x}$	S.D	Level	Rank
1	I can share my teaching experience and resources and encourage colleagues to learn from each other.	4.19	0.82	High	6
2	I can stimulate students' learning motivation and improve their learning outcomes through interaction and cooperation with them.	4.27	0.72	High	4
3	I can work with parents to focus on students' learning and growth and develop an educational plan that is appropriate for their students.	4.37	0.71	High	1
4	I communicate and cooperate with colleagues by participating in teaching and research activities and teaching teams to improve my teaching level together.	4.19	0.82	High	6
5	I encourage students to complete group activities to exercise their teamwork skills.	4.29	0.72	High	2
6	I can clearly divide the work and complete the work efficiently when working with colleagues.	4.12	0.81	High	10
7	I have a clear sense of self and can play to my strengths as a team.	4.15	0.78	High	9
8	I can accept the opinions of others even if they disagree with my own ideas.	4.02	0.78	High	13

Table 4.7 Questions classified by variables: 5. Collaborative skills (n-52)(cont.)

No.	Items	$\overline{x}$	S.D	Level	Rank
9	I discuss and develop curriculum plans and teaching plans with teachers of the same grade.	4.06	0.75	High	12
10	I coordinate with colleagues from other departments to ensure the work runs smoothly.	4.08	0.74	High	11
11	I set up activities such as group discussions and collaborative projects to encourage students to communicate and interact.	4.29	0.85	High	3
12	I can set clear learning goals and guide students to work together to develop collaborative goals.	3.96	0.82	High	16
13	I can guide students in dividing the work and cooperating in activities so that everyone can play to their strengths.	3.90	0.77	High	17
14	I can set some challenging questions and let students solve them together in groups to cultivate students' collaborative problem-solving skills.	4.17	0.88	High	8
15	I can introduce role-playing and simulation activities to have students work together to solve problems in specific scenarios.	4.02	0.94	High	14
16	I can empathize with others and understand their difficulties when I work with them.	3.98	0.90	High	15
17	I participated in collaboration skills training to improve my team awareness and collaboration ability.	4.19	0.69	High	5
	Total	4.13	0.28	High	

From Table 4.7, this study found that the overall of Collaborative skills was at a high level ($\overline{x}$ =4.13, S.D.=0.28). Among them, teachers can work with parents to focus on students' learning and growth and develop an educational plan that is appropriate for their students had the highest level ($\overline{x}$=4.37, S.D.=0.71), followed by teachers encourage students to complete group activities to exercise their teamwork skills ($\overline{x}$=4.29, S.D.=0.72) and teachers set up activities such as group discussions and collaborative projects to encourage students to communicate and interact ($\overline{x}$=4.29, S.D.=0.85), And the side with the lowest mean value was teachers can guide students in dividing the work and cooperating in activities so that everyone can play to their strengths ($\overline{x}$=3.90, S.D.=0.77).

4.3 Results of Data Analysis

From Tables 4.2-4.7, researcher analyze the current status of business school teachers' 21st century teacher skills and propose guidelines for the development of business school teachers' 21st century

teacher skills. This study interviewed 5 education administration, with 7 interview questions. The interview results are analyzed as follows:

Table 4.8 Summary of the Interview

issues of consideration	Opinions of interviewee
1.What is your opinion and attitude towards the Development of Teachers' Skills in the 21st Century at Business College of Guizhou City Vocational College? What is the most important skills for the teacher?	1.Teachers not only need to have traditional teaching skills, but also need to have strong information technology capabilities. Technical skills are the most important skills for teachers.
	2.Teachers should enhance their awareness of lifelong learning and constantly update their professional knowledge and educational concepts.
	3.Teachers need to adjust their teaching methods and strategies according to different factors.
	4.Teachers need to have adaptability, cross-border capabilities and innovative thinking.
	5.Teachers must have strong adaptability and the continuous evolution of their educational concepts, teaching methods and communication models.
2.Do you have any suggestions or support measures to improve the innovation skills of Teachers' skills in the 21st Century at Business College of Guizhou City Vocational College?	1.Schools should provide teachers with systematic and regular professional training and encourage teachers to conduct in-depth learning and communication.
	2.Interdisciplinary teaching teams can be established to allow teachers from different fields to share knowledge and collaborate on innovation.
	3.Teachers should enhance their understanding of the industry and improve their innovation capabilities.
	4.Teachers can stimulate innovation through joint development of courses and projects between schools and enterprises.
	5.Adopt incentive measures to encourage innovation and establish an assessment mechanism for innovation capabilities.

Table 4.8 Summary of the Interview (cont.)

issues of consideration	Opinions of interviewee
3.Do you have any suggestions or support measures to improve the Technology skills of Teachers' skills in the 21st Century at Business College of Guizhou City Vocational College?	1. Establish an incentive mechanism for technology application and encourage teachers to boldly try new technologies and tools in teaching.
	2.A dedicated technical support team is established to provide teachers with one-on-one technical guidance to help them master the use of new tools.
	3.Schools can organize teachers to participate in technology-related seminars to improve their Technology skills.
	4.Participate in relevant technical training to help teachers understand the latest industry technology applications.
	5. Include technical ability as one of the elements of professional title evaluation to encourage teachers to improve their technical abilities.
4.Do you have any suggestions or support measures to improve the communication skills of Teachers' skills in the 21st Century at Business College of Guizhou City Vocational College?	1.Schools can hold communication-related training regularly to help teachers improve their communication skills.
	2.Teachers should learn to actively listen and understand students' needs and problems through classroom interaction, group discussions, etc.
	3.When teachers in higher vocational colleges communicate with students, they need to provide effective feedback to promote students' progress.
	4.Teachers communicate with industry enterprises regularly to understand the latest industry needs and reflect them in course design.
	5.By building an interdisciplinary cooperation platform, teachers can improve their communication and collaboration skills through practical cooperation.

Table 4.8 Summary of the Interview (cont.)

issues of consideration	Opinions of interviewee
5.Do you have any suggestions or support measures to improve the critical thinking skills of Teachers' skills in the 21st Century at Business College of Guizhou City Vocational College?	1. Teachers can write their own teaching reflections every day or every week, recording the successes and failures in class, students' performance, and their own progress in teaching.
	2.Teachers can practice arguing and analyzing a teaching topic or educational concept, and choose different viewpoints for comparison and debate.
	3.Participate in critical thinking skills training and experience first-hand how to use critical thinking skills to solve complex problems in teaching.
	4.Organize peer evaluation among teachers to help them get critical feedback from an external perspective.
	5.When faced with complex teaching problems, teachers can think and analyze from multiple perspectives and evaluate the advantages and disadvantages of different solutions.
6.Do you have any suggestions or support measures to improve the collaboration skills of Teachers' skills in the 21st Century at Business College of Guizhou City Vocational College?	1.Schools can regularly organize collaboration skills training for teachers so that teachers can improve their collaboration skills in practice.
	2.Through group activities, students can listen to and evaluate each other's lessons, share teaching strategies and experiences, and improve their collaborative skills.
	3.Create a collaborative platform where teachers can discuss teaching issues, share teaching experiences, and participate in online group lesson preparation and other activities.
	4.Schools can invite industry experts and teachers to participate in curriculum development to ensure that course content is aligned with industry needs.
	5.Schools can set up special collaboration reward mechanisms to encourage teachers to engage in teamwork in teaching, scientific research, project cooperation and other aspects.

Table 4.8 Summary of the Interview (cont.)

issues of consideration	Opinions of interviewee
7.Do you have any suggestions to improve the Teachers' Skills in the 21st Century?	1.Improving the skills of teachers in the 21st century is a systematic project. Teachers should actively adapt to educational changes, master diversified teaching skills and methods, maintain a lifelong learning attitude, and constantly improve their professional abilities and personal qualities.
	2.As educators, teachers should always maintain an attitude of learning and self-improvement, and constantly update their knowledge system and teaching concepts. Lifelong learning is not only a professional responsibility of teachers, but also a source of motivation for their personal development.
	3.The educational environment in the 21st century is changing with each passing day, and teachers need to constantly update their knowledge and skills to adapt to new educational concepts, teaching methods and technical means.
	4.Schools should establish a comprehensive teacher skills development system covering teaching, technology, communication, critical thinking skills and collaboration, and set up a teacher skills assessment and feedback mechanism to help teachers understand their skill levels and development directions.
	5.Teachers should continue to learn and improve themselves, and establish the concept of lifelong learning Schools should provide diverse training and learning resources to meet the individual needs of different teachers.

Through the questionnaire survey, the analysis of the current status of teachers' skills in the Business College of Guizhou City Vocational College shows that although teachers have certain abilities and experience in teaching practice, they still have deficiencies in innovation skills, technology skills, communication skills, critical thinking skills and collaboration skills when facing the new requirements of 21st century education.

In the individual variable research data, communication skills are most in need of improvement, among which "using social software to contact parents or students", "setting thought-provoking questions in class to guide students to express their own views and ideas" and "reading books, newspapers, etc. to improve their own language comprehension and reasoning skills" have the lowest data.

Regarding the recommended guidelines for improving the skills of teachers in the 21st century:1)Teachers should actively embrace technology, master information technology tools, and use digital resources to improve teaching effectiveness;2)Teachers should constantly update their educational

concepts, focus on interdisciplinary cooperation and team teaching, maintain a lifelong learning attitude, continuously improve their professional capabilities, and promote innovation in educational models;3)Teachers should cultivate critical thinking skills, encourage students to think and solve problems independently, and stimulate innovation. 4)Schools should establish a comprehensive teacher skill development system including teaching, technology, communication, critical thinking skills and collaboration, establish a teacher skill assessment and feedback mechanism, and provide a variety of training and learning resources to meet the individual needs of different teachers and help teachers understand their skill levels and development directions.

5. Conclusion

The study found that the 21st century teacher skills of teachers in the Business College of Guizhou City Vocational College are high. Considering the results of this study, the levels from highest to lowest are as follows: the highest level is collaboration skills, followed by critical thinking skills, technology skills, innovation skills, and the lowest level is communication skills. The suggestions on skill development were put forward:

Collaboration skills: 1) Teachers should actively participate in collective course preparation, teaching and research activities, as well as project-based learning, share teaching experience and innovative methods, and improve team collaboration efficiency. 2) Teachers should strengthen cooperation with enterprises, understand industry needs, integrate practical experience into teaching, and improve students' professional ability and social adaptability. 3) Schools can regularly organize collaborative skills training for teachers. By simulating actual teaching, academic conferences, teamwork and other scenarios, teachers can improve their collaborative ability in practice. 4) Schools can invite industry experts and teachers to participate in course development to ensure that the course content is consistent with industry needs. 5) In order to cultivate collaborative skills, a special collaborative reward mechanism should be established to encourage teachers to carry out team work in teaching, scientific research, project cooperation and other aspects.

Technology skills: 1) Teachers should master various educational technology tools, such as online teaching platforms and simulation software, and flexibly use information technology to support classroom teaching and practical links to improve the interactivity and personalization of teaching; 2) Teachers need to update their own technical knowledge reserves, understand the latest industry technology developments, and integrate them into course content and teaching methods to improve students' professional skills and technical application capabilities; 3) Teachers can continuously improve their own technical literacy by participating in regular technical training and interdisciplinary learning, adapt to the rapidly developing educational needs, and cultivate high-quality skilled talents that meet the requirements of the modern workplace; 4) Schools can also establish a special technical support team to provide

technical operation assistance to teachers to ensure that teachers can use various technical tools smoothly, such as one-on-one technical guidance to help teachers master the use of new tools; 5) Establish a technology application incentive mechanism and use technical skills as one of the important reference factors for teacher title evaluation, encouraging teachers to continuously improve their technical capabilities and boldly try new technologies and tools in teaching.

Communication skills: 1) Teachers should have the ability to express themselves clearly and listen actively, and promote students' progress through effective feedback when communicating with students. When evaluating students, teachers should give specific suggestions, not just brief affirmations or denials. For example, for students' homework, specific directions and suggestions for improvement can be pointed out. Encourage students to do the right thing, while pointing out their shortcomings in a timely manner, and help students improve their learning level in a positive atmosphere. 2) Teachers also need to cultivate cross-cultural communication skills, be able to communicate effectively with students and team members from different backgrounds, and promote students' diversified development and social adaptability. 3) Teachers should improve their collaboration ability through teamwork, interdisciplinary communication, and jointly promote the reform and innovative development of vocational education and teaching. Through continuous communication skills training and practice, teachers can establish a more open and trusting communication environment in the education process, improve teaching effectiveness and students' learning experience. 4) Schools can regularly organize communication skills training courses and workshops, and invite experts or experienced lecturers to explain the basic principles, skills and methods of effective communication. These trainings can include classroom communication, personal consultation for students, communication with parents and colleagues, etc.

Critical thinking skills: 1) Teachers should constantly reflect on and evaluate their teaching practices, be good at questioning traditional teaching methods, and try to innovate and improve teaching strategies. For example, teachers can write their own teaching reflections every day or every week, recording their successes and failures in class, students' performance, and their own progress in teaching. These reflections help teachers examine their own teaching methods and students' feedback from a critical perspective; 2) Teachers can observe and provide teaching feedback through mutual evaluation with other teachers, which helps teachers obtain critical feedback from an external perspective and discover their own teaching blind spots and room for improvement. 3) Teachers can design challenging teaching activities such as problem-oriented learning and case analysis to encourage students to analyze problems and cultivate their independent thinking and logical reasoning skills. 4) Teachers can improve their critical thinking skills literacy by participating in professional development and interdisciplinary learning; 5) Schools can regularly organize critical thinking skills training for teachers. Specifically, situational simulations and case analysis allow teachers to experience firsthand how to solve complex problems in teaching through critical thinking skills.

Collaboration skills: 1) Teachers should actively participate in collective course preparation, teaching and research activities, carry out project-based learning, share teaching experience and innovative methods, and improve team collaboration efficiency. 2) Teachers should strengthen cooperation with enterprises, understand industry needs, integrate practical experience into teaching, and improve students' professional ability and social adaptability. 3) Schools can regularly organize collaborative skills training for teachers. By simulating actual teaching, academic conferences, teamwork and other scenarios, teachers can improve their collaborative ability in practice. 4) Schools can invite industry experts and teachers to participate in curriculum development to ensure that the course content is consistent with industry needs. 5) In order to cultivate collaborative skills, a special collaborative reward mechanism should be established to encourage teachers to carry out team work in teaching, scientific research, project cooperation and other aspects.

6. Discussion

Objective 1 :The teacher skills of teachers in Business College of Guizhou City Vocational College are at a high level in five aspects.

From the results of this study, the teacher skills level from high to low are: collaboration skills, critical thinking skills, technology skills, innovation skills, and communication skills. corresponds to Charanjit, et al (2020) believed that Collaboration among teachers will enable them to share lesson planning ideas and improve their teaching practices and professionalism;Zhang Yuanpin(2024) believed that teachers should keep up with the development of digital technology and promote the improvement of technology skills by applying for and participating in information technology projects;Divyansh Bordia(2020) believed that times are changing fast, and as teaching moves online, technological knowledge has become one of the key tutoring skills that teachers should have.

Objective 2 : The suggestions for improving the skills of teachers in Business College of Guizhou City Vocational College in the 21st century were multi-directional include: 1) Teachers should actively embrace technology, master information technology tools, and make good use of digital resources to improve teaching efficiency; 2) Teachers should constantly update their educational concepts, attach importance to interdisciplinary cooperation and team teaching, maintain a lifelong learning attitude, continuously improve their professional capabilities, and promote innovation in educational models; 3) Teachers should cultivate critical thinking, encourage students to think independently, solve problems, and inspire innovative spirits. Through continuous professional development and reflection, teachers can improve their overall personal qualities, better adapt to the rapidly changing educational environment, and cultivate students with core competitiveness in the 21st century; 4) Schools should establish a comprehensive teacher skills development system, including teaching, technology, communication, critical thinking, collaboration, etc., and establish a teacher skills assessment and feedback mechanism for each

skill, provide various training and learning resources, meet the individual needs of different teachers, and help teachers understand their own skill levels and development directions.

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Motivation in English Language Learning of English Education Students, Faculty of Education, Bansomdejchaopraya Rajabhat University

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Abstract

With Thailand's current drive to make English as a Second Language and improve quality of education, students' engagement when learning English has been a great challenge especially when students view the subject as a difficult one. The drive to improve quality teaching and students' engagement in the classroom needs a very constructive intervention program to bridge the gaps.

The main goal of this study is to gather information on the students' motivation in studying English and the challenges they have encountered. This descriptive study is conducted among 75 Junior undergraduate students of Bansomdejchaopraya Rajabhat University. The study was undertaken using the modified motivational survey method of 20-item adapted from Gardners' Attitude/Motivation Test Battery (AMTB). The data were collected through a questionnaire using a 5 likert-type scale where 5 is strongly agree and 1 is strongly disagree. Some of the questions used in the questionnaire were from the revised questionnaire by Ratanalee Wiwolmas in her study "A Survey Study of Motivation in English Language Learning of First Year undergraduate students at Sirhindorn International Institute of Technology (SIIT) Thammasat University.

The findings illuminate that the students had high levels of motivation in studying English as evident in its mean where students' highest mean on both two types of motivation; Instrumental and Integrative motivation were 35 and 41 respectively.

Furthermore, the students possess an Integrative type of motivation. where in students' drive to learn English is not based on the desire to get a better salary but their motivation is driven by their sincere and personal interest in the people and culture. Moreover, the students' top 5 challenges encountered in studying English are: grammar, idioms, pronunciation, speech space and sound detection in the correct order. An intervention program for engaging lessons and helping students overcome the listed challenges will lead to promising results.

Keywords: instrumental motivation; integrative motivation; intervention program; motivation

1. Introduction

Recently, learning English has been prevalent in Thailand and it has become more popularized after its membership of the ASEAN Hub. As countries and people are working towards globalization and as an International language it has become more and more important in international relations and cooperation and equally important in communication especially in the field of tourism. Therefore, it has also been becoming more popular in Thai schools private or public it may be. Motivation plays a vital role in foreign language learning. Learning motivation is to promote, guide and maintain learning activities that have been conducted an internal strength or internal mechanism. Learning motivation, once formed, the students will use an initiative study attitude to learn and express a keen interest in learning and can focus their attention in class to master knowledge. But also, the student will have a kind of motivation to state of attention, especially in the process of learning. Learning motivation that there is a dialectical relationship, which learning can produce motivation and motivation can promote learning again. There is a typical complementary relationship between motivation and learning. (Ausubell,1968). Thus, learning motivation plays an important role in learning English. In the case of learning foreign languages, students with strong motivation can always achieve better while students without intrinsic motivation are often losers of language learning.

In addition, the English learners have become younger and younger. English has been compulsory subject in the primary schools for a long time. But due to the advent of technology (smartphones and the social media). There have been some cases viewed in most classrooms which showed students specifically junior high school students who needs some motivations in learning English as a foreign language. Moreover, teachers should know the psychological theory (teaching styles) and the process of English learning in order to encourage and enhance students' English learning.

Learners' motivation plays a crucial part in learning English. Indeed, the role of learners' motivation in learning has been examined by many researchers who are interested in this area. Some famous linguists and theorists like Gardner (1985) even supported this idea of English Language learning and pointed out that motivation in language learning is of particular importance. (www.ccsenet.org/elt English Language Teaching Vol. 6, No. 9;2013).

Motivation of foreign language learning contains four aspects: a goal, effortful behavior, a desire to attain the goal and attitude. Students who have strong learning motivation take a correct and positive attitude towards study and make great efforts to master English with clear goal and desire and consequently gain better grade. It is true that motivation is such a basic factor in language learning that no teacher could avoid being concerned with students' motivation. Therefore, this study has been initiated to find out the level of students' motivation, type of motivation and the challenges the students have encountered when studying English Language.

2. Objectives

Specifically, the study sought answers to the following questions:

1. What is the profile of the students' respondents in terms of:

1.1 Gender

1.2. Age

1.3. Annual Income of Parents

2. What type of motivation do the students possess?

3. What is the students' level of motivation?

4. What are the top 5 challenges the students encounter in their study of the English Language?

It has been hypothesized that the students are highly motivated. Students possess instrumental motivation, and the top five challenges encountered by the students are Idioms, Pronunciation, Understanding of English Structure, Commas and other Punctuations, and Sound Detection.

The following terminology has been used in this study:

1. Motivation – the general desire or willingness of someone to do something.

2. Instrumental Motivation pertains to the potential pragmatic gains of L2 proficiency, such as to get a better job or to pass a required examination, or for high work renumeration.

3. Integrated Motivation is the sincere and personal interest in the people and culture represented by other language groups.

"The Factors Affecting Learners' Motivation in English Language education" was conducted by Seda Ekiz and Zahitjan Kulmetcav in 2016 stated that, teachers and researchers have broadly accepted that motivation and demotivation as one of the most important elements in foreign language(L2) learning. Results of the study showed that there are strategies and behaviors that motivate the students but suppress positive attitudes towards English learning. Furthermore, learners were not motivated when their parents supported and encourage them to learn English. Reinforcing the learners' beliefs also motivated students and they were more motivated when they worked with peers. Based on the entire results of the study, the researcher suggested many behaviors and strategies which motivate learners.

Likewise in 2015, J.M. Lokie conducted a study entitled "Examining Student's Achievement and motivation using internet-based inquiry in the classroom" an Open Access Theses and Dissertation from the College of Education and Human Sciences, where in, the results revealed that students' level of awareness is quite low. Students just study because it is a necessity. It is part of the curriculum. Furthermore, teachers should be flexible and should apply different ways of teaching and adapt them with a different group of students he/she has to teach. At the same time, analysis of students' needs must be done by the teacher before the actual teaching.

Motivation to Learn English as a Foreign Language in Brazil – Giving Voice to a Group of Students at a Public Secondary School was a research conducted by Raquel Bambirra in 2017. The study investigated as to what extent a group of Brazilian Secondary Public School students find themselves motivated to learn English at school. Motivation was conceptualized as participation in terms of the students' attitudes towards their English classes. Results of the study indicated that these students were usually motivated to attend classes but the classroom experiences played an important role in motivating them even more. Also, the study acknowledged motivation as an everchanging experiential construct deeply influencing the foreign language learning classroom, and at the same time being deeply influenced by internal and external factors to the individuals and the language classroom as well.

Furthermore, Jinghua Qian and Chili Li (2017) Investigated the changes in demotivation among Chinese EFL learners from an Activity Theory Perspective where in results showed that the formation of demotivation is associated with language proficiency, mastery goal orientation, gender, educational level, and other learner variables. Yet, among these learner variables, the academic field is considered to be the vital factor in explaining the relationship with demotivation.

Effects of Teacher Motivation Practices and Student Demotivation on Request and refusal Speech Acts Produced by Iranian EFL Learners was a research conducted in 2018 by Biria, R and Ahmadmdavi. Results of the study showed significant differences between students in high and low motivation groups with respect to the production of request and refusal speech acts as shown on the post test score. It was also observed that various levels of demotivation dramatically influence the quality of request and refusal speech acts produced by the learners in their English classes. Alternately, the finding demonstrated that teachers' motivational practices had a direct effect on the learners' productions of the targeted speech acts.

One study conducted by Sevil Orhan- Ozen in 2017 showed that motivation has a low level positive effect on students' achievement. Moderators identified for the study were; publication type, publication year, school subject, country, culture and sample group were found to variables.

How Motivation Affects Academic Performance was another study conducted in 2017. Results showed that motivation affects students' performance based on their nature. Students are intrinsically motivated if they love or enjoy what they are doing even if there is no reward or incentive for it. While extrinsically motivated to if they do not enjoy what they do but still do so to get the rewards or token. Moreover, motivation affects determination, effort and energy. Motivation uplifts students' enthusiasm about activities presented to them. Once they get motivated to achieve something by doing the tasks, they will eventually exert their full effort, time and energy. They become determined or persistent in accomplishing things even if these are not of their interest. This will also determine if they are pursuing such tasks on a voluntary or on a compulsory basis. Furthermore, motivation affects students' behavior and values. Motivating someone with behavioral issues can be really hard. It should not stop us from

transforming their negative behavior and attitude into positive ones. The best way to deal with it is to align motivation in a way that benefits of the tasks and its advantage. Proper discipline should be taught and implemented so that they will know their limitations.

Todd Braver, in his book "Motivation and Cognitive Control, implies that individuals are not extending their full capabilities when it comes to cognitive engagement or development. Motivation affects an individual when paying attention to specific information and attempts to understand the learning materials through experiences, thoughts, ideas and senses rather than just going through the process of rote learning. Furthermore, he explained that motivation affects students' performance based on their nature. Students are intrinsically motivated if they love or enjoy what they are doing even if there is no reward or incentive for it. While extrinsically motivated if they do not enjoy what they do but will still do so to get rewards or token.

Results of the Research on motivation to engineering students of King Mongkot University of Technology North Bangkok Campus showed the subject's greater support of instrumental reasons for learning the English Language. However, regarding the integrative reason, the results provided evidence that learning English as part of living in English-speaking countries in the future had the least impact on the students' English language motivation towards English Language learning of Pre-engineering students. (Thanaporn 2017)
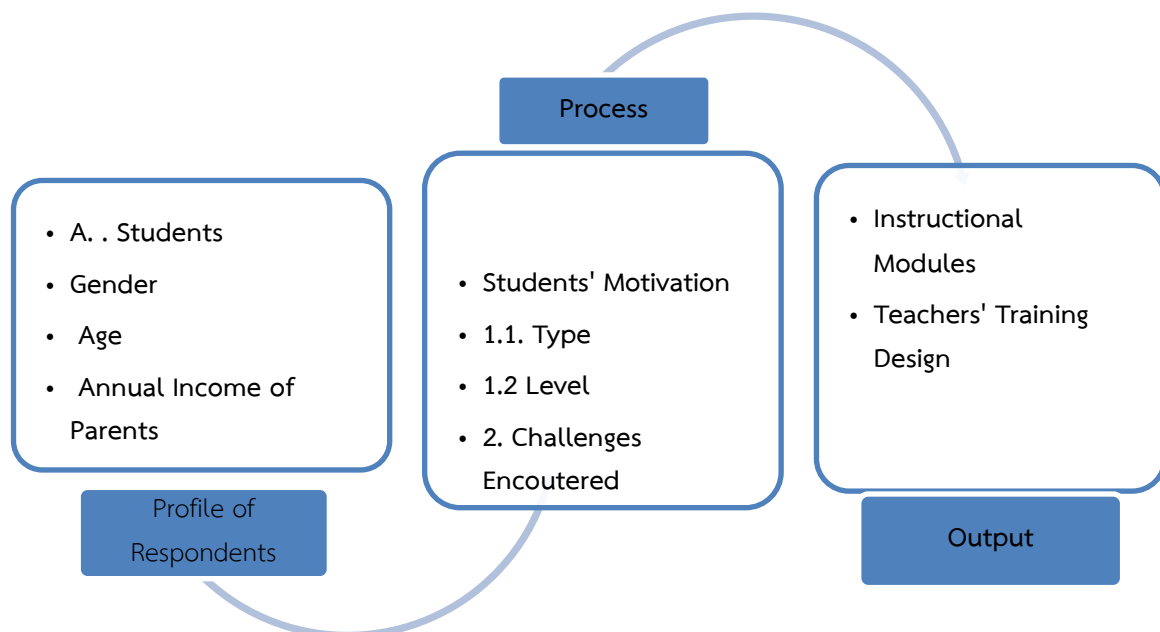
According to Bopita in 2019, Students learn English due to their drive for people and culture which is known as integrative motivation. The students learn English to understand the people and their culture. Relevant learning implications and useful motivation are recommended to increase students' motivation. Thai undergraduate students were highly motivated both instrumentally and integratively with slightly stronger instrumental motivation. Research results revealed that communication with foreigners fluently and preparing for their future careers where the main goal for the participants with regard to studying English as a foreign language.

3. Conceptual Framework

This study was anchored from the study of Sevtap Karaogli entitled " Motivating Language Learner to Succeed." The author points out that motivation plays a role in learning and provides suggestions for how to maintain the motivation level of the learners. According to Karaogli, motivation plays a significant role in the process of learning a language. Language teacher cannot effectively teach a language if they do not understand the relationship between motivation and its effect on language acquisition. The core of motivation is what might be called passion, which relates to a person's intrinsic goals and desires. Successful learners know their preferences, their strengths and weaknesses and compensate for weaknesses. Successful learning is linked to the learner's passion, and instructors should find ways to connect this passion.

Learners need quality instruction, input interactions and opportunities for meaningful output, not only to make progress but also to maintain motivation for language learning. A good teacher, then, must tap into the sources of intrinsic motivation and find ways to connect them with external motivation factors that can be brought to a classroom setting. This is especially significant when English is not seen as important to students' immediate needs other than to pass exams. Because learners have different purposes for studying a language, it is important for instructors to identify students' purposes and needs and to develop proper motivational strategies. Students should understand why they need to make an effort, how long they must sustain an activity, how hard they should pursue it and how motivated they feel toward their pursuits.

Motivation fluctuates, and it is challenging to keep language learners motivation intact. Many students feel more comfortable participating in classroom activities after they know their teachers and pears. Creating a safe and comfortable environment here everyone feels like a part of the whole is one of the most significant factors in encouraging motivation. Doing so, may take time as students adjust themselves to a new setting.

Process

- Students' Motivation
- 1.1. Type
- 1.2 Level
- 2. Challenges Encoutered

Profile of Respondents

- A. . Students
- Gender
- Age
- Annual Income of Parents

Output

- Instructional Modules
- Teachers' Training Design

4. Methodology

This questionnaire-based study is a Descriptive - quantitative research aimed at gathering data on the motivational level of students, type of motivation (Instrumental motivation and Integrative motivation, likewise the challenges students encounter when studying English Language.

4.1 Research Locale

The study was conducted to the 75 third year students of the English Program, Faculty of Education, Bansomdejchaopraya Rajabhat University, 1061 Soi Itsaraphap,15 Hiranruchi, Thonburi, Bangkok.

Thonburi is an area of the modern Bangkok, during the Era of the Kingdom of Ayutthaya located on the right (west) bank of the Chao Praya River.

4.2 Samples and Sampling Techniques

4.2.1. Students Respondents

Student respondents in this study were the two sections (D1 and D2) third - year students of the English program of the Faculty of Education BSRU . The researcher employed the total renumeration or total population sampling. All the 82 student respondents were given the opportunity to participate in the study by answering the questionnaire that was provided to them, however, only 75 students responded questionnaire as the other students did not come to study with the teacher when the survey was conducted.

Total Population Sampling was used in this study because the researcher has perceived that there might be some characteristics of the respondents that could be further defined in the study.

4.2.2 Instrumentation

4.2.2.1 Students' Motivation

The instrument used in this study was a six point likert-scale adopted from the original 7 likert-scale format of Gardner's Attitude/Motivation Battery Test (AMBT), ranged from strongly agree to strongly disagree.(Gardner 1969). Some of the questions used in the questionnaire was adopted from Ratanawalee Wiwolmas who conducted a research on "A Survey Study on Motivation in English Language Learning of First Year Undergraduate Students at SIIT, Thammasat University, Thailand. However the researcher has further modified the scale into 5 ranging from "strongly Agree", Moderately Agree, "Neutral", Moderately disagree, and "strongly disagree". Miss Wimolmas and the researcher shared some commonalities. Firstly, the current study is on the students' level of motivation to study English language. Secondly, the current study will also be conducted in Thailand, however not to freshmen students but the junior university students.

4.2.2.2 Challenges encountered when studying English Language

A list of 9 challenges commonly mentioned by a majority of students studying English was given to the students to arrange according to its level of difficulty where no. 1 listed is the most challenging and listed in number 9 is the least challenging.

4.3 Procedure

The following procedures were adopted in order to meet the objectives of the study. First the survey questionnaires were administered to the student respondents.

The conduct of the survey was done on the regular hour that the students learned with the teacher. Translation was allowed for the students to better understand the question and for the researcher to gather the most reliable responses. The researcher made sure that the objectives of the study are explained clearly and make sure that the researcher has thoroughly explained the purpose of the research,

the importance of their honest responses before the questionnaires have been administered. The researcher gave an overview of the study to the respondents and the description of the instrument in order to get the expected data from them. The respondents were instructed to read each statement in the survey questionnaire and affix their corresponding answers by ticking the appropriate number designated for each descriptive response (1 – 5). In case of confusion and doubts, the respondents were allowed to use their translation apps in their smart phones.

5. Results and Discussions

Results of the basic statistics are shown in tables by frequencies and percentages.

Table 1 Frequency and Percent of the respondents' profile

Profile Variables	Frequency	Percent (%)
Gender:		
Male	19	25.3
Female	56	74.7
Total	75	100.0
Age (in years)		
19	1	1.4
20	23	31.9
21	43	59.7
22	4	5.6
23	-	-
24	1	1.4
Total	72	100.0
Annual Income of Parents		
More than 500,000 Thai Baht	8	10.8
300,000 – 499,000 Thai Baht	15	20.3
100,000 – 299,000 Thai Baht	23	31
Below 100,000 Thai Baht	28	37.8
Total	74	100.0

Table no. 1 shows that majority of the students are female, 59.7% of the respondents are aged 21 years old. Most of the parents have an annual income of below 100 thousand Thai baht.

Table 2 Instrumental Motivation

Instrumental Motivation	(5) Strongly Agree	(4) Moderately Agree	(3) Neutral	(2) Moderately Disagree	(1) Strongly disagree
A.1	17.3	56	24	-	1.33
A.2	9.3	38.7	29.3	13.73	2.7
A.3	10.66	22.66	42.66	17.33	5.33
A.4	28.3	36	25.33	6.67	1.33
A.5	30.66	40	18.66	8	1.33
A.6	65.33	29.33	4	5	-
A.7	61.33	30.66	6.67	-	-
A.8	56	29.33	12	5	-
A.9	50.66	36	8	-	-
A.10	21	33.33	36	4	4
Total	35	35.2	20.7	6	1.6

Table 2 shows that majority of the students have Instrumental motivation. Thirty-five percent strongly agree on the questions/situations presented in the questionnaire.

Table 3 Integral Motivation

Integral Motivation	(5) Strongly Agree	(4) Moderately Agree	(3) Neutral	(2) Moderately Disagree	(1) Strongly disagree
1.	56	33.33	9.3	1.3	-
2.	37.33	48	13.33	-	-
3.	30.66	48	14.66	5.33	-
4.	37.33	36	21.33	4	-
5.	46.66	37.33	12	2.66	-
6.	37.33	36	25	-	-
7.	34.66	30.66	32	1.33	-
8.	41.33	34.66	18.66	4	-
9.	44	36	18.66	1.33	-
10.	46.64	30.66	18.66	1.33	1.33
Total	41.19	37	18.36	2.13	1.33

Table 3 shows the mean and percentage of the integral motivation responses of the students. Majority of the students strongly agree on the different questions and situations presented in the survey questionnaire.

Table 4 Summary of Total Mean Results for Instrumental and Integrative Motivation.

Types of Motivation	(5) Strongly Agree	(4) Moderately Agree	(3) Neutral	(2) Moderately Disagree	(1) Strongly disagree
A.	35	35.2	20.7	6	1.6
B.	41.19	37	18.36	2.13	1.3

Table 4 revealed that the students possess both Instrumental Motivation and Integrative Motivation, However, Integrative motivation is slightly higher than Instrumental motivation.

Table 5 Challenges Encountered by the Students

Challenges	Frequency	Percent (%)
1. Grammar	25	33.33
2. Idioms	20	26.67
3. Pronunciation	25	33.33
4. Speech Space	14	18.66
5. Sound Detection	18	24
6. Slang and Colloquialism	15	20
7. Commas and other Punctuations	19	25.33
8. Practice	20	26.67
9. Understanding English	18	24

Table 5 revealed that knowledge of Grammatical structure in English is the most challenging aspect of the Learning of English Language Among Third Year English Education students.

6. Conclusion

Basic statistics computations showed the following results:

The results on the type of motivation showed that the third-year undergraduate students of the English Program, Faculty of Education, are indeed highly motivated to learn English, with a mean of 35 and 41.19 for Instrumental motivation and integral motivation, respectively. The majority of the students strongly agreed on the different questions presented in the survey questionnaire.

Furthermore, the data collected revealed that the students possess the integrative type of motivation, where in students' drive to learn English is not based on the desire to get a better salary but their motivation is driven by their sincere and personal interest in the people and culture.

Moreover, the top 5 challenges encountered by the students when they study English are; Grammar, Idioms, Pronunciation, Speech Space, and Sound Detection as arranged accordingly from the most challenging to the least challenging. The result of the study is parallel to the study of Tanyalak Lobyam entitled "A study of English Learning Motivation and Demotivation Types of Students in Northeastern Vocational Thai College" where results of her study also showed that grammar is the number 1 demotivational factor of the students in their English Language study.

Consequently, an intervention program on interactive and engaging teaching pedagogy and supplementary activities to overcome students' challenges is deemed necessary to better improve classroom instructions.

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Improving Teacher Professional of Private University in Nanning

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Abstract

This paper focuses on the improvement of professional qualities of teachers in private colleges and universities in Nanning. It analyzes the current status of teachers' professional qualities, including complex sources of teaching staff, lack of professionalism, and few training opportunities. Based on theories, it elaborates on problems in teaching, scientific research and teacher ethics of teachers in private colleges and universities in Nanning, such as single teaching methods, weak research consciousness, and insufficient professionalism. It discusses the application of practice community in improving the professional qualities of teachers in private colleges and universities in Nanning, including constructing a teacher practice community, carrying out activities in the practice community and the role of practice community in improving teachers' professional qualities. Finally, it summarizes the research conclusions and looks forward to the future, and puts forward suggestions such as deepening the connotation and form, integrating external resources, and establishing a long-term mechanism to provide stronger support for the improvement of professional qualities of teachers in private colleges and universities in Nanning.

Keywords: private colleges and universities in Nanning; teachers' professional qualities

1. Introduction

Rationale

Based on the "14th Five-Year Plan" and facing 2035, the "Plan for Strengthening Teachers in basic Education" puts forward ideas and measures to strengthen the construction of teachers in basic education, and build a strong professional development system for teachers in the new era, which is an inevitable requirement to improve the level of teachers' professional ability and cultivate good teachers in a large country. First, promote the integration of teacher education through institutional innovation. Secondly, enhance the accuracy of teacher professional development by connotation construction. (Department of Teachers' Work, Ministry of Education, 2022) According to the document, It is necessary to strengthen the construction of teacher professional development institutions, stimulate the vitality of teachers, take moral cultivation as the foundation, tap the potential of existing teacher professional development institutions and elements, improve the quality of relevant elements, optimize methods and processes, create conditions for high-quality teacher professional development, and promote the improvement of education and teaching quality.

The aim of teacher professional is to adopt a comprehensive approach to teacher development. This is an ongoing process that continuously improve teaching practice throughout their career. Effective teacher professional development can have a positive impact on teachers' practice and significantly improve learners' learning outcome. Teacher professional emphasizes how to participate in the educational experience and to promote the development of teachers' knowledge, skills and teaching practice ability. (Li Quang, 2019)

To sum up, teacher professional is an important part of the higher education system, and the improvement of teacher professional is crucial to the overall development of the private university in Nanning. Facing the challenges of the information age and the requirements of higher education reform, this paper conducts in-depth research on the teacher professional, aiming to provide a better guide for the improving teacher professional under the new situation.

2. Research Questions

1. What is the current situation of teacher professional of private university in Nanning?

2. What are the guidelines for improving teacher professional of private university in Nanning?

3. Are the guidelines for improving teacher professional of private university in Nanning adaptability and feasibility?

3. Objectives

1. To study the current situation of teacher professional of private university in Nanning

2. To develop the guidelines for improving teacher professional of private university in Nanning

3. To evaluate the guidelines for improving teacher professional of private university in Nanning

4. Scope of Research

Population and the Sample Group

Population

The population of this research were 750 teachers from 3 private universities at undergraduate level in Nanning.

Sample Group

According to Krejcie and Morgan sampling table (1970), the sample group of this research was 254 teachers from 3 private university at undergraduate level in Nanning. Random sampling and simple random sampling were used in this research.

The interviewee

The interviewees in this research were 20 teachers from private universities in Nanning. The qualifications of interviewees are as follows: 1) Graduated with master's degree or above; 2) At least three years of teaching experience in private universities; 3) Always full of enthusiasm for teaching and desire to improve teacher professional.

Variable

According to the analysis of related theories and researches, the research of guideline for improving teacher professional should be carried out from the following dimensions:

1. Teacher knowledge
2. Teacher skill
3. Teacher value
4. Teacher competency

Advantages

1. Use the guidelines as a reference to improve teacher professional of private university in Nanning.

2. Promote teacher professional including teacher knowledge, teacher skill, teacher value, teacher competency in Nanning private university.

Definition of terms

1. Teacher professional refers to improving teachers and their practice by adopting a holistic approach to developing the teacher as a professional practitioner. It is an ongoing process that supports continuous development of practice throughout the whole of a teacher's career. It is special field of teachers' occupation. The premise of holding this view is to regard teaching as a specialized occupation. In Chinese traditional language context, "teachers' profession" is often used interchangeably with "teachers' occupation."

2. Teacher knowledge refers to the total knowledge that a teacher has at his or her disposal at a particular moment which, by definition, underlies his or her actions. This does not imply that all the knowledge a teacher has actually plays a role in his or her actions.

3. Teacher skill refers to those necessary for creating lesson plans, instructing students, working with administrators and interacting with students. Some of these skills may be innate to the teacher's personality, but teachers may learn some as a result of formal education or on-the-job experience.

4. Teacher value refers to teaching social, political, cultural, and aesthetic values. Values are expressed through subjective judgements (attitudes) and through behavior. There is a difference between values and norms: norms are social conventions that are ultimately based on values, but are strongly defined within a certain context.

5. Teacher competency refers to different dimensions as field competencies, research competencies, curriculum competencies, lifelong learning competencies, social-cultural competencies, emotional competencies, communication competencies, information and communication technologies competencies (ICT) and environmental competencies. Teachers' competencies affect their values, behaviors, communication, aims and practices in school and also they support professional development and curricular studies. Thus, the discussion on teachers' competencies to improve the teaching-learning process in school is of great importance. Since teaching is such a complex and multidimensional endeavor, teachers need to have sufficient knowledge and skills to handle the requirements of their everyday situations.

5. Research Methodology

This research focuses on guidelines for improving teacher professional of private university in Nanning. To study the current situation and provide the guidelines for improving teacher professional of private university in Nanning. The researcher has the following procedures.

1. The population / Sample group

2. Research Instruments

3. Data Collection

4. Data analysis

Phase 1 The objective of this phase was to study the current situation of the teacher professional of private university in Nanning.

The Population

The population of this research were 750 teachers from 3 private universities at undergraduate level in Nanning.

The Sample Group

According to Krejcie and Morgan sampling table (1970), the sample group of this research was 254 teachers from 3 private university at undergraduate level in Nanning. Random sampling and simple random sampling were used in this research.

Table 1 Lists of university and sample size

NO	The name of university	Population	Sample group
University 1	Nanning University	320	108
University 2	Guangxi University of Foreign Language	200	68
University 3	Xiangsihu College of Guangxi Minzu University	230	78
Total		750	254

Research Instruments

Structured Interview Form

The instrument to collect the data for objective 2. After obtaining the structural dimensions of improving teacher professional of private university in Nanning, the researchers set corresponding interview questions, focusing on the guidelines for improving teacher professional of private university in Nanning. Interview questions can be reviewed by experts in the field and suggestions for improvement can be made.

Part 1: Survey about personal information of 10 teachers in private university in Nanning.

Part 2: Survey about guideline for improving teacher professional of private university in Nanning.

Research steps and methods

Step 1: To summarize the current situation and level of teacher professional of private university in Nanning.

Step 2: To invite experts to conduct structured interviews.

Step 3: To conduct interviews according to the contents and steps of the interview outline.

Step 4: After summary the interview results, a comprehensive guideline was developed to improve teacher professional of private university in Nanning. The data obtained from the interviews was presented in tabular form.

Data Collection

The researcher carried out data collection according to the types and steps of research instruments.

The data collection for objective 2: to provide guideline for improving teacher professional of private university in Nanning.

Step 1: To collect personal information of experts participating in structured interviews.

Step 2: To collect each expert's response to the interview outline questions.

Step 3: To sort out and summarize the content of each expert's answer to form a guideline.

Phase 3 The objective of this phase was to evaluate the guideline for improving teacher professional of private university in Nanning.

The Sample Group

The Sample Group: The experts for evaluating suitability and feasibility of guideline for improving teacher professional of private university in Nanning were 10 teachers in private university in Nanning.

6. Research Instruments

Evaluation Form

The instrument to collect the data for objective 3. After obtaining the guidelines for improving teacher professional of private university in Nanning, the researchers set Evaluation Form, 5 experts were asked to rate the feasibility of the guidelines.

Part 1: Survey about personal information of 5 experts.

Part 2: Evaluate about improving teacher professional of private university in Nanning. The data interpretation for mean based on Rensis Likert (1932) criteria as follow;

4.50-5.00 express highest level

3.50-4.49 express high level

2.50-3.49 express medium level

1.50-2.49 express low level

1.00-1.49 express lowest level

7. Research steps and methods

Step 1: The researcher summarizes the guidelines for improving teacher professional of private university in Nanning, and form the suitability and feasibility Evaluation Form.

Step 2: The researcher invites experts to assess the suitability and feasibility of the guidelines, sort out the results of expert evaluation.

Step 3: To analyze the results about the evaluation of the suitability and

feasibility of guideline for improving teacher professional of private university in Nanning. Presented the data in the form of mean and standard deviation.

Data Collection

The data collection for objective 3 : to evaluate the guidelines for improving teacher professional of private university in Nanning.

Step 1: To collect personal information of experts participating in evaluating the guideline.

Step 2: To collect each expert's response to the Suitability and Feasibility Evaluation Form.

Step 3: To sort out and summarize the evaluation results of each expert and present them in tabular form.

Data Analysis

After data collection, the researcher statistic and analyze data according to objective 1, 2 and 3 as follow;

Step 1: The personal information of the sample was analyzed by frequency and percentage, classified by gender, working experience and professional rank.

Step 2: The current situation of improving teacher professional of private university in Nanning was in five following aspects: 1) Teacher knowledge, 2) Teacher skill, 3) Teacher value, 4) Teacher competency. And criteria of mean as follow;

4.50 – 5.00 expressed highest level

3.50 – 4.49 expressed high level

2.50 – 3.49 expressed medium level

1.50 – 2.49 expressed low level

1.00 – 1.49 expressed lowest level

Step 3: The structured interview about guideline for improving teacher professional of private university in Nanning was analyzed by content analysis.

Step 4: The evaluation of the suitability and feasibility of guideline for improving teacher professional of private university in Nanning were analyzed by mean and standard deviation. And criteria of mean as follow;

4.50 – 5.00 expressed highest level

3.50 – 4.49 expressed high level

2.50 – 3.49 expressed medium level

1.50 – 2.49 expressed low level

1.00 – 1.49 expressed lowest level

8. Conclusion

This research conducts an in-depth exploration around the professional competence of teachers in Nanning's private colleges and universities. It focuses on analyzing the current situation and discusses the application of communities of practice in the process of enhancing teachers' professional competence. Through a series of research and practical case analyses, the following important conclusions have been drawn: Communities of practice have achieved remarkable results in improving the professional competence of teachers in Nanning's private colleges and universities.

I. Improvement in Teaching Ability

At the level of teaching ability, the teaching seminar activities organized by the community of practice have

played a crucial role. Teachers have taken this opportunity to learn a rich variety of teaching methods and strategies, which has significantly enhanced classroom interactivity and optimized teaching design. These series of changes are directly reflected in the learning performance of students, with a substantial increase in students' classroom participation and a noticeable improvement in their academic performance.

Taking Nanning University as an example, under the active promotion of the community of practice, teachers have actively participated in teaching observations and themed seminars. Through continuous learning and practical improvement, teachers' teaching methods have become increasingly refined, thereby leading to a steady upward trend in the overall teaching quality of the school. According to relevant statistical data, the average academic performance of students in the classes taught by teachers who participated in the community of practice has increased by approximately 10%, fully demonstrating the positive impact of the community of practice on the improvement of teaching ability.

II. Enhancement of Scientific Research Ability

In terms of scientific research ability, the scientific research cooperation projects carried out by the community of practice have created extremely valuable learning and growth opportunities for teachers. By forming teams, clarifying division of labor, and collaborating with each other, teachers have gradually mastered scientific research methods and techniques, effectively solved many scientific research problems, and achieved a series of valuable scientific research results. More importantly, these scientific research results can be promptly applied to teaching practice, further promoting the improvement of teaching quality.

Taking a certain private college in Nanning as an example, after teachers actively participated in scientific research cooperation projects, the number of scientific research achievements in the school increased by 30% compared with before. At the same time, the teaching quality has also been correspondingly improved. This fully proves the important role of the community of practice in promoting the development of teachers' scientific research ability and facilitating the integration of teaching and scientific research.

III. Improvement of Teachers' Professional Ethics

In terms of teachers' professional ethics, the community of practice has successfully created a favorable atmosphere, which has played a significant role in promoting the enhancement of teachers' dedication and professional identity. In this positive atmosphere, teachers learn from each other, draw on each other's experiences, and deeply reflect on their own behaviors, thereby establishing correct educational concepts and professional ethics, and greatly strengthening their sense of responsibility and mission.

For example, in some private colleges, there used to be some teachers who lacked dedication and had a low sense of professional identity. However, after participating in the community of practice, these teachers' teaching attitudes have undergone a drastic change, and they have a deeper and clearer

understanding of their professional value, achieving a comprehensive transformation from ideological awareness to actual actions.

In conclusion, the community of practice is undoubtedly an effective way to improve the professional competence of teachers in Nanning's private colleges and universities. It provides solid and powerful support for the long-term development of Nanning's private colleges and universities and is worthy of being promoted and applied in more private colleges and universities.

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Needs Assessment for Leadership Development of Chinese Dance Teachers in Shandong Province

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Abstract

This study examined the leadership development needs of Chinese dance teachers in Shandong Province. The research aims to evaluate the current and expected leadership situations, identify significant gaps using the Positive Need Index (PNI), and propose strategies for sustainable leadership improvement. A mixed-method approach was employed, incorporating quantitative data from 310 Chinese dance teachers and 20 experts (teachers and administrators) through structured questionnaires, as well as qualitative insights from semi-structured interviews with 20 participants.

The findings revealed significant gaps across all dimensions. Educational background exhibited the largest gap, highlighting the need for leadership training programs focusing on management and international collaboration. Age structure underscored the importance of mentorship for younger teachers and recognition for senior educators. Training experience and school support indicate moderate needs for personalized growth plans and enhanced institutional resources. The results of the paired t-test confirmed statistically significant differences between the current and expected leadership development situations. This study proposed targeted approaches, such as mentorship initiatives, professional development workshops, and enhanced institutional collaboration, to bridge these gaps. The recommendations aim to empower educators and policymakers to create effective leadership development programs, ensuring Chinese dance teachers were well-equipped to lead in their field and preserve cultural heritage.

Keywords: Chinese dance teachers; leadership development; needs assessment; Shandong province

1. Introduction

Leadership plays a pivotal role in shaping the quality of education, fostering innovation, and promoting cultural preservation. In the realm of performing arts, particularly Chinese dance, the leadership of educators was essential to sustain the growth and transmission of traditional art forms while adapting to modern educational needs (Li & Chen, 2018; Wang & Zhang, 2016). In China, dance teachers not only serve as instructors but also as cultural ambassadors who uphold and transmit the values and techniques of Chinese dance to future generations. However, as educational demands evolve and schools increasingly focus on leadership development, significant challenges arise in equipping dance teachers with the necessary leadership skills (Liu & Sun, 2019; Zhou, 2017).

In Shandong Province, where Chinese dance is a prominent part of the cultural landscape, there is an urgent need to assess the current state of leadership development among dance educators. The complexity of teaching Chinese dance, coupled with the growing expectations for teachers to lead and innovate within their institutions, calls for a comprehensive evaluation of the leadership capabilities of these educators (Yang et al., 2020; Chen et al., 2020). Despite their artistic expertise, many teachers face challenges in their leadership roles due to gaps in professional development, lack of institutional support, and limited opportunities for growth, particularly in areas like management and organizational leadership (Wang & Zhang, 2016; Zhou, 2017).

Furthermore, as schools in Shandong Province strive to enhance the leadership qualities of their dance teachers, there is a lack of data-driven strategies that specifically address the needs and expectations of these educators. Existing teacher training programs often overlook the unique challenges faced by dance instructors, especially in the context of leadership development (Li & Chen, 2018; Liu & Sun, 2019). This gap in understanding necessitates a focused Needs Assessment, which will help identify the areas where dance teachers require the most support and guide the development of effective leadership training programs tailored to their specific needs.

Leadership development in education was multifaceted, involving a range of dimensions that influence the efficacy of educators in assuming leadership roles. For Chinese dance teachers in Shandong Province, these dimensions: age structure, educational background, training experience, and school support were particularly critical. Each dimension plays a distinct role in shaping the leadership potential and professional growth of educators in this specialized field (Li & Chen, 2018; Liu & Sun, 2019).

This research, therefore, aims to conduct a comprehensive Needs Assessment to evaluate the current and expected leadership development needs of Chinese dance teachers in Shandong Province. By focusing on four key dimensions - age structure, educational background, training experience, and school support-this study will provide valuable insights into the were as requiring immediate attention and the strategies needed to bridge the gap between the current state of leadership and the desired outcomes. The findings of this study were expected to offer practical recommendations for policymakers and educators

to create more effective, sustainable leadership development programs for Chinese dance teachers, ensuring that they were well-prepared to lead both in their classrooms and in the broader educational community.

2. Research Objectives

2.1 To study the current and expected situations of leadership development among Chinese dance teachers in Shandong Province.

2.2 To assess the gap between the current and expected situations in leadership development among Chinese dance teachers in Shandong Province.

2.3 To propose approaches for developing the leadership of Chinese dance teachers in Shandong Province in Shandong Province.

3. Research Hypotheses

3.1 There was a difference between the current and expected situations of leadership development among Chinese dance teachers in Shandong Province.

3.2 The Positive Need Index (PNI) revealed statistically significant gaps between the current and expected situations in leadership development across all four dimensions.

3.3 The approaches developed from the Needs Assessment analysis would effectively address gaps identified in leadership development.

4. Research Methodology

This research adopts a mixed-method approach to assess the leadership development needs of Chinese dance teachers in Shandong Province. The methodology consisted of: population/ sample/ participants, data collection, data analysis, and interpretation of findings. This approach ensures that both quantitative and qualitative data were used to provide a comprehensive understanding of the current and expected leadership development needs.

2.1 Population/Sample/Participants

The participants in this study included 310 Chinese dance teachers and 20 experts (teachers, administrators) from various educational institutions in Shandong Province. The selection of participants was based on their experience in Chinese dance education and their roles in school leadership and administration. Teachers were chosen to represent a diverse range of ages, educational backgrounds, and teaching experiences, ensuring that the data gathered would provide a broad perspective on the leadership needs across different demographics.

2.2 Data Collection

The data for this study were collected through two primary methods:

2.2.1 Questionnaires: A structured questionnaire was distributed to all participants to gather quantitative data on their perceptions of current leadership development practices and their expectations for improvement. The questionnaire covered four key dimensions: age structure, educational background, training experience, and school support. Respondents were asked to rate both the current state and the expected future state of leadership development in each dimension using a five-point Likert scale. This allowed for the calculation of the Positive Need Index (PNI), which measures the gap between the current and desired states.

2.2.2 Interviews: In-depth, semi-structured interviews were conducted with a subset of 20 participants (10 teachers and 10 administrators) to gather qualitative insights into the specific leadership challenges faced by Chinese dance teachers. The interviews focused on understanding the personal experiences of the teachers, their views on leadership development, and the institutional support they received. These interviews provided valuable context to complement the quantitative data and helped to clarify the most critical areas of need.

2.3 Data Analysis

The analysis of the data followed a two-step process:

2.3.1 Quantitative Analysis: The quantitative data from the questionnaires were analyzed using descriptive statistics to identify the current and expected leadership development levels in each of the four dimensions. The Positive Need Index (PNI) was calculated for each dimension by comparing the average scores for the current and expected situations. A high PNI value indicated a significant gap between the current state and the desired outcomes, thus identifying areas that require immediate attention.

2.3.2 Qualitative Analysis: The qualitative data from the interviews were transcribed and analyzed using thematic analysis. Key themes related to leadership challenges, institutional support, and professional development were identified and used to enrich the understanding of the quantitative results. This analysis helped to provide deeper insights into the specific needs of Chinese dance teachers, particularly in areas that were not fully captured by the questionnaire data.

2.4 Ethical Considerations

All participants were informed of the purpose of the research and gave their consent to participate. The study adhered to ethical guidelines regarding confidentiality and anonymity, ensuring that no personal identifiers were used in the reporting of results. Participants were also assured that their responses would be used solely for research purposes.

2.5 Limitations

This study was subject to several limitations. First, the data were drawn from a single province (Shandong), which may limit the generalizability of the findings to other regions. Second, the self-reported nature of the data, particularly in the questionnaires, may introduce bias, as participants may have over- or

underestimated their leadership development needs. Lastly, the qualitative data, while rich, were based on a small sample size, and thus some perspectives may not have been fully captured.

5. Research Results and Discussion

5.1 Research Results

The findings from the data analysis provide a comprehensive understanding of the leadership development needs of Chinese dance teachers in Shandong Province. The results were organized based on the four key dimensions explored in the study: age structure, educational background, training experience, and school support. Both quantitative and qualitative data were presented to highlight the current state of leadership development and the gaps that need to be addressed. The research results can be presented as follows:

1) Results of studying the current and expected situations of leadership development among Chinese dance teachers in Shandong Province.

This study investigates the leadership development needs of Chinese dance teachers in Shandong Province by examining four key dimensions: age structure, educational background, training experience, and school support. Using a Positive Need Index (PNI), this research identifies significant gaps between the current and expected states in leadership development, as shown in Figure 1
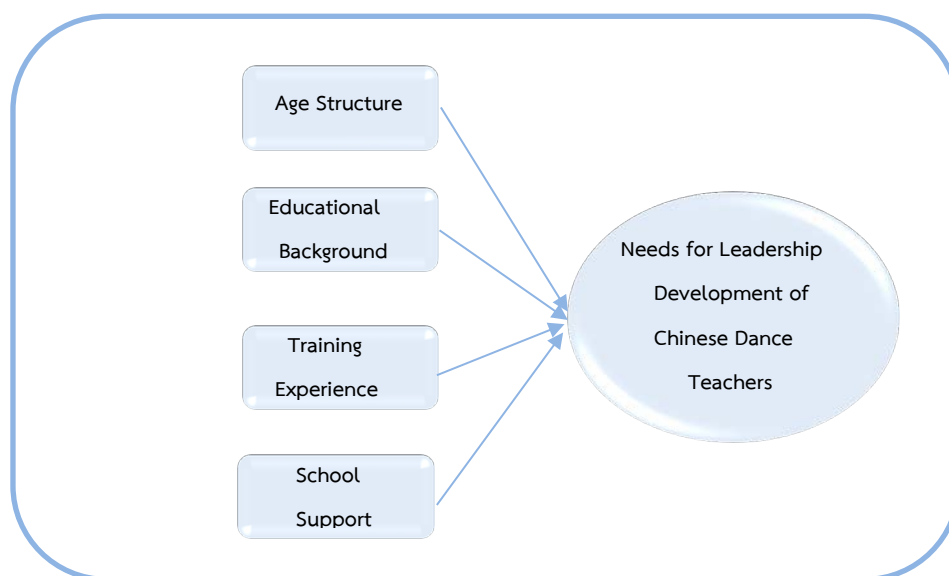

Figure 1 Needs Assessment for Leadership Development of Chinese Dance Teachers

The details of the research results from the table above could be classified into the following explanations:

(1) Age Structure: the analysis of research data from questionnaires and interviews, it was found as follows:

Table 1 Analysis of Current and Expected Situations in Age Structure

Dimension	Current Score	Expected Score	Positive Need Index (PNI)
Teacher mentorship for younger staff	3.15	4.20	0.333
Recognition for older teachers	3.35	4.15	0.239
Inclusion of younger teachers in leadership	3.18	4.10	0.289
Leadership opportunities for experienced teachers	3.20	4.06	0.268
Average	**3.22**	**4.06**	**0.331**

The results show that the quantitative analysis revealed that there was a moderate level of leadership development among Chinese dance teachers when considering the age structure. The current situation was rated at an average score of 3.22, while the expected score was significantly higher at 4.06. The Positive Need Index (PNI) for this dimension was 0.331, indicating a substantial gap between the current state and the desired future state.

The qualitative data further supported these findings, with younger teachers expressing a need for more mentorship opportunities and guidance from experienced leaders. Older teachers, on the other hand, highlighted the importance of being recognized for their contributions and given the opportunity to share their expertise in leadership roles. Overall, the results indicate a need to balance the inclusion of younger teachers in leadership roles while ensuring that older teachers were valued and supported.

(2) Educational Background: the analysis of research data from questionnaires and interviews, it was found as follows:

Table 2 Analysis of Current and Expected Situations in Educational Background

Dimension	Current Score	Expected Score	Positive Need Index (PNI)
Teacher qualifications improvement	3.30	4.25	0.288
Access to leadership training programs	3.25	4.30	0.323
International cooperation for professional growth	3.20	4.30	0.344
Incentive programs for teacher excellence	3.35	4.35	0.299
Average	**3.34**	**4.19**	**0.358**

The results show that the educational background of the teachers was another critical area where leadership development was needed. The current average score for this dimension was 3.34, with an expected score of 4.19, resulting in a PNI of 0.358. This represents the largest gap among all four dimensions, underscoring the urgent need for improvement in this area.

Teachers expressed a desire for more professional development opportunities, particularly in leadership training programs that focus on management and organizational skills. Many respondents also emphasized the importance of international collaboration, where they could learn from global best practices in dance education leadership. The qualitative interviews revealed that teachers with higher academic qualifications felt better prepared for leadership roles, but those with less formal education felt they lacked the necessary skills and confidence to take on such positions.

(3) Training Experience: the analysis of research data from questionnaires and interviews, it was found as follows:

Table 3 Analysis of Current and Expected Situations in Training Experience

Dimension	Current Score	Expected Score	Positive Need Index (PNI)
Personalized growth plans for leadership	3.20	4.15	0.297
Availability of professional development	3.30	4.20	0.273
Focus on leadership skills in training	3.25	4.10	0.262
Structured leadership evaluation system	3.45	4.25	0.232
Average	**3.30**	**4.09**	**0.297**

The results show that the training experience dimension also showed a significant gap between the current and expected situations. The average score for the current state was 3.30, with an expected score of 4.09, resulting in a PNI of 0.297. This suggests that while some training was in place, there was a need for more tailored and structured programs.

Teachers frequently mentioned that current training programs focus more on technical dance skills rather than leadership development. They expressed a strong desire for personalized growth plans and continuous professional development, specifically aimed at improving their leadership capabilities. The qualitative data highlighted the importance of creating training programs that cater to the specific needs of teachers at different stages of their careers, ensuring that both new and experienced teachers have opportunities to develop their leadership skills.

(4) School Support: the analysis of research data from questionnaires and interviews, it was found as follows:

Table 4 Analysis of Current and Expected Situations in School Support

Dimension	Current Score	Expected Score	Positive Need Index (PNI)
Clear institutional leadership support	3.35	4.25	0.269
Communication between administration and teachers	3.40	4.30	0.265
Safety awareness in leadership roles	3.30	4.30	0.303
Collaborative environment	3.25	4.20	0.292
Average	**3.33**	**4.21**	**0.297**

The results show that the final dimension, school support, showed an average current score of 3.33, with an expected score of 4.21, resulting in a PNI of 0.297. This indicates that, although schools provide a moderate level of support, there was considerable room for improvement, particularly in wereas such as institutional support for leadership roles and professional development.

The qualitative data revealed that teachers feel they were often left without clear guidance or resources when taking on leadership responsibilities. Many teachers emphasized the need for better communication from school administrators, as well as more structured leadership development programs that were fully supported by the institution. Safety awareness and creating a supportive, collaborative environment were also identified as areas where schools could improve their support for teachers taking on leadership roles.

2) Results of assessing the gap between the current and expected situations in leadership development among Chinese dance teachers, using the Positive Need Index (PNI) to identify were as that require improvement.

Assessing the gap between the current and expected situations in leadership development among Chinese dance teachers, using the Positive Need Index (PNI) to identify areas that require improvement.

Table 5 Summary of Current and Expected Situations in Leadership Development

Dimension	Current Score (Average)	Expected Score (Average)	Positive Need Index (PNI)
Age Structure	3.22	4.06	0.331
Educational Background	3.34	4.19	0.358
Training Experience	3.30	4.09	0.297
School Support	3.33	4.21	0.297
Overall Average	**3.30**	**4.14**	**0.321**

From research results, Educational Background shows the largest gap with a PNI of 0.358, indicating the most urgent need for improvement, particularly in areas like international collaboration and professional development. Age Structure also highlights significant gaps, especially in mentorship and the inclusion of younger teachers in leadership roles. Training Experience and School Support show similar gaps, with PNIs of 0.297 each, reflecting a need for enhanced professional development programs and stronger institutional support. This table provides a concise overview of the key areas that require attention for leadership development among Chinese dance teachers. In this case, the PNI values for all dimensions range from 0.26 to 0.36, suggesting the need for improvement across all dimensions, particularly in Educational Background and Age Structure.

The research findings indicate that the dimension with the largest gap is Educational Background, highlighting the need for high-quality leadership training programs and increased access to international learning opportunities. The Age Structure dimension points to a need for developing more opportunities for younger teachers to assume leadership roles, as well as providing recognition for experienced teachers. For the dimensions of Training Experience and School Support, while there is moderate support, further development is needed to ensure that teachers possess adequate management skills.

Table 6 Analysis of Paired T-Test Results for assessing the gap between the current and expected situations.

Dimension				Paired Differences			
	Learning	Mean	Std.	Mean	Std.	t	p-value
Age Structure	3.22	4.06	0.84	0.45	0.56	-44.90	
Educational Background	3.34	4.19	0.85	0.36	0.43	-44.90	
Training Experience	3.30	4.09	0.79	0.51	0.54	-44.90	0.000024*
School Support	3.33	4.21	0.88	0.43	0.47	-44.90	

* Statistical significance level, .05.

The results showed That there was a statistically significant difference between the scores for the current situation and the expected situation across all four dimensions: Age Structure, Educational Background, Training Experience, and School Support. This difference was not due to chance or variability in the data but reflects the need for improvement and development in the leadership of Chinese dance teachers across all dimensions.

3) Results of proposing approaches for developing the leadership of Chinese dance teachers in Shandong Province, based on the Needs Assessment analysis in each dimension.

The proposing approaches for developing the leadership of Chinese dance teachers in Shandong Province, based on the Needs Assessment analysis in each dimension. There were as below:

Table 7: Summary of Approaches Based on Needs Assessment Analysis

Dimension	Key Findings (PNI)	Proposed Approach
1. Age Structure	0.331	1.1 Establish structured mentorship programs pairing younger teachers with experienced leaders. 1.2 Develop leadership workshops targeting younger educators to prepare them for administrative and leadership roles. 1.3 Create recognition programs for senior teachers to maintain their motivation and engagement.
2. Educational Background	0.358	2.1 Offer leadership training programs focusing on management and organizational skills. 2.2 Facilitate international exchange programs to learn from best practices in global dance education leadership. 2.3 Design incentive structures to encourage teachers to pursue advanced qualifications and leadership roles.
3. Training Experience	0.297	3.1 Develop personalized growth plans for teachers at different career stages, emphasizing leadership skills. 3.2 Implement regular professional development sessions focusing on leadership alongside technical dance training. 3.3 Introduce structured evaluation systems to assess and improve leadership training outcomes.
4. School Support	0.297	4.1 Improved communication between administration and teachers. 4.2 Safety awareness and management efficiency training. 4.3 Collaborative environments for leadership development.

From research results, the Educational Background and Age Structure dimensions require immediate attention, as indicated by the highest PNIs. Tailored strategies in these areas, alongside ongoing improvements in Training Experience and School Support, will significantly enhance leadership capabilities among Chinese dance teachers in Shandong Province.

5.2 Discussion

The findings from this study provide significant insights into the leadership development needs of Chinese dance teachers in Shandong Province. By analyzing four key dimensions—age structure, educational background, training experience, and school support—this research reveals substantial gaps between the current leadership capabilities of teachers and the expectations for leadership roles. These gaps underscore the importance of targeted leadership development programs, a conclusion echoed by other researchers in the field (Li & Chen, 2018; Wang & Zhang, 2016).

Age Structure

The research results revealed a notable gap in leadership development based on age structure, with younger teachers expressing a need for mentorship and leadership opportunities, while older teachers desired recognition for their contributions. This aligns with the research conducted by Li and Chen (2018), who identified a similar generational gap in the leadership development of performing arts educators. Furthermore, Zhang and Li (2020) found that younger educators in the arts often struggle to find mentorship opportunities, whereas experienced educators feel underutilized. Both studies suggest that mentorship programs are key to bridging this gap and fostering collaboration across generations, a strategy supported by Wang and Liu (2019).

Educational Background

The educational background dimension presents the largest gap, with a Positive Need Index (PNI) of 0.358. This highlights the need for significant improvements in leadership training for educators with diverse academic backgrounds. Similar findings were reported by Wang and Zhang (2016), who showed that higher educational qualifications tend to correlate with greater leadership roles in performing arts education. This is further supported by Liu and Sun (2019), whose research emphasized that teachers with less formal education are less likely to take on leadership roles unless provided with tailored professional development opportunities. International collaborations, as discussed by Yang et al. (2020), can also play a critical role in expanding leadership competencies by exposing educators to global best practices.

Training Experience

The results of this study also underscore the importance of structured leadership development programs. The PNI for training experience is 0.297, suggesting that while some training exists, it is insufficient to meet the needs of teachers at various stages of their careers. Zhou (2017) reached a similar conclusion, noting that the focus of many training programs in performing arts education is primarily on technical skills rather than leadership. This is further supported by Chen et al. (2020), who advocate for the integration of leadership and artistic training to create more well-rounded educators. Sun and Liu (2020) emphasize that personalized growth plans and structured leadership frameworks are necessary to ensure teachers are equipped to lead in both classroom and institutional settings.

School Support

The PNI for school support is also 0.297, indicating that while schools provide some support for leadership development, there is room for improvement. Liu and Sun (2019) found that institutional support in arts education is often fragmented and unclear, a finding echoed by the results of this study. Schools must provide clearer leadership pathways and enhance communication between administrators and teachers. Similar recommendations were made by Wang and Zhang (2016), who argue that schools should invest more resources in creating collaborative environments that foster leadership growth. Zhou (2017) and Chen et al. (2020) both highlight the importance of institutional backing in providing the necessary guidance and resources for teachers to develop as leaders.

Implications for Leadership Development

The findings of this study, along with corroborating research, suggest that a holistic approach to leadership development is crucial for the future of Chinese dance education. A one-size-fits-all approach will not suffice, given the diverse needs of educators across different age groups, educational backgrounds, and levels of experience (Li & Chen, 2018; Zhou, 2017). Instead, educational institutions should adopt multi-faceted strategies that include mentorship programs, tailored leadership training, and stronger institutional support (Wang & Zhang, 2016; Liu & Sun, 2019). The role of international partnerships in enhancing leadership skills is also vital, as noted by Chen et al. (2020) and Yang et al. (2020).

This study's results echoed the growing consensus that leadership development in arts education must be adaptable to the evolving needs of educators. By incorporating these findings into future leadership training programs, Chinese dance teachers can be better equipped to meet the demands of both local and global educational contexts.

6. Recommendations

These recommendations were designed to address the identified gaps and support the sustainable development of leadership among Chinese dance teachers. There were as below:

6.1 For Priority Dimensions: the findings reveal that Educational Background (PNI = 0.358) and Age Structure (PNI = 0.331) require the most urgent attention. Tailored strategies in these areas should be prioritized, while Training Experience (PNI = 0.297) and School Support (PNI = 0.297) should also receive continued development efforts to ensure a comprehensive approach.

6.2 For Implementation Recommendations: should collaborate with policymakers: engage with policymakers to integrate these recommendations into regional education policies for sustained impact. Resource Allocation: Allocate funding and resources strategically to address high-priority areas, such as leadership training programs and mentorship initiatives. Monitoring and Evaluation: Establish a framework for monitoring the progress and impact of these recommendations, using periodic assessments to guide adjustments.

7. Acknowledgments

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The Incentive Mechanism for Grassroots Administrators of Guangxi Polytechnic of Construction

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Abstract

This research aimed to examine the motivational factors influencing grassroots administrative staff and propose an effective motivational mechanism for grassroots administrators at Guangxi Polytechnic of Construction. The study focused on: (1) analyzing the factors affecting staff motivation and (2) providing recommendations to enhance the motivation of grassroots administrative staff. A total of 210 grassroots administrators from the construction department were randomly selected as the sample group from September 2023 to March 2024. A structured questionnaire was employed as the primary research tool, and data analysis included descriptive statistics, reliability analysis, and validity analysis. The findings revealed that the primary challenges affecting the motivation of grassroots administrators include outdated human resource management practices, imbalanced workloads, insufficient remuneration and benefits, suboptimal working environments, and inadequate promotion mechanisms. Based on these results, key recommendations to optimize the incentive system include: (1) strengthening human resource management and building a professional HR team, (2) improving the working environment and balancing work pressure, (3) enhancing remuneration and welfare systems, (4) optimizing security measures and office conditions, and (5) fostering career development through well-defined promotion channels and robust career planning strategies. These measures aim to create a supportive and motivating atmosphere for grassroots administrators at Guangxi Polytechnic of Construction.

Keywords: administrative management; career development; Guangxi polytechnic of construction; incentive mechanism; security system

1. Introduction

The study focuses on Guangxi Polytechnic of Construction, shedding light on the significant challenges faced by grassroots administrators, including high work pressure, limited career development opportunities, and inadequate pay. Previous research, such as that of Lin Jinxiang and Zhou Pan (2017) and Chen Yao (2019), reveals that these issues affect their motivation, professional identity, and job satisfaction, ultimately undermining institutional efficiency. This study builds on existing findings to propose actionable strategies for improving working conditions, compensation, and career development pathways, thereby fostering greater job satisfaction and institutional sustainability. The research also contributes to educational management theory, particularly in the context of frontline administrators, a topic less explored compared to studies on teaching staff. Insights from He Shutong (2017) emphasize the dual goal of personal and organizational development in administrators' professional growth, while Wei Wei (2013) and Fan Ling (2015) highlight the need for fair evaluation systems and supportive organizational structures.

By addressing the unique challenges faced by grassroots administrators, the research offers a framework for improving educational management practices and policies, not only in Guangxi but also in other regions and institutions. Its findings are significant for fostering skilled talent, enhancing vocational education, and advancing the broader goals of higher education development.

2. Research Objectives

To examine the current Motivational challenges faced by grassroots administrators at Guangxi Polytechnic of Construction. And To propose actionable strategies for optimizing incentive systems

3. Relevant Theories

This review focuses on the integration of various motivational theories and their applications in the management of grassroots administrators at Guangxi Polytechnic of Construction. The study emphasizes the importance of scientifically designed incentive mechanisms to enhance the motivation and efficiency of these administrators, critical for the institution's development.

1. Motivation Theory :

- Highlights the need to understand employees' intrinsic and extrinsic motivators.

- Application at Guangxi Polytechnic involves improving working conditions and fostering motivational factors.

2. Scientific Management Theory (Taylor, 1943

- Focuses on efficiency via standardized processes, time-motion studies, and production norms.

- Criticized for overlooking psychological and social aspects but remains influential in productivity enhancement.

3. Needs Theory (Maslow, 1943)

- Human needs are hierarchical, influencing behaviour and motivation.

- Framework applied to administrators to address varying needs for productivity and satisfaction.

4. Achievement Motivation Theory (Mc Clelland, 1953)

- Stresses the roles of achievement, power, and affiliation needs.

- High-achievement individuals are deemed vital for organizational success.

5. Two-Factor Theory (Herzberg, 1959)

- Differentiates between hygiene factors (salary, safety) and motivators (job satisfaction, recognition).

- Useful in designing effective work environments.

6. Expectancy Theory (Fromm, 1964)

- Links motivation to expectancy (effort-goal connection) and goal value.

- Applied in aligning employee and organizational goals for maximum impact.

7. Equity Theory (Adams, 1965)

- Emphasizes fairness in compensation and effort balance.

- Basis for developing equitable and transparent incentive models.

8. Institutional Context: Guangxi Polytechnic of Construction

- Established through the merger of three educational institutions, it serves as a leading vocational training hub in China.

- It has achieved numerous accolades, becoming a recognized demonstration base for skilled personnel training.

- With over 22,200 students and 980 faculty members, its success hinges on the efficiency of its grassroots administrators.

4. Research Methodology

Research Procedures

The research methodology includes the following steps:

1) **Identifying the Population and Sample Group:**

Population: 440 basic-level administrators at Guangxi Construction Vocational and Technical College (GCVTC).

Sample Group: 210 administrators, determined using the Krejcie and Morgan (1970) sampling method (cited in Qiu, 2023). A stratified sampling approach was employed to ensure representativeness with a 95% confidence level and a 5% margin of error.

Designing the Research Instrument:

The research aimed to investigate the motivational dilemmas faced by grassroots administrators at

Guangxi Polytechnic of Construction using a structured questionnaire. The design process followed these five steps:

1) **Literature Review**: Analyzed relevant scholarly works to inform questionnaire content.

2) **Policy Review**: Examined applicable policies and regulations to ensure alignment with institutional frameworks.

3) **Dimension Definition**: Identified five key dimensions influencing motivation:

- Career advancement and development

- Work pressure and workload

- Salary and benefits

- Working environment and atmosphere

- Incentive mechanism and job satisfaction

4) **Content Validation**: The questionnaire comprised 25 questions, with content validity indices (IOC) between 0.67 and 1.00, confirming quality standards.

5) **Expert Evaluation**: Finalized the questionnaire based on expert feedback.

- The questionnaire used a **five-point Likert scale** (strongly agree to strongly disagree) with corresponding scores from 5 to 1, ensuring clear categorization of responses.

Effectiveness Analysis

1) Statistical Tests and Results: KMO and Bartlett's Test:

- **KMO Value**: 0.916 (indicating excellent suitability for factor analysis)

- **Bartlett's Test**: Significant ($p < 0.001$), supporting factor-ability of the data.

2) Reliability Analysis:

- Reliability was assessed using Cronbach's α, with results demonstrating high internal consistency across all dimensions

- **Overall Reliability**: α = 0.932

The methodology ensured a robust and reliable approach for analyzing the motivational dilemmas of grassroots administrators. The questionnaire, validated through expert reviews and statistical testing, demonstrated high reliability and validity, making it a suitable tool for capturing the administrators' perspectives. The results of these analyses are documented in Table 1- 2

Table 1 Reliability of Questionnaire

Cronbach's α	Items	Sample
0.932	25	210

Table 2 Validity of Questionnaire

KMO test and Bartlett's test	
KMO	0.916

5. Results of Data Analysis

1) Basic information on grassroots administrators

This study analyzed the demographic and professional characteristics of 205 grassroots administrators at Guangxi Polytechnic of Construction, highlighting key factors to consider for designing effective incentive policies.

Frequency analysis results			
name (of a thing)	options (as in computer software settings)	Frequency	Percentage (%)
1. Your gender.	male	101	49
	daughter	104	51
2. Marital status	unmarried	132	69
	married	73	31
3. Your age group.	25 and under	32	14
	26-35 years	80	46
	36-45 years	52	24
	46 and over	41	16
4. Your level of education.	Specialized and below	23	10
	undergraduate (adjective)	96	46
	Master's degree student	74	36
	PhD student	12	8
5. Number of years you have worked in basic administrative posts.	Less than 1 year	34	16
	1-3 years	60	35
	4-8 years	51	26
	More than 8 years	60	23
6. Your title.	junior ranking	47	23
	middle level (e.g. doctoral degree)	93	48

Frequency analysis results			
name (of a thing)	options (as in computer software settings)	Frequency	Percentage (%)
	associate title	40	17
	high official title	16	9
	No title	9	3
add up the total			100

Gender Composition: The nearly equal gender ratio (49% male, 51% female) underscores the need for gender-neutral incentives. Policies should address the career development needs of women while ensuring equal opportunities for men and women.

Marital Status: A majority (69%) of administrators are unmarried, indicating a focus on career growth and personal development. Differentiated incentives should cater to unmarried employees with career advancement programs, while married employees may benefit from family-friendly policies like flexible work arrangements and family benefits

Age Distribution: 46% are aged 26-35, a prime career stage, necessitating incentives like promotion opportunities and skill development. Older groups (36+ years) require incentives targeting stability, retirement planning, and work-life balance.

Educational Background: Administrators are predominantly highly educated, with 46% holding bachelor's degrees, 36% master's, and 8% doctorates. Incentives should address career progression for bachelor's holders, while advanced-degree holders may benefit from research opportunities, academic projects, and professional challenges.

Work Experience: Administrators with 1-3 years' experience (35%) need training and mentorship programs. Those with 4-8 years (26%) and over 8 years (23%) require career advancement opportunities and long-term incentives.

Professional Titles: Employees with intermediate titles dominate (48%), followed by junior titles (23%), associate titles (17%), and full titles (9%). Junior-title holders need promotion-focused incentives and training. Higher-title holders benefit from professional development opportunities and involvement in strategic decision-making.

2) Descriptive statistics from the perspective of administrators

The study employed descriptive statistical analysis using specialized software to analyze the factors influencing the endogenous development of the college. This section presents key findings based on questionnaire surveys and literature reviews, shedding light on the motivational dilemmas faced by junior managers and their implications for the college's management practices.

Outdated Human Resource Management Concepts

The college's human resource management system reveals deficiencies, particularly in teacher selection and promotion mechanisms.

- **Promotion Opportunities (T1):** The mean score of 3.63 (SD = 1.283) suggests limited satisfaction with the current promotion system, which lacks scientific rigor and consideration for actual teaching and research abilities. The rigid cost-control approach hinders the recruitment and cultivation of high-quality faculty.

- Training System (T2): The training programs for junior managers received a mean score of 3.60 (SD = 1.235), indicating that the content and implementation fall short of meeting long-term professional development needs.

Imbalance in Work Pressure and Workload

Administrators face significant stress and workload challenges.

- **Work Stress (T7):** Administrators reported a mean score of 3.62 (SD = 1.317), reflecting that heavy daily transactional tasks and emergency management responsibilities contribute to high stress levels.

- Work-Life Balance: Excessive workloads often require overtime, disrupting work-life balance and leading to physical and mental exhaustion, ultimately affecting efficiency and quality of life.

Talent Remuneration and Benefits to Be Enhanced

The college's remuneration and benefits system is seen as uncompetitive compared to similar institutions.

- **Remuneration Levels (T12):** With a mean score of 3.66 (SD = 1.180), administrators expressed dissatisfaction with the current remuneration system. Funding constraints result in a rigid structure that undermines talent attraction, retention, and motivation.

Working Environment and Atmosphere Still Need Improvement

The working environment and organizational climate, while partially positive, require further enhancement.

- Working Environment (T16): The mean satisfaction score was 3.59 (SD = 0.89), indicating that while some employees are content with office conditions and facilities, significant improvements are necessary.

- Team Atmosphere (T17): Teamwork and mutual support received a high rating of 3.87 (SD = 0.94), showcasing the positive impact of a warm and collaborative work culture.

Talent Promotion Mechanism to Be Improved

The promotion mechanism demonstrates critical shortcomings in transparency, fairness, and effectiveness.

- Career Development Support (T21): With a mean score of 3.69 (SD = 1.314), employees expressed low satisfaction with the existing promotion system, which lacks clear criteria and pathways for advancement.

- Incentive Transparency (T22): The perceived lack of openness and fairness in incentives received a mean score of 3.60 (SD = 1.215), highlighting the need for a more equitable and supportive promotion framework.

Table 3 The perspective highlights of administrators

Dimensions	Item	N	MIN	MAX	M	SD	Ranked
Career Advancement and Development	T5 Fair and transparent promotion mechanism for junior executives	205	1	5	3.75	1.186	2
Work Stress and Workload	T9 Excessive workload affects my productivity	205	1	5	3.71	1.196	3
Wages and Benefits Package	T12 Lower pay levels in the College compared to similar institutions	205	1	5	3.66	1.180	5
Work Environment and Climate	T17 Enthusiastic, harmonious and mutually supportive work teams	205	1	5	3.87	0.94	1
Incentives and Job Satisfaction	T21 The College has not yet developed a set of incentives for managing junior administrators	205	1	5	3.69	1.314	4

These findings emphasize the necessity of reforming the college's human resource policies, workload management, remuneration structures, working conditions, and promotion mechanisms to enhance the motivation and effectiveness of its junior administrators.

6. Conclusion and Discussion

The study highlights the critical challenges faced by grassroots administrators at Guangxi Construction Vocational and Technical College, emphasizing the need for systematic reforms to address these issues. Career promotion and development are hindered by unclear pathways, limited opportunities for growth, and insufficient support for upgrading qualifications. Administrators face heavy workloads, long hours, and high skill demands, which lead to stress, reduced creativity, and diminished efficiency. Additionally, low remuneration and unattractive benefits fail to meet living needs and career aspirations, while rigid compensation systems negatively impact morale and job stability. The competitive and tense work environment further exacerbates psychological stress, while inadequate training, appraisal, and feedback systems hinder personal growth and job satisfaction.

The discussion stresses that ambiguity in promotion mechanisms and narrow career channels mirror

findings from other studies, underscoring the importance of reform. Heavy workloads stifle creativity, necessitating solutions like work optimization, automation, and improved collaboration. Competitive and fair remuneration is vital for attracting and retaining talent, and creating a supportive work climate can boost well-being and performance. Furthermore, incentive mechanisms must be dynamic and aligned with employee needs to be effective.

7. Recommendation

To address these challenges, the study recommends introducing a "Career Development Manual" with clear career paths, mentorship programs, and regular training seminars. A performance-based rewards system should link academic upgrades to job promotions and continuing education. Team-building activities and feedback platforms can foster collaboration and problem-solving. Personalized training plans and diverse learning opportunities are essential for skill enhancement. Finally, participatory management practices, such as staff involvement in decision-making and recognition of innovative ideas through initiatives like a "Golden Idea Award," can boost motivation and engagement. These systematic reforms aim to enhance the motivation, effectiveness, and overall well-being of grassroots administrators.

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Needs Assessment for Sustainable Reading Ability of High School Students

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Abstract

This study assessed the sustainable reading ability of high school students in Changsha City to identify current and expected situations, determine the gaps between them, and propose actionable recommendations for improvement. A mixed-methods design was employed, integrating quantitative and qualitative approaches. The sample included 400 students from six high schools and 20 teachers and administrators with over 10 years of experience, selected through purposive sampling. Data collection tools consisted of questionnaires using a 5-point Likert scale across six dimensions and structured interviews. Instrument validation included pilot testing with 30 participants and expert review. Data were analyzed using descriptive statistics, paired t-tests, and the Perceived Needs Index (PNI) to prioritize development areas.

Results indicated a significant gap between the current and the expected levels of reading ability across six dimensions, with the highest needs identified in students' reading literacy reading teaching, and family cultural environment. Paired t-test results confirmed the statistical significance of these gaps ($p < 0.05$). Thematic analysis of qualitative data reinforced the quantitative findings, revealing key barriers such as limited resources, inadequate teaching strategies, and insufficient family support. Recommendations included implementing targeted reading programs, enhancing teacher training, fostering family involvement, and promoting a reading culture through community and school-wide initiatives. These findings contribute to the literature on sustainable reading development and provide practical guidance for educators and policymakers to address critical gaps effectively.

Keywords: high school students; needs assessment; sustainable reading ability

1. Introduction

Reading was a fundamental skill that served as the cornerstone of academic success and lifelong learning. It fostered critical thinking, broadened perspectives, and equipped individuals with the tools needed to navigate an increasingly complex world (Guthrie et al., 2004; OECD, 2019). However, achieving and sustaining proficient reading ability among students remained a challenge, particularly in the context of rapid technological advancements and shifting educational priorities (Gee, 2004). To address this, the concept of sustainable reading ability—defined as the capacity to engage in meaningful and lifelong reading practices—emerged as a critical area of focus for educators and policymakers. Sustainable reading ability went beyond basic literacy to include motivation, comprehension, and application of reading skills in diverse contexts (Clark & Rumbold, 2006; Heath, 1983).

Prior research highlighted the importance of fostering sustainable reading habits. For instance, Kim and Park (2023) found that high-performing students exhibited a strong foundation in vocabulary and reading comprehension, supported by structured programs and rich cultural environments. Similarly, Faqih Seknun and Matdoan (2024) demonstrated the effectiveness of interactive learning models in improving reading engagement and performance among high school students. Hattie (2009) identified that visible teaching methods significantly influenced reading comprehension, while Epstein (2001) emphasized family involvement as a key factor in literacy development. However, while these studies underscored the importance of interventions, they often lacked a holistic needs assessment that examined the disparities between the current and desired states of reading ability across multiple dimensions, such as teaching methods, family support, and societal influences.

This gap in the literature formed the foundation for the present study. By conducting a needs assessment of sustainable reading ability, this research sought to identify critical gaps in six dimensions: reading literacy, teaching strategies, teacher accomplishment, campus culture, family cultural environment, and social cultural environment. Unlike previous studies that focused on singular interventions, this study provided a comprehensive framework for understanding and addressing the diverse factors that influenced reading development.

The significance of this research was further underscored by the educational challenges faced by high school students in Changsha City. Despite policy efforts to enhance literacy, many students still struggled with sustaining reading habits, which hindered their academic and personal growth (OECD, 2019). By examining both the current and expected situations of sustainable reading ability, this study aimed to bridge the gap between policy objectives and practical outcomes.

In conclusion, the present research filled a critical void in the literature by offering a multidimensional assessment of sustainable reading ability among high school students. The findings from this study provided actionable insights for educators, policymakers, and families, enabling them to implement targeted strategies that fostered a culture of reading. Ultimately, this research contributed to the broader goal of

creating a literate, engaged, and informed society, benefiting not only the students but the community as a whole.

2. Research Objectives

2.1 To assess the current and expected situations of sustainable reading ability among high school students.

2.2 To identify the gap between the current and the expected situation of reading ability among high school students.

2.3 To provide actionable recommendations for improving sustainable reading ability among high school students.

3. Research Hypotheses

3.1 The sustainable reading ability in various dimensions can be measured and its level can be identified.

3.2 There was a significant difference between the current situation and the expected situation levels of sustainable reading ability in each dimension.

3.3 The differing Perceived Needs Index (PNI) in each dimension can be used to prioritize the areas for development.

4. Research Methodology

4.1 Research Design

This research adopts a mixed-methods design, combining quantitative and qualitative approaches to assess the current situation and expected situation of sustainable reading ability among high school students in Changsha. The methodology ensures a comprehensive understanding of the topic, supported by robust data collection and analysis.

4.2 Population/Sample

The population consists of 100,000 students and 120 teachers from 30 public high schools in Changsha, as well as experts from colleges and universities in Hunan Province.

The Sample were based on Krejcie & Morgan's (1970) sampling table, a total of 420 participants were selected using purposive sampling: **Students:** 400 students proportionally sampled across six high schools , expert (t**eachers and administrators) were** 20 with at least 10 years of experience.

4.3 Research Instruments

1) questionnaires: developed to measure the current situation and expected situation of sustainable reading ability, a 5-point Likert scale was used for quantitative evaluation across six dimensions

2) Interview Forms: structured interviews with 10 questions aimed at exploring deeper insights from experts (teachers and administrators). Designed to complement quantitative findings and provide a qualitative perspective.

4.4 Validation

Pilot Testing: Instruments were piloted with 30 participants to refine question clarity and ensure reliability. **Expert Review:** The instruments were validated by three experts in education and linguistics.

4.5 Data Collection

1) Questionnaire Distribution: Administered to students during school hours, ensuring high response rates. Data from students and teachers were collected separately for comparative analysis

2) Interviews: Conducted with a subset of participants (10 teachers, and 10 administrators) using structured interview forms. Interviews were audio-recorded with participant consent for accurate transcription.

4.6 Data Analysis:

1) Quantitative Analysis: (1) Descriptive Statistics: Used to calculate mean ($\bar{x}$) and standard deviation (S.D.) for evaluating the current and expected situations of sustainable reading ability. (2) Paired t-tests: Applied to identify significant gaps between the current and the expected situations levels across six dimensions. And (3) PNI Calculation: The Perceived Needs Index (PNI) was computed for ranking development priorities.

2) Qualitative Analysis: Thematic Analysis: Used to analyze interview transcripts and identify recurring themes related to sustainable reading ability.

5. Research Results and Discussion

5.1 Research Results

This section presents the findings of the study conducted to assess the current and expected situations of sustainable reading ability among high school students, identify the gaps between these two states, and provide actionable recommendations for improvement. The results were organized in alignment with the research objectives, offering a comprehensive analysis of quantitative and qualitative data collected from students, teachers, and experts. Each dimension of sustainable reading ability, including reading literacy, teaching practices, family and social environments, is systematically examined to provide insights into the factors influencing reading development. The findings were supported by descriptive statistics, paired t-tests, and thematic analyses, ensuring both clarity and reliability in addressing the research questions. Key results and their implications were discussed to provide a foundation for the proposed recommendations. The details are as follows:

1) Assessing the current and expected situation of sustainable reading ability among high school students.

This study presented a needs assessment of sustainable reading ability, comparing current and expected levels across six dimensions to identify key gaps and areas for development. The details were presented in Table 1.

Table 1 Analysis of current and expected situation of sustainable reading ability among high school students.

Dimensions of sustainable reading ability	Current Situations (D)		Expected Situations (I)		PNI Modified (I-D)/D	Rank
	($\bar{x}$)	S.D.	($\bar{x}$)	S.D.		
Students' Reading Literacy	2.77	0.78	4.71	0.68	0.700	1
Reading Teaching	2.78	0.78	4.68	0.65	0.683	2
Teacher Accomplishment	2.92	0.79	4.76	0.71	0.630	5
Campus Cultural Environment	3.04	0.83	4.47	0.69	0.470	6
Family Cultural Environment	2.74	0.80	4.61	0.64	0.682	3
Social Cultural Environment	2.77	0.81	4.61	0.70	0.664	4
Total	**2.84**	**0.80**	**4.64**	**0.68**	**0.638**	-

The findings presented in Table 1 revealed the current and expected situation regarding the sustainable reading ability of high school students in Changsha City, as assessed across six key dimensions: students' reading literacy, reading teaching, teacher accomplishment, campus cultural environment, family cultural environment, and social cultural environment. The overall current situation was rated as low, with a mean score of 2.84 (S.D. = 0.80), while the expectation was rated as high, with a mean score of 4.64 (S.D. = 0.68). This indicates a significant gap between the current and expected levels, with a total Perceived Needs Index (PNI) of 0.638. The dimensions were ranked based on their PNI values, from the highest to lowest: students' reading literacy (PNI = 0.700), reading teaching (PNI = 0.683), family cultural environment (PNI = 0.682), social cultural environment (PNI = 0.664), teacher accomplishment (PNI = 0.630), and campus cultural environment (PNI = 0.470). These results highlight the urgent need for targeted improvements, particularly in the areas of reading literacy, teaching practices, and family support, to bridge the gap and enhance sustainable reading development among high school students.

The findings underscore a significant gap between the current and expected levels of reading ability, emphasizing the urgent need to address the factors influencing students' sustainable reading development. The high PNI values in students' literacy, teaching methods, and family support suggest these are critical areas to focus on for achieving meaningful improvements. Collaborative efforts among educators, families, and policymakers are essential to bridge this gap and meet students' expectations.

2) Assessing the current and the expected situations of sustainable reading ability among high school students.

This section focused on assessing the current and expected situations of sustainable reading ability among high school students. It aimed to identify the status in key dimensions, providing a foundation for analyzing gaps and prioritizing improvements. The details were presented in Table 2.

Table 2 Analysis of Paired T-Test Results for Assessing the Gap Between the Current and Expected Situations of Sustainable Reading Ability

Dimension	Current Mean (D)	Expected Mean (I)	Mean Difference	Std. Difference	t-value	p-value
Students' Reading Literacy	2.77	4.71	1.94	1.03479467	37.49536144	7.7039E-133
Reading Teaching	2.78	4.68	1.9	1.01533246	37.4261649	1.3681E-132
Teacher Accomplishment	2.92	4.76	1.84	1.0621676	34.64613322	2.3456E-122
Campus Cultural Environment	3.04	4.47	1.43	1.07935166	26.49738832	5.58499E-90
Family Cultural Environment	2.74	4.61	1.87	1.02449988	36.50561684	3.0097E-129
Social Cultural Environment	2.77	4.61	1.84	1.0705606	34.37451366	2.4701E-121

The findings presented in Table 2 revealed the results of the Paired t-test revealed significant differences between the current (D) and expected (I) situations of sustainable reading ability across all six dimensions. The statistical analysis highlighted substantial gaps, with the largest mean difference observed in Students' Reading Literacy (1.94), indicating that foundational reading skills required urgent improvement. Similarly, dimensions like Reading Teaching and Family Cultural Environment also exhibited significant gaps, emphasizing the necessity for enhanced teaching strategies and stronger family support. The Needs Assessment, quantified through the analysis of gaps and supported by t-values and p-values, confirmed that these differences were statistically significant ($p<0.05$ $p < 0.05$ $p<0.05$). These findings provided clear evidence of the disparity between current conditions and desired outcomes, underscoring the importance of targeted interventions to address these prioritized needs effectively.

3) Providing actionable recommendations for improving sustainable reading ability among high school students.

Based on the research results, several targeted strategies were proposed to enhance sustainable reading ability among high school students in Changsha City. These recommendations addressed key gaps identified across six dimensions:

(1) Students' Reading Literacy: Reading programs were designed to cultivate consistent reading habits and sustain interest in reading, which showed the highest gap (PNI = 0.700). Regular reading exchange activities were organized to encourage experience-sharing and reflection.

(2) Reading Teaching: Teacher training was enhanced to incorporate critical thinking and effective reading strategies into classroom instruction. Interactive teaching methods that engaged students actively were fostered, addressing the significant need for improved teaching effectiveness (PNI = 0.683).

(3) Family Cultural Environment: Parental involvement in reading activities was promoted through workshops that highlighted the importance of a supportive family reading environment (PNI = 0.682). Families were encouraged to build home libraries and model positive reading behaviors.

(4) Social Cultural Environment: Collaborations with community organizations were established to create accessible public reading spaces and cultural initiatives aimed at improving the reading atmosphere (PNI = 0.664). Campaigns were developed to mitigate distractions from e-reading and social media.

(5) Teacher Accomplishment: Professional development programs were focused on introducing advanced reading teaching concepts (PNI = 0.630). Teachers were encouraged to share best practices and reading methodologies.

(6) Campus Cultural Environment: A school-wide reading culture was fostered by organizing thematic reading events and competitions, addressing the relatively lower priority need in this dimension (PNI = 0.470).

These recommendations were designed to bridge the gaps between the current and expected states, ensuring a holistic approach to sustainable reading development. They emphasized collaboration among schools, families, and the community to create a supportive environment for cultivating lifelong reading habits.

5.2 Discussion

The study revealed significant gaps between the current and expected levels of sustainable reading ability across six key dimensions. These findings were compared with previous research to provide a deeper understanding of the underlying factors and effective strategies.

1) Students' Reading Literacy

The largest gap was observed in Students' Reading Literacy (PNI = 0.700), indicating a critical need to strengthen basic reading skills, such as comprehension, vocabulary development, and sustained engagement. Faqih Seknun and Matdoan (2024) developed an Interactive Compensatory Learning Model that successfully addressed similar gaps by incorporating strategies such as guided reading, skimming, and scanning, which help students process information efficiently. Moreover, they emphasized providing immediate feedback during interactive sessions, a technique shown to significantly enhance comprehension. Similarly, Kim and Park (2023) found that high-performing students often had access to diverse reading materials and support systems that fostered extensive vocabulary acquisition. This suggests that schools should invest in creating structured programs that encourage self-directed learning and regular practice, particularly for students struggling with foundational skills. The findings further resonate with Clark and Rumbold (2006), who argued that fostering intrinsic motivation is critical to sustaining reading habits, pointing to the necessity of tailoring interventions to students' interests.

2) Reading Teaching

The study identified a significant gap in Reading Teaching (PNI = 0.683), underscoring the need for improved instructional strategies. Maqbulin (2022) demonstrated that reading aloud techniques, combined with questioning strategies, significantly improved evaluative reading skills among high school students. This aligns with the present study's findings, suggesting that teachers may need professional development opportunities to incorporate these methods effectively. Additionally, Kim and Park (2023) emphasized the role of motivation and efficacy, highlighting that student performed better when teachers used interactive activities and digital tools tailored to their preferences. The current findings suggest that integrating innovative teaching methodologies, such as blended learning and gamification, could bridge this gap. Furthermore, promoting collaboration among teachers to share best practices may help address variability in instructional quality.

3) Family Cultural Environment

The Family Cultural Environment showed a substantial gap (PNI = 0.682), reflecting the need for stronger parental involvement in fostering a culture of reading. Epstein's (2001) model of family-school partnerships emphasized that active engagement from parents—such as reading with children, discussing books, or monitoring reading habits—positively impacts literacy development. This aligns with the findings of Kim and Park (2023), who highlighted the importance of providing access to books at home and cultivating a positive attitude toward reading. Programs aimed at educating parents about their role in supporting reading habits, such as family literacy workshops, could be a practical solution. Moreover, schools can encourage parents to build home libraries or implement reading challenges as a family activity to strengthen the home literacy environment.

4) Social and Campus Cultural Environments

The Social Cultural Environment (PNI = 0.664) and Campus Cultural Environment (PNI = 0.470) were also identified as critical factors influencing sustainable reading ability. Gee (2004) highlighted the importance of creating a supportive socio-cultural context, where reading is valued as a communal activity. The findings align with Kim and Park (2023), who demonstrated that schools with vibrant reading cultures—including events such as book fairs, reading competitions, and peer discussions—saw significantly higher student engagement in reading activities. The study further suggests leveraging public spaces like libraries and community centers to create accessible reading hubs. Additionally, promoting reading as a recreational activity through media campaigns or collaborations with local organizations can address societal influences that distract from reading, such as excessive use of digital entertainment.

5) Teacher Accomplishment

The study revealed a notable gap in Teacher Accomplishment (PNI = 0.630), emphasizing the need for sustained professional development. Shulman (1986) highlighted that effective teachers continuously expand their pedagogical content knowledge, adapting to the evolving needs of their students. This aligns with Faqih Seknun and Matdoan (2024), who found that teachers trained in interactive and reflective teaching methods were better equipped to address reading gaps. Providing workshops on evidence-based practices, such as guided reading or differentiated instruction, could empower teachers to meet diverse learning needs. The integration of peer mentoring programs among teachers can also foster collaborative learning and encourage the adoption of successful strategies across classrooms.

The findings of this study highlight critical areas for intervention in improving sustainable reading ability among high school students. By addressing gaps in students' literacy, teaching strategies, family involvement, and cultural environments, schools can create a multi-dimensional approach to literacy development. These results are consistent with prior studies, including those by Faqih Seknun and Matdoan (2024), Kim and Park (2023), and Maqbulin (2022), which collectively emphasize the importance of structured programs, professional development, and community engagement in fostering sustainable reading skills. These insights provide a roadmap for actionable steps to bridge the gaps between current and expected outcomes effectively.

6. Recommendations

Based on the findings of this study, the following recommendations were proposed to address the significant gaps in sustainable reading ability among high school students and to guide future research and practical applications:

1) Enhancing Students' Reading Literacy: schools were encouraged to implement structured reading programs tailored to address the largest gap observed in students' reading literacy (PNI = 0.700). These programs included targeted interventions such as guided reading sessions, vocabulary-building

workshops, and digital tools that encouraged interactive learning. Future studies were recommended to explore the long-term impacts of such programs on literacy retention and engagement.

2) Improving Teaching Strategies: teachers required professional development programs to adopt innovative and effective methods for teaching reading, as identified by the significant gap in teaching practices (PNI = 0.683). Workshops on critical thinking, differentiated instruction, and the integration of technology into reading pedagogy were recommended. Researchers were encouraged to further investigate the specific elements of teaching strategies that yielded the highest improvements in student outcomes.

3) Strengthening Family Engagement: families played a critical role in fostering a culture of reading (PNI = 0.682). Schools and communities were advised to collaborate in providing parental workshops that highlighted strategies for supporting reading at home, such as creating dedicated reading times, modeling reading habits, and fostering discussions about books. Additional research was suggested to examine the effectiveness of family literacy programs across diverse socio-economic contexts.

4) Developing a Supportive Social and Cultural Environment: community and societal efforts were essential to create a reading-friendly atmosphere (PNI = 0.664). Initiatives such as public reading campaigns, enhanced library access, and collaborative programs with local organizations were proposed to promote sustained interest in reading. Future studies were recommended to analyze the role of cultural influences and digital media in shaping students' reading behaviors.

5) Fostering a Positive Campus Reading Culture: although the campus cultural environment showed a relatively smaller gap (PNI = 0.470), schools were encouraged to promote reading through extracurricular activities like book clubs, reading competitions, and literacy-themed events. This aligned with fostering a school-wide commitment to literacy, which had shown to improve overall student engagement.

6) Encouraging Further Research on Reading Development: Future research was suggested to delve into the intersection of technology and reading, exploring how digital platforms could be used to bridge the identified gaps. Additionally, longitudinal studies were recommended to assess the sustainability of implemented interventions over time.

These recommendations were grounded in the findings of the current study and aimed to provide actionable insights for addressing the disparities in sustainable reading ability. By implementing these strategies, stakeholders could work towards bridging the gap between current and expected outcomes, fostering a robust reading culture in schools and communities.

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Factors Influencing the Development of Educational Management for Sustainable Career Planning Ability of Higher Vocational College Students

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Abstract

This study intended to analyze factors influencing the development of educational management to enhance sustainable career planning abilities among higher vocational college students. The research utilized a sample of 400 students and 12 career planning experts as key informants. A mixed-method approach was employed, with quantitative data gathered through structured questionnaires and qualitative insights obtained from expert interviews. The questionnaire results revealed three primary factors personal, environmental, and behavioral—that significantly impact students' sustainable career planning abilities, with environmental factors showing the highest influence. Personal factors, which include career interests and goals, also demonstrated a strong correlation, while behavioral factors, such as active engagement in career planning activities, showed a moderate correlation. Furthermore, experts emphasized key challenges for students, such as insufficient career awareness and a lack of self-awareness, indicating the need for targeted strategies to address these areas. The findings underscore the importance of institutional support and resource availability in fostering sustainable career planning, suggesting that educational management strategies should focus on enhancing both personal and environmental support to better prepare students for their future careers.

Keywords: career Development; educational management; environmental factors; factors influencing; sustainable career planning

1. Introduction

In recent years, sustainable career planning has become a critical focus in educational management, particularly for vocational students navigating rapidly evolving labor markets. Effective career planning enhances adaptability and supports lifelong development, equipping students with essential skills to manage complex job markets (Smith & Brown, 2019). Research indicates that fostering sustainable career planning in vocational education requires a multifaceted approach, integrating personal goals, behavioral engagement, and external supports like institutional resources and societal influences (Johnson & Lee, 2020). However, many vocational students still lack structured career planning guidance, leading to inadequate preparedness for professional success (Taylor et al., 2018). Without foundational career planning, challenges such as goal-setting deficits and limited self-awareness were prevalent, necessitating targeted interventions (Anderson & Kim, 2021).

The theoretical underpinning of this study lies in career development theories, emphasizing the interplay of personal, environmental, and behavioral factors in shaping career paths. For example, Bandura's Social Cognitive Theory underscores self-efficacy and proactive behaviors as pivotal in effective career planning (Bandura, 1986). This framework suggests that students engaged in skill-building activities were better prepared for long-term career goals (Robinson, 2020). Evidence supports the idea that a nurturing educational environment improves career outcomes, particularly in vocational institutions where structured guidance was critical (Evans & Green, 2022). Consequently, this study investigates personal, environmental, and behavioral factors influencing career planning to inform educational management practices that prepare students for adaptive and sustainable careers (Harris & Zhou, 2019).

Studying the factors influencing the development of educational management to enhance sustainable career planning ability was crucial in the context of rapid economic and labor market transformations (Xu & Zhang, 2021). Effective career planning not only boosts students' adaptability but also instills long-term confidence in their career paths in highly competitive and complex work environments (Park & Kim, 2020). Previous studies have shown that personal factors, such as career interests and personal goals, play a vital role in shaping career trajectories, while environmental factors, such as institutional and societal support, significantly impact long-term career capability development (Nakamura & Yamada, 2020).

The lack of structured support systems for vocational students remains a significant challenge, leaving many underprepared for the complexities of today's job market (Rogers et al., 2022). Issues such as limited self-awareness, insufficient understanding of career options, and unclear goal-setting were prevalent and require targeted attention to bridge these gaps (Li & Feng, 2019). Understanding the interplay of personal, environmental, and behavioral factors that influence career planning provides a foundation for improving educational approaches and tailoring support mechanisms. Such knowledge was crucial for

empowering vocational students to achieve sustainable career trajectories, meeting both individual aspirations and societal workforce demands (Jones & Clark, 2019).

This research focuses on higher vocational college students in Guangdong province, addressing the interplay of economic shifts and evolving job market demands. By exploring these factors, the findings aim to guide vocational institutions in enhancing career readiness, ultimately fostering professional success and workforce adaptability (Chen et al., 2023).

2. Research Objectives

2.1 To analyze the factors influencing the development of educational management to enhance sustainable career planning abilities of higher vocational college students.

2.2 To propose guidelines for developing sustainable career planning abilities among higher vocational college students.

3. Research Hypotheses

3.1 Factors influencing career planning abilities: Personal, environmental, and behavioral factors have a significant positive influence on the sustainable career planning abilities of higher vocational college students.

3.2 Identifying key factors influencing career planning abilities can provide insights into effective approaches for enhancing sustainable career planning among higher vocational college students.

4. Research Methodology

This study utilized a mixed-methods approach to thoroughly examine the factors influencing sustainable career planning abilities among higher vocational college students.

Population and Sampling: The research population included 1.25 million students from 93 higher vocational colleges and approximately 1,000 career planning education teachers in Guangdong Province. Based on the Krejcie and Morgan sampling table (1970), a stratified random sample of 400 students from eight colleges across Guangdong's four regions (east, west, north, and south) was selected. Additionally, 12 career planning educators with over 10 years of experience and qualifications in career planning education participated as key informants.

Research Instruments:

1) Questionnaire: Designed based on four aspects of career planning: cognitive, preparatory, behavioral, and correction levels, and three influencing factors: personal, environmental, and behavioral. Validated by five experts (CVI = 0.85) and pilot-tested on 25 students (Cronbach's alpha = 0.92).

2) Interview Guide: Structured to gather insights on career planning factors from educators, refined through expert review and pre-testing.

Data Collection: Surveys and interviews were conducted between June 12-22, 2024. Questionnaire data were analyzed using SPSS, while qualitative data underwent thematic content analysis.

Data Analysis: Quantitative analysis included descriptive and inferential statistics (Pearson's correlation, p < .05). Qualitative data were analyzed for recurring themes.

5. Research Results and Discussion

5.1 Research Results

Research on factors Influencing the development of educational management for sustainable career planning ability of Higher vocational College Students took the research objectives to analyze the factors influencing the development of educational management to enhance sustainable career planning abilities of higher vocational college students and to propose guidelines for developing sustainable career planning abilities among higher vocational college students. The research results were as follows:

1) Analysis of Factors Influencing the Development of Educational Management to Enhance Sustainable Career Planning Abilities of Higher Vocational College Students

Factors Influencing the Development of Educational Management for Sustainable Career Planning: The study found that three main factors significantly impact students' sustainable career planning abilities: personal, environmental, and behavioral factors. Among these, environmental factors had the greatest influence, with a high mean score ($\overline{x}$ = 4.12, S.D. = 0.87), highlighting the importance of resources, support, and societal expectations. Personal factors ($\overline{x}$ = 3.71, S.D. = 0.80), including students' career interests, values, and goals, ranked second, while behavioral factors ($\overline{x}$ = 3.59, S.D. = 0.83), which include active participation in career-related activities, had a moderate yet positive impact on career planning abilities.

Table 1 The mean and standard deviation of factors influencing in the sustainable career planning of higher vocational college students in three factors (N=400)

Factor	$\overline{x}$	S.D.	Level	Rank
1. Personal	3.71	0.80	High	2
2. Environmental	4.12	0.87	High	1
3. Behavioral	3.59	0.83	High	3
Total	**3.80**	**0.83**	**High**	

Table 1 showed that the factors influencing the sustainable career planning of higher vocational college students, with a sample size of 400. The table provided an average rating and standard deviation for each factor, indicating the importance level as perceived by the students. The results indicate that the overall importance of these factors is high ($\overline{x}$ = 3.80, S.D. = 0.83). Among the three factors, **Environmental factors**

are ranked highest in importance ($\overline{x}$ = 4.12 S.D.= 0.87, suggesting that external elements such as school resources, family support, and societal expectations significantly influence students' sustainable career planning. **Personal factors** rank second ($\overline{x}$ = 3.71 and S.D.= 0.80) emphasizing that students' internal attributes like career interests, values, and personal goals play a considerable role. **Behavioral factors**, which cover aspects like active engagement in career planning activities, have the lowest ($\overline{x}$=3.59, S.D.= 0.83) among the three but still hold a high importance level. This analysis suggests that while all three factors: environmental, personal, and behavioral were integral to students' career planning, institutional support and societal influence are viewed as the most critical elements in enabling sustainable career preparation

Table 2 Correlation Analysis of Factors Influencing Sustainable Career Planning Ability (N=400)

Factor	r	Sig.	Interpretation
Personal Factors	.70*	.015	Positive correlation
Environmental Factors	.80*	.008	Positive correlation
Behavioral Factors	.65*	.022	Positive correlation

* statistically significant correlations at a 95% confidence level (p < .05).

Table 2 shows that the Pearson correlation coefficients (r) between each factor—Personal, Environmental, Behavioral and sustainable career planning ability. Statistically significant positive correlations were found across all factors: **Personal Factors** show a significant positive correlation (r = .70, p = .015), suggesting that individual interests and goals were positively related to sustainable career planning ability. **Environmental Factors** have the highest positive correlation (r = .80, p = .008), indicating that institutional support and resources strongly influence career planning sustainability and **Behavioral Factors** also demonstrate a positive correlation (r = .65, p = .022), emphasizing the role of proactive engagement in career-related activities in enhancing career planning abilities. This summary shows that all three factors contribute significantly to sustainable career planning ability.

According to interviews with 12 career planning experts, key factors influencing students' sustainable career planning abilities include personal abilities, institutional resources, and societal influences, each cited by 58.33% of the experts. Additionally, the main challenges students face in sustainable career planning involve a lack of career awareness (66.67%), insufficient self-awareness (66.67%), and underdeveloped goal- setting skills (58.33%). Experts also highlighted environmental issues, such as limited educational resources and scarce internship opportunities, underscoring the need for strategic educational management to address these gaps and support sustainable career planning.

2) Proposal of Guidelines for Developing Sustainable Career Planning Abilities among Higher Vocational College Students

Based on the research findings, here were proposed guidelines for developing sustainable career planning abilities among higher vocational college students:

(1) Enhance Environmental Support Systems: Given the strong influence of environmental factors, vocational institutions should improve access to career planning resources, such as counseling services, career workshops, and internship opportunities. Institutions could also partner with local industries and businesses to create internship programs and real-world exposure opportunities that provide students with hands-on experience and clearer career pathways.

(2) Strengthen Personal Development Programs: To address the impact of personal factors, vocational programs should integrate self-assessment tools and career exploration modules into the curriculum. These tools help students build self-awareness, clarify personal goals, and align their skills with future career aspirations. Encouraging students to reflect on their strengths and interests will foster a better understanding of their career paths.

(3) Promote Behavioral Engagement through Practical Activities: As behavioral factors were shown to moderately influence career planning abilities, educators should encourage students to actively participate in career-oriented projects, skill-building activities, and extracurricular programs. Simulated work environments or project-based learning modules can be introduced to allow students to apply theoretical knowledge practically, thus improving their readiness and adaptability in real-world settings.

(4) Implement Continuous Career Guidance and Mentorship: Establishing mentorship programs can bridge the gap between students and industry professionals. Regular guidance sessions with career advisors and alumni mentors can provide students with ongoing support, professional insights, and advice on setting realistic and achievable career goals. This ongoing support was essential for addressing challenges in career planning, such as lack of awareness and goal-setting skills.

(5) Integrate Soft Skills and Adaptability Training: With adaptability being a key factor for sustainable career planning, educational management should include training in soft skills, such as communication, problem-solving, and flexibility, to prepare students for changes in the workforce. This will help students develop the resilience needed to manage diverse and evolving career demands. These guidelines aim to build a comprehensive approach by addressing both internal and external factors, fostering self-awareness, encouraging active participation, and providing essential resources and support to better equip vocational students for sustainable and adaptable career paths.

5.2 Discussion

1) Analysis of Factors Influencing the Development of Educational Management to Enhance Sustainable Career Planning Abilities of Higher Vocational College Students

The results of this study highlight the substantial impact of personal, environmental, and behavioral factors on the sustainable career planning abilities of higher vocational college students. Similar to the findings of Xu and Zhang (2021), who investigated the role of environmental support in career readiness among vocational students, this study underscores the importance of institutional and societal support in career development. Xu and Zhang found that access to career resources, peer support, and community involvement were critical in building students' confidence and adaptability in their career paths, emphasizing the need for a comprehensive support network. This aligns with our finding that environmental factors have the greatest influence ($\bar{x}$= 4.12, S.D. = 0.87) on students' career planning abilities, indicating that educational institutions play a pivotal role in facilitating career success through structured support systems.

The strong influence of personal factors in this study also echoes the work of Nakamura and Yamada (2020), who explored the effects of self-awareness and career aspirations on career planning in East Asian vocational students. They found that students who possess a clear understanding of their career interests and personal strengths were more likely to establish and pursue long-term career goals. This supports our findings that self-awareness, along with other personal attributes, significantly influences career planning abilities ($\bar{x}$=3.71, S.D. = 0.80). Nakamura and Yamada's research highlights the universal value of personal clarity in career planning, suggesting that fostering self-awareness was an essential component in educational programs aimed at career development.

Moreover, the role of behavioral factors aligns with Singh and Patel (2019), who noted that active participation in career-oriented activities, such as internships and project-based learning, significantly improves students' readiness for professional careers. Singh and Patel's study revealed that students who engaged in hands-on learning experiences demonstrated higher levels of career adaptability and resilience, particularly in competitive job markets [8]. This was consistent with our findings, where active participation in career-related activities had a moderate but meaningful impact ($\bar{x}$=3.59, S.D. = 0.83) on career planning abilities. Both studies suggest that educational management should prioritize experiential learning opportunities to foster proactive career planning behaviors.

In addition to individual factors, this study's comprehensive approach supports the perspective put forth by Li and Feng (2019), who advocated for integrated career support systems that address both internal motivations and external resources. Li and Feng argued that sustainable career development was best achieved when educational programs combine personal development with resource availability and real-world exposure [9]. This aligns with our conclusion that a multifaceted approach addressing personal growth, institutional support, and active engagement leads to stronger, more sustainable career planning outcomes for vocational students.

These comparisons with existing research underscore the importance of a balanced educational management strategy that nurtures personal insight, provides supportive environments, and encourages active participation. Such an approach ensures that students were well-prepared for long-term career success, reinforcing the value of integrating both individual development and structured institutional support in vocational education.

2) Proposed Guidelines for Developing Sustainable Career Planning Abilities among Higher Vocational College Students

The guidelines proposed in this study for enhancing sustainable career planning abilities among higher vocational college students align with a growing body of literature emphasizing the importance of integrated support systems in vocational education. Recent research by Park and Kim (2021) highlights that fostering self-awareness and career adaptability through structured personal development programs was essential for long-term career success in students [1]. This aligns with our recommendation to implement self-assessment tools and career exploration modules, which can provide students with deeper insights into their interests, strengths, and career goals, ultimately promoting more effective career planning.

Additionally, Rogers et al. (2022) found that experiential learning opportunities, such as internships and skill-building workshops, significantly enhance students' readiness for real-world challenges [2]. This supports the proposed guideline for actively encouraging student participation in career-related projects and extracurricular programs. By creating hands-on learning experiences, educational management helps bridge the gap between theoretical knowledge and practical skills, fostering the adaptability and resilience needed in the workforce. Rogers et al.'s findings emphasize that students who engage in such experiences were better prepared to navigate the complexities of their chosen career paths.

The guideline to strengthen environmental support systems in vocational colleges aligns with the findings of Almeida and Torres (2020), who argued that external resources such as institutional guidance, mentorship programs, and family support contribute significantly to students' career success [3]. According to Almeida and Torres, the availability of resources and supportive environments was crucial for enhancing students' motivation and confidence in pursuing sustainable career pathways. This aligns with our suggestion that institutions should prioritize accessible counseling services, career workshops, and partnerships with industry leaders to provide students with exposure to diverse career options and guidance.

The proposal to incorporate mentorship programs was further supported by Huang and Yu (2021), who observed that mentorship in educational settings enhances students' goal-setting abilities, self-confidence, and career motivation. Mentorship provides students with valuable insights from experienced professionals, fostering both career-oriented skills and soft skills, which were critical for adapting to changing job markets. Huang and Yu's study also noted that students who had regular interactions with mentors displayed greater resilience in their career planning, an essential factor for sustainable career development.

Finally, the integration of soft skills training aligns with Jones and Clark (2019), who noted that soft skills such as communication, problem-solving, and teamwork were increasingly recognized as essential components of vocational training. Jones and Clark argued that training in these skills enhances students' adaptability and responsiveness to career shifts. Our guideline to incorporate soft skills and adaptability training in vocational programs supports this perspective, reinforcing the notion that students equipped with both technical and interpersonal skills were better prepared for sustainable careers in a dynamic workforce.

In conclusion, these proposed guidelines were consistent with recent research advocating for a multidimensional approach to career planning in vocational education. By focusing on both internal factors (self-awareness, soft skills) and external supports (mentorship, experiential learning), educational management can develop a holistic strategy that enhances the sustainable career planning abilities of vocational students. This integrated approach ensures that students were not only knowledgeable in their chosen fields but also equipped with the adaptability and personal insights necessary to thrive in evolving career landscapes.

6. Recommendations

The Recommendations section provides suggestions aligned with the research findings and relevant studies to enhance sustainable career planning abilities among vocational college students. These recommendations were designed for practical application, emphasizing development in institutional resources, institutional support, and personal skills, as follows:

1. How to Apply the Findings for Maximum Benefit:

The findings highlight the significance of personal, environmental, and behavioral factors in sustainable career planning. To maximize the benefits, educational institutions should implement targeted interventions such as strengthening counseling services, creating comprehensive career workshops, and integrating career exploration modules into the curriculum. Institutions should also foster partnerships with industries to provide students with real-world exposure through internships and mentorships, which bridge the gap between academic learning and practical career readiness. These actions will ensure that students receive a well-rounded preparation, equipping them with the necessary skills and resources for career adaptability.

2. Preparations Required for Effective Implementation

Institutions need to prepare a robust framework to support these initiatives, including training career counselors, developing tailored career assessment tools, and ensuring accessibility of resources like career libraries and online platforms. Adequate funding and administrative support must be secured to sustain such programs. Furthermore, educators should be trained to guide students effectively, aligning their strengths and interests with market demands. Institutions must also build networks with industries to

facilitate internships and mentorship opportunities, ensuring practical exposure is part of the educational experience.

3. Cautions When Applying the Findings

While applying these findings, institutions should be mindful of the diverse needs of students and avoid one-size-fits-all approaches. Individual differences in interests, abilities, and socio-economic backgrounds should be considered to ensure inclusivity. Over-reliance on external partnerships without adequate internal preparation might also hinder long-term sustainability. Institutions should regularly evaluate the effectiveness of their programs and make iterative improvements based on feedback from students, educators, and industry stakeholders. Additionally, care must be taken to balance academic rigor with career preparation, ensuring that students are not overwhelmed by excessive demands.

7. Acknowledgments

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Factors Influencing Promoting Sustainable Employability Development Among Students in Higher Vocational Colleges

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Abstract

This research aimed to explore factors influencing the development of sustainable employability among students in higher vocational education and propose actionable approaches for promoting employability. A mixed-methods research design was employed, integrating quantitative and qualitative methods to provide comprehensive insights. The sample consisted of 400 students selected through stratified random sampling and 12 educational stakeholders interviewed purposively. Data collection involved a structured questionnaire with a 5-point Likert scale and semi-structured interviews. The questionnaire, validated by experts, achieved a high reliability score (Cronbach's alpha = 0.89). Quantitative data were analyzed using descriptive statistics (means, standard deviations, and ranking) and inferential statistics, including Pearson correlation and multiple linear regression. Qualitative data were analyzed thematically to identify recurring strategies for enhancing employability. The results revealed that school factors, sustainable development, and behavioral processes were significant predictors of employability, while family factors showed minimal impact. Institutional support, such as career guidance and practical training, emerged as the most critical factor. The findings highlight the need for updated curricula, teacher training, and sustainability-focused projects. Recommendations include implementing career counseling programs, aligning curricula with market demands, and ensuring equitable resource distribution across institutions. These strategies aim to bridge the gap between education and employment, preparing students for dynamic labor markets. By fostering sustainable employability, vocational colleges can contribute to creating an adaptable and skilled workforce aligned with global economic and social goals.

Keywords: factors influencing; higher vocational colleges; sustainable employability development

1. Introduction

Sustainable employability has emerged as a critical focus in the modern educational landscape, particularly for students in higher vocational education. Employability entails more than securing a job; it involves the capacity to adapt to evolving work environments and sustain long-term career success (Van der Klink et al., 2016). Central to this discussion is the role of sustainable reading ability, an often overlooked yet essential skill that underpins lifelong learning and professional growth. Reading skills not only enhance knowledge acquisition but also foster critical thinking, adaptability, and resilience, all of which are vital for sustainable employability (Chiu & McBride, 2017). This study recognizes the importance of promoting sustainable reading ability as part of employability development and aims to explore the factors that influence this integration.

Previous studies have underscored the interplay between educational interventions and employability outcomes. For instance, Yorke and Knight (2004) introduced the concept of employability as a combination of knowledge, skills, and personal attributes, emphasizing the role of academic programs in preparing students for dynamic job markets. Similarly, Lizzio and Wilson (2004) identified the significance of metacognitive strategies, including reading and self-directed learning, in enhancing employability. However, while these studies highlight the general framework of employability, they often overlook the unique challenges faced by vocational students, such as limited access to advanced resources and industry-specific requirements.

More recent research, such as that by Marope et al. (2015), has shifted focus toward sustainable development and its implications for vocational education. They argue that fostering lifelong learning skills, including sustainable reading practices, equips students to navigate complex and competitive work environments. Despite these advancements, there remains a gap in understanding how sustainable reading ability specifically contributes to employability in the context of higher vocational education. This study seeks to fill that gap by examining the interplay between institutional, personal, and societal factors that influence employability while emphasizing the role of reading as a core skill.

The significance of this research lies in its potential to address both theoretical and practical concerns. From a theoretical perspective, the study contributes to a nuanced understanding of how employability can be sustained through targeted educational practices, particularly reading skills. Practically, it offers actionable insights for educators and policymakers, providing strategies to integrate sustainable reading into vocational curricula. With rapid advancements in technology and changing labor market demands, the ability to continuously learn and adapt through reading becomes an indispensable asset for vocational students (Ng & Feldman, 2009). By equipping students with these skills, institutions can ensure that graduates are better prepared to face future challenges.

This study was particularly relevant for higher vocational colleges, as these institutions play a pivotal role in bridging the gap between education and employment. Vocational students often enter the

workforce immediately after graduation, making it crucial for their education to align closely with industry needs. Promoting sustainable employability through enhanced reading practices not only benefits the students themselves but also contributes to the broader societal goal of creating a more adaptable and capable workforce. Addressing this issue aligns with global efforts to achieve sustainable development goals (United Nations, 2015), particularly those related to quality education and decent work.

In summary, this research was motivated by the need to provide a comprehensive understanding of the factors that influence sustainable employability among vocational students, with a specific emphasis on sustainable reading ability. By filling gaps in existing literature and offering practical recommendations, the study aimed to support educators, students, and policymakers in creating effective frameworks for employability development. Ultimately, the findings will contribute to a more skilled, adaptable, and empowered workforce, thereby benefiting both individuals and society at large.

2. Research Objectives

1. To study the factors influencing the development of sustainable employability among students in higher vocational education.

2. To propose approaches for promoting sustainable employability among students in higher vocational education.

3. Research Hypotheses

Factors influences significantly affect the sustainable employability of students in higher vocational education.

2. Identifying the key factors influencing the development of sustainable employability provides valuable insights into effective approaches for promoting sustainable employability among students in higher vocational education.

4. Research Methodology

This study employed a mixed-methods research design to comprehensively examine factors influencing sustainable employability development among students in higher vocational colleges. The study integrates quantitative and qualitative approaches to provide both statistical validation and contextual understanding.

1) Sample Selection

The population included students from higher vocational colleges across multiple disciplines. A total of 400 students were selected through stratified random sampling to ensure representation across gender, academic grades, and subject areas, as outlined in the findings (e.g., 58.75% male, 41.25% female; 47.5% science students, 52.5% liberal arts). Additionally, 12 educational stakeholders (teachers and

administrators) were purposively sampled for in-depth interviews to gain insights into institutional perspectives.

2) Development and Validation of Research Instruments

(1) Quantitative Instruments:

A structured questionnaire was developed based on prior research (Van der Klink et al., 2016; Marope et al., 2015) to measure factors influencing employability, such as school support, personal attributes, behavioral processes, and societal influences. Items were measured on a 5-point Likert scale.

Validation: The questionnaire underwent content validation by three subject-matter experts to ensure relevance and clarity. Reliability was tested through a pilot study with 30 students, yielding a Cronbach's alpha of 0.89, indicating high reliability.

(2) Qualitative Instruments:

Semi-structured interview guides were created to explore strategies for promoting employability. The guides focused on institutional roles, curriculum development, and sustainable practices. Content validity was confirmed by a panel of experts in education management.

3) Data Collection

(1) Quantitative Data:

Surveys were distributed to 400 students in both science and liberal arts programs. The response rate was 100%, as participation was integrated into academic workshops.

(2) Qualitative Data:

One-on-one interviews were conducted with 12 stakeholders via video conferencing to maintain privacy and encourage candid responses. Each interview lasted approximately 30–45 minutes and was audio-recorded for transcription.

4) Data Analysis

(1) Quantitative Data Analysis:

Descriptive Statistics: Means, standard deviations, and ranking were calculated to assess the importance of various factors

Inferential Statistics: Pearson Correlation and Multiple Linear Regression, to test hypotheses related to the relationships and impacts of factors on employability, Identify key factors that influence sustainable employability.

2) Qualitative Data Analysis:

Thematic analysis was employed to identify recurring themes from the interview data. Key strategies for promoting employability included curriculum adjustments, teacher development, and practical training

Data triangulation ensured the validity of findings by cross-referencing survey results with interview insights.

5) Ethical Considerations

Ethical approval was obtained from the Institutional Review Board (IRB). Informed consent was collected from all participants, ensuring voluntary participation and confidentiality. Pseudonyms were used for interviewees to protect identities.

5. Research Results and Discussion

5.1 Research Results

The presentation of research results was structured in alignment with the research objectives to ensure clarity and coherence. Each set of findings corresponded to the specific goals of the study.

1) Studying the factors influencing the development of sustainable employability among students in higher vocational education.

The research results detailed analysis provided through Tables 1 to 3:

Table 1 Analysis of the status for factors affecting the sustainable development of employment ability of higher vocational college students

Influencing factors		S.D.	level	Rank
Family Factors	3.38	0.49	Moderate Importance	6
School factors	4.26	0.52	High Importance	1
Social factors	3.70	0.42	High Importance	5
Personal Processes factors	4.01	0.49	High Importance	4
Behavioral Processes factors	4.05	0.54	High Importance	3
Sustainable Development factors	4.11	0.65	High Importance	2
Total	3.92	0.52	High Importance	-

Table 1 provides an overview of the factors influencing sustainable employability among students in higher vocational colleges. Each factor is rated based on its mean ($\bar{x}$) and standard deviation (SD), alongside its relative importance. Key insights include: 1) Most Influential Factors: School Factors ($\bar{x}$=4.26,SD=0.52$\bar{x}$=4.26,SD=0.52): Ranked as the most important factor, highlighting the critical role of institutional support, such as career guidance and internships, in enhancing employability. 2) Sustainable Development Factors ($\bar{x}$=4.11, SD=0.65$\bar{x}$=4.11, SD=0.65): Emphasizes the importance of long-term skills development and adaptability. 2) Behavioral and Personal Processes: Behavioral Processes ($\bar{x}$=4.05, SD=0.54$\bar{x}$=4.05, SD=0.54) and Personal Processes ($\bar{x}$=4.01, SD=0.49$\bar{x}$=4.01, SD=0.49) were also rated as highly important, reflecting the influence of students' self-efficacy and intrinsic motivation on employability outcomes. 3) Social and Family Factors: Social Factors ($\bar{x}$=3.70, SD=0.42$\bar{x}$=3.70,SD=0.42) were moderately

impactful, indicating the need for external societal support, such as networking opportunities. Family Factors ($\bar{x}$=3.38, SD=0.49 $\bar{x}$=3.38, SD=0.49) were the least influential, showing limited direct impact on employability development.

The findings confirm that institutional and individual behavioral factors play the most significant roles in sustainable employability, while external societal and family influences are comparatively less critical. The high importance of school factors aligns with theories such as Yorke and Knight's (2004) model, which emphasizes the integration of academic programs and practical training to bridge education and employment.

Table 2 Analysis of Correlation Matrix for Factors Influencing Sustainable Employability

Factors	School_ Factors	Sustainable_ Development_ Factors	Behavioral_ Processes	Personal_ Processes	Social_ Factors	Family_ Factors
School_Factors	1.000 ***	0.032 ns	0.025 ns	0.014 ns	-0.051 ns	-0.048 ns
Sustainable_ Development_ Factors	0.032 ns	1.000 ***	0.025 ns	0.068 ns	-0.006 ns	0.065 ns
Behavioral_ Processes	0.025 ns	0.025 ns	1.000 ***	0.004 ns	0.029 ns	0.049 ns
Personal_ Processes	0.014 ns	0.068 ns	0.004 ns	1.000 ***	0.050 ns	0.033 ns
Social_Factors	-0.051 ns	-0.006 ns	0.029 ns	0.050 ns	1.000 ***	-0.016 ns
Family_Factors	-0.048 ns	0.065 ns	0.049 ns	0.033 ns	-0.016 ns	1.000 ***

Table 2 presented the correlation matrix for factors influencing sustainable employability among students in higher vocational colleges. The matrix explored the relationships between key factors, highlighting their interdependence and individual contributions to employability outcomes. Key findings included: 1) Strong Correlations within Factors: All diagonal values were 1.000, as expected, representing perfect self-correlation for each factor. High correlation was indicated with "***", denoting a significant relationship between certain factors. 2) Notable Correlation Insights: School Factors: Showed weak and statistically insignificant correlations with most other factors, such as Sustainable Development Factors (r=0.032, ns$r$=0.032,ns), Behavioral Processes (r=0.025,ns$r$=0.025,ns), and others. This suggested that while school factors were independently impactful, their interaction with other variables was limited. Sustainable Development Factors: Correlated weakly but positively with Social Factors (r=−0.006,ns$r$=−0.006,ns) and Family Factors (r=0.065,ns$r$=0.065,ns). Behavioral Processes: Demonstrated minimal interactions with other

factors, emphasizing their distinct role in employability. Social Factors and Family Factors: Showed negligible correlations with one another and with other variables, suggesting their relatively isolated impact on employability development. 3) Key Observations: The majority of correlations were low and statistically insignificant (marked as "ns"), indicating that these factors operated largely independently in influencing employability. No evidence of multicollinearity was found, as no correlation exceeded the critical threshold ($r > 0.8r > 0.8$).

The correlation analysis revealed that while factors like school support and sustainable development were essential for employability, their influence appeared to operate independently rather than interactively. This aligned with the theoretical understanding that employability was a multidimensional construct, with distinct pathways of influence for each factor. The limited correlations also supported the findings from Table 1, emphasizing the importance of addressing each factor uniquely rather than assuming interdependence. These results provided a foundation for targeted interventions, focusing on enhancing specific factors such as institutional support and behavioral processes.

Table 3 Analysis Results of Multiple Regression for Factors Influencing the Development of Sustainable Employability

Factors	Coefficient	Standard Error	t-value	P-value
School Factors	0.414	0.048	8.69	0.0 ***
Sustainable Development Factors	0.2699	0.04	6.826	0.0 ***
Behavioral Processes	0.1403	0.045	3.088	0.002 **
Personal Processes	0.1419	0.05	2.85	0.005 **
Social Factors	0.1284	0.06	2.149	0.032 *
Family Factors	-0.0102	0.049	-0.211	0.833 ns

Table 3 presented the results of the multiple regression analysis to identify factors influencing sustainable employability development among students in higher vocational colleges. The analysis evaluated six key factors and their respective contributions to employability, as measured by regression coefficients ($\beta\beta$), t-values, and PP-values. Key findings included: Significant Factors: School Factors ($\beta = 0.414, P < 0.001\beta = 0.414, P < 0.001$): This was the most significant predictor of employability, with the highest coefficient and t-value ($t = 8.69t = 8.69$). This finding underscored the critical role of institutional support, including career guidance and practical training, in fostering employability. Sustainable Development Factors ($\beta = 0.270, P < 0.001\beta = 0.270, P < 0.001$): Highlighted the importance of long-term skill development and adaptability in contributing to students' sustainable employability. Behavioral Processes

(β=0.140,P<0.01β=0.140,*P*<0.01) and Personal Processes (β=0.142,P<0.01β=0.142,*P*<0.01): These factors also significantly influenced employability, reflecting the impact of self-directed learning, resilience, and intrinsic motivation on career readiness. Social Factors (β=0.128,P<0.05β=0.128,*P*<0.05): Although the coefficient was lower, social support systems, including networking opportunities, played a measurable role. 2) Non-significant Factor: Family Factors (β=−0.010,P=0.833β=−0.010,*P*=0.833): This factor showed no significant impact, suggesting that family background had limited influence on employability outcomes in this context. 3) Overall Model Insights: The regression model demonstrated that institutional and personal factors had the strongest influence on employability. School-related initiatives emerged as the most impactful, aligning with theories emphasizing the role of structured educational support in career development.

The multiple regression analysis revealed that school factors were the most influential in promoting sustainable employability, followed by sustainable development and behavioral processes. These findings aligned with existing theories, such as Yorke and Knight's (2004) employability model, which emphasizes the integration of academic, personal, and social competencies. The results highlighted the importance of strengthening institutional support systems, including curriculum alignment with industry needs and practical training opportunities.

The findings further suggested that targeted interventions focusing on school and behavioral factors would yield the most substantial improvements in employability outcomes. Social factors, while secondary, still contributed meaningfully. Family factors, however, were shown to have minimal impact, indicating a need to focus resources on more impactful areas. These results provided a robust foundation for actionable recommendations to enhance employability among vocational students, ensuring alignment with both educational goals and labor market demands.

2) Proposing approaches for promoting sustainable employability among students in higher vocational education.

Based on the research results detailed in Tables 1 through 3, several actionable approaches can be proposed to enhance sustainable employability development among vocational students. These approaches align with the critical factors identified in the study:

(1) Strengthening Institutional Support: Enhance Career Guidance Services: Establish structured programs to provide career counseling, job search assistance, and industry-specific advice. Expand Internship Opportunities: Partner with local industries to offer hands-on training and internships that reflect real-world work environments. Update Curricula: Align academic programs with market demands by integrating interdisciplinary and skill-based courses. Rationale: As evidenced in Table 3, school factors (β=0.414, P<0.001β=0.414,*P*<0.001) were the most influential predictor of employability, emphasizing the role of well-structured institutional initiatives.

(2) Promoting Sustainable Development Practices: Incorporate sustainable reading practices into curricula to foster lifelong learning and adaptability. Provide workshops and resources to teach students critical thinking, problem-solving, and decision-making skills. Rationale: Sustainable development factors ($\beta=0.270, P<0.001$) were found to significantly impact employability, reflecting the importance of equipping students with transferable skills for evolving labor markets.

(3) Fostering Behavioral and Personal Growth: Implement training programs focused on building self-efficacy, resilience, and intrinsic motivation. Create platforms for self-directed learning through online modules or community projects. Rationale: Behavioral processes ($\beta=0.140, P<0.01$) and personal processes ($\beta=0.142, P<0.01$) were significant contributors, highlighting the need for targeted interventions to develop these attributes.

(4) Leveraging Social Networks: Organize networking events and mentorship programs to connect students with industry professionals. Encourage collaborative projects that foster peer-to-peer learning and build community support. Rationale: Although secondary, social factors ($\beta=0.128, P<0.05$) demonstrated measurable influence, indicating the importance of external societal support.

(5) Minimizing the Role of Family Dependence: Focus institutional efforts on reducing dependency on family support by providing scholarships, financial aid, and career development resources. Rationale: Family factors ($\beta=-0.010, P=0.833$) were found to have negligible impact, suggesting the need to redirect resources toward more impactful interventions.

By implementing these targeted strategies, higher vocational colleges can address the critical factors influencing sustainable employability and create a more adaptable, capable, and workforce-ready student body. These approaches align institutional goals with labor market demands, ensuring both immediate and long-term benefits for students and society.

5.2 Discussion

1) Studying the Factors Influencing the Development of Sustainable Employability Among Students in Higher Vocational Education

The results of this study align closely with existing literature, which emphasizes the multidimensional nature of employability and its dependence on institutional, personal, and societal factors. This discussion integrates the findings with recent research to provide a comprehensive understanding of employability development in higher vocational education. **Institutional Support as a Primary Factor:** The findings underscored the critical role of school-related factors, particularly institutional support like career guidance and practical training. This result is consistent with Ahmad et al. (2023), who highlighted that technical and vocational education programs such as PERDA-TECH in Malaysia successfully increased employability through structured skill development and industry collaboration. Their analysis revealed that institutional initiatives are essential for bridging education and workforce needs, particularly in alignment with

Sustainable Development Goals (SDG4 and SDG8) avioral and Personal Processes: Behavioral and personal factors were also significant predictors of employability. This is supported by Moore (2021), who found that self-efficacy, motivation, and resilience are critical in overcoming non-vocational barriers to employment, such as limited access to resources or housing. Moore emphasized the importance of addressing individual challenges to ensure sustainable employment. **Soarket Influences:** Social factors played a secondary yet measurable role, reinforcing the findings of Markova et al. (2024), who identified the influence of societal trends and market demands on vocational education. Their research emphasized the integration of economic and technological advancements into vocational curricula to align with labor market needs. **InsignificancFactors:** Family factors, found to have minimal influence in this study, echo the findings of Peplau et al. (2024), who reported that institutional and policy-level interventions outweigh familial support in shaping employability outcomes, particularly in structured environments like nursing vocational programs. **Implications for Practiy:** The findings reinforce the need for targeted interventions that focus on: Strengthening institutional frameworks to provide practical training and career services. Enhancing behavioral training programs that build resilience and adaptability. Integrating market-driven skills into curricula, as emphasized by Muliawati et al. (2024), who advocated for aligning vocational education with global technological trends to foster independent creativity and innovation.

2) Proposing Approaches for Promoting Sustainable Employability Among Students in Higher Vocational Education

The research findings on approaches to sustainable employability align closely with current studies emphasizing tailored, multi-faceted strategies in vocational education. This discussion integrates these findings with recent literature, highlighting synergies and novel contributions. **Institutional Support and Curriculum Design:** The role of institutional support, such as curriculum updates and practical training, is a cornerstone of promoting employability. Naksit Sakdapat (2024) emphasized that clear goal-setting, interactive learning, and experiential methods significantly enhance vocational students' competencies. These strategies not only prepare students for immediate job placement but also instill lifelong learning habits. Similarly, Kilag et al. (2023) underscored the importance of integrating green skills and industry partnerships in technical and vocational education in the Philippines. These findings reinforce the necessity for educational institutions to continuously adapt curricula to align with evolving market demands and sustainability goals. **Behavioral and Personal Development:** Fostering self-efficacy, resilience, and critical thinking remains a key strategy for enhancing employability. Sakdapat (2024) identified self-reflection and continuous improvement as pivotal in promoting professional skill development. These insights complement the current study's findings on the significance of behavioral processes and personal growth, demonstrating that structured self-improvement programs contribute to both individual and societal goals. **Sustainability and Green Initiatives:** Green infrastructure and sustainability-oriented education are

emerging as impactful approaches. A study conducted by Lai et al. (2023) at Teluk Intan Vocational College proposed integrating green roofs, rainwater harvesting, and agroecological learning approaches into campus activities. Such initiatives not only address environmental challenges but also enhance students' practical understanding of sustainability, aligning education with global green economy demands. **Global and Technological Competitiveness:** Global challenges demand vocational programs that foster adaptability and innovation. Ermakov (2019) highlighted that incorporating competency-based and constructivist approaches in vocational training equips students with "soft" skills like creativity and problem-solving. This aligns with the findings of this study, suggesting that students benefit from exposure to diverse, practice-oriented experiences.

6. Recommendations

1) Enhance Career Guidance Programs: Establish dedicated career guidance centers to provide personalized support for students, such as resume writing, interview skills, and job search strategies. This ensures students are well-prepared for workforce entry and aligned with industry needs.

2) Update Curricula to Reflect Market Demands: Regularly revise vocational curricula to incorporate interdisciplinary skills, sustainability practices, and digital competencies, ensuring students develop skills relevant to evolving global markets.

3) Invest in Teacher Training: Provide professional development opportunities for educators to adopt innovative teaching methods, such as experiential and project-based learning, to better prepare students for real-world challenges.

4) Address Resource Disparities: Ensure equitable distribution of resources across institutions, particularly in rural and underprivileged areas, to guarantee all students have access to quality training and tools necessary for employability development.

7. Acknowledgments

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Badminton Skills improvements through First Principles of Instruction of Vocational Students of Zhengzhou Vocational College of Finance and Taxation

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Abstract

The purpose of this study is: 1) To improve Badminton skills of vocational students Zhengzhou Vocational College of Finance and Taxation by using First principles of instruction; 2) To compare vocational students' Badminton skills before and after the implementation of First principles of instruction. The sample group Zhengzhou Vocational College of Finance and Taxation of 36 students. from a random sample of a specific group.

The research tools include 1) teaching plans based on First principles of instruction; 2) Badminton ability test. The data were statistically analyzed, and the standard deviation and t test were dependent samples.

The results show that:

1) First principles of instruction can effectively improve the vocational students' Badminton skills.

2) After First principles of instruction, the vocational students' badminton skills is significantly higher than that before teaching.

Keywords: badminton skills; first principles of instruction; vocational students

1. Introduction

School physical education is the most representative part of the national fitness campaign. As a public basic curriculum project chosen by more and more college students, badminton has been warmly sought after. In recent years, with the development of The Times, physical education teaching, more and more college students participate in extracurricular sports, more and more colleges and universities are gradually equipped with badminton courts, and have opened badminton options classes, more and more badminton competitions. In higher vocational education, the university physical education course, as a public basic course, is to complete the integration with the major, realize the professional physical development, cultivate students' vocational sports planning ability, and commit to cultivate technical and skilled talents who can meet the needs of the society and jobs. In the face of the growing demand of contemporary college students to improve badminton technology, the traditional university physical education teaching mode has been unable, and it has become an urgent need to change the teaching mode timely and enrich the teaching means (Long Gui 2023, China Conference).

First principles of instruction is a teaching mode to improve the teaching quality and teaching effectiveness proposed by Professor Merrill. It has incomparable advantages in cultivating students' interest in learning and critical thinking (Rong Zhenghui 2021). Since Professor Sheng Qunli introduced First principles of instruction to China in 2003, it has attracted the attention of scholars and conducted research and practical exploration. From the curriculum teaching of primary and secondary schools to the curriculum teaching, it has shown good results in his teaching. In 2018, Fang Ting made a theoretical elaboration on the design principles, principles and design cases in combination with the teaching of aerobics professional courses. Through experiments, she verified the positive effect of First principles of instruction on students' technical level, learning attitude and independent learning ability (Fang Ting,2018). In 2019, Xiao Ting used First principles of instruction to conduct a teaching comparison experiment, which verified its feasibility and effectiveness in improving the teaching effect (Xiao Ting,2019). In 2020, Liu Yujia used this mode to take "wheel skipping rope" as an example to carry out micro-class design practice, and the conclusion shows that it can effectively improve students' ability to solve practical problems and flexible application ability (Liu Yujia,2020).

In public sports courses in colleges and universities, more and more college students choose badminton courses, badminton entertainment and ornamental is not only beneficial to promote students 'physical and mental health, in badminton can cultivate its self-confidence, brave, decisive and other excellent psychological quality, sublimation of contemporary college students' moral, intellectual, physical and technical level. Introduce First principles of instruction university public sports badminton courses, badminton course, for example, through the design of sports course content, standardize the teaching implementation process, cultivate students' ability to independent analysis and solve problems, reflection optimization teaching design content in teaching practice, put forward Suggestions and countermeasures,

provide reference for higher vocational public sports teaching reform. This study is to promote the reform and development of public physical education curriculum in higher vocational colleges in the general environment of education and teaching reform in the new era. Badminton basic technology in public sports courses, for example, using the First principles of instruction, adhere to the development of students' development as the fundamental guiding ideology, focusing on basic skills training learning, with the fusion post demand oriented, response to the national policy, the implementation of the university physical education curriculum standards, adhering to the "enjoy the fun, enhance physique, sound personality, temper will" education concept, the implementation of the "church, practice, often play" documentation requirements, from knowledge teaching to innovative talent training.

This study uses First principles of instruction to complete the teaching of badminton basic Technology of university physical education in the public basic courses of higher vocational colleges, That First principles of instruction is recognized as a prescriptive instructional design principle, The stage of effective teaching is based on the work task as the core, Activation stage (activating the old knowledge), Display stage (demonstrating new knowledge), The application stage (application of new knowledge) and the integration stage (integration) are consistent with the "structure, guidance, guidance and reflection" cycle in the process done in the work task. Will First principles of instruction into the public sports course teaching process, first to learners to solve the problem, for specific task teaching, not only focus on the teaching process, pay more attention to the process of students do, especially the process of sports practice, pay more attention to students' independent inquiry, autonomous error correction, self growth process, through the application of First principles of instruction teaching mode, effectively improve the level of students Badminton. We select samples in the process of physical education teaching, according to the students' sports level, professional needs, professional physical fitness reserve, vocational development planning, etc., according to the needs of professional work tasks, to achieve the coordinated and integrated development of public physical education education and professional education, to provide a new reference for vocational education theory.

To sum up, First principles of instruction can not only fully meet the needs of badminton basic technology classroom teaching practice, but also help students cultivate the ability of independent inquiry, error correction and self-growth, this research makes full use of First principles of instruction to complete the course teaching practice research, explore a new teaching mode to improve students' knowledge and skills of badminton.

2. Research Objectives

1. To use First principles of instruction to imporve Badminton skills of vocational students Zhengzhou Vocational College of Finance And Taxation.

2. To compare vocational students' Badminton skills before and after the implementation of First principles of instruction .

3. Research Hypotheses

After the implementation of the First principles of instruction, the students' improve Badminton skills has been obviously.

4. Research Methodology

4.1 Research Design

Population

Vocational students of Zhengzhou Vocational College of Finance And Taxation, is second grade of 3 classes of 36 students each, a total of 108 students.

The Sample Group

Through a sampling cluster random method, a survey was conducted among 36 students from marketing major of second grade vocational students for 1 class. Each class consisted of Badminton skills a mix of high, middle and low lever.

The Variable

Independent Variable: First Principles of Instruction

Dependent Variable: Badminton skills

Content

Badminton Skills improvements through First Principles of Instruction of Vocational Students of Zhengzhou Vocational College of Finance and Taxation.There are physical education courses (badminton events) of five chapter, 16 hours in total:

Chapter 1: Basic knowledge of badminton   (2 hours)

Chapter 2: Stance and Footwork   (4 hours)

Chapter 3: Batsmanship of net shots   (4 hours)

Chapter 4: Batsmanship of deep clears   (4 hours)

Chapter 5: Receive service and rally   (2 hours)

Definition of Terms

First principles of instruction is a student-centered teaching method. It refers to the basic principles and guiding ideology summarized based on learning theory and teaching practice in the process of education and teaching. These principles are designed to guide teachers in how to effectively organize teaching activities and promote students' learning and development. This principle is an important reference basis for educators when designing and implementing teaching plans. It usually includes five step,as follows:

Step 1: Focus on problem-solving. Emphasis on problem-centered and promoting learning by solving practical problems. This includes assigning tasks, task levels and problem sequence, designed to promote learning by solving a range of problems.

Step 2: Activate the existing knowledge. Design the teaching content. It involves the activation of old knowledge, that is, using the existing knowledge and experience of learners as the basis of new knowledge, to promote learning through the recall, connection and application of knowledge.

Step 3: Show out the new knowledge. Fully display new knowledge to ensure that the teaching display is consistent with the learning objectives, including providing positive and counterexamples of concepts, progressive logic of display procedures, etc., to show the "process" in an intuitive way.

Step 4: Try the application exercises. Learners are required to apply knowledge or skills to solve problems and promote learning through practice and post-tests.

Step 5: Complete the mastery. The skilled use of knowledge, to achieve the transfer, application and creation of knowledge, truly achieve the purpose of drawing inferences from one example, mastery.

Badminton skills refers to the various hitting methods and strategies used in badminton. These include a single technique, including serving, receiving, killing, picking, rubbing, and net diagonal, and how to combine them to form a tactical combination, such as creating scoring opportunities by mobilizing an opponent to move.Skills of badminton also includes physical training such as physical strength, flexibility, and explosive boost to enhance skills in the game.

In college badminton class, the tools to measure badminton technology mainly include professional stopwatch, starting whistle, ruler, badminton buckets and score record table. These tools are used to document the students' technical performance, ensuring the accuracy and objectivity of the evaluation. Each course will be tested on three observation points, with a total of 45 after six consecutive sessions.

4.2 Research Instrument

The research tools used by the researchers include the First principles of instruction based instructional design and evaluation criteria for assessing badminton skills, as follows:

1. Teaching plan based on the First principles of instruction

1.1 This teaching plan is implemented based on First principles of instruction and the characteristics of sports for college students.

1.2 Complete the teaching content design according to the training objectives of marketing professionals and university physical education curriculum standards, combined with the teaching objectives, content and assessment standards of badminton courses.

1.3 Complete the experimental teaching design and implementation according to relevant theories and existing research.

Table 1 Detailed teaching contents

Teaching Process	Chapter 1: Basic knowledge of badminton	Chapter 2: Stance and Footwork	Chapter 3: Batsmanship of net shots	Chapter 4: Batsmanship of deep clears	Chapter 5: Receive service and rally
Focus on problem-solving	Present task lists to students and stimulate their interest.	Present task lists to students and stimulate their interest.	Present task lists to students and stimulate their interest.	Present task lists to students and stimulate their interest.	Present task lists to students and stimulate their interest.
Activate the existing knowledge	The history and cultural background of badminton, as well as the basic rules and field layout of the game.	Review the existing knowledge, the classification of badminton footwork.	Review the existing knowledge and understand the importance of Batsmanship of net shots.	Review the existing knowledge and understand the importance of deep clears in the game.	Review the existing knowledge and understand the importance of high quality reception
Show out the new knowledge	The teacher teaches the students the correct grip method and serve movements.	The teacher teaches the students the correct stance and footwork.	Teachers teach the students the correct Batsmanship of net shots.	The teacher explained the essentials of the forehand hitting the high ball.	The teacher conducts the field demonstration of receiving technology and decomposed the movements in detail.
Try the application exercises	The students practice the grip and serve, and the teacher observes and instructs.	Students practice stance and footwork in groups.	Students practice the Batsmanship of net shots in stages.	Students practice the high ball in groups, and the teacher observes and instructs them.	Students conduct repeated exercises under the guidance of the teacher.
Complete the mastery	The students practice the grip and serve, and the teacher evaluates the students.	Students conduct combined exercises to simulate the movement mode in the competition.	Through the game, let the students use the Batsmanship of net shots in the actual combat.	Students conduct actual combat simulation practice, the teacher evaluates	The teacher arranges the students to have the simulation competition.
Eaching cycle	1 Week	2 Weeks	3 Weeks	4 Weeks	5 Weeks

1.4 The researchers submitted these plans to three experts for review to verify their accuracy. Experts have verified the effectiveness of the course plan development process. The consistency index of the test is between 0.67 and 1.00, and the following levels are considered:

2. Badminton ability test

2.1 The evaluation table contains five evaluation contents, as follows:

1) Badminton serve technology Is master the correct grip position and serve skills.

2) Quick pace of badminton Is master the correct direction of movement and body control essentials.

3) Ball hitting technique before the net Is master the correct hitting position and body control essentials

4) Middle-and back-field hitting skill Is master the correct order of power force and shot control essentials

5) Practical application Is master the correct technical connection and tactical application

2.2 Researchers have designed the badminton assessment and evaluation scale according to the theoretical knowledge and skills of badminton, combined with the learning skills evaluation tools.

2.3 Measure the confidence by coefficient method, and check the badminton skill evaluation table. The confidence value is 0.75 which is suitable for research.

Data Collection

The data collection was as follows:

(1) Coordinate with 3 professional scholars experts dispense official document from Bansomdejchaopraya Rajabhat University professional scholar experts and give information about data collection process and research tools: instructional model and checklist form about quality of instructional model for consideration (Index of Objective Consistency: IOC).

(2) Collect data from 3 professional scholar experts and analysis data for consideration (Index of Objective Consistency: IOC).

Table 2 Experimental one-group pretest - posttest design

Group	Pretest	Experimental	Posttest
R	O_1	X	O_2

The meaning of the symbols used in the experimental design

R   means   Random Sampling

X   means   Experimental

O_1 means   Pretest

O_2 means   Posttest

Data Analysis

    1. Analyze quantitative data through descriptive statistics; Mean and standard deviation.

    2. Evaluate the skill of badminton before and after implementation First principles of instruction The experimental data are used to analyze the mean and standard deviation of and T-test for dependent statistical data.

Table 4.1 Students' Badminton Skills before and after First Principles of Instruction

Student lD	Pre-test Scores (Full Score=45)	Post-test Scores (Full Score=45)	Difference Scores (D)
1	18	30	12
2	35	42	7
3	24	35	11
4	17	30	13
5	38	43	5
6	26	36	10
7	20	35	15
8	30	40	10
9	18	29	11
10	32	38	6
11	31	39	8
12	30	37	7
13	22	32	10
14	24	36	12
15	19	28	9
16	18	28	10
17	20	29	9
18	15	25	10
19	24	32	8
20	25	35	10
21	18	29	11
22	18	31	13
23	19	35	16
24	26	39	13
25	20	37	17

Table 4.1 Students' Badminton Skills before and after First Principles of Instruction (cont.)

Student lD	Pre-test Scores (Full Score=45)	Post-test Scores (Full Score=45)	Difference Scores ($_D$)
26	18	33	15
27	27	40	13
28	27	34	7
29	18	28	10
30	22	36	14
31	18	27	9
32	29	38	9
33	27	39	12
34	26	40	14
35	22	40	18
36	24	38	14
$\bar{X}$	23.47	34.53	11.06
SD.	5.57	4.78	3.11

As shown in Table 4.1, First Principles of Instruction can improve the badminton skills of vocational students. The average score of students' badminton skills before First Principles of Instruction is 23.47, and after teaching, the average score is 34.53, with an average difference of 11.06. It can be seen that the badminton skills after First Principles of Instruction is higher than that before teaching.

Table 4.2 shows that the students' badminton skills after class is higher than the average before class by using First Principles of Instruction, which shows that First Principles of Instruction can effectively improve the students' badminton skills. There is statistical significance at the level of ($P < 0.01$), which is consistent with the research hypothesis.

The researchers analyzed the data, and used the mean value, standard deviation and T test as relevant samples to analyze the students' badminton skills before and after First Principles of Instruction. The data analysis results are shown in Table 4.2.

Table 4.2 Comparison of Badminton Skills

Badminton Skills	n	full score	$\bar{X}$	SD.	df	t	p
Pre-test	36	45	23.47	5.57	35	13.48**	.00
Post-test	36	45	34.53	4.78	35		

** Statistically significant at the level. 01 (p <.01)

Table 4.2 shows that the students' badminton skills after class is higher than the average before class by using First Principles of Instruction, which shows that First Principles of Instruction can effectively improve the students' badminton skills. There is statistical significance at the level of ($P < .01$), which is consistent with the research hypothesis.

5. Research Results and Discussion

According to the research theme, the research on improving the badminton skills in vocational students by First Principles of Instruction is summarized as follows. According to the evaluation results of experts, the teaching plan and badminton skills test are made.

1. First Principles of Instruction, As an efficient teaching strategy, its core is to promote students' learning effectiveness through a series of carefully designed links. The application of First Principles of Instruction to badminton courses to realize the application of mixed learning, and the organic integration of theory and practice is a beneficial attempt to improve classroom efficiency, teaching effect and enhance students' professional ability.

2. First Principles of Instruction is used in teaching. Before teaching, the average score of students' badminton skills is 23.47, and after teaching, the average score is 34.53, with an average difference of 11.06. The students' badminton skills after teaching is higher than that before teaching. The results showed that students' badminton skills after First Principles of Instruction teaching was higher than that before teaching, with statistical significance at the level of ($P < .01$).

Therefore, First Principles of Instruction can be used as a teaching method of vocational students badminton skills, which is suitable for badminton courses teaching and has certain advantages.

Discussion

Using First Principles of Instruction, the research results of improving the badminton skills of 36 students from marketing major of second grade vocational students for 1 class are discussed as follows:

1.First Principles of Instruction The application of university badminton courses has many advantages. At present, public physical education teaching generally follows the traditional physical education teaching mode as the main body and students imitate and practice. The long-term teaching inertia leads to the solidification of most teachers' teaching concepts and the lack of internal motivation to update the teaching mode. Based on the characteristics of badminton, First Principles of Instruction is somewhat better than the traditional teaching methods. First of all, it can help students to establish correct concepts of sports and improve their badminton skills through scientific training methods. Secondly, it emphasizes students 'active participation and inquiry learning, which can stimulate students' interest in learning and independent learning ability. In addition, through stratified teaching, teachers can provide individualized guidance according to students' different levels and needs of students, so as to improve the teaching effectiveness. Finally, the primary teaching principle focuses on the combination of theory and

practice, which helps students to understand the tactics and strategies of badminton while mastering the skills, and lays a solid foundation for becoming an all-round athlete.

2.The researcher studied a large number of documents related to First Principles of Instruction, and according to the characteristics of First Principles of Instruction, it was integrated into five steps to formulate the teaching plan for vocational students. The First Principles of Instruction scheme of badminton course is mainly constructed from five aspects: teaching objectives, teaching contents, teaching methods, teaching process and effect evaluation. Among them, the teaching goal is the basic point, the teaching content is the core, the teaching method is the key, the teaching process is the guarantee and the effect evaluation is the result. Data analysis is to evaluate the quality of classroom teaching plan by three experts according to First Principles of Instruction, and the evaluation results reflect the quality of classroom teaching plan by experts; Generally speaking, the suitability of research objectives is the most appropriate. This is because the learning plan is consistent with the concept of First Principles of Instruction, and the curriculum plan contains the key elements of the curriculum plan. First Principles of Instruction can better improve the students' badminton skills. In 2018, Fang Ting made a theoretical elaboration on the design principles, principles and design cases in combination with the teaching of aerobics professional courses. Through experiments, she verified the positive effect of First principles of instruction on students' technical level, learning attitude and independent learning ability (Fang Ting,2018). In 2019, Xiao Ting used First principles of instruction to conduct a teaching comparison experiment, which verified its feasibility and effectiveness in improving the teaching effect (Xiao Ting,2019). In 2020, Liu Yujia used this mode to take "wheel skipping rope" as an example to carry out micro-class design practice, and the conclusion shows that it can effectively improve students' ability to solve practical problems and flexible application ability (Liu Yujia,2020).

3.After using First Principles of Instruction, the average score of students' badminton skills before teaching is 23.47, and after teaching it is 34.53, with an average difference of 11.06. The badminton skills after teaching is higher than that before teaching. The results showed that the badminton skills after First Principles of Instruction teaching was significantly higher than that before teaching, which was statistically significant at the level of (P<.01), which was consistent with the hypothesis. This is because the First Principles of Instruction emphasizes the key factors in the learning process. First, clear learning goals help students understand the specific skill levels they need to achieve. Second, by breaking down movements and teaching step by step, students can gradually master complex skills to avoid feeling overwhelmed. In addition, providing appropriate feedback allows students to timely understand their own progress and the need for improvement. In addition, repeated practice and consolidation skills are indispensable to improving badminton skills, which helps students to form muscle memory. Finally, through simulated competitions and practical applications, students can use the skills they have learned in real situations, so as to improve

their competitive level and actual combat ability. The comprehensive application of these principles makes badminton courses more systematic and efficient, so as to effectively improve students' badminton skills.

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The pursuit of knowledge is perpetual, and my dedication to advancing education and crafting a splendid life will persist. I wish all teachers, students and friends, in Bansomdejchaopraya Rajabhat University, health and happiness in this blossoming day of spring! Learning is never-ending, and I will also continue to strive in the future and write a beautiful life!

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Using Cooperative Learning Model to Improve Mathematics Logic Ability for Senior High School Students

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Abstract

The purpose of this research was 1) To use a cooperative learning model to improve mathematics logic ability for senior high school students. 2) To compare senior high school students' mathematics logic ability before and after the implementation based on the cooperative learning model. The sample group consisted of 50 senior high school students, No. 2 Senior High School of Panzhou City, Guizhou Province, China, selected through cluster random sampling. The research instruments were 1) lesson plans using a cooperative learning model, and 2) mathematics logic ability by data analyzed by frequency, percentage, interpretation, mean, and standard deviation for confirmation.

The results revealed the following:

1. Using cooperative learning model consisted of 5 steps, 1) Task assignment, 2) Setup, 3) Group discussion, 4) Result report, and 5) Teaching comment. The research included three units, totaling 12 hours. The experiment lasted for about four months.

2. After implementing the cooperative learning model, it was found that 50 students who enrolled in the math course were at a good level. The mean was 35.13 before, and 61.23 after the test (P<.05), indicating a significant difference between the pre-test and post-test.

Keywords: cooperative Learning model; mathematics logic ability; senior high school students

1. Introduction

It is necessary to apply the cooperative learning model in mathematics teaching. It can promote students' thinking collision, and brainstorming to solve difficult problems; cultivate teamwork and communication skills; enhance students' motivation and initiative in learning; enable students of different levels to complement each other and make progress; and also align with the requirements of the mathematics discipline for practical exploration and multi-angle thinking.

The background of the cooperative learning model to improve mathematical logical ability could be attributed to the promotion of educational reform and the demand of modern society for talent training. Under the background of quality education and intelligent education, mathematics discipline did not simply require students to get high scores but hoped to cultivate students' comprehensive literacy. Cooperative learning could enable students to form a perfect ability for analysis, summary, and problem-solving in the process of cooperative exploration. Cooperative consciousness was the requirement of social development for people, and then fed back to other disciplines to improve students' overall accomplishment (Ren, 2023).

The Ministry of Education issued the "Curriculum Standards for Full Time Compulsory Education (Experimental Draft)" in July 2001 (hereinafter referred as the "Curriculum Standards"). One of the key points of this curriculum reform was to change students' learning methods. The "Curriculum Standards" pointed out that hands-on practice, independent exploration, and cooperative communication were important ways for students to learn. In the basic concept of curriculum standards and the suggestions for curriculum implementation, (The Ministry of Education, 2001).

With the deepening of education reform, the traditional teaching model has gradually exposed some problems, such as students' lack of initiative, cooperation and communication. In order to change this situation, educators began to explore new teaching modes, among which cooperative learning model had attracted wide attention because of its emphasis on interaction and cooperation. Cooperative learning model not only helped to improve students' learning interest and enthusiasm, but also cultivated students' teamwork and communication ability, so it is widely used in the teaching of various subjects, including mathematics education (Ma, 2023).

In addition, the characteristics of mathematics also provided conditions for the emergence of a cooperative learning model. Mathematics was a subject that required logical thinking and reasoning ability. Through the cooperative learning model, students could discuss mathematics problems together, exchange problem-solving ideas, and inspire each other to deepen their understanding of mathematics concepts and methods. At the same time, the cooperative learning model could also provide more practical opportunities for students, so that students could exercise their logical thinking ability in the process of solving practical problems (Luo, 2023).

To sum up, the cooperative learning model mainly includes the promotion of educational reform, the demand for talent training in modern society, and the characteristics of mathematics itself. These factors

together promote the emergence of a cooperative learning model, and make it become an important way to improve students' mathematical logical thinking ability.

2. Research Objectives

(1) To use a cooperative learning model to improve mathematics logic ability for senior high school students.

(2) To compare senior high school students' mathematics logic ability before and after the implementation based on the cooperative learning model.

3. Research Hypotheses

After implementing the cooperative learning model, the students' mathematics logic ability was improved obviously.

4. Research Methodology

4.1 Research Design

The study period was from March to June 2023 and was divided into the following stages:

(1). In March 2023, three chapters were submitted and defended.

(2). In April 2023, modify and complete the teaching plan, relevant tools, and experiments based on the cooperative learning model.

(3) The formal research phase was scheduled for May 2023.

(4) The research findings were summarized, the research thesis completed, and the paper published in October 2024.

4.2 Population and Sample

(1) There were 200 senior high school students, at No. 2 Senior High School of Panzhou City, Guizhou Province, China, distributed four classes with a class size of 50 students each.

(2) A survey was conducted among 50 students from Class One, Grade One, through a cluster random sampling method. The class consisted of a mix of high, middle, and low levers at No. 2 Senior High School in Panzhou City.

4.3 Research Instrument

Mathematics Logic Skill Performance Assessment

The measures for the examination and verification of the performance included 3 elements. The specific steps for the creation and quality determination are as follows:

1) Concept of set

2) Basic relationships between sets

3) Basic operations of sets

4.3.1 Multiple-choice

Study the theory about how to create multiple choice questions test through three plans about the basic knowledge of each content to measure the achievement of logic skills. The scoring criteria are points for correct answer and 0 points for wrong answer. Take the test to 3 experts for measurement and evaluation. Check the content validity and analyze the Index of Item Objective Congruence (IOC) = 1.00 for all questions.

Improve and revise items test that have been verified by experts, and take it to try out with students who were not a sample group for 50 students from senior high school students to calculate the quality of the test: difficulty value (p), discrimination power (r) and reliability by Kuder Richardson's method (KR-20). The results of the quality analysis of the questions found that there were 23 questions: 1) concept of set, there were 8 questions (p=0.47-0.77, r=0.20-0.53), 2) the relationships between sets, there were 8 questions (p=0.53-0.80, r=0.20-0.47), and 3) basic operations of sets, there were 7 questions (p= 0.47-0.73, r= 0.20-0.27). And reliability (KR-20) at 0.75.

4.3.2 Logic ability performance assessment

Learn the theories, principles, and performance appraisal methods from literature, teaching materials, and related research.

Determine scoring criteria for performance assessment by authentic assessments (holistic rubric) rating on 3 scales. Update and improve the performance assessment that experts have corrected and analyze the Index of Item Objective Congruence (IOC) = 1.00 for all questions. Then take it to try out with students who were not a sample group for 50 students from Class 2 and calculate the quality of confidence values in performance assessment by analyzing the reliability by Cronbach's Coefficient Alpha method at 0.75.

Submit the revised curriculum activity plans to 3 experts for review to assess the correctness and completion of factors that can enhance mathematics logic ability for senior high school students.

+1 = Sure that the contents are related to the topics

0 = Not sure that the contents are related to the topics

-1 = The contents are not related to the topics

The acceptable items must have the IOC values not less than 0.5. The IOC calculated from the validation measures 1.00 for each unit.

4.4 Data Collection

The data collection was as follows:

(1) Coordinate with 3 professional scholars experts to dispense official documents from Bansomdejchaopraya Rajabhat University professional scholar experts and give information about the data collection process and research tools: instructional model and checklist form about quality of instructional model for consideration (Index of Objective Consistency: IOC).

(2) Collect data from 3 professional scholar experts and analyze data for consideration (Index of Objective Consistency: IOC).

4.5 Data Analysis

The data were analyzed as follows:

(1) Analyze data to compile and summarize findings of cooperative learning model, mathematics logic ability, and students' behavior.

(2) Use the cooperative learning model to evaluate mathematics logic ability for senior high school students before and after the experiment, and statistically analyze the data obtained from the experiment by means, standard deviation, and dependent sample.

Table 1 The comparison of students' mathematics logic ability before and after the learning by using cooperative learning model

Logic skill	Testing	n	score	$\bar{X}$	SD.	df	t	p
Concept of set	Pre-test	50	35	14.23	1.55	29	-25.83	.00**
	Post-test	50	35	23.80	1.58			
Basic relationships between sets	Pre-test	50	27	11.47	1.41	29	-28.47	.00**
	Post-test	50	27	19.53	1.11			
Basic operations of sets	Pre-test	50	25	9.43	1.70	29	-22.48	.00**
	Post-test	50	25	17.90	1.71			
Total	Pre-test	50	87	35.13	3.03	29	-37.53	.00**
	Post-test	50	87	61.23	3.04			

5. Research Results and Discussion

5.1 The research results

The research used a cooperative learning model to improve the mathematics logic ability course on 50 senior high school students at No. 2 Senior High School of Panzhou City, Guizhou Province, China. The researcher concluded as follows:

As can seen in Table 1, through the application of the cooperative learning model, the average mathematics logic ability for senior high school students was 35.13 before the experiment, and 61.23 after the experiment, with a difference of 26.10 in the average scores, which indicated that the scores had been improved significantly after the experiment. Through the implementation of the cooperative learning model,

students' mathematics logic ability significantly improved. This result supported the research hypothesis and demonstrated a statistically significant improvement at the level .01.

In summary, after the implementation of the cooperative learning model, students' mathematics logic ability was improved.

5.2 To use cooperative learning model to improve mathematics logic ability for senior high school students.

5.2.1 Role assignment

Role assignment was a crucial part in cooperative learning. To improve the mathematical logic ability of high school students, teachers could divide students into several groups and assign different roles to each group such as group leader, recorder, spokesman, etc. This role allocation helped to develop students' teamwork skills and responsibility, and also ensured that each student could bring out his or her strengths in group activities (Qu, 2024).

5.2.2 Task setup

In order to improve the mathematical logic ability of high school students, teachers should pay attention to the level and challenge of the task when setting cooperative learning tasks. For example, teachers could design some tasks involving logical deduction, comprehensive proof, problem-solving strategies, etc., so that students could constantly exercise and improve their mathematics logic ability in the process of completing the task. At the same time, the difficulty of the task should be moderate, which could not only stimulate students' interest, but also ensure that students achieved certain results in the process of cooperative learning (Ma, 2023).

5.2.3 Group discussion

Group discussion was the core of cooperative learning. In group discussions, students could fully communicate and discuss tasks and jointly find ways and strategies to solve problems. In order to improve the mathematical logic ability, teachers should guide students to pay attention to the logical structure, reasoning process and problem-solving ideas of the problem in the group discussion, so as to help students establish a correct mathematical thinking mode. In addition, teachers could also encourage students to put forward their own opinions and insights in group discussions to develop students' critical thinking and innovation skills (Luo, 2023).

5.2.4 Result report

After completing the group discussion, each group was required to report their discussion results to the class. The process of result reporting could not only show students' cooperative learning results, but also help students exercise their oral expression ability and logical thinking ability. In the reporting process, teachers should ask students to clearly explain the problem-solving ideas, logical reasoning process and achievements, so that other students can understand and use them for reference. At the same time,

teachers should also give timely feedback and evaluation of students' reports so as to help students further improve their mathematics logic ability (Chen, 2023).

5.2.5 Teaching comment

Teaching commentary was an important link in the process of cooperative learning, which helped teachers to understand students' learning situations and adjust teaching strategies in time. In the process of comment, teachers should pay attention to the following aspects: First, evaluate students' performance in cooperative learning, including participating enthusiasm, cooperation spirit, and contribution degree. Secondly, analyze the effect of improving students' mathematical logic ability to provide references for subsequent teaching. Finally, because of the problems and difficulties encountered by students in cooperative learning, teaching comments put forward specific suggestions and guidance measures for improvement (Wang, 2023).

In short, it was a systematic and comprehensive process to improve the mathematics logic ability of senior high school students by using cooperative learning model. Through the organic combination of reasonable role assignment, task setup, group discussion, result report and teaching comment, cooperative learning model could effectively promote the development of students' mathematics logic ability, and cultivate students' teamwork spirit and comprehensive quality.

6. Recommendations

The cooperative learning model is a student-centered teaching method that promotes students' active participation and mutual learning through group discussion and team cooperation. When implementing a cooperative learning model, teachers need to put forward application suggestions from the following five aspects.

6.1 Select cooperation content.

When choosing the content of cooperative learning, teachers should give full consideration to students' knowledge background, interests, and subject characteristics. The content should be challenging and stimulate students' interest in learning while meeting the teaching objectives and helping to develop students' ability to solve problems. In addition, teachers also need to pay attention to the difficulty of the cooperation content and ensure that students can gain achievement in the cooperation process, and avoid the effect of cooperation based on too simple or complicated tasks.

6.2 Divide into reasonable groups.

In cooperative learning mode, grouping is a key link. Teachers should make reasonable groups according to the characteristics, abilities, and interests of students to ensure that the members of each group are complementary and can promote each other. At the same time, teachers also need to assign clear tasks and roles to each group to ensure that each student can play their own advantages in the cooperation and avoid the phenomenon of "free riding". In addition, teachers also need to pay attention to

the dynamic changes of the group and adjust the grouping strategy according to the actual situation to ensure the smooth progress of cooperative learning.

6.3 Change teachers' role.

In the cooperative learning model, the role of teachers has changed from the traditional knowledge imparts to the guide and collaborator of students. Therefore, teachers need to adjust their mentality and teaching methods, give full play to their guiding role, and help students solve the problems encountered in the process of cooperation. At the same time, teachers also need to pay attention to students' needs and psychological changes, give timely care and support, establish a good relationship between teachers and students, and create a good atmosphere for cooperative learning.

6.4 Develop cooperation skills.

Cooperative learning mode requires students to have certain cooperative skills, such as communication ability, coordination ability, leadership and so on. Therefore, when implementing cooperative learning mode, teachers need to pay attention to cultivating students' cooperative skills. Students' cooperation skills can be improved by organizing special training courses and carrying out the roles. At the same time, teachers also need to infiltrate the cultivation of cooperation skills in daily teaching, so that students can continue to learn and progress in practice.

6.5 Provide multiple evaluation feedback.

Evaluation is an important link in the cooperative learning model, which can not only test students' learning results, but also provide feedback and improvement direction for teachers' teaching. When implementing the cooperative learning model, teachers need to adopt multiple evaluation methods, such as self-evaluation, group evaluation, teacher evaluation, etc., in order to have a more comprehensive understanding of students' learning situation and cooperation ability. At the same time, teachers also need to feedback the evaluation results in time to help students understand their own strengths and weaknesses, so as to adjust learning strategies and improve learning results. In addition, teachers need to reflect and improve the cooperative learning mode according to the evaluation results, and constantly improve the teaching strategies and methods.

In short, the application of cooperative learning mode needs to be comprehensively considered from many aspects, including selection of cooperative content, reasonable division of labor in groups, teacher role transformation, training of cooperative skills and multiple evaluation feedback. Only in the aspects, can teachers ensure the effectiveness and efficiency of cooperative learning mode and provide strong support for the all-round development of students.

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University, health and happiness in this blossoming day of spring! Learning is never-ending, and I will also continue to strive in the future and write a beautiful life!

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The Development of a Blended Training Curriculum to Enhance Teamwork Competencies of Student Teachers at Rajabhat University

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Abstract

This research focuses on developing a blended training curriculum to enhance the teamwork competencies of student teachers at Rajabhat University. The objectives of the study are to: 1) develop a blended training curriculum to improve teamwork competencies, 2) compare student teachers' teamwork competencies before and after participating in the blended training curriculum, and 3) assess satisfaction levels with the training curriculum. The sample consisted of 25 second-year student teachers from the Faculty of Education at Bansomdejchaopraya Rajabhat University, selected through cluster sampling. Research instruments included a blended training curriculum, a curriculum evaluation form, a teamwork competency assessment form, and a satisfaction survey. Statistical methods used were mean($\bar{X}$), standard deviation(S.D.), and t-test. The findings revealed that the blended training curriculum included principles, objectives, content, training duration, methods, learning resources, and evaluation. The curriculum was rated as highly appropriate and consistent. The teamwork competencies of the student teachers showed statistically significant improvement after participating in the blended training curriculum, with a significance level of 0.05. Additionally, the student teachers expressed the highest level of satisfaction with the curriculum, highlighting its effectiveness in enhancing teamwork competencies and its practical value in preparing them for collaborative work in educational contexts.

Keywords: blended training; student teachers; teamwork competencies

1. Introduction

The global society of the 21st century is characterized by unlimited access to information and rapid transitions, driven by continuous exchange and interaction among diverse groups. Advances in communication technology have significantly reduced distances, fostering cultural flows and integration. The 21st century is regarded as a borderless era, where the mobility of people, societies, and cultures occurs seamlessly across various channels. This dynamic environment has prompted countries worldwide to formulate development paradigms that address transformations across politics, governance, economy, social systems, and education (Office of the Education Council, 2017).

The development of personnel and programs aimed at enhancing learner competencies and potential includes the refinement of curriculum standards, teaching methodologies, educational materials, and assessment systems(Office of the Basic Education Commission, 2014; Siroj Pholpanthin, 2015; Harrey & Bowin, 2014). It also prioritizes the production and professional development of high-quality teachers to ensure a workforce capable of addressing labor market demands and driving economic and social progress in the dynamic context of the 21st century. These efforts are vital for fostering essential skills, including teamwork, communication, and critical thinking, which are fundamental in modern professional and educational contexts (NASSP, 2013).

Human resources are regarded as a crucial asset in driving societal progress and are key indicators of development in the modern world. Prachai Jedaman (2013, 2015) emphasized that effective human resource development enhances knowledge, skills, and understanding, improving individual and organizational performance. Education serves as a foundation for this process, focusing on equipping individuals with the competencies needed to thrive. Among these competencies, teamwork has emerged as a critical focus for student teachers, as it fosters collaboration, innovation, and communication in professional environments (Phayom Wongsarsorn, 2014).

The importance of teamwork in educational settings has been widely studied. Trimble and Miller (2016) found that promoting teamwork among teachers, students, and school administrators enhances morale, creativity, and participatory management. Effective teamwork also improves communication between students and instructors, while clearly defined roles and responsibilities among team members contribute to overall success. However, challenges persist, as Trent (2017) noted that limited experience, mismatched understanding, and ineffective coordination within teams can hinder problem-solving processes. Additionally, Mierlo (2018) highlighted that successful teamwork relies on clear goals, open communication, and a positive working environment, all of which contribute to individual satisfaction and team effectiveness.

The COVID-19 pandemic has further exposed challenges in teamwork development among pre-service teachers. With the shift to online learning, instructional media and learning strategies have often failed to support active teamwork processes. Consequently, many students lack the knowledge, skills, and

competencies necessary to work effectively in teams, which are essential for their future professional success (Saowaluk Anuyant, 2020). Anupamanarayan (2018) emphasized that understanding team dynamics and setting clear team goals are critical for achieving efficiency and satisfaction in teamwork, further underscoring the need for targeted interventions.

Blended learning has emerged as a promising approach to address these challenges. Graham (2012) described blended learning as integrating traditional classroom methods with computer-mediated instruction to create flexible and interactive learning experiences. Bernath (2012) further explained that blended learning promotes equitable access and supports collaboration through innovative teaching methods and technological tools. The study focuses on students from Bansomdejchaopraya Rajabhat University and aims to address individual differences by providing equal learning opportunities. It also facilitates learner-centered instruction, enabling effective communication between students and instructors. By strengthening teamwork competencies, this blended learning approach seeks to achieve impactful and sustainable learning outcomes.

2. Research Objectives

1) To develop a learning curriculum based on interactive learning theory integrated with connectivism to enhance the systematic thinking skills of secondary school students.

2) To compare the systematic thinking skills of secondary school students before and after learning through the proposed interactive and connectivism-based learning model.

3) To examine the satisfaction of secondary school students with the learning management process implemented through the interactive and connectivism-based learning model.

3. Research Methodology

This research focuses on developing a blended training curriculum aimed at enhancing teamwork competencies among pre-service teachers at Rajabhat University. The study employs both qualitative and quantitative research methods, divided into four phases:

Step 1: Studying Foundational Data for Determining Curriculum Components

This initial phase focused on gathering foundational information from various theories, principles, and concepts. The review encompassed research on training curricula, training principles, online training methodologies, and strategies for developing teamwork competencies. It also incorporated school curriculum content intended for use in the training sessions. To support this process, a document synthesis form, was employed to collect and synthesized relevant data. Key insights were identified systematically enabling the extractions of meaningful findings. The results from this phase guided the detailed specification of the components for the blended training curriculum aimed at enhancing teamwork competencies.

Step 2: Development of the Blended Training Program to Enhance Teamwork Competency

This step focuses on the design and development of the blended training program, aimed at

enhancing teamwork competencies. The study involves a group of five experts in curriculum and teaching, selected through purposive sampling who are tasked with evaluating the program's appropriateness. The primary research tools include the blended training program itself, the teamwork competency assessment tool, and the satisfaction survey. Both the teamwork competency assessment tool and the satisfaction Survey underwent validation using the Index of Item-Objective Congruence (IOC), with scores ranging from 0.80 to 1.00, indicating strong alignment with the study's objectives. The reliability of these instruments was assessed using Cronbach's alpha coefficient, yielding values of 0.96 for the teamwork competency assessment tool and 0.97 for the satisfaction survey. These results demonstrate high internal consistency, confirming the quality and reliability of the instruments used in the study. Data collected from the evaluation process will be analyzed using descriptive statistics, including the mean and standard deviation (S.D.), to determine the consistency and relevance of the experts' assessments. The results will then be compared with predefined criteria to evaluate the program's overall suitability and alignment with the intended objectives.

Step 3: Trial Implementation of the Blended Training Program to Enhance Teamwork Competency This step involves the trial implementation of the blended training program to evaluate its effectiveness in enhancing teamwork competency. The target group for this study consists of 25 second-year teacher education students from the Faculty of Education at Bansomdejchaopraya Rajabhat University, enrolled in the curriculum development course. These students are selected using cluster sampling. From the population of 3,863 students enrolled in 129 sections of the course, one section was randomly selected as the cluster. This method was chosen to ensure that the sample group could perform group-based activities in a natural and cohesive team environment without separating students into smaller, fragmented groups. Selecting one section of 25 students allowed for focused development and monitoring of teamwork competencies within a structured classroom setting. This approach aligns with the study's objective to observe and enhance teamwork in a collaborative educational context. The data analysis will involve using a teamwork competency assessment tool to measure the students' abilities. The results will be assessed using descriptive statistics, such as the mean and standard deviation (S.D.), and the differences in teamwork competency before and after the training will be analyzed using a t-test to determine if the training program significantly improved the students' teamwork skills.

Step 4: Evaluation of the Blended Training Program to Enhance Teamwork Competency

This step involves the evaluation of the blended training program to assess its effectiveness in enhancing teamwork competency. The target group for this study consists of 25 second-year teacher education students from the Faculty of Education at Bansomdejchaopraya Rajabhat University, selected through cluster sampling. The same target group of 25 students, selected using cluster sampling, participated in this evaluation. By selecting one entire section enrolled in the curriculum development course, the study maintained a consistent and cohesive group for observing teamwork dynamics in a

collaborative setting. This course was specifically chosen due to its emphasis on group work and teamwork activities, aligning with the program's objectives. The research instrument used is a satisfaction survey, designed to assess the students' satisfaction with the blended training program aimed at enhancing teamwork competency. The data will be analyzed using descriptive statistics, including the mean and standard deviation (S.D.), to summarize the satisfaction levels of the participants. To evaluate the improvement in teamwork competency, a paired-sample t-test will be conducted to compare the pre- and post-training mean scores, with a significance level set at 0.05. This test will determine whether the observed changes in teamwork competency are statistically significant. Additionally, the results of the training will be summarized through content analysis to provide insights into the effectiveness of the training program.

4. Research Results

The research findings on the development of a blended training program to enhance teamwork competency of student teachers at Rajabhat Universities can be presented as follows:

1. The results of the evaluation of the suitability of the blended training program to enhance teamwork competency of pre-service teachers at Rajabhat Universities.

2. The comparison of teamwork competency before and after the training on enhancing teamwork competency.

3. The results of the satisfaction assessment of the training program on enhancing teamwork competency of pre-service teachers who participated in the program.

Table 1 Results of the Evaluation of the Suitability of the Blended Training Program to Enhance Teamwork Competency of Pre-service Teachers at Rajabhat Universities

Evaluation Item	n	$\bar{X}$	S.D.	Interpretation
1. Principles of the training program	3	4.60	0.51	Most appropriate
2. Objectives of the training program	4	4.60	0.60	Most appropriate
3. Content/Topics and training duration	4	4.65	0.49	Most appropriate
4. Training methods	4	4.65	0.49	Most appropriate
5. Media/Learning resources	3	4.73	0.46	Most appropriate
6. Assessment methods	3	4.40	0.74	Very appropriate
7. Evaluation of learning modules	18	4.60	0.56	Most appropriate
Overall Average	**39**	**4.60**	**0.62**	**Most appropriate**

The evaluation results of the blended training program revealed that the overall suitability was rated as "most appropriate" ($\bar{X}$ = 4.60, S.D. = 0.62). Among the components, media and learning resources received

the highest score ($\bar{X}$ = 4.73, S.D. = 0.46), reflecting its strong contribution to the program's effectiveness. Both content/topics and training duration and training methods scored equally high ($\bar{X}$= 4.65, S.D. = 0.49), indicating their relevance and alignment with program objectives. The principles and objectives of the program were rated at 4.60, demonstrating their appropriateness. The evaluation of learning modules also scored 4.60, showing its consistency with the overall framework. While assessment methods scored slightly lower at 4.40 (S.D. = 0.74), they were still deemed "very appropriate." These results confirm the program's effectiveness and suitability for developing teamwork competency among pre-service teachers.

The results of the comparison of teamwork competency of pre-service teachers at Rajabhat Universities before and after participating in the blended training curriculum are detailed in Table 2.

Table 2 The comparison of teamwork competency before and after the training program

Test	Full Score	n	$\bar{X}$	S.D.	t	Sig.
Before training	25	25	16.64	0.71	19.20	0.00*
After training	25	25	29.12	0.66		

*Note: *Statistically significant at the 0.05 level*

The results showed a statistically significant improvement in teamwork competency after the training program, with the mean score increasing from 16.64 (S.D. = 0.71) before training to 29.12 (S.D. = 0.66) after training. The t-test result (t = 19.20, p < 0.05) confirmed the significance of this improvement. This indicates that the training program effectively enhanced the teamwork competency of pre-service teachers.

The study on student satisfaction with the training program aimed at enhancing teamwork competency among pre-service teachers analyzed satisfaction data across various aspects, as summarized in Table 3.

Table 3 Evaluation of Pre-service Teachers' Satisfaction with the Training Program on Enhancing Teamwork Competency

Aspect	$\bar{X}$	S.D.	Interpretation
1. Content of the training program	4.71	0.51	Highest
2. Training methods	4.56	0.64	Highest
3. Instructors	4.44	0.78	High
4. Application of knowledge gained	4.22	0.90	High
5. Knowledge acquired from the training	4.45	0.82	High
Overall	**4.52**	**0.72**	**Highest**

Note: The interpretation scale is as follows: 4.51–5.00 = Highest; 3.51–4.50 = High; 2.51–3.50 = Moderate; 1.51–2.50 = Low; 1.00–1.50 = Lowest.

The evaluation of pre-service teachers' satisfaction with the training program showed an overall high level of satisfaction ($\bar{X}$ = 4.52, S.D. = 0.72). The content of the program and training methods received the highest ratings ($\bar{X}$ = 4.71 and 4.56, respectively), indicating strong alignment with participants' expectations. Satisfaction with instructors, knowledge acquired, and application of knowledge was also rated highly, with mean scores ranging from 4.22 to 4.45. These results confirm the program's effectiveness in meeting its objectives and enhancing teamwork competency.

5. Discussion

The research was conducted following a methodology aligned with its objectives, and the findings were consistent with the set hypotheses. The discussion of the results is as follows:

First, Regarding the development of the blended training program to enhance teamwork competency of student teachers at Rajabhat universities, the blended training program comprised six key components: (1)principles, (2)objectives, (3)content/topics and training duration, (4) training methods, (5) media/learning resources, and (6)evaluation methods. The program's structure was rated as highly suitable, effectively achieving its objectives and enhancing the teamwork competency of pre-service teachers. This aligns with the concepts of Chaiyot Damrongkitkosol and Patchariphorn Bangkiew (2017), who developed a training package on test analysis using computer software. They emphasized that an effective training program must have cohesive components, including principles, objectives, content/topics, methods, learning media, and evaluation, to ensure the achievement of desired knowledge, skills, and attributes.

Additionally, the blended training program was organized into four learning units, totaling 16 hours, with a sequential structure designed to develop learning skills related to curriculum studies. This aspect was rated as highly suitable, consistent with the findings of Anchalee Wimonsilp and Nopporn Waikhakul (2022), who developed a blended training program to promote online teaching. Their research highlighted the importance of aligning content with all curriculum components and rated the content as highly suitable.

The integration of digital technologies in learning management and online education standards is increasingly significant. The research incorporated online learning techniques with classroom activities to create a hybrid training model. This approach addresses challenges such as students' inability to attend on-site classes and aligns with the ideas of Suparada Anchunda (2023), who studied a blended training curriculum based on connectivism principles. Her research aimed to develop, implement, and evaluate a training curriculum that combined in-person and online learning to foster innovation skills grounded in local knowledge for Thai language education students at Rajabhat Universities. She concluded that blended training methods benefit learners and effectively meet learning objectives.

Second, the comparison of pre-service teachers' teamwork competency before and after training revealed a significant improvement, with post-training scores being higher across all evaluation criteria at a statistical significance level of .05. This improvement can be attributed to the structured learning activities

within the blended training program, which focused on five key aspects of teamwork competency: participation in team planning, responsibility for assigned tasks, cooperation in team activities, contribution of opinions, and listening to others' perspectives. The program emphasized systematic teamwork development through group activities, where teams of 5–7 members worked collaboratively toward shared goals. This approach included defining clear roles, establishing timelines, and ensuring accountability for tasks. By fostering trust and reducing potential conflicts, the program provided an environment conducive to effective teamwork.

These findings align with the framework proposed by Katzenbach and Smith (1993), who highlighted five critical elements of effective teamwork. First, team size should be optimal, ideally between 5–12 members, to ensure familiarity and skill diversity without hindering collaboration. Second, teams should have a shared purpose and unified goals, creating mutual commitment among members. Third, a common approach, including clear plans and equitable task distribution, ensures smooth teamwork. Fourth, clearly defined roles and responsibilities help members understand their contributions and develop essential leadership skills. Lastly, fostering collaboration and trust among team members is crucial for minimizing conflict and enhancing harmony. Similarly, Woodcock and Francis (1994) emphasized that effective teams must have clear objectives and collective agreement on goals, which unifies the team and strengthens their commitment to achieving shared outcomes. Furthermore, research has shown that team structure, which provides clear and defined roles, routines, and ranks, helps improve team coordination. This positive effect on team coordination is particularly strong in teams with greater longevity (*Ji &Yan*, 2020).

The results demonstrate the success of the blended training program in systematically developing teamwork competency among student teachers. By integrating collaborative practices and structured methodologies, the program aligns with established theories on effective team dynamics and provides a model for fostering essential teamwork skills in educational settings.

Finally, the evaluation of satisfaction with the blended training program revealed that participants were highly satisfied, indicating that the program is of sufficient quality to effectively enhance teamwork competency among pre-service teachers. This high level of satisfaction can be attributed to the systematic organization of the training process and the integration of various tools and web applications. These include video clips, Padlet, Google Forms, Vonder Go, and Blooket, which were utilized in both classroom and online learning activities.

The use of these tools provided trainees with hands-on experience in curriculum development, allowing them to maximize their potential. Moreover, the selected programs were user-friendly and free of charge, enabling participants to easily access the training content at their convenience through internet networks. This aligns with the views of Bath and Bourke (2010), who emphasized that blended training programs should include well-designed content, accessible learning resources, engaging activities, and appropriate evaluation methods to support learners effectively. Similarly, research by Timotheou et al.

(2022) found that personalized augmented reality experiences create more engaging learning environments, leading to improved academic performance. Furthermore, the findings are consistent with the research by Silpawit Chanphut and Worawut Mansukphon (2018), which highlighted that integrating modern media and technology into diverse training activities enables participants to learn without limitations.

Overall, the blended training program's systematic approach and effective use of digital tools facilitated a high-quality learning experience, meeting the participants's needs and providing them with valuable skills to enhance teamwork competency.

6. Recommendations

Based on the research findings, it is recommended to integrate advanced digital tools to facilitate both synchronous and asynchronous learning, thereby enhancing engagement and accessibility. Customizing training content to meet the specific needs of various educational institutions can lead to more effective skill development. Providing continuous professional development for instructors will ensure the successful implementation of blended learning strategies. Conducting longitudinal assessments of teamwork competencies will help in understanding the long-term impact of the training. Additionally, exploring factors influencing participants' satisfaction, such as through qualitative methods like interviews, would provide deeper insights into the program's effectiveness. Encouraging collaborative learning environments and conducting further research on the efficacy of blended learning approaches are also advised to foster a culture of collaboration and inform best practices.

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Factors Influencing the Promotion of Sustainable Entrepreneurship Development Among Students in Higher Vocational Colleges in Shandong Province

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Abstract

This study aimed to explore factors influencing the promotion of sustainable entrepreneurship development among students in higher vocational colleges and to propose actionable approaches to achieve this goal. Employing a mixed-methods research design, the study integrated quantitative and qualitative methodologies for a comprehensive analysis. The quantitative phase involved 400 vocational students selected through stratified random sampling, ensuring representation across gender, academic grade, and field of study. Data collection utilized a structured questionnaire validated by experts and tested for reliability (Cronbach's alpha = 0.85). The qualitative phase comprised semi-structured interviews with 12 experts in entrepreneurship education and business management, offering in-depth insights. Quantitative data were analyzed using descriptive statistics, Pearson correlation, and multiple linear regression.

Results indicated that the education management environment was the most critical factor, followed by the market environment. Correlation analysis showed significant relationships, with the market environment and education management environment as the strongest predictors of sustainable entrepreneurship development. Regression analysis further confirmed the market environment as the most significant contributor, emphasizing the pivotal role of institutional and external factors. The findings highlighted the importance of integrating sustainability into entrepreneurship curricula, strengthening partnerships with industries, providing financial and policy support, and fostering innovation-driven ecosystems. Challenges included insufficient policy implementation, weak entrepreneurial skills, and limited family support. Recommendations included developing specialized entrepreneurship curricula, establishing

mentorship programs, simplifying funding access, and promoting community engagement to create a sustainable entrepreneurial ecosystem. This research contributes to understanding the dynamics of sustainable entrepreneurship in vocational education, offering actionable strategies to enhance educational practices and align with global sustainability goals. The study underscores the importance of collaborative efforts among educators, policymakers, and communities in fostering entrepreneurial growth aligned with sustainability principles.

Keywords: factors influencing; higher vocational colleges; sustainable entrepreneurship

1. Introduction

Entrepreneurship played a pivotal role in driving economic development, fostering innovation, and transforming societies, establishing itself as a cornerstone of modern economies. Within this landscape, sustainable entrepreneurship emerged as a critical focus, emphasizing the integration of environmental, social, and economic dimensions into entrepreneurial activities. As the global community increasingly prioritized sustainable development goals (SDGs), higher vocational colleges faced mounting expectations to equip their students with the knowledge, skills, and values required to contribute to these objectives (Gibb, 2002). Vocational colleges held a unique position in this context, serving as bridges between theoretical knowledge and practical application, making them ideal environments to cultivate entrepreneurial thinking that aligned with sustainable development. Despite this, challenges persisted in embedding sustainability into the entrepreneurial curricula and practices of vocational institutions. This highlighted the need to explore the factors influencing sustainable entrepreneurship development in such settings.

Research on entrepreneurship education provided valuable insights into the development of entrepreneurial intentions and competencies among students. Fayolle and Gailly (2008) demonstrated that well-designed educational programs significantly impacted students' entrepreneurial mindsets. Similarly, Zhao et al. (2005) identified individual and contextual factors, such as family support, institutional resources, and market dynamics, as key determinants of entrepreneurial success. Hall et al. (2010) expanded on these findings by emphasizing the critical role of sustainability, advocating for a holistic approach that incorporated social and environmental considerations. However, a significant gap existed in understanding how these factors operated within vocational colleges, where students often possessed unique needs, limited resources, and faced distinctive challenges, such as a lack of entrepreneurial mentorship or policy support. This research sought to address these gaps, building upon previous studies to investigate the dynamics of sustainable entrepreneurship in the context of higher vocational education.

To address these gaps, the literature has outlined various methods for measuring key variables in sustainable entrepreneurship. For example, Schaltegger and Wagner (2011) proposed a framework for evaluating sustainability integration in entrepreneurial practices, emphasizing the use of indicators such as environmental impact, social equity, and economic viability. Similarly, Fayolle and Gailly (2008) recommended assessing entrepreneurial intentions through validated scales that measure motivational and attitudinal factors. Zhao et al. (2005) highlighted the importance of using structured surveys to capture contextual influences, including family support and institutional resources. These approaches underscore the multidimensional nature of sustainable entrepreneurship and provide a foundation for the quantitative and qualitative methods employed in this study.

Sustainable entrepreneurship was not merely about achieving financial success; it was about creating value that aligned with societal and environmental priorities. Vocational students, equipped with

practical skills and hands-on training, were particularly well-positioned to address real-world challenges. However, many lacked access to the critical resources, networks, and policy support required to initiate and sustain entrepreneurial ventures. Schaltegger and Wagner (2011) emphasized that integrating sustainability into entrepreneurship could act as a catalyst for societal transformation. They argued that fostering sustainable entrepreneurship was vital for addressing issues like climate change, resource scarcity, and economic inequality. Furthermore, promoting this mindset among vocational students could lead to localized solutions that had broader implications, creating opportunities for both economic advancement and environmental stewardship.

Vocational colleges played a central role in this mission, but there were notable gaps in the strategies they employed. For instance, many institutions lacked structured entrepreneurial programs that focused on sustainability, while others failed to provide adequate mentorship, funding, or real-world exposure. Additionally, family dynamics, market conditions, and unclear government policies often discouraged students from pursuing entrepreneurial careers. These limitations underscored the need for a comprehensive understanding of the factors that influenced sustainable entrepreneurship development. Such an understanding would enable the design of more effective strategies and interventions to promote entrepreneurship that aligned with both student aspirations and societal needs.

This research was particularly significant as it aimed to identify and analyze the factors influencing sustainable entrepreneurship development in higher vocational colleges, including the educational environment, market conditions, family support, and policy frameworks. By evaluating these factors and their interrelations, the study offered a comprehensive perspective on the challenges and opportunities in promoting sustainable entrepreneurship. Additionally, the research proposed actionable strategies that could be adopted by vocational institutions to enhance their educational practices and align them with global sustainability goals. These strategies included fostering mentorship networks, strengthening school-business partnerships, and developing policies to support entrepreneurship at local and institutional levels.

In conclusion, the researcher undertook this study to bridge critical gaps in understanding and practice regarding sustainable entrepreneurship in higher vocational colleges. The findings of the research held the potential to benefit multiple stakeholders, including educational institutions, students, policymakers, and communities. By empowering vocational students to become socially responsible entrepreneurs, this research contributed to building a more sustainable and equitable future, addressing both local and global challenges. This study underscored the importance of aligning entrepreneurship education with sustainability principles, ensuring that vocational colleges became incubators of innovation, drivers of social change, and agents of transformative economic progress.

2. Research Objectives

1. To study the factors influencing the promotion of sustainable entrepreneurship development among students in higher vocational colleges.

2. To propose approaches for promoting sustainable entrepreneurship development among students in higher vocational colleges.

3. Research Hypotheses

1. The factors influencing the promotion of sustainable entrepreneurship development among students in higher vocational colleges, such as educational environment, market environment, family environment, and policy and legal environment, have a significant and varying degree of impact.

2. Approaches for promoting of sustainable entrepreneurship development, including enhancing educational management, strengthening collaboration between institutions and businesses, and providing financial and mentorship support, significantly promote sustainable entrepreneurship development among students in higher vocational colleges.

4. Research Methodology

This research employed a mixed-methods approach, combining quantitative and qualitative methodologies to comprehensively explore factors influencing the promotion of sustainable entrepreneurship development among students in higher vocational colleges. The study was divided into distinct phases: quantitative data collection through structured questionnaires and qualitative insights gathered from expert interviews. The mixed-methods design ensured a robust understanding of the factors and their significance, providing depth and validity to the findings.

Sample Selection

The study targeted students from higher vocational colleges in Guangdong Province, China, as the primary respondents for the quantitative phase. A stratified random sampling technique was employed to ensure diversity across gender, academic grade, and field of study (science and liberal arts). A sample size of 400 students was determined to achieve statistically significant results, with proportions representing the actual student demographics: 62.5% male, 37.5% female, and equal representation of students from science and liberal arts streams. Each college contributed an equal proportion of students, ensuring balance across institutions. This distribution included 40 students from each of the 10 selected colleges, further ensuring representation from minor groups. For the qualitative phase, 12 experts were purposefully selected based on their expertise in entrepreneurship education or business management, ensuring comprehensive insights from both academic and industry perspectives.

Development and Validation of Research Instruments

A structured questionnaire was developed for the quantitative phase, incorporating items to assess various factors such as the educational environment, market dynamics, policy and legal frameworks, and

family support. These items were measured on a 5-point Likert scale. The scale was interpreted as follows: 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree. This interpretation ensured clarity in participants' responses. Content validity was ensured by consulting a panel of experts who reviewed the relevance and clarity of the items. A pilot study with 30 participants was conducted to test reliability, yielding a Cronbach's alpha of 0.85, indicating high internal consistency.

The four influencing factors were extracted through a combination of systematic literature review and exploratory factor analysis (EFA). The literature review identified potential dimensions of sustainable entrepreneurship development. The EFA was conducted on the pilot study data to confirm these factors, resulting in the selection of market environment, educational environment, policy and legal environment, and family environment as the most impactful.

For the qualitative phase, a semi-structured interview guide was created, focusing on the experts' perspectives on key factors and strategies for promoting sustainable entrepreneurship. Experts were selected using purposive sampling criteria: over 10 years of experience in entrepreneurship education or business management, involvement in entrepreneurial policymaking, or mentorship roles in vocational colleges. The interview topics included identifying barriers to sustainable entrepreneurship, evaluating existing support systems, and proposing practical strategies for improvement. These topics were designed to align with the research objectives. The guide was iteratively refined based on feedback from initial interviews to enhance clarity and depth.

Data Collection

Quantitative data were collected through in-person administration of the questionnaires to the selected sample, ensuring a high response rate. The interviews were conducted face-to-face with the experts, each lasting approximately 30 minutes, and were audio-recorded with consent for accurate transcription. The data collection process adhered to ethical research standards, including informed consent and confidentiality agreements.

Data Analysis

For quantitative data, descriptive statistics were employed to analyze demographic characteristics and the current status of sustainable entrepreneurship development. Inferential statistics, including mean comparison and ranking analysis, were used to determine the importance of various influencing factors. Sustainable entrepreneurship was measured as a composite score derived from responses to items related to entrepreneurial skills, sustainability awareness, and practical applications. This composite score provided an overall indicator of the level of sustainable entrepreneurship development.[The results revealed that the educational environment ranked highest in importance (mean = 4.38, SD = 0.60), followed by market and family environments.

Qualitative data were analyzed using thematic analysis, focusing on patterns and themes that emerged from the expert interviews. Thematic coding was conducted to identify critical insights into the

strategies and challenges in fostering sustainable entrepreneurship development. The analysis revealed recurring themes, such as the need for more entrepreneurial practice bases and mentorship programs.

Procedures

The research process followed these steps:

1) Studying the factors influencing the promotion of sustainable entrepreneurship development among students in higher vocational colleges.

2) Proposing approaches for promoting sustainable entrepreneurship development among students in higher vocational colleges.

In conducting the research, the following actions were undertaken:

1) Initial Preparation: Identification of research objectives, development of instruments, and pilot testing.

2) Quantitative Phase: Distribution and collection of questionnaires, followed by statistical analysis of the responses.

3) Qualitative Phase: Conducting expert interviews, transcription, and thematic analysis of the content.

4) Integration of Findings: Synthesizing results from both quantitative and qualitative phases to provide comprehensive insights into the research problem.

5. Research Results and Discussion

The research results were reported in accordance with the study's objectives, the presentation was categorized based on key issues, including:

1) Research Results

(1) Studying the factors influencing the promotion of sustainable entrepreneurship development among students in higher vocational colleges.

This study examined the factors influencing the promotion of sustainable entrepreneurship development among vocational college students, focusing on institutional and external elements such as education management, market environment, and policy support. The findings provide insights into enhancing entrepreneurial ecosystems through sustainability-oriented strategies. The details were as follows:

Table 1 Results of Key Factor Identification for Sustainable Entrepreneurship Development among Higher Vocational Students. (n=400)

Influencing factors	$\overline{X}$	S.D.	level	Rank
Market environment	4.21	0.58	high Importance	2

Influencing factors	$\overline{X}$	S.D.	level	Rank
Education management environment	4.38	0.60	high Importance	1
Policy and legal environment	3.82	0.46	moderate Importance	4
Family environment	4.15	0.53	high Importance	3
total	**4.14**	**0.54**	**high Importance**	-

Table 1 presented the descriptive statistics of key factors that influenced the promotion of sustainable entrepreneurship development among students in higher vocational colleges. The factors included the market environment, education management environment, policy and legal environment, and family environment. Among these, the education management environment had the highest mean score (Mean = 4.38, SD = 0.60), indicating its perceived importance in fostering sustainable entrepreneurship. The market environment followed closely (Mean = 4.21, SD = 0.58), highlighting its significant role in shaping entrepreneurial development. The policy and legal environment (Mean = 3.82, SD = 0.46) and family environment (Mean = 4.15, SD = 0.53) showed moderate levels of influence. These findings suggested that institutional and external environments, such as education and market conditions, were critical to promoting sustainable entrepreneurship, whereas familial and policy support might have played secondary roles. The research results could be presented in the form of a bar chart as follows:
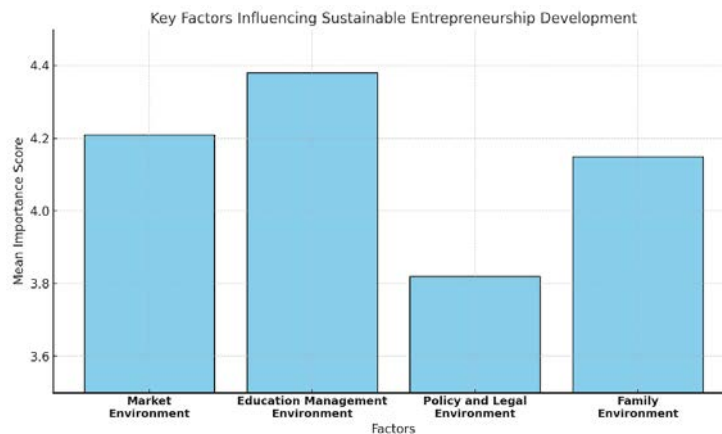

Figure 1 Results of Key Factor Identification for Sustainable Entrepreneurship Development

Table 2 Results of Correlation Analysis of Key Factors Influencing Sustainable Entrepreneurship

Development among Higher Vocational Students. (n=400)

Factors	Market environment	Education management environment	Policy and legal environment	Family environment	Promotion of Sustainable Entrepreneurship Development
Market environment	1.00	-0.12	-0.03	0.03	.28*
Education management environment	-0.12	1.00	0.01	0.07	.25*
Policy and legal environment	-0.03	0.01	1.00	0.03	.15*
Family environment	0.03	0.07	0.03	1.00	.05
Promotion of Sustainable Entrepreneurship Development	0.28	0.25	0.15	0.06	1.00

"Note: * indicates statistical significance at p<.05"

Table 2 presented the correlation matrix showing the relationships between key factors influencing the promotion of sustainable entrepreneurship development among students in higher vocational colleges. The analysis revealed that the market environment exhibited the strongest positive correlation with sustainable entrepreneurship development (r=.284, r = .284, r= .284), indicating that improvements in market conditions were likely to have a meaningful impact. The education management environment also demonstrated a moderate positive correlation (r=.249, r = .249, r=.249), highlighting the role of institutional support and quality education in fostering entrepreneurship. The policy and legal environment (r=0.155r = 0.155r=0.155) and family environment (r=0.054r = 0.054r=0.054) showed weaker correlations, suggesting that while these factors were relevant, they might not have been as influential as market and educational contexts. These findings underscored the importance of prioritizing market and educational improvements to promote sustainable entrepreneurship. The research results could be presented in the form of a bar graph as follows:
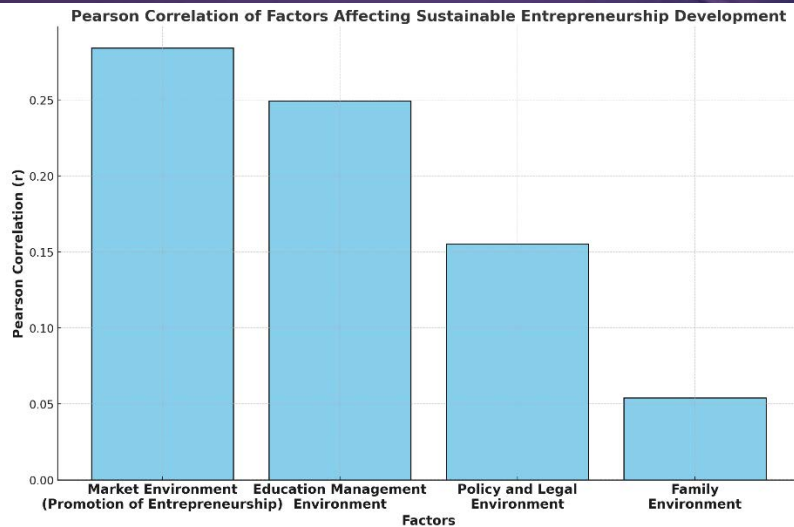
Pearson Correlation of Factors Affecting Sustainable Entrepreneurship Development

Figure 2 Results of Correlation Analysis of Key Factors Influencing Sustainable Entrepreneurship Development

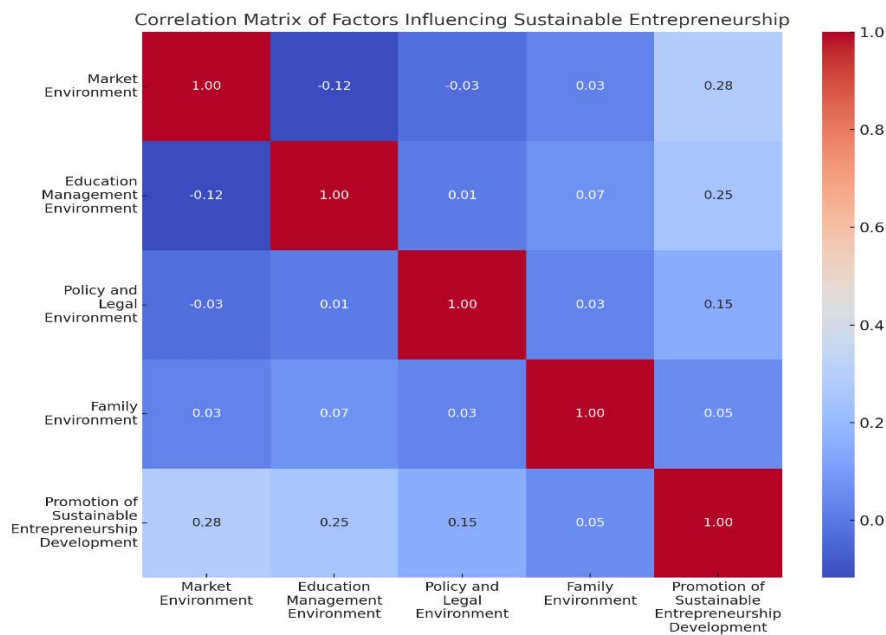Correlation Matrix of Factors Influencing Sustainable Entrepreneurship

Figure 3 Correlation Matrix of Factors Influencing Sustainable Entrepreneurship Development

The correlation matrix displays the relationships between various factors influencing sustainable entrepreneurship development. It presents correlation values ranging from -1 to 1 and uses color coding to visually indicate the strength of these relationships. The details are as follows:

Market Environment: This factor shows the strongest positive correlation with sustainable entrepreneurship development (r=0.284). It highlights the importance of market-related aspects, such as competitive opportunities and economic support systems, as the most significant contributors to fostering entrepreneurship.

Education Management Environment: This factor demonstrates a moderate correlation (r=0.249), underscoring the role of educational management in providing training and mentorship within vocational institutions.

Policy and Legal Environment: This factor exhibits a weaker correlation (r=0.155), indicating that existing policies and legal frameworks may not have a prominent impact in this context.

Family Environment: This factor has the lowest correlation (r=0.054), suggesting that family support plays a comparatively minor role compared to other factors.

Promotion of Sustainable Entrepreneurship Development: This represents the primary goal of the study. The correlations highlight the need for a multi-faceted approach, with particular emphasis on enhancing market conditions and educational support.

The results emphasize the critical importance of improving the market environment and educational management to promote sustainable entrepreneurship development. Meanwhile, policy and family factors have secondary effects. This information is vital for strategic planning and creating supportive environments for sustainable entrepreneurship.

Table 3 Results of Multiple Linear Regression Analysis on Factors Influencing the Promotion of Sustainable Entrepreneurship Development

Factors	Coefficient	Standard Error	t-value	P-value
Market environment	0.31	0.05	6.24	.001*
Education management environment	0.24	0.05	4.71	.001*
Policy and legal environment	0.20	0.05	4.06	.001*
Family environment	0.00	0.05	0.02	.05

"Note: * indicates statistical significance at p<.05 "

Table 3 presented the results of the Multiple Linear Regression analysis on the factors influencing the promotion of sustainable entrepreneurship development among students in higher vocational colleges. The analysis identified that the market environment ($\beta = 0.312, p = 0.001$\beta = 0.312, p = 0.001 $\beta = 0.312$, $p = 0.001$) was the most significant factor, followed by the education management environment ($\beta = 0.235, p = 0.001$\beta = 0.235, p = 0.001 $\beta = 0.235$, $p = 0.001$) and the policy and legal environment ($\beta = 0.203, p = 0.001$\beta = 0.203, p = 0.001$\beta = 0.203$, $p = 0.001$). The family environment ($\beta=0.001$, p=0.05\beta = 0.001, p = 0.05 $\beta = 0.001$, $p = 0.05$) was found to have no significant impact. These findings highlighted the critical role of institutional and external factors over personal or familial influences in fostering sustainable entrepreneurship development. The research results could be presented in a pie chart as figure 3 Results of correlation analysis of key factors influencing sustainable entrepreneurship development.
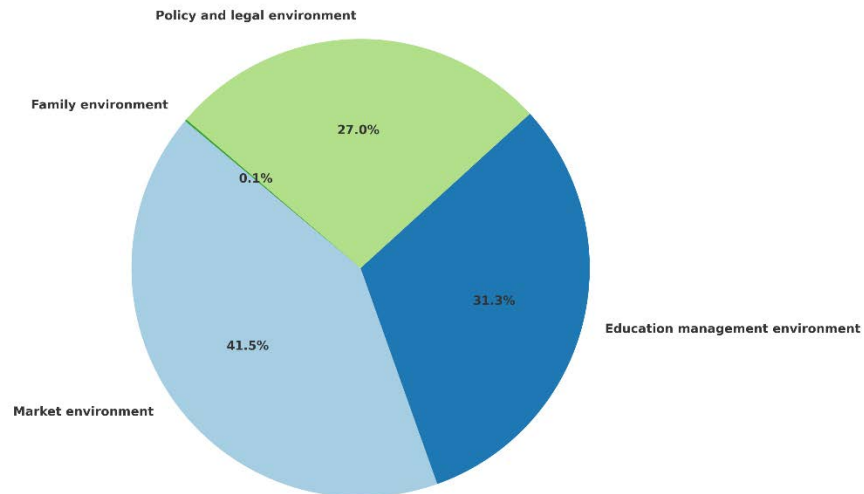
Figure 4 Results of Correlation Analysis of Key Factors Influencing Sustainable Entrepreneurship Development

Overall Research Findings: The results confirm that educational management and market environments play the most significant roles in promoting sustainable entrepreneurship development among vocational college students. Secondary factors, such as policy and family support, have a lesser influence. Recommendations: Efforts should focus on enhancing educational and market support systems to maximize long-term impacts on entrepreneurship.

The expert interviews provided valuable insights into the critical factors influencing sustainable entrepreneurship development among vocational students, as well as the barriers and potential approaches for promoting of sustainable entrepreneurship development among students in higher vocational colleges. Key Findings: factors promoting entrepreneurship: entrepreneurial skills, education management, and family environment were universally recognized as pivotal. This underscores the need for integrating entrepreneurship education into the curriculum and enhancing family involvement. Challenges: weak innovation abilities, insufficient entrepreneurial skills, and gaps in policy implementation were identified as primary obstacles. The low quality of entrepreneurial mentorship and limited institutional focus on entrepreneurship further hinder progress. Significance: the findings highlight the importance of a holistic approach involving individuals, institutions, and policymakers. A strong education management environment, coupled with supportive policies and family influence, can create a sustainable ecosystem for entrepreneurship. Addressing personal skill gaps and fostering an innovation-driven culture are essential for long-term success. Implications: these insights offer practical guidelines for educational institutions, government bodies, and entrepreneurs to collaborate effectively. By prioritizing the suggested strategies,

stakeholders can enhance entrepreneurial capacities, overcome systemic barriers, and contribute to the development of sustainable entrepreneurship in vocational education.

(2) Propose approaches for promoting of sustainable entrepreneurship development among students in higher vocational colleges

Based on the research results and objectives, here are proposed approaches for promoting sustainable entrepreneurship development among students in higher vocational colleges:

1. Strengthen Educational Support: Enhance entrepreneurship education and mentorship to equip students with essential skills.

2. Foster Institutional Collaboration: Build partnerships between schools and industries to provide practical learning opportunities.

3. Improve Financial and Policy Accessibility: Facilitate easier access to resources and increase awareness of supportive policies.

4. Promote Innovation and Sustainability: Encourage entrepreneurial initiatives aligned with sustainable development goals.

5. Involve Families and Communities: Strengthen family and community engagement to support student entrepreneurship.

These approaches aimed to address the key factors identified in the research, such as educational management, market environment, policy support, and family involvement, ensuring a comprehensive strategy to foster sustainable entrepreneurship development among vocational students.

2) Discussion

The findings of this research highlighted the significant role of education, policy, and external environmental factors in promoting sustainable entrepreneurship development among students in higher vocational colleges. These results aligned with recent studies and contributed to the evolving discourse on sustainable entrepreneurship education. There were details as follows:

(1) Studying the factors influencing the promotion of sustainable entrepreneurship development among students in higher vocational colleges.

The research identified four key factors influencing the promotion of sustainable entrepreneurship development:

1. Market Environment: this was found to be the most significant factor influencing sustainable entrepreneurship development. A well-developed market environment, including competitive opportunities and supportive ecosystems, played a critical role in fostering entrepreneurial growth.

2. Education Management Environment: the second most influential factor, emphasizing the importance of educational systems in providing mentorship, entrepreneurial skills, and practical exposure. Effective education management significantly enhanced students' entrepreneurial capacities and intentions.

3. Policy and Legal Environment: Although less influential than market and educational factors, policies and regulations provided a foundation for sustainable entrepreneurship through incentives and legal frameworks. Gaps in policy awareness and implementation were identified as barriers.

4. Family Environment: This factor had the least impact, indicating that family support played a relatively minor role compared to institutional and external factors.

Primary Factors: The market and educational environments were pivotal in promoting sustainable entrepreneurship. These environments fostered essential skills, provided real-world exposure, and created opportunities for innovation.

Supporting Factors: Policy frameworks and family environments contributed to entrepreneurship development but had a less significant impact.

Challenges: The research highlighted barriers such as weak entrepreneurial skills, insufficient family support, and gaps in policy implementation.

The findings confirmed that institutional and external factors, particularly market and educational management environments, are critical for promoting sustainable entrepreneurship development among vocational students. Efforts to strengthen these areas could significantly enhance the entrepreneurial ecosystem, leading to more sustainable outcomes.

Studies like Chahal et al. (2024) emphasized the critical importance of a sustainable entrepreneurial environment and education in fostering entrepreneurial motivation and intentions. Their findings aligned with this research, which underscored the role of educational management and market environments as pivotal factors influencing entrepreneurial outcomes. Both studies revealed the necessity of embedding sustainability into educational systems to enhance entrepreneurial aspirations and actions (Chahal et al., 2024).

The integration of sustainability into entrepreneurship courses was demonstrated to increase students' sustainability literacy and skills. Kaiser et al. (2024) showed that modifying entrepreneurship curricula to include sustainability content led to measurable improvements in entrepreneurial competencies and a better understanding of impact entrepreneurship. This echoed the findings here, where the need for curriculum innovation in higher vocational colleges was highlighted (Kaiser et al., 2024).

The findings of Dyantyi et al. (2024) reinforced the notion that entrepreneurship education catalyzed sustainable development by equipping students with creativity and resilience to address socio-economic challenges. This resonated with the current research, which emphasized the role of policy and legal environments in supporting entrepreneurial initiatives (Dyantyi et al., 2024).

The challenges identified in this research, such as insufficient family support and gaps in policy implementation, aligned with Ihsan et al. (2025), who noted similar barriers in achieving sustainability goals in technical and vocational education globally. The need for coordinated efforts among stakeholders to bridge these gaps was critical (Ihsan et al., 2025).

This research contributed to the growing evidence base supporting the integration of sustainability principles into entrepreneurship education. It emphasized a multifaceted approach, combining educational reforms, policy improvements, and community engagement to foster sustainable entrepreneurship.

By comparing and aligning findings with contemporary research, this study validated the importance of fostering a supportive ecosystem for sustainable entrepreneurship through innovative education and robust policy frameworks. Future studies could build on this foundation to explore more nuanced interventions tailored to specific cultural and institutional contexts.

(2) Propose approaches for promoting of sustainable entrepreneurship development among students in higher vocational colleges.

The research identified practical and actionable approaches to promote sustainable entrepreneurship development, emphasizing the following key areas:

1. Strengthening Educational Support: Develop specialized curricula integrating sustainability principles into entrepreneurship education. Establish mentorship programs to provide practical guidance and real-world exposure to entrepreneurial practices.

2. Enhancing Institutional Collaboration: Foster partnerships between vocational colleges and industries to create opportunities for internships and hands-on learning. Develop entrepreneurship practice centers simulating real business environments to prepare students for challenges.

3. Providing Financial and Policy Support: Simplify access to financial resources by creating entrepreneurship funds. Increase awareness of existing policies and create new supportive frameworks to foster entrepreneurial activities.

4. Fostering Innovation and Sustainability: Promote interdisciplinary collaboration to encourage creative, sustainable business ideas. Integrate sustainability goals into all entrepreneurial initiatives to align with broader development objectives.

5. Strengthening Family and Community Engagement: Involve families in supporting students' entrepreneurial journeys. Collaborate with local communities to provide additional resources and platforms for entrepreneurial activities.

The proposed approaches aimed to address barriers such as gaps in education, financial constraints, and policy support. They provided a holistic framework that combined education, institutional collaboration, and community engagement to foster sustainable entrepreneurship development in vocational education settings.

The importance of integrating sustainability into entrepreneurship education was echoed in Baena-Navarro et al. (2024), who proposed models for integrating Information and Communication Technologies (ICT) into sustainability education. Their framework emphasized active pedagogy, community engagement,

and inclusion - key elements that were also highlighted in this study's recommendations (Baena-Navarro et al., 2024).

The research aligned with the study by EL-Nwasany et al. (2024), which emphasized adapting technical education to Industry 4.0 needs while embedding sustainability. The focus on integrating modern educational strategies supported the relevance of this study's recommendation to enhance curricula and mentorship programs (EL-Nwasany et al., 2024).

The findings from this research on financial and policy support aligned with recommendations by Mustafa et al. (2024), who emphasized leveraging collaborative funding mechanisms for sustainable educational models. Their focus on addressing financial constraints paralleled the importance of simplifying funding processes as highlighted in this study (Mustafa et al., 2024).

The strategies proposed in this research resonated with Ruiz-Vanoye et al. (2024), who explored sustainable urban strategies through innovative solutions. This alignment underscored the broader applicability of sustainability principles beyond education into entrepreneurial development (Ruiz-Vanoye et al., 2024).

This research confirmed that a combination of innovative educational reforms, institutional collaboration, financial support, and community engagement was essential for fostering sustainable entrepreneurship among vocational students. The proposed approaches aligned with global trends and provided actionable strategies for achieving sustainable development in vocational education. Further exploration of tailored interventions could have enhanced the effectiveness of these strategies.

6. Recommendations

From this research, the following recommendations were made:

1. Implement Curriculum Reforms: Vocational colleges should integrate sustainability principles into entrepreneurship curricula to ensure students develop the skills and mindset required for sustainable business practices. Collaboration with educational experts to design and implement these reforms is crucial.

2. Strengthen Institutional Support: Establish dedicated entrepreneurship centers equipped with mentorship programs and practical training opportunities. These centers should align with industry needs to provide students with real-world exposure.

3. Enhance Policy Awareness and Accessibility: Educational institutions and policymakers should collaborate to simplify the application process for financial assistance and raise awareness about supportive policies to reduce barriers for aspiring entrepreneurs.

4. Prepare Stakeholders: Ensure readiness among teachers, administrators, and policymakers through training and workshops on sustainable entrepreneurship education. This preparation will enhance the capacity to implement and monitor initiatives effectively.

5. Exercise Caution in Implementation: Avoid one-size-fits-all approaches, as cultural and institutional contexts vary. Tailor strategies to local needs and consider feedback from students and faculty to ensure relevance and impact.

By adhering to these recommendations, stakeholders can maximize the benefits of this research and contribute to the development of a robust, sustainable entrepreneurial ecosystem in vocational education.

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Development of Training Course on RAM THAI CHUEAM JAI CHERD HUN to Promote Thai Classical Dance Skills of Upper Primary School Students

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Abstract

The research aims at developing a training course on ram thai chueam jai cherd hun to promote thai classical dance skills of upper primary school students with the following objectives: 1) the development of training Course on ram thai chueam jai cherd hun to promote thai classical dance skills of upper primary school students to enhance dance performance skills among upper elementary students. 2) the compare dance performance skills before and after participating in the training curriculum. 3) the assess upper elementary students' satisfaction with the training curriculum. For this study, the 13 students from the Thai Classical Dance Club at Niphath Withaya School, Yan Nawa District, Sathon, Bangkok, studying in the first semester of the 2024 academic year, These participants come from specific sample group. The research equipment consists of 1) proactive lesson plans curriculum. 2) dance performance skill assessment form. And 3) the satisfaction assessment of training course. The research statistic are as following factors, such as percentage, average, standard deviation, and the comparison with t-test dependent samples.

The result found that (1) The curriculum appropriation about training Course on ram thai chueam jai cherd hun to promote thai classical dance skills of upper primary school students reached the highest level. The curriculum accordance about training course on ram thai chueam jai cherd hun to promote thai classical dance skills of upper primary school students has been matched at all points. (2) After being trained in the curriculum for training course on ram thai chueam jai cherd hun to promote thai classical dance skills of upper primary school students, the knowledge of proactive lesson plans has increased, with a statistically significant value of.05 and a higher level of proactive lesson plans than 75% of all points. (3) The result of satisfaction toward training course on ram thai chueam jai cherd hun to promote thai classical dance skills of upper primary school students found at the highest level.

Keywords : dance practice skills; development of training course; lesson plans

1. Introduction

National Education Act B.E. 2542 and its amendments (No. 4) B.E. 2019, Section 4 regarding organizing guidelines. The study has mentioned several important principles of organizing the teaching and learning process. An interesting point is encouraging educational institutions to use Thai cultural wisdom in organizing teaching and learning in educational institutions design content for consistent with interests and aptitude of students taking into account individual differences, and the government has established a framework for national development develop strong local communities and can build immunity for people in the community support the search for a distinctive community identity by preserving and restoring local wisdom (Office of the National Education Commission, 2019, p. 6) and Section 23 (3) stated that "educational management both formal education non-formal education and informal education must emphasize the importance of both knowledge morals, learning processes and integration as appropriate for each level of education in various matters. Especially knowledge about religion, art, culture, sports, Thai wisdom and the application of wisdom" and Section 27 emphasizes that basic educational institutions have the duty to prepare the content of the curriculum according to the objectives regarding problems in the community and society local wisdom. Desirable characteristics to be a good member of the family, community, society, and nation (Office of the National Education Commission, 2019, p. 8).

The Basic Education Core Curriculum, B.E. 2008 (revised edition 2023) was created for local areas and educational institutions to use as a framework and direction in preparing school curriculums and organizing teaching and learning. To develop all Thai children and youth at the basic education level to have quality knowledge and skills necessary for living in a society that is constantly changing and seeking knowledge for continuous self-improvement throughout life. The learning standards and indicators set forth in this document help to make relevant agencies at all levels clearly see the desired results in developing student learning along the way which can help the agencies. Relevant at the local level and educational institutions together we can confidently develop the curriculum (Ministry of Education, 2008, p.3).

Training course it is the knowledge of training content that consists of subject topics, techniques, methods, teaching plans, and activities. Academic to provide trainees with knowledge, understanding, skills, attitudes, experiences, and directions for behavioral change. According to the goal and objectives in the specified topic or curriculum. The art learning group is a group of subjects that helps develop students' creativity. Have artistic imagination appreciate beauty, have aesthetics, and have value that affects the quality of life. Artistic activities help develop learners physically, mentally, intellectually, emotionally, and socially, as well as lead to environmental development encourage learners to have self-confidence which is the basis for further study or career, consisting of 3 subjects: art subject, music subject, and dance subject. The subject of dance aims to develop students to have knowledge. Understanding the elements of dance expressed through dance be creative, use basic vocabulary in performing arts, analyze and criticize the value of performing arts. Express feelings and ideas freely Create movement in various forms and apply

dance in daily life. Understand the relationship between dance and history culture. See the value of dance as a cultural heritage Local Wisdom, Thai and International Wisdom (Core Curriculum 2008, revised 2023, 2024, online) at the end of Mathayom 3, students must understand the elements of dance, be able to express body language basic dance vocabulary create movement and perform dance, and dramatic performances convey style or emotion and can design costumes or performance props. Understand the relationship between the performing arts and drama with things experienced in everyday life Give your opinion on watching the show and describe their own feelings about the work dance: know and understand the relationship and benefits of dance and drama. Can compare different types of performances. Thai in each locality and what the performance reflects cultural traditions see the value of preserving and inheriting Thai dance performances (Core curriculum 2008, revised 2023, 2024, online) in organizing classes in the art subject group. Students still lack practical skills and do not have the basics for learning. They are at an age where they must dare to express themselves and express their ideas. Able to adapt to the environment within the school and should be able to develop and practice skills from the results of the learning management of performing arts. It has not been successful in encouraging students to learn from actual practice. Link it with expression and practice in a variety of ways consistent with the learning context in the real-life conditions of communities and localities as a result, students still lack basic knowledge of dance, eagerness to learn and along with the motivation aspect to successfully study dance.

Teacher Sakhon's small puppet show develop mechanisms and shapes to have more beautiful proportions. It also gives details on the dance moves that are available basics from playing Khon and drama without being too attached to the old traditions and adjusted to have a show in front of the theater to give the audience the opportunity to watch the performance of the puppeteers and creates interaction between the puppeteer and the audience. It is a charm that makes the performance livelier when it has been revived until it is widely known in various events. The small puppet theater also shows off to the eyes of foreigners by representing Thailand. To spread the art of small puppet theater performances in various countries. A small puppet shows from Teacher Sakhon's generation It was passed on to all 9 male and female sons and daughters of Teacher Sakhon since they were young. In the year 1999, Mr. Phisut and Mr. Surin Yangkhiaosod initiated a small theater are near the house in Nonthaburi area to open a small puppet show to interested audiences. It also helps in preserving and continuing the art of our ancestors (Kulthawat Inbua, 2017, p.16).

The Sippatham small theater puppeteer uses 3 puppeteers. All 3 puppeteers must join together to become one or make. They are the same person in conveying their demeanor emotions to the small puppets to make the small puppet show move similar to living things that maintain their uniqueness. The identity of the ancestors that has accumulated until becoming a beautiful and valuable puppet show in Thai culture that is accepted all over the world, puppetry, small theater, Sippatham group is unique. The 3 puppeteers wear masks, costumes, gloves, and black socks. This is to make the puppet stand out and

draw the viewer's attention to the puppet's movements. The 3 puppeteers have different responsibilities in puppeteering. There are also applications, excerpts, and additions to various stories and exhibits.

Most of the stories that the Sippatham group plays are Ramakien (small puppet theater) stories Faculty of Silapatham, 2022, online). It can be seen that the puppet show Lakorn Lek is a show that uses the basics of dance in puppetry. Let the puppet and the puppeteer be one and expand knowledge. A student's abilities go beyond the specific content of a lesson. According to the core curriculum. The researcher therefore foresaw the organization of a training course on connecting the hearts of Thai dance and puppetry. To promote dance practice skills of upper primary school students. It is extremely important to students. In addition to developing dance practice. It is also a way to preserve and perpetuate Thai art and culture.

2. Objectives

1. To develop a training course on connecting the hearts of Thai dance and puppetry. To promote dance practice skills of student's Upper primary school.

2. To compare dance performance skills before and after training in the training course on connecting the Heart in Thai Puppet Dance for Promote dance practice skills of upper primary school students.

3. To assess the satisfaction of upper primary school students regarding the training course on connecting the hearts of Thai dance and puppetry to promote dance practice skills of upper primary school students.

3. Research hypothesis

Upper elementary school students learned using the training course on connecting the hearts in Thai dance and puppetry. Have skills in performing back dance postures studying higher than before studying.

4. Research methods

The population used in this research includes upper primary school students. Niphat Wittaya School, Yannawa Subdistrict, Sathorn District, Bangkok Who are studying in the 1st semester of academic year 2024, a total of 43 people. Random sampling used in this research specific from upper primary school students who are in the dance club at Niphat Wittaya School. Who are studying in the first semester of the academic year 2024, a total of 13 people with good, medium and weak abilities.

Research tools include:

(1) Dance practice skill assessment form and measure and evaluate results according to actual conditions scored in the form of Rubrics 5, practical level, totaling 5 items with the criteria for judging quality must be at a better level (75 percent or higher).

（2）Questionnaire on satisfaction with the training course at 5 levels: most, very, moderate, little and least, totaling 20 questions.

Data analysis is t-test dependent, find the average percentage from the dance performance assessment form and from the results of the satisfaction assessment of the trainees and then compare with the criteria.

Training course development steps

Step 1: study basic information from related documents and research, it is divided into 3 areas as follows: (1) core curriculum basic education, (2) training curriculum development, (3) dance and puppetry practice skills.

Step 2: creating a curriculum in 2 steps:

（1）Creation of a draft training curriculum on connecting hearts with Thai dance and puppetry to promote dance practice skills of upper primary school students. The details are divided into 4 parts as follows.

1) Set objectives in line with the problem situation.

2）Set the content framework for preparing learning plans to promote dance practice skills.

3) Create training activities according to learning units by practice.

4) Create a dance performance assessment form.

(2) Quality inspection of training curriculum drafts by having 3 experts consider and judge. Consisting of academics in teaching lesson planning. Academics in dancing and puppetry skills and academics in measurement and evaluation which evaluates the suitability of the curriculum with a scale measuring 5 levels, which is the most appropriate (5) very appropriate (4), moderately appropriate (3), slightly appropriate (2), and least appropriate (1), with an average of 3.51 and above considered to be Suitability for use in draft curriculum (Bunchom Srisa-at, 1992, p. 100) which is the average of the suitability scores of this training course has an average score ranging from 4.33 – 4.67.

And evaluate the consistency of the curriculum with a scale measuring the values at 3 levels: consistent (+1), uncertain (0), and inconsistent (-1). If there is a consistency value of 0.67 or more, it is considered to be within the criteria for use which the consistency index value of this training course has a rating of 1.00 on every topic.

Stage 3: the trial of the training course takes a total of 16 hours, which is divided into 2 units, learning the history of the show and the characteristics of the characters dance pose of Hanuman and Nang Suphanmacha basics of puppetry and the puppetry drama episode Hanuman captures Nang Suphanmacha within the learning management plan, there are 1) main points, 2) learning objectives, 3) learning content, 4) learning activities, 5) learning media and resources, and 6) measurement and evaluation.

Step 4: evaluation of the training curriculum

（1）Consider comparing knowledge comparison scores before training and after training on the practice of Hanuman dancing to catch Nang Suphanmacha.

(2) Evaluate dance performance skills.

(3) Evaluate trainees' satisfaction with the training curriculum.

5. Results and discussion

The results of the preparation of the training course on connecting the hearts of Thai dance and puppetry to promote dance practice skills of students' Upper primary school from the evaluation of the appropriateness of the curriculum including the problems and needs of the curriculum.

Objectives of training contents of the training course, training methods, training evaluation, and assessment of learning units by evaluating the appropriateness of the training curriculum, it was found that the training curriculum was the most appropriate in all aspects. When considering each aspect, it was found that the objectives of the training, training course content, and evaluation of training results. The average value is the same as highest ($\overline{X}$= 4.67), which is at the most appropriate level. Next is training methods ($\overline{X}$= 4.56) which is at the most suitable level and the problems and needs of the curriculum ($\overline{X}$= 4.53) were at the most appropriate level, respectively, and when considering the consistency of the curriculum on the topic of connecting the heart with Thai dance and puppetry to promote dance practice skills of elementary school students. At the end, it was found that there was consistency in every issue.

The results of the ability to develop a training course on connecting the hearts of Thai dance and puppetry to promote dance practice skills of upper primary school students, divided into 2 areas:

1. Knowledge before training and after training on the practice of Hanuman dancing to catch Nang Suphanmacha.

In terms of knowledge and skills in performing dance postures after receiving training with a training course on connecting hearts with Thai dance and puppetry for Promote dance practice skills of upper primary school students higher than before receiving the training statistically significant at .05. shown as Table 1

Table 1 Shows a comparison of knowledge before training and after the training on connecting the heart with Thai dance and puppetry to promote skills dance practice of upper elementary school students.

Knowledge	Numbers	Average	Standard deviation	t	p-value
Before training	17	11.70	3.66	6.01[*]	<0.001*
After training	17	16.29	3.41		

* Statistically significant at .05.

2. Dance practice skills

Dance practice skills after attending the training course on connecting hearts with Thai dance and puppetry to promote dance practice skills of upper primary school students higher than the 75% threshold in all issues. Considering each item, it was found that the issue of timing accuracy had the highest mean ($\overline{X}$= 4.53), accounting for 90.59 percent followed by the issue of resourcefulness in problem solving ($\overline{X}$= 4.47), accounting for 89.41 percent, and the issue of daring to express themselves ($\overline{X}$= 4.41), accounting for 88.24 percent, respectively, as shown in Table 2.

Table 2 shows dance practice skills. After attending the training course on connecting hearts with Thai dance and puppetry to promote skills Practice dance moves for upper elementary school students.

Dance practice skills	Numbers	Average	Percentage	Passing criteria
1. Correctness of the dance moves	17	4.18	83.53	pass
2. Accuracy of rhythm	17	4.53	90.59	pass
3. Delicacy and beauty	17	4.18	83.53	pass
4. Assertiveness	17	4.41	88.24	pass
5. Acumen in solving problems	17	4.47	89.41	pass
Total average	17	4.35	87.06	pass

3. Results of the evaluation of the satisfaction of the development participants with the training course on the subject: connecting the Heart with Thai Dance and Puppetry. To promote dance practice skills of upper primary school students, it was found that the overall results showed results in evaluating satisfaction with the curriculum, training on connecting hearts, Thai dance, puppetry to promote dance practice skills of upper primary school students, the overall picture was at the highest level ($\overline{X}$= 4.54) when considering the overall picture in each aspect. The aspect of organizing training activities has the highest mean ($\overline{X}$= 4.87), which is in highest level followed by teachers/lecturers ($\overline{X}$= 4.85) at the highest level and atmosphere in organizing training ($\overline{X}$= 4.81) is at the highest level, respectively as shown in Table 3.

Table 3 shows the results of the evaluation of satisfaction with the training course on connecting hearts with Thai dance and puppetry to promote dance practice skills of upper primary school students.

Evaluation list	Average	Standard deviation	Satisfaction level
1. Atmosphere in organizing training	4.81	0.22	maximum
2. Content of the training course	4.72	0.37	maximum
3. Organizing training activities	4.81	0.22	maximum
4. Teacher/speaker side	4.85	0.22	maximum
5. Knowledge application	4.71	0.40	maximum
6. Knowledge gained from training	3.26	0.64	moderate
Total average	4.54	0.27	maximum

Discussion of research results

Training course on connecting hearts in Thai dance and puppetry can promote dance practice skills for elementary school students. Finally, the results of the research can be discussed as follows.

1. Training course on connecting hearts in Thai dance and puppetry. It can promote dance practice skills of students in upper primary school because it has important characteristics in developing students' dance practice skills. Can be promoted by teaching, practicing, creating an atmosphere and environment that is suitable for learning through demonstration methods. This is a method that aims to help the whole class see the practice true with your own eyes. It creates a clearer understanding of the matter or practice by developing a training course on connecting the hearts of Thai dance and puppetry. To promote dance practice skills of upper primary school students, there is a process. Curriculum development consists of 4 steps: 1) studying basic information, 2) developing the curriculum structure, 3) trying out the curriculum, and 4) evaluating the use of the curriculum. This is consistent with the idea of Sailor et al., who discussed the process of developing a curriculum with the following steps: 1) studying various variables, 2) setting aims and objectives, 3) designing the curriculum, 4) implementing the curriculum. Use and evaluate the curriculum (Saylor and et al, 1981) and are consistent with Siriwan's research. Niamsuwan(2019) It has been said that. The process of developing a curriculum involves three main processes: creating a curriculum; using the curriculum and curriculum evaluation.

2. Ability to develop a training course on connecting the hearts of Thai dance and puppetry. To promote dance practice skills of upper primary school students, it was found that:

2.1 Knowledge about the skills of performing the Hanuman dance holding Nang Suphan Matcha. It was found that the students had knowledge and understanding about the skills of performing the Hanuman dance holding Nang Suphan Matcha. After receiving training with a training course on connecting hearts with Thai dance and puppetry for promote dance practice skills of upper primary school students. Higher than

before receiving training statistically significant at .05. This may be because during training. Students who attend the training learn practical skills from demonstrations by teachers and lecturers. Then have students practice in a step-by-step sequence. This is consistent with Chanakarn Onprathum (2020) who conducted a research study on development of learning activities for standard dance practice skills using Davies' model For Mathayom 1 students, it was found that when students gained practical skills from demonstrations. Students have higher learning outcomes after studying than before studying with a statistical significance of .05 and it is also consistent with Rosukon Pennet (2018) who conducted research on development of dance practice skills and posture language using collaborative group learning, TAI techniques together with the concept of teaching practice of Harrow for Grade 4 students found that when students learned the collaborative group TAI technique combined with Harrow's practical teaching concept had higher achievement after studying than before with statistical significance at the .05 level consistent with Supattra Suphophatana (2019) conducted a research study on a study of Thai dance skills and academic achievement in the Nopparat dance of Mathayom 5 students using Davies's learning management that emphasizes practical skills combined with cooperative learning STAD techniques found that Thai dance skills in the Nopparat Dance of the group of students who received learning that emphasized Davies' practical skills along with cooperative learning using the STAD technique were higher than those who received normal learning. Statistically significant at the 0.05 level.

3. Results of the evaluation of satisfaction with the training course on connecting hearts with Thai dance and puppetry to promote dance practice skills of upper primary school students, it was found that students are satisfied with the training course on the subject: connecting the Heart with Thai Dance and Puppetry. To promote dance practice skills of upper primary school students at the highest level It shows that the training has appropriate content for the trainees. Emphasis is placed on training participants to practice practical skills. As a result, the trainees will have knowledge and understanding and will be able to develop the trainees' practical skills. This is consistent with Tisana Khammani (2014, p. 319) who stated that learning management is based on practice. It is a method for organizing teaching and learning activities by placing students at the center. Emphasis is placed on developing language skills in art, music, dance, etc. by using a slow practice method until students develop the desired skills.

6. Suggestions

Suggestions for using research results

1. Developing a training course on connecting hearts in Thai dance and puppetry. To promote dance practice skills of upper primary school students. Curriculum developers should carefully study the context of the learners first. To be appropriate for the learners and beneficial to the learners.

2．Training curriculum development should include a training curriculum that focuses on the practical skills of the learners so that the learners will have a process of practicing, repeating, repeating, and repeating until learning occurs.

Suggestions for future research

1. There should be research and development of a curriculum to promote practical skills in other content and in other subjects such as music, art.

2. Other teaching methods that can develop students' practical skills should be studied.

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Development of Problem-Based Learning Management in Social Studies, Religion and Culture to Promote Critical Thinking Ability for Grade 3 Students

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Abstract

This research focuses on the development of learning management titled "Development of Problem-Based Learning Management" in the subject of Social Studies, Religion, and Culture, aiming to enhance critical thinking skills among Grade 3 students. The objectives of the study are: 1. To develop problem-based learning management in the subject of Social Studies, Religion, and Culture to promote critical thinking skills among Grade 3 students. 2. To compare the critical thinking skills of Grade 3 students before and after implementing problem-based learning. The sample group consisted of Grade 3/1 students from Ratwittaya School in Phetchaburi Province, under the jurisdiction of Phetchaburi Primary Educational Service Area 1. The sample was selected using cluster random sampling, with classrooms as the unit of selection. One classroom of 31 students was randomly chosen from two classrooms. The research tools included: 1. Learning management plans focused on economics, specifically Unit 2, "Planning Money Usage," for Grade 3 students. The plans consisted of four sessions, each lasting three hours, for a total of 12 hours. 2. A critical thinking ability test for Grade 3 students in a multiple-choice format with four answer options. The statistical methods used in the study included percentage, mean, standard deviation, and a t-test for dependent samples to analyze and compare the results before and after implementing the learning approach.

The findings of the study revealed that: (1) The appropriateness of developing learning management titled "Development of Problem-Based Learning Management" in the subject of Social Studies, Religion, and Culture to enhance critical thinking skills among Grade 3 students was rated as the highest level of appropriateness. Additionally, the alignment of the development plans for problem-based learning management in the subject of Social Studies, Religion, and Culture to enhance critical thinking skills for Grade 3 students was consistent across all aspects.(2)The critical thinking skills of the students significantly improved after receiving learning management based on problem-based learning in the subject of Social Studies, Religion, and Culture, at the .05 level of statistical significance.

Keywords: critical thinking; problem-based learning management development

1. Introduction

The modern world in the 21st century is marked by rapid changes in every aspect, especially in information and communication technology. Knowledge and ideas spread within seconds at the touch of a fingertip through various communication tools. Therefore, individuals in this era must possess critical thinking skills to evaluate and utilize information that is credible and reliable for solving daily life problems. Consequently, educators must instill critical thinking, problem-solving skills, and adaptability in learners across all grade levels. Learners should also be equipped to cope with changes, adapt to new situations, and collaborate effectively with others (Watchara Laoliengdee et al., 2017, p. 15).

The changing way of life inevitably affects the quality of people in society. A life of constant competition and adaptation to societal values and cultures can sometimes make it difficult for individuals to keep up with the pace of changes or challenges. Particularly in education, it is crucial to promote problem-solving skills among learners. The National Education Act B.E. 2542, amended (No. 2) B.E. 2545 (Section 24), mandates that educational institutions organize learning processes that foster thinking skills, management, dealing with situations, and applying knowledge to prevent and solve problems (Ministry of Education, 2006). A study of the problems in teaching and learning management in the subject of Social Studies, Religion, and Culture during the first semester of the academic year 2023 among Grade 3 students revealed that the students' average academic achievement was relatively low. This was attributed to the teaching methods, which overly emphasized lectures and lacked appropriate teaching techniques.

Additionally, the content of the subject was extensive, and the allocated learning time was limited, resulting in students not engaging in hands-on learning. Most learning processes were conducted individually, which deprived students of collaborative group processes and peer learning. Learning activities were not conducted as comprehensively as they should have been, which prevented students from forming their own understanding and applying their knowledge in daily life. Moreover, teachers observed that students exhibited diverse learning styles. Some were better at speaking, others excelled in hands-on tasks, some were good at calculations, and others were skilled in drawing and coloring. If the same traditional teaching methods are applied to a topic like "Planning Money Usage," which contains extensive content but is familiar and relevant to students' daily lives, it could lead to boredom, hinder students from constructing their own conceptual understanding, and result in lower academic achievement than the required standards (Journal of Education, Chiang Mai Rajabhat University, Vol. 1, Issue 1, January–April 2022, p. 55).

From the aforementioned problems and significance, it is evident that students still lack critical skills such as thinking, decision-making, social skills, and problem-solving skills necessary for daily life.

The importance of implementing problem-based learning in the subject of Social Studies, Religion, and Culture to promote critical thinking is therefore highly significant. However, problem-based learning (PBL) is a learner-centered instructional model that uses real-life problems or issues of interest to students as the starting point for the learning process. Problems serve as a stimulus for students to analyze and understand the issues clearly, conduct research to gather additional knowledge, and make informed decisions to select the most suitable solutions. This approach is carried out through group processes, with the teacher acting as a facilitator and guide (Tisana Khammanee, 2013, pp. 137–138). PBL is a method that helps learners develop both subject knowledge and essential skills. It enables students to apply their knowledge in ways that align with real-world contexts while also fostering critical thinking and problem-solving skills. By engaging with problems, researching credible information, and using it as evidence to support or challenge arguments, learners are encouraged to make informed decisions and select the best solutions to the issues at hand (Paisan Suwannanoi, 2014, p. 2).

Students should be equipped with skills such as critical thinking, decision-making, social skills, and problem-solving in daily life to align with societal needs and foster the development of good citizenship, which forms the foundation for becoming global citizens. Therefore, the teaching of Social Studies, Religion, and Culture—or the learning area of Social Studies, Religion, and Culture—should adopt instructional methods that enhance students' experiences, allowing them to apply knowledge, reasoning, intellect, skills, values, and positive attitudes. Moreover, learning activities should be tailored to the age and maturity levels of the students, encouraging them to actively participate in their own learning process while developing and expanding their thinking from the knowledge they acquire (Wiphaphan Pinla, 2017).

Development of problem-based business learning management Development of problem-based business learning management in social studies research to promote critical thinking to promote critical thinking for computer programs 3 and to promote thinking skills, necessary skills of society in order to be a leader in the learning management plan to observe and control skills normally for learners to learn good learning mostly to bring knowledge to develop further in use.

2. Research Objectives

1. To develop problem-based learning management in social studies, religion and culture to promote critical thinking ability for grade 3 primary school students.

2. To compare critical thinking ability of grade 3 primary school students before and after problem-based learning management.

3. Research Methods

Population and Sample

The population is grade 3 students of Ratwitthaya School, Phetchaburi Province, under the Office of the Primary Educational Service Area 1, Phetchaburi, who are studying in the first semester of the

academic year 2024, consisting of 4 classrooms, totaling 121 students, who are arranged into classes with mixed abilities.

The sample group is grade 3/1 students of Ratwitthaya School, Phetchaburi Province, under the Office of the Primary Educational Service Area 1, Phetchaburi, which was obtained using the cluster random sampling method using the classroom as the sampling unit.

The research instruments were:

(1) Learning management plans, Economics, Unit 2, Spending Planning, for Grade 3 primary school students, 4 plans, 3 hours per plan, totaling 12 hours.

(2) Critical thinking ability test for Grade 3 primary school students, a 4-choice multiple choice test.

Data analysis is t-test dependent test.

Steps in developing learning management

Step 1 Create a learning management plan, Unit 2, on spending planning, 4 plans, total 12 hours. Analyze the curriculum of Ratsadawitthaya School, Social Studies, Religion and Culture Learning Group, Learning Subject 3, Economics Learning Standard S 3.1 Understand and be able to manage resources in production and consumption, use limited resources efficiently and cost-effectively, including understanding the principles of sufficiency economy for a balanced life and indicator S 3.1 P.3/2 Analyze your own spending.

Step 2 Study documents, concepts, research documents related to teaching using problems as a base, about Methods and steps in creating a learning management plan.

Step 3 Create a learning management plan using problems as a base on spending planning for Grade 3 students, 4 plans, 12 hours.

Step 4 Present the learning management plan to the thesis advisor to check the correctness, appropriateness and consistency of the content, consistency of the objectives with learning activities, and feasibility of the activities. Then improve according to the suggestions.

Step 5 Present the created learning management plan to 3 experts to check the accuracy of the content, appropriateness and completeness of the plan, consistency with learning objectives, content, teaching activities and teaching media, as well as measurement and evaluation, for improvement.

Step 6 Apply the revised learning management plan according to the experts' suggestions to the sample group.

Step 7 Create a critical thinking ability test on spending planning for Grade 3 students, which is a multiple choice test with 4 choices and 30 questions.

Step 8 Present the test to the thesis advisor and have the experts consider checking the quality and accuracy of the content with the purpose, appropriateness of the language used and measurement aspects.

Step 9 Take the test that passed the criteria and was revised to test with students of Ratsadawitthaya School who are not in the sample group to find the quality of each test item.

Step 10 Print the original complete version of the critical thinking ability test that has been selected and passed the quality criteria. and used to collect data before and after learning with the sample group of students.

4. Research Results

The results of this research resulted in a learning management development plan on the development of problem-based learning management in social studies, religion and culture to promote critical thinking ability for grade 3 primary school students, consisting of

1) Documents/methods/steps/concepts of problem-based learning management. In this learning management, learners will create new knowledge from real problems and are consistent with adult learning concepts, in which learners will determine learning objectives by themselves or learn when they actually apply them, emphasizing interaction in groups of learners, emphasizing collaborative learning, active learning, leading to the creation of new knowledge or leading to self-searching for answers. 2) The objectives of the development of problem-based learning management in social studies, religion and culture are to promote critical thinking ability by providing the ability to refer to or summarize, the ability to state preliminary agreements, the ability to deduce, the ability to interpret, and the ability to evaluate claims or arguments. Including knowledge and understanding of what is being learned 3) Problem-based learning management process Step 1: Problem definition Step 2: Understanding the problem Step 3: Conducting research Step 4: Synthesizing knowledge Step 5: Summarizing and evaluating the answer Step 6: Presenting and evaluating the work 4) The results that learners will receive from problem-based learning management Learners will develop the ability to think critically in 5 areas: the ability to refer to or summarize. The ability to identify preliminary agreements The ability to deduce The ability to interpret and the ability to evaluate claims or arguments, including having true knowledge and understanding of the subject being studied, having communication and collaboration skills.

The comparative results of critical thinking ability of Grade 3 students after organizing learning by using problem-based learning in social studies, religion and culture to promote critical thinking ability of Grade 3 students were significantly higher than before organizing learning at the statistical level of .01.

Table 1 shows the comparison of students' critical thinking ability before and after the problem-based learning management.

Critical Thinking Ability	Score	N	Before Learning		After Learning		$\overline{D}$	t	p
	Full		$\overline{X}$	S.D.	$\overline{X}$	S.D.			
1. Referencing or Summarizing	6	31	3.68	1.49	5.03	1.25	1.35	4.48**	.000
2. Identifying Preliminary Agreements	6	31	3.65	1.40	5.10	0.87	1.45	6.43**	.000
3. Deduction	6	31	3.52	1.71	5.23	0.72	1.71	5.61**	.000
4. Interpreting	6	31	3.52	1.43	4.42	1.52	0.90	2.94**	.000
5. Evaluating Claims Or argument	6	31	3.32	1.45	4.26	1.53	0.94	3.01**	.000
Total	30	31	17.69	7.48	24.04	5.89	6.35	22.47	.000

** Statistically significant   at the .01 level.

5. Discussion of research results

1) Development of problem-based learning management in social studies, religion and culture to promote critical thinking skills for grade 3 primary school students as a principle of learner-centered learning. Learners will create knowledge while gaining experience in various situations by actively participating in the situation and interacting with the environment. Learners will understand thoroughly when they know it by themselves, seek knowledge by themselves, and think carefully and ponder with wisdom. By searching for evidence, data, facts, and logic, linking events to make decisions and draw reasonable conclusions, and then giving learners an opportunity to work in groups together, creating interactions within the group. Learners can think, do, solve problems, take responsibility together, learn from each other to find conclusions and resolve problematic situations, and can apply knowledge to other situations in daily life, which has 6 steps of learning management process, as follows:

Step 1: Problem definition step, in which the teacher should define a problem situation which is something close to the learner or a problem that occurs in the learner's community as the starting point for learning. The problem characteristics will start from a simple problem first and then increase the difficulty or complexity of the problem to challenge the learner's problem-solving ability. This is consistent with the Office of the Education Council (2007, p. 7) that the characteristics of problems in problem-based learning management must be problems that are used in organizing the learning process. They should be problems that can be found in the learner's real life or have a chance of actually occurring. In addition, if

the problem situation is a problem that does not yet have a clear solution, it will be a challenge for the learner's ability to want to learn to apply various knowledge to solve such problems. Students will have more fun and be more interested in learning when the teacher presents the problem situation using a video or documentary. This is consistent with Barell (1998, p. 10) that the characteristics of problems used in problem-based learning management should be real problems or problems that have not been successfully solved, which require further investigation and seeking for answers by themselves for the most meaningful learning benefits for the learner.

Step 2: Understanding the Problem In this step, learners must understand the problem they want to learn about. They must be able to explain things related to the problem. Learners will brainstorm together, analyze the given problem situation, and understand the problem, identify the problem issues, the cause of the problem, and set up hypotheses/predict the approach to solve the problem. This is consistent with the concept of Gallagher (1997, p.336) who presented the steps of problem-based learning management as follows: Encountering and Defining the Problem. Learners will be given a situation related to a real problem to read, analyze, and understand the problem situation. Or, they can view pictures or videos of real situations. They may ask students what they know about this problem or question, what they need to know to solve this problem, what information or learning media they need to use, in order to come up with a solution or hypothesis. The teacher will advise the group leader to play a role in using questions to lead to the analysis of the problem issues and causes of the problem. The group leader will encourage all members in the group to express their opinions on hypotheses about which methods or approaches to use to solve the problem. The problem being analyzed may be a problem for which answers cannot be found, which is consistent with the concept of the Office of the Secretary of the Education Council (2007, p.3-4) and is a problem for which answers cannot be found immediately. It requires exploration, research, and data collection or experimentation before getting an answer. It is not easy to guess or predict what knowledge is required, what the methods for seeking knowledge will be, and what the answers or results of knowledge will be.

Step 3: Researching Step In this step, learners determine what they need to learn and conduct their own research using various methods, which is consistent with the concept of the Office of Educational Standards and Learning Development (2007, p. 8). Learners organize the data to be used by identifying which data will be used as a guideline for solving problems (what data/knowledge needs to be further searched for). They plan their research/searching by assigning tasks, dividing the topics for searching for data for each individual, specifying the responsible person and the data sources to be searched for. The group leader plays a role in organizing the data search to cover all issues, which is consistent with the concept of Pornjit Pratumsuwan (2010, p. 4). The teacher recommends that learners search for data from various sources and is a supporter and motivator of learners by jointly creating an atmosphere that promotes learning within the group.

Step 4: Knowledge synthesis step is the step where learners bring their researched knowledge to exchange and learn together, discuss the results and synthesize the knowledge they have obtained to see if it is appropriate or not, which is consistent with the concept of the Office of Educational Standards and Learning Development (2007, p. 8) and Ponsan Phothisrithong (2005, p. 186-187). Step 5: Knowledge analysis: Students bring their findings and researched knowledge to exchange and learn together, discuss the results and synthesize the knowledge they have obtained to see if it is appropriate or not. Learners study and research information according to the divided topics by searching for information individually. The teacher prepares various information sources such as internet media, knowledge sheets, textbooks, articles, journals, pamphlets, posters, etc., which is consistent with the concept of Barrows (2000, p. 5-6) who mentioned the important characteristics of problem-based learning management as a learning that is learner-centered, where the teacher is only a guide. Learners must be responsible for their own learning, which learners may seek knowledge from various information sources such as real situations, real places, from TV programs, newspaper articles, books, journals, or other information sources.

Step 5: Summarizing and evaluating the answers In this step, each group of students will summarize their group's work and evaluate whether the researched information is appropriate or not. They try to independently check their own group's ideas. All groups help summarize the overall knowledge of the problem again, which is consistent with the idea of the group leader who will play a role in leading the group members to discuss and ask for opinions individually to obtain various approaches or methods for solving the problem. The students will consider selecting reliable information to use. The group members discuss, criticize, provide reasons to support or object to each approach to solving the problem, and reflect on the results of solving the problem in each approach and evaluate its feasibility. The group members will jointly decide to choose the most appropriate/worthwhile/best approach/method to solve the problem, taking into account the impacts that will follow in all aspects, with reasonableness, and draw a conclusion to solve the problem together. This is consistent with Boonchanok Thamwongsa (2018, p. 3) who mentioned the key to developing students' potential in critical thinking and problem-solving: students must find the answers by themselves and discuss and exchange ideas with each other. Criticism occurs, and students must find evidence that is substantial enough to support their own position. The teacher will encourage all students to participate in expressing their opinions.

Step 6: Presentation and Evaluation Stage In this stage, learners organize the data they have obtained into knowledge levels and present their work in various formats. All groups of learners, including those involved in the problem, jointly evaluate the work, which is consistent with the concept of each group of learners presenting data covering topics such as the problem that occurred, the cause of the problem, hypotheses/predictions of problem-solving approaches, and conclusions for problem-solving. The teacher will encourage learners to jointly reflect on the results of problem-solving and have learners express their opinions by providing supporting reasons or arguing using reliable evidence/data. Learners will reach

a conclusion for problem-solving together, which is the conclusion of the entire class, which is consistent with the concept of Gallagher (1997, p.336). Data Synthesis and Performance Stage is the stage where learners create or determine problem-solving approaches. They may create supporting media or manage new knowledge, which is different from making a simple report. However, it presents a clear problem-solving approach and implements problem-solving. Summarize the results or general principles obtained from problem-solving and present the learning results in class.

2) The results of problem-based learning management can develop critical thinking skills of Grade 3 students on the topic of spending planning. Students have higher critical thinking skills, developed in all 5 areas: 1.) Ability to refer or summarize, 2.) Ability to identify preliminary agreements, 3.) Deductive ability, 4.) Interpretation ability, and 5.) Ability to evaluate claims or arguments. Students who have learned using problem-based learning are consistent with the research of Barrows (2000, p.5-6).

Research Suggestions

Suggestions for applying research results

1) Preparation before organizing problem-based learning Teachers must prepare Content, learning media, study the components of learning management to understand thoroughly

2) Problem-based learning The teacher is the one who stimulates, advises and coordinates for children to cooperate in activities, gives opportunities for students to practice thinking by themselves and think together in groups, such as

Step 1: Problem definition The teacher must define a problem situation that is close to home or an event that happened to the students, which is a problem that can use various methods to solve that problem.

Step 2: Understanding the problem The teacher encourages students to brainstorm, analyze the given problem situation, and understand the problem, identify the problem issues, causes of the problem, and set hypotheses/predict the approach to solve the problem.

Step 3: Research and study The teacher must encourage students to organize the data to be used by identifying which data will be used as a guideline for solving the problem.

Step 4: Synthesizing knowledge The teacher prepares various sources of information for students to search for information individually, such as Internet media, knowledge sheets, textbooks, articles, journals, brochures, posters, etc.

Step 5: Summarizing and evaluating the answers The teacher will have students consider selecting reliable information to use. Group members discuss, critique, provide supporting reasons or arguments for each solution.

Step 6: Presentation and evaluation The teacher will encourage students to jointly reflect on the results of the problem-solving and have students express their opinions by providing supporting reasons or arguing using reliable evidence/data.

3) When the learning management is complete, the teacher must check the work and inform the students of their results so that they can use the problem-solving methods they have thought of to improve or apply to other situations in the future and to increase their understanding and ability to think critically.

Suggestions for future research

1) There should be a study on the application of problem-based learning to promote critical thinking ability with populations and samples in other grades.

2) There should be a study on the application of problem-based learning to promote critical thinking ability of Grade 3 primary school students to study the results in terms of student satisfaction with the learning management and student attitudes towards learning.

3) There should be a study on the application of this learning management to learning management in other learning subjects.

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In-service General Education Teachers' Competency for Inclusive Education Practice: A Systematic Scoping Review Protocol

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Abstract

General education teachers play a vital role in implementing inclusive education practices. However, their competency of working with students with special education needs (SEN) in inclusive settings remains under-researched with inconsistent evidence and inadequate systematic reviews. This protocol outlines the stages of a systematic scoping review on in-service general education teachers' competency for inclusive education practice. The primary objectives are to identify the empirical studies on this topic, map the characteristics of the evidence, and present descriptions of in-service general education teachers' perceived or actual competencies (i.e., knowledge, skills, self-efficacy) for inclusive education practice. Results from this scoping review will contribute to providing an overview of research evidence and to identifying the knowledge gap guiding follow-up research.

Keywords: inclusive education; in-service general education teachers; study protocol; systematic scoping review; teachers' competency

1. Introduction

Originating from the "normalization" and "mainstream" movement for students with disabilities in the 1960s and 1970s, inclusive education was put forward in 1994 in the Salamanca Statement and Framework for Action on Special Needs Education in response to the diversity of learners (UNESCO, 1994). Through almost three decades of development, inclusive education has become an international policy consensus and a worldwide trend of educational practice. It helps to ensure equal rights of children with special education needs (SEN) to be educated in general education systems with their peers and not to be excluded in segregated placement because of their disabilities (Keles, ten Braak, & Munthe, 2022; Sokal & Sharma, 2013; United Nations, 2006; Wu, Ashman, & Kim,2008). Despite the international consensus of the importance of inclusive education on guaranteeing education equality and equity, inclusive educational practice confronts challenges in many countries due to diverse factors (Ainscow, 2020; Bornman & Donohue, 2014; Chhabra, Srivastava, & Srivastava, 2010; Gajdzica, McWilliam, Potměšil, & Guo, 2020). Among them, it is widely recognized that teaching practice is central to the success of inclusion education and teachers are among the most influential factors for students' success, especially for students with diverse needs (Forlin, Cedillo, Romera-Contreras, Fletcher, & Hernandez,, 2010; Miller et al., 2022; Sokal & Sharma, 2013; Wray, Sharma, & Subbanet, 2022).

One of the action recommendations from UNESCO to promote inclusion within education systems is to ensure "that teachers are supported in promoting inclusion and equity" (UNESCO, 2020, p. 27). This does not only include preparation and support of pre-service teachers to meet learning as well as participation of all students, but also continuing professional development and support for teachers working in inclusive classrooms to assist them to develop their capacities to respond to diversity. For example, teachers should have competence and skill development opportunities in such areas like assessment to identify needs of all learners and assist them accordingly, or recognition of cultural and linguistic diversity to promote inclusion in schools and to strengthen learning for all (UNESCO, 2020).

Previous research indicate that teachers are supposed to have appropriate knowledge, skills, and certain beliefs to work effectively in inclusive settings (Cate, Markova, Krischler, & Krolak-Schwerdt, 2018) and teachers' perceptions of efficacy are closely connected with their attitudes and behaviors towards students with SEN in practice (Cate et al., 2018; Tschannen-Moran, Hoy, & Hoy, 1998). However, general education teachers in inclusive settings often feel unprepared about their competency and they are less willing to work with students with SEN (Cate et al.,2018; Dan, 2019; Guo, 2019; Rajendran, Athira, & Elavarasi, 2020).

Along with the international recognition of teachers' vital role for the success of inclusive educational practice, teachers' attitudes towards or beliefs on inclusive education or students with SEN have been well researched with many primary studies and with increasing numbers of systematic reviews (Amor et al., 2019; Lautenbach & Heyder, 2019; Mieghem, Verschueren, Petry, & Struyf, 2020; Supriyanto,

2019). However, agreement on teachers' competency for inclusive education practice is under debate as there is no unified definition or comprehensive evidence of teachers' competency of practically working with students with SEN in inclusive settings (Miltenienė & Daniutė, 2014; Zulfija, Indira, & Elmira, 2013). The professional knowledge and skills needed to work with students with SEN in inclusive settings remain unknown due to lack of reliable evidence and vague definitions. This makes it difficult for in-service general teachers to get appropriate support in inclusive education practice. It also adds on difficulties for policymakers and teacher training institutions to prepare competent teachers to work with students with SEN in inclusive settings. Hence, this systematic scoping review aims to provide an overview of research evidence, to map the conceptual understanding of in-service general education teachers' competency for inclusive education practice, and to identify the knowledge gaps that may guide follow-up research.

1.1 Previous Systematic Reviews

In recent years, increasing number of review studies about inclusive education have been conducted, covering various research themes which include attitudes towards inclusive education, teachers' professional development on inclusive education, inclusive education practices and student participation (Amor et al., 2019, Mieghem et al., 2020). In contrast to several systematic reviews about teachers' attitudes to inclusive education, to our best knowledge, no systematic review of teachers' competency for inclusive education practice has been conducted according to literature search for published articles or registered protocols in Campbell or the Open Science Framework. But there are three relevant systematic reviews and one evidence gap map study, as detailed below.

The first systematic review (Tümkaya & Miller, 2020) analyzed articles about pre- and in-service teachers' perceptions of self-efficacy regarding inclusive practices in which TEIP (Teacher Efficacy for Inclusive Practices) scale was used as measuring instrument. 24 peer reviewed articles from 2012-2018 were included in this review. Fourteen of them were conducted among in-service teachers and nine of them were conducted among pre-service teachers while one was conducted among both. The results show that both pre- and in-service teachers perceived most adequate efficacy in inclusive instruction and moderate efficacy in behavior management, while most inadequate efficacy in collaboration. However, the scope of this review was limited due to its focus on one instrument.

Scarparolo & Subban (2021) analyzed peer-reviewed empirical studies about pre-service teachers' self-efficacy beliefs for differentiated instruction from 2003 to 2018. Only four articles were included in this review which also indicates a research gap on this topic. The results revealed that some education areas including coursework and teacher practicum may help to develop pre-service teachers' self-efficacy for differentiated instruction. This review also implies evidence gap on the influence of organizational support to improve pre-service teachers' self-efficacy for differentiated instruction, but it did not cover in-service general education teachers.

Wray et al. (2022) explored how teacher self-efficacy had been measured and the factors that influence teachers' self-efficacy for inclusive education practices based on 71 peer-reviewed articles in English. According to the results, TEIP scale (Sharma, Loreman, & Forlin, 2012) is the most often used measuring instrument, followed by Teacher Self-efficacy Scale (TSES) (Tschannen-Moran & Hoy, 2001) and other scales. Influence factors of teachers' self-efficacy were categorized into five domains: demographics, teacher initial attributes, previous interactive experience with people with disabilities, school climate, and teacher education and professional learning. In addition, clear evidence indicates that pre-service teacher education and in-service professional learning help to increase teachers' self-efficacy for inclusive education practice. However, what knowledge or skills should be included in in-service teachers' professional learning help were not explained in this study.

Ahmed et al. (2022) re-emphasized the importance of teacher readiness and capability for successful disability inclusive education in their evidence gap map study. The focus was on in-service teacher professional development programs for disability inclusion in low-and middle-income Asia-Pacific countries based on 50 published English literature, including primary studies, descriptive report, systematic reviews, and evidence gap maps. The results showed that the intended teacher level outcomes of the teacher professional development programs fell into four categories: a) attitudes, knowledge, and understanding level, b) changes of pedagogical skills, c) enabling positive student behavior, and d) confidence and efficacy to implement inclusion. In contrast to a substantial number of programs oriented to teacher attitudes and understanding of disability, there is missing evidence of teacher professional development program covering learning assessments for students with disabilities or application of assistive devices.

The systematic reviews and evidence gap map study mentioned above draw attention to teachers' competency for inclusive education practice but fail to present broad and clear research evidence map of in-service general teachers' competency for inclusive education practice. On one hand, the above reviews only involve a single component of teachers' competency for inclusive education, e.g., self-efficacy. Overview of teachers' competency for inclusive education practice, especially their knowledge, skills for inclusive education and their perceptions of own competency is still unknown (Keles et al., 2022; Kuyini, Yeboah, Das, Alhassan, & Mangope, 2016). On the other hand, even though both pre- and in-service general education teachers are included in some of the above reviews, the evidence of in-service teachers' competency is unclear. According to literature search, there are several review studies about pre-service teacher education for inclusive education (Cretu & Morandau, 2020; Symeonidou, 2017; Wray et al., 2022) with a focus on preparation of future teachers, while convincing evidence of in-service general education teachers' competency for inclusive education in practice remains unknown as systematic review on this topic is inadequate. In addition, some of the systematic reviews mentioned above lack quality assessment of the included studies, which may decrease the reliability and validity of the evidence. This scoping review

plans to make up for the lack of systematic review research and to generate reliable evidence of the overview of in-service general education teachers' competency for inclusive education practice.

1.2 This Systematic Scoping Review

Scoping review is a suitable research method for exploring the breadth and depth of available evidence, capturing the characteristics of studies, clarifying key concepts/definitions, identifying related knowledge gap, and informing the practice from the literature on a certain topic, which highly match with the research objectives of this study (Zachary et al., 2022). To our best knowledge, as there is no systematic review study identified on teachers' competency for inclusive education practice, this scoping review endeavors to map the design and characteristics of relevant empirical studies and to identify the research gaps for further study. By mapping the research evidence systematically, this scoping review may allow for a common understanding of in-service general teachers' competency for inclusive education practice and a more complete picture of reliable evidence based on empirical studies.

Different descriptions of teachers' competency have been provided in previous studies (Miltenienè & Daniutè, 2014). Among them, knowledge, skills, and abilities are the most often mentioned elements (Cate et al., 2018; Miltenienè & Daniutè, 2014). Hence, in this review, general education teachers' competency for inclusive education practice will involve the required knowledge and skills refereed in previous research, as well as teachers' self-efficacy and perceptions of abilities to work with students with SEN in inclusive settings rather than their attitudes to or beliefs of inclusive education or students with SEN.

In this scoping review, we will present an overview of the existing empirical studies on in-service general education teachers' competency for working with children with SEN in inclusive settings. The research purpose includes a) to identify the characteristics of the empirical studies on this topic, b) to map definitions or conceptual descriptions of in-service general education teachers' competency for inclusive education practice, and c) to discover the knowledge gaps. More specifically, this review will be driven by the following questions:

1) What are the characteristics of the empirical studies on in-service general education teachers' competency for inclusive education practice?

2) Which perspectives and understandings of in-service general education teachers' competency for inclusive education practice were referred to in previous empirical studies?

3) What in-service general education teachers' perceived or actual competencies (i.e., knowledge, skills, self-efficacy) for working with children with SEN in inclusive settings have been reported in previous empirical studies?

2. Method

In order to obtain broad and reliable research evidence on in-service general teachers' competency for inclusive education practice, this scoping review will be conducted according to Arksey and O'Malley's methodological framework with stages of identifying the research question, identifying relevant studies, study selection, charting the data, collating, summarizing, and reporting the results (Arksey & O'Malley, 2005). This protocol is prepared according to the Preferred Reporting Items for Systematic review and Meta-Analysis Protocols (PRISMA-P) 2015 statement (see Appendix Table A1 for the detailed checklist) (Moher et al., 2015; Shamseer et al., 2015). Reporting of the systematic scoping review will also adhere to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for scoping reviews 2018 checklist (PRISMA-ScR) (Tricco et al., 2018).

2.1 Inclusion and Exclusion Criteria

Inclusion and exclusion criteria (see Table 1) based on the research questions are set a priori, and will be applied for literature search and screening. Studies fulfilling all the inclusion criteria will be identified as eligible and be included for data extraction. Studies with the following characteristic will be included:

Topic: The eligible studies should focus on teachers' perceived or actual competencies (i.e., knowledge/skills/self-efficacy) for inclusive education practice.

Target group: The population of eligible studies refers to in-service general education teachers in basic education (primary and secondary education) who directly work with children with SEN in inclusive setting. Studies with population of pre-service teachers, special education teachers either in special school or general school (resource teacher), general teachers not in inclusive setting, teachers in early childhood education or higher education will be excluded.

Study type: Only empirical study with quantitative or qualitative data will be included, while theoretical or conceptual articles without empirical data will be excluded.

Type of publication: Only published articles in peer-reviewed journals will be included. Grey literature (e.g., conference papers, thesis, reports and so on) will be excluded.

Language: This scoping review will include articles published in English.

Table 1 The Inclusion and Exclusion Criteria

Selection criteria	Inclusion	Exclusion
Topic	teachers' perceived or actual competencies/knowledge/skills/self-efficacy to work with children with SEN in inclusive setting	not focused on teachers' competencies/ knowledge/ skills/ self-efficacy to work with children with SEN in inclusive setting

Selection criteria	Inclusion	Exclusion
Target group	in-service general education teachers in basic education (primary and secondary education) in inclusive setting	✔ pre-service teachers ✔ special education teacher either in special school or general school (resource teacher) ✔ general teachers not in inclusive setting ✔ teachers in early childcare or kindergarten ✔ teachers in higher education
Study type	empirical study with quantitative or qualitative data	theoretical or conceptual article without empirical data
Type of publication	published peer-reviewed articles	grey literature (conference papers, thesis, reports)
Language	English	not written in English

2.2 Information Sources

The systematic literature search will be conducted in the three electronic databases: Educational Resources Information Center (Eric), Academic Search Premier and Scopus based on pilot searches we conducted in different databases. These databases were chosen because of their coverage, scope (e.g., SCOPUS is the largest abstract and citation database of peer-reviewed research literature) and relevance for educational research. The formal search will be conducted in February 2023.

2.3 Search Strategy

Four categories of search terms (see Appendix Table A2 for detailed search terms) have been elaborated by both authors through group discussions based on reviewing previous systematic reviews, conducting pilot searches to identify extra keywords. The four search terms (i.e., "in-service general education teacher", "competency", "inclusive setting", "special education need") together with their variations and synonyms in academic articles will be used for literature searching in each database. These search terms will be combined by the Boolean operator "AND" and further combined with "AND NOT" with terms describing educational context out of the scope of this review, such as "higher education" or "early childhood education". The searching will be limited to peer-reviewed journal articles in English language in line with the eligibility criteria for study selection. A sample search string is:

TITLE-ABS-KEY ("general education teacher*" OR "in-service teacher*" OR "inservice teacher*" OR "general educat*" OR "classroom teacher*" OR practitioner*)

AND

TITLE-ABS-KEY (competenc* OR knowledge OR skill* OR expertise OR "professional learning" OR self-efficac* OR abilit* OR preparation OR preparedness OR readiness OR perception*)

AND

TITLE-ABS-KEY ("special education* need*" OR "special need*" OR SEN OR "special-need*" OR "individual* education plan" OR IEP OR disab*)

AND

TITLE-ABS-KEY (inclusi* OR mainstream* OR integration OR "regular class*" OR "general class*" OR "regular education*" OR "ordinary class*" OR "equal education* opportunit*")

AND NOT

TITLE-ABS-KEY ("higher education" OR universit* OR college* OR "further education" OR preschool* OR kindergarten* OR nursery OR "early childhood education" OR ECEC OR ECE)

2.4 Data Management

The EPPI Reviewer database (https://eppi.ioe.ac.uk/cms/) will be used for independent double screening, and data extraction in this scoping review. And EPPI-Mapper tool (Digital Solution Foundry & EPPI-Centre, 2020) will be used for visualizing research evidence.

2.5 Study Screening

All retrieved studies in the electronic search will be exported to EPPI Reviewer database for study screening and selection. After removal of duplicates, two reviewers will first independently screen the title and abstract of all retrieved studies against the inclusion and exclusion criteria. In the second stage, full text of the eligible articles will be retrieved to further screen by both reviewers independently. Initially, a pilot screening of 10% of the studies will be conducted to calibrate the screening process in each stage.

2.6 Data Extraction

The EPPI Reviewer software will be used to extract data from the full text of the studies included. In line with our research questions, four categories of potential data items (see Table 2) including identification data (e.g., title, author, publication year), sample data (e.g., sample size, gender distribution, age information), methodological data (e.g., research instrument, sampling technique) and result data (e.g., description of competency, competency component, perception tendency) will be extracted. The first three categories of data items (i.e., identification data, sample data, methodological data) will present the characteristics of the included studies and will allow this scoping review to present an overview of the existing research evidence on in-service general education teachers' competency for inclusive education practice. In response to the second and third research questions, the result date items will contribute to identifying the core themes of perspectives or understanding of general education teachers' competency for inclusive education practice in the empirical studies, and presenting in-service general education teachers' perceptions of their competency of working with student with SEN in inclusive settings.

Before formal data extraction, two reviewers will extract data independently from 5% of the included studies as a pilot data extraction. Then data extraction will be conducted by the first author and

validated by the second author by randomly assessing the extracted data. Discussion between reviewers and flexibility for data extraction (e.g., to be added, removed, or adjusted) are necessary in the data extraction process (Bray et al., 2023).

Table 2 Data Extraction Checklist

Identification data	Sample data	Methodological data	Result data
tile	target population	research design	description of competency
author	sample size	sampling technique	competency component referred
publication year	gender distribution	research instrument	description of measuring approach or instrument
study location	age information	study purpose	perception tendency (positive, negative, neutral)
	educational level		
	teaching experience		
	grade level		

2.7 Reporting of the results

The data items extracted from the included articles will be summarized and reported both in descriptive texts and visualized forms. For example, descriptive texts with tables and/or graphs will be applied to present the identification data and sample characteristics of the studies included. Core themes of the perspectives or understanding of general education teachers' competency for inclusive education practice will be aggregated and presented in descriptive texts and tables. Besides, part of the results of this scoping review will also be visualized in an evidence gap map using EPPI-Mapper tool (Digital Solution Foundry & EPPI-Centre, 2020).

2.8 Outcomes

The two primary outcomes of this systematic scoping review are to identify the characteristics of the empirical studies on in-service general teachers' competency for inclusive education practice, and to map definitions or conceptual descriptions of in-service general education teachers' competency for inclusive education practice.

The secondary outcome of this scoping review is to discover the knowledge gap for further research.

3. Discussion

In-service general teachers work directly with students with SEN in inclusive settings, hence their competency plays a key role for students' academic achievements and well-being. This protocol presents the research plan of a systematic scoping review on in-service general teachers' competency for inclusive education practice. This scoping review is intended to identify the characteristics of the relevant research, to map the empirical evidence of in-service general teachers' competency for inclusive education practice and to discover the research gaps. The findings will enhance our understanding of general teachers' competency for inclusive education practice, shed light on in-service general teacher support as well as input for pre-service teacher training for inclusive education, and guide direction for future research on this topic.

Due to the important role of in-service general education teachers in inclusive education practice, this planned systematic scoping review implies the following strengths:

1. Addressing a critical issue which may place real impact on the quality development of inclusive education by gaining an overview of in-service general teachers' competency of working with students with SEN in inclusive settings.

2. Initiating a systematic scoping review study on in-service general teachers' competency for inclusive education practice according to the standard guidelines of systematic review.

3. Cooperation of two reviewers in the entire process of this scoping review to minimize potential errors and subjective bias in study selection and evidence extraction.

4. Utilizing professional software to make sure the review process is traceable and more transparent.

There are also some potential limitations of this scoping review. Firstly, the scope of this review is limited as the eligible studies are restricted to peer-reviewed empirical studies published in English language. Research findings published in other languages or grey literature will not be included in this planned scoping review. Secondly, the primary aim of this scoping review is to present an overview of empirical research evidence on this topic, hence in-depth analysis of in-service general education teachers' competency for inclusive education practice will not be carried out in this study. The in-depth synthesis of in-service general teachers' competency for inclusive education practice will not be presented in this scoping review, however, can be initiated based on the overview data this scoping will provide.

4. Additional notes

4.1 Ethics

This scoping review will be fully based on secondary literature and systematic review research method. As no human or animal subject will be directly involved, formal ethical approval would not be necessary.

4.2 Conflicts of Interest

There is no conflict of interest in this study.

4.3 Acknowledgments

This scoping review is supported by the Knowledge Center for Education, University of Stavanger.

4.4 Anticipated Time Frame and Contribution

This scoping review is anticipated to be completed in one year and two months, and the tasks and contributions of both authors are outlined in Table 3.

Table 3 Anticipated Time Frame and Contribution

Month	Main tasks	Author contribution
Nov-Dec 2022	kick-off meeting and identifying research questions	LG & SK
Jan 2023	protocol writing and modification	LG & SK
Feb 2023	submitting protocol for publication	LG & SK
Mar -Apr2023	running formal search	LG & SK
May-Jun 2023	identifying relevant studies (i. e., title and abstract screening, full-text screening)	LG & SK
Sep-Dec2023	data extraction	LG & SK
Jan-Jun 2024	data analyses and reporting	LG & SK&WS
Sep-Dec 2024	writing up and dissemination	LG & SK&WS

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A Discussion on Three Basic Issues in High-quality Development in Education

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Abstract

High-quality development has become a strong discourse in the field of education, and various related discussions have become very numerous. However, the discussion on the concept of high quality of education itself is still very insufficient. Based on this, the author discusses the concept of high-quality development of education from the perspective of education's own prescriptive nature, combined with the context of the era in which the concept of high-quality development was put forward, and attempts to discuss the concept of high-quality development of education in terms of the ideas of what, why, and how to do the three basic questions. The so-called high-quality development of education has the connotation of using the concepts, ideas and methods of high-quality development to promote better, faster and more sustainable development of human physical and mental qualities. Only by relying on education with high-quality development can the basic common sense that education promotes the physical and mental development of human beings be put into practice. Innovation, coordination, greenness, openness and sharing are the basic ideas for implementing high-quality development of education in practice.

Keywords: education; high-quality development; human development

1. Introduction

Since the 19th National Congress of the Party, the concept of high-quality development has had a significant impact on all major areas of China's economic and social development, and it is transforming itself from a policy discourse at the central level into a value leader for the continued development of the entire Chinese society, including the field of education, which is not only a policy discourse, but also has been expanded to become a scholarly discourse and a practical discourse.

In the report of the Twentieth Party Congress, it is further clearly proposed to accelerate the construction of a high-quality education system. At present, the discussion on the high-quality development of education in the academic world has been very hot, but what exactly is the root of high-quality development of education is still an academic issue worthy of in-depth excavation and theoretical clarification. As the old saying goes: the root is established and the way is born. On the basis of reading the opinions of many schools of thought, the author tries to give his thoughts on the issue of high-quality development of education from this perspective.

1. High-quality development in education: what is it?

Everyone is talking about quality development in education, so what exactly is quality development in education? If we do not make this question clear, it will easily lead to arguing about an issue in completely different discourse systems, that is to say, what you say about high-quality development of education, what I say about high-quality development of education and what he says about high-quality development of education seem to be talking about the same thing, but after all is said and done, it is entirely possible that we are not talking about high-quality development of education in the same sense. In order to avoid this situation, the author here first gives his own definition of the connotation of high-quality development of education.

In discussing the discourse of "high-quality development of education", we should first clarify the relationship between the terms "education" and "high-quality development". In the author's opinion, as a combination word, the root is still "education", and "high-quality development" is a modification of the core word "education" in the new era. In fact, this combination word should be a partial and positive structure, "education" is the core word, "high-quality development" is the modifier. Therefore, the new strong discourse of high-quality development should help us better understand education itself and better develop education itself, rather than the opposite, rather than losing the thinking of education itself under the overwhelming strong discourse of high-quality development, not to mention the fashionable and trendy labeling of a new fashion. As Cao Yongguo said, "the high-quality development of education must be the high-quality development of education as it is", otherwise, it will lead to a kind of high-quality development of education "to get rid of education", the external utility of education squeezes out the intrinsic value of education, and performance-based competition suppresses the spiritual pursuit of education itself. The

external utility of education squeezes the intrinsic value of education, and the competition of performanceism suppresses the spiritual pursuit of education itself. [1]

What is education? The definition given by Mr. Yelan is the clearest: "Education is a social activity with the direct goal of consciously influencing the physical and mental development of human beings." [2] This definition is suitable for the phenomenon of education occurring in any era and in any geographical area, whether it is in the era of artificial intelligence under the technological discourse or in the new era under the policy discourse, which is where the prescriptive nature of education itself lies. Therefore, when we think about the concept of high-quality development of education, we should adjust the order of words, that is, adjust it to: high-quality development to serve education, the former is a means, the latter is the end, the former is the idea, the latter is the direction. What does education itself do as an end, as a direction? Undoubtedly, in any era, education is a social activity that consciously influences the physical and mental development of human beings. By this point, it is easy to see that we are repeatedly talking about high-quality development, and that education itself is a social activity with development as its key word, although what education is meant to develop is not the economy but people, their physical and mental qualities. Therefore, when we discuss the discourse of high-quality development of education, the real center of gravity should be how to develop this professional activity of developing the physical and mental qualities of human beings in a high-quality way, which can also be said to be the secondary side of development, where high-quality development is not the goal, but the development of the physical and mental qualities of human beings is the goal.

At this point, the author can give his thoughts on the first issue, the so-called high-quality development of education, the connotation of which is to use high-quality development concepts, ideas and methods to promote the physical and mental qualities of human beings to get better, faster and more sustainable development. The landing place and destination of high-quality development is not ultimately in the abstract concept of education, but must be in the human development of this more vivid, more specific, more real facts and process itself. Leaving people, leaving human nature, leaving the needs of human nature, leaving people in the pursuit of a better life and its corresponding need for a better education, it is impossible to discuss the quality development of education in a fundamental sense. The need to use the concept of high-quality development to promote better development of the physical and mental qualities of human beings stems from a basic contradiction in the development of education under the conditions of the current new era, that is, the contradiction between the growing need for a better education for the pursuit of a better life by the people of the country and the overall unbalanced and inadequate development of the current educational endeavors.

In a word, it is in the pursuit of a better life and in the pursuit of a better education that education for quality development is needed, and that discussion that promotes the physical and mental

development of human beings in high quality is needed. High-quality development serves education, and education serves human development, which is fundamental.

2. High-quality development in education: why?

Why, then, is there a need to use the discourse of high-quality development to discuss education and human development? On the surface, it is because the policy discourse of high-quality development was put forward at the 18th Party Congress, and because high-quality development has become a strong discourse in society after the 18th Party Congress and up to the present day. In fact, it is because the basic contradiction of education has changed profoundly, from the contradiction between people's growing educational needs and the relatively backward educational system to the contradiction between people's growing needs for a better education and the insufficient and unbalanced development of education. The basic contradiction has changed, and the fundamental idea of solving the contradiction and promoting the development of education must be changed accordingly. In the past, the mode of developing education mainly characterized by the pursuit of quantitative expansion and acceleration must be transformed, and a more sensitive, more appropriate and more precise response must be made to the new basic contradiction. The expansion of quantity and the acceleration of speed must be transformed into the improvement of quality, and a more qualitative response must be made to the needs of the nation for a better education. However, the awareness of quality in the educational process is precisely what we need to reflect deeply on in the social conditions of the new era.

As the saying goes, "daily use does not necessarily mean real knowledge". In fact, very often, when discussing such common terms as the quality of teaching, the quality of education and the quality of schooling, we may not have the opportunity to conduct really in-depth and professional thinking on what is the quality of teaching, what is the quality of education and what is the quality of schooling. Of course, this kind of thinking itself is also a process that needs to be deepened and clarified continuously. Many years ago, in a state education bureau for research, once with the then responsible for the reception of the deputy director of the discussion of this issue, when the deputy director of the habit of saying "...... the quality of education has significantly improved", the author could not help but ask a question: "What specifically do you mean by improvement in the quality of education?" , the deputy director replied: "That is to say that the quality of our students has significantly improved", the writer again pressed: "What do you mean by quality improvement?" The writer pressed again, "What aspects do you mean by quality improvement?", and the deputy director answered again, "Our students have made remarkable progress both in terms of their academic performance and in other aspects", and when the writer wanted to continue to pursue the question, he found that the deputy director's expression was already very tense, and so, he stopped his own pursuit of the question. It can be inferred that this case is not an isolated phenomenon, if not a general one. In fact, neither the Secretary, nor the principal, nor the teachers have had too many

opportunities to think deeply about one question: What is quality in the sense of education? Too often, this high-speed rotation of the social rhythm and highly institutionalized education system, has made people tired of dealing with a variety of tests, competitions and inspections, there is not much possibility to think deeply about the true nature of education, there is not much possibility to reflect on their own in the process of teaching and learning in the specific behavior in the education of how far will deviate from the true nature of education.

Philosopher Zhao Tingyang once made an excellent assertion: society exists for the sake of man, not vice versa, man exists for the sake of society. This sentence, seems like useless nonsense, late at night, quiet mind to think about it, have to marvel at the real depth of it, as well as the modern social disease of a word. The same thought can be moved over, the existence of education is for the development of human beings, rather than the other way around, the development of human beings is for education. However, in reality, very often, in our busyness and anxiety, we have lost the thinking about quality itself, lost the academic pursuit of the quality of education itself, so much so that it has become a high-speed gyroscope in the modern education system, by an unknown force constantly expelled from the spinning down.

In 2012, the Eighteenth National Congress of the Communist Party of China (CPC) explicitly proposed that "the establishment of morality and respect for human rights should be the fundamental task of education, so as to cultivate socialist builders and successors who are all-rounded in terms of morality, intelligence, physical fitness and aesthetics". In 2014, the Ministry of Education developed and issued the Opinions on Comprehensively Deepening Curriculum Reform and Implementing the Fundamental Task of Establishing Virtues and Shulin, proposing that "the Ministry of Education will organize research to put forward a system of core literacies for student development in various school segments, and make clear the necessary character and key abilities that students should have to adapt to the needs of lifelong development and social development.". september 2019 Results of the Core Literacy for Student Development in China are published. In October 2020, the CPC Central Committee and the State Council jointly issued the Overall Plan for Deepening Education Evaluation Reform in the New Era; on July 24, 2021, the General Office of the CPC Central Committee and the General Office of the State Council jointly issued the Opinions on Further Reducing the Burden of Homework on Students at the Compulsory Education Stage and the Burden of Out-of-School Training. The central level (no longer the Ministry of Education), so high-end and so urgent to introduce such major initiatives consecutively, in fact, to a certain extent, reflects the anxiety of the CPC Central Committee and the State Council on the issue of the quality of education accurately said the quality of human training. High-end top-level design, precise and heavy-handed, the deeper intention behind is to split the head and face of the momentum and the head of a blow, forcibly require all educators from the past those extremely common repetitive, high-intensity, meaningless busy to pause, calmly, soberly think about: what is the real quality of education? What is the real quality of teaching? What is the real quality of schooling?

If we still develop education, conduct teaching and run schools in the same way as in the past, by expanding in quantity and speeding up, we are actually no longer adapting to the basic contradictions inherent in the continued development of education in the new era. The old track has been gradually shut down, and a new track is gradually being opened. What kind of people does this accelerating and evolving society need? What kind of people are capable of pursuing and realizing a better life? These seemingly grandiose questions, in fact, imply that education should pursue the right path and the right way on the road of high-quality development.

The high-quality development of education is for the sake of human development and the ability of people to pursue a better life under the social conditions of the new era. Accelerating the construction of a high-quality education system is itself only a means to an end, which remains human development and the well-being of the people. High-quality development is itself a people-centered development idea, "development for the people, development relying on the people, development fruits are shared by the people, so that the fruits of modernization will benefit all the people in a greater and fairer way." If this idea is transferred to the development of education, the high-quality development of education is the idea of education development centered on the physical and mental development of students, the high-quality development of education is for the physical and mental development of students, the high-quality development of education relies on the physical and mental development of students, and the fruits of the high-quality development of education should be able to promote the physical and mental development of all students to have better performance, and to make the Chinese-style education The fruits of the modernization of education in China should benefit all students in a greater and more equitable way. In the words of General Secretary Xi Jinping, all students should be given the opportunity to excel in their educational careers.

Almost all of us in the education profession know that education is to promote the physical and mental development of human beings, but how many of us dare to pat ourselves on the back and say that the work I do every day and the efforts I make on students every day can really promote their physical and mental development? How many people dare to say that the work I do every day, the efforts I make on my students every day, can really promote their physical and mental development? Can it promote the continuous development of their physical and moral qualities, their thinking ability, their ability to work with their hands, their ability to communicate with others, their ability to appreciate aesthetics, and their ability to exercise? If we look at the basic connotation and essence of the concept of education, are these not the most important duties of education?

Why is it necessary to realize the high-quality development of education? The answer is only one sentence, because only by relying on high-quality development of education can the basic common sense that education promotes the physical and mental development of human beings be put into practice, can the cause of education be truly transformed into a genuine cause of cultivating the physical and mental

qualities of human beings, and can the basic requirement of establishing morality and nurturing human beings be truly put into practice.

3. High-quality development in education: how to do it?

The expression "high-quality development" was first put forward at the 19th CPC National Congress, but its spirit and rich connotation did not come out of the blue, but came from the reflection and conceptualization of the experience of the Chinese people under the leadership of the Communist Party of China (CPC) who have been exploring the path of socialist development with Chinese characteristics for several decades; in 2003, the Central Committee of the CPC put forward the scientific development concept of "people-oriented, comprehensive, coordinated and sustainable", which came from the summary of China's development practice, the reference to foreign development experience and the consideration of China's development requirements, In 2003, the CPC Central Committee put forward the scientific concept of development, which is "people-oriented, comprehensive, coordinated, and sustainable", from summarizing China's development practice, drawing on foreign development experience, and considering China's development requirements. Since then, the issue of the concept of development has really entered the vision of the Chinese people in a comprehensive way. In the past, the center of gravity was rapid development, but now the center of gravity is how to develop, and the reason for adding the word "view" to the word "development" represents a meta-meaning of thinking about the issue of development, that is, constantly reflecting on, asking questions about, and searching for the development itself. The result of this constant questioning and inquiry is to promote the "scientific concept of development" to the height of "high-quality development". The scientific concept of development emphasizes the need for a scientific approach to development and respect for the objective laws of nature and human society. High-quality development, on the other hand, has begun to emphasize that development must be of high quality. High-quality development has become an important element of Chinese-style modernization; in the past, emphasis was placed on the scale and speed of development, but now, emphasis is placed on the quality of development, and for the first time, awareness of quality should surpass awareness of speed and scale and become the number one important awareness in the development process.

Therefore, the high-quality development of education means that we have to work hard on quality, that is, we have to work hard on how to promote the physical and mental development of human beings in a higher quality. Education must always adhere to the promotion of the physical and mental development of human beings as the fundamental, as the core, this is indisputable, the question is how to ensure that the time, energy, material and financial resources we spend on students, or in short, all the resources we invested in students, are really able to promote the physical and mental development of his good, instead of more used to cope with the assessment system that does not really promote the overall development and personality of students. The answer to the question of the quality of educational

development can only be found in the assessment system. The answer to the question of the quality of educational development can only be defined in terms of the true nature of education, in terms of education's own intrinsic provisions, that is to say, the quality of education, including the quality of teaching and the quality of schooling, is not to be determined simply by the scores and the rate of advancement, but rather by how well the students who have been taught are doing in terms of their physical and mental qualities. What is the specific performance in each aspect of physical and mental development?

Few teachers in China don't know about Pavlish High School or Sukhomlinsky, which is just a township school without a high school, and Sukhomlinsky's real identity is that of a principal of a township school. However, the reason why everyone is fascinated by it is not because of the number of famous college students who have come out of Pavlish High School, or the number of top students who have entered famous universities, but because the students of Pavlish High School have the opportunity to really devote all of their energies to the development of their own physical and mental qualities (real physical and mental qualities, not printed physical and mental qualities on paper), in every day, in every corner, and in every activity of the Pavlish High School. The design and consideration of time, space, and activities at Palfreysh High School truly implements the common sense approach to education that promotes the development of the human mind and body. In today's terms, this is a Pavleysh practice of high quality educational development.

The Resolution of the Central Committee of the Communist Party of China on the Major Achievements and Historical Experience of the Party's Centennial Struggle, adopted at the Sixth Plenary Session of the 19th CPC Central Committee, emphasizes the need to achieve high-quality development in which innovation has become the first driving force, coordination has become an endogenous feature, green has become a universal form, openness has become the way of the road, and sharing has become the fundamental purpose, and to promote changes in the quality of economic development, efficiency, and power. In fact, for us to think about the question of how to develop high-quality education, the basic ideas and methods are already in these key words.

At this point, we can define the concept of high-quality development of education. High-quality development of education is the development that is guided by Xi Jinping's thought of socialism with Chinese characteristics in the new era, that aims at developing the core qualities of students in many aspects of morality, intellectuality, physicality, aesthetics and labor, and that is able to meet the growing needs of students for a better education; it is the development that takes bold educational innovations as the first driving force, that takes the coordinated development of the relationship between teacher and student, the student-student relationship and the teacher-teacher relationship as an endogenous characteristic, that takes the healthy development of teachers and students physically and mentally as the universal form, the introduction of high-quality educational resources as the way to go, and the sharing of

the fruits of the development of educational reform by teachers and students as the fundamental purpose of development.

(i) Bold educational innovations are the first driver of quality development in education

It is reasonable to say that education takes the promotion of the physical and mental development of human beings as its own responsibility, while human beings are the spirit of all living things, and human beings are the most creative of all living things, and creativity can be said to be the fundamental difference that distinguishes human beings from other ordinary animals, so that education, as a kind of activity responsible for the development of the physical and mental qualities of the most creative kind of living beings in the heavens and the earth, should really be the most creative field. Mr. HD Hai, a famous philosopher in China, said, "Human beings do not become human beings because of their obedience to natural nature, but precisely because of their rebellion against natural nature. Breaking through the limitations of the natural species, man opens up for himself an infinitely wider space of existence and activity than all existence." [3] This "rebellion" is the reason why man became man, it is the human ancestor who breaks the formula set by nature, who does not play according to the formula set by nature, and who leads the earliest group of apes to move from the trees to the ground, and to move from the continent of Africa to the corners of the whole earth. Of course, this so-called "rebellion" began as a kind of harsh conditions of survival under the accident, in the natural evolutionary rules, it became a kind of human beings are human beings inevitably.

However, for various reasons, objectively speaking, the field of education is not the most innovative, and has even been called one of the most conservative. Liu Daoyu wrote: "As early as more than 40 years ago, UNESCO pointed out that education has both the function of cultivating talents and the side effect of suppressing talents. The conservatism of education is mainly manifested in the fact that it pursues standardization, proceduralization, formalization, and uniformity and follows them from generation to generation, thus plunging it into the conservative situation of stereotyping." [4] It should be said that this kind of conservatism in education does have its rationality, and that education's own cultural origin, social function, and development system determine its conservative qualities. [5] However, under the premise of moderate conservatism, under the premise of abiding by party discipline and state law, bold educational innovations are truly suitable for human nature, truly able to promote the physical and mental development of human beings, not to mention that the innovations are not necessarily radical and fundamental raging storms.

Therefore, as long as it can have a positive impact on the physical and mental development of students, as long as it can actually promote the physical and psychological quality of students, as long as it can really benefit the establishment of good morals and good people, no matter what kind of means, what kind of way, what kind of method, and no matter what piece of ancient and modern China and foreign countries, or from the economy, literature, creative ideas such as ideas, methods or creative ideas can

boldly draw on, boldly try, boldly practice, art, politics, military and other fields, can be boldly borrowed, boldly tried, boldly practiced. In terms of means, in the sense of tools, it is entirely possible to be wild, whimsical or do something that is not related to the original attempts, as long as our value and purpose is anchored in the service of promoting the positive development of students' physical and mental qualities, in the Party's leadership of establishing morality and educating people, and in the great cause of cultivating all-rounded moral, intellectual, physical, aesthetic and laborious builders and successors for the cause of socialism with Chinese characteristics in the new era and the modernization of the Chinese style. This is a great cause for the modernization of China. Cultivation of human beings is one of the most complicated things under the sky, and it is even more difficult to firmly grasp the cause of cultivating human resources without changing the red flag. The extremely difficult thing cannot be done by just taking the conventional way. As long as the direction is right and the purpose is clear, then, walking can go, running can go, jumping can go, and even rolling can go. As long as we hold on to the four basic principles, start from the dynamically changing reality, boldly emancipate our minds, and courageously seek truth from facts, we can't go wrong.

(ii) Endogenous characterization of the harmonious development of teacher-student, student-student and teacher-teacher relationships

Education is a professional activity that promotes the physical and mental development of human beings by using human beings themselves as the most important means, and for which the human being is both the means and the end. "In education, out of a general sense of professional mission to improve the physical and mental qualities of the educated, the educated who gather together with the common goal of developing their own physical and mental qualities try by all means to manifest their sense of existence as educators through words and actions, which in turn inspires a strong desire to be the first to show their own existence and value through words and actions, and so on. In such an interpersonal atmosphere of positive action, human development is naturally maximized." [6] Therefore, education is a typical professional activity with interpersonal interaction and communication as the core means, and whether or not interpersonal relations in education are coordinated will directly have an impact on whether or not education can successfully promote human development. Therefore, the concept of coordinated development should be one of the core concepts of high-quality development of education. For education, especially for school education, teacher-student relationship, student-student relationship, and teacher-teacher relationship are the three pairs of relationships that are the most central, major and important in the education process. If education is regarded as a system, the subjects within the system should at least cooperate with each other, and preferably stimulate each other, so as to ensure the benign operation of the system, and constantly promote the physical and mental qualities of students to develop in a better direction. Otherwise, the seemingly beautiful goal of education for the physical and mental development of human beings will only be empty words if there is constant internal conflict and mutual depletion. Therefore, in order to realize the high-quality development of education, it is necessary to treat the

interpersonal relationship in the process of education and the real feelings of people in this relationship as the most important thing, and to treat the coordination of these basic relationships in the process of education as the most important thing. Otherwise, it will be difficult to trust the teacher without being close to him; and it will be difficult to be at peace within oneself if the relationship is not smooth. In such an atmosphere, it is impossible to develop the physical and mental qualities of human beings in a truly high-quality manner.

(iii) Physical and mental health development of teachers and students as a universal pattern

This is the embodiment of the concept of green development in the field of education, which is a kind of non-polluting, non-polluting green development of education. In fact, if you look at it with your heart, a series of major policies introduced by the Party and the State in the field of education in recent years have been to vigorously address the sources of pollution in the field of education by means of top-level design and administrative impetus, and to endeavor to promote the entire educational enterprise in order to ensure that teachers and students can have a healthier and more developed physical and psychological quality. This is also the ultimate pursuit and fundamental interest of Marxism as espoused by our Party, namely, the comprehensive and full development of human personality. The fundamental aim of all the efforts we have made in history, at this stage and in the future is to gradually realize the all-round development of human beings. According to Marx, human development is "man's appropriation of his own comprehensive nature in a comprehensive way, that is to say, as a complete human being." Xi Jinping pointed out in his "New Words of Zhijiang" that "human beings, by nature, are cultural beings, not 'materialized' beings; they are dynamic, comprehensive beings, not rigid, 'one-dimensional' beings. " [7] So, in this sense, the so-called education to the test, one-sided development is fundamentally contrary to the nature and purpose of our party, the educational cause under the leadership of the party can never allow the widespread and long-lasting existence of this phenomenon of education to the test at the expense of the physical and mental health of teachers and students. Therefore, the high-quality development of education inevitably requires that our educational institutions truly put into practice the promotion, rather than the harm, of the physical and mental development of teachers and students, and that the high-quality development pursued by education can be realized only if the physical and mental qualities of teachers are healthier and more developed, and if the physical and mental qualities of students are healthier and more developed.

(iv) Bringing in quality educational resources as the way to go

Openness is the requirement of the times and a valuable experience of the Party in leading China's revolution and construction to new victories. It is necessary to keep the original intention as well as to be tolerant. Both self-improvement and virtue are needed. To be inclusive and broadly admitting good talents, we cannot close the vision of educational resources within the high walls of the campus, and we cannot isolate education from the lively life of society. Education is a big system, but this system is only one of

the many systems in the society, which can have human, financial, material and time, space, information and other related resources are ultimately limited, and this limited resources to promote the high quality of physical and mental development of human beings is ultimately far from enough. What is more, there are also various small systems, departments and units within the education system, so if we continue to draw a line in the sand and continue to fight separately, the more we reach the grassroots level and the more we reach the end of the day, the more scarce the educational resources that can be utilized to develop the physical and mental qualities of human beings will become. Promoting the physical and mental development of human beings is definitely not an empty phrase, but a reality that can only be realized through the actual investment of many resources. The Party has led China's economic reform and opening up to the world's attention, and the core measures are two: internal reform and opening up to the outside world. The same should be true for the education sector, which, of course, has been progressing in line with the country's broader reform and opening-up strategy. However, relatively speaking, due to the conservatism of the education sector, as mentioned earlier, the steps taken to introduce quality education resources through opening up are still relatively small, and the vigor is still not enough and the thinking is still relatively narrow. As some scholars have pointed out, "the sharing of quality education resources is faced with institutional dilemmas such as lack of information sharing, lack of coordination, and lack of comprehensive management work" [8]. If we can further internal opening, external fluent, really a unit, a local or even national education resources are integrated, really able to more creative way to actively absorb from outside the education system of all kinds of quality education resources, then, it is bound to unleash the development of high-quality education more potential out of the development of more people in more aspects of development!The greater the likelihood that it will be realized.

(v) Sharing the developmental fruits of education reform among teachers and students as the fundamental objective

The fundamental purpose of high-quality development of education is no other than to enable teachers and students, and even parents, to share the development fruits of education reform. Some scholars say, "Adhere to the people-centered development of education, …… respond to and meet the people's expectations for fair and quality education, …… is an important embodiment of the Party's people-centered development ideology " [9] The high-quality development of education is precisely the implementation and realization of the people-centered development concept in the field of education. The fundamental purpose of education reform is for the people, for meeting the people's needs for a better education in a higher quality. However, the people mentioned here are, first of all, teachers and students, behind whom stand countless families, which together are all the people. It is very important that high-quality education reform focuses on the sharing of teachers and students, and on the sharing of all people in education. In order to truly implement in the field of education, development for the people, development relies on the people, the development fruits of the people to share the basic concept of

people-oriented, people-oriented, in fact, this is also our party's consistent embodiment of the mass line, we must be truly education reform development fruits of teachers and students to share as the fundamental purpose. This is equivalent to the "high-quality development of education," the distribution of such products, if the distribution is unreasonable, not the people's hearts, will inevitably in turn affect the front of the production process. Some scholars have suggested that "the people's pursuit of a better life provides an endogenous impetus for the right to quality education." [10] If the fruits of the development of education reform cannot be shared by teachers and students, and if teachers and students are not able to feel from the fruits of the development of education reform that their physical and mental qualities have grown in real ways, and that this has brought about a real increase in their ability to pursue, realize, and enjoy a good life, then it is impossible to expect that they can truly devote themselves wholeheartedly to the development of education of high quality in this new era. The great cause of the new era of high-quality development of education cannot be expected to be fully committed.

In fact, the above five reflections on how to do this are both a method and a result, both a goal and a process, all of which are indispensable, interdependent and important parts of the process of high-quality development of education.

The above discussion is still very shallow and there are many more holes in the thinking. It is only for the purpose of throwing out bricks to attract jade.

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A Study of Personalized Learning For Rural Children in Southwest China Based on Accurate Analysis Characteristics

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Abstract

This study aims to explore the personalized learning of rural children based on accurate portrait technology. With the development of big data and artificial intelligence technology, precision portrait technology provides new possibilities for rural children's education, which helps to overcome the limitations of the traditional education model, optimize the allocation of resources, and improve the quality of education. Research reviews show that in recent years, relevant studies have focused on accurately collecting and analyzing student learning data to construct learner profiles and designing personalized teaching programs accordingly. However, the research on rural children is still insufficient. In this study, we developed a personalized learning path recommendation system by constructing accurate portraits of rural children to improve the educational environment of rural children and promote educational equity. The study targets children living in rural areas, especially those with little educational resources, and focuses on their personalized learning needs and strategies to improve their learning outcomes. The focus of the study includes the construction of accurate portraits and the development of personalized learning path recommendation algorithms, and the difficulties lie in data collection and processing and resource limitations. The research adopts the literature method, field study and big data measurement, and is carried out through five stages, including field survey, data analysis, system development, trial and optimization, and project summary. The innovation of the research lies in the innovation of technical means and methods, which provides the technical and theoretical basis for the personalized learning of rural children through the construction of a virtual simulation real training platform and the deep description of rural children's learning portraits. The expected results include a research report, a platform system and an academic monograph, which have far-reaching academic value and social benefits, and can promote the development and innovation of educational theories and bring substantial improvements to rural education.

1. Background of the study

1.1 Review of relevant studies

With the rapid development of big data and artificial intelligence technology, the field of education is ushering in a profound change. Precision portrait technology, as an important part of this change, offers new possibilities for personalized learning for rural children.

Precise portrait, that is, through the deep mining and analysis of multi-dimensional data such as students' learning behaviors, abilities, interests, etc., the precise learning characteristics of each student are constructed. In the rural education environment, the application of this technology is of great significance in overcoming the limitations of the traditional education model, realizing the optimal allocation of educational resources, and improving the quality of education.

In recent years, more and more studies have focused on personalized learning for rural children based on accurate portraits. These studies focus on two main aspects: first, how to accurately collect and analyze students' learning data in order to construct a comprehensive and detailed learner portrait; second, how to design and implement personalized teaching programs based on these portraits.

In terms of data collection and analysis, researchers use big data technology to track and record students' learning behaviors, grades, interests, etc., and then analyze key information such as students' learning preferences and ability levels through advanced algorithmic models. This information provides data support for building an accurate learner portrait.

In terms of the design and implementation of personalized teaching plans, researchers have tailored each student's teaching plan to meet his or her learning characteristics and needs based on learner profiling. These plans not only focus on the transfer of knowledge, but also emphasize the development of students' learning interests and abilities.

In summary, the research on personalized learning for rural children based on accurate portraits is gradually deepening and has achieved certain results. However, there are still not many studies on how to further improve the accuracy of data collection, improve the algorithmic model of portrait construction, optimize the design and implementation of personalized teaching programs, and focus the research object on rural children.

1.2 Research value

With the advent of the information age, the field of education is facing unprecedented changes. Among them, the rise of accurate portrait technology has opened up a new way for the personalized learning of rural children. The theoretical research significance and application value of this technology should not be ignored, which can not only promote the development of educational theory, but also bring substantial improvements to rural education.

1.2.1 Academic value of the study

From the perspective of theoretical research, the study of personalized learning for rural children based on accurate portraits has deepened our understanding of the personalization of education. Traditional education concepts often emphasize standardization and consistency, ignoring the differences and diversity of individual students. The introduction of accurate portrait technology enables us to understand more deeply the learning characteristics, interest preferences and learning needs of each student, and then provide more accurate education services for each student. This not only helps to realize educational equity, but also stimulates students' interest in learning and cultivates their innovative ability and lifelong learning habits.

(1) Based on the demand-oriented study of the current reality of rural digital educational resources gaps and growth dilemmas, the construction of virtual simulation of educational resources for rural children as a response path is conducive to the construction of high-quality rural digital educational resources and the promotion of resource sharing and construction of new ideas for the rural education of high-quality development of digital development path.

(2) Anchor to rural children to explore their personalized learning difficulties in the trend of digital transformation, based on multiple data to quantitatively assess the current situation of rural children's ideological and ethical, disciplinary literacy, digital literacy and practical ability, which can help to understand the current situation of rural children's learning, and then provide a theoretical basis for technology-enabled personalized learning for rural children.

(3) Constructing a personalized learning path recommendation system based on intelligent algorithms, and constituting personalized learning activities for rural children through the smart promotion of immersive learning resources, thus constituting a technology-enabled personalized learning mechanism for rural children, which will help to construct a personalized learning paradigm and a learning theory system for rural children in the digital era.

1.2.2 Applied value of research

From the perspective of application value, personalized learning solutions based on accurate profiling are of great significance in improving the educational environment for rural children. Due to limited resources, it is often difficult for rural areas to provide educational services comparable to those in cities. The application of accurate portrait technology can help rural schools allocate educational resources more effectively and ensure that each student can get the education that suits him or her. This will not only help improve students' learning efficiency, but also narrow the gap between urban and rural education and promote educational equity.

(1) The construction of a virtual simulation training platform can provide rural children with high-quality digital learning resources with a high degree of fit, which is conducive to improving the quality of rural children's learning. Traditional digital learning resources and the reality of rural education lack of fit

and insufficient interaction with learners, based on the virtual simulation training platform to develop immersive learning resources not only for rural education resource gaps, but also with the degree of immersion, interactivity and fun, can enhance the quality of learning and learning effect of rural children.

(2) The development of rural children's learning dashboards can dynamically monitor children's development and help optimize the management decisions of rural schools and the teaching decisions of teachers. We have constructed a learning database for rural children from the dimensions of ideology and morality, subject core literacy, digital literacy, and practical ability, and then developed a learning dashboard that can reflect the comprehensive development of rural children in real time, which is conducive to optimizing management decisions and teaching decisions of schools and teachers, and improving the high-quality development of rural education by digital means.

(3) Building a personalized learning path recommendation system to facilitate personalized learning for rural children. The use of intelligent algorithms to fully assess the individual differences in the physical and mental development of rural children, and then match personalized learning programs and immersive learning resources to help rural children carry out personalized learning activities. At the same time, the learning feedback can continuously optimize the personalized learning recommendation system and the construction of the virtual simulation training platform resource base, so as to realize the qualitative improvement of children's personalized learning effect.

In summary, the study of personalized learning of rural children based on accurate portrait not only has far-reaching theoretical research significance, but also has significant application value. It can not only promote the development and innovation of educational theory, but also bring substantial improvement to rural education, promote educational equity and enhance educational quality. Therefore, we should further strengthen the research and practice in this field to provide rural children with better educational services.

2. Content of the study

2.1 Subjects of study

The research object of this project is mainly rural children and their individualized learning needs, aiming to provide these children with better quality and more individualized educational services through precise imaging technology. Specifically, it can be summarized as follows: (1) Rural children: the research object of this project is children living in rural areas, especially those groups of children with relatively scarce educational resources and limited learning conditions. The learning characteristics, needs and challenges of these children are studied in depth through the precise portrait technology. (2) Individualized learning needs: The subject focuses on the individualized learning needs of rural children, i.e., each child has differences in learning styles, learning speeds, learning interests and other aspects. These needs can be more accurately identified and understood through accurate profiling, so as to provide customized learning

solutions for each child. (3) Learning Effectiveness and Improvement Strategies: The project will also study how to assess and improve the learning effectiveness of rural children through the use of precision imaging technology. This includes analyzing children's learning data, identifying their learning difficulties and challenges, and exploring effective intervention strategies to enhance their academic performance and interest.

2.2 Main objectives

Developing a personalized learning path recommendation system based on an accurate portrait of rural children. Build a personalized learning path recommendation system to facilitate personalized learning for rural children. Using intelligent algorithms to fully assess the individual differences in the physical and mental development of rural children, and then matching personalized learning programs and immersive learning resources to facilitate personalized learning activities for rural children. At the same time, the learning feedback can continuously optimize the personalized learning recommendation system and the construction of the virtual simulation training platform resource base, so as to realize the qualitative improvement of children's personalized learning effect.

2.3 Key challenges

Research focus: (1) Construction of accurate portrait: In-depth analysis of multi-dimensional data of rural children's learning behaviors, achievements, interests and so on. Utilizing big data and artificial intelligence technology, a comprehensive and detailed accurate portrait model is constructed. (2) Development of personalized learning path recommendation algorithm: Based on the accurate portrait, design an efficient recommendation algorithm that can accurately match the personalized learning needs of rural children. Considering the granularity of learning content, provide appropriate learning resource recommendations, such as courses, videos, learning materials, etc.

Research Difficulties: (1) Data Collection and Processing: In rural areas, one may face difficulties in data collection and low data quality. Effective data cleaning and pre-processing processes need to be designed to ensure the accuracy and availability of data. (2) Resource constraints: in rural areas, technical facilities and resource constraints may be faced, and it is also a challenge to achieve efficient personalized learning path recommendation under these conditions.

2.4 Research Program

2.4.1 Research ideas

Through in-depth interpretation of the Ministry of Education's 2022 version of the new curriculum standard subject core literacy requirements, digging and sorting out related literature within foreign countries, understanding the research frontiers of scholars at home and abroad in the area of children's personalized learning, exploring children's learning styles, developmental stages, and personality characteristics, as well as the learning goals in terms of ideology and morality, subject core literacy, and

digital literacy, and so on. With the help of virtual simulation development engine, 3D modeling technology, subject knowledge mapping and other technical tools, we build immersive learning resources for rural children. Adopt the survey method and big data assessment method, and construct a learning dashboard with the help of technical tools such as multimodal and data mining to comprehensively and deeply analyze and assess the current situation of rural children in terms of ideology and morality, disciplinary literacy, digital literacy, and practical ability. Using the survey method and design-based research method, we develop a personalized learning recommendation system based on intelligent algorithms, conduct personalized learning experiments for rural children using small-scale experimental method, and verify the practical utility of the personalized learning recommendation system + virtual simulation training platform. Based on the experimental results and in-depth interviews with the subjects, we iteratively optimize the personalized learning recommendation system and improve the virtual simulation training platform. The specific research route is shown in the figure below.
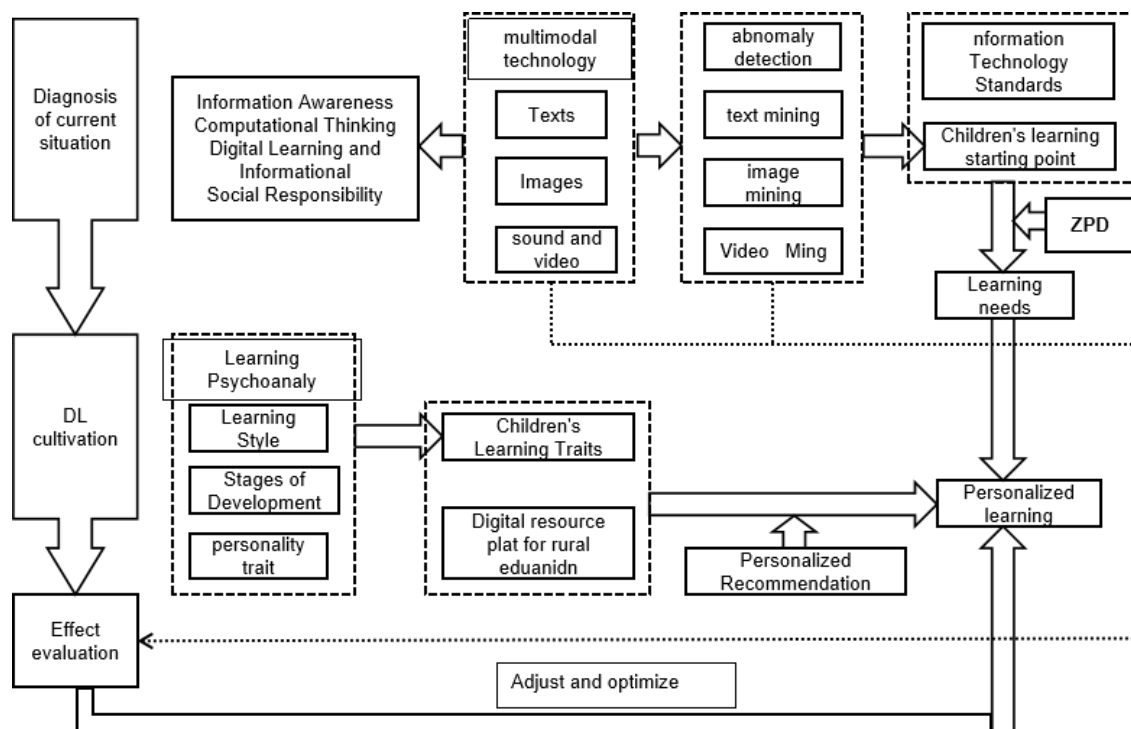
Figure 1 Roadmap for research on personalized learning for rural children

2.4.2 Research methodology

(1) Literature method: to gain a deeper understanding of the research background, status quo and development trend of personalized learning for rural children, to grasp the research hotspots and frontiers in the field, and to provide theoretical support and research direction for the development of the topic; to clarify the research problems and assumptions of the topic by combing and analyzing the existing literatures;

to understand and collect a variety of effective strategies for personalized learning, and to combine them with the actual situation of rural children to formulate a practical personalized learning programs.

(2) Fieldwork: Going deep into the living and learning environment of rural children, observing and understanding their learning conditions, family background, community resources, etc. on the spot; emphasizing long-term contact and in-depth exchanges with the research subjects, establishing a trusting relationship with the rural children, and understanding their inner worlds and learning needs, so as to more comprehensively grasp their personalized learning characteristics; recording the real performance of the rural children in their daily learning, including their learning styles, learning attitudes, learning habits and so on. The study emphasizes long-term contact and in-depth communication with the research subjects to establish a trusting relationship with them to understand their inner world and learning needs, so as to grasp their individualized learning characteristics more comprehensively.

(3) Big data assessment: Adopting the survey method and big data assessment method, and with the help of technical tools such as multimodality and data mining, a learning dashboard is constructed to comprehensively and thoroughly analyze and assess the current situation of rural children in terms of ideology and morality, disciplinary literacy, digital literacy, and practical ability.

2.4.3 Outline of the content of the study

I. Introduction

II. Analysis of rural children and personalized learning needs

    1. Profile of rural children and their educational status

    2. The importance of personalized learning needs

III. Theory and Application of Precise Imaging Technology

    1. The theoretical basis of accurate portrait technology

    2. Application of Precision Imaging Technology in Education

IV. Research methodology and data sources

    1. Research design

    2. Data analysis methods

V. Empirical study on the application of accurate portrait technology in rural children's education

    1. Construction of a learning portrait of rural children

    2. Development of personalized learning programs

    3. Assessment of learning effectiveness and improvement strategies

VI. Results and discussion

    1. Presentation of research results

    2. Discussion and interpretation of results

vii. conclusions and recommendations

    1. Conclusions of the study

2. Policy and practice recommendations

2.4.4 Progress schedule

The study was conducted in five phases:

(1) Field research. A survey and research was conducted in rural areas of counties in Guizhou, Yunnan, Sichuan, Guangxi, Chongqing and other provinces and municipalities to collect the realities of infrastructure, social environment, family education and other aspects of the basic conditions and current situation of personalized learning for rural children.

(2) Data analysis. Based on the survey data, some counties were selected as research samples to analyze the data on rural children's learning styles, developmental stages, personality characteristics, digital literacy, disciplinary core literacy, and practical abilities in the sample areas.

(3) System development. The personalized learning recommendation system developed for rural children uses intelligent algorithms to create a unique learning path for each child based on his or her learning ability, interest and progress. Through data analysis, the system accurately identifies students' weaknesses and pushes relevant teaching resources to help target improvement.

(4) Trial and optimization. Using small-scale experiments to carry out personalized learning experiments for rural children to verify the practical effectiveness of the personalized learning recommendation system + virtual simulation training platform. Based on the experimental results and in-depth interviews with the subjects, we iteratively optimize the personalized learning recommendation system and improve the virtual simulation training platform.

(5) Project summary. Summarize all the data of the entire research, write a project completion report, and publish the results of the project.

2.5 Feasibility of the study

1. Technical feasibility. At present, with the development of big data and artificial intelligence technology, accurate portrait technology has been widely used in many fields. In the field of education, it has become possible to construct accurate student portraits by analyzing students' learning data and behavioral patterns. Therefore, from a technical point of view, it is feasible to use accurate portrait technology to study the personalized learning needs of rural children.

2. Practical feasibility. Although data collection in rural areas may face certain challenges, with the state's emphasis on rural education and the advancement of informationization, more and more rural schools have begun to introduce informationized teaching methods, which provides the possibility of collecting students' learning data. Personalized Learning Programs: With the updating of education concepts and the advancement of technology, personalized teaching has become an important direction of education reform. It is completely feasible in practice to develop personalized learning programs based on students' learning characteristics and needs.

3. Economic feasibility. Although the introduction of accurate imaging technology requires some initial investment, in the long run, it can reduce education costs and improve education quality by improving teaching effectiveness and learning outcomes, thus maximizing cost-effectiveness. Through cooperation with the government, enterprises and social organizations, resources from all parties can be integrated to jointly promote the implementation of the project and reduce economic pressure.

3. Research innovation

With the goal of promoting personalized learning and comprehensive development of rural children, this research direction aims to address the real dilemmas of marginalized status of learners, lack of high-quality digital resources, difficulty in meeting personalized learning needs, and increasingly obvious digital divide presented by rural children under the current trend of digital transformation of education, and to provide rural children with rich and diverse By constructing a virtual simulation training platform for rural children's personalized learning, we can provide them with rich and diverse digital learning resources to meet their personalized learning needs, and at the same time cultivate their patriotic sentiment, core literacy, digital literacy and practical ability, so as to promote the comprehensive development of rural children. The innovations of this study are mainly reflected in the following three points:

(1) Innovation in technical means - building a virtual simulation training platform to provide a technical basis for personalized learning for rural children. Supported by the school's virtual simulation training center, based on the virtual simulation development engine, VR/AR helmet, virtual gesture data gloves, child development training module, ideological and political virtual simulation software and other technical equipment, the construction of a virtual simulation learning resource base containing patriotic thematic education, disciplinary core literacy, students' digital literacy, and creator education, etc., to solve the current shortage of high-quality digital learning resources for rural children. Dilemma.

(2) Innovation in research methodology - Deeply describing rural children's learning portraits and providing a theoretical basis for rural children's personalized learning. Through learning analysis technology, we analyze and process multimodal data such as text, image, audio and video in the learning process of rural children, and build a learning dashboard of rural children by combining data mining techniques such as anomaly detection, text mining, image and video data mining, so as to realize accurate assessment of rural children's ideology and morality, disciplinary literacy, digital literacy and practical ability, and to dynamically monitor the development status of rural children in various aspects. development status of rural children in various aspects.

4. Expected results

(1) Academic value

1. Based on the demand-oriented study of the current reality of rural digital educational resources gaps and growth dilemmas, to build virtual simulation of educational resources for rural children as a

response path, is conducive to the construction of high-quality rural digital educational resources and the promotion of resource sharing and construction of new ideas for rural education for the high-quality development of the development of digital development path.

2. Anchor to rural children to explore their personalized learning dilemma in the trend of digital transformation, based on multiple data quantitative assessment of the current situation of rural children's ideological and moral, disciplinary literacy, digital literacy and practical ability, which can help to understand the current situation of rural children's learning, and then provide a theoretical basis for technology-enabled personalized learning of rural children.

(iii) Constructing a personalized learning path recommendation system based on intelligent algorithms, and constituting personalized learning activities for rural children through the smart promotion of immersive learning resources, thus constituting a technology-enabled personalized learning mechanism for rural children, which helps to construct a personalized learning paradigm and a learning theory system for rural children in the digital era.

(2) Social benefits

1. A set of learning and development dashboards for rural children. It involves the assessment dimensions of children's ideology and morality, subject core literacy, digital literacy and practical ability, and can dynamically reflect children's learning trajectory and development in various aspects.

2. Rural children's personalized learning virtual simulation training platform. The platform includes 3-5 sets of Civics and Politics virtual virtual simulation learning resources, 1 set of all-discipline virtual simulation learning experience resources, 2-3 sets of segment-based digital skills learning resources, and 3-5 sets of children's creativity virtual simulation learning resources.

(iii) A set of personalized learning path recommendation system for rural children. It is equipped with learning portrait function, learning assessment function and learning resources adaptive recommendation function, supporting the analysis of learners' multimodal learning process data, in-depth tracing of learners' portraits, precise assessment of learners' multidimensional qualities, as well as adaptive recommendation of personalized learning paths and learning resources.

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Health Sciences

(151-EN-HSC)

Characterization of Mesenchymal Stem Cells among Atrophic Non-Union Patients

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Abstract

Atrophic non-union results in failure of fracture reparative process which occurs about 5-10% of long bone fractures. The biological component may affect the fracture healing and the impairment of this factor can lead to atrophic non-union condition. Mesenchymal stem cell which is osteoblast progenitors may be deteriorated. In this study, we aim to identify and characterize mesenchymal stem cells (MSCs) from atrophic non-union tissue or defined as "non-union derived mesenchymal stem cells (NMSCs). NMSCs were isolated from atrophic non-union tissue and determined their surface markers including CD73, CD90, and CD105 markers using the flow cytometry method. Their differentiation capacity of osteogenesis, chondrogenesis and adipogenesis were assessed under in vitro conditions. NMSCs can be induced to adipogenic, osteogenic and chondrogenic differentiation medium determined by histomorphology and gene expression analysis. NMSCs were successfully isolated, induced, and identified in all the non-union tissue. NMSCs showed positive marker more than 90% and negative marker less than 2%. Real-time PCR results, NMSCs showed higher expressed of RUNX2 and SOX9 genes at day 14. In this study, MSCs are presented in a non-union tissue and demonstrates their potential to differentiate into bone under appropriate conditions. By analyzing gene expression associated with bone formation at the molecular level, the study enhances understanding of the underlying biological mechanisms. These findings aim to support the development of effective treatments, preventive measures, and strategies to reduce the incidence of non-union fractures.

1. Introduction

A non-union is a leading cause of chronic inefficiency following a bone fracture and that status cannot be healed or repaired to complete. About 5-10 % of bone fracture patients represent a biological failure of the fracture healing process [1,2]. The U.S. Food and Drug Administration (FDA) defines a non-union fracture site is not shown any signs of healing for discontinuous more than 3 months and has not completely of bone healing more than 9 months. The prevalence of non-union fractures in Thailand remains undocumented. In 2012, retrospective study conducted at Phetchabun Hospital reviewed cases of non-union and avascular necrosis in patients under 50 years old who underwent delayed fixation for traumatic displaced femoral neck fractures between 1997 and 2002. While the study identified cases of non-union, it did not report prevalence data [3]. In 2018, statistics from the National Health Security Office (NHSO) revealed a steady annual increase in fracture cases, linked to rising accident rates. Similarly, the Department of Medical Services (DMS) reported over 30,000 fracture patient treatments annually, primarily among patients over 50 years old with hip fractures. Despite of non-union being noted as a common complication requiring additional treatment, prevalence data was not reported [4] Rattasat S. (2018) reported that among patients with tibial diaphyseal fractures treated with dynamic compression, non-union occurred in approximately 1–2% of 98 patients, with a mean age of 32.74 ± 38.34 years. [5]. According to Mills et al. (2017), non-union fractures were observed in patients aged 15 to 84 from a population of over 4 million adults between 2005 and 2010. Atrophic non-union is primarily attributed to factors such as high-energy injuries, smoking, obesity, diabetes, and hormonal imbalances. Nevertheless, osteoporosis was not identified as a significant risk factor for fracture non-union [6].

The traditional management of atrophic non-union typically involves the use of fixation techniques at the fracture site to stimulate angiogenesis and osteogenesis [7]. Many factors that have not yet been measured accurately and were outside of the scope of this study may have an impact on fracture healing. These variables can be associated with patient (such as obesity or smoking) or associated with surgeons (inadequate operative fixation). Presently, the biological mechanisms and molecular pathogenesis underlying atrophic non-union remain poorly understood, and further research is needed to elucidate these processes [8, 9]. In terms of fracture site, atrophic non-union is characterized by callus formation around the fracture area, which is associated with osteochondrogenesis, related to the properties of mesenchymal stem cells (MSCs) [10,11]. MSCs have potential in regenerative medicine as they can differentiate into the growth of bone, cartilage, adipose tissue, tendon, and muscle [12]. These cells can be isolated from various adult tissues, including subcutaneous fat, bone marrow, and cartilage. Atrophic non-union is characterized by limited bone formation around the fracture site, indicating impaired osteogenesis. Our focus is on identifying ways to reduce atrophic non-union in fracture patients, as previous studies have not provided a clear characterization of the involved cells.

This study proposes to examine isolated and derived atrophic non-union fracture cells to mesenchymal stem cells (NMSCs) and characterize these cell properties compared with mesenchymal stem cells from bone marrow. This study focuses on the molecular-level analysis of gene expression related to bone formation. It aims to deepen the understanding of the biological mechanisms involved, providing a foundation for further research into molecular biology. The ultimate goal is to develop effective treatment methods, preventive measures, and strategies to reduce the occurrence of non-union fractures in the future.

2. Research Objectives

1. To determine the presence of NMSCs from fractured bone and to characterize NMSCs properties according to the international society for cell and gene therapy (ISCT).

2. To conduct a comprehensive comparative analysis of gene expression under adipogenesis, osteogenesis, and chondrogenesis conditions of NMSCs.

3. Research Hypotheses

Non-union tissue derived mesenchymal stem cells could be isolated from atrophic non-union fracture and they would be stimulated in osteogenic conditions.

4. Research Methodology

4.1 Study design

Four patients were diagnosed with atrophic nonunion and underwent open reduction with internal fixation at the Ramathibodi Hospital. Atrophic nonunion was indicated if there was no evidence of callus and presented with radiolucent line on radiographic image at least 6 months follow up after initial treatment. The exclusion criteria were septic non-union, presented hypertrophic callus, the steroid used and rheumatoid arthritis patients. Patients undergoing surgery for the treatment of non-union fractures will have callus bone removed and discarded during the operation, which is part of the treatment process. This leftover specimen will be used for further study. All procedures performed in this study involving human participants were in accordance with the ethical standard approved by the Committee on Human Rights Related to Research Involving Human Subject, Faculty of Medicine Ramathibodi Hospital, Mahidol University, Thailand (MURA.2021/172).

4.2 Isolation and Cell Culture

Non-union derived Mesenchymal Stem Cells (NMSCs) were obtained from the Non-union tissue (Figure 1.) at the bone fracture site by sterile technique from 4 patients. The specimen was washed twice of 1% penicillin/ streptomycin (Gibco, USA) in Dulbecco's phosphate-buffered saline (DPBS) (Cat#SH2002803; Hyclone, USA) and digested with 0.1% Collagenase type I and type II (Cat#17100017; Gibco, USA) in DPBS at 37 C. The specimens were added Dulbecco's modified Eagle medium with 10% Fetal bovine serum (FBS) (Biochrom GmbH, Germany) and centrifuged at 400g for 10 min. The spun cells were collected and washed twice with PBS and passed through a 40-uM cell strainer (Cat#352340; Corning, USA) and

centrifuged. The pellets were counted using hemacytometer and plated to an adherent culture flask in DMEM complete medium containing 10% FBS, 1% penicillin/streptomycin (Gibco, USA) and 1% of 200 mM L-glutamine (Gibco, USA) in 5% humidified CO_2 incubated at 37 C. the culture medium was changed every 3-4 days until the NMSCs were grow up to 80-90% confluent and subculture with 0.25% Trypsin/EDTA (Gibco, USA) to passage 2-3.

Figure 1 Atrophic non-union tissue harvested from callus bone of fracture site of patient.

4.3 Immunophenotypes

NMSCs were trypsinized using Trypsin/EDTA into single cells and washed with PBS. The cells were suspended in DPBS, an aliquot as 2 x10^5 cells/tube and centrifuged at 400g for 5 min. The spun cells were added 100 uL of DPBS and incubated with fluorochrome-conjugated antibodies against human antigens, the following clones of antibody were used for immunophenotyping analysis: anti CD34, anti CD45, anti-HLA-DR, anti-CD73, anti-CD90 and anti-CD105 (BD Bioscience, California, USA) at 4 C in dark for 30 min. The cells were centrifuged and washed with DPBS and resuspended with DPBS. The fluorescence cells were evaluated by flow cytometer using a BD flow cytometry (Bio Sciences, USA) and the data were analyzed using the BD FACSuite™ software program.

4.4 Cells differentiation potentials

For adipogenic differentiation, NMSCs were seeded into 6-well culture plate at a density of 5,000 cells/cm^2 at 37°C for differentiation and then were cultured and that reach 70-80% confluences in a week with culture medium. NMSCs were induced by adipogenic differentiation medium (DMEM-LG with supplemented 10% FBS, 1% penicillin/ Streptomycin, 0.5 uM dexamethasone (Cat#D4902; Sigma, USA), 50 uM indomethacin (Cat#I7378; Sigma, USA), 0.5 uM isobutyl methylxanthine (Cat#I5879; Sigma, USA), and Insulins solution (Cat#I9278; Sigma, USA) for 21 days. The culture medium was changed every 3 days. At day 21, the adipogenic differentiation cell was evaluated by staining of Oil droplet with Oil Red O (Cat#O0625; Sigma, USA) stained.

For Osteogenic differentiation, NMSCs were seeded and cultured a in 6-well plate until the cells were grown up to 70-80% confluent. NMSCs were cultured in osteogenic differentiation medium (DMEM-LG with dexamethasone (Sigma, USA), B-glycerophosphate (Cat#154804-51-0; Sigma, USA), and L-ascorbic acid (Cat# A92902; Sigma, USA) for 21 days. Culture medium was changed every 3 days. After 3 weeks, osteogenic

differentiation cells were evaluated to determine bone matrix mineralization with Alizarin Red (Cat#A5533; Sigma, USA) stained.

For Chondrogenic differentiation, NMSCs were seeded with a density of 5×10^5 cells per well a in 96-well plate and cultured in a chondrogenic differentiation medium (DMEM high glucose, 10% ITS+ Premix Tissue Culture Supplement (Becton Dickson), 10-7 M dexamethasone (Sigma, USA), 1 uM ascorbate-2-phosphate (Wako, Richmond, VA), 1% sodium pyruvate (Invitrogen, USA), and 10 ng/ mL transforming growth factor- beta 1 (TGF- B1, Peprotech, Rochky Hill, NJ) and cells were cultured for 21 days, chondrogenic differentiation cells were evaluated to determine cartilage extracellular matrix with Alcian blue (Cat#A5268;Sigma, USA) stained.

4.5 Colony forming unit-fibroblast

NMSCs have seeded 100 cells/well with culture medium into a 6-well plate without medium change for 2 weeks. The NMSCs were fixed with 100% of methanol and stained with Giemsa. The cells have counted in a group of cells with more than 50 cells used under an inverted microscope. Bone marrow-derived MSC was used as the control.

4.6 Gene expression for Osteogenesis

Total cellular RNA was extracted by TRIzol® technique (Ambion, USA) and determined the concentration by Nanodrop spectrophotometer (ND1000. For cDNA synthesis cDNA synthesis was performed using iScript^{TM} Reverse Transcription Supermix for RT-qPCR (Bio-Rad, USA) and amplified by using KAPA SYBR FAST® qPCR Master Mix (KAPA Biosystems, South Africa) with Quantitative polymerase chain reaction (qRT-PCR) analysis. The arrangement of gene expression analysis was following Table 1. The specific PCR primer of NMSCs analyzed by osteogenic and chondrogenic marker gene, including ALPL, COL2A1, GDF-5, RUNX2 and SOX-9, respectively. All samples were analyzed by CFX96^{TM} Touch Real-Time PCR system (Bio-Red, USA). Gene expression was used GAPDH expression level to be normalized to the housekeeping gene for relative quantification. The relative expression level was evaluated which based on a target gene and the housekeeping gene cycle by using equation $R = 2^{-(\Delta CT\ sample - CT\ control)}$

4.7 Statistical analysis

All data were tested by two-way ANOVA analysis using Prism 9 program version 9.3.1 (GraphPad Software, LLC). The results were showed as mean ± stand error of the mean (SEM) and p-values less than 0.05 were considered statistical significance.

Table 1. List of primer sequences.

Gene	Sequence forward	Sequence reverse
ALPL	5' CTATCCTGGCTCCGTGCTCC 3'	5'AGATGCAATCGACGTGGGTG 3'
COL2A1	5' GCTCCTGCCGTTTCGCTG 3'	5' ATTATACCTCTGCCCATCCTGC3'
GDF-5	5' GACAAAGGGCAAGATGACCG 3'	5' TTCTTCCGCAAGATCCGCAG 3'
RUNX2	5' CGGAATGCCTCTGCTGTTAT 3'	5' TTCCCGAGGTCCATCTACTG 3'
SOX9	5' AGGTGCTCAAAGGCTACGAC 3'	5' GTAATCCGGGTGGTCCTTCT 3'
GAPDH	5' AATGGGCAGCCATTAGGAAA 3'	5' GCCCAATACGACCAAATCAGAG 3'

5. Research Results and Discussion

5.1 Research Results

5.1.1 Demographics data:

Four patients who have non-union fracture from different sites were recruited. The age range of patients was between 17-50 years. There were 2 females and 2 males in this study. The duration of patients before diagnosis with atrophic non-union was from 5-9 months. Characteristics are displayed in Table 2.

Table 2 Baseline characteristics of NMSCs from long bone fractures

List	Case 1	Case 2	Case 3	Case 4
Sex	Female	Female	Male	male
Age (yrs)	50	39	49	27
Side of bone fracture	Left	Left	Right	Right
Non-union healing time (month)	6	9	5	9
Non-union tissues weight (gram)	2.6712	1.463	1.6672	3.6998
Number of NMSC isolation (P 0*) ($\times 10^6$cells/ml)	1.2625	0.4375	0.725	0.7
Yield of NMSCs Collection ($\times 10^4$cells/ml)	0.4726	0.2990	0.4348	0.2891

5.1.2 Evaluated isolation and cell culture from NMSCs.

Atrophic non-union tissue could be isolated from all samples (4/4). The morphology of NMSCs from the culture medium were spindle-shaped and fibroblast-like cells. (Figure 2.) The weight of non-union was measured from 1.463-3.69 grams. and the yield of cells isolation ranged from 0.43 $\times 10^6$-1.26$\times 10^6$ cells/mL. The details are as follows in Table 2. The colony-forming unit assay from NMSC was determined and compared by BMMSC (n=4) as the control with seeded 100 cells/well in a 6-well plate at 2 weeks after seeding and colonies stained with the Giemsa technique were counted under an inverted microscope.

Figure 2 The morphology of mesenchymal stem cells derived from non-union tissue.

5.1.3 Colony-forming unit like fibroblast

In the assessment of colony-forming unit quantification for atrophic non-union, NMSCs were seeded 100 cells per well in a six-well plate with the culture medium remaining unaltered for two weeks. Subsequently, cells were subjected to Giemsa staining and enumerated utilizing an inverted microscope.

The self-renewal property of MSCs in low-density cell cultures was assessed through Colony-Forming Unit Fibroblast (CFU-F) assays (Figure 3.).
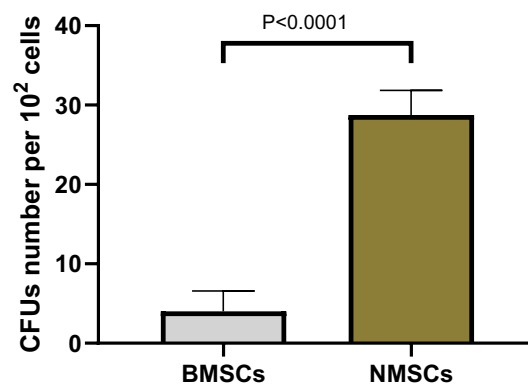
Figure 3 CFU-F assay comparing cell proliferation between BMSCs (n=4) and NMSCs (n=4). CFU counts are shown as bar graphs. Statistical analysis by two-way ANOVA (P < 0.0001).

5.1.4 Immunophenotypic analysis.

The results showed MSCs surface markers of NMSCs were evaluated by flow cytometry. NMSCs were expressed of positive markers more than 90% (CD73; 98.31±2.12%, CD90; 94.2±4.1% and CD105; 90.92±5.59%) (Figure 4.) and negative markers show less than 1% (CD34; 0.93±0.14% and CD45; 0.32±0.18%).
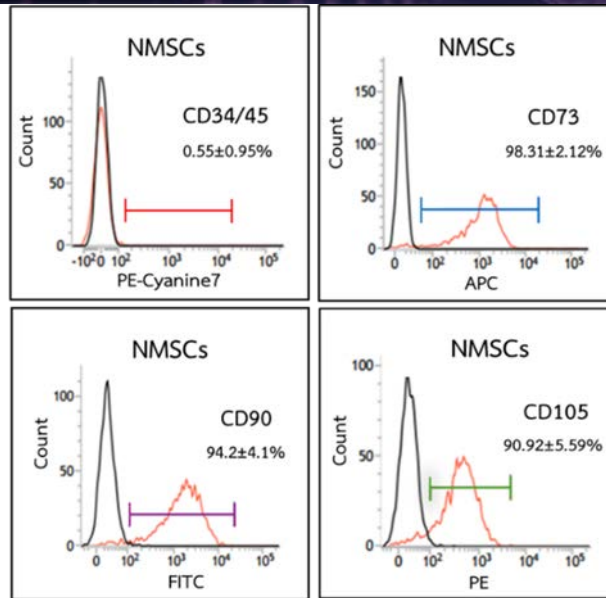
Figure 4 Immunophenotypic analysis of NMSCs (n=4) were showed specific surface marker of positive markers (CD73, CD90 and CD105) and negative markers (CD34 and CD45).

5.1.5 Trilineage differentiation of NMSCs

The morphology of NMSCs was evaluated using an inverted microscope previous to the initiation of cells differentiation. The cells differentiation was evaluated using by specific staining solution. In adipogenic differentiation, the cells show positive stained with oil red-o (Figure 5C). Osteogenic differentiation cells were assessed bone matrix mineralization that show positive with alizarin red stained (Figure 5D) and chondrogenic differentiation cells were evaluated extracellular matrix with alcian blue stained (Figure 5E) at day 21.
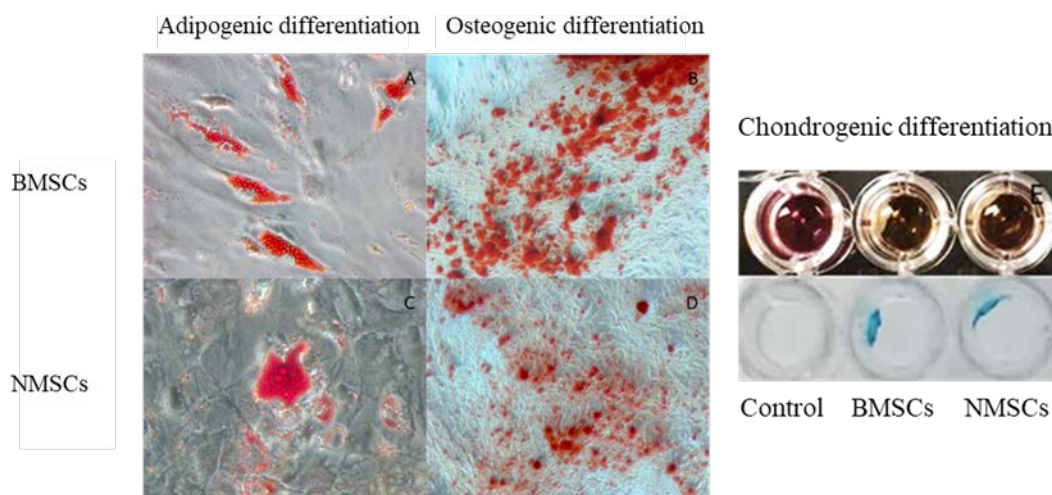
Figure 5: At day 21, NMSCs differentiation to adipocyte stained by oil red-o (B), osteoblast stained by alizarin red (D), and chondrocyte stained by alcian blue (E).

5.1.6 A comparison of BMSCs and NMSCs in terms of the levels of mRNA expression associated with adipogenesis, osteogenesis, and chondrogenesis.

In the subsequent phase of this investigation, our focus revolves around conducting a comparative analysis of gene expression to assess the adipogenic, osteogenic, and chondrogenic environments in MSCs. The study encompasses both mesenchymal stem cells derived from NMSCs and BMSCs. The study's findings revealed that NMSCs express RUNX2 and SOX9, indicating their superior capability in osteogenic and chondrogenic environments compared to BMSCs. However, during the adipogenic phase, the significance of PPAR-gamma genes in BMSCs was greater, suggesting an enhanced involvement in adipogenesis compared to NMSCs (Figure 6).
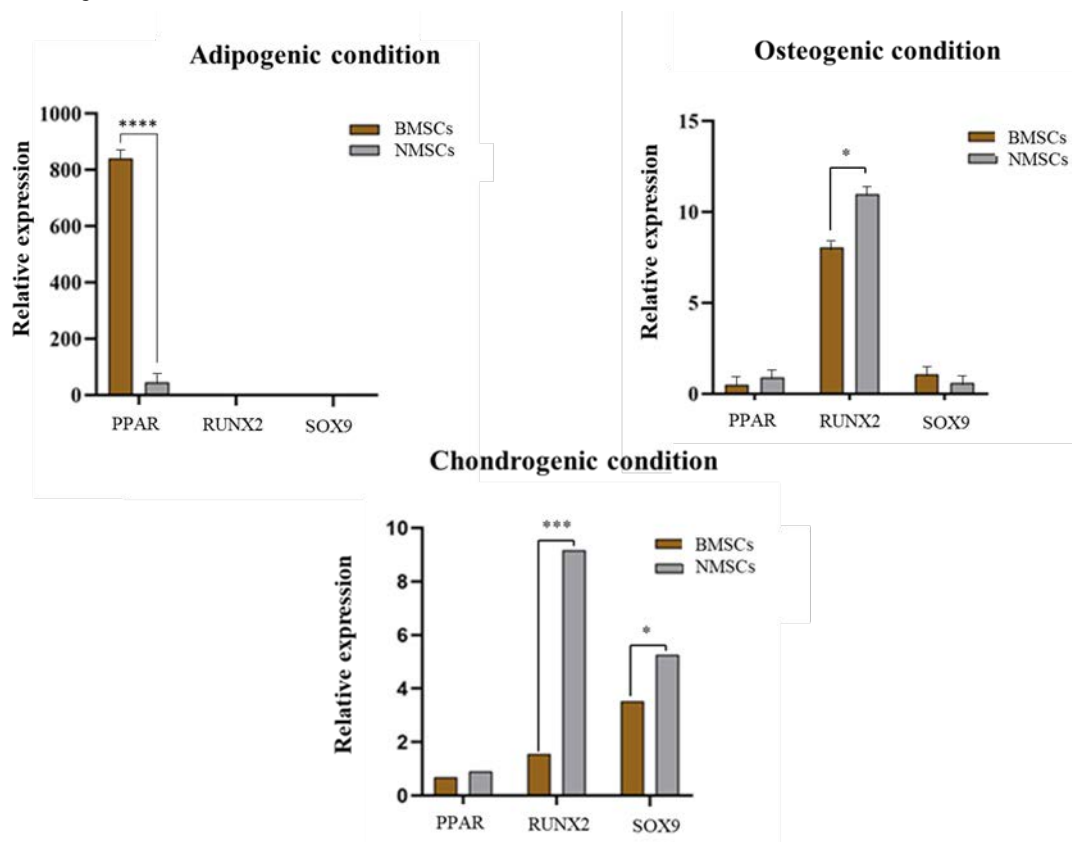
Figure 6. Relative gene expression fold change from BMSCs and NMSCs on day 21 in different conditions, including adipogenic (A), osteogenic (B), and chondrogenic mediums (C). Statistical analysis by two-way ANOVA

5.1.7 Stimulation of Specific Genes During Osteogenesis Under Differentiation Conditions

To compare the gene expression of osteogenesis condition of NMSCs, the cells were seeded under static conditions and exhibited monolayer of adherent cells after culture in the osteogenic medium between days 0, 7 and 14 respectively. The osteogenesis potential of NMSCs after cultured until day 14 was determined using gene expression analysis in 2 different types of culture medium, including basal

medium and osteogenic medium. The expression of ALPL, COL2A1, RUNX2, SOX9 and GDF5 gene in each culture medium at days 0, 7 and 14 was assessed.

Under osteogenic conditions, gene expression of NMSCs revealed that most of the identified genes show significant changes at day 7 and 14. Those gene were expressed to compare with the control (Figure 7).

Figure 7. Relative gene expression fold change levels were assessed in cells cultured under osteogenic versus basal conditions. Data represent mean ± SEM (*P < 0.05, **P < 0.01, ***P < 0.001) by two-way ANOVA.

5.2 Discussion

In this study, our aim was to establish the presence of mesenchymal stem cells derived from NMSCs associated with bone fractures. Additionally, we endeavored to thoroughly characterize the properties of these NMSCs in accordance with the guidelines established by the International Society for Cell and Gene Therapy (ISCT). The results exhibited that MSCs can be isolated from non-union tissues. The cells were attached to a culture container and demonstrated heterogeneous morphology become a homogeneous monolayer of fibroblast-like cells. In investigating the characteristics of MSCs through flow cytometry, the results indicated that a significant proportion, exceeding 95%, exhibited positive markers. Furthermore, MSCs displayed a minimal expression, less than 2%, of hematopoietic markers. The assessment of cellular differentiation potential demonstrated that the isolated cells were capable of undergoing adipogenesis, osteogenesis, and chondrogenesis. However, NMSC adipogenesis was only faintly discernible through Oil Red O staining, contrasting with the robust adipogenesis observed in MSCs from other sources such as bone marrow and adipose tissue-derived stem cells [13]. This aligns with the examination of cell differentiation potentials. Previous study by Tulyapruek et al. (2014) demonstrated that Wistar rats induce atrophic nonunion characterized by chondrogenic and osteogenic differentiation, with adipogenic differentiation notably absent. The possibility that these cells serve as progenitor cells in the non-union tissue was postulated by the researchers. On the other hand, MSCs showed a variety of morphologies and remained fixed as a monolayer on the culture vessel's surface. The ISCT guidelines were followed for MSCs identification [14].

In the subsequent phase of this investigation, our focus revolves around conducting a comparative analysis of gene expression to assess the adipogenic, osteogenic, and chondrogenic environments in MSCs. The study encompasses both mesenchymal stem cells derived from NMSCs and BMSCs. The study's findings revealed that NMSCs express RUNX2 and SOX9, indicating their superior capability in osteogenic environments compared to BMSCs. However, during the adipogenic phase, the significance of PPAR-gamma genes in BMSCs was greater, suggesting an enhanced involvement in adipogenesis compared to NMSCs.
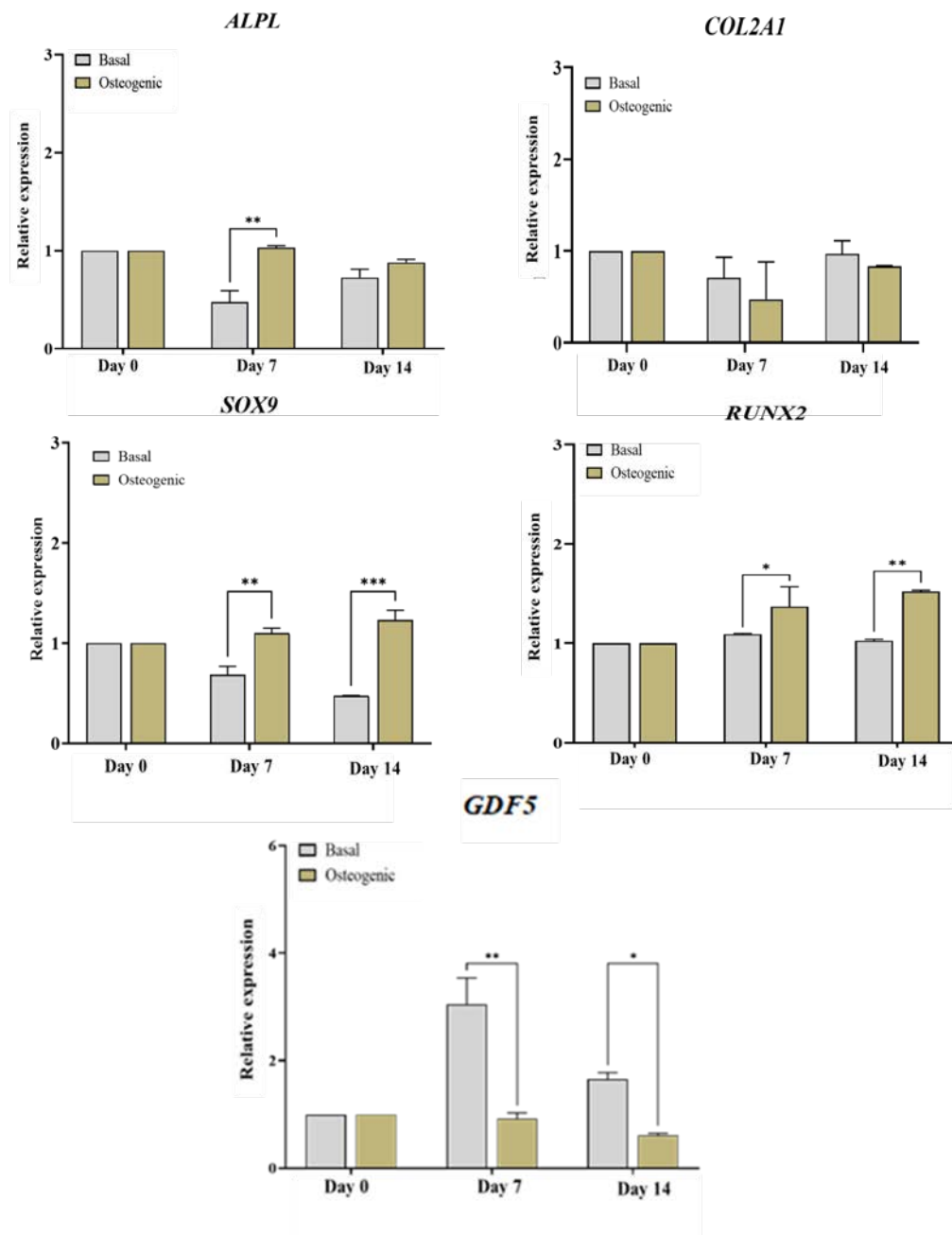
In the study of gene expression under osteogenic conditions, it was observed that NMSCs cultured in osteogenic medium exhibited significantly higher expression levels of ALPL, SOX9, and RUNX2 genes compared to NMSCs cultured in basal medium at Day 7. Notably, at Day 14, the expression of SOX9 and RUNX2 in NMSCs remained significantly elevated, demonstrating their enhanced osteogenic potential. Consistent with the findings of Loebel et al. (2015), the RUNX2/SOX9 ratio expressed in human mesenchymal stem cells (hMSCs) was analyzed to predict the ossification process. The study demonstrated that SOX9 expression was downregulated as the ratio of RUNX2 to SOX9 increased with extended culture duration. Conversely, SOX9 expression was upregulated with prolonged culture time.[15]. These observations highlight that RUNX2 and SOX9 serve as critical early indicators of osteogenic differentiation during in vitro conditions, providing valuable insights into the molecular mechanisms underlying bone

formation The SOX9 gene is crucial for skeletal development, particularly in processes related to fibrosis. Similarly, RUNX2 plays a key role in the development and maintenance of bones and cartilage, driving osteoblast differentiation. Additionally, RUNX2 regulates osteoblast lineage commitment from mesenchymal stem cells and is essential for chondrocyte maturation and cartilage phenotype specification, highlighting its critical role in skeletal development [16,17]. In contrast, GDF5 expression was significantly higher in BMSCs than in NMSCs on both day 7 and day 14. This suggests that BMSCs exhibit a stronger capacity for GDF5 expression under osteogenic conditions, potentially contributing to their superior osteogenic potential and bone regeneration ability. Because the GDF5 gene is essential for osteogenesis, contributing to the formation and repair of bone tissue. It also plays a pivotal role in promoting angiogenesis within the bone microenvironment, a process mediated by osteoblast-derived vascular endothelial growth factor-A (VEGF-A). GDF5 plays a critical role in bone regeneration and vascularization, both essential for effective bone healing. The reduced GDF5 expression in NMSCs may contribute to the impaired healing seen in non-union fractures. This underscores the need for further investigation into GDF5's role in the regenerative potential of these cells. Ultimately, exploring GDF5 as a key target may offer promising therapeutic strategies in regenerative medicine.

This study has several limitations, including a small sample size, inherent heterogeneity related to bone characteristics and age, lack of comparison groups, and failure to assess impairment. To overcome these limitations, further research is needed, particularly in the areas of mechanical testing and in vivo studies.

5.3 Conclusion

In conclusion, this study successfully developed effective techniques for isolating non-union derived mesenchymal stem cells from the callus bone at the fracture site. The NMSCs demonstrated conformity with the criteria set forth by the International Society for Cell Therapy (ISCT), positioning them as a prime representative of mesenchymal stem cells. In genes expression associated with cell differentiation potentials, BMSCs promoted PPARG in adipogenesis, but not osteogenesis and chondrogenesis conditions. NMSCs promoted RUNX2 in osteogenesis and chondrogenesis conditions and promoted only SOX9 in chondrogenesis condition. Our study demonstrates that NMSCs exhibit significantly reduced expression levels of the *GDF5* gene in comparison to other genes. The *GDF5* gene is critical for osteogenesis and plays a pivotal role in inducing angiogenesis within bone tissue through osteoblast-derived VEGF-A. These findings suggest that the downregulated expression of *GDF5* in non-union tissues may significantly contribute to the impaired bone regeneration and healing observed in non-union fractures. In the future, *GDF5* induction could serve as a therapeutic strategy for treating non-union fracture patients.

6. Recommendations

This research contributes to the evolving field of regenerative medicine, offering a promising approach to improving patient outcomes and advancing therapeutic strategies.

7. Acknowledgments

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Bond strength of Experimental Light Cured Orthodontic Adhesive Containing Gold Nanoparticles

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Abstract

The integration of gold nanoparticles (AuNPs) into orthodontic adhesives has potential implications for reducing white spot lesions around orthodontic brackets owing to their anti-microbial properties. Still, it may influence adhesive characteristics, with bond strength crucial for mechanical properties. This study aimed to compare the bond strength of an experimental light-cured orthodontic adhesive containing 0.5 wt% AuNPs (AuNPs group) with a commercially available light-cured orthodontic adhesive (control group), Transbond XT (3M Unitek, Monrovia, California, USA). Forty human upper premolars were randomly assigned to two groups (n=20 per group) and bonded with metal brackets using two different adhesives. The shear bond strength (SBS) and adhesive remnant index (ARI) were assessed and compared between the two adhesive groups using a universal testing machine and scanning electron microscope, respectively. The degree of conversion (DC) was assessed by Fourier transformation infrared spectroscopy (FTIR) immediately, Day 1, Day 7, and 1 month. The data were analyzed using an independent sample t-test for SBS, Fisher's exact test for ARI, Mann-Whitney U test, and pairwise comparison for DC ($P<0.05$). No significant differences were observed in SBS between AuNPs and control groups (22.82 ± 5.29 and 20.99 ± 6.94 MPa). The highest frequency of ARI score within each group was 1. The AuNPs group demonstrated a higher DC at each time point, although DC did not statistically increase with time in both groups. Orthodontic adhesive containing AuNPs could be an alternative adhesive as it exhibited comparable bond strength and significantly higher DC than the commercial adhesive, Transbond XT.

Keywords: adhesive remnant index (ARI); degree of conversion (DC); gold nanoparticles (AuNPs); orthodontic adhesives; shear bond strength (SBS)

1. Introduction

Enamel decalcification or white spot lesions around brackets is a significant challenge in fixed orthodontics (Srivastava et al., 2013). It can decrease bracket bonding strength, resulting in bracket loosening, interrupting the force system, and prolonging treatment time. An effective way to reduce the occurrence of lesions without relying on patient compliance is the use of antibacterial adhesives (Oz et al., 2019). Several antimicrobial agents, including nanoparticles, have been combined into orthodontic products (Sodagar et al., 2016). Gold nanoparticles (AuNPs) have been extensively studied as they are considered non-toxic and can be easily prepared and bound to various substrates (Lima et al., 2013). They have also shown antibacterial activity against both gram-positive and gram-negative bacteria. Although the size and shape of the AuNPs can affect their properties (Carnovale et al., 2019), spherical AuNPs were found to exhibit greater antimicrobial activity than other shapes. In a recent study by Akarajarasrod et al., orthodontic adhesives containing AuNPs reduced the growth of cariogenic bacteria, *Streptococcus mutans,* and *Streptococcus sobrinus*, which accumulate on metallic brackets (Akarajarasrod et al., 2021).

Nanofillers are known to increase mechanical strength and provide structural reinforcement (Al-Nafori et al., 2017). Shear bond strength (SBS) is essential for adhesives to resist debonding forces (International Organization for Standardization 2013). A recent in-vitro systematic review and meta-analysis by Pourhajibagher et al. reported that incorporating antimicrobial NPs did not result in drastic changes in SBS. However, none of the included studies used AuNPs (Pourhajibagher et al., 2020). Dadkan et al. revealed increased mechanical properties when changing the concentration of AuNPs from X/10 to 10X with 5X of AuNPs as the optimum concentration (Dadkan et al., 2014). In contrast, a study by Al-Nafori et al showed that using AuNPs did not affect the bond strength (Al-Nafori et al., 2017). Orthodontic adhesives should have adequate strength to endure forces from treatment and mastication while being non-hazardous to the tooth surface when debonding (Alzainal et al., 2020). Most studies have utilized the adhesive remnant index (ARI) to evaluate the debonding characteristics. Moreover, the degree of conversion (DC) can influence the physical properties of adhesives. A high percentage in complete polymerization is associated with excellent mechanical properties and less adverse effects from unreacted releasing monomer (Sideridou et al., 2002).

Since limited given studies, a comprehensive evaluation of the mechanical performance of the nano-filled adhesive is essential to assess the impact of AuNPs incorporation. The null hypothesis was that there is no difference in mechanical performance of the nano-filled adhesive compared to commercial adhesive.

2. Research Objectives

The objective of this study was to compare bond strength of experimental light-cured orthodontic adhesive containing AuNPs with a commercially available conventional light-cured orthodontic adhesive, Transbond XT.

3. Research Methodology

A flowchart for the study processing is available in Figure 1

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┌─────────────────────────────┐
│ Define the research problem and │
│   develop research questions    │
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              │
              ▼
┌─────────────────────────────┐
│      Review literature          │
└─────────────────────────────┘
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┌─────────────────────────────┐
│  Develop research hypotheses    │
│        and objectives           │
└─────────────────────────────┘
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┌─────────────────────────────┐
│    Select research design       │
│      and methodology            │
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┌─────────────────────────────┐        ┌──────────────────────────────────┐
│ Adhesive and sample preparation │──────│ 1. Adhesive preparation          │
└─────────────────────────────┘        │ - AuNPs group and control group  │
              │                         │ 2. Sample preparation            │
              │                         │ - tooth preparation and bonding  │
              │                         │   procedure                      │
              ▼                         └──────────────────────────────────┘
┌─────────────────────────────┐        ┌──────────────────────────────────┐
│ Research testing and data       │──────│ 1. Characterization of adhesives │
│       collection                │      │ 2. Shear bond strength test and  │
└─────────────────────────────┘        │ identify adhesive remnant index  │
              │                         │ 3. Degree of conversion test     │
              ▼                         └──────────────────────────────────┘
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│        Data analysis            │──────│      Statistical analysis        │
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│  Identify results and discussion│──────│ Following research objectives and│
└─────────────────────────────┘        │   comparing with other studies   │
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│    Research implications        │
│       and conclusion            │
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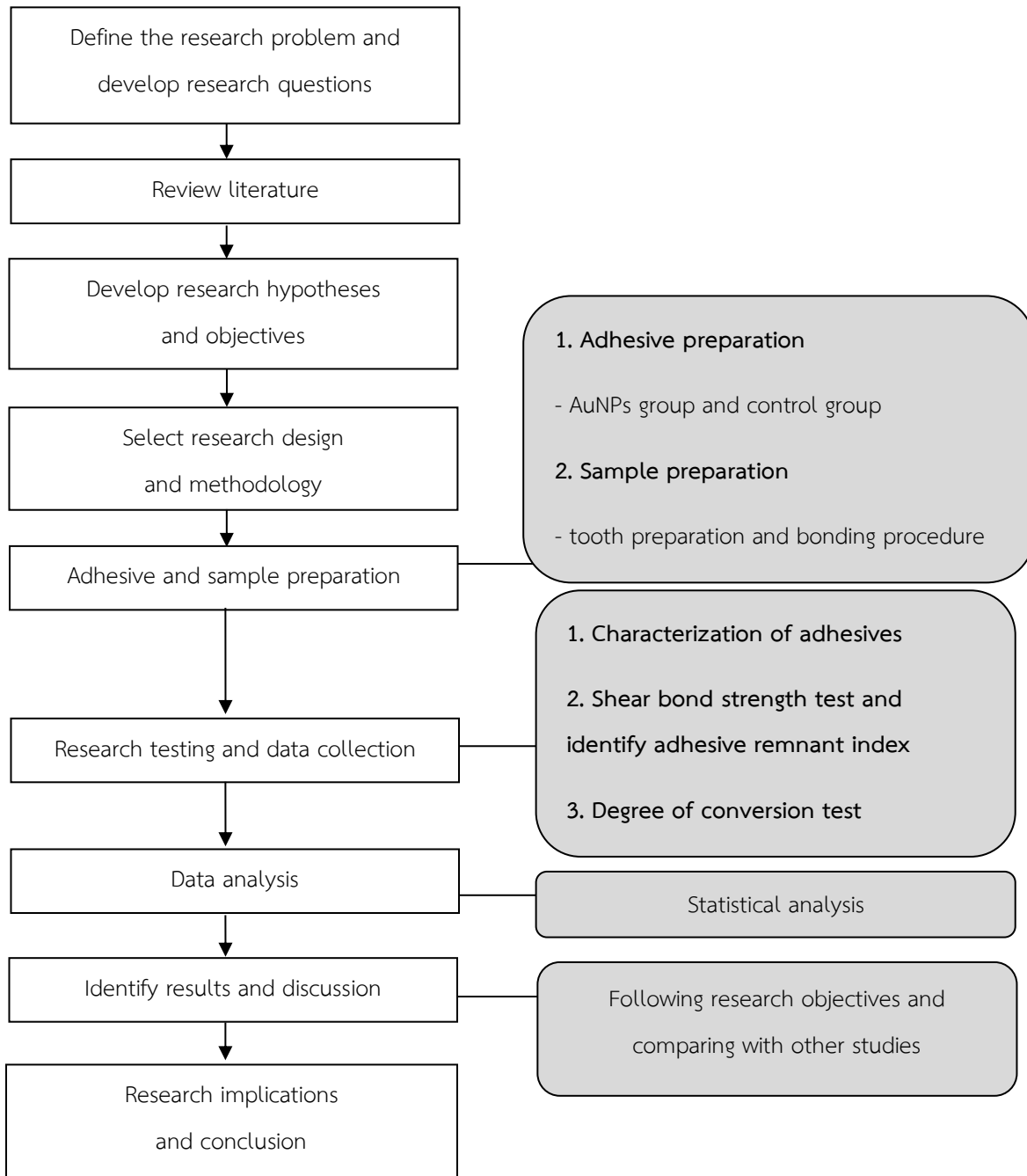
Figure 1 shows a flowchart of the study processing of this research

3.1 Adhesive preparation

The experimental light-cured orthodontic adhesives containing AuNPs were prepared using the formulation described in our previous study (Akarajarasrod et al., 2021; K. Nimcharoensuk et al., 2019). All compositions were mixed with the adhesive in special containers using a centrifuge (Kubota) and food blender (Electrolux) in an environment devoid of artificial light and stored in opaque containers at room temperature (Table 1). The control was a commercially available orthodontic adhesive, Transbond XT (3M, Unitek; Monrovia, CA, USA) (Table 2).

Table 1 Composition of AuNPs adhesive

List	Composition	Type of composition	Amount (wt%)
1	Bisphenol A glycerolate dimethacrylate (Bis-GMA)	Monomer	20.65
2	Triethylene glycol dimethacrylate (TEGDMA)	Monomer	8.85
3	Silanized barium borosilicate glass with particle size 0.7 micron	Filler	69.5
4	Gold nanoparticles (AuNPs) with spherical shape and particle size of 20 – 40 nm, stabilized by Cetyltrimethylammonium bromide (CTAB) Concentration = 3 mg/ml	Filler	0.5
5	Diphenyl (2,4,6-trimethylbenzoyl) phosphine oxide (TPO)	Initiator	0.5

1-3 from Essington, PA, USA; 4 from the Department of Biochemistry, Faculty of Medicine, Siriraj Hospital, Bangkok, Thailand; 5 from St. Louis, MO, USA

Table 2 Composition of control adhesive (Transbond^{TM} XT adhesive)

List	Composition	Type of composition	Amount (wt%)
1	Bisphenol A Diglycidyl Ether Dimethacrylate (BIS-GMA)	Monomer	14
2	Bisphenol A Bis (2-Hydroxyethyl Ether) Dimethacrylate (BIS-EMA)	Monomer	9
3	Silane-treated quartz, Silane-treated silica	Filler	77
4	Camphorquinone (<1wt%), Other (<1wt%)	Initiator	<1

3.2 Characterization of adhesives

Both adhesives were assessed under scanning electron microscopy (SEM) (JEOL JSM-6610LV., Tokyo, JAPAN) at various magnifications for particle characterization and adhesion to the tooth surface. Polymerized AuNPs adhesives were examined for AuNPs morphology and size under SEM (JEOL JSM-IT700HR., Tokyo, JAPAN). Then, Energy dispersive X-ray Spectroscopy (EDX) analysis (EDS Oxford X-Max 65, UK) was performed at 15 kV to analyze elemental composition and confirm AuNPs presence.

3.3 Shear bond strength (SBS) and adhesive remnant index (ARI score).

The acquired 40 freshly extracted teeth in this study were approved by the Institutional Review Board, Faculty of Dentistry/ Faculty of Pharmacy, Mahidol University (COE.No.MU-DT/PY-IRB 2022/055.0212). Based on a pilot test, sample size calculation revealed a minimum of 12 samples for each adhesive group relying on 95% confidence, 95% test power, and d = 1.405 effect size. The teeth were collected at Oral and Maxillofacial Surgery Clinic, Faculty of Dentistry, Mahidol University. The inclusion criteria were non-carious human upper premolar with intact enamel and extracted with orthodontic or periodontal disease purpose. The teeth excluded were presence with carious lesions, cracks, restorations, defects and history of bleaching. The teeth were randomly assigned to 2 groups consisting of 20 in each group of adhesives. They were stored in 0.1% thymol at room temperature for < 30 days and their roots were resected 2 mm below the CEJ. The crowns were then mounted, aligned perpendicularly in a polyvinyl chloride tube, and stored in distilled water.

All upper premolar brackets (ROTH 0.022 Mini Diamond Twin pre-adjusted edgewise, Ormco Corp., CA, USA) were bonded on the extracted teeth according to the manufacturer's guidelines. Each tooth surface was etched with 37% phosphoric acid (Transbond^{TM} XT etching gel; 3M) for 20 seconds, rinsed with DI water for 15 seconds, and applied with a thin layer of Transbond^{TM} XT Primer; 3M. Experimental adhesive (AuNPs) and control adhesive (Transbond^{TM} XT adhesive; 3M) were used (n = 20 per group). Each bracket was pressed on the tooth surface with 500 N load (Figure 2A). Any excess adhesive was removed, and light polymerized by VALO Multiwavelength LED light curing unit (Ultradent, Utah, USA) in high power mode for 12 seconds; 4 seconds each on mesial, distal and buccal surfaces (Figure 2B). After storage in distilled water at 37°C for 24 hours, brackets were debonded for SBS testing by the universal testing machine (Instron model 5566, Instron Corporation, Canton, MA, USA) with a crosshead speed of 0.5 mm/minute, 500 N loaded on occluso-gingival aspect (Figure 2C and 2D). The SBS was calculated using the following equation (1) (International Organization for Standardization 2013; K. Nimcharoensuk et al., 2019).

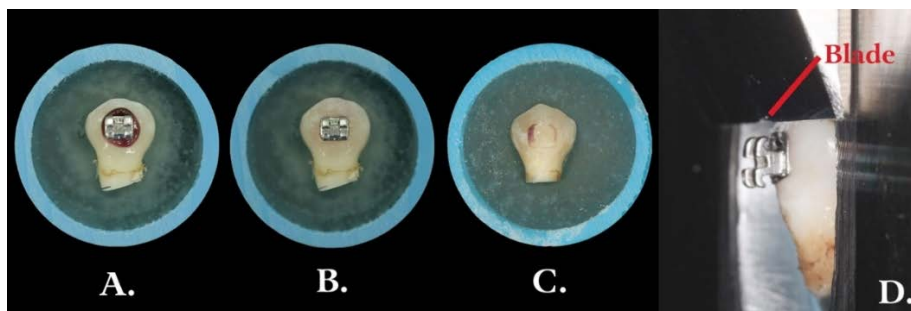$$SBS \ (MPa) = \frac{F\,(N)}{A\,(m^2)} \tag{1}$$

Figure 2 shows experimental adhesive containing gold nanoparticles when bonded and debonded**.**

The adhesive remnant index (ARI) was used to describe the amount of resin remaining on the tooth using SEM (JEOL JSM-6610LV., Tokyo, JAPAN) at 25X magnification. The images were then analyzed using the ImageJ program, Version 1.53k (Wayne Rasband and contributors, National Institutes of Health, USA) (Montasser & Drummond, 2009).

The criteria are as follows:

Score 0 = No adhesive left on the tooth

Score 1 = Less than half of the adhesive left on the tooth

Score 2 = More than half of the adhesive left on the tooth

Score 3 = All adhesives left on the tooth, with a distinct impression of the bracket mesh.

3.4 Degree of conversion (DC)

Based on an analogous study (Hasan, 2021), a minimum sample size of 2 for each adhesive group was determined and relied on a 95% confidence, 95% test power, and d = 8.193 effect size. A total of 5 smear samples from each group were placed on an Attenuated Total Reflectance (ATR) crystal of Fourier transform infrared spectroscopy (Figure 3A) (FTIR, Nicolet 6700, Madison, Michigan, USA) to assess the C–C double bonds of pre-polymerized resin. The unpolymerized adhesives were molded (1 mm in thickness and 10 mm in diameter), covered with a mylar strip, and irradiated with a VALO light curing device (Ultradent, Utah, USA, 1,400 mW/cm^2) for 12 seconds (Figure 3C). The infrared spectra of the material were evaluated immediately after curing (Figure 3D). All specimens were stored in light-proof boxes until day 1, day 7, and day 30 after polymerization. The FTIR spectra were recorded in the region 2,000-500 cm^{-1} wavenumbers with a range of 4 cm^{-1} resolution and 32 scans (Figure 3B). The % DC was calculated from the aliphatic C=C peak at 1638 cm^{-1} and the aromatic C=C peak at 1608 cm^{-1} according to the following equation (2) (Chaichana et al., 2022; Kanin Nimcharoensuk et al., 2019)

$$\% \ DC = (1 - \frac{Cured_{aliphatic}/Cured_{aromatic}}{Uncured_{aliphatic}/Uncured_{aromatic}}) \times 100\% \tag{2}$$
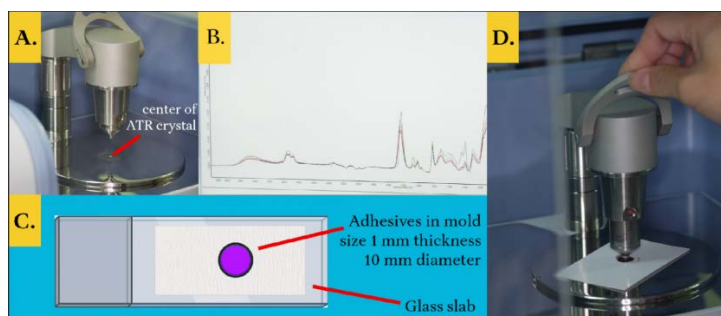

Figure 3 shows the degree of conversion analysis by FTIR spectroscopy**.**

3.5 Statistical analysis

Statistical analysis was performed with SPSS software, Version 21 (SPSS Inc., Chicago, IL, USA). Shapiro–Wilk test and independent sample t-test were used for SBS analysis. Fisher's exact test was used to compare the ARI scores. Nonparametric Mann-Whitney U test and Friedman's two-way test were used to measure the degree of conversion analysis. The level of significance was set at *P-value of* < 0.05.

4. Research Results and Discussion

4.1 Characterization of adhesives

SEM images revealed a homogeneous particle distribution of AuNPs adhesive compared to Transbond XT, which presented a variety of particle sizes (Figure 4). No marked distinct features at the enamel resin interface in the cross-section samples between both groups except fillers (Figure 5). Spherical gold nanoparticles with an average size of 20-40 nm were shown dispersed in the experimental adhesive (Figure 6) and were confirmed contained in the experimental adhesive (Figure 7).
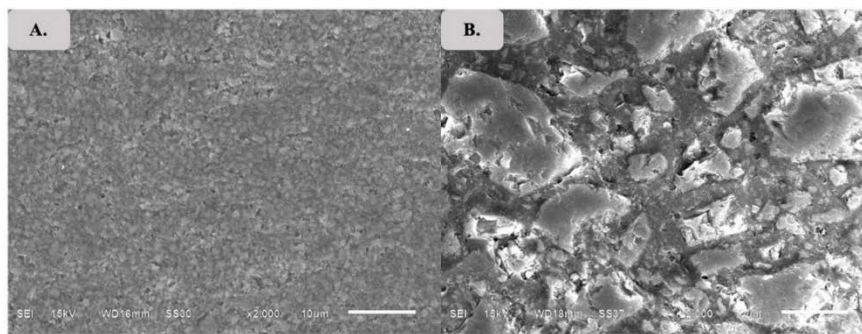

Figure 4 demonstrates the SEM micrographs of particle characterization at 2000x magnification of (A.) AuNPs adhesive compared to (B.) Transbond XT
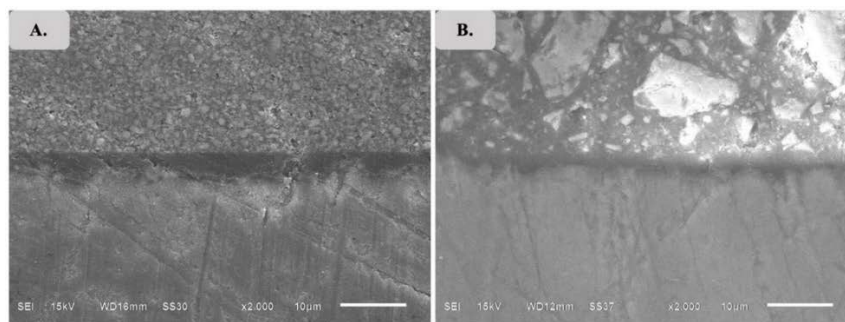

Figure 5 demonstrates the SEM micrographs at 2000x magnification of the adhesion of both adhesives to tooth surface between (A.) AuNPs adhesive compared to (B.) Transbond XT
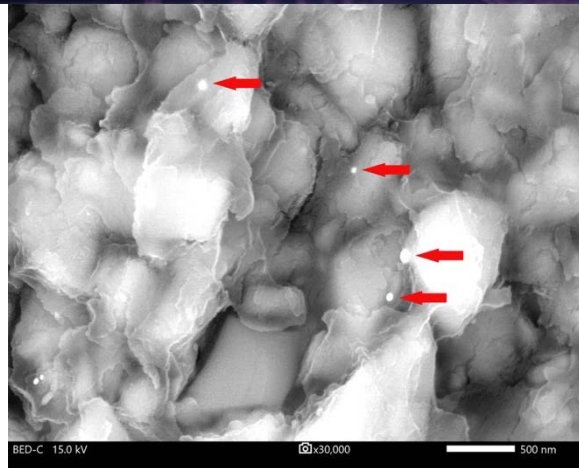
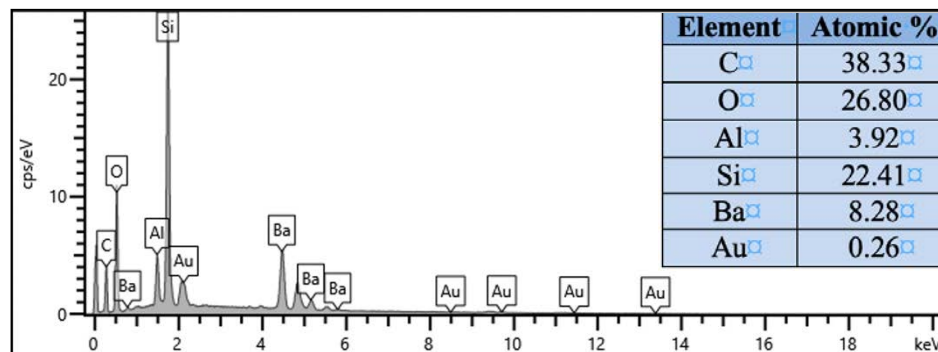**Figure 6** SEM image of gold nanoparticles in the experimental adhesive.

Element	Atomic %
C	38.33
O	26.80
Al	3.92
Si	22.41
Ba	8.28
Au	0.26

Figure 7 Elemental composition of AuNPs adhesive using EDX analysis (C=Carbon, O=Oxygen, Al=Aluminum, Si=Silica, Ba=Barium and Au=Gold)

4.2 Shear bond strength (SBS) and Adhesive remnant index (ARI)

The mean SBS of the AuNPs group was higher than that of the control group, with no statistically significant differences (Table 3). After debonding, adhesive remnants on the tooth surface and under bracket bases were also evaluated (Figure 8 and Figure 9). ARI score also demonstrated no significant difference between both groups, with score 1 being observed with the highest frequency (Table 4).

Table 3 Descriptive statistics and independent sample T-test of shear bond strength

Groups	Shear Bond Strength (MPa)			
	N	Mean ± SD*	t	P-value
AuNPs group	20	22.82 ± 5.29	0.94	P=0.353
Control group	20	20.99 ± 6.94	df=38	

* Significant = P < 0.05

Table 4 Frequency, percentage and Fisher's exact test of ARI score for both groups

Groups	ARI				x^2	P-value
	0	1	2	3		
AuNPs group	-	17 (85%)	3 (15%)	-	1.729	P=0.451
Control group	-	14 (70%)	5 (25%)	1 (5%)	df=2	
Total	-	31 (77.5%)	8 (20%)	1 (2.5%)		

* Significant = P < 0.05
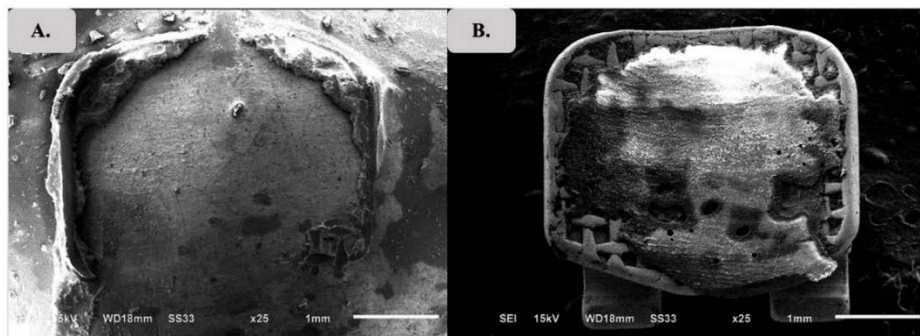
Figure 8 demonstrates debonded specimens under SEM 25x magnification with less than 50% of adhesive remaining on the enamel (ARI score = 1); (A.) on the enamel and (B.) on the bracket base
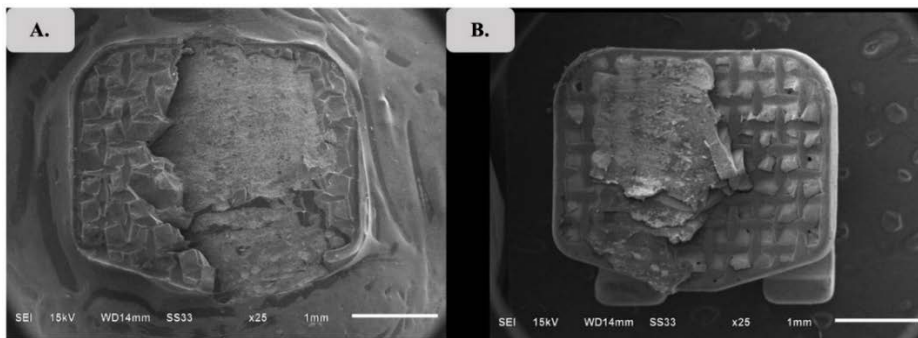
Figure 9 demonstrates debonded specimens under SEM 25x magnification with more than 50% of adhesive remaining on the enamel (ARI score = 2); (A.) on the enamel and (B.) on the bracket base

4.3 Degree of conversion (DC)

Analysis of DC immediately after polymerization showed higher values in AuNPs group than control group. Statistical analysis revealed significant differences between the groups at each time period (P=0.008). However, within the group, DC did not increase with time and showed no statistically significant difference in every time period (Table 5).

Table 5 Degree of conversion % of each group

Median (P25, P75)					
	Immediate	Day 1	Day 7	Day 30	*P*-Value
AuNPs group	42.09 (39.40,44.43)	40.8 (39.73,42.63)	39.77 (39.05,42.97)	41.81 (40.41,43.81)	0.05
Control group	29.12 (28.87,30.02)	28.82 (28.11,29.47)	28.45 (26.9,28.67)	27.84 (27.35,28.92)	0.077
P-Value	0.008	0.008	0.008	0.008	

* Significant = *P* < 0.05

4.4 Discussion

AuNPs are promising agents for their antimicrobial effect and have been used in recent years. Although adhesive containing AuNPs at both concentrations 0.5 and 1.0 wt% had proven antibacterial effectiveness (Akarajarasrod et al., 2021) , 0.5 wt% concentration exhibited lighter color and faster setting and was, therefore, used in our study. Bond performance is a crucial factor that needs to be evaluated to produce orthodontic adhesives on a standardized commercial scale. Since the number of studies on AuNPs adhesives is limited, the primary objective of this study was to evaluate the bond strength of orthodontic adhesives containing AuNPs and Transbond XT. The result indicated no significant difference in SBS between the two groups through SBS and ARI values. This finding suggested that modifying the adhesive with AuNPs did not compromise its bonding strength as compared to traditional formulations. These results provide valuable insights into the potential application of AuNPs-modified adhesives in orthodontics, affirming their viability as a preferable adhesive without sacrificing bond performance.

A few in-vitro studies have investigated the effects of incorporating AuNPs into orthodontic adhesives on their mechanical properties. Al-Nafori et al utilized 100 μg/mL colloidal AuNPs solution diluted in Transbond primer, reporting lower mean SBS values (7.7 ± 2.54 MPa) than in our study (22.82 ± 5.29 MPa) (Al-Nafori et al., 2017), yet statistically insignificant when compared to the control group. Dadkan et al incorporated 3.18 ng/mL AuNPs into Premise composite, achieving a maximum micro-shear bond strength of 18 MPa (Dadkan et al., 2022). However, both studies utilized a wire loop around the adhesive to test the shear test in contrast to our study, which used a razor blade. Shear bond tests can be affected by various factors. In addition, the difference in the mean SBS among the studies could be due to variations in material composition and sample size. Comparatively, when considering studies with other NPs, it can be assumed that most NPs at logical concentrations did not significantly impact SBS, unlike unmodified adhesives (Mirhashemi & Jazi, 2021; Pourhajibagher et al., 2020). Although our Transbond XT values were lower than some previous studies (Ahmed et al., 2023; Mirhashemi et al., 2021), they exceeded the clinically acceptable range of 5.9-7.8 MPa (Reynolds & von Fraunhofer, 1976).

ARI scores were assessed in our study to identify the site of bond failure, which was categorized as adhesive, cohesive, or mixed. Adhesive failure was defined as debonding at the enamel-adhesive or bracket-adhesive interface. Cohesive failure was defined as complete debonding within the adhesive. Mixed failure (a combination of adhesive and cohesive failures) was divided into two subcategories: failure closer to enamel and failure closer to bracket (Pont et al., 2010). Our study showed a predominant ARI score of 1 in both groups (< 50% left on the tooth), indicating mixed failure closer to the enamel. This characteristic implied a stronger bond towards the bracket than to the enamel, facilitating easier post-debonding adhesive removal. Caution is advised during debonding to minimize the risk of enamel cracks and damage (Al Shamsi et al., 2006), SEM screening revealed no enamel cracks in our study.

No studies have explored the bond failure patterns of adhesives containing AuNPs. Thus, a comparative analysis was conducted with analogous studies employing metal oxide NPs, such as silver. Biglar et al (Biglar et al., 2023) also reported ARI score of 1 as the highest frequency and location of debonding was closer to the enamel. Rezvani et al. reported that the addition of 0.5% SiNPs did not improve the bond strength to dentin, resulting in a higher frequency of cohesive and mixed failures (Rezvani et al., 2019). Most samples of Transbond XT showed ARI score of 1, which conformed with previous studies (Rahmanpanah et al., 2023). Some studies have reported greater observations of ARI score 2 (Behnaz et al., 2018; Farzanegan et al., 2021). However, when compared with the NPs group, the results found no difference among past literature (Behnaz et al., 2018; Farzanegan et al., 2021; Rahmanpanah et al., 2023) which conformed with our study.

The degree of conversion (DC) significantly influences mechanical properties, with higher conversion contributing to greater strength (Ferracane et al., 1997). In this study, AuNPs group exhibited a significantly higher DC than the control group, aligning with other studies. No previous studies have evaluated the DC of orthodontic adhesives containing AuNPs. The conversion of AuNPs group in this study was lower than that of other NPs in other studies (Chaichana et al., 2022; Hasan, 2021). Hasan et al. stated that a 2 wt% NP group achieved a higher DC (80.57%) than the control group (64.79%), but it required a longer photopolymerization time with higher intensity (Hasan, 2021). Previous study also showed a significant increase in DC with increasing the irradiation time (Ilie et al., 2014).

In this study, the conversion of the Transbond group observed immediately following light polymerization (29.38%) was higher than in previous studies (24.6%), even though the same LED light curing unit (VALO) was utilized. On the contrary, Transbond DC was reported to be lower compared to other findings, which may be due to the research methodology (Chaichana et al., 2022). Yilmaz et al also noted the lowest DC of Transbond XT when using VALO light-curing compared with other light-curing units (Yılmaz et al., 2020).

Although there were differences in the DC among the two groups in this study, there were no differences in the SBS. The higher DC observed in the AuNPs group may be supported by a previous study, which stated that different materials have different percentages of remaining methacrylate groups after

polymerization (Ruyter & Györösi, 1976). Transbond XT is composed of BisGMA and BisEMA as monomers while the AuNPs adhesive was formed by BisGMA and TEGDMA. In order to reduce viscosity, increase DC, and facilitate higher filler incorporation, BisGMA is often blended with less viscous co-monomers like TEGDMA and UDMA (Anseth et al., 1996). However, these co-monomers may impact matrix resin properties, increasing water sorption and curing shrinkage. Research by Floyd and Dickens' observed a significant increase in % DC for BisGMA-based resins with higher TEGDMA concentration (Floyd & Dickens, 2006).

Another possible factor could be due to the types of photoinitiators in the adhesives. TPO contributes to a higher degree of conversion than composites containing camphorquinone (CQ), as reported in many studies (Kowalska et al., 2021). Transbond XT contains CQ, but the AuNPs adhesive used TPO to prevent yellowing. Lucirin TPO showed increased efficiency due to its higher photo absorption and generation of more free radicals through alpha-cleavage. However, TPO's light absorbance below 420 nm necessitates dual peak light curing units, like VALO, with primary peaks around 468 nm for CQ initiation and secondary peaks at approximately 400 nm. The AuNPs adhesive would require light-curing units with a broad wavelength spectrum, especially extending below 400 nm (Janda et al., 2007).

The FTIR measurements in the present study showed that the median % DC did not increase with time in either of the study groups. The post-cure polymerization of dental composites is typically completed within one day after light curing (Al-Ahdal et al., 2015). The results conformed with a study by Corekci et al., who concluded that the conversion of many orthodontic adhesives, including Transbond XT, did not change within 1 month (Çörekçi et al., 2011). Moreover, the samples were stored in a lightproof box to prevent exposure to other factors that could affect polymerization.

Compared to other NPs, AuNPs offer lower toxicity and significant antibacterial activity (Al-Nafori et al., 2017). The incorporation of AuNPs into orthodontic adhesives can reduce the growth of *S.mutans* and *S.sobrinus* commonly found on metallic brackets (Akarajarasrod et al., 2021). In this aspect, the AuNPs adhesive could be superior to the conventional adhesives, potentially preventing white spot lesions. Although the AuNPs adhesive exhibited a purplish-red color, it could be advantageous during debonding because of the improved visibility of the remaining adhesives. However, it is important to note that this is an experimental in-vitro study, and further testing, including cytotoxicity and in-vivo studies, is necessary before clinical applications.

5. Conclusion

The incorporation of AuNPs into orthodontic adhesives exhibited comparable bond strength in terms of SBS and ARI to commercial products and a higher degree of conversion (DC). The study demonstrated that the addition of 0.5 wt% AuNPs did not adversely affect the bonding performance of the orthodontic adhesive. It can be concluded that orthodontic adhesive incorporating AuNPs could serve as an alternative to commercial products. However, further in-vivo and clinical studies are essential to validate its use and ensure long-term safety for future applications.

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Humanities and Social Sciences

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Create Understanding and Develop Thai Dancers into World-class Cheer Dance

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Abstract

This paper explores the evolution and development of Thai dancers in the realm of cheer dance, specifically focusing on the journey towards achieving world-class status in pom dance. Cheer dance, characterized by its blend of athleticism and artistry, has gained global recognition for its dynamic routines and vibrant performances. The objectives of this study are twofold: first, to foster a comprehensive understanding of cheer dance styles within Thai society, and second, to elucidate the nuances of pom dance development, with a specific focus on arm movements. In Thailand, cheer dance competitions adhere to rules set by two main organizations: the Cheer Association of Thailand, following the International Cheer Union (ICU) guidelines, and the Thailand National Cheerleading Championship, which aligns with the International Federation of Cheerleading (IFC) standards. These competitions serve as platforms for elevating cheer dance to an international level, culminating in aspirations to introduce the sport to the 2028 Olympic Games. Critical to the development of pom dance athletes is the mastery of arm motions, pivotal in enhancing routine aesthetics and synchronization. Techniques such as precision, variety, and creativity in arm movements, combined with seamless transitions and unified formations, underscore the technical prowess and emotional depth inherent in pom dance performances. Training regimes encompass foundational technique, strength conditioning, pom-specific skills practice, choreography sessions, and performance opportunities, supported by holistic approaches to nutrition, rest, mindset, and continued learning. In conclusion, the pursuit of world-class status in pom dance demands a multifaceted approach that integrates technical proficiency with artistic expression, underpinned by a commitment to growth and innovation. By fostering a deeper understanding of cheer dance styles and honing the intricacies of pom dance arm movements, Thailand aims to establish itself as a formidable presence on the global cheer dance stage.

Keywords: arm motion; cheer dance; pom dance

1. Introduction

Cheer dance, derived from the fusion of "cheer" and "dance," combines vocal encouragement and rhythmic movement. While "cheer" involves vocal support to uplift and motivate teams during games, "dance" encompasses expressive bodily movements synchronized with music. Initially stemming from cheerleading, a sport originating in the United States, cheer dance evolved from routines featuring gymnastic elements like jumps, tumbling, lifts, and tosses, accompanied by spirited chants. The global recognition of cheerleading as a competitive sport was catalyzed by ESPN International's broadcasting of cheerleading competitions beginning in 1997, sparking widespread interest. (Geronimo) Dance and cheer share commonalities, such as synchronized movements to music and participation in sports events, yet their distinctive styles, attire, and techniques easily distinguish between them. According to the PAUSD athletics department, cheer and dance belong to separate extracurricular categories. Cheer, classified as a sport, involves stunts, tumbling, and rigid movements, whereas dance, as an art form, boasts limitless possibilities in expression. Dance encompasses various styles like hip hop, jazz, lyrical, and contemporary, each with its own unique characteristics, unlike cheer routines which tend to have a standardized appearance. Dance routines offer a wider spectrum of motion, ranging from soft and fluid to sharp and dynamic. The disparities between cheer and dance extend beyond physical activities; they reflect in the teams' external commitments. While both perform at sporting events, the dance team's engagements outside school include participation in five competitions annually, including national-level contests, contrasting with the cheer team's non-competitive approach. Moreover, most dance team members receive external training, whereas the majority of cheer team members do not. The relationship between dance and cheer team members can be likened to that of a square and a rectangle: dancers may also participate in cheerleading, but the reverse is not true. (Zhao, 2017) The Difference between cheerleading and dance, cheerleaders aim to entertain onlookers and enhance team morale by supporting their home sports team with a combination of movement, acrobatic stunts, tumbling, along with rhythmic chanting and cheers. In the other hand, dance serves as an artistic medium to convey narratives, emotions, or simply express movement and rhythm through bodily motion, serving as a form of pure expression. (Bellerose, 2022)

Cheer dance, a captivating fusion of athleticism and artistry, continues to enchant audiences worldwide with its dynamic routines and vibrant performances. Rooted in cheerleading and dance traditions, pom dance has evolved into a distinct form of expression, combining intricate choreography, precise formations, and spirited movements. At its core, pom dance celebrates teamwork, discipline, and creativity. Dancers, adorned in sparkling uniforms adorned with pom-poms, synchronize their movements with precision, creating visually stunning displays of unity and grace. Each routine is meticulously crafted, blending elements of jazz, hip-hop, and traditional dance styles to create a seamless tapestry of movement. The allure of pom dance lies not only in its technical proficiency but also in its emotional resonance. Dancers convey a range of emotions through

their performances, from joy and exuberance to determination and intensity. Every step, jump, and gesture are imbued with meaning, allowing audiences to connect with the narrative of each routine on a visceral level. Beyond its aesthetic appeal, pom dance serves as a powerful platform for self-expression and empowerment. Dancers, often representing diverse backgrounds and experiences, find solace and strength in the camaraderie of their teammates and the exhilaration of performance. Through countless hours of practice and rehearsal, they hone their skills, push their limits, and ultimately, inspire others to pursue their passions fearlessly. In recent years, pom dance has gained recognition as a competitive sport, with teams competing at regional, national, and international levels. These competitions showcase the talent and dedication of dancers from around the globe, elevating pom dance to new heights of athleticism and artistry. However, at its heart, pom dance remains a celebration of community and creativity. Whether performed on a grand stage or a local gymnasium, it embodies the spirit of collaboration, perseverance, and joy. As dancers move in harmony to the rhythm of the music, they remind us of the power of dance to unite, uplift, and inspire. In a world often fraught with challenges and uncertainties, pom dance offers a beacon of hope and optimism. It reminds us of the beauty that can be found in synchronicity, the strength that comes from solidarity, and the sheer joy of movement. So, the next time you watch a pom dance performance, take a moment to appreciate the skill, passion, and artistry that goes into every routine. For in the world of pom dance, every step is a testament to the extraordinary potential of the human spirit.

2. Thailand's entry into the world-class cheer competition

In Thailand, there are cheer dance competitions using the rules of 2 organizations: 1. Cheer Association of Thailand which follows the rule of International Cheer Union (ICU) and 2. Thailand National Cheerleading Championship which follows the rule of International Federation of Cheerleading (IFC). This has laid down different rules for the format of the competition as can be seen the differences, but both organizations aim to bring cheer dance to the international level, especially The Cheer Association of Thailand, which has set a goal to introduce the sport of cheer dancing into the Olympic Games 2028. This can be considered as another sport that brings dancing skills to the international stage where it is truly accepted. However, developing the skills of a cheer dance athlete is not the same thing. Those who aspire to advance their dancing skills into the Olympic Games need to be familiar with the rules.

International Cheer Union (ICU) and International Federation of Cheerleading (IFC), which sets rules for pom dance. However, various dance organizations may have their own set of rules and regulations for pom dance competitions. Typically, rules for pom dance competitions cover aspects such as:

- Routine Length: There's usually a minimum and maximum time limit for pom dance routines.

- Technical Elements: These include required elements such as jumps, turns, formations, and choreography that must be included in the routine.

- Music: Guidelines for music selection, editing, and usage during the routine.

- Uniforms and Appearance: Regulations regarding uniform styles, colors, accessories, and overall presentation.

- Scoring: Criteria for judging the routines, which may include factors like synchronization, technique, creativity, showmanship, and overall performance.

- Safety: Rules to ensure the safety of the performers, including limitations on stunts and lifts.

- Division Specifics: Different divisions (such as age groups or skill levels) may have their own set of rules and guidelines.

It's essential for teams and participants to familiarize themselves with the specific rules and regulations of the organization or competition they are participating in to ensure compliance and fairness. Rules may also evolve over time, so staying updated with the latest guidelines is crucial for all involved in pom dance competitions. The International Federation of Cheerleading (IFC) does not have specific rules solely dedicated to pom dance. The IFC primarily focuses on cheerleading rules and regulations, including categories such as cheer, group stunt, partner stunt, and dance. However, many international cheerleading competitions, including those sanctioned by the IFC or other federations like the International Cheer Union (ICU), may include pom dance as one of their categories. In such cases, the rules and regulations for pom dance are typically integrated into the broader framework of cheerleading or dance categories. These rules often cover elements such as routine length, technical requirements, music guidelines, uniform regulations, scoring criteria, safety protocols, and division specifics. They aim to ensure fairness, safety, and consistency across all aspects of the competition. For the most accurate and up-to-date information on pom dance rules in international cheerleading competitions, it's recommended to consult the specific rulebooks and guidelines provided by the organizing bodies of those competitions or federations. These resources typically outline in detail the requirements and standards for pom dance performances at the international level.

3. Cheer dance style according to the organization's regulations

3.1 Dance concepts in International Cheer Union (ICU)

POM: Incorporates the use of proper Pom motion technique that is sharp, clean, and precise while allowing for the use of concepts from Jazz, Hip Hop and High Kick. An emphasis is placed on group execution including synchronization, uniformity and spacing. The choreography of a dynamic and effective routine focuses on musicality, staging of visual effects through fluid and creative transitions, levels, and groups, along with complexity of movement and skills. Poms are required to be used throughout the routine. The uniform/costuming should reflect the category style.

HIP HOP: Incorporates authentic street style influenced movements with groove and style. An emphasis is placed on group execution including synchronization, uniformity and spacing. The choreography of a dynamic

and effective routine utilizes musicality, staging, complexity of movement and athleticism. Distinctive clothing and accessories reflecting the Hip Hop Culture must be worn.

JAZZ: Incorporates traditional or stylized dynamic movements with strength, continuity, presence, and proper technical execution. An emphasis is placed on group execution including synchronization, uniformity, and spacing. The choreography of a dynamic and effective routine utilizes musicality, staging, complexity of movement and skills. The overall impression of the routine should be lively, energetic, and motivating, with the understanding that the dynamics of movement may change to utilize musicality. The uniform/costuming should reflect the category style. (2024 ICU WCC Rules & Regulations, 2024)

3.2 Dance concepts in International Federation of Cheerleading (IFC)

Cheer Dance & Pom Dance

Dance Lifts/Stunting

Any move where the body weight is supported by another competitor without the flyer's foot/feet touching the ground. Allowed: Pulling the competitor up from a sitting/crouching position on the ground; competitor leaning on another with at least one foot on the ground. Prohibited: Dance Lifts, Stunts.

Urban Cheer Dance

Dance Lifts/Stunting

Allowed: A weight bearing skill performed by 2 or more individuals that is fluid and continuous in movement. Prohibited: Static Dance Lifts, Stunts. (EUROPEAN CHEERLEADING ASSOCIATION Rules & Regulations ECC 2024, 2024)

From both Rules & Regulations I can see the differences between ICU and IFC follows:

The dance concepts outlined by the International Cheer Union (ICU) and the International Federation of Cheerleading (IFC) demonstrate distinct approaches to choreography and execution within the realm of cheer dance.

ICU emphasizes three main dance styles: POM, HIP HOP, and JAZZ. In POM routines, precise motions are paramount, drawing from Jazz, Hip Hop, and High Kick styles, with an emphasis on synchronization, uniformity, and the dynamic use of poms throughout the routine. HIP HOP routines focus on authentic street-style movements, prioritizing synchronization, musicality, and the incorporation of distinctive clothing reflecting Hip Hop culture. JAZZ routines showcase dynamic movements executed with strength and technical precision, emphasizing synchronization, musicality, and lively, energetic performance, with uniform/costuming reflecting the category style.

In contrast, IFC's focus lies on Cheer Dance & Pom Dance and Urban Cheer Dance, with attention to Dance Lifts/Stunting. Cheer Dance & Pom Dance incorporates lifts and stunting where the body weight is supported by another competitor without the flyer's feet touching the ground, with specific guidelines for

allowed and prohibited techniques. Urban Cheer Dance permits fluid, continuous weight-bearing skills performed by multiple individuals, with restrictions on static lifts and stunts.

While both organizations prioritize synchronization, uniformity, and musicality in their dance concepts, ICU's approach encompasses a wider range of dance styles and choreographic elements, whereas IFC's focus is more specifically on cheer dance techniques and stunts, tailored to different categories of competition.

3.3 Differences in classification for scoring cheer dance competitions on the score sheet

Moreover, the format of the two competitions can be compared based on the score sheet, each of which has a specific format for its respective organization and can be summarized as follows.

International Cheer Union (ICU) score sheet

Figure 1 JAZZ DIVISIONS, FREESTYLE POM DIVISIONS, and HIP HOP DIVISIONS

Note: From © International Cheer Union 2024

International Federation of Cheerleading (IFC) score sheet

Figure 2 CHEER DANCE, POM DANCE, and URBAN DANCE Score Sheet

Note: From © EUROPEAN CHEERLEADING ASSOCIATION Rules & Regulations ECC 2024

Comparing the score sheets for dance categories in the International Cheer Union (ICU) and the International Federation of Cheerleading (IFC) reveals differences in evaluation criteria and emphasis:

International Cheer Union (ICU):

1. Dance Technique: ICU score sheets typically assess dance technique, including execution, precision, and mastery of various styles such as Jazz, Hip Hop, and Pom.

2. Choreography: Judges evaluate the creativity and complexity of choreography, including transitions, formations, and use of space.

3. Musicality: ICU emphasizes musicality, assessing how well the routine synchronizes with the music in terms of rhythm, timing, and interpretation.

4. Uniformity and Synchronization: Judges look for uniformity and synchronization among team members, ensuring that movements are executed in unison.

5. Overall Effectiveness: ICU considers the overall impact and effectiveness of the dance routine in engaging the audience and conveying the team's theme or message.

International Federation of Cheerleading (IFC):

1. Dance Elements within Cheerleading: IFC score sheets may integrate dance elements within cheerleading categories such as Cheer Dance & Pom Dance or Urban Cheer Dance.

2. Execution and Technique: Similar to ICU, IFC evaluates dance execution and technique, including precision, synchronization, and mastery of specific dance moves.

3. Integration with Cheerleading Elements: IFC score sheets may also consider how well the dance routine integrates with other cheerleading elements such as stunts, tosses, and pyramids.

4. Creativity and Originality: Judges assess the creativity and originality of choreography, looking for innovative movements and formations that enhance the overall routine.

5. Overall Presentation: IFC emphasizes the overall presentation of the routine, including energy level, showmanship, and teamwork among team members.

While both ICU and IFC evaluate dance routines based on technical execution, creativity, and overall performance quality, ICU may focus more on dance-specific criteria such as technique and musicality, while IFC may integrate dance elements within broader cheerleading categories and consider how well the routine complements other cheerleading elements.

From the study of both organizations, it is evident that dance is integrated into the competition, encompassing cheer dance under different names. However, when considering the dance styles, it becomes apparent that both organizations feature distinct forms. These include jazz dancing, hip hop dancing, and pom dancing. Thailand has achieved notable success in hip-hop competitions, securing the world championship for three consecutive years. However, in jazz and pom-pom dancing, Thailand's success has been comparatively limited. Particularly, jazz dance in Thailand boasts numerous domestic competition stages and a considerable number of talented dancers. However, these dancers often refrain from participating in international competitions, perceiving them as overly focused on athleticism and lacking in the aesthetic qualities of the dance style. Consequently, there is a scarcity of participation in this category. Despite considering the format of the score sheet and definitions provided by the ICU and IFC, it is evident that these competitions do not significantly differ from domestic dance competitions. In addition, considering the author's roles as a judge in both national and international organizations, it becomes apparent that there is still insufficient understanding of Pom dancing. This lack of understanding persists due to the unique focus of Pom dancing, particularly emphasizing arm motions as crucial.

4. Enhancing Arm Motions in Pom Dance: Techniques, Training, and Impacts

Pom dance, a genre that blends athleticism with artistic expression, relies heavily on the precision and synchronization of arm movements. These motions are not merely decorative but are fundamental to the choreography, enhancing visual appeal and contributing to the narrative of the performance. This article examines the techniques and training strategies essential for mastering arm motions in pom dance, supported by academic research and practical applications. Pom dance routines are carefully designed to highlight the dancers' precision, synchronization, and showmanship. Key elements of a successful pom routine include clean

arm motions, sharp formations, and smooth transitions between movements. Dancers collaborate as a team to ensure perfect synchronization, creating visually impressive pictures and patterns on the performance floor. Engaging in pom dance provides dancers with numerous benefits. This dance style requires discipline, strength, and stamina, which help dancers improve their overall technique and physicality. The precise arm movements and formations in pom dance enhance dancers' control, coordination, and body awareness. Furthermore, the high-energy nature of pom dance boosts dancers' endurance and cardiovascular fitness. Pom dance not only improves technical skills but is also an enjoyable style to both watch and perform. Dynamic choreography, upbeat music, and vibrant costumes make for an entertaining and engaging experience for spectators. Dancers find joy in the energetic movements, teamwork, and sense of accomplishment that pom dance offers. (ANDROMEDA CHEER & DANCE, 2023)

4.1 Techniques for Arm Motions in Pom Dance

Precision and Sharpness: Arm motions in pom dance must be executed with high precision and sharpness. This requires dancers to focus on clean lines and consistent movement quality, ensuring each gesture is well-defined and contributes to the overall aesthetic. Studies have shown that precision in movement is crucial for audience perception and adjudication in dance competitions (Kassing & Jay, 2003).

Variety and Creativity: Incorporating a variety of arm movements can add depth and interest to a pom dance routine. Common movements include high Vs, low Vs, T motions, diagonals, L motions, and angles. Creative arm choreography not only maintains audience engagement but also showcases the versatility of the dancers (Ryman, 2016).

Figure 3 Basic Arm Motion Techniques

Note: From © SOUTHEAST REGION 2022

Pom-Pom Usage: Utilizing pom-poms effectively in arm movements accentuates beats and highlights key elements of the routine. Research indicates that the visual impact of pom-poms can enhance audience engagement and judges' scores when used creatively and in synchrony with music (Marshall & Singer, 1992).

Synchronization and Unity: Synchronized arm motions are vital for creating a unified and cohesive performance. Training for synchronization involves extensive group rehearsals and a focus on timing and spacing. The importance of synchronization in dance teams has been emphasized in various studies, noting its impact on performance quality and group dynamics (Koutedakis & Sharp, 2004).

Expression and Emotion: Arm movements in pom dance convey emotions and narrative elements of the routine. Effective use of arm motions can express excitement, confidence, elegance, or intensity, contributing to the storytelling aspect of the performance. Emotional expression through movement has been shown to enhance audience connection and engagement (Hanna, 2008).

Transitions and Formations: Smooth transitions between arm movements are essential for maintaining the fluidity and continuity of the routine. Proper spacing and formation within the team are crucial for visual

harmony. The choreography should ensure seamless transitions to keep the performance dynamic and polished (Smith-Autard, 2010).

To achieve effective arm motions in pom dance, precision and sharpness are crucial, contributing to clean lines and consistent movement quality that are essential for audience perception and judging criteria. Integrating a variety of arm movements showcases the dancers' versatility while maintaining audience interest. Utilizing pom-poms effectively highlights beats and key elements, enhancing the visual impact. Synchronization and unity, achieved through extensive group rehearsals, are vital for cohesive performances, significantly influencing overall quality and group dynamics. Additionally, arm motions convey emotions and narrative elements, fostering a stronger connection with the audience through expressive movements. Smooth transitions and proper formations are essential for maintaining fluidity and visual harmony, ensuring the performance is both dynamic and polished.

4.2 Training Strategies for Developing Arm Motions

To effectively develop arm motions in pom dance, establishing a strong foundation in dance technique is the first step. This includes mastering fundamental movements such as kicks, turns, leaps, and basic choreography, which provide the basis for more complex arm motions (Wright, 2000). Building strength, especially in the arms and shoulders, is crucial for executing sharp and sustained arm movements. A training regimen that includes strength exercises, cardio workouts, and flexibility training helps build endurance and prevents injuries (Koutedakis & Jamurtas, 2004). Specific training sessions focused on pom skills, such as sharp arm movements, synchronized routines, and precise formations, are essential. Using pom-poms during rehearsals simulates performance conditions and improves coordination (Kassing & Jay, 2003). Working with experienced choreographers to create routines that showcase arm movements effectively is crucial. Encouraging creativity and experimentation within the choreography ensures that routines are dynamic and visually appealing (Ryman, 2016). Providing opportunities for dancers to perform in front of audiences, such as through competitions or community events, builds confidence and helps refine stage presence. Performance experience is vital for developing expressive arm movements (Hanna, 2008). Regular constructive feedback helps dancers improve their arm techniques. Encouraging peer and instructor feedback fosters a supportive environment for continuous growth and excellence (Smith-Autard, 2010).

Developing effective arm motions in pom dance necessitates a comprehensive approach combining fundamental dance techniques, strength building, and focused pom skills practice. Establishing a strong technical foundation is essential for mastering complex arm movements, while strength and conditioning regimens ensure the stamina and precision needed for sharp, sustained arm actions. Rehearsing with pom-poms and working with skilled choreographers enhance the visual appeal and coordination of routines. Performance opportunities build confidence and refine stage presence, while constructive feedback and a supportive

environment promote continuous improvement. By integrating these elements, dancers can achieve excellence in pom dance, showcasing dynamic and expressive arm motions that captivate audiences and judges alike.

5. Conclusion

In conclusion, the examination of cheer dance competitions organized by the Cheer Association of Thailand and the Thailand National Cheerleading Championship reveals a nuanced landscape of dance integration under different names. While both organizations encompass various dance styles such as jazz, hip hop, and pom dancing, each showcases distinct characteristics and competitive environments. Thailand has notably excelled in hip-hop competitions, clinching consecutive world championships, yet faces challenges in achieving similar recognition in jazz and pom-pom dancing. Despite domestic acclaim and a wealth of talented jazz dancers, participation in international arenas remains limited, often due to perceived emphasis on athleticism over aesthetic qualities in these styles. Moreover, despite adherence to specific score sheet formats and definitions from the ICU and IFC, the differences between international and domestic competitions appear subtle. This parity suggests ongoing opportunities for refining competition frameworks to better align with global standards and foster broader participation across dance styles. As Thailand continues to navigate these dynamics, nurturing talent and evolving competition structures will be pivotal in elevating its presence and achievements in the Olympic 2028.

For the arm motions, overall are an integral component of pom dance, contributing to its energy, style, and impact. By mastering precision, variety, synchronization, and expression in their arm movements, dancers can elevate their performances to new heights of artistry and excellence. In pom competitions, both dance techniques and arm motions are equally important and contribute significantly to a team's overall performance and score. However, their importance may vary depending on the specific requirements and judging criteria of the competition. Dance Techniques encompass a wide range of elements, including footwork, jumps, turns, kicks, and overall movement quality. Strong dance techniques demonstrate the dancers' skill, athleticism, and artistry. They contribute to the fluidity, precision, and gracefulness of the routine. Judges often evaluate the execution, timing, and proficiency of dance techniques, looking for clean lines, pointed toes, proper alignment, and control in movements. While dance techniques are essential for showcasing the dancers' abilities and artistic expression, they are typically complemented by arm motions to enhance the overall visual impact of the routine. Arm Motions in pom dance add texture, dynamics, and visual interest to the routine. They help create formations, emphasize beats in the music, and convey emotion and expression. Sharp, synchronized arm motions contribute to the precision and uniformity of the performance, enhancing the team's visual presentation and synchronization. Judges pay close attention to the clarity, sharpness, and synchronization of arm motions, as well as their integration with other elements of the routine. While arm

motions are integral to pom dance, they are often accompanied by strong dance techniques to create a balanced and impactful performance.

Developing a dancer into pom dance proficiency requires a holistic approach integrating physical training, technical skill refinement, and artistic expression. Begin with establishing a strong foundation in dance technique, encompassing essential movements like kicks, turns, leaps, and basic choreography. Enhance stamina and strength, particularly in the arms and legs, through a structured regimen combining strength exercises, cardio routines, and flexibility training to bolster endurance and prevent injuries. Focus on pom-specific skills such as sharp arm movements, synchronized routines, and precise formations during dedicated practice sessions, utilizing pom poms to simulate performance conditions and enhance coordination. Collaborate with experienced choreographers to craft dynamic routines that showcase the dancer's personality and skills while adhering to pom dance style requirements. Offer ample opportunities for public performance through competitions, showcases, or community events to build confidence, refine stage presence, and establish audience connection. Foster a supportive environment for continuous improvement by providing constructive feedback, encouraging peer and instructor input, and promoting a growth mindset centered on perseverance, discipline, and passion. Emphasize cross-training in diverse dance genres like jazz, hip-hop, and ballet to enrich versatility and overall performance quality. Prioritize the dancer's physical and mental well-being through proper nutrition, hydration, and rest, essential for optimal performance and recovery. Lastly, cultivate a commitment to lifelong learning and growth within the dynamic landscape of pom dance, urging participation in workshops, classes, and conventions to stay abreast of evolving trends and techniques.

In summary, both dance techniques and arm motions are crucial components of a successful pom dance routine in competition. While dance techniques demonstrate the dancers' skill and artistry, arm motions enhance the visual appeal and synchronization of the performance. To excel in pom competitions, teams must strive for excellence in both areas, achieving a harmonious blend of technical proficiency and artistic expression. Effective arm motions are integral to the success of pom dance routines, enhancing visual appeal, emotional expression, and synchronization. By employing structured training techniques and fostering creativity, dancers can master the precision and artistry required for pom dance. Continued research and innovation in training methods will further advance the discipline, contributing to its recognition and evolution as a competitive art form.

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Guidelines to Improve the Efficiency of Human Resource Management of Vocational Universities in Nanning of Guangxi

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Abstract

This research objective was to study the current situation of the efficiency of Human resource management of vocational universities in Guangxi. The population was 320 administrators and teachers from 5 vocational universities in Guangxi, with a sample group of 172 administrators and teachers. The research instrument was a 5-level rating scale questionnaire. The statistics used for the data analysis were percentage, mean, and standard deviation.

The research result found that the current situation of the efficiency of Human resource management of vocational universities in Guangxi in five aspects was at high level. Ranged from the highest to the lowest mean as follows: Faculty development was the highest mean, followed by faculty tenure and promotion, and participants' recruitment was the lowest mean.

Keywords: human Resource management; vocational universities

1. Introduction

On September 15, 1999, based on the principle of simplify, high efficiency and according to the real needs of colleges and universities, the "Several Opinions on Deepening the Reform of Personnel Distribution System in institutions of higher learning " proposed to simplify the structure of colleges and universities. the Ministry of Education and other departments jointly issued the "Implementation Opinions on Deepening the Reform of Personnel System in Higher Education Institutions"(the Implementation Opinions). the Implementation Opinions point out that to reform the authorized strength of colleges and universities must comply with the principle of "Total-control, Micro-decentralization, Standardized and Reasonable, simplify and high efficiency". November 1, 2016, release by the Central Committee of the Communist Party of China and the State Council, the "Opinions on Deepening the Reform of the Professional Title System" issued regulations on teacher recruitment, authorized strength management, post setting of institutions, title reformation and treatment, improve teacher personnel management system continuously.On November 20, 2017, release by the Central Committee of the Communist Party of China and the State Council, the "Opinions on Comprehensively Deepening the Reform of Teacher Team Construction in the New Era" mentioned that we must improve the quality of higher education teachers comprehensively to build a high-quality and innovative teacher group; to deepening the Reform of Personnel System in Higher Education Institutions, to promote salary system reformation of higher education teachers. On June 24, 2024, at the National Science and Technology Conference, National Science and Technology Award Conference, Academician Conference of the Chinese Academy of Sciences and Chinese Academy of Engineering, the general secretary of the Central Committee of the Communist Party of Chinami Jinping stressed that we must strengthen systematic concept, deepen the talent reformation of the integration of education and technology, better the collaborative education mechanism between science and education, accelerate the cultivation of a large-scale, structure-reasonable and high-quality innovative talents group.

Human resources are one of the most precious resources in today's world. It is not only a valuable strategic resource, but also reflection of comprehensive national strength. At present, human resources in vocational colleges still operates as purely administrative and management form in most scenarios, which focusing on receiving employment, salary promotion, personnel adjustment, file management and so on. There are many drawbacks. It is unable to meet the scientific and high-quality development needs of vocational colleges. therefore, reforming the human resources management in vocational colleges are more and more urgent. To achieve the goals of the organization, the subjective initiative of vocational college faculty and staff should be fully utilized to make full use of their talents and ensure that personnel are appropriate.

In the era of knowledge economy, the role of human resources in promoting economic development and social progress is becoming increasingly prominent, and the advantage of human resources will become

the most fundamental advantage. How to establish a scientific, efficient, systematic, and standardized human resource management mechanism to maximize the overall efficiency of human resources has become an urgent problem to be solved. Even though most vocational colleges in China have established their own human resource management systems, look into the current situation, it is easy to found that , due to outdated management concepts, constraints of management systems, lack of management mechanisms, and relatively low comprehensive quality of managers, vocational college teachers group construction are slowing down, and its 'salary structure are becoming unreasonable. Therefore, it is necessary to strengthen the human resource management of vocational college teachers based on the national conditions, enhance the overall quality of the vocational college teacher team and promote the healthy and high-quality development of vocational colleges.

2. Objectives

To study the current situation of the efficiency of Human resource management of vocational universities in Guangxi.

3. Research Methodology

Population

The population of this research 172 administrators and teachers from 5 vocational universities in Guangxi.

The research instrument

The instrument to collect the data for the objective was the questionnaire designed based on the management system in 5 following aspects: 1) Participants' recruitment, 2) Faculty tenure and promotion, 3) Compliance with labor laws, 4) Faculty development,5) Employee well-being. The questionnaire was divided into two parts:

Part 1: The personal information of sample group, classified by gender, working experience and academic title.

Part 2: The current situation of the efficiency of Human resource Management of vocational universities in Guangxi. The criteria for data interpretation based on five-point Likert's scale, as follow:

5 express the level of the efficiency of human resource management at the highest level

4 express the level of the efficiency of human resource management at high level

3 express the level of the efficiency of human resource management at medium level

2 express the level of the efficiency of human resource management at low level

1 express the level of the efficiency of human resource management at the lowest level

The process of constructing the Instrument

Step 1: Reviewing and analyzing documents, concepts, theories, and research related to the efficiency of Human resource Management of vocational universities.

Step 2: Constructing the questionnaire about the current situation of the efficiency of Human resource Management of vocational universities in Guangxi. Then sending the questionnaire outline of questionnaire to the thesis advisors to review and revise the contents according to the suggestions.

Step 3: The index of objective congruence (IOC) of the questionnaire was examined by three experts. The index of objective congruence (IOC) was 0.67-1.00.

Step 4: Revise the questionnaire based on the experts' suggestions.

Step 5: The questionnaire was distributed to 15 administrators in universities in Guangxi for try-out. The reliability of the questionnaire was obtained by Conbach's Alpha Coefficient.

Step 6: The questionnaire was applied to 172 administrators and teachers in vocational universities in Guangxi.

Data Collection

To achieve the research objectives, the researcher collected the required data according to the type and steps of the research instruments as follows procedures:

1. The researcher requested requirement letter form from the graduate school, Bansomdejchaopraya Rajabhat University for requiring collecting the data from 172 administrators and teachers in vocational universities in Guangxi.

2.The researcher distributed the questionnaire to 172 administrators and teachers and returned questionnaires.

Data analysis

The researchers analyzed the data using the program as follows:

1. Analysis of respondents' status includes: work unit, educational background, and work experience using frequency distribution and percentage.

2.Analysis of the efficiency of human resource management of vocational universities in Nanning of Guangxi in 5 aspects as follows 1) Participants' recruitment, 2) Faculty tenure and promotion, 3) Compliance with labor laws,4) Faculty development,5) Employee well-being. And criteria of mean as follow:

4.50 – 5.00 express highest level

3.50 – 4.49 express high level

2.50 – 3.49 express medium level

1.50 – 2.49 express low level

1.00 – 1.49 express lowest level

4. Research Results and Discussion

The analysis about the current situation of the efficiency of Human resource management of vocational universities in Guangxi was presented in the form of mean and standard deviation.

Table 1 Mean and standard deviation of the current situation of the efficiency of Human resource management of vocational universities in Guangxi in five aspects.

No	The efficiency of Human resource management of vocational universities in Guangxi	$\bar{x}$	S.D.	Level	Order
1	Faculty development	3.75	0.80	high	1
2	Compliance with labor laws	3.57	0.97	high	4
3	Employee well-being	3.58	0.96	high	3
4	Participants' recruitment	3.55	0.99	high	5
5	Faculty tenure and promotion	3.69	0.88	high	2
	Total	**3.68**	**0.92**	**high**	

From Table 1, it was found that the current situation of the efficiency of Human resource management of vocational universities in Guangxi in five aspects was at high level ($\bar{x}$ = 3.68, 0.92). Ranged from the highest to the lowest mean as follows: Faculty development was the highest mean ($\bar{x}$ = 3.75, 0.80), followed by faculty tenure and promotion ($\bar{x}$ = 3.69, 0.88), and participants' recruitment was the lowest mean ($\bar{x}$ = 3.55, 0.99).

Summary of research results

The current situation of the efficiency of Human resource management of vocational universities in Guangxi in five aspects was at a high level ($\bar{x}$ = 3.68, 0.92). Ranged from the highest to the lowest mean as follows: Faculty development was the highest mean $\bar{x}$ = 3.75, 0.80), followed by faculty tenure and promotion ($\bar{x}$ = 3.69, 0.88), and participants' recruitment was the lowest mean ($\bar{x}$ = 3.55, 0.99).

The efficiency of Human resource management of vocational universities in Guangxi in faculty development was the highest mean. Ranged from the highest to the lowest mean as follows: Professional development opportunities ($\bar{x}$ = 3.80, 0.75) was the highest mean, followed by faculty training programs ($\bar{x}$ = 3.70, 0.85), and faculty mentorship ($\bar{x}$ = 3.60, 0.90) was the lowest mean.

The efficiency of Human resource management of vocational universities in Guangxi in faculty tenure and promotion ($\bar{x}$ = 3.69, 0.88) was the highest mean. Ranged from the highest to the lowest mean as follows: Transparent tenure process ($\bar{x}$ = 3.72, 0.82) was the highest mean, followed by promotion criteria clarity ($\bar{x}$ = 3.65, 0.90), and tenure decision-making ($\bar{x}$ = 3.60, 0.95) was the lowest mean.

The efficiency of Human resource management of vocational universities in Guangxi in employee well-being ($\bar{x}$ = 3.58, 0.96) was the highest mean. Ranged from the highest to the lowest mean as follows: Work-life balance ($\bar{x}$ = 3.65, 0.90) was the highest mean, followed by health and wellness programs ($\bar{x}$ = 3.55, 1.00), and employee satisfaction ($\bar{x}$ = 3.50, 1.05) was the lowest mean.

The efficiency of Human resource management of vocational universities in Guangxi in compliance with labor laws ($\bar{x}$ = 3.57, 0.97) was the highest mean. Ranged from the highest to the lowest mean as follows: Fair labor practices ($\bar{x}$ = 3.60, 0.95) was the highest mean, followed by legal compliance training ($\bar{x}$ = 3.55, 1.00), and labor dispute resolution ($\bar{x}$ = 3.50, 1.05) was the lowest mean.

The efficiency of Human resource management of vocational universities in Guangxi in participants' recruitment ($\bar{x}$ = 3.55, 0.99) was the highest mean. Ranged from the highest to the lowest mean as follows: Recruitment strategy effectiveness ($\bar{x}$ = 3.60, 0.95) was the highest mean, followed by candidate experience ($\bar{x}$ = 3.50, 1.05), and diversity in hiring ($\bar{x}$ = 3.45, 1.10) was the lowest mean.

Discussion

Faculty development emphasizes the promotion of learning through a cycle of concrete experience, reflective observation, abstract conceptualization, and active experimentation. This cycle is not only applicable to teacher development but also to other professional fields such as medicine and law. Teachers generate insights through practical reflection and actively try new methods, which aligns with the principles of action research and helps to improve teaching quality and student learning outcomes. Research indicates that teacher development models based on the experiential learning circle theory can effectively promote professional growth and the improvement of teaching practices. For example, the Interconnected Model of Teacher Professional Growth (IMTPG model) proposed by Clarke and Hollingsworth emphasizes that teacher change is triggered through two intermediary mechanisms of reflection and action, involving personal, practice, outcome, and external domains.

The principles of **faculty tenure and promotion** advocate for open access publishing and academic evaluation standards that are consistent with modern concepts of **f**aculty tenure and promotion, emphasizing the quality and impact of academic achievements rather than just quantity. This shift helps to evaluate teachers' academic contributions more fairly, encourages innovation and high-quality research, and thus promotes the healthy development of the academic environment. Relevant research shows that international research evaluation reform practices and insights—represented by DORA—indicate that DORA is one of the most influential initiatives in the field of international scientific evaluation reform. Its promoting organizations' main activities and the explorations carried out by related international academic organizations, funding agencies, universities, etc., influenced by DORA, in terms of research evaluation methods, project reviews, talent evaluation, etc.

The diversity and quality of **employee well-being** can more comprehensively meet the needs and expectations of employees, thereby improving job satisfaction and loyalty. High-quality benefits can stimulate employees' enthusiasm and creativity, enhancing job satisfaction and organizational performance. Relevant research, "The Window of Benefits: Exploring the Deep Connection between Employee Benefits and Job Satisfaction," provides a systematic review, emphasizing the importance of employee benefits in improving job satisfaction, productivity, and motivation. In particular, Herzberg's two-factor theory mentions that employee benefits are an important factor in the work environment, affecting job satisfaction.

There is a relationship between **compliance with labor laws** and employee perceptions, attitudes, and behaviors. Fair labor practices can improve employee job satisfaction and organizational commitment. Colquitt's research constructs and validates the dimensions of organizational justice, which echoes the principles of fairness in complying with labor regulations, helping to enhance employee job satisfaction and the overall performance of the organization. Relevant research, "Why Do Many Companies Dare to Openly Violate Labor Laws?" discusses the enforcement issues of labor laws, pointing out that lax enforcement is the main reason for the neglect of labor laws, emphasizing the importance and necessity of complying with labor laws.

Participant recruitment emphasizes the complementary role of theory and practice in teacher development, arguing that teachers need to understand the theoretical basis behind classroom procedures and the practical application of these theories. This resonates with the combination of theory and practice in participant recruitment, emphasizing the dual consideration of candidates' theoretical knowledge and practical skills in the recruitment process, which helps to find excellent teachers who understand theory and can operate practically. Relevant research, "How Do Teachers Develop?—A Characterization and Analysis Based on Experiential Learning Circle Theory," provides theoretical support for teacher development, indicating that the combination of theory and practice is crucial for professional development of teachers.

5. Recommendations

Implications

From the research results, guidelines to Improve the efficiency of human resource management of vocational universities in Nanning of Guangxi has the following suggestions:

1. In terms of participant recruitment, leverage multiple channels such as social media, professional networks, and campus recruitment to attract talent, implement inclusive recruitment strategies, and value candidates' skills and potential.

2. In terms of compliance with labor laws, regularly train management and human resources departments on labor laws, hire professional legal advisors, and ensure that all human resources policies and practices comply with the latest labor laws.

3. In terms of employee well-being, offer comprehensive health insurance plans, encourage employee participation in decision-making processes, and collect employee opinions and suggestions through regular surveys and feedback meetings.

4. In terms of faculty tenure and promotion, establish clear standards for tenure and promotion, implement peer review mechanisms, and provide faculty with a clear career development path, including the transition from non-tenure track to tenure track positions.

5. In terms of faculty development, provide professional development programs for faculty, including training in teaching skills, research methods, and academic leadership; provide research funding and resources to encourage faculty involvement in academic research and innovation; encourage and support faculty participation in international conferences and exchange programs to broaden horizons and establish international cooperation.

Future Research

1. Faculty Recruitment System and Evaluation System: Future research will focus on how to establish and improve the faculty recruitment system, as well as how to construct a scientifically sound and reasonable faculty evaluation system and incentive mechanisms to enhance the overall quality of the university's teaching staff and the competitiveness of the university.

2. Internationalization and Global Leadership: Against the backdrop of globalization, research on university human resource management will pay more attention to the cultivation of international talents, international team collaboration, cross-cultural communication, and how to build a global leadership model and performance assessment plans.

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A Survey of Library and Information Science Education in Foundation Knowledge Areas (FKAs) According to IFLA Guidelines for Professional Library and Information Science (LIS) Education Programmes

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Abstract

This research aims to examine the alignment of Library and Information Science (LIS) education curricula with the guidelines and standards set by the International Federation of Library Associations and Institutions (IFLA). The study focuses on 14 universities in Thailand, evaluating their course offerings against the eight Foundation Knowledge Areas (FKAs) defined by IFLA: FKA1 Information in Society, FKA2 Foundations of the LIS Profession, FKA3 Information and Communication Technologies, FKA4 Research and Innovation, FKA5 Information Resources Management, FKA6 Management for Information Professionals, FKA7 Information Needs and User Services, and FKA8 Literacies and Learning. The results revealed a total of 431 courses, comprising 218 required courses and 213 elective courses. Analyzing the distribution of these courses, FKA3 Information and Communication Technologies had the highest number of courses overall, with 88 courses. When considering only required courses, FKA3 still has the highest number of courses, followed closely by FKA2 Foundations of the LIS Profession, which has a similar number of courses. For elective courses, FKA1 Information in Society and FKA6 Management for Information Professionals were tied as the most prevalent. The findings indicate a strong emphasis on technology and professional foundations in required courses, while societal information and management aspects dominate elective offerings. The study highlights areas of strength and potential gaps in current LIS curricula, providing valuable insights for future curriculum development in line with international standards.

Keywords: curriculum development; Foundation Knowledge Areas (FKA) ; IFLA guidelines; library and information science; LIS education.

1. Introduction

Library and Information Science (LIS) education has long adapted to meet the needs of a rapidly changing information environment. As digital transformation and globalization reshape the field, there is an increased need for standardization in LIS education to ensure that graduates are prepared for the challenges they will face. The IFLA Guidelines for Professional Library and Information Science Education Programs serve as a global framework to inform curriculum design, particularly through its Foundation Knowledge Areas (FKAs), which cover core topics essential for LIS professionals.

Chu, C.M., Raju, J., et. al. (2022) highlighted the significance of the Foundational Knowledge Areas (FKAs) defined in the IFLA Guidelines for LIS Education. These FKAs represent essential domains of expertise required for professionals in Library and Information Science (LIS). Each foundational area can be summarized as follows: **FKA1 Information in Society**: Explores the role of information in social, cultural, and economic contexts, including the impact of information policies and ethics. **FKA2 Foundations of the LIS Profession**: Covers the history, principles, values, and ethics that underpin the LIS profession, providing a solid grounding for future professionals. **FKA3 Information and Communication Technologies (ICTs):** Focuses on the use of digital technologies and systems that support information access, retrieval, and management. **FKA4 Research and Innovation:** Emphasizes the importance of research methods, critical thinking, and the application of innovative practices in LIS. **FKA5 Information Resources Management:** Deals with the processes of acquiring, organizing, and maintaining information resources, ensuring effective access and preservation. **FKA6 Management for Information Professionals:** Provides knowledge on organizational management, leadership skills, and strategic planning in library and information services. **FKA7 Information Needs and User Services:** Addresses the identification of user information needs and the design of services to meet those needs effectively. And **FKA8 Literacies and Learning:** Focuses on promoting information literacy, digital literacy, and lifelong learning to empower users in accessing and using information efficiently.

Therefore, this research aims to explore the extent to which the courses in LIS curricula of universities in Thailand align with the Foundational Knowledge Areas (FKAs) defined in the IFLA Guidelines for LIS Education in various aspects. These FKAs form the core framework for developing comprehensive LIS education programs, equipping professionals with the necessary skills and knowledge to thrive in diverse information environments. The findings will be utilized to develop and improve the curricula to ensure comprehensive coverage of all areas and alignment with international standards.

2. Research Objectives

This research aims to explore the extent to which current Library and Information Science (LIS) courses teaching is aligned with FKA.

3. Research Methodology

This research is a survey-based study employing questionnaires and a comprehensive analysis of courses corresponding to each Foundational Knowledge Area (FKA). The population for this research consisted of representatives from undergraduate LIS (Library and Information Science) programs at 48 universities in Thailand. (Ministry of Higher Education, Science, Research, and Innovation, 2024) The sample was selected using stratified random sampling, dividing the population into two groups: public/state universities and Rajabhat universities. A simple random sampling method was then applied, selecting 7 universities from the group of public/state universities and 7 universities from the group of Rajabhat universities, making a total of 14 universities.

This research utilized open-ended survey questions, which were developed collaboratively with faculty members representing 14 universities offering LIS programs. The final set of questions was designed to comprehensively address the issues and topics relevant to the study's data collection needs. The collected data encompasses information on degrees, programs, and faculties from these 14 universities. The following table presents the list of 14 universities selected as the sample group for this research.

Universities	Degrees	Programmes	Faculties
1. Chulalongkorn University (CU)	Bachelor of Arts (B.A.)	Information Studies	Faculty of Arts
2. Chiang Mai University (CMU)	Bachelor of Arts (B.A.)	Information Studies	Faculty of Humanities Sciences
3. Khon Kaen University (KKU)	Bachelor of Information Science (B.Inf.Sc.)	-	Faculty of Humanities and Social Sciences
4. Ramkhamhaeng University (RU)	Bachelor of Arts (B.A.)	Information and Library Science	Faculty of Humanities Sciences
5. Srinakharinwirot University (SWU)	Bachelor of Arts (B.A.)	Information Studies	Faculty of Humanities Sciences
6. Sukhothai Thammathirat Open University (STOU)	Bachelor of Arts (B.A.)	Information Science	School of Liberal Arts
7. Silpakorn University (SU)	Bachelor of Arts (B.A.)	Information and Library Science	Faculty of Arts
8. Bansomdejchaopraya Rajabhat University (BSRU)	Bachelor of Arts (B.A.)	Library and Information Science	Faculty of Humanities and Social Sciences

Universities	Degrees	Programmes	Faculties
9. Chiang Mai Rajabhat University (CMRU)	Bachelor of Arts (B.A.)	Information and Library Science	Faculty of Humanities and Social Sciences
10. Pibulsongkram Rajabhat University (PSRU)	Bachelor of Arts (B.A.)	Information Science	Faculty of Humanities and Social Sciences
11. Suratthani Rajabhat University (SRU)	Bachelor of Arts (B.A.)	Information and Library Science	Faculty of Humanities and Social Sciences
12. Surindra Rajabhat University (SRRU)	Bachelor of Education (B.Ed.)	Library and Information Science	Faculty of Humanities and Social Sciences
13. Valaya Alongkorn Rajabhat University (VRU)	Bachelor of Arts (B.A.)	Library and Information Science	Faculty of Humanities and Social Sciences
14. Yala Rajabhat University (YRU)	Bachelor of Arts (B.A.)	Information Management for Public and Private Sectors	Faculty of Humanities and Social Sciences

4. Research Results and Discussion

Results and Analysis:

The research results of "A Survey of Library and Information Science Education in Foundation Knowledge Areas (FKAs) According to IFLA Guidelines for Professional Library and Information Science (LIS) Education Programs" are categorized into the following dimensions:

4.1 Ranking of FKAs for required and elective courses.

Table 1 Ranking of FKAs for required and elective courses.

Ranks	Foundation Knowledge Areas (FKAs)	Required Courses	Elective Courses	Total	Percentage
1	FKA3 Information and Communication Technologies	45	43	88	20.42
2	FKA2 Foundations of the LIS Profession	44	19	63	14.62
3	FKA5 Information Resources Management	19	43	62	14.38
	FKA6 Management for Information Professionals	23	39	62	14.38

Ranks	Foundation Knowledge Areas (FKAs)	Required Courses	Elective Courses	Total	Percentage
4	FKA8 Literacies and Learning	35	18	53	12.30
5	FKA7 Information Needs and User Services	16	22	38	8.82
6	FKA4 Research and Innovation	28	8	36	8.35
7	FKA1 Information in Society	8	21	29	6.73
	Total	218	213	431	100
	Percentage	50.58	49.42	100	

According to Table 1, the analysis covered a total of 431 courses, including 218 required courses (50.58 percent) and 213 elective courses (49.42 percent). Among the Foundation Knowledge Areas (FKAs), FKA3 Information and Communication Technologies had the highest number of courses, totaling 88 (20.42 percent). In contrast, FKA1 Information in Society had the fewest, with only 29 courses (6.73 percent).

The ranking of required and elective courses from highest to lowest is as follows: FKA3 Information and Communication Technologies; FKA2 Foundations of the LIS Profession; FKA5 Information Resources Management and FKA6 Management for Information Professionals are tied for same rank; Next are FKA8 Literacies and Learning, FKA7 Information Needs and User Services, FKA4 Research and Innovation, and lastly, FKA1 Information in Society.

4.2 Ranking of FKAs for required courses.

Table 2 Ranking of FKAs for required courses.

Ranks	Foundation Knowledge Areas (FKAs)	Required Courses	Percentage
1	FKA3 Information and Communication Technologies	45	20.64
2	FKA2 Foundations of the LIS Profession	44	20.18
3	FKA8 Literacies and Learning	35	16.06
4	FKA4 Research and Innovation	28	12.84
5	FKA6 Management for Information Professionals	23	10.55
6	FKA5 Information Resources Management	19	8.72
7	FKA7 Information Needs and User Services	16	7.34
8	FKA1 Information in Society	8	3.67
	Total	218	100

According to Table 2, when considering only the required courses, the ranking from highest to lowest is as follows: FKA3 Information and Communication Technologies, followed by FKA2 Foundations of the LIS

Profession, FKA8 Literacies and Learning, FKA4 Research and Innovation, FKA6 Management for Information Professionals, FKA5 Information Resources Management, FKA7 Information Needs and User Services, and lastly, FKA1 Information in Society, respectively.

4.3 Ranking of FKAs for elective Courses.

Table 3 Ranking of FKAs for elective Courses.

Ranks	Foundation Knowledge Areas (FKAs)	Elective Courses	Percentage
1	FKA1 Information in Society	43	20.19
	FKA6 Management for Information Professionals	43	20.19
2	FKA2 Foundations of the LIS Profession	39	18.31
3	FKA8 Literacies and Learning	22	10.33
4	FKA5 Information Resources Management	21	9.86
5	FKA3 Information and Communication Technologies	19	8.92
6	FKA4 Research and Innovation	18	8.45
7	FKA7 Information Needs and User Services	8	3.75
	Total	213	100

According to Table 3, when considering only the elective courses, the ranking from highest to lowest is as follows: FKA1 Information in Society and FKA6 Management for Information Professionals (tied for first place), followed by FKA2 Foundations of the LIS Profession, FKA8 Literacies and Learning, FKA5 Information Resources Management, FKA3 Information and Communication Technologies, FKA4 Research and Innovation, and finally, FKA7 Information Needs and User Services, respectively.

4.4 Comparison of the rankings of FKA for required and elective courses.

Table 4 Comparison of the rankings of FKA for required and elective courses.

Ranks	Required Courses	Elective Courses
1	FKA3 Information and Communication Technologies	FKA1 Information in Society
		FKA6 Management for Information Professionals
2	FKA2 Foundations of the LIS Profession	FKA2 Foundations of the LIS Profession
3	FKA8 Literacies and Learning	FKA8 Literacies and Learning
4	FKA4 Research and Innovation	FKA5 Information Resources Management

Ranks	Required Courses	Elective Courses
5	FKA6 Management for Information Professionals	FKA3 Information and Communication Technologies
6	FKA5 Information Resources Management	FKA4 Research and Innovation
7	FKA7 Information Needs and User Services	FKA7 Information Needs and User Services
8	FKA1 Information in Society	

According to Table 4, comparing the rankings of each FKA between required and elective courses based on the number of courses listed from most to least, it was found that the rankings have both similarities and differences. For required courses, FKA3 Information and Communication Technologies holds the top rank, while for elective courses, the top-ranked are FKA1 Information in Society and FKA6 Management for Information Professionals. Notably, FKA1 Information in Society, which ranks first for elective courses, is ranked last for required courses. The rankings that are identical for both required and elective courses include FKA2 Foundations of the LIS Profession (rank 2), FKA8 Literacies and Learning (rank 3), and FKA7 Information Needs and User Services (rank 7).

4.5 List of required courses and elective courses for each FKA

FKA1 Information in Society	
Required Courses (8)	
1) Culture and Tourism	2) Community Engagement and Information Work
3) Information and Society	4) Information in Knowledge-based Economy Society
5) Information Network Management in Community	6) Information Society and Services
7) Library and Information Science in Knowledge Society	8) Smart Citizens
Elective Courses (21)	
1) ASEAN Information	2) Community and Information Services
3) Community Engagement and Information Work	4) Community Resources for Lifelong Learning
5) Cultural Heritage Information	6) Cultural Information
7) Information for Local Development	8) Information for Preservation of Local Wisdom
9) Information Society	10) Lanna Information Management
11) Local Information Management	12) Local Museum Management
13) Local Wisdom and Information	14) Local Information Management

FKA1 Information in Society	
15) Museum and Archives	16) Social Service for Information Profession
17) Tourism Information Management	18) Thai Cultural Heritage Information
19) Thai Living	20) Thai Localities
21) The Arts and Thai Society	

FKA2 Foundations of the LIS Profession	
Required Courses (44)	
1) Advanced Cataloging and Classification	2) Analysis and Creation of Information Surrogates
3) Analysis of Information Resources	4) Basic knowledge of literature
5) Cataloging and Bibliographic Standards	6) Cataloging and Classification
7) Cataloging for Books and Serials	8) Cataloging Information Resources
9) Classification and Cataloging of Information Resources 1	10) Classification of Information Resources
11) Collection Development	12) Development of Information Literacy Skills and Learning Skills
13) Dewey Decimal Classification	14) Digital Information Storage and Retrieval
15) Ethics and Law for Information Profession	16) Field Professional Experience in Information Science
17) Fundamentals of Library and Information Science	18) Information Analysis and Synthesis
19) Information and Digital Society	20) Information and Knowledge Acquisition
21) Information and Knowledge organization	22) Information Cataloging
23) Information Landscapes	24) Information Resources Analysis
25) Information Resources Cataloging	26) Information Resources Development
27) Information Resources Management	28) Information Services and Dissemination
29) Information Sources	30) Information Sources in Social Sciences, Humanities and Science
31) Internship in Academic Libraries or Special Libraries	32) Internship in Public Libraries
33) Introduction to Information and Library Science	34) Introduction to Information Management
35) Introduction to Information Science	36) Introduction to Library and Information Science
37) Knowledge Organization	38) Laws and Ethics for Information Professionals
39) Library of Congress Classification	40) Preparation for Professional Experience in Information Science
41) Preparation Internship in Library and Information Science	42) Principles of Information Organization
43) Principles to Information Science	44) Professional Experience in Information Science
Elective Courses (19)	
1) Advanced Analysis and Cataloging of Information Resources	2) Analysis and Cataloging of Information Resources
3) Analysis of Information Resources: Dewey Decimal Classification System	4) Analysis of Information Resources: Library of Congress Classification System

FKA2 Foundations of the LIS Profession	
5) Bibliography Indexing and Abstracting	6) Classification and Cataloging of Information 2
7) Co-operative Education	8) Co-operative Education Preparation
9) Indexing and Abstracting	10) Information Retrieval
11) Internship in Information Profession	12) Introduction to Digital Humanities
13) Introduction to Graphic Design	14) Introduction to Preliminary Data Analysis
15) Online Databases Searching	16) Preparation for Field Experience in Information and Library Science
17) Professional Moral in Library and Information Science	18) Professional Project
19) Records management	

FKA3 Information and Communication Technologies	
Required Courses (45)	
1) Application Development for Public and Private Sector Organizations	2) Computer Programming
3) Computer Programming Development	4) Data analytics
5) Database Design and Creation	6) Database Design and Development for Information Work
7) Database development and website design in library work	8) Database Management
9) Database Management System	10) Database System Development for Information Works
11) Digital Information Retrieval	12) Digital Library
13) Digital Library and Institutional Repositories	14) Digital Media for Lifelong Learning
15) Digital Platform Development	16) Digital Technology and Data Science
17) Electronic Commerce and Mobile Business	18) Graphic Animation and Digital Media Design and Production
19) Information Analysis	20) Information and Communication Technology
21) Information Management with Artificial Intelligence Technology for Public and Private Sector	22) Information Retrieval and Storage
23) Information Storage and Retrieval Systems	24) Information System Analysis and Design
25) Information System Design	26) Information Systems Analysis and Design
27) Information Technology for Information Works	28) Information technology in libraries
29) Information Technology in Library and Information Science	30) Information Technology in Public and Private Sector Management
31) Innovation and Digital Media Creation	32) Innovation and Digital Technology
33) Introduction to Database	34) Management Digital Libraries
35) Office Information System	36) Principle of programming language
37) Software Development for Information Works	38) System Analysis and Design

FKA3 Information and Communication Technologies	
39) System Design for Information Work	40) Technology for Information Management
41) Web and Online Database Development	42) Web Technology for Information Presentation
43) Web Technology for Information Works	44) Website Design and Development
45) Website Development and Administration	

Elective Courses (43)

1)	Analysis and Design for Information System	2)	Application Software for Library and Information Profession
3)	Artificial Intelligence for Information Management	4)	Big Data Analytics and Visualization
5)	Computer Applications for Academic Work	6)	Computer Applications for Business Work
7)	Computer Applications for Information Services	8)	Data Analytics
9)	Data Analytics in Digital Humanities	10)	Data Visualization
11)	Development of Multimedia and Digital in Information Works	12)	Digital and Print Media Design
13)	Digital Content Creation and Communication	14)	Digital Content Management
15)	Digital Libraries	16)	Digital Media Design and Development
17)	Digital Photography and Video Production	18)	Electronic Commerce in Information Works
19)	Game and Gamification for information works	20)	Graphic Design
21)	Information Network Systems	22)	Information Retrieval
23)	Intellectual Property and Cyber Security	24)	Library Automated Systems
25)	Media and Learning Innovation in Digital Age	26)	Mobile Application Development for Information Works
27)	Multimedia and Animation Development	28)	Multimedia Design and Production
29)	Office Information System	30)	Online Databases Searching
31)	Online Information Retrieval and Development	32)	Ontology and Semantics Web for Information Works
33)	Open-Source Applications for Information Work	34)	Problem Solving in Information Systems I
35)	Problem Solving in Information Systems II	36)	Social media for Information Services
37)	Software Packages for Information Services	38)	Techniques in Project Writing on Information Systems
39)	Technology Application for Digital Transformation	40)	User Interface Design in Information Work
41)	Virtual Reality and Augmented Reality for information works	42)	Web Programming
43)	Website Design		

FKA4 Research and Innovation	
Required Courses (29)	
1) Apprenticeship	2) Basic Research for Information Profession
3) Basic Research in Information Work	4) Capstone Project in Information Studies

FKA4 Research and Innovation	
5) Cooperative Education	6) Field Experience in Information and Library Science
7) Independent Study in Information Studies	8) Information and Library Science Project 1
9) Information and Library Science Project 2	10) Information Professional Internship
11) Innovation in Information Work	12) Introduction to Library and Information Science Research
13) Introduction to Research in Information Science and Library Science	14) Professional Practicum in the Library and Information Science
15) Research and Evidence-based Information Practice	16) Research and Innovation in Information and Library Science
17) Research in Information Science	18) Research Methods and Statistics for Information Work
19) Research Methods in Information Studies	20) Scholarly Communication
21) Seminar for Information Professionals	22) Seminar in Information and Library Science
23) Seminar in Information and Library Science Profession	24) Seminar in Information Science
25) Seminar in Information Studies	26) Seminar on Information Service Organization Practicum
27) Special Problems in Information and Library Science	28) Traineeship
Elective Courses (8)	
1) Independent Study	2) Innovation Development for Information Profession
3) Professional Project	4) Research Data Management
5) Research in Library and Information Science	6) Seminar in Library and information Science
7) Special Topics in Information Science	8) Statistics for Humanities Research

FKA5 Information Resources Management	
Required Courses (19)	
1) Cataloging of Information Resources	2) Collection Development and Management
3) Collections Development and Preservation of Digital Information	4) Data Analysis and Storytelling
5) Digital Library System	6) Digital Preservation
7) Digital Records Management	8) Fundamentals of Data Science and Data Visualization
9) Information Organization and Cataloging	10) Information Resources Development
11) Information Resources Management	12) Information Sources
13) Information Storage and Retrieval	14) Introduction to Cataloging of Information Resource
15) Introduction to Classification of Information Resource	16) Introduction to Data and Information Curation
17) Local Community and Cultural Heritage Information Management	18) Periodical Management
19) Preservation and Conservation of Local Community and Cultural Heritage Information	
Elective Courses (42)	

FKA5 Information Resources Management	
1. Advanced Classification and Cataloging of Information Resource	2. Archive and Local Museum Management
3. Archives Management	4. Business Information Management
5. Business Information Sources	6. Collection Development and Management
7. Conservation of Information Resources	8. Cultural Heritage Information Management
9. Digital Archives Management	10. Digital Libraries
11. Digital Serial Management	12. Digitization of Information Resources
13. Electronic Documentation Management	14. Electronic Serials Resources Management
15. Geographic Information System	16. Information Media Development
17. Information Resource of ASEAN	18. Information Resources Development
19. Information Resources for Adults	20. Information Resources for Children and Adolescents
21. Information Resources in Humanities and Social Sciences	22. Information Resources in Science and Technology
23. Innovation Management for Local Information Center	24. Intellectual Property Management
25. Lanna Information Management	26. Library Collection Management and Organization
27. Local Information Management	28. Local Museum Management
29. Management for Electronic Resources	30. Management of Archives and Museum
31. Metadata for Information Management	32. Metadata Management
33. Museum and Archives	34. Office Information Management
35. Office Records Management	36. Production of Professional Materials
37. Records management	38. Records Management and Information Governance
39. Serials Management	40. Social Media Management in Information Organization
41. Special Information Management	42. Tourism Information Management

FKA6 Management for Information Professionals	
Required Courses (23)	
1. Administration for Modern School Library	2. Business Communication in the Digital Age
3. Communication in Information Work	4. Database Management in Library and Information
5. Data-Driven Digital Organization	6. Digital Entrepreneurship and New Venture Creation
7. Digital Information Storage and Retrieval	8. Digital Library Management
9. Ethics and Law for Information Profession	10. Information Organization and Learning Center Management
11. Information Technology Strategic Planning and Management	12. Knowledge Management
13. Laws and Ethics for Information Professionals	14. Library and Modern Learning Resources Management
15. Library and Resources Management	16. Management of Information Organization

FKA6 Management for Information Professionals	
17. Management of Information Organization and Intellectual Capital	18. Modern Information Organization Management
19. Office Work Management	20. Preparation for Working and Entrepreneurship
21. Principles of Information Service Management	22. Principles of Management for the Humanities
23. Public Sector Administration in Digital Era	

Elective Courses (39)

1. Academic Libraries	2. Art in Information Service Organization
3. Communication and Marketing in Information Services	4. Communication for Information Work
5. Customer Relation Management in Information Center	6. Data and Information Governance
7. Design Thinking for Information Professionals	8. Digital Information Business and Industry
9. Digital Library	10. Editorial Discussion
11. Editorial Profession	12. Electronics Office
13. Ethics of Information Professional	14. Human Resource Strategy and Learning Organization
15. Information Business	16. Information Business Entrepreneurship
17. Information Business Management	18. Information System Project Management
19. Knowledge Management in Information and Library Science	20. Knowledge Management in Information Works
21. Knowledge Management in Organizations	22. Leadership and Organizational Behaviour
23. Libraries Management	24. Management of Libraries and Learning Resources of All Ages
25. Marketing and Public Relations for Information Organizations	26. Marketing for Information Services
27. Modern Information System Management	28. Office Automation Management
29. Office Digital Information Management	30. Organization and Management and Strategic Management
31. Project Management	32. Project Management for Information Systems
33. Public Libraries	34. School Libraries
35. Social Networking and Professional Communication	36. Social Service for Information Profession
37. Space Management for Information Service Institutions	38. Special Libraries
39. The Modern Publishing Trade	

FKA7 Information Needs and User Services	

Required Courses (16)

1. Digital Content Creation	2. Digital Services
3. Information Repackaging	4. Information Service Innovation
5. Information Services and Activities	6. Information Services and Dissemination
7. Information Services and Marketing	8. Information Services Management

FKA7 Information Needs and User Services	
9. Information Users and Services	10. Library and Information Center Service
11. Library and Information Services	12. Reading and Reading Promotion
13. Reading Promotion and Learning Activities Design and Organization	14. Service Design for Information Institute
15. User Studies	16. Users and Information Services
Elective Courses (22)	
1. Computer Applications for Information Services	2. Creative Storytelling
3. Information Behavior	4. Information for Children and Young Adults
5. Information for Special Groups	6. Information for the Elderly
7. Information Repackaging	8. Information Service for Cultural Tourism
9. Information Services for Specific Groups	10. Information Services for the elderly
11. Information User Instruction	12. Marketing for Information Services
13. Psychology for Information Services	14. Psychology in Information Service
15. Reading and Reading Promotion	16. Reading Promotion in 21st century
17. Reference Resources and Services	18. Reference Services in Digital Age
19. Social Media for Information Services	20. Software Packages for Information Services
21. Teaching and Services for Lifelong Learning	22. Users Studies

FKA8 Literacies and Learning	
Required Courses (35)	
1. Communication in Information Work	2. Community Resources for Lifelong Learning
3. Creative Communication for Information	4. Development of Information Literacy Skills and Learning Skills
5. Digital Literacy	6. Digital Media for Lifelong Learning
7. English for Business	8. English for Career Preparation
9. English for Digital Technology Users	10. English for Information Profession 1
11. English for Information Profession 2	12. English for Information Professionals
13. English for Information Technology	14. English for Office Staff
15. English for Professional Communication in the Digital Age	16. English for Specific Studies
17. English for Standardized Tests	18. English for Tourism
19. Graphic Design in Information Work	20. Information and Digital Literacy
21. Information and Media Literacy	22. Information Literacy
23. Information Literacy and 21st Century Skills	24. Information Literacy and Information Presentation
25. Information Literacy in 21st Century	26. Information Literacy Skills
27. Information, Media and Digital Literacy Learning Management	28. Instructional Behavior in Information Literacy

FKA8 Literacies and Learning	
29. Introduction to Tourism and Tourism Industry	30. Knowledge Management
31. Learning to the World of 21st Century	32. Listening and Speaking for Effective English Communication
33. Reading and Reading Promotion	34. Reading and Writing for Effective English Communication
35. Speaking and Presentation for Careers	
Elective Courses (18)	
1. Creative Writing for Information Work	2. Designing and Application Development for Education
3. Development of Learning Media for Lifelong Learning	4. Digital Information Media for Online Learning
5. English for Information Professionals	6. English for Librarians
7. Information Design for Presentation	8. Information Literacy
9. Information Literacy Instructions	10. Information Resources and Literacy
11. Information Technology Communication	12. Knowledge Management
13. Learning and Reading Promotion	14. Management for Learning Organization
15. Media and Learning Innovation in Digital Age	16. Psychology and Cognitive Sciences
17. Psychology and Learning Methodology	18. Systematic Thinking for Issues in Humanities

Discussion

This research provides valuable insights into the current focus and priorities of Library and Information Science (LIS) education in Thailand based on the IFLA Foundation Knowledge Areas (FKAs). The distribution of courses indicates several trends worth discussing:

1) **Balanced Emphasis on Required and Elective Courses**

The almost equal split between required courses (50.58%) and elective courses (49.42%) suggests that LIS programs aim to provide a strong foundation through core requirements while also offering students flexibility to tailor their education according to specific interests and career paths.

2) **Dominance of Technology-Focused Courses (FKA3)**

The highest number of courses falls under **FKA3: Information and Communication Technologies (ICT)**, making up 20.42% of the total. This trend reflects the increasing importance of digital skills and technological literacy in the LIS profession. With the rapid evolution of digital resources, data management, and information systems, it is unsurprising that technology-based competencies are emphasized. This suggests that LIS programs are responding to the demands of the job market, where ICT skills are highly sought after. This finding aligns with Tammaro (2020), who emphasizes the need for educational institutions to adapt their curricula to include emerging technologies (e.g., AI, machine learning) and data-driven approaches.

3) **Strong Focus on Professional Foundations (FKA2)**

The second most represented area is **FKA2: Foundations of the LIS Profession**, with 14.62% of the courses. This focus highlights the commitment of LIS programs to instill core professional values, ethics, and foundational knowledge. It reflects the importance of grounding students in the historical, theoretical, and ethical aspects of the profession, ensuring they have a robust understanding of the field's core principles before specializing. This finding aligns with Raju (2020), who emphasizes that the future of LIS education depends on its ability to adapt and meet evolving global competency requirements. To remain relevant, LIS programs must incorporate new skills and emerging knowledge areas, equipping graduates to navigate the complexities of the digital information landscape.

4) **Importance of Management Skills (FKA5 and FKA6)**

Both **FKA5: Information Resources Management** and **FKA6: Management for Information Professionals** rank third, each accounting for 14.38% of the courses. This parity indicates the dual emphasis on managing information resources effectively and developing leadership skills for future information professionals. It suggests that LIS education recognizes the importance of equipping students with both technical resource management competencies and broader managerial abilities to succeed in leadership roles.

5) **Linking Findings to Relevant Theories**

Information and Communication Theories: FKAs such as information retrieval, information behavior, and knowledge organization have roots in foundational theories like Shannon and Weaver's communication model, Wilson's information-seeking behavior models, and classification theories (e.g., Ranganathan's Five Laws). A survey of how programs teach these FKAs shows the extent to which curricula embed such theoretical constructs, ensuring that graduates can understand, predict, and facilitate effective information exchange.

6) **Linking Findings to International Framework.**

UNESCO and the Sustainable Development Goals (SDGs): Many FKAs-such as information literacy, community engagement, and cultural heritage preservation-align with UNESCO's advocacy for equitable access to information, education, and cultural heritage, as well as the broader United Nations Sustainable Development Goals (e.g., SDG 4: Quality Education, SDG 10: Reduced Inequalities). The survey thus shows how LIS education supports these global objectives, preparing professionals to contribute to societal development.

The survey of LIS education in relation to IFLA's FKAs is more than a curriculum-checking exercise; it is a lens through which to view how international theories, and global frameworks are influencing the education and practice of future information professionals. Through this linkage, the survey highlights whether the next generation of librarians and information specialists will be adept at navigating theoretical foundations, applying globally recognized standards, and contributing proactively to international information ecosystems.

5. Recommendations

The recommendations based on research findings are as follows:

1) Enhance Integration of Digital Skills: Given the strong emphasis on FKA3 Information and Communication Technologies, it is recommended that universities further integrate digital competencies into their curricula. This should include emerging areas such as artificial intelligence, machine learning, and data analytics to better prepare students for the evolving demands of the information industry.

2) Strengthen Core Professional Foundations: With FKA2 Foundations of the LIS Profession ranking highly among required courses, it is essential to continue emphasizing core professional values, ethics, and theoretical principles. Universities should consider expanding this area to include more practical applications and case studies that connect theory with real-world practice.

3) Expand Course Offerings in Management and User Services: The findings show a prevalence of elective courses related to FKA6 Management for Information Professionals and FKA1 Information in Society. This suggests an opportunity to expand these areas by offering more courses focused on leadership, strategic planning, and community engagement, which are vital skills for future LIS professionals.

4) Address Gaps in Research and Innovation: The relatively lower ranking of FKA4 Research and Innovation highlights a potential gap in fostering research skills among students. Universities should consider incorporating more research-oriented courses and projects, promoting innovative thinking and problem-solving abilities in the LIS field.

5) Promote Interdisciplinary Learning: To align with the diverse and evolving nature of the information landscape, universities are encouraged to offer interdisciplinary courses that bridge LIS with related fields such as data science, digital humanities, and user experience design. This approach can help students develop a broader skill set and adapt to various career paths.

6) Regular Curriculum Review and Adaptation: The study underscores the need for ongoing curriculum evaluation to ensure alignment with IFLA guidelines and industry standards. It is recommended that universities implement a regular review process, incorporating feedback from industry stakeholders, alumni, and current students to keep course content relevant and up to date.

7) Emphasize Lifelong Learning and Professional Development: Given the rapid changes in technology and information practices, LIS programs should prioritize lifelong learning opportunities. This can include offering continuing education courses, workshops, and certification programs to help graduates stay current with industry trends and technological advancements.

8) Enhance Collaboration Between Universities: To strengthen LIS education nationwide, universities should consider forming partnerships and collaborative networks. This can facilitate the sharing of resources, expertise, and best practices, leading to more comprehensive and standardized LIS curricula across institutions.

6. Acknowledgments

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Science and Technology

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The Application for Tracking the Location of Electric Trains for Use within Rajabhat Bansomdejchaopraya University

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Abstract

This article presents the development of GPS tracking software for monitoring the locations of electric trains via smartphones for use within Rajabhat Bansomdejchaopraya University. The experiment was conducted in three time periods: 09:00 a.m.–10:00 a.m., 12:00 p.m.–1:00 p.m., and 3:00 p.m.–4:00 p.m. Four routes were tested: Building 9 to Building 7, Building 9 to Building 3, Building 9 to Building 24, and Building 9 to Building 30, with two rounds per route. The average value of each round was measured, and the error between the actual experimental time and the value calculated by the program was compared. The results showed that the highest percentage error occurred between Buildings 9 and 7, where the program measured 00:37 minutes, the actual time used was 00:38 minutes, resulting in a 2.6% error. The lowest percentage error occurred between Buildings 9 and 30, where the program measured 02:57 minutes, the actual time used was 02:59 minutes, with an error of 1.1%.

Keywords: GPS tracking; electric train; smartphone

1. Introduction

The campus of Rajabhat Bansomdejchaopraya University is extensive, comprising two main areas: the administrative zone and the demonstration school area. This layout complicates intra-campus travel for communication between departments. To address this issue, the university introduced an electric train service to facilitate travel for students, personnel, and visitors. (S. , Phetsawat, Jomnonkwao,S. , and Wichitphongsa,W. , 2019)

However, the lack of accurate arrival-time information for the electric trains creates inconvenience for passengers., which may affect the users. Therefore, what passengers really want to know is where the train is and when the train will arrive at the train stop. Nowadays, information technology plays a role in every aspect of human daily life, including various applications that are created to meet the needs and convenience of the users (P., Punya ,Saitong, P. , Kaenampornpan,M., 2014).

To solve this, the researchers aimed to develop a train tracking system for the university using a smartphone application. This system predicts the train's arrival time, enhancing both service efficiency and passenger convenience(S. A. Sharif, M. S. Suhaimi, N. N. Jamal, I. K. Riadz, I. F. Amran and D. N. A. Jawawi,2 0 1 8 .), (Kaewkiriya, T. ,2 0 1 4). This increases the efficiency of the train system for Rajabhat Bansomdejchaopraya University and increases convenience for service users.

2. Research Objectives

This study aims to:

2.1 Develop GPS tracking software integrated with smartphones to monitor routes, speeds, and locations of electric train services.

2.2 Design a program to work with the GPS system for tracking locations, distances, and times to improve convenience for students and staff at the university.

3. Research Methodology

3.1 System Operation

The GPS tracking program was developed using Flutter and written in JavaScript, DART, HTML, and PHP. A MySQL database was used to store system data. The system architecture is illustrated in
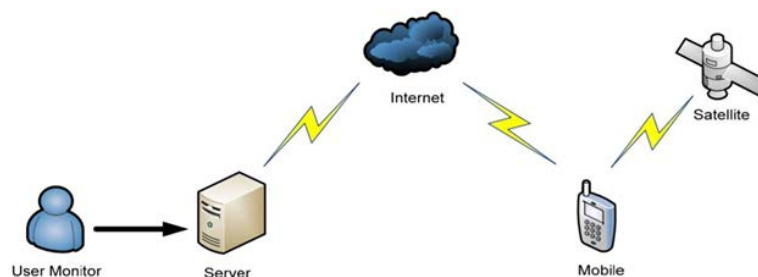
Figure 1 System Operation

3.2 Writing code and designing UI screens

The user interface was designed using Visual Studio Code, Android Studio, and Figma. Screens include login (Figure 3), user account creation (Figure 4), service type selection (Figure 5), vehicle number selection (Figure 6), real-time location display (Figure 7), and notification messages (Figure 8).

Figure 2 Program for writing code and designing the display screen
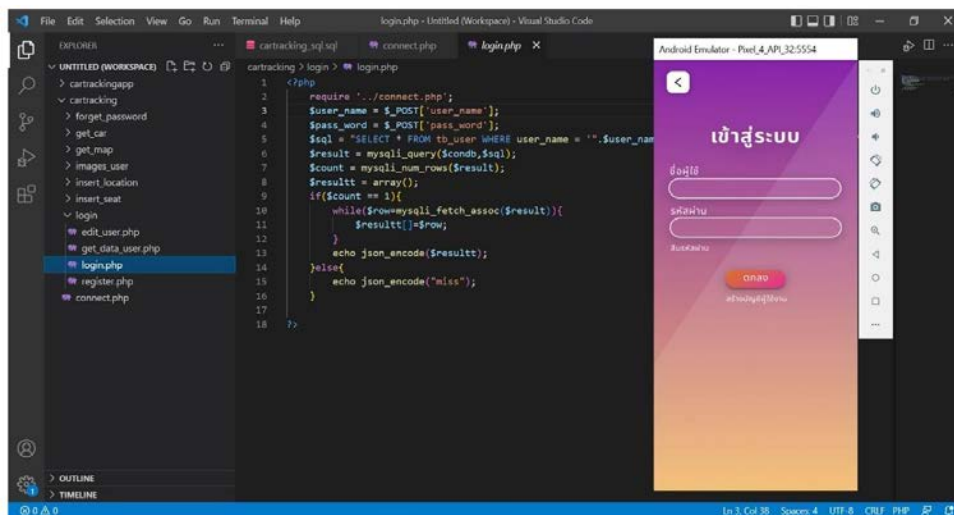
Figure 3 The login screen is displayed
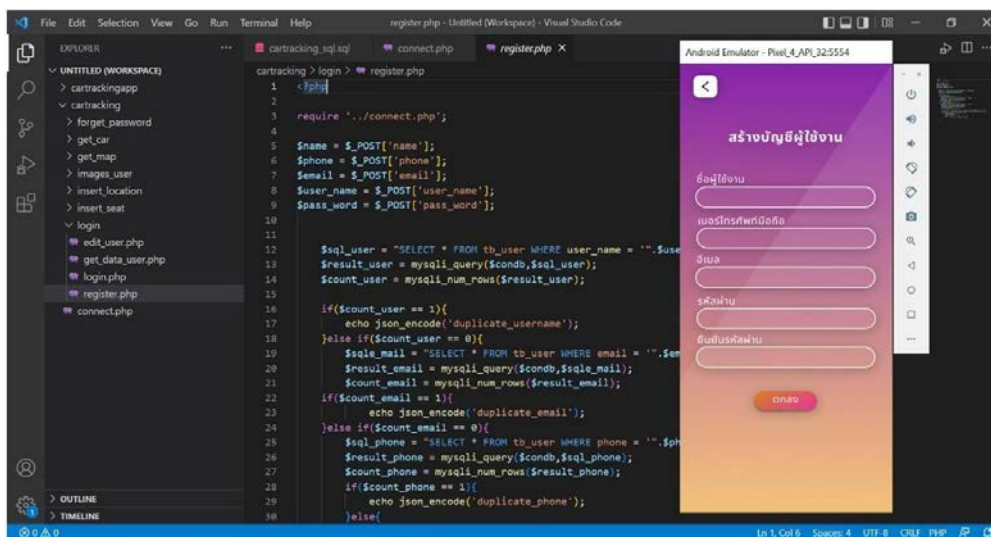
Figure 4 Creating a user account is displayed
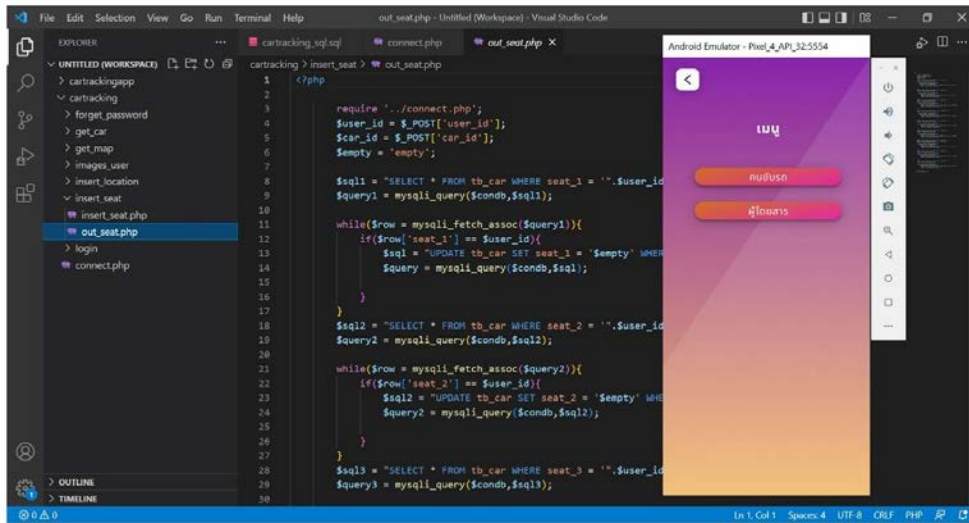
Figure 5 Selecting the service type is displayed
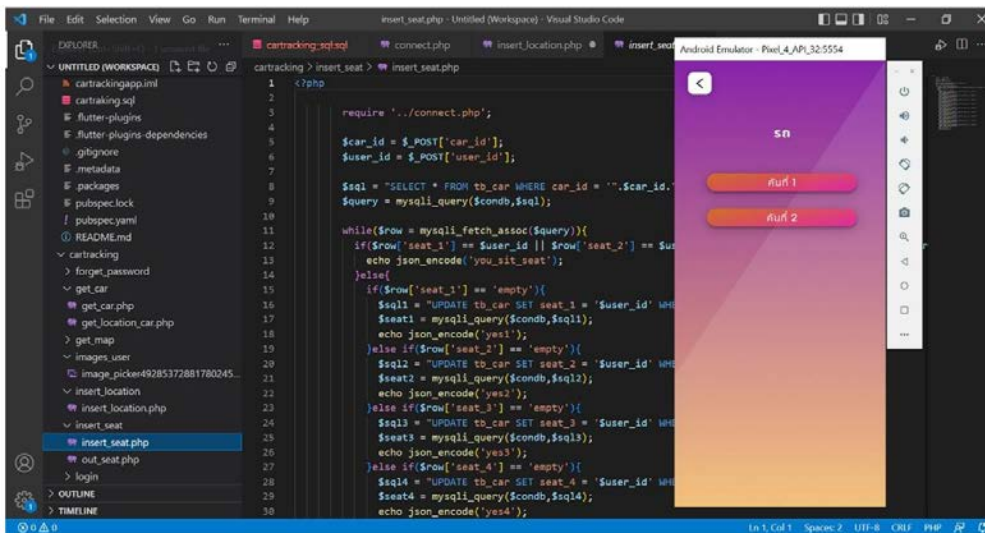
Figure 6 Selecting the vehicle number is displayed
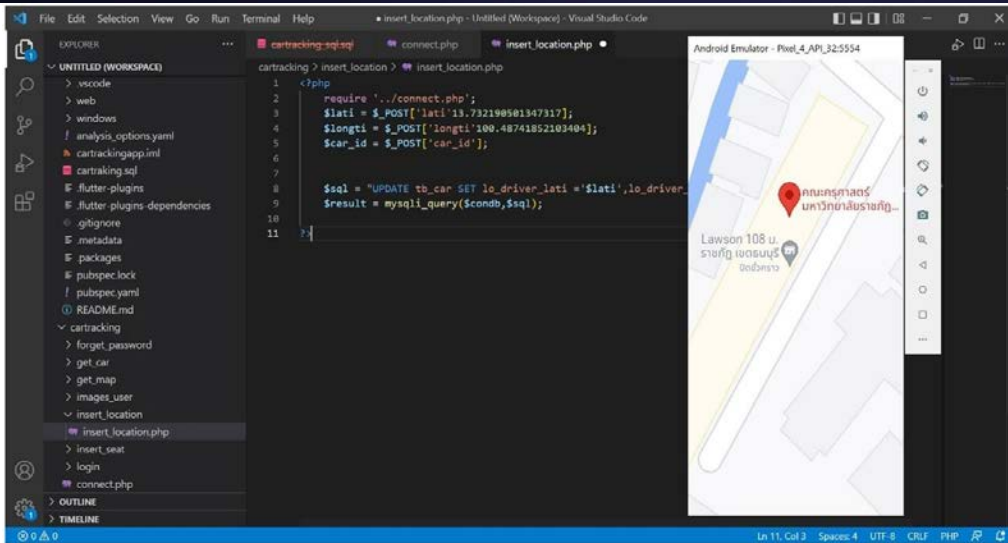
Figure 7 Displaying the location
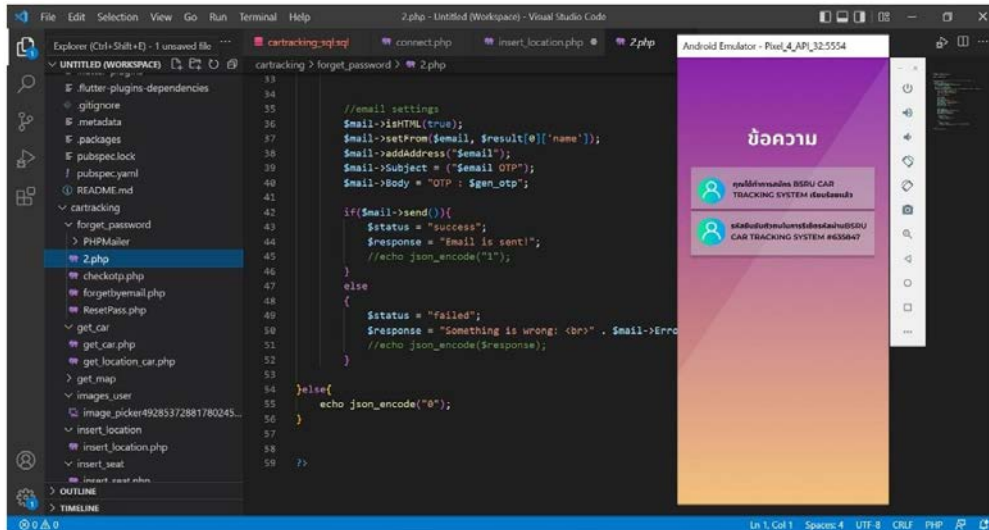
Figure 8 Notification of the message

3.3 Electric Trains Used for Testing

The electric train used in this study operates between the administrative area and the demonstration school. Its characteristics are depicted in Figure 9.

Figure 9 Electric trains used for testing

4. Research Results and Discussion

Software for GPS tracking was designed and developed to monitor routes, record speeds, and log locations for electric train services. Travel times between specified locations (Buildings 9, 7, 3, 27, and 30) were measured during three periods: 09:00 a.m.–10:00 a.m., 12:00 p.m.–1:00 p.m., and 3:00 p.m.–4:00 p.m., with results summarized in Tables 1–4.

Table 1 Travel time of electric trains during 9:00 a.m. - 10:00 a.m.

No.		location	Distance (km)	Actual time used (Min)		average
				1 st	2 nd	
1	Start	Building 9	0.13	00.33	00.36	00.35
	Finish	Building 7				
2	Start	Building 9	0.39	01.19	01.21	01.20
	Finish	Building 3				
3	Start	Building 9	0.81	02.38	02.41	02.40
	Finish	Building 27				
4	Start	Building 9	0.89	02.55	02.52	02.54
	Finish	Building 30				

Table 2 Travel time of electric trains during 12:00 a.m. - 1:00 p.m.

No.		location	Distance (km)	Actual time used (Min)		average
				1 st	2 nd	
1	Start	Building 9	0.13	00.42	00.40	00.41
	Finish	Building 7				
2	Start	Building 9	0.39	01.27	01.30	01.29
	Finish	Building 3				
3	Start	Building 9	0.81	02.47	02.50	02.49
	Finish	Building 27				
4	Start	Building 9	0.89	03.06	03.06	03.04
	Finish	Building 30				

Table 3 Travel time of electric trains during 3:00 p.m. - 4:00 p.m.

No.		location	Distance (km)	Actual time used (Min)		average
				1 st	2 nd	
1	Start	Building 9	0.13	00.38	00.36	00.37
	Finish	Building 7				
2	Start	Building 9	0.39	01.24	01.25	01.245
	Finish	Building 3				
3	Start	Building 9	0.81	02.40	02.43	02.415
	Finish	Building 27				
4	Start	Building 9	0.89	02.57	02.59	02.58
	Finish	Building 30				

Table 4 Comparison results of the three experimental times.

No.	Time	Average time actually used (Min)			
		Building 9 to 7	Building 9 to 3	Building 9 to 27	Building 9 to 30
1	9:00 a.m. - 10:00 a.m.	0.35	01.20	02.40	02.54
2	12:00 a.m. - 1:00 p.m.	0.41	01.29	02.49	03.04
3	3:00 p.m. - 4:00 p.m.	0.37	01.25	02.42	02.58
Average		0.38	01.25	02.44	02.59

The experimental principle of the prototype program was to test the electric shuttle bus in 3 periods: 09.00 am -10.00 am., 12.00 am. -1.00 p.m., and 3.00 pm.-4.00 pm. Each period took a different amount of time. Because there were different obstacles in the operation of the bus, such as the number of students using the service, the time to pick up passengers, etc. From the experiment, it can be seen that the period 12.00-13.00 hrs. took longer than other periods. Because it was the period for lunch and changing classes.

And there was also a test to find the percentage of error between the time measured by the program and the average time of the actual experiment. Error percentages between measured and actual times were consistently low, not exceeding 3%, as shown in Table 5.

Table 5 Comparison results of the measured time error values and the actual average time used.

location	Time (Min)		Error (%)
	Actual	Program	
Building 9 to 7	0.37	0.38	2.6
Building 9 to 3	01.23	01.25	2.4
Building 9 to 27	02.41	02.44	1.8
Building 9 to 30	02.57	02.59	1.1

From Table 5, in all cases, it was found that the minimum error value is 1.1% and the maximum error value is 2.6%. It is an acceptable value. This application can be used.

6. Conclusion

The research demonstrated the successful design and testing of a GPS tracking application for electric train services at Rajabhat Bansomdejchaopraya University. The system reliably predicts train arrival times with an acceptable error margin (1.1%–2.6%), significantly improving service efficiency and user convenience.

7. Acknowledgments

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Animation to Promote Awareness of the Impact of Improper Technology Use on Time Management in Adolescents

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Abstract

Nowadays, adolescents are increasingly influenced by technology, which can make improper usage of technology that negatively affect their time management skills. This study aims to: 1) assess the effectiveness of animation in enhancing awareness of time management among adolescents and 2) explore students' awareness of using animation as a learning tool for time management. The research tools were: 1) animation media effectiveness assessment form and 2) questionnaire to assess students' awareness of the impact of improper technology use on time management in adolescents. The sample consisted of 30 secondary school students selected through purposive sampling. The statistic used were mean and standard deviation. Data analysis revealed significant improvements in students' awareness related to time management after viewing the animation. The results show that: 1) the effectiveness of animation in enhancing awareness of time management was at high level and 2) students' awareness of using animation as a learning tool for time management was also at high level.

Keywords: animation; awareness; digital media; time management

1. Introduction

Nowadays, adolescents are increasingly immersed in technology, raising significant concerns about the impact on their daily live. The use of smartphone, social media, and gaming could make young people struggle to balance their time effectively. The excessive screen time can lead to distractions and procrastination, making it difficult for adolescents to manage their academic responsibilities, personal interests, and social interactions [1]. As a result, understanding the effects of improper technology use on time management has become an urgent issue for educators, parents, and mental health.

Animation is a creative and innovative media of entertainment and an effective advertising technology that profitable form of entertainment that can make audiences happy and attract audiences interest [2]. Animation media is one of the ways to make advertisements more interesting and effective.

Animation is no longer for children only, rather has become popular among adults as well (Goel and Upadhyay, 2017). Digital media technology play a crucial role in behaviors and habit of adolescents. However, adolescents find themselves caught in a cycle of constant notifications and online engagement, which can detract from their ability to focus on essential tasks [3]. Not only affect their academic performance but also impact their overall well-being, leading to increased stress and a sense of overwhelm.

This research aims to engage adolescents us effective animation media. By utilizing 3D animation as an educational tool, the study enhance awareness of the consequences of poor time management related to technology use. Showing that this approach will not only capture the attention of adolescents but also empower them with practical strategies to navigate their digital live more effectively. Moreover, this research could make a healthy relationship with technology, encouraging adolescents to take control of their time and enhance their overall productivity.

2. Research methodology

2.1 Sample size

The population were all secondary school students who use technology from secondary school in Bangkok. The sample consisted of 30 secondary school students selected through purposive sampling for assess students' awareness of the impact of improper technology use on time management in adolescents and 5 animation experts to assess the animation media effectiveness. The animation experts must have knowledge of animation techniques including 2D and 3D animation.

2.2 Research tools

2.2.1 Animation media effectiveness assessment form

Creating an animation media effectiveness assessment form involves the steps as follows:

1) develop survey questions that align with the objectives, include questions that assess of the animation's effectiveness, design and clarity of messaging 2) conduct a pilot test of the survey with a small group of students to identify any issues with question clarity, length, or relevance then, adjustments as needed based on feedback from pilot 3) launch the survey to the target group 4) analyze survey responses of animation media effectiveness.

2.2.2 questionnaire to assess students' awareness of the impact of improper technology use on time management in adolescents

Creating questionnaire involves the steps as follows: 1) define assessment objectives include awareness and knowledge toward technology use and time management 2) develop questions in 1 to 5 Likert-scale questions 3) pilot and refine the questionnaire with a small group of students to identify any issues with question clarity, length, or relevance then, revise based on pilot feedback to improve clarity, coherence, and reliability of questions 4) launch the questionnaire to the target group and 5) analyze the answer to identify insights.

2.3 Animation to promote awareness of the impact of improper technology use on time management in adolescents

Creating an animation to promote awareness of the impact of improper technology use on time management in adolescents involves: 1) define objectives of the animation media 2) research and concept development 3) create a storyboard that visually maps out each scene of the animation, including character design, 3D backgrounds, and transitions between scenes, 4) animation production by create the visual elements for the animation, including 3D character and 3D backgrounds, 5) voiceover and sound design for any dialogue or narration in the animation 6) review and feedback by 5 animation experts by using animation media effectiveness assessment form 7) make revisions based on experts feedback to improve the quality of the animation media, and 8) distribution the animation media to the target group.

2.4 Data analysis and statistical used

To assess the effectiveness of animation and questionnaire to assess students' awareness used descriptive statistics to summarize and describe the characteristics of the sample. The results were translate using 5-point Likert scale (1 = Low level to 5 = Highest level). Also, mean and standard deviation to summarize the scores.

3. Results

The animation to promote awareness of the impact of improper technology use on time management in adolescents as show in figure 1. This animation represent the story of a student's overuse of phone game leads to poor time management, showing how excessive or improper technology use can distract from his responsibility. The student ignores notifications and misses the deadline. This narrative emphasizes the need for adolescents to balance technology use to avoid impacts on their productivity and time management skills.

The results of an animation media effectiveness assessment conducted by 5 animation experts had an overall average score at 4.10, indicating that it was rated at a high level across all topics. The evaluation focuses on various aspects of the animation quality, with an average score and standard deviation (S.D.) provided for each criterion. The visual quality and character design were at high level, with scores of 4.00 and 4.60, respectively. Experts noted that the visuals were appealing and the character design effectively suited the theme, indicating strong engagement potential for the target. The animation movements and lighting were smooth and realistic movements and effective lighting were also at high level, with a score of 4.00 and 4.20. These aspects contributed to creating an immersive experience, important for conveying the animation's message. The camera angle and transitions had an average score of 4.40, enhancing the storytelling quality of the animation and guiding viewers' attention to essential elements. The 3D environment design with a score of 3.80 and sound effects, and sound effects with a score of 3.60, these aspects showed room for slight improvement to enhance immersion and message

impact. Finally, the overall quality with a score of 4.20, indicating that the animation was effective in delivering its message about the impact of improper technology use on time management in adolescents.

Scene: 1	Scene: 2	Scene: 3	Scene: 4
Scene: 5	Scene: 6	Scene: 7	Scene: 8
Scene: 9	Scene: 10	Scene: 11	Scene: 12
Scene: 13	Scene: 14	Scene: 15	Scene: 16
Scene: 17	Scene: 18	Scene: 19	Scene: 20
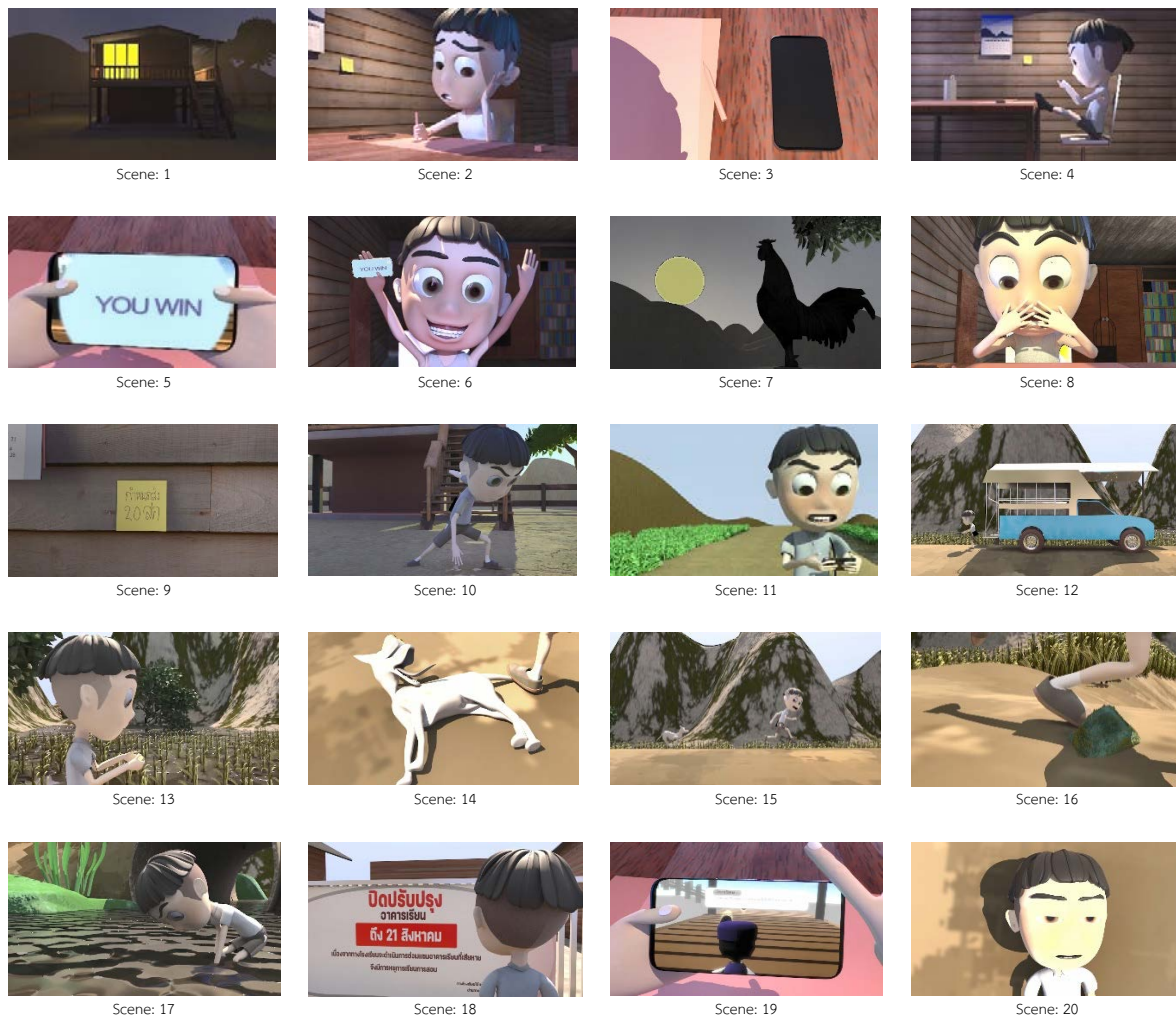
Figure 1 Animation to promote awareness of the impact of improper technology use on time management in adolescents

Table 1 Animation media effectiveness assessment results by 5 animation experts.

Topic	Average score	S.D.	Level
1. The visual quality of the animation (e.g., textures, colors, and details) was appealing and enhanced the overall experience.	4.00	1.00	High
2. The character designs were visually engaging and suited the theme of the animation.	4.60	0.55	High
3. The animation movements (e.g., character motion, object dynamics) were smooth and realistic.	4.00	0.00	High
4. The lighting in the animation was effective in setting the mood and guiding attention to important elements.	4.20	0.84	High
5. The camera angles and transitions were well-chosen and added to the storytelling quality of the animation.	4.40	0.89	High
6. The 3D environment design was immersive and aligned with the animation's theme.	3.80	0.84	High
7. The sound effects and background music complemented the visuals and enhanced the impact of the animation.	3.60	0.55	High
8. Overall, the technical and artistic quality of the 3D animation contributed positively to its message and effectiveness.	4.20	0.00	High
Overall average score	**4.10**	**0.58**	**High**

The questionnaire assessed students' awareness of the impact of improper technology use on time management in adolescents had an overall average score at 4.38. The high average score was the animation helped students understand how technology can interfere with time management with a score of 4.67. The importance of controlling technology usage to achieve daily goals, where students scored an average of 4.50. The lowest average score was the likelihood of students applying what they learned from the animation to their technology habits was also rated high, with a score of 4.10.

Table 2 Students' awareness of the impact of improper technology use on time management in adolescents.

Topic	Average score	S.D.	Level
1. I am aware of how technology use can impact my ability to manage time effectively.	4.33	0.66	High
2. I believe it is important to control technology usage to achieve my daily goals.	4.50	0.57	High
3. The animation helped me understand how technology can interfere with my time management.	4.67	0.55	Highly
4. The animation motivated me to consider limiting my technology use during important tasks.	4.30	0.65	High
5. I am likely to apply what I learned from the animation to my daily technology use habits.	4.10	0.66	High
Average	**4.38**	**0.62**	**High**

4. Conclusion and discussion

The animation received an average score of 4.10, at a high level. This shows that the animation was well-designed and effective in promoting awareness of time management related to improper technology use. However, enhancing sound effects and 3D environment design could further strengthen the media's impact. Animation is an effective media that represent the concept that cannot be expressed in words [4]. Visual learning tool like animation were effective in engaging younger audiences, as can make complex ideas and abstract concepts more relatable and understandable. Also, animation can capture attention, engagement, and promote retention, which is crucial when teaching adolescents about self-regulation [5].

For the students' awareness impact of improper technology use on time management in adolescents, animation can provide immediate, tangible example, enhancing adolescents' understanding of the consequences of excessive screen time, indicating strong agreement with the need for self-regulation. Also, students demonstrated a readiness to integrate these insights into daily life, supporting the idea that awareness-based intervention can promote long-term behavioral change. Raising awareness of the consequences of improper technology use can foster self-regulation [6]

In conclusion, the study suggests that using animation can be a valuable method for promoting responsible technology use and enhancing time management skills among adolescents. Moreover, multimedia educational tool can effectively self-regulation, awareness, and motivation for behavior change in adolescent. For further development of engaging, multimedia tool could be valuable for digital literacy programs, especially in promoting effective time management in the face of increasing digital distraction.

5. Research suggestions

5.1 assessing the effectiveness of animation media in changing adolescents' technology by using behavior

5.2 comparing the effectiveness of animation media and other educational media on adolescents' time management

5.3 investigating the long-term impact of animation on time management and technology habits in adolescents

6. Acknowledgments

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Knowledge Dissemination on the Application to Promote Historical and Community Cultural Tourism:

A Case Study of Ban Thiang Tae Community, Chainat Province

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Abstract

This research aims to evaluate the effectiveness of using an application to promote historical and community cultural tourism: a case study of the Ban Thiang Tae community in Chainat Province. The sample group consists of community leaders and community enterprises or businesses that are related to the use of the application and the integrated application of virtual reality technology to enhance historical and community cultural tourism in accordance with the public-private collaboration approach in Mueang Chainat District, Chainat Province, totaling 100 people. The sample was selected using a purposive sampling method with a 90% confidence level. The research methodology involved using a virtual tourism innovation (VR) prototype to promote historical and community cultural tourism. To disseminate knowledge the application uses and assess innovation satisfaction, evaluate performance, and improve innovation to completely from feedback. The research results show that the satisfaction of service is at high level ($\bar{x}$ = 4.49, S.D. = 0.55). The next is the satisfaction of knowledge usage is at high level ($\bar{x}$ = 4.47, S.D. = 0.64), followed by the knowledge dissemination is at high level ($\bar{x}$ = 4.25, S.D. = 0.55), and the last is the satisfaction of instructors is at high level ($\bar{x}$ = 4.24, S.D. = 0.61), respectively. The overall satisfaction of knowledge dissemination of the application usage to promote historical and community cultural tourism was at a high level ($\bar{x}$ = 4.36, S.D. = 0.59).

Keywords: cultural and historical community tourism; virtual reality; virtual tourism

1. Introduction

Virtual Reality (VR) tourism is a simulated experience that replicates real-world objects, places, or environments in a highly realistic manner, including visual and auditory elements. Users can explore these virtual spaces in a 360-degree view without physically being present at the location [1]. This immersive experience often requires specialized hardware such as virtual reality glasses to provide a three-dimensional view. The creation of these virtual environments involves complex computer hardware and software that work together to generate a realistic digital world. Furthermore, users may interact with the virtual environment through body movements, creating a more engaging and interactive experience [2]. By simulating real-world environments with digital technology, VR tourism can stimulate multiple senses through haptic feedback devices, enhancing the overall experience. This technology can be used to promote tourism by providing potential travelers with valuable information to plan their trips. In terms of marketing, VR tourism can attract more visitors and enable tourism businesses to reach a wider audience directly, often at a lower cost.

The important factors of tourists affecting travel behavior in Chainat Province are the purpose of travel, transportation, frequency of travel, motivation for historical and cultural tourism, especially historical and cultural tourist attractions, which are tourist attractions related to stories from the past and are evidence showing history, archaeology, and religion, such as temples, churches, cathedrals, and traditional ways of life. In particular, Chainat is a small province located in the upper central region, is rich because three rivers flow through almost every district. Since Chainat is an old city that has existed since the Sukhothai period and is located between the old cities of Sukhothai and Ayutthaya, it has received cultural diversity from both the upper Chao Phraya River and the lower Chao Phraya River basins, for example, Benjarong pottery, sedge mats and machinery from Ban Tha Chanuan, water hyacinth weaving machinery from Ban Oi, Tai Krang woven fabric from Ban Noen Kham. In addition to tourists visiting important historical sites, there are also many religious sites.

From reviewed found that the problem affecting tourism in Chainat Province is the COVID-19 pandemic due to travel limitation in many areas to reduce the risk of infection. This has resulted in a continuous decrease in the number of tourists. Local people, including tourism operators, have lost income and because Chainat Province is a secondary city, most tourists pass through without stopping to visit or have no travel plans in the province. Because the tourist attractions are not well-known, public relations may not be widespread. Tourist attractions are not very attractive to tourists, even though Chainat Province also has many historical and cultural tourist attractions. Therefore, the research team has proposed ideas and methods to solve tourism problems by developing innovations with virtual reality (VR) technology to present information on historical and cultural tourist attractions in Chainat Province. So that tourists can use it as information to plan their travels, both in normal conditions and after the epidemic crisis has passed. Innovations with virtual reality technology can be used to travel online in their own homes. And increase

the ability of innovations to make online transactions. It is another trading channel for community enterprise groups that cannot sell products through their normal stores.

This research aims to use technology to transfer knowledge in managing and promoting cultural tourism to community leaders in community enterprises and businesses related to the use of applications and the application of virtual reality technology to enhance historical and community cultural tourism based on Pracharat approach, Mueang Chai Nat District, Chai Nat Province, to develop the tourism economy for Chai Nat Province, create and develop local products to meet standards that are accepted both domestically and internationally, and support cultural tourism in Chai Nat Province to be accepted and outstanding in terms of its long history. Moreover, the unique cultures of the two river basins, so that Chai Nat becomes a destination for cultural tourism tourists and can use innovations with virtual reality technology to travel online in their own homes and increase the ability of innovations to make online transactions, which is another trading channel for community enterprise groups that cannot sell products through normal storefronts. This can create sustainable community strength and create competition in historical tourism as economic development along with social development and environmental conservation in a balanced way to create stability and sustainability in the community.

2. Background and Related Work

2.1 Historical and Cultural Tourism

Historical tourism is a journey to ancient sites with stories from the past to study the history of the place or community in that area and to make tourists aware of the value and significance of history, as well as to have a sense of preserving valuable cultural heritage. Historical tourism can travel to places with stories or history from the past, such as culture, local art, the way of life of cities and communities, ancient cultural sites, traditions and festivals of the community. Tourists gain knowledge and are aware of the value and significance of history and have a sense of preserving the value and significance of that history.

For cultural tourism, it is considered a part of historical tourism because cultural tourism is a form of tourism to places with a history in the past, similar to historical tourism, but focuses on tourism to study stories about life, arts and crafts, performing arts, traditional festivals, folk games, etc. Cultural tourism must travel to places with a history of life, customs, traditions, arts and crafts, and folk games so that tourists have knowledge, understanding, and appreciation of the cultural value of that community. This is to help preserve ancient sites, religious sites, ways of life, customs, traditions, arts and crafts, and folk games so that tourists have knowledge, understanding, and appreciation of the historical and cultural value of that community.

2.2 Historical and Cultural Places in Chainat

Chainat Province is located in the upper central region. It is an ancient city which was originally located at the right bank of the Chao Phraya River at the mouth of Mueang San [3]. It was a frontier city of Sukhothai. During the reign of King Ramathibodi I, he ordered Khun Luang Phra Ngua to lead an army to attack Chainat, causing Chainat to become a tributary of Ayutthaya and becoming a city that stores weapons

and munitions of Ayutthaya. As a result, it has been influenced in many ways from Ayutthaya. At present, Chainat borders Nakhon Sawan, Uthai Thani, Sing Buri, and Suphan Buri provinces. The Chao Phraya River, Tha Chin River, and Noi River flow through various areas in every district. It is divided into 8 administrative districts: Mueang Chainat, Manorom, Wat Sing, Sapphaya, Sankhaburi, Hankha, Nong Mamong, and Noen Kham.

Figure 1 Chainat geography

Source: [4]

Chainat has important historical and cultural attractions, such as ancient temples that have been a part of the city since the Ayutthaya period. In the temple, there is a sacred Buddha image. The second-class royal temple is located at Ban Tai Muang on the right bank of the Chao Phraya River, built in the early Ayutthaya period. The famous old temple for amulets is Luang Pu Suk. People like to worship it according to the belief that it will bring good luck, kindness, popularity, and invulnerability. The temple that enshrines Phra Phuttha Maha Sila (Luang Pho Hin Yai) was built in the early Ayutthaya period and is a place of worship for the people of Chainat and the general public. In particular, interesting historical and cultural tourist attractions in the community include Wat Wihan Thong, which was originally an ancient temple in the walls of San City in the late Ayutthaya period. Later, it became a deserted temple. During the reign of King Rama V, it was renovated and restored until it became a temple today. Inside the area of Wat Wihan Thong, there is a shady atmosphere. There is a chapel, a temple hall, and ancient civilization. In addition, Wat Wihan Thong has preserved large trees, such as rubber trees and golden teak trees, which have tall trunks that provide a very shady atmosphere. In front of the temple, there is a wooden suspension bridge. The chapel is shaped like an ancient junk boat, built in the Ayutthaya period. It has similar characteristics to the chapel at Wat Mahathat.
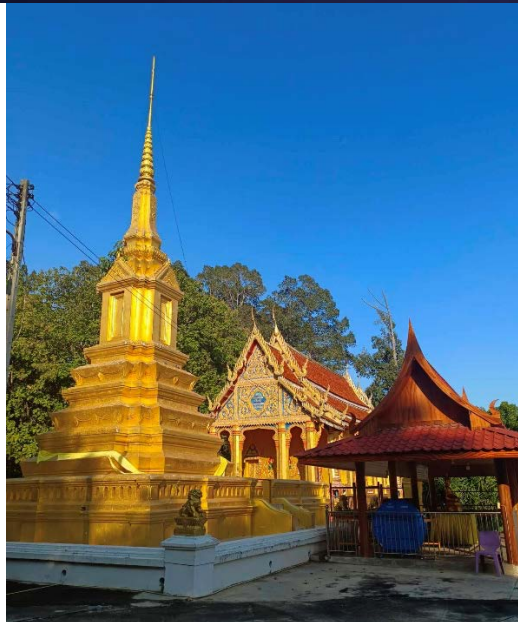
Figure 2 Wat Wihan Thong

Wat Mahaeyong is an ancient temple built since the early Ayutthaya period, when Chao Yi Phraya ruled the city of Saraburi in 1952-1967. After that, in 1767, the enemy invaded and the temple was abandoned. Until 1809, the villagers helped to restore the temple and built many buildings by Phra Chainat Muni (Rhun).

Figure 3 Wat Mahaeyong

2.3 Virtual Technology in Tourism

Virtual reality is an evolution of the United States government's research technology. It was initially intended for military and flight simulation technology research and development only. In 1960-1969, Evan Sutherland invented the first 3D head-mounted display and developed computer graphics for displaying images on the head-mounted display together with 3D computer graphics, which is considered the origin

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of virtual reality technology. Evan is honored as the father of virtual reality technology. After that, there was a lot of research on virtual reality technology, such as the University of North Carolina developing virtual reality technology for architecture and medicine. The University of Wisconsin and Connecticut researched artificial reality that interacts with the virtual world and applied it in education and entertainment. In 1993, Disney World used virtual reality technology to produce movies. Game manufacturers such as Sega and Nintendo used virtual reality technology to produce games. Later, it began to expand in engineering, science, medicine, training, etc.

Virtual reality systems types are classified based on the method of contacting the user [5], as follows:

1. Desktop VR or Window on World Systems (WoW) is a virtual reality system that uses a computer monitor for display.

2. Video Mapping is the use of video as a device or tool for inputting user data. And use computer graphics to present the display in a two-dimensional or three-dimensional model. The user will see themselves and change themselves from the screen.

3. Immersive Systems is a virtual reality system for personal users. The user uses a head-mounted display (HMD) device, such as a helmet or mask, to simulate images and hearing.

4. Telepresence is a virtual system that uses a remote sensing device that may be installed on a robot to connect to the user.

5. Augmented/Mixed Reality Systems is a combination of Telepresence, virtual reality technology and imaging technology to create something real for the user.

For the application of virtual reality technology in tourism, there are many ways to present information in both still images, moving images, and sound [6]. It is a simulation of tourist attractions to be modern, memorable, and create a good experience before the actual tourism. Thailand has famous architecture, nature, traditions, and cultures that are popular among foreigners. Most foreign tourists are very interested in temples in Thailand [7]. Receiving information beyond images and text is realistic for tourist attractions, creating more interest and motivation. In addition, using it with ecotourism and historical tourist attractions allows tourists who visit historical and cultural tourism to realize the value of those places more.

2.4 Related Research

Umpai Yongkulwanich [8] developed a virtual cultural tourism guide document of Pla Khao Village, Amnat Charoen Province was carried out to assess tourists' satisfaction with the virtual cultural tourism guide document of Pla Khao Village, Amnat Charoen Province. The technology used combined data from documents and virtual technology was used to test the developed document with a sample group of 30 tourists. The research results found that the virtual cultural tourism guide document of Pla Khao Village, Amnat Charoen Province was presented in a document format consisting of text and still images that could be linked to additional information in other virtual formats using an application on tablets or smartphones,

such as motion pictures and videos with audio narration. The evaluation results showed that tourists were highly satisfied with the document overall. The highest levels of satisfaction in each aspect, in order, were usefulness in use, information, technical data presentation, and document design.

Prayoon Imiwat et al. [9] proposed innovation in historical and community culture tourism management based on the Pracharat approach in Wiang Chai District, Chiang Rai Province. The research objectives were 1) to survey data on historical and community culture sites in Wiang Chai District, Chiang Rai Province, 2) to study the joint creation of the Pracharat approach in managing community-based historical and cultural tourism in Wiang Chai District, Chiang Rai Province, and 3) to synthesize approaches and activities for community-based historical and cultural tourism in Wiang Chai District, Chiang Rai Province. As integrated research, the researchers chose to use a mixed method research method, which is to use qualitative research methodology and quantitative research methodology together. This involved focus group discussions with those involved in tourism management and questionnaires with a sample group of the population living near tourist attractions in Wiang Chai District. The research results found 8 issues for the management of community historical and cultural tourism in Wiang Chai District: 1) Tourism policy determination 2) Ability to plan and manage systematic tourism 3) Creating community understanding of tourism 4) Creating cooperation with public-private partnerships 5) Community ability to support tourists 6) Creating competitiveness 7) Building community strength The development of tourist attractions is a synthesis of the co-creation of the government, private sector, and public sectors based on the idea of "joint thinking, joint planning, joint implementation, joint responsibility, and joint benefit". The management guidelines for community historical and cultural tourism in Wiang Chai District are the strategic planning and strategies for tourism management in 4 approaches: 1) Public relations approach 2) Tourism management approach 3) Cultural conservation and restoration approach 4) Joint utilization approach under the pride and cherishment of historical and community culture tourist attractions which are their own resources.

Nakhanin Inthanuphat [10] studied the potential of communities for community tourism management, a case study of Lam Phok Reservoir community, Surin Province, focusing on studying the potential of communities for community tourism management and studying the components of Lam Phok Reservoir community tourism management. The results of the study on the quality of Lam Phok Reservoir community tourism management considering the components of tourism resources in terms of nature, arts, culture and community lifestyles, including community participation in terms of community leaders, networks and government agencies, found that it was at a high-quality level, which was ready to drive community tourism. However, the community tourism components in terms of tourism management found that accommodation and tourism management models were at a low-quality level. When considering personnel, it was found that personnel and the general public in the Lam Phok Reservoir community still lacked knowledge and understanding of community tourism. The results of the study on the components for community tourism management of Lam Phok Reservoir when considering access to attractions, facilities, accommodations and tourism activities found that Lam Phok Reservoir has the potential to be developed

into a community tourism destination under the following components: 1) Community characteristics 2) Collaborative network groups 3) Increasing community tourism capacity 4) Determining a master plan and tourism action plan and 5) The process of developing a collaborative network.

Adirek, et al. [11] conducted research on ARCH-TOUR, a mobile application for historical and cultural tourism, using Augmented Reality (AR) and Virtual Reality (VR) technologies to create an application that can display results via smartphones to create a new tourism experience. The experiment was conducted with a sample group of 18 people using tourist attractions such as temples and ancient sites in Phitsanulok Province. The results showed that satisfaction with the mobile application prototype was very high. Users were inspired to receive more information about the exhibits and buildings in the temple. In terms of presentation, tourists found the information useful and interesting when they experienced the system. However, the use of low-quality cameras can sometimes hinder the capture and display of 3D models. The program cannot read and display virtual objects if there is too much reflection or too dark during the sign reading process. For future work, it will use Augmented Reality technology to present virtual tourism in other places via the web or mobile devices to gain more interest and convenience for users.

Argyriou et al. [12] conducted a study on the development of a 360° application for cultural heritage tourism for a Head Mounted Display (HMD) device to present a tourism model based on the experiential learning of cultural heritage. The design challenges arise from this new form of virtual reality media due to the 2D format of the resources used for construction, the lack of depth, limited interaction, and the need to respond to the sense of presence. In addition, the use of Virtual Reality (VR) headsets often causes nausea or motion sickness, which further affects the design of moderate-level movement. This research introduces a methodological classification of tasks and techniques for designing immersive 360° video applications. Based on the proposed design guidelines, a test application was created as an interactive virtual tour in the historic center of Rethymno in Crete, Greece, which was tested by users. Based on the analysis of the results of this study, a set of design guidelines for the implementation of 360° virtual video tours was proposed.

3. Methodology

This research is a research process for developing virtual reality (VR) tourism innovations to promote historical and community culture tourism, a case study is Ban Thiang Tae community, Chainat province. This is the third phase of the research. The research steps are as follows:

1. To impart knowledge about the application and utilization of virtual reality technology to community enterprises and their community leaders, in order to improve the level of community history and cultural tourism in accordance with the guidelines of the private state, Muang Chai Nat District, Chainat Province, 100 people, able to convey innovation to people in the community through various channels such as travel websites and social media.

2. Monitor and evaluate the success of the innovation using virtual reality technology and the performance of the community to be used as information for correction and improvement of the innovation model to be consistent and appropriate after the innovation is put into actual use.

3. Summarize knowledge, transfer all knowledge of this study, and disseminate academic research, including academic articles.

4. Research Conceptual Framework
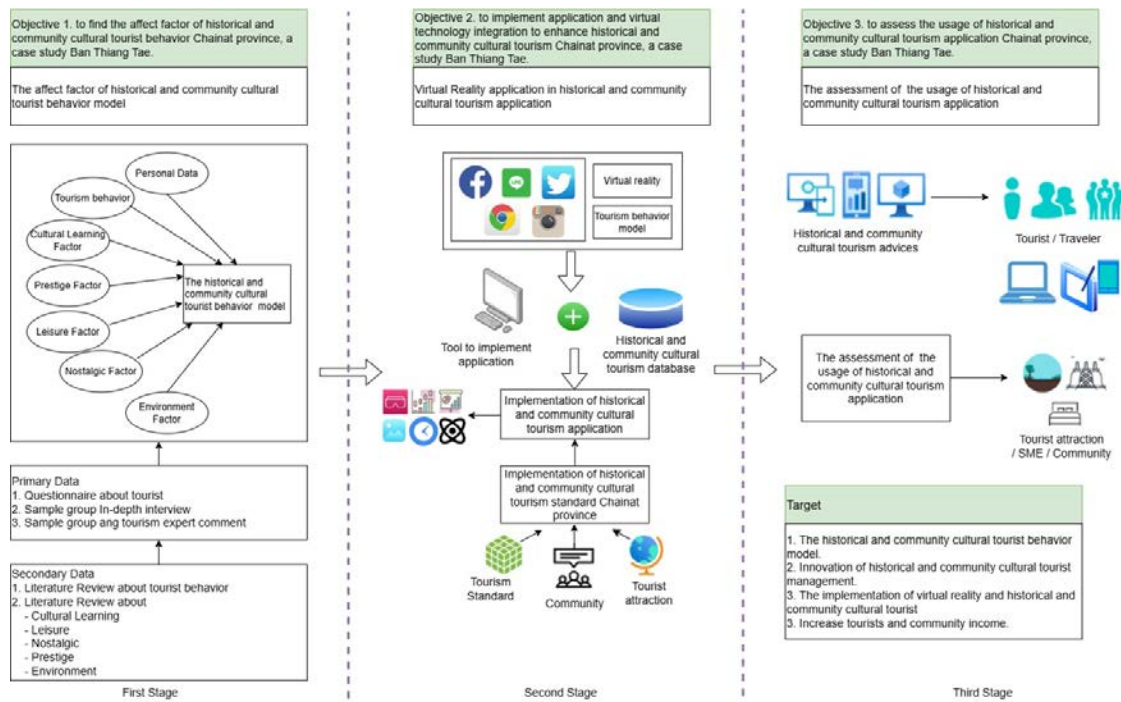
Figure 4 Conceptual Framework

This research, according to the research conceptual framework in Figure 4, is a research process in the third phase, which is the downstream phase. It is the phase that uses the prototype of virtual reality tourism (VR) to promote historical and community culture tourism, transfers the usage method to the experimental group to assess satisfaction from using the innovation, assesses the efficiency of the innovation prototype, evaluates the results, and brings back the feedback to improve the innovation to be complete, which is consistent with the third objective of the research.

5. Research Result

In the research on knowledge dissemination on the use of applications to promote historical and cultural community tourism, a case study of Ban Thiang Thae community, Chainat province, the research team has disseminated knowledge on how to use virtual tourism innovation for historical and community culture tourism, a case study of Ban Thiang Thae community, Chainat province, with 100 participants from 10 communities located in historical and cultural tourist areas.

Figure 5 Knowledge dissemination of VR innovation
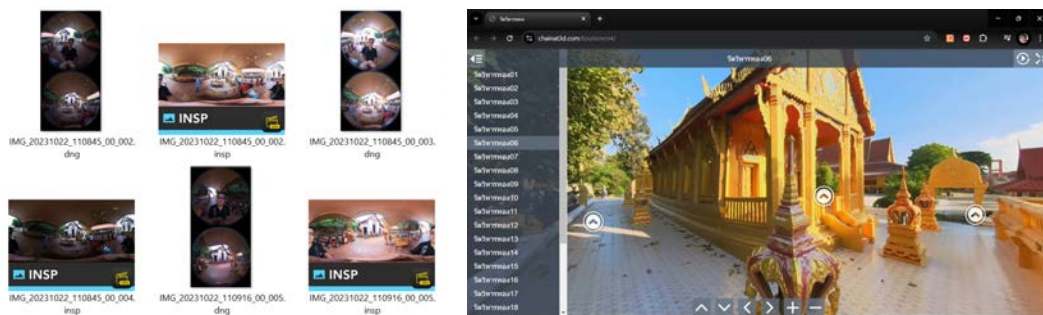
Figure 6 Original images and VR images

ท่องเที่ยวแบบ 360 องศา

วัดวิหารทอง
ตั้งอยู่ตำบลเที่ยงแท้ อำเภอสรรคบุรี จังหวัด
ชัยนาท ตั้งริมแม่น้ำน้อย เดิมเป็นวัดโบราณอยู่
ในกำแพงเมืองสรรค์

วัดหนองบัว
กราบหลวงพ่อศิลาพระพุทธรูปศักดิ์สิทธิ์ประจำ
วัด ตั้งอยู่ตำบลเที่ยงแท้ อำเภอสรรคบุรี จังหวัด
ชัยนาท

วัดโคกดอกไม้
ตั้งอยู่บ้านดงคอน เป็นบ้านเมืองเก่าแก่ที่มีหลัก
ฐานการอยู่อาศัยมาตั้งแต่ยุคก่อนประวัติศาสตร์
จนถึงยุคทวารวดีจนถึงปัจจุบัน

วัดมหาธาตุ
ตั้งอยู่ที่ตำบลแพรกศรีราชา อำเภอสรรคบุรี
โบราณสถานที่สำคัญของจังหวัดชัยนาท เป็น
วัดเก่าแก่โบราณคู่เมืองแพรกหรือเมืองสรรค์

วัดมะเหยงคณ์
พื้นที่ตั้งวัดเป็นที่ราบ อยู่ริมฝั่งแม่น้ำน้อยฝั่ง
ตะวันออก เดิมเป็นวัดเก่าแก่ สร้างมาตั้งแต่สมัย
อยุธยาตอนต้น

วัดพระยาแพรก
เป็นศาสนสถานของชุมชนภายในเมืองโบราณ
ติดกับวัดพระบรมธาตุเมืองสรรค์ ที่รู้จักกันใน
นามเมืองแพรกศรีราชาหรือเมืองสรรค์

วัดสังฆาราม
เป็นวัดราษฎร์ สังกัดคณะสงฆ์มหานิกาย ตั้งอยู่
ที่หมู่ที่ ๒ ตำบลเที่ยงแท้ อำเภอสรรคบุรี
จังหวัดชัยนาท

วัดพระบรมธาตุ
เดิมมีนามว่า "วัดพระธาตุ" และมีนามเรียกอีก
นามหนึ่งว่า "วัดหัวเมือง" สร้างขึ้นมาตั้งแต่สมัย
ขอมเรืองอำนาจอยู่แถบลุ่มแม่น้ำเจ้าพระยา

Figure 7 Virtual tourist attractions

After the knowledge transfer, the audience tried using the virtual tourism innovation for historical and community culture tourism, a case study of Ban Thiang Thae community, Chainat Province, and completed a questionnaire to evaluate the satisfaction of the innovation. The results of the satisfaction

analysis from using the virtual tourism innovation for historical and cultural tourism in Chainat Province are shown in Table 1

Table 1 Sample characteristics: demographics

	Qtn.	Percent
Gender		
Male	39	38.23
Female	63	61.77
Total	100	100.00

From Table 1, most respondents were female, 63 people, or 61.77 percent, and male, 39 people, or 38.23%. They were 45-50 years old, 19 people, or 18.63%, followed by those under 25 years old, 17 people, or 16.66%, followed by those 31-35 years old, 16 people, or 15.69%, followed by those 25-30 and 41-45 years old, 14 people, or 13.73%, followed by those over 50 years old, 12 people, or 11.76%, and those 36-40 years old, 10 people, or 9.80%.

Table 2 User Satisfaction of each Item

Item	$\bar{x}$	$S.D.$	Meaning
1. Knowledge dissemination	4.25	.55	high
2. Speaker	4.24	.61	High
3. Knowledge usage	4.47	.64	High
4. Staff Service	4.49	.55	High
Overall	4.36	.59	high

From Table 4, the level of opinions on the image of knowledge dissemination on the use of applications to promote community historical and cultural tourism, a case study of Ban Thiang Tae community, Chai Nat province, found that the level of satisfaction in terms of staff service was at a high level ($\bar{x}$ = 4.49, SD = .55), followed by knowledge usage at a high level ($\bar{x}$= 4.47, SD = .64), followed by knowledge dissemination at a high level ($\bar{x}$= 4.25, SD = .55), and speaker at a high level ($\bar{x}$= 4.24, SD = .61), respectively. The average satisfaction from knowledge dissemination on the use of applications to promote community historical and cultural tourism was at a high level overall ($\bar{x}$= 4.36, SD = 0.59).

6. Conclusion

This research aimed to evaluate the application results to promote historical and cultural tourism in the community, a case study of Ban Thiang Thae community, Chai Nat province, by using the virtual reality tourism system to promote historical and community cultural tourism, a case study of Ban Thiang Thae community, Chai Nat province, to disseminate and transfer knowledge on how to use virtual reality

tourism innovation for historical and cultural tourism. There were 100 participants from 10 communities in the historical and cultural tourist area. It was found that the satisfaction with the knowledge transfer from the application to promote historical and cultural tourism in the community was at a high level ($\bar{x}$= 4.36, SD = 0.59), respectively, which is consistent with the research of [8] and [12] who studied the use of virtual reality technology in tourism to create interest and good experiences in perception. The application users were highly satisfied with the use of the 360-degree application.

7. Suggestion

1. This research uses virtual reality technology to present 360-degree motion pictures for realism like going to visit real places. The characteristics of the motion pictures should be set to be able to be displayed through 3D glasses to create more reality and to create a learning experience for the user.

2. The display of content details should use Augmented Reality or Mixed Reality to create more realism.

8. Acknowledgments

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(149-EN-SCT)

Effect of *Hericium erinaceus* Peptides Stimulated under the *In Vitro* Gastrointestinal Tract on RAW 264.7 Macrophage Viability and Proliferation of Human Keratinocytes

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Abstract

Hericium erinaceus (HE), yamabushitake, has been identified as a medicinal mushroom showing several biological activities, including anti-inflammatory, anti-oxidant, and anti-cancer. There is, however, little or no research reporting the potential of HE mushrooms proteins and peptides to promote wound healing. Therefore, this study aimed to evaluate the potential wound-healing effect of HE proteins and peptides derived from *in vitro* gastrointestinal digestion. Protein concentrate was prepared by using an alkaline extraction and the protein extraction yield was $28.27 \pm 1.20\%$. Glutamine, arginine, leucine, and valine were the majority among various types of amino acid found in HE proteins. Three protein fractions, including unhydrolyzed protein, pepsin hydrolysate, and pepsin-trypsin hydrolysate, were confirmed to have no toxic effect on the RAW 264.7 macrophage cells up to 100 µg/mL concentration. The proliferation effect of unhydrolyzed and hydrolyzed fractions was studied at 0, 24, 48, and 72 hours at 37.0 µg/mL concentration. Unhydrolyzed, pepsin hydrolyzed and pepsin-trypsin hydrolyzed fractions had a significant proliferation effect on human keratinocytes (HaCaT), reaching a closure of the scratch at $67.34 \pm 2.66\%$, $70.7 \pm 1.85\%$, and $90.39 \pm 5.65\%$, respectively ($p < 0.05$). Our findings revealed the potential use of bioactive peptides from the *Hericium erinaceus* mushroom as a promising wound closure-promoting active ingredient for medication development which causes no systemic side effects.

Keywords: *Hericium erinaceus*, gastrointestinal digestion, human keratinocytes, peptides, wound healing

1. Introduction

Physical, mechanical, and chemical factors can produce wounds or injuries to the human skin, causing health risks. One of its traits is the skin's capacity for self-regeneration, which necessitates the participation of specific cells that can aid in healing. Even if wound healing happens naturally, the presence of both aerobic and anaerobic microorganisms can cause serious infections that need to be treated right away (Olán-Jiménez et al., 2024). Wounds pose a serious challenge to healthcare systems because of their vulnerability to infection, the frequency of having chronic as well as non-healing forms, the high expense of long-term treatment, and the specialized treatments required to heal wounds. Effective wound treatment is the only solution for overcoming these obstacles (Ksovreli et al., 2024). Both synthetic and conventional medications used to treat wounds have adverse effects, and large dosages of antibiotics can result in serious systemic toxicities, including hepatotoxicity and stomach ulcers (Paswan et al., 2023). The rising number of diabetes patients, the aging population, and growing knowledge of wound repair and management are all contributing factors for expanding market demand for wound treatments. While herbal medicines are widely used as part of traditional remedies in Asia, South America, and Africa, the demand for alternative therapies has been on the rise in Germany, Australia, and the United States, since 1999 (Yap et al., 2023).

The four primary stages of wound healing are remodeling, proliferation, inflammation, and homeostasis. It was found that the antioxidants and essential amino acids in mushrooms accelerate the healing process of wounds by increasing the production of collagen and lowering oxidative stress at the wound site (Anil Kumar et al., 2023). The medicinal mushrooms contained many bioactive compounds that supported a variety of biological processes related to wound rehabilitation, including keratinocyte proliferation, migration, and the early inflammatory phase. Additionally, keratinocyte proliferation and wound closure are regulated by several factors, including growth factors, chemokines, cytokines, keratins, and extracellular matrix. The majority of macro-fungi showed antibacterial, immunomodulatory, and anti-inflammatory properties that were important for improving wound healing (Yap et al., 2023). Traditional Chinese and Japanese medicine have recognized the medicinal properties of *Hericium erinaceus* mushrooms for centuries. Currently, extracts of *H. erinaceus* are utilized in the prevention and treatment of various cancers and are reported to possess antibacterial, anticancer, antitumor, and lipid-lowering properties (Atila et al., 2018). Moreover, Shi et al. (2024) reported that polysaccharides derived from *H. erinaceus* enhanced the immunological function of RAW 264.7 macrophages by promoting the synthesis of some cytokines, such as tumor necrosis factor-α (TNF-α) and interleukin-6 (IL-6).

Similarly, peptides are also crucial for regulating normal body functions, including neuron functions, growth and development, and wound healing. Numerous peptide types, including collagen peptides, neuropeptides, and antimicrobial peptides, have been identified to support wound healing (Liu et al., 2024a). However, mushrooms are not considered high-protein sources (Reis et al., 2020). To achieve optimal protein yield, an effective extraction method should be applied for the disruption of cell walls and structural membranes and the cleavage of structural bonds since carbohydrates, lipids, dietary fiber, and polyphenolic

compounds serve as key structural components that facilitate the interaction between proteins and other macromolecules within plant systems. Consequently, numerous studies have investigated conventional extraction methodologies utilizing alkaline, salt, and organic solvents to enhance protein extraction (Rashwan et al., 2023).

Afterwards, the extracted proteins need to be hydrolyzed to reveal their bioactive properties since the majority of bioactive peptides are concealed in the structure of native proteins. Bioactive peptides become active when the proteins are hydrolyzed (Akbarian et al., 2022). The most popular and practical technique for creating bioactive peptides is enzymatic hydrolysis, which includes digestive enzyme hydrolysis.

There is currently little to no research regarding *Hericium erinaceus* (HE) mushroom proteins on wound healing. Thus, our study aimed to (1) extract protein from HE mushrooms, (2) stimulate its bioactivity under *in vitro* gastrointestinal digestion, and further (3) evaluate its impacts on cell viability of RAW 264.7 macrophage and human keratinocyte (HaCaT) proliferation.

2. Research Objectives

To examine the effects of *Hericium erinaceus* mushroom peptides stimulated under *in vitro* gastrointestinal digestion on RAW 264.7 macrophage viability and human keratinocyte proliferation.

3. Research Methodology

3.1 Sample Collection and Preparation

Fresh *Hericium erinaceus* (HE) mushrooms were obtained from the Siam Organic Mushroom Farm in Chaing Mai, Thailand.

3.2 Chemicals and Cell Lines

Bovine serum albumin, sodium potassium tartrate, copper sulfate, sodium hydroxide (NaOH), hydrochloric acid (HCl), pepsin (E.C.3.4.23.1) and trypsin (E.C.3.4.21.4) obtained from porcine gastric mucosa and bovine pancreas were purchased from Sigma-Aldrich Company (St. Louis, MO, USA). HaCaT cell line was purchased from CLS Cell Lines Service GmbH (CLS Cell Lines Service GmbH, Eppelheim, Baden-Wurttemberg, Germany). The mouse RAW 264.7 murine macrophages (ATCC® TIB-71 ™) used in this study were obtained from ATCC (ATCC, Manasssas, VA, USA).

3.3 Determination of Proximate Composition

The freeze-dried and ground fine mushroom powder was used to analyze proximate and dietary fiber content using the Association of Official Analytical Chemists (AOAC, 2019). Moisture (AOAC 934.01, 2019), crude fat (AOAC 983.23, 2019), crude proteins (AOAC 995.04, 2019), and dietary fiber content (AOAC 991.43, 2019), were analyzed by using a hot air oven (UF30, Memmert GmbH + Co.KG, Germany), Soxtec extraction system (Soxtec TM 2055, Foss, Sweden), Kjeldahl apparatus (DK 6, F30100182 Series, and UDK 129 - F30200120 Series, Velp Scientifica, Italy), and dietary fiber analyzer (Enzymatic digester-GDE, SA30400209 series, and filtration unit- CSF6, F30420210 series, Velp Scientifica, Italy), respectively. Available

carbohydrate content was calculated using by difference method. All the analyses were conducted in triplicate. The data are presented as mean ± standard deviation (SD).

3.4 Preparation of Mushroom Protein Concentrate (MPC)

Mushroom protein concentrate was prepared using an alkaline extraction at pH 10 with continuous stirring for 1.5 hours, followed by an iso-electric precipitation at pH 4.5. After that, the precipitate was washed three times, adjusted to pH 7.0, and finally freeze-dried (MPC) as described in Phongthai et al. (2018). Then the protein yield was calculated using the following equation.

$$Protein\ yield\ (\%) = \frac{Amount\ of\ extracted\ protein\ in\ g}{Amount\ of\ total\ protein\ in\ original\ mushroom} \times 100$$

3.5 Analysis of Amino Acid Profile

The amino acid profiles were evaluated using AOAC Official Method 994.12 (2000). The HE mushrooms proteins were dissolved in 6M HCl and then incubated at 110 °C for 24 hours. The pH of the liquid was brought down to 2.2 by diluting it with sodium citrate buffer. Using standards of 17 amino acids, individual amino acids were determined. A gas chromatography (6890N; Agilent Technologies, Santa Clara, CA, USA) and a transmission quadrupole mass spectrometer (5973; Agilent Technologies) with Zebron ZB-AAA GC column (10 mm × 0.25 mm, 0.25 μm film thickness) were used. The quantity of each amino acid was expressed in milligrams per 100 grams of protein.

3.6 Preparation of Mushroom Protein Hydrolysates (MPH)

With minor adjustments, mushroom protein hydrolysate was prepared using the methodology of Phongthai & Rawdkuen (2020). After making a protein solution (3% w/v) and adjusting the pH to 1.5, it was incubated for 5 minutes at 37 °C. Pepsin was added to this reaction mixture in 1:100 protein to pepsin ratio, and it was continuously agitated for 2 hrs at 37 °C in a digesting chamber. After bringing the pH to 7.0, trypsin was added in 1:100 protein to trypsin ratio and allowed to continue digesting for 2 hrs. The digestion was terminated at 95 °C for 10 minutes. After that, the mixture was filtered via Whatman 4 filter paper, lyophilized, and kept at -18 °C (MPH).

3.7 Determination of RAW 264.7 Macrophage Viability

According to Takuathung et al. (2021), the 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide (MTT) assay was used to evaluate the possible cytotoxicity of HE proteins (HEP) to RAW 264.7 macrophage cells. In brief, 2×10^5 cells/mL were seeded into 96-well plates and left in full medium for 24 hrs. After that, the cells were exposed to different concentrations of HEP (0–1000 μg/mL) for a further 24 hrs. The plates were incubated for 2 hrs at 37 °C with 5% CO_2 after the MTT solution (0.5 mg/mL in PBS) was added to each well. Following the aspiration of the culture supernatants, DMSO (200 μL) was added, and the plates were then incubated in the dark (10 min). Absorbance at 590 nm was detected by a microplate reader (MicroTek Instruments, United States).

3.8 Cellular Wound Healing Activity Assay

Cellular wound healing activity assay was carried out according to the method described by Ruttanapattanakul et al. (2022). The effects of undigested and digested peptides from HE mushrooms on accelerating wound closure were examined using a human keratinocyte monolayer wound-healing test. In 24-well plates, the seeded HaCaT cells (0.02×10^6 cells) were permitted to reach confluence in full medium. SPLScar™ Scratcher (SPL Life Sciences, Gyeonggi-do, Korea) was used to create a scratch wound in a vertical and horizontal crossline form. The cells were treated with peptides at 37.0 µg/mL or DMSO in DMEM without FBS after each well was once cleaned with sterile phosphate buffer saline (PBS). A phase-contrast Axio Vert.A1 microscope with 10 magnification was used to view and take pictures of the changes in the injured areas at 0, 24, 48, and 72 hrs.

4. Research Results and Discussion

4.1 Proximate Composition and Protein Extraction Yield

Hericium erinaceus (HE) mushroom contained 21.24±0.07% proteins, 4.37±0.17% ash, 39.98±0.82% dietary fiber, 4.72±0.82% fat, and 26.69±1.37% available carbohydrates. Dimopoulou et al. (2022) evaluated the protein content of several different mushroom species, and the protein contents of *Morchella elata* (28.2%), *Agaricus bisporus* (25.1%), *Amanita caesarea* (24.0%), and *Codyceps militaris* (23.1%) are higher than the protein content obtained from HE mushrooms in our study. However, proteins in *Cantharellus cibarius* (19.9%), *Coprinus comatus* (14.2%), *Ganoderma lucidum* (19.2%), and *Lentinula edodes* (20.7%), were lower than proteins found in HE mushrooms. With this regard, HE mushrooms can be considered as an alternative protein source. The protein extraction yield obtained from an alkaline extraction was only 28.27±1.20%. Therefore, some novel techniques, such as enzymatic-, ultrasonic-, microwave-, and pulsed electric field-assisted extractions might be helpful for enhancing a protein extraction yield.

4.2 Amino Acid Profile

The amino acid profile of HE mushrooms protein is shown in Table 1. Hydrophobic amino acid was found to be a major amino acid. Among hydrophobic amino acids, leucine was the highest abundant amino acid (5812.43 mg/100 g of protein), followed by valine (4706.32 mg/100 g of protein) and alanine (3815.19 mg/100g of protein). Zhang et al. (2015) found that leucine was able to improve the expression of the amino acid transporters through transcriptional as well as translational regulation through ERK and PI3K/Akt/mTOR activation. Further, it was mentioned that leucine has been shown to regulate intestinal protein metabolism in addition to cell proliferation, and migration.

Leucine content (5812.43 mg/100 g protein) in HE protein was higher than that of *Pleurotus eryngii* (2300 mg/100 g protein) and *Flammulina velutipes* (5600 mg/100 g protein), while it was lower than that of *Voarella volvaceae* (8100 mg/100 g protein), as indicated in the study of Stepanova & Akrashie (2021). Furthermore, the leucine content of the extracts of *Pleurotus columbinus* (381 mg/100 g protein), *Pleurotus sajor-caju* (417 mg/100 g protein), and *Agaricus bisporus* (337 mg/100 g protein), conducted by Elhusseiny

et al. (2021), were lower than HE mushrooms in this study. Therefore, HE protein is suitable for being used as a raw material for the development of bioactive peptides, e.g. wound-healing promoting peptides.

Table 1 Amino acid profile of *Hericium erinaceus* proteins (mg/100g protein)

Amino acids	Amount	Amino acids	Amount
Hydrophobic		*Electrical charged*	
Leucine	5812.43	Arginine	3931.91
Valine	4706.32	Histidine	1640.97
Alanine	3815.19	Lysine	3544.97
Phenylalanine	3420.47	Asparagine	6501.38
Isoleucine	2974.91	Glutamine	7405.42
Tyrosine	2548.24	*Special cases*	
Methionine	1021.60	Proline	2539.05
Polar uncharged		Glycine	3046.51
Serine	2943.2	Cysteine	99.05

4.3 RAW 264.7 Macrophage Viability

All unhydrolyzed and hydrolyzed fractions were evaluated for cytotoxicity using the MTT assay to screen biological substances for toxicity necessitated in evaluating the therapeutic application. The cell viability test results are shown in Figure 1.
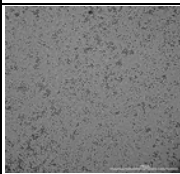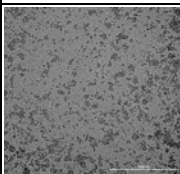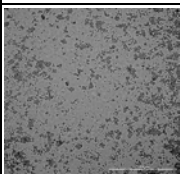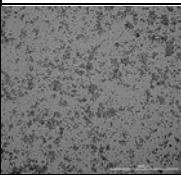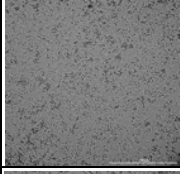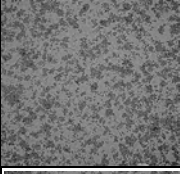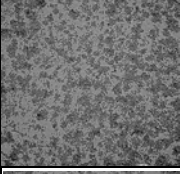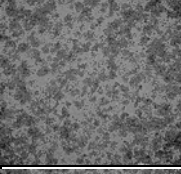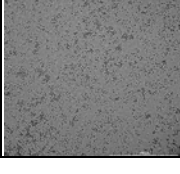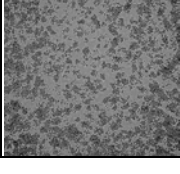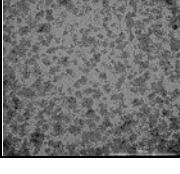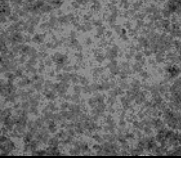
Figure 1 Cell viability test results of unhydrolyzed and hydrolyzed proteins; F1: Unhydrolysed fraction, F2: Pepsin hydrolysed fraction, F3: Pepsin-trypsin hydrolysed fraction

It was clearly observed that, unhydrolyzed, pepsin hydrolyzed and pepsin-trypsin hydrolyzed fractions were not toxic to the RAW 264.7 macrophage cells up to 100 µg/mL concentration. Furthermore, it was evident that RAW 264.7 cells exhibited a proliferation increase of approximately 1.5 times relative to the control group. Consequently, it can be affirmed that the HE mushrooms proteins and their resultant hydrolysates may be safe for direct consumption or use as a food ingredient, and may also be beneficial in the wound healing process.

4.4 *In Vitro* Wound Healing Activity

Micrographs in Figure 2 clearly show that the development in cell proliferation and migration subsequently leads to decrease in the wound area in the scratch.
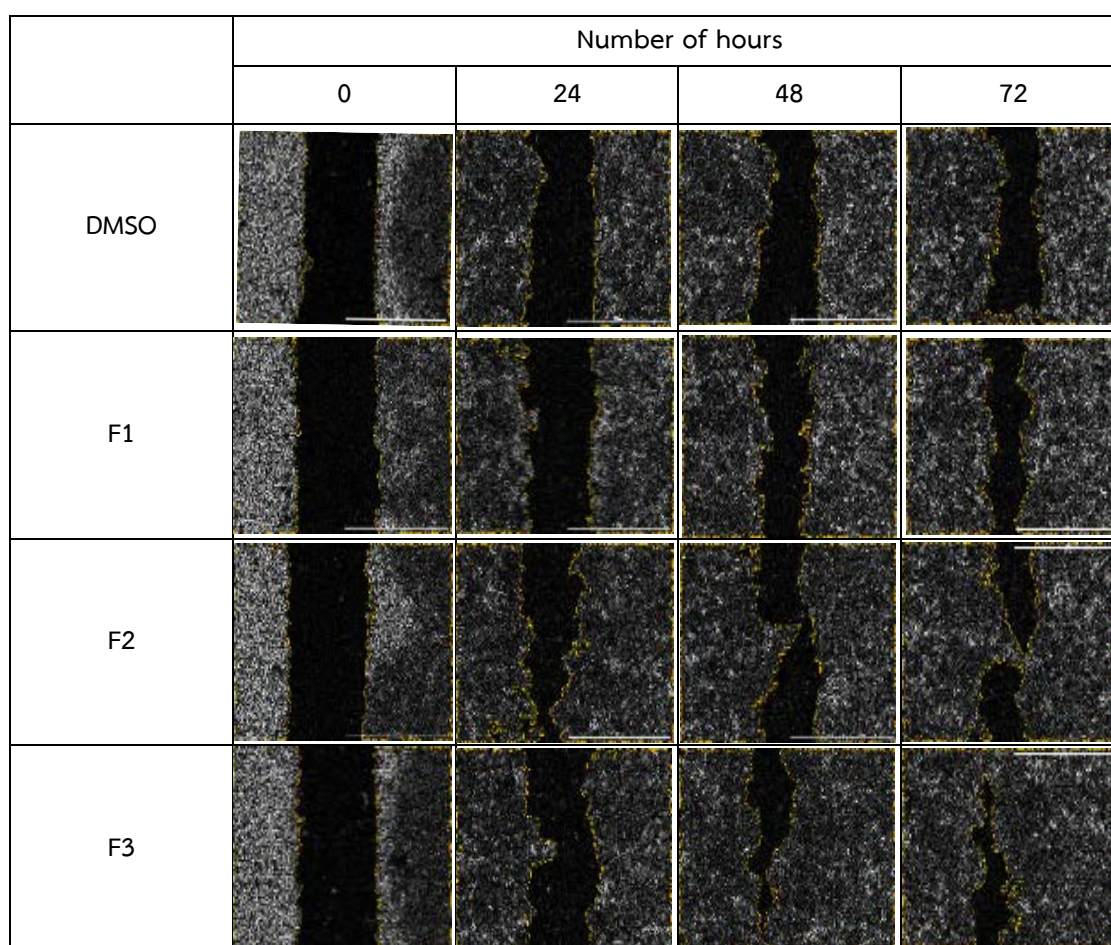
Figure 2 Effects of F1 (unhydrolyzed), F2 (pepsin hydrolyzed), and F3 (pepsin-trypsin hydrolyzed) fractions on accelerating the closure of scratch wound of human keratinocyte monolayers. Phase-contrast microscopy (10 × magnification) of scratch wound-healing assay at various captured times (0 h, 24 h, 48 h, and 72 h) in HaCaT treated with 37.0 µg/mL concentration

The wound closure percentages of the combined peptides (37.0 µg/mL) and human keratinocyte cell culture, at 0, 24, 48, and 72 h, are shown in Figure 3. The unhydrolyzed, pepsin hydrolyzed and pepsin-

trypsin hydrolyzed fractions significantly improved the proliferation of human keratinocytes at 72 h, with respect to the DMSO control (p<0.05). Among these three fractions, unhydrolyzed proteins possessed proliferation of human keratinocytes, in term of the percentage closure of the scratch, with 33.82±1.75%, 57.23±3.16%, and 67.34±2.66%, whereas pepsin hydrolyzed fraction caused 38.03±2.14%, 60.68±5.57%, and 70.7±1.85% of cell proliferation at 24, 48, and 72 h, respectively. In addition, pepsin-trypsin fraction enhanced the proliferation with 42.24±0.69%, 59.45±1.55%, and 90.39±5.65% at 24, 48, and 72 h, respectively. As a results, it was evident that the percentage closure of the scratch across all evaluated fractions was significantly influenced by the incubation duration (p<0.05). However, the highest wound healing activity was observed with the pepsin-trypsin hydrolyzed fraction at 72 h and the activity of this fraction was significantly higher than all other fractions (p<0.05).
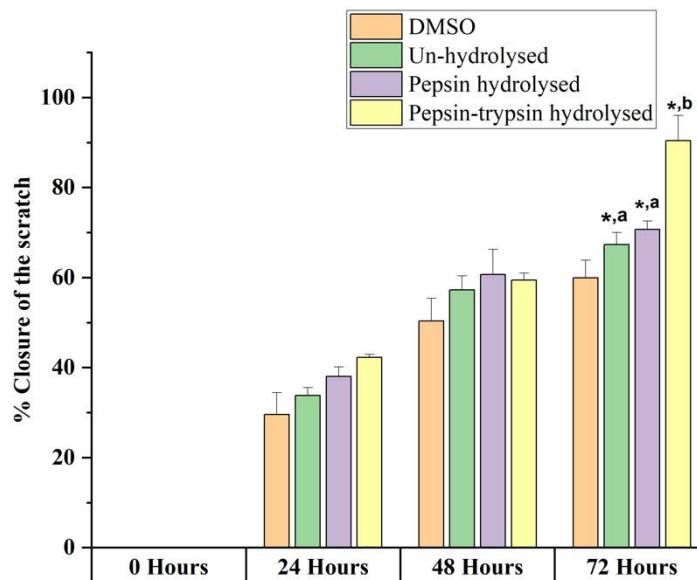
Figure 3 Percentage closure of the scratch wounded areas of human keratinocyte monolayer over 0, 24, 48, and 72 h in HaCaT treated with 37.0 µg/mL unhydrolyzed, pepsin hydrolyzed, and pepsin-trypsin hydrolyzed fractions. Data were analyzed from three individual replicates and showed as mean±SD. * p < 0.05 as compared with the DMSO control and different lower-case letters show significant differences among treatments for each fraction (p<0.05).

Other sources of wound-healing promoting peptides were also reported. Song et al. (2019) found that *Odorrana andersonii* frog peptides improved the scratch-healing of keratinocytes and human fibroblasts. In addition, egg white peptides dramatically reduced pro-inflammatory expression and shortened inflammation, moreover, it can also boost growth factor secretion (PDGF, VEGF, and TGF-β1) in skin tissue, leading to faster regeneration of granulation tissue and endothelium during the proliferation phase, boosting wound healing (Ge et al., 2024). In addition, tetrapeptides from sea cucumber have excellent skin wound healing potential by promoting keratinocyte migration and re-epithelialization,

improving dermal regeneration, promoting angiogenesis, and increasing growth factor expression, as well as activating ERK/AKT signaling, which further promotes skin wound healing in mice (Zhang et al., 2023).

There are several steps in the wound-healing process that ultimately led to the regeneration of skin. Hemostasis, inflammation, proliferation, and remodeling are the four main components of the wound-healing process, which is set in motion by the damage. Furthermore, different cellular and biophysical events take place during each of these stages. For example, in the inflammation stage, monocytes differentiate into macrophages, and neutrophils and lymphocytes infiltrate the body. In the proliferation phase, there is an increase in angiogenesis, and fibroblast migration causes re-epithelialization (Gomes et al., 2017). In addition, different peptides, in terms of peptide sources, size, animo acid sequences, may differently exert the wound healing activity.

5. Recommendations

Regarding the amino acid profile, *Hericium erinaceus* mushroom protein is a suitable compound for cell proliferation and migration due to its high leucine content. *In vitro* gastrointestinal digestion improved the efficiency of bioactive peptides with wound healing by 90.39%. Hence, *Hericium erinaceus* mushroom proteins can be utilized as a natural, effective future pharmaceutical drug for treating wounds with minimal toxicity effects.

6. Acknowledgments

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(150-EN-SCT)

Selenium Biotransformation and Antioxidant Activity of Se-Polysaccharide in Different Molecular Weights Extracted from *Pleurotus ostreatus*

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Abstract

Pleurotus ostreatus, an edible and medicinal mushroom, is widely regarded as a functional food, prized not only for its nutritional value but also for its medicinal properties, which have been exploited for centuries. Recently, there has been growing interest in leveraging this species for their bioactive compounds, particularly polysaccharides, which exhibit significant therapeutic potential. The management of oxidative stress is vital for overall health promotion and disease prevention. Selenium (Se), a vital trace element, is mentioned for its antioxidative and potential anticancer benefits. This study enriched *P. ostreatus* with Se using substrates with 0-200 mg/kg sodium selenite to harness fungi's ability to convert inorganic Se into organic forms. Optimal Se accumulation occurred at 200 mg/kg of sodium selenate in the substrate. Four molecular weight fractions of Se-polysaccharide (<3 kDa, 3–5 kDa, 5–10 kDa, and >10 kDa) were separated by membrane filtration, revealing that Se was significantly concentrated in the low molecular weight fractions while maintaining consistent polysaccharide content across fractions. The antioxidant activity measured after the membrane filtration according to their molecular weight and highest scavenging activity shows the Se-polysaccharide in molecular weight range 5-10 kDa in the FRAP method (80.82±0.01 μg TE/g) and ABTS assay (44.32±1.62 μg TE/g). Moreover, the anti-proliferation activity of Se-polysaccharide against human lung cancer was higher than the control sample in a dose-dependent manner. These results support the potential as bioactive ingredients of Se-polysaccharide from the Se biotransformation process in Pleurotus ostreatus for foods and pharmaceuticals.

Keywords: antioxidant; Se-Polysaccharide; Selenium; Selenium biotransformation

1. Introduction

Mushrooms are a fascinating food choice for any individual trying to create a healthy diet since they are high in dietary fibre, proteins, and minerals but low in calories and fat. It has distinct flavours and textures (Bhatia et al., 2013). Beyond their culinary appeal, mushrooms are acknowledged for their contributions to well-being. The physiologically active substances found in these fungi have been shown to have anti-inflammatory, anti-bacterial, anti-allergenic, and anti-carcinogenic properties. In addition, mushrooms are a good source of vitamins, high-quality protein, and micro and macronutrients like protein-polysaccharide complexes and polysaccharides (Mleczek et al., 2013). Among them, *Pleurotus* is the most well-known genus of *Basidiomycetes*. It is also referred to as the oyster mushroom, which is one of the most productive types of mushrooms due to their edible and medicinal properties (Irshad et al., 2023).

Polysaccharides play a key role in the biological effects of mushrooms, influencing the immune system and possessing antioxidant properties, contributing to overall health benefits. Polysaccharides, recognized as biological response modifiers (BRMs) in both edible and medicinal mushrooms, have attracted significant scientific interest due to their complex structural properties and diverse physiological effects (Chen et al., 2017). Mushroom polysaccharides, including heteropolysaccharides rich in fucose, galactose, mannose, and xylose, and glycogen-like glucans, are complex carbohydrate chains with exceptional structural versatility, standing out for their ability to convey biological information (Ojha, 2018). Some polysaccharides, particularly those high in mannose, rhamnose, and fucose, are associated with bioactivity (Wang et al., 2022). Polysaccharides, recognized for their anti-tumour properties vary in composition and physical characteristics, exerting anti-tumour effects by enhancing the host organism's immune response. Khamlue et al., (2012) reported that the anti-cancer efficacy of polysaccharide of blue oyster mushroom demonstrated a 70% inhibition at a concentration of 100μg/ml against A549 human lung carcinoma cells. These findings highlight the notable antioxidant and anti-cancer potential of polysaccharides, showing a significant correlation with their molecular weight and monosaccharide composition, including mannose, glucose, and fucose. These substances can range from single-type polymers to complex mixtures, with their effectiveness influenced by factors like water solubility, molecule size, branching pattern, and overall structure (Ojha, 2018; Cui & Chisti, 2003). Different polysaccharide types have been isolated in *P. ostreatus*. The most extensively discovered of them is (1→3)-β-d-glucan, or pleuran, which was isolated from the fruiting bodies of *P. ostreatus,* a significant and widely recognized species that are cultivated for commercial purposes all over the world (Baeva et al., 2019).The majority of *P. ostreatus* polysaccharides are commonly extracted using a hot water method due to the water-soluble nature of polysaccharides (Zhao et al., 2024).

Selenium (Se) is an important micronutrient for humans, it serves as a co-factor for enzymes, plays a role in antioxidant defense systems, influences thyroid hormone metabolism, and affects immune function, reproduction, and DNA synthesis (Xu, et al., 2021) Moreover, Se is actively engaged in various cellular metabolic processes, and it exhibits potent bioactivities, including antioxidant, anti-inflammatory, and antiviral properties (Bañuelos et al., 2017). Although Se is widely recognized for its health benefits, little

is known regarding how edible mushrooms, especially *P. ostreatus*, are fortified with it. Previous research has mostly concentrated on various mushroom species or other Se-enriched foods. Due to its high resistance to conventional radiation and chemotherapeutic drugs, especially in lung cancer with a poor prognosis, novel therapeutic approaches are needed to address the increasing prevalence of human lung cancer (Sharifi-Rad et al., 2020). Se-polysaccharides belong to an innovative category of organoselenium compounds. They alter the structure and biological activity of the original polysaccharide, which is more readily absorbed and used by humans (Xu et al., 2021). Notably, those Se-polysaccharides have shown wonderful efficacy when compared to performing normal polysaccharides and inorganic Se when used individually (Shang et al., 2009).

Therefore, the present paper aims to analyze the antioxidant and antiproliferative activity in human lung cancer cell lines of Se-polysaccharides fractions extracted from Se-enriched *P. ostreatus* compared to non-Se-polysaccharide *in vitro*. The outcomes of this study have a significant impact on the development of Se-polysaccharides as a higher bioactive component. The potential for synergy between Se and the bioactive compounds that exist in *P. ostreatus* allows the creation of innovative dietary supplements with enhanced health benefits. This is in accordance with the growing demand from consumers for natural products that promote general health benefits.

2. Research Objectives

2.1 To investigate the Se biotransformation on polysaccharide and Se content in the polysaccharide extracted from *P. ostreatus.*

2.2 To obtain Se-polysaccharide molecular weight fraction and determine bioactivity from Se-enriched *P. ostreatus.*

3. Research Hypotheses

Selenium enhances the bioactivity activity of polysaccharides extracted from *P. ostreatus.*

4. Research Methodology

4.1 Material and Chemicals

All chemicals and reagents, ethanol, sulphuric Acid, Nitric Acid, Hydrogen peroxide, and Phenol were used of analytical grade were purchased from Merck (Darmstadt, Germany). All aqueous solutions were prepared using deionized water. Sodium selenite [Se (IV)] was obtained from Sigma (St. Louis, MO, USA). The standard compound Dextrose Anhydrous was purchased from Loba Chemie Pvt. Ltd. India.

4.2 Cultivation of Se-Enriched Mushrooms

P. ostreatus was cultivated in 800 g compost bags containing a commercial growing kit and autoclaved at 121 °C. The substrate was supplied with Se in the form of sodium selenate ($NaSeO_3$) of Se concentrations (0, 50, 100, 150 and 200 mg/kg), respectively, and the Se solution was thoroughly mixed with the substrate. Each treatment was done using six bags. Three days later, the bags were inoculated with

P. ostreatus culture and left in the dark at 25 °C. After the substrate was completely colonized by the mycelia, the bags were incubated in a fruiting chamber where the environmental conditions were maintained at 25–28 °C, and 80%–90% relative humidity. After 30 days of cultivation, fruiting bodies were collected.

4.3 Sample Preparation

The mushrooms were rinsed under running tap water for 15 minutes to remove any contaminants. Subsequently, the mushrooms were vacuum-dried at 50^0C for 48 h to reduce their moisture content. The dried mushrooms were ground into fine particles (50-100 mesh). The ground mushroom was sealed in air-tight plastic bags and stored under dry and dark conditions.

4.4 Extraction and Precipitation of Polysaccharides

The mushroom powder was mixed with distilled water at a ratio of 1:20 w/v. The mixture was heated to a temperature of 80°C for 2 hours and 30 minutes under continuous stirring. After extraction, the mixture was allowed to cool to room temperature. The solution was centrifuged at 6000 rpm to separate the solid residue from the liquid supernatant. The liquid supernatant was concentrated using a rotary evaporator at reduced pressure and 60°C until the volume was reduced to about ¼ th of the original volume. Ethanol (95%) was gradually added to the concentrated extract at a 5:1(v/v) ratio (ethanol to extract) to precipitate polysaccharides. The mixture was left undisturbed at 4°C for 48 hours to allow for complete polysaccharide precipitation. The precipitate was collected by centrifugation at 8000 rpm at 4°C for 20 minutes. The supernatant was discarded, and the precipitate was washed with ethanol to remove impurities. Then it was freeze-dried to obtain the crude polysaccharide product in powder form.

4.5 Analytical Methods

4.5.1. Determination of Yield of Polysaccharide

The yield was determined by extraction of crude polysaccharide using the hot water extraction method, mushroom powder mixed with the water 1:20 ratio, then it was kept in the water bath for 2 hours 30 minutes at a temperature of 80°C (Jiang et al., 2014).

4.5.2 Analysis of Polysaccharide Content

The content of polysaccharides in the extracts was determined by the Phenol-Sulfuric acid method according to the method Yue et al. (2022). Standard D-glucose solutions (5–120 µg/mL) and a sample solution (50 mg in 250 mL water) were prepared. Each sample (0.5mL) was combined with 5% phenol (1mL) and Conc. sulfuric acid (5mL), vortexed, and cooled, then its absorbance was measured at 490 nm using a microplate reader (spark 10M; Tecan Trading AG, M'annedorf, Switzerland) against the blank sample prepared by substituting distilled water for the glucose solution. Polysaccharide levels were quantified as hexose equivalents based on a D-glucose standard curve.

4.5.3 Analysis of Se Content

The Se content of the polysaccharide was determined according to the method outlined by(Hu et al., 2019). The sample weight was 0.1 g, 9 mL of HNO_3 and 1 mL of H_2O_2, digested in microwave

digestion (ETHOS-900 Microwave Laboratory Systems, Italy) at 200°C for 20 min. The solution was diluted with deionized water to make 50 mL. The Se content was determined by Graphite furnace Atomic Absorption Spectrometry analysis (GAAS, nov AA1 300, Analytik Jena AG, Jena, Germany).

4.6 Membrane Separation of Polysaccharides Extracts from *P. ostreatus*

Crude polysaccharides were extracted and prepared a solution by dissolving them in distilled water to achieve a concentration of 0.2 g/mL. This extract had been ultrafiltered using cellulose membranes with molecular weight cutoffs (MWCO) of 3 kDa, 5 kDa, and 10 kDa. The retentates obtained from each membrane contained homogeneous polysaccharides with fractions as <3 kDa, 3-5 kDa, 5-10 kDa, and >10 kDa, respectively. The above four fractions were dried with a freeze-dryer. The antioxidant activity, polysaccharide content, and Se content of polysaccharides were assessed for each fraction. This comprehensive analysis aimed to identify the fraction with the highest antioxidant activity, attributable to Se-polysaccharide characteristics (Cheng et al., 2016).

4.7 Antioxidant Activity of Polysaccharide Fractions

4.7.1 Ferric Reducing Antioxidant Power (FRAP Assay)

According to the method described by Benzie and Strain (1996) with slight modifications. The FRAP assay was prepared using 10 mM TPTZ in 10 mM HCL, 20 mM $FeCl_3$, and acetate buffer (300 mM, pH 3.6) in a 1:1:10 (v/v/v) ratio. In a 96-well plate, 175 µL of the FRAP solution and 25 µL of each sample(1mg/mL) were added and then incubated at 37°C for 15 minutes. After incubation, the absorbance was measured at a wavelength of 593 nm using a microplate reader (spark 10M; Tecan Trading AG, M'annedorf, Switzerland) with Trolox as the standard and distilled water as the blank. Results were expressed in µmol Trolox equivalents per gram of dry weight (µmol TE/g DW).

4.7.2 2,2'-azino-bis (3-ethylbenzothiazoline-6-sulfonic acid) ABTS Radical Scavenging Activity

The free-radical scavenging capability of the polysaccharides was analyzed by employing the ABTS test according to a modified method as described in Re et al. (2021) with slight modification. ABTS radical cation was generated by mixing ABTS (7 mM) and $K_2S_2O_8$ (2.45 mM) in the dark for 12 hours. The ABTS solution was then diluted to a working solution with an absorbance of 0.74 ± 0.03 at 734 nm. In a 96-well plate, 175 µL of ABTS solution and 25 µL of each sample (1 mg/mL) were mixed, protected from light, and incubated for 7 minutes before measuring absorbance at 734 nm. Results were expressed in µmol Trolox equivalent per gram dry weight (µmol TE/g DW).

4.8 Anti-proliferation on Human Lung Cancer Cell

The assay, based on Amritha et al. (2015), tested sample effects on A549 lung cancer cells. The cells were cultured in minimal Essential Medium (MEM) with supplements (10% Fetal Bovine Serum, streptomycin, and penicillin) and incubated at 37°C with 5% CO_2. After reaching confluency, samples at various concentrations were applied for 24 hours. Post-incubation, cells were washed with PBS, and MTT dye was

added to assess viability. Formazan crystals formed were dissolved in dimethyl sulfoxide (DMSO), and absorbance at 570 nm measured cell viability using a UV spectrophotometer, with DMSO as the blank.

4.9 Statistical Analyses

All analyses were done in triplicate, with data expressed as means ± SD. One-way ANOVA and Duncan's tests determined significance ($p < 0.05$). A significant difference was concluded at a level of $p < 0.05$.

5. Research Results and Discussion

5.1 Effects of Se concentration of the substrate on the yield, and polysaccharide content.

The percentage yield and polysaccharide content at different Se concentrations cultivated in substrate containing Se (control) 0, 50, 100, 150, and 200 mg/kg are shown in Table 1.

Table 1: Extraction Yield and Polysaccharide Content Extracted from Se-enriched *P. ostreatus*

Se concentration in substrate (mg/kg)	Yield (%) [ns]	Polysaccharide content (%)
0	4.74±0.26	54.39±0.39[a]
50	4.39±0.27	60.25±1.88[a]
100	4.37±0.19	55.12±1.71[a]
150	4.43±0.06	43.76±1.80[b]
200	4.43±0.58	46.57±1.07[b]

Means with different letters [a-b] within a column are significantly different ($p < 0.05$). Each value is expressed as mean ± SD (n = 3). The [ns] Indicates non-significant differences within the treatment based on the independent test ($p > 0.05$)

The polysaccharide content is a critical factor, given its importance in the nutritional and medicinal value of mushrooms (Liu et al., 2022). The data indicated an initial increase in polysaccharide content percentage at lower Se concentrations (50 and 100 µg/mL). At higher levels (150 and 200 mg/kg), the polysaccharide content is low. This could be due to the incorporation of Se into the polysaccharide structure. Additionally, Se is a co-factor in enzymatic reactions involved in polysaccharide biosynthesis (Sravani et al., 2021). Selenium enhances the activity of key antioxidant enzymes, improving their overall antioxidant effects. These enzymes include glutathione peroxidase (GSH-Px), catalase (CAT), and superoxide dismutase (SOD). SOD is a primary scavenger of superoxide anions, catalyzing their conversion into hydrogen peroxide (H_2O_2), which is then broken down into water (H_2O) and oxygen (O_2) by CAT (Chang & Liu, 2024). The addition of sodium selenite to the growth medium led to a rise in polysaccharide production, reaching 60.25 ± 1.88% at 50 mg/kg of Se. While Se is known to function as an antioxidant at low concentrations, it can shift to a pro-oxidant role at higher levels (Malinowska et al., 2009). This suggests that while Se can be

beneficial at optimal levels, its excessive presence in the substrate can be unfavorable to polysaccharide production in *P. ostreatus*.

5.2. Selenium Content in Polysaccharide

The results indicate in Figure 1 that a significant increase in Se concentration in the substrate at 200 mg/kg was suggested as an optimal level within the range at which *P. ostreatus* maximizes Se incorporation into its polysaccharides with the highest Se content at 144.3 µg/g.
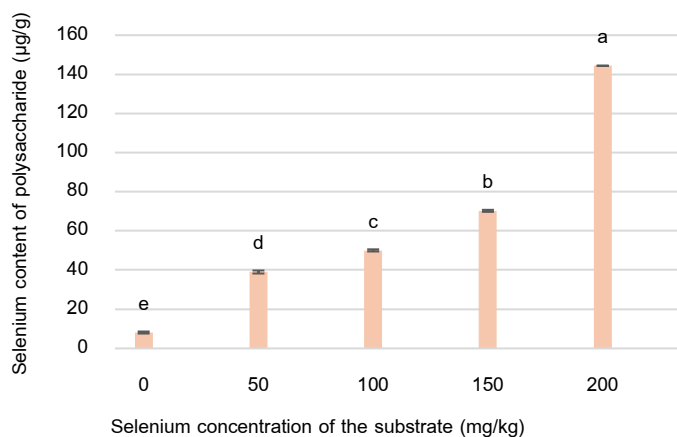
Figure 1 Selenium content of polysaccharide at different Na_2SeO_3 concentrations of substrate

Error bars indicate the SD of the mean (n = 3). Different letters [a–e] indicate significant differences (p < 0.05).

According to the findings, this species effectively absorbs and accumulates Se at elevated substrate selenium levels. Based on these results, selected treatments at 200 mg/kg of Se concentration in the substrate achieving a peak Se content of polysaccharide 144.3 µg/g was identified as optimal. This concentration achieves substantial Se enrichment. Although the 200 mg/kg of Se treatment in the substrate is slightly lower purity, this is balanced by the anticipated enhancement in bioactivity due to the higher level of selenium incorporation. A substrate containing 200 mg/kg of Se was selected for further extraction and subsequent analysis. Although Se is antioxidant protection and enzyme functions at low levels, its excessive presence disrupts cellular functions. High Se concentrations lead to the formation of biologically inactive selenium nucleosides and selenoglycosides, which interfere with essential metabolic processes. Selenoglycosides act as glycosidase enzyme inhibitors, obstructing sugar breakdown necessary for energy and growth. Consequently, elevated Se levels impose oxidative stress and metabolic imbalances, impairing cellular structure and reducing the mushroom's growth and yield (Milovanović et al., 2014).

5.3 Polysaccharide Content of Different Molecular Weights Fractions

Polysaccharide was extracted using mushroom powder (200 mg/kg of substrate Se concentration) and it was separated into four molecular weight fractions: <3 kDa, 3-5 kDa, 5-10 kDa, and >10 kDa. Each fraction was analyzed for Se content, and polysaccharide content antioxidant, these were compared with non-fortified polysaccharide fractions of the same molecular weights. The polysaccharide content of different molecular weight fractions is shown in Table 2.

Table 2 Effect in different molecular weights on Se-polysaccharide content extracted from Se-enriched
P. ostreatus with control

Molecular weights fraction (kDa)	Polysaccharide content (%)	
	Control [ns]	Se-polysaccharide [ns]
10	73.15±1.19	71.07±1.14
5-10	71.33±0.20	70.96±0.70
3-5	79.57±3.26	72.94±3.05
< 3	70.69±3.42	75.25±5.94

The [ns] within a column are no significantly different ($p > 0.05$). Each value is expressed as mean ±
SD (n = 3).

Results show that Se-polysaccharides in the 3-5 kDa range showed the highest polysaccharide
content (79.57%) in control samples, with no significant difference among the fractions in both control and
Se-fortified samples in 200 mg/kg substrate levels. Polysaccharide content remained consistent (70%-80%)
after membrane separation, indicating that Se fortification of *P. ostreatus* did not impact polysaccharide
content under the same extraction conditions in molecular weight rangers for >10,10-5,5-3, < 3 kDa.
Mushroom polysaccharides show varying structures. Polysaccharides >10 kDa primarily consist of complex
β-glucans (β-(1→3)-glucans and β-(1→6)-glucans. Medium-weight polysaccharides (10-5 kDa), including
β-glucans, α-glucans and mannans (mannose sugar units). Low molecular weight polysaccharides (5-3 kDa
and <3 kDa) and gluco-oligosaccharides. These molecular weight ranges highlight structural differences that
influence each polysaccharide's solubility and bioactivity (Wang et al., 2017).

5.4. Selenium Content in Polysaccharide

Selenium content in Se-polysaccharide and control samples was measured using an Atomic
Absorption Spectrophotometer, as shown in Figure 2. Selenium content was significantly higher ($p < 0.05$)
in all molecular weight fractions of Se-fortified samples compared to controls, indicating substrate Se
concentration strongly influences Se content in polysaccharides.
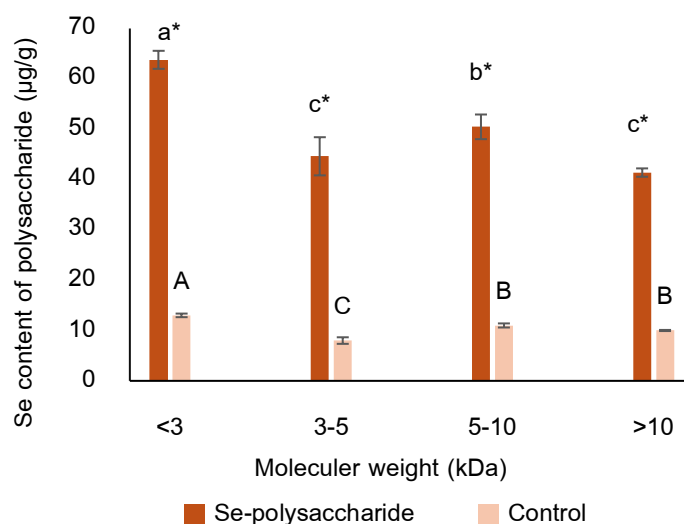
Figure 2 Se Content in Different Molecular Weights of Se-Polysaccharide Compared with the Control.

Error bars indicate the SD of the mean (n = 3). Different letters [a-c] and [A-C] indicate significant differences within the molecular weight fractions (p < 0.05) in Se-polysaccharide and control samples (p< 0.05). The* Indicates significant differences between the Se-polysaccharide and control based on the independent t-test (p < 0.05)

The fraction with a molecular weight < 3 kDa exhibited the highest Se content, indicating that smaller polysaccharides have a stronger capacity to bind and retain Se. As the molecular weight increased, the Se content gradually reduced, with the fraction above 10 kDa containing the least amount of Se. This suggests a clear inverse relationship between molecular size and Se retention. Similarly, polysaccharide content varied significantly within the fractions of non-fortified mushroom polysaccharides. The fraction with a molecular weight < 3 kDa and 5-10 kDa exhibited a notably higher Se content compared to molecular weight >10 kDa fraction, which showed lower Se content in both fortified and non-fortified substrates. These findings suggest that Se binding is more efficient in lower molecular weight fractions (Chang & Liu, 2024)**.** This could be related to the molecular interactions that facilitate Se binding within smaller molecules. Se-polysaccharides exhibit di-, tetra-, or zero-valent states, depending on the chemical structure and the nature of the bonds or interactions involved. Divalent Se is primarily found in selenoglycosides and selenopyranoses, while tetravalent Se is present in selenites of polysaccharides, such as selenious acid esters. Most selenosugars containing divalent Se are small molecules, typically obtained in lower molecular weight fractions. These variations in Se valency suggest that the specific chemical form of Se in polysaccharides is influenced by both the molecular size and the type of chemical bonding (Górska et al., 2021). Furthermore, Se incorporation causes deformations in the polysaccharide structure, including changes in bond lengths and torsion angles. This modification may affect the interaction with specific polysaccharide receptors. The molecular weight fraction of polysaccharides specific to the nature of polysaccharide chelate Se to the structure of molecules leads to higher Se retention which aligns with the observed trends in the graph (Liu et al., 2016).

5.5 Antioxidant Activity of Se-Polysaccharide Fractions

5.5.1 ABTS Assay

The results of an ABTS assay are illustrated in Figure 3. The results suggest that the Se-polysaccharide fractions significantly increased antioxidant activity ($p < 0.05$) compared to controls, indicating that Se enhances the biopolymer's free radical-neutralizing ability.
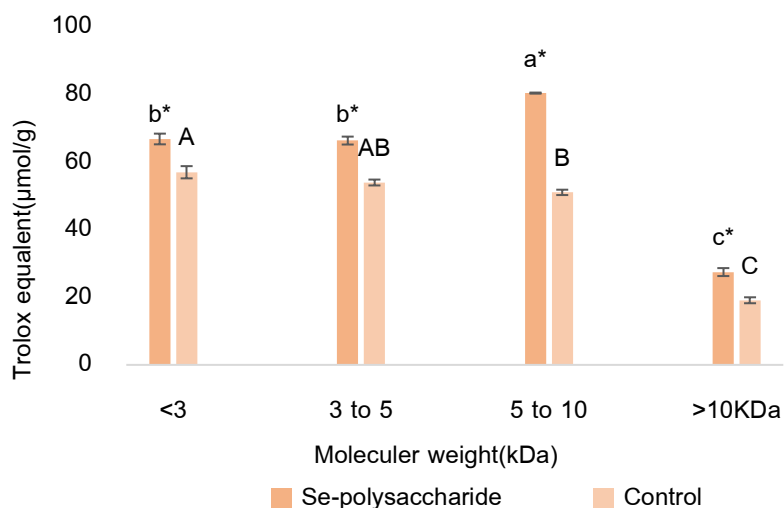
Figure 3. Antioxidant Activity of ABTS Assay in Se-Polysaccharide in Different Molecular Weight Ranges. Error bars indicate the SD of the mean (n = 3).

Different letters [a-c] and [A-C] indicate significant differences within the molecular weight fractions ($p < 0.05$) in fortified and control samples ($p < 0.05$). The* Indicates significant differences between the Se-polysaccharide and control based on the independent t-test ($p < 0.05$)

This improvement is likely due to better Se interaction with polysaccharide structures. Se fortification notably increased antioxidant capacity, particularly in the 5-10 kDa and smaller fractions (<3 and 3-5 kDa), while the >10 kDa fraction showed minimal enhancement. This suggests that smaller polysaccharides more effectively incorporate Se, resulting in greater antioxidant activity compared to larger fractions.

5.5.2 FRAP Assay

The FRAP assay antioxidant activity is shown in Figure 4 for different molecular weight fractions. In fortified samples, the <3 kDa and 5-10 kDa fractions showed significantly higher antioxidant capacities than the other fractions, indicating an optimal interaction of Se with polysaccharides in the 5-10 kDa range. The FRAP assay confirmed that only the <3 kDa and 5-10 kDa fractions had significantly higher antioxidant activity than the controls ($p < 0.05$).
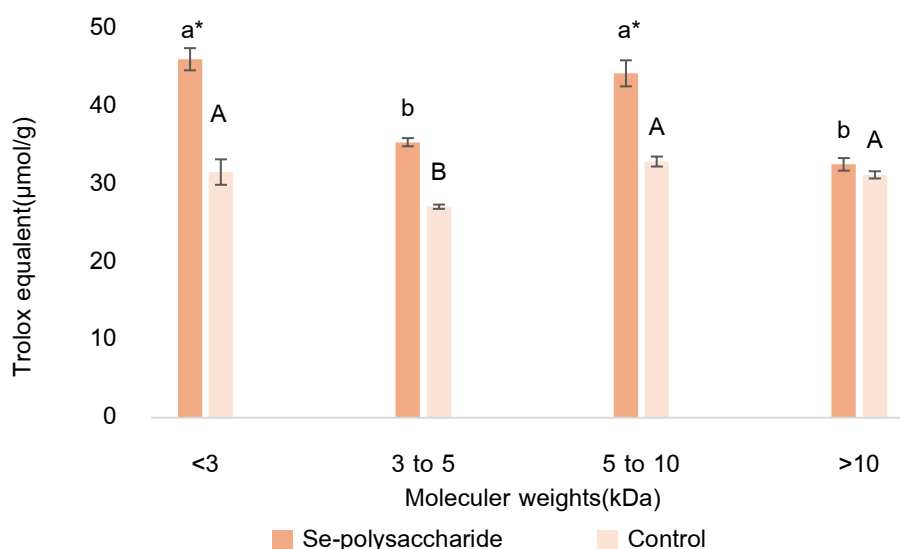
Figure 4 Antioxidant Activity of FRAP Assay in Se-Polysaccharide in Different Molecular Weight Ranges**.**

Error bars indicate the SD of the mean (n = 3). Different letters a–c and A-C indicate significant differences within the molecular weight fractions (p < 0.05) in fortified and control samples (p < 0.05). The* Indicates significant differences between the Se-polysaccharide and control based on the independent t-test (p < 0.05).

In both assays ABTS and FRAP showed significant antioxidant enhancement in Se-polysaccharides compared to controls across all molecular weight fractions with Se fortification greatly enhancing free radical neutralisation, particularly in the 5-10 kDa, < 3 kDa, and 3-5 kDa ranges. This improvement suggests that Se interacts effectively with smaller polysaccharide molecules, boosting bioactivity with the 5–10 kDa fraction showing the optimum condition in both ABTS and FRAP assays. The bioactivity of Se-polysaccharides is influenced by their molecular weight, affecting solubility and interactions with solvents. Low molecular weight Se-polysaccharides are more soluble and bioavailable, while slightly higher molecular weights have more complex structures, enabling better interactions with enzymes or cell receptors, thus enhancing bioactivity (Zeng et al., 2023).

Se-polysaccharides enhance antioxidant enzyme activity, directly quenching free radicals and stimulating enzymes like SOD, CAT, and GSH-Px. Their bioactivity is linked to molecular weight, branching, and monosaccharide composition. These results suggested that polysaccharides in the 5–10 kDa range may adopt stable, degradation-resistant conformations, enhancing antioxidant activity. Their biological activity is closely tied to complex structural factors, including glycosidic linkages, branching, monosaccharide composition, molecular weight, and chain conformation (Chang & Liu, 2024).

5.6 Cytotoxicity

The cytotoxicity of Se-polysaccharide against human lung A549 cancer cells is shown in Figure 5.
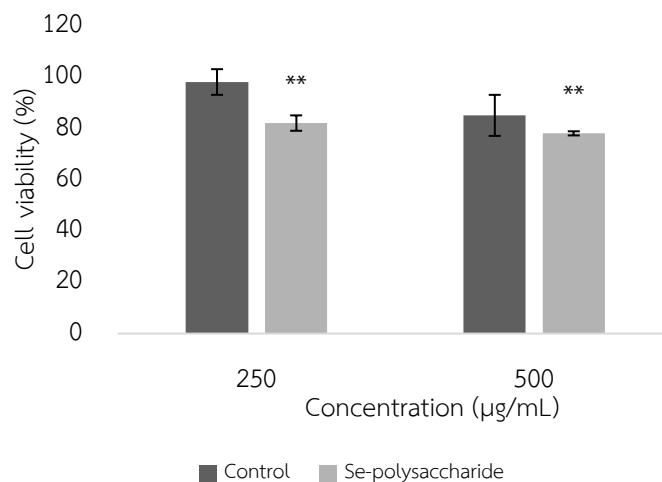
Figure 5 Cytotoxicity of Se-Polysaccharide Against Human Lung Cancer A549 Cell.

Error bars indicate the SD of the mean (n = 5). ** indicate significant comparing between Se-polysaccharide and control (p < 0.05)

The Se-polysaccharide at the concentration of 125 µg/mL showed significantly lower cell viability at 80% compared with non-cytotoxicity detected in the control (A) at the same concentration. This means that Se-enrichment has higher anti-proliferation on human cancer cells. These effects are typically linked to their ability to modulate the immune response, induce apoptosis (programmed cell death), and inhibit cancer cell proliferation. Moreover, Se has been shown to possess potent anticancer properties, which include inducing apoptosis, reducing oxidative stress, and enhancing the immune system's ability to target cancer cells (Ma et al., 2011). The result was consistent with the previous study by Zhang et al. (2020) which reported that Se-polysaccharide extracted from *P. ostreatus* exhibits anticancer properties by promoting apoptosis and suppressing cancer cell migration. Their Results showed that Se-Polysaccharide has 25.9 µg/g of selenium, an average molecular weight of 16,106 Da, and is mainly composed of mannose, glucose and galactose showed antitumor activity at a cellular level. These mechanisms are crucial in halting cancer cell proliferation and preventing its spread within the body.

6. Recommendations

The present study demonstrates the use of sodium selenite in different concentrations to the growth medium for cultivating *P. ostreatus* as a sodium selenite concentration of 200 mg/kg was selected according to the Se content of polysaccharide. The se-polysaccharide was extracted using hot water. The crude polysaccharides were separated by membrane filtering to obtain four fractions according to molecular weights, and their polysaccharide content was not affected in different molecular weights fractions, but Se content was significantly higher in low molecular weight fractions, <3 kDa and 5-10 kDa. Investigated the effect of Se-polysaccharide four fractions on antioxidant activity and cytotoxicity of lung cancer cells. The study's findings highlight Se-polysaccharides enhanced bioactivity. The 5-10 kDa fortified fraction exhibited superior antioxidants indicating that lower molecular weight fractions hold enhanced potential for bioactivity.

Selenium fortification significantly lowers the cell viability of the Se-polysaccharide compared to the control, underscoring Se role in enhancing these biological properties. These findings suggested that Se shows a synergistic role in enhancing the bioactivity of mushroom polysaccharides, making Se-fortified *P. ostreatus* a promising agent for developing functional foods and dietary supplements contributing to antioxidant defense and possibly, cancer prevention.

Future research should focus on *in vivo* evaluations and enhancing the purification processes will be crucial to improve their quality, potency, and safety, ensuring more effective therapeutic outcomes. It should be focused on conducting comprehensive *in vivo* studies to further evaluate the biological effects and therapeutic potential of Se-polysaccharides in living systems. Additionally, detailed structural isolation and characterization of Se-polysaccharides will be important to gain deeper insights into their bioactive properties and underlying mechanisms of action. Exploring their use as a natural dietary source of bioactive compounds and Se will open new possibilities for health benefits in consumer products. Lastly, investigating the applications of Se-polysaccharides as functional ingredients in the food industry holds promise for the development of health-promoting foods and nutraceuticals.

7. Acknowledgments

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Nonstandard Finite Difference Scheme for Burger's Equation

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Abstract

A nonstandard finite difference is developed to resolve Burger's equation. Examine the scheme's convergence employing local truncation error and the stability condition. Comparing the numerical results and the exact answers shows that the numerical scheme works efficiently.

Keywords: Burger's equation; Nonstandard finite difference scheme; Stability condition

1. Introduction

The solution of the nonlinear partial differential equations (npdes) is necessary to investigate the behavior of the many phenomena described by the nonlinear partial differential equation and to gain an exhaustive comprehension of how they function. To learn how the different phenomena are defined by the nonlinear behavior and employ it to explain specific events.

Numerous difficulties in daily life may be resolved by the application of numerical analysis. Additionally, it is a crucial technique for integrating mathematics into everyday life. Simulating situations that occur in engineering and scientific research is an additional crucial use for nonlinear partial differential equations (npdes). One of the well-known equations is Burger's equation.

Therefore, the Burger's equation, which was introduced by Harry Bateman in 1915 and Burger later regarded as a mathematical model for shock wave theory, gas dynamics, and heat conduction, is of significance for us in this study. For the numerical solution of the one-dimensional Burger's equation, Inan and Bahadir (2013) presented implicit and fully implicit exponential finite difference methods. In 2014, Inan and Bahadir employed Crank Nicolson exponential technique to provide numerical solution for the Burgers equation. To solve Burger's problem, Sachin and Wani (2016) suggested a modified Crank Nicolson type approach. Finite difference strategies were employed from Ucar et al (2017) to resolve the modified Burgers equation numerically. The Burgers's equation can be stated as follows:

$$\frac{\partial u}{\partial t} + u\frac{\partial u}{\partial x} = v\frac{\partial^2 u}{\partial x^2}, \ x \epsilon (0, X) \tag{1}$$

Subjected to the initial condition

$$u(x, 0) = f(x), f \epsilon \ C[0, X]. \tag{2}$$

And the boundary conditions

$$u(0, t) \ = g_1(t), g_1 \epsilon \ C[0, T], \tag{3}$$

$$u(X, t) \ = g_2(t), g_2 \epsilon \ C[0, T], \tag{4}$$

Where $v, X, T \ \epsilon \ \mathbb{R}^+$.

Therefore, this research builds the nonstandard finite difference scheme for Burger's equation. Analyze the local truncation error and stability condition. Using the numerical experiment to compare the numerical solution and the analytic solution.

2. Research Objectives

To construct the numerical scheme for the Burger's equation and compare the numerical solutions of the Burger's equation with the exact solution.

3. Research Methodology

In this research, we constructed the nonstandard finite difference scheme. Let h and l be increment in $0 \leq x \leq L$ and $0 \leq t \leq T$, respectively. By applying definition $h = \frac{L}{M}$ And $l = \frac{T}{N}$, where $M, N \in \mathbb{N}$ and $M \neq 1$ in the standard finite difference scheme.

Let $u_m^n = u(mh, nl)$ for all $m \in \{0, 1, \ldots, M\}$ And $n \in \{0, 1, \ldots, N\}$. For every $n \in \{0, 1, \ldots, N-1\}$, the nonstandard finite difference scheme in (1) allows for the approximation of the partial derivatives of u as stated below:

$$\frac{\partial u}{\partial x}(mh, nl) \approx \frac{u_{m+1}^n - u_{m-1}^n}{2\psi(h)} \qquad\qquad , m \in \{1, 2, \ldots, M-1\},$$

$$\frac{\partial^2 u}{\partial x^2}(mh, nl) \approx \theta\left(\frac{u_{m+1}^n - 2u_m^n + u_{m-1}^n}{\left(\psi(h)\right)^2}\right) + (1-\theta)\left(\frac{u_{m+1}^{n+1} - 2u_m^{n+1} + u_{m-1}^{n+1}}{\left(\psi(h)\right)^2}\right) \quad , m \in \{1, 2, \ldots, M-1\},$$

$$\frac{\partial u}{\partial t}(mh, nl) \approx \frac{u_m^{n+1} - u_m^n}{\phi(l)} \qquad\qquad , m \in \{1, 2, \ldots, M-1\},$$

Where $0 \leq \theta \leq 1, \psi, \phi : \mathbb{R}^+ \longrightarrow \mathbb{R}^+$ Are function defined by $\psi(h) = h + \mathcal{O}(h^2)$ and $\phi(l) = l + \mathcal{O}(l^2)$ as $h \longrightarrow 0$ and $l \longrightarrow 0$, respectively.

This prompts us to examine the nonstandard finite difference scheme

$$\frac{U_m^{n+1} - U_m^n}{\phi(l)} + U_m^n\left(\frac{U_{m+1}^n - U_{m-1}^n}{2\psi(h)}\right) = v\left[\theta\left(\frac{U_{m+1}^n - 2U_m^n + U_{m-1}^n}{\left(\psi(h)\right)^2}\right) + (1-\theta)\left(\frac{U_{m+1}^{n+1} - 2U_m^{n+1} + U_{m-1}^{n+1}}{\left(\psi(h)\right)^2}\right)\right], \qquad (5)$$

Where $m \in \{0, 1, \ldots, M-1\}$. It's important to note that u_m^n Is the solution used in this scheme to approximate the exact solution u at the point (mh, nl). Establish $R = \frac{\phi(l)}{\left(\psi(h)\right)^2}$, $S = \frac{\phi(l)}{\psi(h)}$, $U_m^0 = f(mh)$ for all $m \in \{0, 1, \ldots, M\}$, $U_0^n = g_1(nl)$, and $U_M^n = g_2(nl)$ For all $n \in \{0, 1, \ldots, N\}$.

Therefore, the equation (5) can be rewritten as

$$-vR(1-\theta)U_{m-1}^{n+1} + \left(1 + 2vR(1-\theta)\right)U_m^{n+1} - vR(1-\theta)U_{m+1}^{n+1}$$
$$= (vR\theta + 2SU_m^n)U_{m-1}^n + (1 - 2vR\theta)U_m^n + (vR\theta - 2SU_m^n)U_{m+1}^n,$$

for $m \in \{2, 3, \ldots, M-2\}$,

$$\left(1 + 2vR(1-\theta)\right)U_1^{n+1} - vR(1-\theta)U_2^{n+1}$$
$$= (1 - 2vR\theta)U_1^n + (vR\theta - 2SU_1^n)U_2^n + (vR(1-\theta)g_1\left((n+1)l\right) + (vR\theta + 2SU_1^n)g_1(nl),$$

for $m = 1$

$$\left(1 + 2vR(1-\theta)\right)U_{M-2}^{n+1} - vR(1-\theta)U_{M-1}^{n+1}$$
$$= (vR\theta + 2SU_{M-1}^n)U_{M-2}^n + (1 - 2vR\theta)U_{M-1}^n + vR(1-\theta)g_2\left((n+1)l\right) + (vR\theta - 2SU_{M-1}^n)g_2(nl),$$

for $m = M-1$.

It is feasible to express the nonstandard finite difference scheme (5) in matrix form

$$AU^{n+1} = B(U^n)U^n + b(U^n), \tag{6}$$

Where

$$U^n = \begin{bmatrix} U_1^n \\ U_2^n \\ \vdots \\ U_{M-2}^n \\ U_{M-1}^n \end{bmatrix}, \quad b(U^n) = \begin{bmatrix} vR(1-\theta)g_1\big((n+1)l\big) + (vR\theta + 2SU_1^n)g_1(nl) \\ 0 \\ \vdots \\ 0 \\ vR(1-\theta)g_2\big((n+1)l\big) + (vR\theta - 2SU_{M-1}^n)g_2(nl) \end{bmatrix},$$

$$A = \begin{bmatrix} 1 + 2vR(1-\theta) & -vR(1-\theta) & \square & \square & \square \\ -vR(1-\theta) & 1 + 2vR(1-\theta) & -vR(1-\theta) & \square & \square \\ \square & \square & \ddots & \square & \square \\ \square & \square & -vR(1-\theta) & 1 + 2vR(1-\theta) & -vR(1-\theta) \\ \square & \square & \square & -vR(1-\theta) & 1 + 2vR(1-\theta) \end{bmatrix},$$

$$B(U^n) = \begin{bmatrix} 1 - 2vR\theta & vR\theta - 2SU_1^n & \square & \square & \square \\ vR\theta + 2SU_2^n & 1 - 2vR\theta & vR\theta - 2SU_2^n & \square & \square \\ \square & \square & \ddots & \square & \square \\ \square & \square & vR\theta + 2SU_{M-2}^n & 1 - 2vR\theta & vR\theta - 2SU_{M-2}^n \\ \square & \square & \square & vR\theta + 2SU_{M-1}^n & 1 - 2vR\theta \end{bmatrix}.$$

It can be observed that A is strictly diagonally dominant matrix, $(|a_{ii}| > \sum_{j \neq i} |A_{Ij}|)$. Which implies that A is invertible. Consequently, (6) can be used to discover U^{n+1} For each time point $n \in \{0, 1, \dots, N-1\}$. Furthermore, (6) proposes the unique solution U^{n+1}.

To examine the local truncation error of the nonstandard finite difference formula (5), the error can be considered

$$L = L[u(x,t): h, l]$$

$$= \frac{u(x,t+l) - u(x,t)}{\phi(l)} + u(x,t)\left(\frac{u(x+h,t) - u(x-h,t)}{2\psi(h)}\right)$$

$$-v\left[\begin{array}{l} \theta\left(\frac{u(x+h,t) - 2u(x,t) + u(x-h,t)}{(\psi(h))^2}\right) \\ +(1-\theta)\left(\frac{u(x+h,t+l) - 2u(x,t+l) + u(x-h,t+l)}{(\psi(h))^2}\right) \end{array} \right]$$

$$= \frac{u(x,t+l) - u(x,t)}{\phi(l)} + u(x,t)\left(\frac{u(x+h,t) - u(x-h,t)}{2\psi(h)}\right) - v\theta\left(\frac{u(x+h,t) - 2u(x,t) + u(x-h,t)}{(\psi(h))^2}\right)$$

$$-v(1-\theta)\left(\frac{u(x+h,t+l) - 2u(x,t+l) + u(x-h,t+l)}{(\psi(h))^2}\right)$$

$$-\left(\frac{\partial u}{\partial t} + u\frac{\partial u}{\partial x} - v\frac{\partial^2 u}{\partial x^2}\right).$$

It should be noted for the simplicity that

$$\frac{h}{\psi(h)} = 1 + \mathcal{O}(h), \left(\frac{h}{\psi(h)}\right)^2 = 1 + \mathcal{O}(h), \frac{l}{\phi(l)} = 1 + \mathcal{O}(l),$$

As $h \longrightarrow 0$ and $l \longrightarrow 0$. Thus, we obtain

$$\left(\frac{u(x,t+l)-u(x,t)}{\phi(l)}\right) = \frac{l}{\phi(l)}\left(\frac{\partial u}{\partial t} + \frac{l}{2}\frac{\partial^2 u}{\partial t^2} + \frac{l^2}{6}\frac{\partial^3 u}{\partial t^3} + \cdots\right),$$

$$\left(\frac{u(x+h,t)-u(x-h,t)}{2\psi(h)}\right) = \frac{h}{\psi(h)}\left(u\frac{\partial u}{\partial x} + u\frac{h^2}{6}\frac{\partial^3 u}{\partial x^3} + \cdots\right),$$

$$\left(\frac{u(x+h,t)-2u(x,t)+u(x-h,t)}{(\psi(h))^2}\right) = \left(\frac{h}{\psi(h)}\right)^2\left(\frac{\partial^2 u}{\partial x^2} + \frac{h^2}{12}\frac{\partial^4 u}{\partial x^4} + \cdots\right),$$

$$\left(\frac{u(x+h,t+l)-2u(x,t+l)+u(x-h,t+l)}{(\psi(h))^2}\right) = \left(\frac{h}{\psi(h)}\right)^2\left(\frac{\partial^2 u}{\partial x^2} + \frac{h^2}{12}\frac{\partial^4 u}{\partial x^4} + l\frac{\partial^3 u}{\partial x^2\partial t} + \frac{l^2}{4}\frac{\partial^4 u}{\partial x^2\partial t^2} + \cdots\right).$$

The local truncation error of the scheme is represented by $\mathcal{O}(h,l)$ As $h \longrightarrow 0$ and $l \longrightarrow 0$, which exhibits consistency and first-order accuracy in both space and time. Afterward, the stability conditions will be evaluated. Equation (6) can lead to the writing as

$$-vR(1-\theta)U_{m-1}^{n+1} + \left(1 + 2vR(1-\theta)\right)U_m^{n+1} - vR(1-\theta)U_{m+1}^{n+1}$$
$$= \left(vR\theta + \frac{1}{2}S\tilde{u}\right)U_{m-1}^n + (1 - 2vR\theta)U_m^n + \left(vR\theta - \frac{1}{2}S\tilde{u}\right)U_{m+1}^n.$$

The error is defined as $\varepsilon_m^n = V_m^n - U_m^n$ For all $m \epsilon \{0,1,\dots,M\}$ And $n \epsilon \{0,1,\dots,N\}$, with V_m^n Representing the numerical solution calculated by finite-precision arithmetic. In addition, assume that V_m^n Is in line with (6). Consequently, we acquire

$$-vR(1-\theta)\varepsilon_{m-1}^{n+1} + \left(1 + 2vR(1-\theta)\right)\varepsilon_m^{n+1} - vR(1-\theta)\varepsilon_{m+1}^{n+1}$$
$$= \left(vR\theta + \frac{1}{2}S\tilde{u}\right)\varepsilon_{m-1}^n + (1 - 2vR\theta)\varepsilon_m^n + \left(vR\theta - \frac{1}{2}S\tilde{u}\right)\varepsilon_{m+1}^n.$$

Choosing $\varepsilon_m^n = e^{i\alpha_m mh}e^{\beta nl}$, where $\alpha_m = \frac{m\pi}{L}$ Is a wave number. If $m \epsilon \{0,1,\dots,M-1\}$, then

$$e^{\beta nl} = \frac{\left(vR\theta+\frac{1}{2}S\tilde{u}\right)e^{-i\alpha_m h}+(1-2vR\theta)+\left(vR\theta-\frac{1}{2}S\tilde{u}\right)e^{i\alpha_m h}}{-vR(1-\theta)e^{-i\alpha_m h}+(1+2vR(1-\theta))-vR(1-\theta)e^{i\alpha_m h}}$$

$$= \frac{1-4vR\theta\sin^2(\frac{\alpha_m h}{2})-S\tilde{u}(i\sin(\alpha_m h))}{1+4vR(1-\theta)\sin^2(\frac{\alpha_m h}{2})}.$$

We get $e^{\beta nl} = \frac{a-ib}{c}$, where

$$a = 1 - 4vR\theta\sin^2\left(\frac{\alpha_m h}{2}\right), b = S\tilde{u}\sin(\alpha_m h), c = 1 + 4vR(1-\theta)\sin^2\left(\frac{\alpha_m h}{2}\right).$$

The Von Neumann's stability condition can be obtained by considering $\left|e^{\beta nl}\right| \le 1$. Thus, we must have $a^2 + b^2 \le c^2$. The stability condition is satisfied by the following inequality

$$8vR\theta + \frac{s^2\tilde{u}^2}{vR} \leq 2.$$

The consistency and stability of the nonstandard finite difference formula (5) are derived using the Lax equivalence theorem, guaranteeing the scheme's convergence.

4. Research Results and Discussion

The performance of the nonstandard finite difference scheme will be illustrated through the numerical experiments. Burger's equation in (1) states that

$$\frac{\partial u}{\partial t} + u\frac{\partial u}{\partial x} = v\frac{\partial^2 u}{\partial x^2}, \ x \in (0, X).$$

The initial and boundary conditions are now configured as follows

$$u(x,0) = 2x, \ 0 \leq x \leq 1, \tag{7}$$

$$u(0,t) = 0, \ u(1,t) = \frac{2}{2t+1}, \ t \geq 0. \tag{8}$$

Equation (1) can be solved analytically using (7) - (8) as follows:

$$u(x,t) = \frac{2x}{2t+1}. \tag{9}$$

Tables 1 and 2 exhibit both the analytic solution (9) and the numerical results of the schemes (5). The absolute error between (9) and (5) is displayed in Table 3.

x	$t = 0.01$	$t = 0.5$	$t = 1$
0.1	0.19607843137255	0.10000000000000	0.06666666666667
0.2	0.39215686274510	0.20000000000000	0.13333333333333
0.3	0.58823529411765	0.30000000000000	0.20000000000000
0.4	0.78431372549020	0.40000000000000	0.26666666666667
0.5	0.98039215686275	0.50000000000000	0.33333333333333
0.6	1.17647058823529	0.60000000000000	0.40000000000000
0.7	1.37254901960784	0.70000000000000	0.46666666666667
0.8	1.56862745098039	0.80000000000000	0.53333333333333
0.9	1.76470588235294	0.90000000000000	0.60000000000000

Table 1. The analytical solution (9).

x	$t = 0.01$	$t = 0.5$	$t = 1$
0.1	0.19601992854606	0.09987394393464	0.06664712015942
0.2	0.39203992406078	0.19975536418964	0.13329548194156
0.3	0.58806012657707	0.29965177852384	0.19994631589813
0.4	0.78408090197096	0.39957078425088	0.26660083008157
0.5	0.98010324114030	0.49952008963615	0.33326019789184
0.6	1.17612984109556	0.59950753502676	0.39992554480957
0.7	1.37216804745622	0.69954109994067	0.46659793359388
0.8	1.56823786867948	0.79962889203838	0.53327834747704
0.9	1.76439380571717	0.89977911351709	0.59996767082670

Table 2. The numerical results of scheme (5).

x	t = 0.01	t = 0.5	t = 1
0.1	0.00005850282649	0.00012605606536	0.00001954650724
0.2	0.00011693868431	0.00024463581036	0.00003785139177
0.3	0.00017516754058	0.00034822147616	0.00005368410187
0.4	0.00023282351924	0.00042921574913	0.00006583658510
0.5	0.00028891572244	0.00047991036385	0.0000731354149
0.6	0.00034074713973	0.00049246497324	0.00007445519043
0.7	0.00038097215162	0.00045890005933	0.00006873307279
0.8	0.00038958230091	0.00037110796162	0.00005498585630
0.9	0.00031207663577	0.00022088648291	0.00003232917330

Table 3. The absolute error between (9) and (5)**.**

In conclusion, the nonstandard finite difference scheme (5) is constructed for Burger's equation (1). To ensure the scheme's convergence, investigate the nonstandard finite difference scheme (5). This technique can create an algorithm to solve Burger's problem, according to the numerical trials. It demonstrates the nonstandard finite difference scheme and its applicability in different physics or mathematics domains.

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ด้านการบริหารและการจัดการ

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การพัฒนาตราสินค้าและบรรจุภัณฑ์สำหรับวิสาหกิจชุมชนกรีนพาวเวอร์

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บทคัดย่อ

งานวิจัย เรื่อง การพัฒนาตราสินค้าและบรรจุภัณฑ์สำหรับวิสาหกิจชุมชนกรีนพาวเวอร์ เป็นส่วนหนึ่งของโครงการ
ยุทธศาสตร์มหาวิทยาลัยราชภัฏเพื่อการพัฒนาท้องถิ่น ปีงบประมาณ พ.ศ. 2567 โดยคณะวิทยาการจัดการ มหาวิทยาลัยราช
ภัฏบ้านสมเด็จเจ้าพระยา เพื่อพัฒนาผลิตภัณฑ์ของวิสาหกิจชุมชน คณะผู้วิจัยได้เลือกลงพื้นที่วิสาหกิจชุมชนกรีนพาวเวอร์
กองพันทหารสื่อสารที่ 102 กรมทหารสื่อสารที่ 1 ค่ายกำแพงเพชรอัครโยธิน ตำบลสวนหลวง อำเภอกระทุ่มแบน จังหวัด
สมุทรสาคร ซึ่งอยู่ในพื้นที่ในความรับผิดชอบของมหาวิทยาลัยราชภัฏบ้านสมเด็จเจ้าพระยา โดยงานวิจัยนี้มีวัตถุประสงค์ คือ
1. เพื่อศึกษาสภาพปัญหาและความต้องการในการออกแบบตราสินค้า และพัฒนาบรรจุภัณฑ์เพื่อยกระดับผลิตภัณฑ์สำหรับ
วิสาหกิจชุมชนกรีนพาวเวอร์ และ 2. เพื่อพัฒนาตราสินค้าและบรรจุภัณฑ์สำหรับวิสาหกิจชุมชนกรีนพาวเวอร์ ดำเนินการโดย
ใช้การสัมภาษณ์เชิงลึก (In-depth Interview) และการสนทนากลุ่ม (Focus Group) ผลของการวิจัยพบว่า การพัฒนาตรา
สินค้า เนื่องจากกลุ่มวิสาหกิจฯ ยังไม่มีตราสัญลักษณ์สินค้าที่เป็นเอกลักษณ์ของตนเอง และกลุ่มวิสาหกิจฯ ต้องการออกแบบ
บรรจุภัณฑ์ที่ทันสมัย เหมาะสม และปลอดภัยต่อการใช้งาน รวมไปถึงฉลากสินค้าที่มีความสวยงาม ทันสมัย และมีข้อมูล
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คำสำคัญ: การพัฒนาตราสินค้า; การพัฒนาบรรจุภัณฑ์; วิสาหกิจชุมชน

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Branding and Packaging Development for Green Power Community Enterprise

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Abstract

This research is part of the Strategic Project for Local Development under the Budget Year 2024 by the Faculty of Management Science, Bansomdejchaopraya Rajabhat University. The objective is to enhance the products of the Green Power Community Enterprise. The research team conducted fieldwork in the Green Power Community Enterprise located at the 102nd Signal Battalion, 1st Signal Regiment, Kampaengpetch Akkarayothin Military Camp, Suan Luang Subdistrict, Krathum Baen District, Samut Sakhon Province. This area falls under the university's responsibility. The objectives of the research are as follows: 1. To study the issues and needs related to branding and packaging design to upgrade the products of the Green Power Community Enterprise. 2. To develop branding and packaging for the Green Power Community Enterprise. The research was conducted through in-depth interviews and focus group discussions. The findings revealed that the Green Power Community Enterprise lacked a distinctive brand logo. Additionally, the enterprise expressed a need for modern, appropriate, and safe packaging designs, as well as aesthetically pleasing and contemporary product labels with clear information. The selected products for development were honey turmeric soap, in both liquid and bar forms. Research Outcomes: The Green Power Community Enterprise successfully acquired a unique brand logo, product labels, and packaging that are visually appealing, modern, safe, and provide clear information, meeting the enterprise's needs. These elements have the potential to attract customer interest, leading to purchase decisions.

Keywords: Branding; Community Enterprise; Packaging

1. บทนำ

มหาวิทยาลัยราชภัฏเป็นสถาบันการศึกษาเพื่อการพัฒนาท้องถิ่น โดยมีการจัดทำยุทธศาสตร์มหาวิทยาลัยราชภัฏ เพื่อการพัฒนาท้องถิ่น ระยะ 20 ปี (พ.ศ. 2560 - 2579) โดยการมีส่วนร่วมของมหาวิทยาลัยราชภัฏทั้ง 38 แห่งทั่วประเทศ โดยการพัฒนาท้องถิ่นเป็นยุทธศาสตร์ที่ 1 จาก 4 ยุทธศาสตร์มหาวิทยาลัยราชภัฏเพื่อการพัฒนาท้องถิ่น ระยะ 20 ปี โดยหนึ่ง มีหนึ่งในกลยุทธ์ คือ บูรณาการความร่วมมือในมหาวิทยาลัยและภายนอกมหาวิทยาลัย (ภาครัฐ ภาคเอกชน ภาคประชาสังคม) ในการดำเนินโครงการพัฒนาให้บรรลุตามเป้าหมายอย่างมีนัยสำคัญ (สำนักงานที่ประชุมอธิการบดีมหาวิทยาลัยราชภัฏ, 2561) ดังนั้นมหาวิทยาลัยราชภัฏบ้านสมเด็จเจ้าพระยา จึงได้จัดโครงการยุทธศาสตร์มหาวิทยาลัยราชภัฏเพื่อการพัฒนา ท้องถิ่น ปีงบประมาณ พ.ศ. 2567 ขึ้น โดยพื้นที่ หนึ่งที่อยู่ในพื้นที่ในความรับผิดชอบของมหาวิทยาลัยราชภัฏ บ้านสมเด็จเจ้าพระยา คือ พื้นที่จังหวัดสมุทรสาคร โดยคณะวิทยาการจัดการเป็นส่วนหนึ่งในการรับผิดชอบโครงการนี้ โดย บุคลากรสายวิชาการและสายสนับสนุนได้ทำการลงพื้นที่จังหวัดสมุทรสาคร เพื่อสำรวจปัญหาและความต้องการของชุมชน และ/หรือวิสาหกิจชุมชน นำไปสู่การร่วมพัฒนาผลิตภัณฑ์ของวิสาหกิจชุมชนนั้น ๆ

กลุ่มวิสาหกิจชุมชนกรีนพาวเวอร์ กองพันทหารสื่อสารที่ 102 กรมทหารสื่อสารที่ 1 ค่ายกำแพงเพชรอัครโยธิน ตำบลสวนหลวง อำเภอกระทุ่มแบน จังหวัดสมุทรสาคร เป็นอีกหนึ่งวิสาหกิจชุมชนในพื้นที่รับผิดชอบของมหาวิทยาลัยราชภัฏ บ้านสมเด็จเจ้าพระยา โดยกลุ่มวิสาหกิจชุมชนกรีนพาวเวอร์ได้ผลิตและจำหน่ายผลิตภัณฑ์ จากศูนย์การเรียนรู้ตามหลัก ปรัชญาเศรษฐกิจพอเพียง ค่ายกำแพงเพชรอัครโยธิน ซึ่งประกอบไปด้วยหลากหลายผลิตภัณฑ์เพื่อการอุปโภคและบริโภค อาทิเช่น ดินปลูกสูตรเปลือกไข่ น้ำหมักชีวภาพ สบู่น้ำผึ้งขมิ้น แบบเหลว และแบบก้อน น้ำมันมะพร้าวสกัดเย็น เป็นต้น คณะผู้วิจัยจากคณะวิทยาการจัดการ มหาวิทยาลัยราชภัฏบ้านสมเด็จเจ้าพระยา ได้เลือกพื้นที่นี้ในการพัฒนาเพราะเป็น วิสาหกิจชุมชนที่มีศักยภาพอีกทั้งมีทรัพยากรบุคคลที่มีคุณภาพ สามารถพัฒนาผลิตภัณฑ์และต่อยอดผลิตภัณฑ์ไปในอนาคตได้

2. วัตถุประสงค์ของการวิจัย

1. เพื่อศึกษาสภาพปัญหาและความต้องการในการออกแบบตราสินค้า และพัฒนาบรรจุภัณฑ์เพื่อยกระดับผลิตภัณฑ์ สำหรับวิสาหกิจชุมชนกรีนพาวเวอร์

2. เพื่อพัฒนาตราสินค้าและบรรจุภัณฑ์สำหรับวิสาหกิจชุมชนกรีนพาวเวอร์

3. ระเบียบวิธีวิจัย

การวิจัยครั้งนี้มุ่งศึกษาการพัฒนาตราสินค้าและบรรจุภัณฑ์สำหรับวิสาหกิจชุมชนกรีนพาวเวอร์ซึ่งการวิจัยจะ ดำเนินการโดยใช้การสัมภาษณ์เชิงลึก (In-depth Interview) และการสนทนากลุ่ม (Focus Group) โดยมีวิธีการดำเนินการ วิจัยดังนี้

ขอบเขตด้านพื้นที่ศึกษา การศึกษาครั้งนี้เป็นการศึกษาในพื้นที่ กลุ่มวิสาหกิจชุมชนกรีนพาวเวอร์ กองพันทหาร สื่อสารที่ 102 กรมทหารสื่อสารที่ 1 ค่ายกำแพงเพชรอัครโยธิน ตำบลสวนหลวง อำเภอกระทุ่มแบน จังหวัดสมุทรสาคร

ขอบเขตด้านกลุ่มตัวอย่าง การศึกษาครั้งนี้ เป็นการศึกษาจากกลุ่มตัวอย่าง โดยการสัมภาษณ์ผู้บังคับบัญชาค่าย กำแพงเพชรอัครโยธิน จำนวน 3 คน และการสนทนากลุ่ม (Focus Group) สมาชิกกลุ่มวิสาหกิจชุมชนกรีนพาวเวอร์ จำนวน 8 คน ด้วยวิธีการเลือกแบบเจาะจง (Purposive Sampling) เพื่อเก็บข้อมูลความต้องการของผู้ประกอบการ รวมถึงอัตลักษณ์ ของค่ายกำแพงเพชรอัครโยธิน เพื่อนำข้อมูลที่ได้รับนำไปพัฒนาตราสินค้าและบรรจุภัณฑ์สำหรับวิสาหกิจชุมชนกรีนพาวเวอร์

4. ผลการวิจัย

1. การศึกษาสภาพปัญหาและความต้องการการออกแบบตราสินค้า และพัฒนาบรรจุภัณฑ์เพื่อยกระดับผลิตภัณฑ์
สำหรับวิสาหกิจชุมชนกรีนพาวเวอร์ พบว่ากลุ่มวิสาหกิจชุมชนกรีนพาวเวอร์ มีความต้องการในด้านการพัฒนาตราสินค้า และ
บรรจุภัณฑ์ ดังนี้

1.1 การพัฒนาตราสินค้า เนื่องจากกลุ่มวิสาหกิจฯ ยังไม่มีตราสัญลักษณ์สินค้าที่เป็นเอกลักษณ์ของ
ตนเอง การจำหน่ายสินค้าที่ผ่านมา จำหน่ายสินค้าภายใต้ตราสัญลักษณ์ศูนย์การเรียนรู้ตามหลักปรัชญาเศรษฐกิจพอเพียง
กลุ่มวิสาหกิจฯ จึงต้องการนำเอาอัตลักษณ์ของค่ายกำแพงเพชรอัครโยธิน รวมกับชื่อกรีนพาวเวอร์ มาออกแบบตราสัญลักษณ์
ทำให้สินค้าให้เป็นที่จดจำง่าย และสื่อถึงตัวผลิตภัณฑ์ เป็นการสร้างกลยุทธ์ทางการตลาด ที่ทำให้สามารถขยายตลาด
ผลิตภัณฑ์ของทางตนเองให้เป็นที่รู้จัก ดึงดูดความสนใจของลูกค้า

1.2 การพัฒนาบรรจุภัณฑ์ กลุ่มวิสาหกิจฯ ต้องการออกแบบบรรจุภัณฑ์ที่ทันสมัย เหมาะสม และ
ปลอดภัยต่อการใช้งาน รวมไปถึงฉลากสินค้าที่มีความสวยงาม ทันสมัย และมีข้อมูลชัดเจน สอดคล้องกับการพัฒนาตราสินค้า
ใหม่ โดยเลือกผลิตภัณฑ์ที่ต้องการพัฒนาได้แก่ สบู่น้ำผึ้งขมิ้น แบบเหลว และแบบก้อน

2. การพัฒนาออกแบบตราสินค้าและพัฒนาบรรจุภัณฑ์สำหรับวิสาหกิจชุมชนกรีนพาวเวอร์ จากการการศึกษา
สภาพปัญหาและความต้องการการออกแบบตราสินค้า และพัฒนาบรรจุภัณฑ์เพื่อยกระดับผลิตภัณฑ์สำหรับวิสาหกิจชุมชน
กรีนพาวเวอร์ ผู้วิจัยได้นำเอาอัตลักษณ์ของค่ายกำแพงเพชรอัครโยธิน รวมกับชื่อกรีนพาวเวอร์ มาออกแบบตราสัญลักษณ์ ทำ
ให้สินค้าให้เป็นที่จดจำง่าย และสื่อถึงตัวผลิตภัณฑ์ เป็นการสร้างกลยุทธ์ทางการตลาด ที่ทำให้สามารถขยายตลาดผลิตภัณฑ์
ของทางตนเองให้เป็นที่รู้จักและดึงดูดความสนใจของลูกค้า โดยในการออกแบบครั้งแรกได้นำเสนอรูปแบบตราสินค้า 3 รูปแบบ
จาก 3 แนวคิด ดังภาพที่ 3 4 และ 5

ภาพที่ 1 ตราสัญลักษณ์จังหวัดสมุทรสาคร กรมทหารสื่อสารที่ 1 กองพันทหารสื่อสารที่ 102
ค่ายกำแพงเพชรอัครโยธิน และข้อความที่ต้องมีในตราสินค้า

การประชุมวิชาการระดับชาติและนานาชาติบ้านสมเด็จเจ้าพระยา ครั้งที่ 1 (BS2C 2025)
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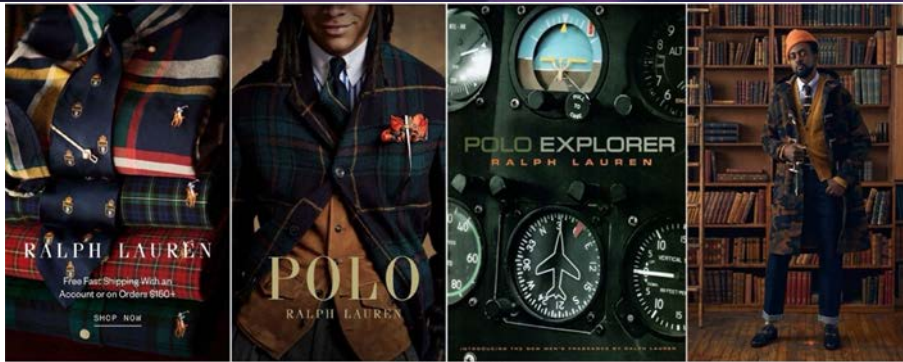
ภาพที่ 2 แรงบันดาลใจในการออกแบบตราสินค้า

ภาพที่ 3 การพัฒนาตราสินค้าของกลุ่มวิสาหกิจชุมชนกรีนพาวเวอร์ แบบที่ 1
ภายใต้แนวคิด กรมทหารสื่อสาร ตราสัญลักษณ์ และสายฟ้า

ภาพที่ 4 การพัฒนาตราสินค้าของกลุ่มวิสาหกิจชุมชนกรีนพาวเวอร์ แบบที่ 2
ภายใต้แนวคิด ค่ายกำแพงเพชรอัครโยธิน ความต่อเนื่อง มีหลายกองพันแต่หลอมรวมกันเป็นหนึ่ง

การประชุมวิชาการระดับชาติและนานาชาติบ้านสมเด็จเจ้าพระยา ครั้งที่ 1 (BS2C 2025)
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ภาพที่ 5 การพัฒนาตราสินค้าของกลุ่มวิสาหกิจชุมชนกรีนพาวเวอร์ แบบที่ 3
ภายใต้แนวคิด ความสามัคคี การทำงานร่วมกัน วิสาหกิจชุมชน สมุทรสาคร และสายน้ำ

สำหรับการพัฒนาบรรจุภัณฑ์นั้น ผู้วิจัยได้พัฒนาบรรจุภัณฑ์ของผลิตภัณฑ์สบู่น้ำผึ้งขมิ้น แบบเหลว และแบบก้อน โดยออกแบบฉลากสินค้าสวยงาม ทันสมัย และมีข้อมูลชัดเจน สอดคล้องกับการพัฒนาตราสินค้าใหม่ รวมไปถึงการออกแบบบรรจุภัณฑ์ที่ทันสมัย เหมาะสม ปลอดภัยต่อการใช้งาน และเป็นการยกระดับผลิตภัณฑ์ ดังต่อไปนี้

ภาพที่ 6 แรงบันดาลใจในการออกแบบฉลากสินค้า

ภาพที่ 7 แรงบันดาลใจในการออกแบบบรรจุภัณฑ์สบู่น้ำผึ้งขมิ้น แบบเหลว และแบบก้อน

การประชุมวิชาการระดับชาติและนานาชาติบ้านสมเด็จเจ้าพระยา ครั้งที่ 1 (BS2C 2025)
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ภาพที่ 8 การพัฒนาฉลากสินค้า และบรรจุภัณฑ์สบู่น้ำผึ้งขมิ้น แบบเหลว แบบที่ 1

ภาพที่ 9 การพัฒนาฉลากสินค้า และบรรจุภัณฑ์สบู่น้ำผึ้งขมิ้น แบบเหลว แบบที่ 2

ภาพที่ 10 การพัฒนาฉลากสินค้า ผลิตภัณฑ์สบู่น้ำผึ้งขมิ้น แบบก้อน แบบที่ 1

ภาพที่ 11 การพัฒนาฉลากสินค้า ผลิตภัณฑ์สบู่น้ำผึ้งขมิ้น แบบก้อน แบบที่ 2

เมื่อผู้วิจัยได้นำเสนอรูปแบบของตราสินค้า และบรรจุภัณฑ์ให้กับวิสาหกิจชุมชนฯ และนำข้อคิดเห็นจากวิสาหกิจ
ชุมชนฯ เพื่อนักวิจัยจักได้นำไปปรับการออกแบบ พัฒนา และนำมาเสนอวิสาหกิจชุมชนฯ อีกครั้ง จนได้รูปแบบของตราสินค้า
และบรรจุภัณฑ์ที่วิสาหกิจชุมชนฯ พึงพอใจและเลือกใช้ ดังต่อไปนี้

ภาพที่ 12 ตราสินค้าของกลุ่มวิสาหกิจชุมชนกรีนพาวเวอร์ที่ได้รับคัดเลือก

ภาพที่ 13 ฉลากสินค้า และบรรจุภัณฑ์สบู่น้ำผึ้งขมิ้น แบบเหลว ที่ได้รับคัดเลือก

ภาพที่ 14 ฉลากสินค้า และบรรจุภัณฑ์สบู่น้ำผึ้งขมิ้น แบบก้อน ที่ได้รับคัดเลือก

5. สรุปผลการวิจัย

    จากการศึกษาการพัฒนาตราสินค้าและบรรจุภัณฑ์สำหรับวิสาหกิจชุมชนกรีนพาวเวอร์ สามารถสรุปผลได้ดังต่อไปนี้ กลุ่มวิสาหกิจชุมชนกรีนพาวเวอร์ได้สัญลักษณ์ตราสินค้า ฉลากสินค้า รวมไปถึงบรรจุภัณฑ์ที่เป็นเอกลักษณ์ มีความสวยงาม ทันสมัย ปลอดภัย และมีข้อมูลชัดเจน ตรงตามความต้องการของวิสาหกิจชุมชนกรีนพาวเวอร์ ซึ่งสัญลักษณ์ตราสินค้า ฉลากสินค้า และบรรจุภัณฑ์สามารถดึงดูดให้กลุ่มลูกค้าเกิดความสนใจ จนนำไปสู่การตัดสินใจซื้อได้ สอดคล้องกับงานวิจัยของ ศรีสุดา มหิธิธรรมธร (2564) ที่กล่าวว่า ตราสัญลักษณ์เป็นส่วนหนึ่งของแบรนด์เป็นอัตลักษณ์ที่สามารถสะท้อนผ่านการมองเห็นของผู้บริโภค ส่งผลต่อการตัดสินใจในการเลือกซื้อหรือเลือกใช้บริการ และสอดคล้องกับงานวิจัยของ ดลญา แก้วทับทิม (2561) ที่กล่าวว่า โลโก้มีความโดดเด่น เป็นเอกลักษณ์ บรรจุภัณฑ์ออกแบบสวยงามโดดเด่น เป็นปัจจัยที่มีผลต่อการตัดสินใจซื้อของผู้บริโภค

    นอกจากคณะผู้วิจัยได้ลงพื้นที่เพื่อพัฒนาผลิตภัณฑ์แล้ว ยังได้ทำการมอบความรู้เรื่องการคิดต้นทุน การพัฒนาบรรจุภัณฑ์ และช่องทางการจัดจำหน่าย รวมไปถึงการให้ความรู้ในการเตรียมผลิตภัณฑ์เพื่อเข้าสู่การขอมาตรฐานผลิตภัณฑ์ชุมชน (มผช.) ให้กับวิสาหกิจชุมชนอีกด้วย

6. ข้อเสนอแนะ

    1. ควรทำการประเมินความพึงพอใจของกลุ่มลูกค้าที่มีต่อตราสินค้าและบรรจุภัณฑ์ที่พัฒนาสำหรับวิสาหกิจชุมชนกรีนพาวเวอร์

    2. ควรมีการศึกษาและพัฒนาบรรจุภัณฑ์ของผลิตภัณฑ์อื่น ๆ ของกลุ่มวิสาหกิจชุมชนกรีนพาวเวอร์

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อิทธิพลของภาวะผู้นำในองค์การที่ส่งผลต่อคุณภาพชีวิตในการทำงานของบุคลากร
องค์การภาครัฐแห่งหนึ่ง ในเขตกรุงเทพมหานคร

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บทคัดย่อ

การวิจัยครั้งนี้มีวัตถุประสงค์เพื่อ (1) ศึกษาระดับคุณภาพชีวิตในการทำงานของบุคลากร และ (2) ศึกษาอิทธิพล
ของภาวะผู้นำในองค์การที่ส่งผลต่อคุณภาพชีวิตในการทำงานของบุคลากรองค์การภาครัฐแห่งหนึ่งในเขตกรุงเทพมหานคร
กลุ่มตัวอย่างที่ใช้ในการวิจัยครั้งนี้ คือ บุคลากรที่เป็นข้าราชการซึ่งปฏิบัติงานอยู่ในองค์การภาครัฐแห่งหนึ่งจำนวน 103 คน
และเก็บข้อมูลจากกลุ่มตัวอย่างด้วยวิธีการสุ่มตัวอย่างแบบบังเอิญ (Accidental Sampling) โดยใช้แบบสอบถามในการวิจัย
สำหรับสถิติที่ใช้ในการวิเคราะห์ข้อมูล ได้แก่ ความถี่ ร้อยละ ค่าเฉลี่ย ส่วนเบี่ยงเบนมาตรฐาน การวิเคราะห์ค่าสัมประสิทธิ์
สหสัมพันธ์เพียร์สัน และการถดถอยพหุคูณแบบขั้นตอน

ผลการวิจัย พบว่า (1) คุณภาพชีวิตในการทำงานของบุคลากรองค์การภาครัฐแห่งหนึ่งในเขตกรุงเทพมหานคร โดย
ภาพรวม อยู่ในระดับมาก ค่าเฉลี่ยเท่ากับ 3.917 (2) อิทธิพลของภาวะผู้นำในองค์การที่ส่งผลต่อคุณภาพชีวิตในการทำงาน
ของบุคลากรองค์การภาครัฐแห่งหนึ่งในเขตกรุงเทพมหานคร พบว่า ตัวแปรด้านภาวะผู้นำการเปลี่ยนแปลง สามารถพยากรณ์
คุณภาพชีวิตการทำงานของบุคลากร ได้อย่างมีนัยสำคัญทางสถิติที่ระดับ 0.05 โดยสามารถพยากรณ์คุณภาพชีวิตการทำงาน
ของบุคลากรได้ร้อยละ 28.5 ($R^2 = 0.285$)

คำสำคัญ: คุณภาพชีวิตการทำงาน; ภาวะผู้นำการเปลี่ยนแปลง; ภาวะผู้นำในองค์การ

การประชุมวิชาการระดับชาติและนานาชาติบ้านสมเด็จเจ้าพระยา ครั้งที่ 1 (BS2C 2025)
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The influence of organizational leadership on the quality of working life of personnel in a governmental organization in Bangkok

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Abstract

The purposes of this research were (1) to study the quality of working life of personnel in a governmental organization in Bangkok and (2) to study the organizational leadership affecting the quality of working life of personnel in a governmental organization in Bangkok. The sample group used in this research consists of 103 civil servants working in a government organization, and the data were collected from the sample group using accidental sampling and a questionnaire for the study. The statistics utilized in data analysis include frequency, percentage, mean, standard deviation, Pearson's correlation, and stepwise multiple regression analysis.

The study results indicated that: (1) The overall quality of work life of personnel in a public organization in Bangkok is at a high level, with an average score of 3.917 ($\bar{x}$ = **3.917**, S.D. = 0.427). (2) The influence of organizational leadership effect on the quality of working life of personnel in a governmental organization in Bangkok found that the transformational leadership variable can significantly predict the quality of work life of personnel at a 0.05 significance level by predicting the quality of work life of personnel at 28.5 % (R^2 = 0.285).

Keywords: quality of working life; organizational leadership; transformational leadership

1. บทนำ

เนื่องด้วยสภาพแวดล้อมขององค์การที่มีการปรับตัวและแข่งขันอยู่ตลอดเวลา ประกอบกับสถานการณ์ที่มีมิติของ
ความหลากหลาย ความท้าทายที่เพิ่มมากยิ่งขึ้นนั้น เพื่อนำองค์การไปสู่ความสำเร็จพัฒนาอย่างยั่งยืนและบรรลุเป้าหมายอย่าง
มีประสิทธิภาพ จึงนำไปสู่การพัฒนาความสามารถในการปฏิบัติงานของบุคลากร เพื่อให้บุคลากรดำเนินงานไปในทิศทาง
เดียวกัน และเพื่อบรรลุวัตถุประสงค์ขององค์การที่ตั้งไว้ ทำให้ทุกองค์การต้องพัฒนาบุคลากรของหน่วยงาน ให้เป็นบุคลากรที่
มีความรู้ความสามารถและทักษะที่สูงขึ้น โดยผ่านรูปแบบการบริหารงานของผู้บริหารในระดับต่างๆ

สำหรับองค์การที่จะประสบความสำเร็จได้ ย่อมมาจากผู้บริหาร ซึ่งเป็นผู้ที่มีบทบาทในการชี้นำทิศทางองค์การ
กำหนดกลยุทธ์ และสร้างบรรยากาศในการทำงานที่ส่งเสริมความเป็นทีม ผู้บริหารที่มีคุณสมบัติที่ดีจะสามารถดึงศักยภาพของ
ทีมงานออกมาอย่างเต็มที่ และช่วยให้ทุกคนทำงานไปสู่เป้าหมายร่วมกันอย่างมีประสิทธิภาพ ซึ่งทำหน้าที่เป็นผู้นำที่มี
ประสิทธิภาพ ด้วยเหตุนี้ทำให้ ภาวะผู้นำ จึงเป็นอีกหนึ่งบทบาทหนึ่งที่ผู้บริหาร อาจจะใช้เป็นเครื่องมือและปัจจัยสำคัญใน
การบริหารงานต่างๆ หรือแม้แต่อาจจะเกี่ยวข้องกับ การนำกลยุทธ์ไปสู่การปฏิบัติได้ โดยอาศัย การชักจูง โน้มน้าว การจูงใจ
การเปลี่ยนแปลงค่านิยมและวัฒนธรรมขององค์การ ภาวะผู้นำจึงเป็นเครื่องชี้ให้เห็นถึงความสำเร็จของหน่วยงาน เพื่อพิจารณา
ว่า งานจะดำเนินไปด้วยดีและบรรลุวัตถุประสงค์นั้น ย่อมขึ้นอยู่กับทักษะความสามารถในการจูงใจ หรือมีอิทธิพลต่อบุคคลอื่น
เพื่อให้ดำเนินการหรือการปฏิบัติงานไปสู่เป้าหมายที่กำหนดไว้ และเพื่อให้บุคลากรดำเนินงานไปในทิศทางเดียวกัน ตลอดจน
เพื่อบรรลุวัตถุประสงค์ขององค์การที่ตั้งไว้ [1] โดยที่ผู้นำแต่ละรูปแบบ อาจมีประโยชน์ต่อการบริหารงาน บริหารคน นำพา
องค์การให้ไปสู่ความสำเร็จ มีส่วนช่วยให้เกิดทั้งแง่มุมของการบริหารองค์การที่มีประสิทธิภาพ การใช้ภาวะผู้นำเพื่อให้เกิด
การปฏิบัติงานของผู้ตาม การเป็นแบบอย่างที่ดีและการก่อให้เกิดการเปลี่ยนแปลงกับบุคลากรและองค์การ เป็นต้น แต่สิ่งหนึ่ง
ที่ควรตระหนักถึงสำหรับบุคลากรในทุกๆองค์การ เนื่องจากเป็นปัจจัยสัมพันธ์อีกปัจจัยหนึ่ง คือ คุณภาพชีวิตในการทำงาน [2]

ทั้งนี้ คุณภาพชีวิตในการทำงานนั้น หมายรวมถึง ระดับความพึงพอใจ ความสุข และสภาพแวดล้อมที่ดีที่พนักงาน
ได้รับในที่ทำงาน ซึ่งส่งผลต่อสุขภาพกายและจิตใจ รวมถึงประสิทธิภาพการทำงานของพนักงานโดยตรง การมีคุณภาพชีวิตใน
การทำงานที่ดีทำให้พนักงานมีความสุข มีแรงจูงใจในการทำงาน และรู้สึกผูกพันกับองค์การ ค่าตอบแทนที่เป็นธรรมและ
เพียงพอ สิ่งแวดล้อมที่ถูกลักษณะและปลอดภัย การเปิดโอกาสให้ผู้ปฏิบัติงานได้พัฒนาความรู้ความสามารถได้เป็นอย่างดี
เพิ่มพูนทักษะของตนเอง ไม่ว่าจะโดยการศึกษา การฝึกอบรม หรือการพัฒนาต่างๆ ย่อมเป็นการเพิ่มศักยภาพของผู้ปฏิบัติงาน
ให้สูงขึ้น ผู้นำองค์การสามารถนำแนวทางดังกล่าว มาประยุกต์และกำหนดเป็นหลักการบริหารได้เป็นผลดีต่อการสร้างขวัญ
และกำลังใจแก่ผู้ปฏิบัติงาน ความภักดีที่จะอยู่ทำงานต่อไปกับองค์การด้วยความเต็มใจ รวมถึงความพึงพอใจในการปฏิบัติงาน
ที่ได้รับมอบหมายอย่างเต็มความสามารถก่อเกิดประสิทธิภาพและประสิทธิผลเชิงภาพรวม เพื่อให้บรรลุเป้าหมายตาม
ที่องค์การกำหนดไว้ [3] ลักษณะงานที่ส่งเสริมความเจริญเติบโตและความมั่นคงให้แก่ผู้ปฏิบัติงาน ภาวะสมดุลระหว่าง
ชีวิตส่วนตัวและงาน ตลอดจนลักษณะงานมีส่วนส่งเสริมด้านบูรณาการทางสังคมของผู้ปฏิบัติงาน ซึ่งตั้งอยู่บนฐานของ
กฎหมายหรือกระบวนการยุติธรรม รวมทั้งยังมีส่วนเกี่ยวข้องและสัมพันธ์กับสังคมโดยตรง โดยภาวะผู้นำอาจมีความสัมพันธ์กับ
คุณภาพชีวิตในการทำงาน เนื่องจากหากมีผู้นำที่ดี หรือผู้นำที่มีคุณสมบัติและทักษะหลายอย่าง เช่น การสื่อสารที่มีประสิทธิภาพ
ความสามารถในการตัดสินใจ ความเห็นอกเห็นใจผู้อื่น การสร้างแรงบันดาลใจให้ทีม และความสามารถในการจัดการความท้าทาย
หรืออุปสรรค [4] เพราะการมีผู้นำที่ดี หรือ ผู้นำที่มีภาวะผู้นำย่อมนำไปสู่คุณภาพชีวิตในการทำงานที่ดีของบุคลากร และ
ก่อให้เกิดความร่วมมือและความเข้าใจระหว่างกันในองค์การ ซึ่งจะเป็นประโยชน์ต่อการพัฒนาสู่ประสิทธิภาพและเกิดการเพิ่ม
ผลผลิตขององค์การในที่สุด [5] ซึ่งมีแนวคิดทฤษฎีต่างๆ ที่ระบุว่าภาวะผู้นำมีอิทธิพลต่อผู้ตามและการสร้างแรงบันดาลใจ เช่น
ภาวะผู้นำการเปลี่ยนแปลงจะใช้การจูงใจให้ผู้ตามเกิดความพยายามในการทำงานมากขึ้น ซึ่งมาจากผู้ตามที่ระดับความมั่นใจ
ต่อผลงานที่ได้รับมอบหมาย และมีความมุ่งมั่นต่อความสำเร็จ ก่อให้เกิดการเปลี่ยนแปลงที่ดีขึ้น [6] และยังส่งผลต่อ

การประชุมวิชาการระดับชาติและนานาชาติบ้านสมเด็จเจ้าพระยา ครั้งที่ 1 (BS2C 2025)
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ประสิทธิผลของงาน ความพึงพอใจในการปฏิบัติงาน ฯลฯ ด้วยเหตุนี้ทำให้คณะผู้วิจัยจึงสนใจศึกษาอิทธิพลของภาวะผู้นำใน
องค์การที่ส่งผลต่อคุณภาพชีวิตในการทำงานของบุคลากรองค์การภาครัฐแห่งหนึ่งในเขตกรุงเทพมหานคร

2. วัตถุประสงค์

      2.1 เพื่อศึกษาระดับคุณภาพชีวิตในการทำงานของบุคลากรองค์การภาครัฐแห่งหนึ่งในเขตกรุงเทพมหานคร

      2.2 เพื่อศึกษาอิทธิพลของภาวะผู้นำในองค์การที่ส่งผลต่อคุณภาพชีวิตในการทำงานของบุคลากรองค์การภาครัฐ
แห่งหนึ่งในเขตกรุงเทพมหานคร

3. กรอบแนวคิดที่ใช้ในการศึกษา

      การวิจัยครั้งนี้ ผู้วิจัยได้ศึกษาแนวคิดที่สามารถใช้เป็นกรอบในการอธิบายอิทธิพลของภาวะผู้นำในองค์การที่ส่งผลต่อ
คุณภาพชีวิตในการทำงานของบุคลากร ซึ่งประกอบด้วยภาวะผู้นำในองค์การ [11] และแนวคิดคุณภาพชีวิตในการทำงาน [12]
ดังแสดงกรอบแนวคิดที่ใช้ในการศึกษาได้ตามภาพที่ 1
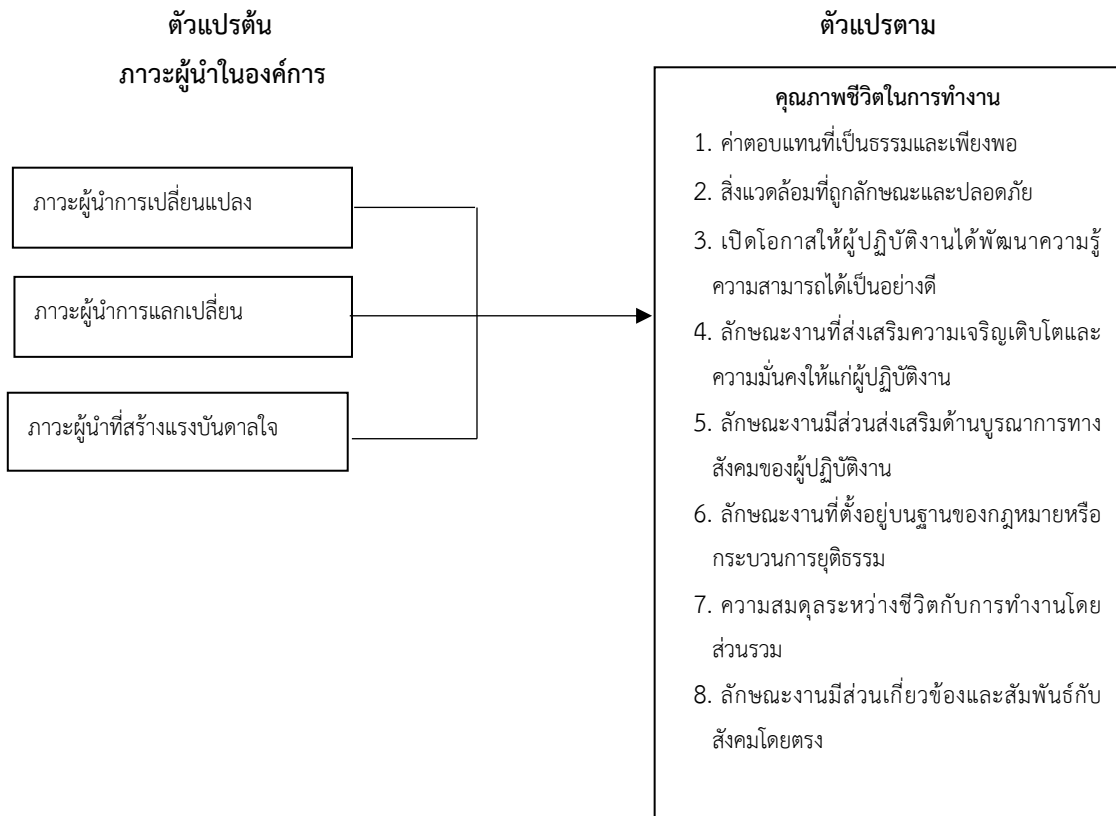
ภาพที่ 1 กรอบแนวคิดการวิจัย

4. ระเบียบวิธีวิจัย

การวิจัยครั้งนี้เป็นการวิจัยเชิงสำรวจ (Survey Research) ด้วยวิธีการวิจัยเชิงปริมาณ (Quantitative Research) ผู้วิจัยมีวิธีการดำเนินการวิจัย ดังนี้

4.1 ประชากรและกลุ่มตัวอย่าง

ประชากรและกลุ่มตัวอย่างของการศึกษาครั้งนี้ คือ บุคลากรที่เป็นข้าราชการซึ่งปฏิบัติงานอยู่ในองค์การภาครัฐ แห่งหนึ่งในเขตกรุงเทพมหานคร จำนวน 122 คน [7] และได้กำหนดขนาดกลุ่มตัวอย่างตามตาราง [13] ที่ช่วงความเชื่อมั่น ร้อยละ 95 ความคลาดเคลื่อน 0.05 โดยได้กลุ่มตัวอย่างเท่ากับ 94 คน ทั้งนี้ผู้วิจัยได้เพิ่มขนาดของกลุ่มตัวอย่าง เพื่อป้องกัน การสูญหายอีกร้อยละ 10 ดังนั้นขนาดกลุ่มตัวอย่างที่ใช้ในการวิจัยครั้งนี้ จึงเท่ากับ 103 คน และเก็บข้อมูลจากกลุ่มตัวอย่าง ด้วยวิธีการสุ่มตัวอย่างแบบบังเอิญ (Accidental Sampling) โดยเก็บเฉพาะผู้ที่เต็มใจให้ข้อมูลเท่านั้น

4.2 เครื่องมือที่ใช้ในการวิจัย

เครื่องมือที่ใช้ในการวิจัย ได้แก่ แบบสอบถามในการจัดเก็บข้อมูลแบ่งออกเป็น 3 ตอน ประกอบด้วย

ตอนที่ 1 ข้อมูลส่วนบุคคลของผู้ตอบแบบสอบถาม ได้แก่ เพศ อายุ ระดับการศึกษา ระยะเวลาในการปฏิบัติงาน และรายได้

ตอนที่ 2 แบบสอบถามเกี่ยวกับภาวะผู้นำในองค์การ พัฒนาแบบสอบถาม โดยอาศัยแนวความคิด [11] ประกอบด้วย ภาวะผู้นำ 3 รูปแบบ ได้แก่ ภาวะผู้นำการเปลี่ยนแปลง ภาวะผู้นำแบบแลกเปลี่ยน และภาวะผู้นำที่สร้างแรง บันดาลใจ

ตอนที่ 3 แบบสอบถามเกี่ยวกับคุณภาพชีวิตในการทำงาน พัฒนาแบบสอบถาม โดยใช้รูปแบบแนวความคิด [12] ประกอบด้วย เงื่อนไขต่าง ๆ 8 ประการ ได้แก่ ค่าตอบแทนที่เป็นธรรมและเพียงพอ สิ่งแวดล้อมที่ถูกลักษณะและปลอดภัย เปิดโอกาสให้ผู้ปฏิบัติงานได้พัฒนาความรู้ความสามารถได้เป็นอย่างดี ลักษณะงานที่ส่งเสริมความเจริญเติบโตและความมั่นคง ให้แก่ผู้ปฏิบัติงาน ลักษณะงานมีส่วนส่งเสริมด้านบูรณาการทางสังคมของผู้ปฏิบัติงาน ลักษณะงานที่ตั้งอยู่บนฐานของ กฎหมายหรือกระบวนการยุติธรรม ความสมดุลระหว่างชีวิตกับการทำงานโดยส่วนรวม และลักษณะงานมีส่วนเกี่ยวข้องและ สัมพันธ์กับสังคมโดยตรง

การตรวจสอบคุณภาพเครื่องมือ ผู้ศึกษาได้ตรวจสอบตรงเชิงเนื้อหา (Content Validity) โดยอาศัยผู้เชี่ยวชาญ ตรวจสอบ พบว่า คำถามทุกข้อมีค่า IOC อยู่ระหว่าง 0.70 - 1.00 ผ่านเกณฑ์ที่ยอมรับได้ จากนั้นได้นำไปทดลองหา ความน่าเชื่อถือ (Reliability) โดยนำแบบสอบถามไปทดลองใช้ (Try Out) กับข้าราชการในกลุ่มที่คล้ายคลึงกับประชากรแต่ มิใช่กลุ่มตัวอย่าง จำนวน 30 ชุด ซึ่งจากการทดสอบความน่าเชื่อถือ พบว่า ค่าสัมประสิทธิ์สหสัมพันธ์แอลฟาของครอนบาร์ค ทั้งฉบับอยู่ที่ 0.761 แสดงว่า แบบสอบถามที่พัฒนาขึ้นนั้น มีคุณภาพเพียงพอสามารถนำไปใช้เก็บข้อมูลได้ ซึ่งดำเนินการและ เป็นไปตามหลักเกณฑ์ [14]

4.3 วิธีการเก็บรวบรวมข้อมูล

ผู้วิจัยแจกแบบสอบถามเพื่อเก็บข้อมูลจากกลุ่มตัวอย่างด้วยตนเอง โดยเก็บรวบรวมข้อมูลการวิจัยในช่วงเดือน พฤษภาคม พ.ศ.2567 และได้แบบสอบถามกลับคืนตามจำนวนขนาดกลุ่มตัวอย่างที่กำหนด จำนวนทั้งสิ้น 103 ฉบับ

4.4 การวิเคราะห์ข้อมูลและสถิติที่ใช้ในการวิเคราะห์ข้อมูล

ผู้วิจัยตรวจสอบความถูกต้องและความสมบูรณ์ของแบบสอบถามแล้วประมวลผลข้อมูลโดยใช้โปรแกรมสำเร็จรูป ตามขั้นตอนดังนี้

4.4.1 วิเคราะห์ข้อมูลส่วนบุคคล ด้วยสถิติเชิงพรรณนา (Descriptive Statistic) ได้แก่ ความถี่ และร้อยละ

4.4.2 วิเคราะห์ระดับคุณภาพชีวิตในการทำงาน ได้แก่ ความถี่ ร้อยละ และส่วนเบี่ยงเบนมาตรฐาน

4.4.3 วิเคราะห์ความสัมพันธ์ระหว่างตัวแปรที่ศึกษา ได้แก่ การวิเคราะห์ค่าสัมประสิทธิ์สหสัมพันธ์เพียร์สัน (Pearson's Correlation Coefficient)

4.4.4 วิเคราะห์อิทธิพลของตัวแปร ได้แก่ การถดถอยพหุคูณแบบขั้นตอน (Stepwise Multiple Regression Analysis) เพื่อตอบวัตถุประสงค์การวิจัย

5. ผลการวิจัยและอภิปรายผล

5.1 ผลการศึกษาระดับคุณภาพชีวิตในการทำงานของบุคลากรองค์การภาครัฐแห่งหนึ่งในเขตกรุงเทพมหานคร

ผลการวิเคราะห์ระดับคุณภาพชีวิตในการทำงานของบุคลากรองค์การภาครัฐแห่งหนึ่งในเขตกรุงเทพมหานคร ทั้ง 8 ด้าน ซึ่งประกอบด้วย ค่าตอบแทนที่เป็นธรรมและเพียงพอ สิ่งแวดล้อมที่ถูกลักษณะและปลอดภัย เปิดโอกาสให้ผู้ปฏิบัติงาน ได้พัฒนาความรู้ความสามารถได้เป็นอย่างดี ลักษณะงานที่ส่งเสริมความเจริญเติบโตและความมั่นคงให้แก่ผู้ปฏิบัติงาน ลักษณะงานมีส่วนส่งเสริมด้านบูรณาการทางสังคมของผู้ปฏิบัติงาน ลักษณะงานที่ตั้งอยู่บนฐานของกฎหมายหรือกระบวนการ ยุติธรรม ความสมดุลระหว่างชีวิตกับการทำงานโดยส่วนรวม และลักษณะงานมีส่วนเกี่ยวข้องและสัมพันธ์กับสังคมโดยตรง ผลปรากฏดังตารางที่ 1 ดังนี้

ตารางที่ 1 ค่าเฉลี่ย ($\bar{x}$) และส่วนเบี่ยงเบนมาตรฐาน (S.D.) ผลการวิเคราะห์ระดับคุณภาพชีวิตในการทำงานของบุคลากร องค์การภาครัฐแห่งหนึ่งในเขตกรุงเทพมหานคร โดยภาพรวม

ด้าน	องค์ประกอบคุณภาพชีวิตในการทำงาน	$\bar{x}$	S.D.	การแปลผล	ลำดับที่
1	ค่าตอบแทนที่เป็นธรรมและเพียงพอ	3.907	0.472	มาก	4
2	สิ่งแวดล้อมที่ถูกลักษณะและปลอดภัย	3.876	0.533	มาก	6
3	เปิดโอกาสให้ผู้ปฏิบัติงานได้พัฒนาความรู้ความสามารถได้เป็นอย่างดี	3.830	0.475	มาก	7
4	ลักษณะงานที่ส่งเสริมความเจริญเติบโตและความมั่นคงให้แก่ผู้ปฏิบัติงาน	3.669	0.619	มาก	8
5	ลักษณะงานมีส่วนส่งเสริมด้านบูรณาการทางสังคมของผู้ปฏิบัติงาน	3.905	0.336	มาก	5
6	ลักษณะงานที่ตั้งอยู่บนฐานของกฎหมายหรือกระบวนการยุติธรรม	4.031	0.282	มาก	3
7	ความสมดุลระหว่างชีวิตกับการทำงาน โดยส่วนรวม	4.085	0.347	มาก	1
8	ลักษณะงานมีส่วนเกี่ยวข้องและสัมพันธ์กับสังคมโดยตรง	4.034	0.382	มาก	2
	รวม	**3.917**	**0.427**	**มาก**	-

จากตารางที่ 1 แสดงให้เห็นผลการวิเคราะห์องค์ประกอบคุณภาพชีวิตในการทำงานของบุคลากรองค์การภาครัฐแห่ง หนึ่งในเขตกรุงเทพมหานคร โดยรวมอยู่ในระดับมาก ค่าเฉลี่ยเท่ากับ 3.917 ($\bar{x}$ = 3.917, S.D. = 0.427) เมื่อพิจารณาแต่ละ องค์ประกอบ พบว่า ความสมดุลระหว่างชีวิตกับการทำงานโดยส่วนรวม มีค่าเฉลี่ยสูงสุด อยู่ในระดับมาก ค่าเฉลี่ยเท่ากับ 4.085 ($\bar{x}$ = 4.085, S.D. = 0.347) รองลงมา คือ ลักษณะงานมีส่วนเกี่ยวข้องและสัมพันธ์กับสังคมโดยตรง อยู่ในระดับมาก ค่าเฉลี่ยเท่ากับ 4.034 ($\bar{x}$ = 4.034, S.D. = 0.382) ลักษณะงานที่ตั้งอยู่บนฐานของกฎหมายหรือกระบวนการยุติธรรม อยู่ใน ระดับมาก ค่าเฉลี่ยเท่ากับ 4.031 ($\bar{x}$ = 4.031, S.D. = 0.282) ค่าตอบแทนที่เป็นธรรมและเพียงพอ อยู่ในระดับมาก ค่าเฉลี่ย เท่ากับ 3.907 ($\bar{x}$ = 3.907, S.D. = 0.472) ลักษณะงานมีส่วนส่งเสริมด้านบูรณาการทางสังคมของผู้ปฏิบัติงาน อยู่ในระดับ มาก ค่าเฉลี่ยเท่ากับ 3.905 ($\bar{x}$ = 3.905, S.D. = 0.336) สิ่งแวดล้อมที่ถูกลักษณะและปลอดภัย อยู่ในระดับมาก ค่าเฉลี่ย เท่ากับ 3.876 ($\bar{x}$ = 3.876, S.D. = 0.533) เปิดโอกาสให้ผู้ปฏิบัติงานได้พัฒนาความรู้ความสามารถได้เป็นอย่างดี อยู่ใน ระดับมาก ค่าเฉลี่ยเท่ากับ 3.830 ($\bar{x}$ = 3.830 , S.D. = 0.475) และ ลักษณะงานที่ส่งเสริมความเจริญเติบโตและความมั่นคงให้ แก่ผู้ปฏิบัติงาน อยู่ในระดับมาก ค่าเฉลี่ยเท่ากับ 3.669 ($\bar{x}$ = 3.669 , S.D. = 0.619) ตามลำดับ โดยพบว่าระดับของคุณภาพ ชีวิตในการทำงาน ในภาพรวม สอดคล้องกับงานวิจัยเรื่อง คุณภาพชีวิตในการทำงานของข้าราชการส่วนกลาง สำนักงาน คณะกรรมการป้องกันและปราบปรามยาเสพติด [8] ที่ผลการศึกษา พบว่า คุณภาพชีวิตในการทำงานโดยรวม มีค่าเฉลี่ย 3.99 ซึ่งอยู่ในระดับมาก

5.2 เพื่อศึกษาอิทธิพลของภาวะผู้นำในองค์การที่ส่งผลต่อคุณภาพชีวิตในการทำงานของบุคลากรองค์การ ภาครัฐแห่งหนึ่งในเขตกรุงเทพมหานคร

ผลการศึกษาและการวิเคราะห์อิทธิพลของภาวะผู้นำในองค์การที่ส่งผลต่อคุณภาพชีวิตในการทำงานของบุคลากร องค์การภาครัฐแห่งหนึ่งในเขตกรุงเทพมหานคร พบว่า ปัจจัยด้านภาวะผู้นำในองค์การ ได้แก่ ตัวแปรด้านภาวะผู้นำ การเปลี่ยนแปลง ภาวะผู้นำการแลกเปลี่ยน และภาวะผู้นำที่สร้างแรงบันดาลใจ มีความสัมพันธ์กับคุณภาพชีวิตในการทำงาน ของบุคลากร ผลปรากฏดังตารางที่ 2 ดังนี้

ตารางที่ 2 ผลการวิเคราะห์สัมประสิทธิสหสัมพันธ์เพียร์สัน (Pearson's Correlation Coefficient) ระหว่างตัวแปรที่ศึกษา

	คุณภาพชีวิตใน การทำงาน	ภาวะผู้นำการ เปลี่ยนแปลง (X$_1$)	ภาวะผู้นำ การแลกเปลี่ยน	ภาวะผู้นำที่สร้าง แรงบันดาลใจ
คุณภาพชีวิตในการทำงาน (Y)	1.000	0.292*	0.050	-0.013
ภาวะผู้นำการเปลี่ยนแปลง (X$_1$)		1.000	0.188	0.010
ภาวะผู้นำการแลกเปลี่ยน (X$_2$)			1.000	0.240*
ภาวะผู้นำที่สร้างแรงบันดาลใจ (X$_3$)				1.000

หมายเหตุ *p < 0.05

จากตารางที่ 2 แสดงให้เห็นผลการวิเคราะห์สัมประสิทธิสหสัมพันธ์เพียร์สัน (Pearson's Correlation Coefficient) ระหว่างตัวแปรที่ศึกษา ซึ่งมีความสัมพันธ์ ดังนี้ ตัวแปรด้านภาวะผู้นำการเปลี่ยนแปลง (X$_1$) กับ คุณภาพชีวิตในการทำงาน (Y) มีความสัมพันธ์ทางบวก อย่างมีนัยสำคัญทางสถิติที่ระดับ 0.05 (r=0.292, p < 0.05) ส่วนตัวแปรด้านภาวะผู้นำการ แลกเปลี่ยน (X$_2$) และภาวะผู้นำที่สร้างแรงบันดาลใจ (X$_3$) กับ คุณภาพชีวิตในการทำงาน (Y) มีค่าเท่ากับ 0.050, -0.013 ตามลำดับ ซึ่งสอดคล้องกับงานวิจัยเรื่องภาวะผู้นำมีความสัมพันธ์กับคุณภาพชีวิตในการทำงานของพนักงานกรณีศึกษา

การประชุมวิชาการระดับชาติและนานาชาติบ้านสมเด็จเจ้าพระยา ครั้งที่ 1 (BS2C 2025)
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ธนาคารพาณิชย์ไทยแห่งหนึ่งในเขตสาทร [9] โดยผลการวิจัย พบว่า ภาวะผู้นำการเปลี่ยนแปลงมีความสัมพันธ์กับ
ความมีคุณภาพของพนักงานธนาคารพาณิชย์ไทยแห่งหนึ่งในเขตสาทรโดยภาพรวมในระดับมากที่สุด (r=0.855) อย่างมี
นัยสำคัญทางสถิติที่ 0.05 เนื่องจากธนาคารจำเป็นต้องมีการปรับเปลี่ยนรูปแบบการให้บริการเพื่อให้สามารถตอบสนอง
ความต้องการของผู้ใช้บริการอย่างรวดเร็ว ถูกต้อง และปลอดภัย ซึ่งปัจจุบันสภาพแวดล้อมมีการเปลี่ยนแปลงอยู่ตลอดเวลา
ทำให้ธนาคารต้องเปลี่ยนแปลงองค์การอยู่อย่างต่อเนื่อง ดังนั้นผู้นำควรปรับวิสัยทัศน์และกลยุทธ์ให้เหมาะสมและทันสมัยกับ
การเปลี่ยนแปลง และสื่อสารกับพนักงานให้เข้าใจถึงสถานการณ์พร้อมทั้งสร้างแรงจูงใจให้พนักงานร่วมมือกันปฏิบัติงานอย่าง
สอดคล้องกับวิสัยทัศน์และกลยุทธ์ที่ผู้นำได้วางแผนไว้ ซึ่งจะทำให้สร้างบรรยากาศการทำงานที่ดี และเกิดผลลัพธ์ที่น่าพึงพอใจ
สำหรับการทำให้ภาวะผู้นำการเปลี่ยนแปลงมีความสัมพันธ์กับคุณภาพชีวิตการทำงานของพนักงาน เนื่องจากภาวะผู้นำแบบ
เปลี่ยนแปลง [15] จะมีลักษณะที่ช่วยกระตุ้นให้เกิดความสนใจระหว่างผู้นำ ผู้ร่วมงาน และผู้ตาม ตลอดจนเพื่อให้เกิดมุมมอง
ในแง่มุมใหม่ๆ ของการทำงาน ก่อเกิดการตระหนักรู้ในเรื่องภารกิจ วิสัยทัศน์ ก่อให้เกิดการพัฒนาความสามารถของผู้ร่วมงาน
และผู้ตาม นำไปสู่การพิจารณาความสนใจของผู้ตามและท้าทายความคาดหวัง มุ่งสู่การบรรลุถึงผลงานที่สูงขึ้น นอกจากนี้ยัง
สอดคล้องกับงานวิจัยเรื่องการศึกษาภาวะผู้นำของหัวหน้างาน สภาพแวดล้อมในการทำงานและวัฒนธรรมในการทำงานที่มีผล
ต่อคุณภาพชีวิตในการทำงานของพนักงานระดับปฏิบัติการในอุตสาหกรรมยานยนต์ ย่านอุดมสุข เขตบางนา กรุงเทพมหานคร
ซึ่งพบว่า อิทธิพลของภาวะผู้นำของหัวหน้างาน มีผลต่อระดับคุณภาพชีวิตในการทำงานของพนักงานระดับปฏิบัติการใน
อุตสาหกรรมยานยนต์ย่านอุดมสุข เขตบางนา กรุงเทพมหานคร ร้อยละ 54.3 อย่างมีนัยสำคัญทางสถิติที่ระดับ 0.05 [6]

ตารางที่ 3 ผลการวิเคราะห์อิทธิพลของภาวะผู้นำในองค์การที่ส่งผลต่อคุณภาพชีวิตในการทำงานของบุคลากรองค์การภาครัฐ
แห่งหนึ่งในเขตกรุงเทพมหานคร

ตัวแปรพยากรณ์	Unstandardized Coefficient		Standardized Coefficient	t	P-values
	B	S.E.	Beta		
ค่าคงที่ (Constant)	3.452	0.152	-	22.653*	0.000
ภาวะผู้นำ การเปลี่ยนแปลง (X_1)	0.123	0.040	0.292	3.071*	0.003
$R = 0.352$, $R^2 = 0.285$, Adjusted $R^2 = 0.276$, S.E. = 0.152, F = 11.429*					

หมายเหตุ *p < 0.05

จากตารางที่ 3 แสดงผลการวิเคราะห์ค่าสัมประสิทธิ์การถดถอยพหุคูณแบบขั้นตอนของภาวะผู้นำการเปลี่ยนแปลง
ส่งผลต่อคุณภาพชีวิตในการทำงานของบุคลากรองค์การภาครัฐแห่งหนึ่งในเขตกรุงเทพมหานคร ร้อยละ 28.5 และมี
ความคลาดเคลื่อนการพยากรณ์หรือการประมาณค่าต่อคุณภาพชีวิตในการทำงาน เท่ากับ 0.152 สามารถสร้างสมการใน
รูปคะแนนดิบและคะแนนมาตรฐานได้ดังต่อไปนี้

สมการพยากรณ์ในรูปคะแนนดิบ   Y' = 3.452 + 0.123 (X_1)

สมการพยากรณ์ในรูปคะแนนมาตรฐาน Z'_Y = 0.292 (X_1)

จากสมการการถดถอยพหุคูณข้างต้น สามารถอภิปรายผลได้ดังนี้

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การวิเคราะห์การถดถอยพหุคูณแบบขั้นตอนของภาวะผู้นำในองค์การที่ส่งผลต่อคุณภาพชีวิตในการทำงานของบุคลากรองค์การภาครัฐแห่งหนึ่งในเขตกรุงเทพมหานคร โดยพิจารณาที่ภาวะผู้นำการเปลี่ยนแปลง สามารถอธิบายได้ว่า ถ้าตัวแปรภาวะผู้นำการเปลี่ยนแปลง มีหน่วยเพิ่มขึ้น 1 หน่วย จะทำให้คุณภาพชีวิตในการทำงานของบุคลากรองค์การภาครัฐแห่งหนึ่งในเขตกรุงเทพมหานคร เพิ่มขึ้น 0.292 หน่วย ทั้งนี้ตัวแปรด้านภาวะผู้นำการเปลี่ยนแปลง สามารถพยากรณ์คุณภาพชีวิตการทำงานของบุคลากร ได้อย่างมีนัยสำคัญทางสถิติที่ระดับ 0.05 โดยสามารถพยากรณ์คุณภาพชีวิตการทำงานของบุคลากรได้ร้อยละ 28.5 (R^2 = 0.285) สอดคล้องกับงานวิจัยเรื่องภาวะผู้นำการเปลี่ยนแปลงของผู้บริหารสถานศึกษาส่งผลต่อคุณภาพชีวิตการทำงานของครูและบุคลากรทางการศึกษาโรงเรียนในสังกัดสำนักงานเขตพื้นที่การศึกษามัธยมศึกษากรุงเทพมหานครฯ [10] ซึ่งผลการวิจัย พบว่า ความสัมพันธ์ระหว่างภาวะผู้นำการเปลี่ยนแปลงของผู้บริหารสถานศึกษากับคุณภาพชีวิตการทำงานของครูและบุคลากรทางการศึกษา ได้ค่าประสิทธิภาพของการทำนาย R^2 เท่ากับ 0.396 กล่าวคือ ความเป็นได้ของการตั้งสมมติฐานว่า ปัจจัยที่ส่งผลต่อคุณภาพชีวิตการทำงานของครูและบุคลากรทางการศึกษามีความสัมพันธ์กับคุณภาพชีวิตการทำงานของครูและบุคลากรทางการศึกษา ซึ่งความสามารถในการทำนายยังมีค่าน้อย ซึ่งสัมพันธ์ตามแนวคิดที่กล่าวว่า ภาวะผู้นำเชิงเปลี่ยนแปลงมีส่วนช่วยปรับปรุงความยืดหยุ่นในสถานที่ทำงาน ความมั่นคงในงาน ความมุ่งมั่นการสร้างขวัญกำลังใจ และความพึงพอใจในงานโดยรวมของพนักงาน [16] และสอดคล้องกับงานวิจัยเรื่องการศึกษาเชิงประจักษ์ของภาวะผู้นำเชิงเปลี่ยนแปลงและคุณภาพชีวิตการทำงานในสถาบันอุดมศึกษา [17] ซึ่งผลการศึกษา เผยให้เห็นว่ามีความสัมพันธ์เชิงบวกระหว่างภาวะผู้นำเชิงเปลี่ยนแปลงและคุณภาพชีวิตการทำงาน จึงจำเป็นต้องได้รับการเสริมสร้างให้เข้มแข็งยิ่งขึ้นเพื่อกระดับคุณภาพชีวิตการทำงานของพนักงาน นอกจากนี้เมื่อผู้นำมีภาวะผู้นำการเปลี่ยนแปลง จะทำให้ผู้ใต้บังคับบัญชา ไว้วางใจ ชื่นชม และเคารพต่อผู้นำ โดยผู้ใต้บังคับบัญชาจะทำผลงานได้มากกว่าที่คาดหวัง เพราะผู้นำที่มีภาวะผู้นำการเปลี่ยนแปลงจะเปลี่ยนแปลงและสร้างแรงบันดาลใจให้ผู้ใต้บังคับบัญชา โดยทำให้ผู้ใต้บังคับบัญชามีความตระหนักมากขึ้นถึงความสำคัญของผลลัพธ์สุดท้ายของงาน พร้อมทั้งสนับสนุนให้ผู้ใต้บังคับบัญชาทำมากกว่าผลประโยชน์ส่วนตัวเพื่อประโยชน์ขององค์กรหรือทีม และกระตุ้นความต้องการขั้นสูงของผู้ใต้บังคับบัญชา [18] ตลอดจนภาวะผู้นำการเปลี่ยนแปลงยังมีส่วนช่วยส่งเสริมความเป็นอยู่ที่ดีของพนักงาน [19] อีกทั้งหากองค์กรต้องการปรับปรุงประสิทธิภาพการทำงานขององค์กรสามารถทำได้โดยการนำภาวะผู้นำเชิงเปลี่ยนแปลงไปใช้ การนำกระบวนการวัฒนธรรมองค์กรไปใช้ เพื่อการปรับปรุงคุณภาพชีวิตการทำงานของพนักงาน ดังนั้นองค์กรต่างๆ จะต้องตระหนักถึงความจำเป็นของผู้นำที่สามารถนำรูปแบบภาวะผู้นำเชิงเปลี่ยนแปลงไปใช้ได้ เนื่องจากภาวะผู้นำ สามารถสร้างการเปลี่ยนแปลง ผ่านการนำกระบวนการวัฒนธรรมองค์กรที่พนักงาน (ผู้ใต้บังคับบัญชา) สามารถปฏิบัติตามวิสัยทัศน์ขององค์กรได้ โดยเฉพาะอย่างยิ่งในด้านความคิดสร้างสรรค์ นวัตกรรม และการปรับปรุงประสิทธิภาพการทำงาน [20]

6. ข้อเสนอแนะ

6.1 ควรมีการเก็บข้อมูลเชิงลึก โดยการใช้เครื่องมือการวิจัยเป็นแบบสอบถามสัมภาษณ์เชิงลึก

6.2 ควรมีการศึกษาถึงภาวะผู้นำการเปลี่ยนแปลงที่อาจจำแนกเป็นรายด้าน เช่น การมีอิทธิพลอย่างมีอุดมการณ์, การสร้างแรงบันดาลใจ, การกระตุ้นทางปัญญา และการคำนึงถึงความเป็นปัจเจกบุคคล เป็นต้น

6.3 ควรศึกษาปัจจัยอื่น ๆ ที่อาจส่งผลหรือมีความเกี่ยวข้องกับคุณภาพชีวิตในการทำงาน เช่น ความเครียดจากการปฏิบัติงาน ประสิทธิภาพในการปฏิบัติงาน หรือแรงจูงใจในการปฏิบัติงาน เป็นต้น

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อิทธิพลของทุนทางจิตวิทยาเชิงบวกที่ส่งผลต่อประสิทธิภาพการปฏิบัติงานของพนักงานในองค์กรธุรกิจค้าปลีกสมัยใหม่

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บทคัดย่อ

การวิจัยครั้งนี้มีวัตถุประสงค์เพื่อ (1) ศึกษาระดับประสิทธิภาพการปฏิบัติงานของพนักงานในองค์กรธุรกิจค้าปลีกสมัยใหม่ และ (2) ศึกษาอิทธิพลของทุนทางจิตวิทยาเชิงบวกที่ส่งผลต่อประสิทธิภาพการปฏิบัติงานของพนักงานในองค์กรธุรกิจค้าปลีกสมัยใหม่ กลุ่มตัวอย่างที่ใช้ในการวิจัย คือ พนักงานผู้ปฏิบัติงานอยู่ในองค์กรธุรกิจค้าปลีกสมัยใหม่ ประเภทห้างสรรพสินค้า ในเขตธนบุรี กรุงเทพมหานคร จำนวน 160 คน โดยเลือกกลุ่มตัวอย่างแบบสะดวก และเก็บรวบรวมข้อมูลด้วยแบบสอบถาม สำหรับสถิติที่ใช้ในการวิจัย ได้แก่ ร้อยละ ค่าเฉลี่ย ส่วนเบี่ยงเบนมาตรฐาน การวิเคราะห์ค่าสัมประสิทธิ์สหสัมพันธ์เพียร์ และการถดถอยพหุคูณแบบขั้นตอน

ผลการวิจัยพบว่า ระดับประสิทธิภาพการปฏิบัติงานของพนักงานในองค์กรธุรกิจค้าปลีกสมัยใหม่ โดยภาพรวมอยู่ในระดับมาก ค่าเฉลี่ยเท่ากับ 3.881 และ อิทธิพลของทุนทางจิตวิทยาเชิงบวกที่ส่งผลต่อประสิทธิภาพการปฏิบัติงานของพนักงานในองค์กรธุรกิจค้าปลีกสมัยใหม่ พบว่า ตัวแปรด้านความเชื่อมั่นในศักยภาพของตนเอง สามารถพยากรณ์ประสิทธิภาพการปฏิบัติงานของพนักงานในองค์กรธุรกิจค้าปลีกสมัยใหม่ ได้อย่างมีนัยสำคัญทางสถิติที่ระดับ 0.05 โดยสามารถพยากรณ์ประสิทธิภาพการปฏิบัติงานของพนักงาน ได้ร้อยละ 37.5 ($R^2 = 0.375$, F = 94.710)

คำสำคัญ : ธุรกิจค้าปลีกสมัยใหม่; ทุนทางจิตวิทยาเชิงบวก; ประสิทธิภาพการปฏิบัติงาน

การประชุมวิชาการระดับชาติและนานาชาติบ้านสมเด็จเจ้าพระยา ครั้งที่ 1 (BS2C 2025)
The 1st Bansomdejchaopraya National and International Conference (BS2C 2025)

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The Positive Psychological Capital Affecting the Job Performance of Operational Officers Working in Modern Retail Business Organizations

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Abstracts

The purposes of this research were (1) to study the job performance level of operational officers in modern retail business organizations and (2) to study the positive psychological capital affecting the job performance of operational officers working in modern retail business organizations. The research sample consists of 160 employees working in modern retail business organizations, specifically department stores, in the Thonburi district of Bangkok. The sample was selected using convenience sampling, and data was collected through questionnaires. The statistics utilized in data analysis include percentage, mean, standard deviation, Pearson's correlation, and stepwise multiple regression analysis.

The study results indicated that: (1) The overall job performance of operational officers working in modern retail business organizations was high, Mean =3.881 ($\tilde{x}$= 3.881, S.D. = 0.599). (2) The influence of positive psychological capital on the job performance of operational officers working in modern retail business organizations by the coefficient of determination (R^2) of .375 which means positive psychological capital is related to the job performance of operational by 37.5%. However, the operational job performance has a multiple correlation coefficient of .612, adjusted prediction efficiency or R^2 = .371, F = 94.710, and S.E. = .252. The influence of positive psychological capital on the job performance of operational officers working in modern retail business organizations found that the variable of self-efficacy can significantly predict employee performance in modern retail business organizations at the 0.05 level, with the ability to predict the job performance of operational officers at 37.5% (R2 = 0.375, F = 94.710).

Keywords: positive psychological capital; job performance of operational; modern retail business

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1. บทนำ

จากแนวโน้มของธุรกิจและอุตสาหกรรม ปี พ.ศ. 2566 - 2568 พบว่า ตั้งแต่ปี พ.ศ. 2565 มีการปรับเพิ่มสูงขึ้นตาม
ภาวะเศรษฐกิจ โดยพบปัจจัยที่สนับสนุนได้แก่ 1) มาตรการกระตุ้นการใช้จ่ายของภาครัฐ 2) การกลับมาของนักท่องเที่ยว
ต่างชาติ และ 3) ผู้บริโภคที่ยังคงมีศักยภาพการใช้จ่าย และในปี พ.ศ. 2566 - 2568 ธุรกิจยังได้เติบโตที่ระดับเฉลี่ย 4 - 5%
ต่อปี จากทั้งกำลังซื้อที่มีสภาวะฟื้นตัวตามสภาพเศรษฐกิจที่ยังคงคาดว่าจะเติบโตเฉลี่ย 3 - 4% ต่อปี และจำนวนนักท่องเที่ยว
ต่างชาติที่จะเพิ่มขึ้นในระดับใกล้เคียงกับช่วงก่อนสถานการณ์การแพร่ระบาดของโรคติดเชื้อไวรัสโคโรนา 2019 (covid-19)
ประกอบกับการลงทุนโครงการก่อสร้าง และการลงทุนขนาดใหญ่ที่มีบทบาทช่วยเพิ่มการจ้างงานและนำมาซึ่งปริมาณเงิน
หมุนเวียนในระบบ นอกจากนี้ยังพบว่า การเติบโตทางเศรษฐกิจของประเทศเพื่อนบ้านยังส่งผลต่อการเพิ่มโอกาสสร้างรายให้
แก่ธุรกิจอีกทางหนึ่งด้วยเช่นกัน [1] จากทิศทางการขยายตัวที่เพิ่มมากขึ้นของการเติบโตทางธุรกิจนี้ ธุรกิจค้าปลีกถือเป็นอีก
ธุรกิจหนึ่งที่ช่วยขับเคลื่อนเศรษฐกิจของประเทศและอยู่คู่กับระบบเศรษฐกิจไทยมาตั้งแต่ดีต [2] เนื่องจากธุรกิจค้าปลีก
เกี่ยวข้องกับการซื้อการขายที่ผู้บริโภคใช้ในชีวิตประจำวัน ตั้งแต่ปัจจัยสี่จนกระทั่งสิ่งที่ใช้สร้างความสุขความพึงพอใจในชีวิต
การค้าปลีกจึงเปรียบเสมือนการเชื่อมโยงผู้ผลิตกับผู้บริโภคที่ช่วยสร้างความรวดเร็ว ความสะดวกสบาย และความประหยัดใน
กระบวนการซื้อขาย เพราะผู้ค้าปลีกมีหน้าที่ติดต่อกับผู้ผลิตและผู้จัดจำหน่ายต่าง ๆ ทำให้ผู้บริโภคสามารถเลือกซื้อสินค้า หรือ
บริการได้อย่างหลากหลาย โดยไม่ต้องไปเสาะหาผู้ขายหลาย ๆ ราย มีการแบ่งสินค้าเป็นหน่วยย่อย ๆ ทำให้ผู้บริโภคสามารถ
ซื้อหาตามจำนวนที่ต้องการได้ มีการจัดเก็บและจัดแสดงสินค้าเพื่อให้ผู้บริโภคสามารถเลือกซื้อได้ง่ายตามเวลาที่ต้องการ ไม่
ต้องซื้อสิ่งของเก็บไว้ในปริมาณมาก ๆ และมีสิ่งอำนวยความสะดวกอื่น ๆ เช่น การทดลองใช้ การให้ข้อมูลข่าวสาร และการมี
พนักงานช่วยเหลือ เป็นต้น [12] ธุรกิจค้าปลีกในประเทศไทย ถือว่าเป็นธุรกิจที่มีมูลค่าจำนวนมหาศาลและมีสภาวะการ
แข่งขันที่สูงทำให้ธุรกิจค้าปลีกจำเป็นต้องปรับตัวและเสาะแสวงหาแนวทางในการดำเนินธุรกิจเพื่อให้เกิดรายได้ กำไร และอยู่
รอดอย่างยั่งยืน [3]

จากสภาพการแข่งขันที่รุนแรงของธุรกิจค้าปลีกในปัจจุบัน ทำให้ธุรกิจค้าปลีกแต่ละประเภทได้พยายามสร้างความ
ได้เปรียบในการแข่งขันที่มีความเฉพาะตัวให้สอดคล้องกับกลุ่มลูกค้าเป้าหมายของธุรกิจค้าปลีกสมัยใหม่แต่ละประเภทมาก
ยิ่งขึ้น เพื่อให้มีความแตกต่างจากธุรกิจค้าปลีกสมัยใหม่ที่เป็นคู่แข่งขัน ซึ่งจะส่งผลต่อกระบวนการในการรักษาฐานลูกค้าและ
สร้างความจงรักภักดีให้แก่ธุรกิจค้าปลีกสมัยใหม่ [2] จากการแข่งขันทางธุรกิจส่งผลให้องค์กรจำเป็นต้องมีการปรับตัวเพื่อให้
สามารถแข่งขันได้ โดยสิ่งที่ต้องคำนึงถึงมากที่สุดคือ ระบบการบริหารงาน และทรัพยากรมนุษย์ในองค์กร เพราะทรัพยากร
มนุษย์ ถือเป็นปัจจัยสำคัญในการควบคุมกลไกที่จะทำให้งานบรรลุไปได้ตามวัตถุประสงค์ที่กำหนดไว้ได้อย่างมีประสิทธิภาพ
ซึ่งประสิทธิภาพการปฏิบัติงานของพนักงาน ถือเป็นหัวใจขององค์กรที่สำคัญ องค์กรต้องการประสิทธิภาพและประสิทธิผลใน
งานสูง [4] เพื่อให้การทำงานสำเร็จลุล่วงไปได้ด้วยดี ซึ่งหากพิจารณาอย่างถี่ถ้วนแล้วนั้น พบว่า ประสิทธิภาพในการปฏิบัติงาน
เกิดจากการที่พนักงานมีความรู้สึกนึกคิดในด้านบวกต่องานและองค์กร อันจะนำไปสู่ความสำเร็จของงานและองค์กร รวมทั้ง
ความสุขในการทำงาน เพราะหากพนักงานมีความรู้สึกนึกคิดในด้านบวก [5] ไม่ว่าจะเป็นการมีความเชื่อมั่นในศักยภาพของ
ตนเอง การมีความคาดหวังในการทำงาน การมองโลกในแง่ดี และการมีความยืดหยุ่นทางอารมณ์ ซึ่งสิ่งเหล่านี้จะทำให้
พนักงานสามารถจัดการกับอารมณ์และสถานการณ์ต่าง ๆ ได้เป็นอย่างดี จนส่งผลต่อผลลัพธ์ของการปฏิบัติงาน ทั้งนี้หาก
องค์กรสามารถช่วยเพิ่มระดับทุนทางจิตวิทยาเชิงบวกให้กับพนักงานได้โดยการฝึกอบรมทักษะในการทำงาน เพื่อเพิ่มความรู้
ความสามารถในการทำงานและเสริมองค์ความรู้ให้กับพนักงานได้ ทำให้พนักงานเกิดความมั่นใจและมีความพร้อมที่จะเผชิญกับ
ปัญหาและอุปสรรคที่เกิดจากการปฏิบัติงาน มีความมั่นใจในศักยภาพและประสบความสำเร็จ หรือเกิดแนวคิดใหม่ ๆ เพื่อ
ประสิทธิภาพและคุณภาพของผลงาน [4] ดังนั้น ทุนทางจิตวิทยา จึงเป็นมิติใหม่ที่ผู้ประกอบการทางธุรกิจหรือองค์กรให้การ
ตระหนักในการลงทุนเพิ่มขึ้น เพราะอาจเป็นปัจจัยความสำเร็จที่จะสร้างพฤติกรรมองค์กรเชิงบวก ก่อให้เกิดประสิทธิภาพใน

การทำงาน และส่งผลหรือก่อให้เกิดความได้เปรียบในเชิงการแข่งขันของธุรกิจ [6] ซึ่งจากที่กล่าวมาในข้างต้น เห็นได้ว่า ทุน
ทางจิตวิทยาเชิงบวก อาจนำไปสู่การพัฒนาพนักงานและเพิ่มประสิทธิภาพการปฏิบัติงานของพนักงานอันจะก่อให้เกิดการ
บรรลุเป้าหมายขององค์กรได้

      ด้วยเหตุนี้ คณะผู้วิจัยจึงสนใจศึกษาอิทธิพลของทุนทางจิตวิทยาเชิงบวกที่ส่งผลต่อประสิทธิภาพการปฏิบัติงานของ
พนักงานในองค์กรธุรกิจค้าปลีกสมัยใหม่ โดยผู้วิจัยเชื่อว่าข้อค้นพบของการวิจัยครั้งนี้จะให้คำตอบที่ลึกซึ้งและให้สารสนเทศที่
เป็นประโยชน์ต่อผู้ประกอบการธุรกิจทั้งในองค์กรธุรกิจค้าปลีกสมัยใหม่และองค์กรธุรกิจอื่น ๆ โดยสามารถนำผลที่ได้จาก
การศึกษาไปใช้เป็นแนวทางในการพัฒนาทุนทางจิตวิทยาเชิงบวกและประสิทธิภาพในการปฏิบัติงาน ซึ่งทุนทางจิตวิทยาเชิง
บวกนี้จะเป็นสิ่งที่ช่วยทำให้พนักงานเกิดความพึงพอใจในการทำงาน เกิดความกระตือรือร้นในการทำงานด้วยการแสดง
ความสามารถและศักยภาพส่วนตนออกมาจนก่อให้เกิดผลสำเร็จต่อองค์กรได้ในที่สุด

2. วัตถุประสงค์

      2.1 เพื่อศึกษาระดับประสิทธิภาพการปฏิบัติงานของพนักงาน ในองค์กรธุรกิจค้าปลีกสมัยใหม่

      2.2 เพื่อศึกษาอิทธิพลของทุนทางจิตวิทยาเชิงบวกที่ส่งผลต่อประสิทธิภาพการปฏิบัติงานของพนักงานในองค์กรธุรกิจ
ค้าปลีกสมัยใหม่

3. กรอบแนวคิดที่ใช้ในการศึกษา

      การวิจัยครั้งนี้ ผู้วิจัยได้ศึกษาแนวคิดที่สามารถใช้เป็นกรอบในการอธิบายอิทธิพลของทุนทางจิตวิทยาเชิงบวกที่ส่งผล
ต่อประสิทธิภาพการปฏิบัติงานของพนักงานในองค์กรธุรกิจค้าปลีกสมัยใหม่ ซึ่งประกอบไปด้วย แนวคิดทุนทางจิตวิทยาเชิง
บวก ของ Luthans, Youssef & Avolio [12] และ แนวคิดประสิทธิภาพการปฏิบัติงาน ของ Peterson & Plowman [13]
ดังแสดงกรอบแนวคิดที่ใช้ในการศึกษาได้ตามภาพที่ 1
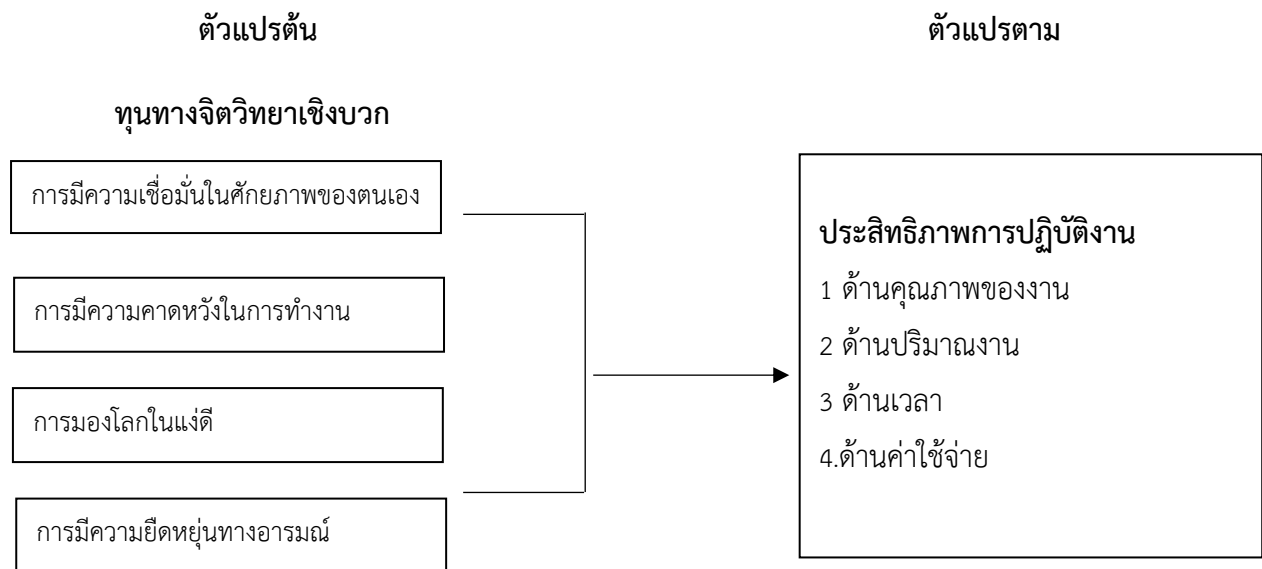
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<tr><td>ตัวแปรต้น</td><td>ตัวแปรตาม</td></tr>
</table>

ทุนทางจิตวิทยาเชิงบวก

| การมีความเชื่อมั่นในศักยภาพของตนเอง |
| การมีความคาดหวังในการทำงาน |
| การมองโลกในแง่ดี |
| การมีความยืดหยุ่นทางอารมณ์ |

ประสิทธิภาพการปฏิบัติงาน
1 ด้านคุณภาพของงาน
2 ด้านปริมาณงาน
3 ด้านเวลา
4.ด้านค่าใช้จ่าย

ภาพที่ 1 กรอบแนวคิดการวิจัย

4. ระเบียบวิธีวิจัย

การวิจัยครั้งนี้เป็นการวิจัยเชิงสำรวจ (Survey Research) ด้วยวิธีการวิจัยเชิงปริมาณ (Quantitative Research) ผู้วิจัยมีวิธีการดำเนินการวิจัย ดังนี้

4.1 ประชากรและกลุ่มตัวอย่าง

ประชากร ที่ใช้ในการวิจัยครั้งนี้ คือ พนักงานที่ปฏิบัติงานอยู่ในองค์กรธุรกิจค้าปลีกสมัยใหม่ ประเภทห้างสรรพสินค้า (Department Store) ในเขตธนบุรี กรุงเทพมหานคร เนื่องจากเขตธนบุรีถือเป็นย่านทำเลค้าปลีกในอนาคต ที่ประกอบไปด้วย แหล่งที่อยู่อาศัย อาทิเช่น คอนโดมิเนียม โครงการบ้านจัดสรรที่กำลังเปิดให้บริการอย่างต่อเนื่อง ประกอบกับเป็นแนวรถไฟฟ้า สายสีม่วงใต้ที่มีสถานที่ท่องเที่ยวและร้านอาหารในตำนานจำนวนมาก ซึ่งถือเป็นแรงขับเคลื่อนให้ธุรกิจค้าปลีกในพื้นที่ขยายตัว และแข็งแกร่งในระยะยาว [7] ผู้วิจัยกำหนดขนาดกลุ่มตัวอย่าง โดยใช้หลักเกณฑ์สำหรับการเลือกตัวอย่างในการวิเคราะห์ ถดถอยพหุ (Multiple Regression Analysis) คือ ขนาดตัวอย่างเท่ากับ 10 ต่อ 1 ตัวแปร ในการวิจัย และขนาดตัวอย่าง รวมกันต้องไม่ต่ำกว่า 100 ตัวอย่าง [8] เพื่อให้ผลการวิจัยน่าเชื่อถือ ผู้วิจัยทำการส่งแบบสอบถามถึงกลุ่มตัวอย่างเพิ่มเป็น จำนวน 200 ตัวอย่าง เพื่อป้องกันความคาดเคลื่อนของข้อมูล โดยได้รับแบบสอบถามกลับคืนจำนวน 160 ตัวอย่าง คิดเป็น ร้อยละ 80 ซึ่งมากกว่าร้อยละ 20 ถือเป็นที่ยอมรับสำหรับการวิเคราะห์สหสัมพันธ์และการวิเคราะห์ถดถอยพหุคูณ [15] ซึ่งใน การเลือกกลุ่มตัวอย่าง ผู้วิจัยเลือกกลุ่มตัวอย่างแบบสะดวก (Convenience sampling) โดยเก็บเฉพาะผู้ที่เต็มใจให้ข้อมูล เท่านั้น

4.2 เครื่องมือที่ใช้ในการวิจัย

เครื่องมือที่ใช้ในการวิจัย ได้แก่ แบบสอบถามในการจัดเก็บข้อมูลแบ่งออกเป็น 3 ตอน ประกอบด้วย

ตอนที่ 1 ข้อมูลส่วนบุคคลของผู้ตอบแบบสอบถาม จำนวน 5 ข้อ ประกอบด้วย เพศ อายุ ระดับการศึกษา ระยะเวลา ในการปฏิบัติงาน และรายได้

ตอนที่ 2 แบบสอบถามเกี่ยวกับทุนทางจิตวิทยาเชิงบวก ปรับปรุงจากแนวคิดของ Luthans, Youssef & Avolio [13] มาพัฒนาเป็นแบบสอบถาม จำนวน 19 ข้อ ประกอบด้วย ทุนทางจิตวิทยาเชิงบวก 4 คุณลักษณะ ได้แก่ การมีความเชื่อมั่นใน ศักยภาพของตนเอง การมีความคาดหวังในการทำงาน การมองโลกในแง่ดี และการมีความยืดหยุ่นทางอารมณ์

ตอนที่ 3 แบบสอบถามเกี่ยวกับประสิทธิภาพการปฏิบัติงาน ปรับปรุงจากแนวคิดของ ของ Peterson & Plowman [14] มาพัฒนาเป็นแบบสอบถาม จำนวน 12 ข้อ ประกอบด้วย ประสิทธิภาพการปฏิบัติงาน 4 ด้าน ด้านคุณภาพของงาน ด้าน ปริมาณงาน ด้านเวลา และด้านค่าใช้จ่าย

การตรวจสอบคุณภาพเครื่องมือ ผู้ศึกษาได้ตรวจสอบตรงเชิงเนื้อหา (Content Validity) โดยอาศัยผู้เชี่ยวชาญ ตรวจสอบ พบว่า คำถามทุกข้อมีค่า IOC อยู่ระหว่าง 0.700-1.000 ผ่านเกณฑ์ที่ยอมรับได้ จากนั้นได้นำไปทดลองหาความ น่าเชื่อถือ (Reliability) โดยนำแบบสอบถามไปทดลองใช้ (Try Out) กับข้าราชการในกลุ่มที่คล้ายคลึงกับประชากรแต่มิใช่ กลุ่มตัวอย่าง จำนวน 30 ชุด ซึ่งจากการทดสอบความน่าเชื่อถือ พบว่า ค่าสัมประสิทธิ์สหสัมพันธ์แอลฟาของครอนบาร์ค ทั้ง ฉบับอยู่ที่ 0.780 แสดงว่าแบบสอบถามที่พัฒนาขึ้นนั้นมีคุณภาพเพียงพอสามารถนำไปใช้เก็บข้อมูลได้ ซึ่งเป็นไปตามเกณฑ์ ของ Nunnally [16]

4.3 วิธีการเก็บรวบรวมข้อมูล

ผู้วิจัยแจกแบบสอบถามเพื่อเก็บข้อมูลจากกลุ่มตัวอย่างด้วยตนเอง โดยเก็บรวบรวมข้อมูลการวิจัยในช่วงเดือน พฤษภาคม พ.ศ. 2567 และได้แบบสอบถามกลับคืนตามจำนวนขนาดกลุ่มตัวอย่างที่กำหนด จำนวนทั้งสิ้น 160 ฉบับ

4.4 การวิเคราะห์ข้อมูลและสถิติที่ใช้ในการวิเคราะห์ข้อมูล

ผู้วิจัยตรวจสอบความถูกต้องและความสมบูรณ์ของแบบสอบถามแล้วประมวลผลข้อมูลโดยใช้โปรแกรมสำเร็จรูป ตามขั้นตอนดังนี้

4.4.1 วิเคราะห์ข้อมูลส่วนบุคคล ด้วยสถิติเชิงพรรณนา (Descriptive Statistic) ได้แก่ ความถี่ และร้อยละ

4.4.2 วิเคราะห์ระดับการเป็นองค์กรแห่งการเรียนรู้ ได้แก่ ความถี่ ร้อยละ และส่วนเบี่ยงเบนมาตรฐาน

4.4.3 วิเคราะห์ความสัมพันธ์ระหว่างตัวแปรที่ศึกษา ได้แก่ การวิเคราะห์ค่าสัมประสิทธิ์สหสัมพันธ์เพียร์สัน (Pearson's Correlation Coefficient)

4.4.4 วิเคราะห์อิทธิพลของตัวแปร ได้แก่ การถดถอยพหุคูณแบบขั้นตอน (Stepwise Multiple Regression Analysis) เพื่อตอบวัตถุประสงค์การวิจัย

5. ผลการวิจัยและอภิปรายผล

5.1 ผลการศึกษาระดับประสิทธิภาพการปฏิบัติงานของพนักงานในองค์กรธุรกิจค้าปลีกสมัยใหม่

ผลการวิเคราะห์ระดับประสิทธิภาพการปฏิบัติงานของพนักงานในองค์กรธุรกิจค้าปลีกสมัยใหม่ ประกอบด้วย 4 ด้าน ได้แก่ ด้านคุณภาพของงาน ด้านปริมาณงาน ด้านเวลา และด้านค่าใช้จ่าย ผลปรากฏดังตารางที่ 1 ดังนี้

ตารางที่ 1 ค่าเฉลี่ย $(\widetilde{x})$ และส่วนเบี่ยงเบนมาตรฐาน (S.D) ของผลการวิเคราะห์ระดับประสิทธิภาพการปฏิบัติงานของพนักงานในองค์กรธุรกิจค้าปลีกสมัยใหม่ โดยภาพรวม

ด้าน	ประสิทธิภาพการปฏิบัติงาน	$\widetilde{x}$	S.D.	การแปลผล	ลำดับที่
1	ด้านคุณภาพของงาน	3.938	0.585	มาก	1
2	ด้านปริมาณงาน	3.872	0.585	มาก	3
3	ด้านเวลา	3.895	0.594	มาก	2
4	ด้านค่าใช้จ่าย	3.822	0.634	มาก	4
	รวม	3.881	0.599	มาก	-

จากตารางที่ 1 แสดงผลการวิเคราะห์ระดับประสิทธิภาพการปฏิบัติงานของพนักงานในองค์กรธุรกิจค้าปลีกสมัยใหม่ โดยรวมของกลุ่มตัวอย่างมีค่าเฉลี่ยอยู่ในระดับมาก ค่าเฉลี่ยเท่ากับ 3.881 ($\widetilde{x}$= 3.881, S.D. = 0.599) และเมื่อพิจารณาราย ด้าน พบว่า ประสิทธิภาพการปฏิบัติงานด้านคุณภาพของงาน มีค่าเฉลี่ยสูงสุด ซึ่งอยู่ในระดับมาก ค่าเฉลี่ยเท่ากับ 3.938 ($\widetilde{x}$= 3.938, S.D. = 0.585) รองลงมา คือ ประสิทธิภาพการปฏิบัติงานด้านเวลา อยู่ในระดับมาก ค่าเฉลี่ยเท่ากับ 3.895 ($\widetilde{x}$= 3.895, S.D. = 0.594) ประสิทธิภาพการปฏิบัติงานด้านปริมาณงาน อยู่ในระดับมาก ค่าเฉลี่ยเท่ากับ 3.872 ($\widetilde{x}$= 3.872, S.D. = 0.585) และ ประสิทธิภาพการปฏิบัติงานด้านค่าใช้จ่าย อยู่ในระดับมาก ค่าเฉลี่ยเท่ากับ 3.822 ($\widetilde{x}$= 3.822, S.D. = 0.634) ตามลำดับ ซึ่ง สอดคล้องกับงานวิจัยของ ธนภรณ์ พรรณราย [9] ที่ศึกษาเรื่องปัจจัยที่ส่งผลต่อประสิทธิภาพการปฏิบัติงานของบุคลากร องค์กรบริหารส่วนจังหวัดสงขลา พบว่า ระดับประสิทธิภาพการปฏิบัติงานของบุคลากรองค์กรบริหารส่วนจังหวัดสงขลา อยู่ใน ระดับมาก ซึ่งปัจจัยทั้ง 4 ด้านนี้ สามารถใช้เป็นเครื่องมือในการวัด การพัฒนา และการจัดการผลการปฏิบัติงานของพนักงาน ได้อย่างมีประสิทธิภาพ [16] นอกจากนี้ยังสอดคล้องกับงานวิจัยของ ณฐนนท ทวีสิน, ธีรพล กาญจนากา, และ ปาริชาติ เงิน สม [10] ที่ศึกษาเกี่ยวกับประสิทธิภาพการปฏิบัติงานของพนักงาน พบว่า ประสิทธิภาพการปฏิบัติงานในภาพรวมของ

พนักงานในองค์กรอยู่ในระดับมาก โดยพนักงานสามารถปฏิบัติงานได้สำเร็จตามปริมาณงานที่ได้รับมอบหมาย สามารถแก้ไข
ปัญหา หรือให้บริการลูกค้าได้อย่างมีประสิทธิภาพ

**5.2 ผลการศึกษาอิทธิพลของทุนทางจิตวิทยาเชิงบวกที่ส่งผลต่อประสิทธิภาพการปฏิบัติงานของพนักงานใน
องค์กรธุรกิจค้าปลีกสมัยใหม่**

ผลการศึกษาและการวิเคราะห์อิทธิพลของทุนทางจิตวิทยาเชิงบวกที่ส่งผลต่อประสิทธิภาพการปฏิบัติงานของพนักงาน
ในองค์กรธุรกิจค้าปลีกสมัยใหม่ พบว่า ปัจจัยด้านทุนทางจิตวิทยา ได้แก่ ตัวแปรด้านการมีความเชื่อมั่นในศักยภาพของตนเอง
ตัวแปรด้านการมีความคาดหวังในการทำงาน ตัวแปรด้านการมองโลกในแง่ดี และตัวแปรด้านการมีความยืดหยุ่นทางอารมณ์
มีความสัมพันธ์กับประสิทธิภาพการปฏิบัติงานของพนักงานในองค์กรธุรกิจค้าปลีกสมัยใหม่ ผลปรากฏดังตารางที่ 2 ดังนี้

ตารางที่ 2 ผลการวิเคราะห์สัมประสิทธิสหสัมพันธ์เพียร์สัน (Pearson's Correlation Coefficient) ระหว่างตัวแปรที่ศึกษา

ตัวแปร	Performance	Self-efficacy	Hope	Optimism	Resilience	VIF
ค่าเฉลี่ย (Mean)	3.882	3.723	3.885	3.796	3.925	
ค่าเบี่ยงเบนมาตรฐาน (S.D.)	0.318	0.437	0.548	0.446	0.421	
ประสิทธิภาพการปฏิบัติงาน (Performance)	1.000	0.156**	0.072	0.101	0.058	
การมีความเชื่อมั่นในศักยภาพของตนเอง (Self-efficacy)		1.000	0.206***	0.001	0.097	1.000
การมีความคาดหวังในการทำงาน (Hope)			1.000	0.043	0.135**	1.044
การมองโลกในแง่ดี (Optimism)				1.000	0.009	1.000
การมีความยืดหยุ่นทางอารมณ์ (Resilience)					1.000	1.009

หมายเหตุ *$p<0.10$, **$p<0.05$, ***$p<0.01$

จากตารางที่ 2 แสดงให้เห็นผลการวิเคราะห์ ค่าเฉลี่ย ค่าความเบี่ยงเบนมาตราฐาน และค่าสัมประสิทธิสหสัมพันธ์ของ
ตัวแปรที่ศึกษา พบว่า ตัวแปรอิสระทั้งหมดมีค่าน้อยกว่า 0.800 แสดงว่าตัวแปรอิสระต่าง ๆ ไม่มีความสัมพันธ์กันเอง [18]
นอกจากนี้ผู้วิจัยได้พิจารณาร่วมกับค่า VIF ของตัวแปรอิสระอยู่ระหว่าง 1.000 – 1.044 ซึ่งมีค่าน้อยกว่า 5 ดังนั้น ตัวแปร
อิสระจึงไม่มีความสัมพันธ์กัน [19] โดยตัวแปรต่าง ๆ ของการวิจัยครั้งนี้ สามารถนำมาวิเคราะห์การถดถอยแบบพหุคูณ ได้ดัง
ตารางที่ 3 ดังต่อไปนี้

การประชุมวิชาการระดับชาติและนานาชาติบ้านสมเด็จเจ้าพระยา ครั้งที่ 1 (BS2C 2025)
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ตารางที่ 3 ผลการวิเคราะห์อิทธิพลของทุนทางจิตวิทยาเชิงบวกที่ส่งผลต่อประสิทธิภาพการปฏิบัติงานของพนักงานในองค์กร
ธุรกิจค้าปลีกสมัยใหม่

ตัวแปรพยากรณ์	Unstandardized Coefficient		Standardized Coefficient	t	P-values
	B	S.E	Beta		
ค่าคงที่ (Constant)	3.460	0.214	-	16.138***	0.000
การมีความเชื่อมั่นใน ศักยภาพของตนเอง (Self-efficacy)	0.114	0.057	0.156	1.985**	0.023
R = 0.612, R² = 0.375, Adjusted R² = 0.371, S.E. = 0.252, F = 94.710**					

หมายเหตุ*p<0.10, **p<0.05, ***p<0.01

      จากตารางที่ 3 แสดงให้เห็นผลการวิเคราะห์การถดถอยพหุคูณแบบขั้นตอนเพื่อหาตัวแปรที่มีอิทธิพลต่อประสิทธิภาพ
การปฏิบัติงานของพนักงานในองค์กรธุรกิจค้าปลีกสมัยใหม่ ผลการศึกษาพบว่า ตัวแปรด้านการมีความเชื่อมั่นในศักยภาพของ
ตนเองสามารถพยากรณ์ประสิทธิภาพการปฏิบัติงานของพนักงานได้อย่างมีนัยสำคัญทางสถิติที่ระดับ 0.05 โดยตัวแปรด้าน
การมีความเชื่อมั่นในศักยภาพของตนเอง มีค่าสัมประสิทธิ์สหสัมพันธ์พหุคูณเท่ากับ 0.612 (R = 0.612) ซึ่งสามารถพยากรณ์
ประสิทธิภาพการปฏิบัติงาน ได้ร้อยละ 37.5 (R² = 0.375) และเมื่อนำตัวแปรที่สามารถพยากรณ์ประสิทธิภาพการปฏิบัติงาน
ของพนักงานมาเขียนเป็นสมการ จะได้สมการถดถอยพหุในรูปคะแนนดิบ ดังนี้

      Performance = 3.460 + 0.114(Self-efficacy)

      และได้สมการถดถอยพหุในรูปคะแนนมาตรฐาน ดังนี้

      ^{Z}Performance = 0.156(Self-efficacy)

      จากสมการพยากรณ์ประสิทธิภาพการปฏิบัติงานของพนักงาน พบว่า ตัวแปรที่พยากรณ์ได้ดีที่สุดเมื่อเทียบกับค่าคงที่
คือ การมีความเชื่อมั่นในศักยภาพของตนเอง โดยสามารถอธิบายได้ว่า ถ้าตัวแปรการมีความเชื่อมั่นในศักยภาพของตนเอง มี
หน่วยเพิ่มขึ้น 1 หน่วย จะทำให้ประสิทธิภาพการปฏิบัติงานของพนักงานเพิ่มขึ้น 0.156 หน่วย อย่างมีนัยสำคัญทางสถิติที่
ระดับ 0.05 ซึ่งการมีความมั่นใจในศักยภาพของตนเองนี้ จะทำให้บุคคลสามารถปฏิบัติงานให้บรรลุเป้าหมายได้ด้วยความ
มุ่งมั่น ทุ่มเท และพยายามปฏิบัติงานเพื่อให้ประสบความสำเร็จ ถึงแม้เป้าหมายนั้นจะยากและท้าทาย [20] มากเพียงใด ก็ย่อม
ทำให้เกิดประสิทธิภาพการปฏิบัติงาน เพราะเป็นการประเมินส่วนบุคคลว่าตนเองมีความสามารถในการรับมือกับปัญหาที่
เกิดขึ้นได้ โดยสามารถปฏิบัติงานที่ได้รับมอบหมายให้สำเร็จเป็นไปตามเป้าหมายที่กำหนดไว้ ซึ่งรวมถึงการประเมิน
ความสามารถของตนเองที่จะสามารถทำงานในแต่ละชิ้นภายใต้เงื่อนไข ข้อกำหนดกฎเกณฑ์ให้ประสบความสำเร็จ [21] ได้
สอดคล้องกับการศึกษาของ วรรณวิษา สงสัย [4] ที่ศึกษา อิทธิพลของทุนทางจิตวิทยาเชิงบวกที่ส่งผลกระทบต่อ
ประสิทธิภาพในการปฏิบัติงานของบุคลากรระดับปฏิบัติการภายในองค์กรเอกชน พบว่า การมีความเชื่อมั่นในศักยภาพของ
ตนเอง มีบทบาทสำคัญต่อประสิทธิภาพในการปฏิบัติงานของบุคลากรภายในองค์กรเอกชน โดยอธิบายว่าคุณลักษณะของการ
มีความเชื่อมั่นในศักยภาพของตนเองจะทำให้บุคคลเกิดความมั่นใจและเชื่อมั่นในการปฏิบัติงานของตนเองเพื่อให้ประสบ

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ผลสำเร็จได้ตามเป้าหมาย มีความอดทนสามารถทำงานภายใต้ความกดดันและสถานการณ์ต่าง ๆ ได้ดี และยังสอดคล้องกับ งานวิจัยของ โชติ ภักดีอักษร, ธัญนันท์ บุญอยู่, และสุมาลี รามนัฏ [11] ที่ศึกษา อิทธิพลคั่นกลางแบบอนุกรมของความฉลาด ทางอารมณ์และคุณภาพชีวิตในงานที่เป็นตัวแปรถ่ายทอดอิทธิพลของทุนทางจิตวิทยาสู่ผลการปฏิบัติงานสำหรับมัคคุเทศก์ไทย พบว่า อิทธิพลของทุนทางจิตวิทยามีผลต่อผลการปฏิบัติงาน โดยอธิบายว่า การที่บุคคลรับรู้ได้ถึงความเชื่อในความสามารถ ของตนเองทำให้เกิดการพัฒนาศักยภาพทางอารมณ์และการตัดสินใจที่จะทำให้เกิดประสิทธิภาพในการให้บริการที่ดี ซึ่ง ก่อให้เกิดการมีผลการปฏิบัติงานที่ดีขึ้นตามมา

6. ข้อเสนอแนะ

6.1 ข้อเสนอแนะในการนำผลวิจัยไปใช้ ผลการศึกษาพบว่า ตัวแปรด้านการมีความเชื่อมั่นในศักยภาพของตนเองมี อิทธิพลต่อประสิทธิภาพในการปฏิบัติงานของพนักงาน ดังนั้นองค์กรจึงควรมีการส่งเสริมในเรื่องการสร้างความเชื่อมั่นใน ศักยภาพของตนเองให้แก่พนักงาน เพื่อให้พนักงานมีความมั่นใจ มีเชื่อมั่นในการปฏิบัติงานอย่างเต็มความสามารถของตนซึ่ง จะนำไปสู่ความสำเร็จขององค์กรต่อไป

6.2 องค์กรสามารถนำผลการวิจัยไปใช้เพื่อเป็นแนวทางในการจัดการทรัพยากรมนุษย์ขององค์กรได้ ไม่ว่าจะเป็น การ นำไปใช้เป็นแนวทางในการคัดเลือกบุคลากรที่มีคุณลักษณะของทุนทางจิตวิทยาเชิงบวก ตลอดจนการฝึกอบรมส่งเสริม พนักงานในองค์กรให้เกิดคุณลักษณะการปฏิบัติงานที่เหมาะสม

6.3 ข้อเสนอแนะสำหรับการศึกษาครั้งต่อไป ควรศึกษาขยายผลการศึกษาไปสู่การพิจารณาทุนทางจิตวิทยาที่มีอิทธิพล ต่อปัจจัยด้านอื่น ๆ เช่น เรื่องพฤติกรรมการเป็นสมาชิกที่ดีต่อองค์กร ความผูกพันต่อองค์กร เป็นต้น

6.4 ควรนำปัจจัยของทุนทางจิตวิทยาเชิงบวก มาสร้างเป็นโปรแกรมและทดสอบประสิทธิภาพในการปฏิบัติงานของ พนักงาน โดยการศึกษาอย่างต่อเนื่องในรูปแบบการวิจัยเชิงทดลอง และวัดผลการศึกษาเชิงรูปธรรม เพื่อนำไปประยุกต์ใช้ให้ เกิดประโยชน์สูงสุด

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การประชุมวิชาการระดับชาติและนานาชาติบ้านสมเด็จเจ้าพระยา ครั้งที่ 1 (BS2C 2025)
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ด้านการศึกษา

(49-TH-EDU)

การพัฒนากระบวนการเรียนรู้วิชาวิทยาศาสตร์ เรื่อง ไฟฟ้าและแหล่งพลังงานของนักเรียนชั้นประถมศึกษาปีที่ 3 โรงเรียนสุวิทย์เสรีอนุสรณ์ โดยการจัดการเรียนรู้แบบสะเต็มศึกษา

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บทคัดย่อ

การวิจัยนี้มีวัตถุประสงค์เพื่อศึกษาการพัฒนากระบวนการเรียนรู้วิชาวิทยาศาสตร์ เรื่อง ไฟฟ้าและแหล่งพลังงานของนักเรียนชั้นประถมศึกษาปีที่ 3 โรงเรียนสุวิทย์เสรีอนุสรณ์ โดยการจัดการเรียนรู้แบบสะเต็มศึกษา กลุ่มตัวอย่าง ได้แก่ นักเรียนชั้นประถมศึกษาปีที่ 3 โรงเรียนสุวิทย์เสรีอนุสรณ์ จำนวน 10 คน ที่กำลังศึกษาอยู่ในภาคเรียนที่ 2 ปีการศึกษา 2567 ได้มาจากการเลือกด้วยวิธีเฉพาะเจาะจง (Purposive Sampling) เครื่องมือที่ใช้ในการเก็บรวบรวมข้อมูล ประกอบด้วย แบบทดสอบวัดความรู้ความเข้าใจ มีความยากง่ายอยู่ระหว่าง 0.20-0.80 มีค่าอำนาจจำแนกมากกว่า 0.20 มีค่าความเชื่อมั่นเท่ากับ .80 วิเคราะห์ข้อมูลโดยใช้สถิติค่าเฉลี่ย ส่วนเบี่ยงเบนมาตรฐาน และใช้การทดสอบค่าที (t-test for Dependent)

ผลการวิจัย พบว่า

การพัฒนากระบวนการเรียนรู้วิชาวิทยาศาสตร์ เรื่อง ไฟฟ้าและแหล่งพลังงานของนักเรียนชั้นประถมศึกษาปีที่ 3 โรงเรียนสุวิทย์เสรีอนุสรณ์ โดยการจัดการเรียนรู้แบบสะเต็มศึกษา มีผลสัมฤทธิ์ทางการเรียนหลังเรียนสูงกว่าก่อนเรียนอย่างมีนัยสำคัญทางสถิติที่ระดับ .05

คำสำคัญ: ไฟฟ้าและแหล่งพลังงาน; โรงเรียนสุวิทย์เสรีอนุสรณ์; วิทยาศาสตร์; สะเต็มศึกษา

The development of the learning process of science subject on electricity and energy sources of grade 3 students at Suwit Seri Anusorn School with STEM education

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Abstract

This research aimed to study the development of the learning process of science subject on electricity and energy sources of grade 3 students at Suwit Seri Anusorn School with STEM education. The sample group consisted of 10 grade 3 students of Suwit Seri Anusorn School who were studying in the second semester of the academic year 2024. They were selected by purposive sampling. The tools used to collect data consisted of a knowledge and understanding test with a difficulty level between 0.20-0.80, a discrimination power of more than 0.20, and a reliability value of .80. Data were analyzed using statistics of mean, standard deviation, and t-test for Dependent.

The research results found that: The development of the learning process of science subject on electricity and energy sources of grade 3 students at Suwit Seri Anusorn School resulted in significantly higher academic achievement after learning than before learning at a statistical level of .05.

Keywords: Electricity and Energy Sources; Suwit Seri Anusorn School; Science; STEM Education

1. บทนำ

ในยุคที่การเปลี่ยนแปลงทางเทคโนโลยีและวิทยาศาสตร์ก้าวกระโดด การพัฒนาการศึกษาให้สอดคล้องกับความ
ต้องการของสังคมและเศรษฐกิจในปัจจุบันเป็นสิ่งจำเป็นอย่างยิ่ง การศึกษาไม่ควรหยุดเพียงแค่การให้ความรู้เชิงทฤษฎี แต่ควร
ปลูกฝังให้นักเรียนสามารถเชื่อมโยงความรู้เหล่านั้นกับการปฏิบัติและการแก้ปัญหาในชีวิตประจำวัน การศึกษาแบบสะเต็ม
ศึกษา (STEM Education) จึงเป็นหนึ่งในแนวทางที่มีความสำคัญในการส่งเสริมการเรียนรู้ที่สามารถนำไปใช้ได้จริง พร้อมทั้ง
พัฒนาทักษะการคิดเชิงวิเคราะห์ การแก้ปัญหา และการทำงานร่วมกัน

งานวิจัยนี้มีเป้าหมายเพื่อพัฒนากระบวนการเรียนรู้วิชาวิทยาศาสตร์ เรื่องไฟฟ้าและแหล่งพลังงานสำหรับนักเรียน
ชั้นประถมศึกษาปีที่ 3 โรงเรียนสุวิทย์เสรีอนุสรณ์ โดยใช้แนวทางสะเต็มศึกษา ซึ่งช่วยให้นักเรียนสามารถเข้าใจและประยุกต์
ความรู้ทางวิทยาศาสตร์สู่การใช้พลังงานอย่างมีประสิทธิภาพ การวิจัยครั้งนี้เน้นการจัดการเรียนรู้ที่บูรณาการระหว่างเนื้อหา
วิทยาศาสตร์และกิจกรรมที่ส่งเสริมความคิดสร้างสรรค์ ทำให้นักเรียนมีส่วนร่วมในการเรียนรู้มากขึ้น รวมถึงการพัฒนาทักษะ
พื้นฐานที่สำคัญ เช่น การทดลอง การสังเกต และการสรุปผล

ในงานวิจัยนี้ ผู้วิจัยได้เลือกหัวข้อ "ไฟฟ้าและแหล่งพลังงาน" ซึ่งเป็นเรื่องที่เกี่ยวข้องโดยตรงกับชีวิตประจำวันของ
นักเรียน การเรียนรู้เรื่องนี้ไม่เพียงแต่ช่วยให้นักเรียนเข้าใจหลักการทางวิทยาศาสตร์เบื้องต้น แต่ยังช่วยปลูกฝังความตระหนักรู้
ในเรื่องการใช้พลังงานอย่างมีประสิทธิภาพและเป็นมิตรต่อสิ่งแวดล้อม การเรียนรู้ดังกล่าวจึงไม่เพียงช่วยพัฒนาความรู้เชิง
วิทยาศาสตร์ แต่ยังส่งเสริมคุณลักษณะอันพึงประสงค์ในด้านความรับผิดชอบต่อสังคมและธรรมชาติ เพื่อให้การพัฒนา
กระบวนการเรียนรู้ครั้งนี้มีประสิทธิภาพ ผู้วิจัยได้ออกแบบการเรียนรู้โดยคำนึงถึงความเหมาะสมของเนื้อหาและกิจกรรมกับ
ช่วงวัยของผู้เรียน รวมถึงการสร้างสรรค์เครื่องมือการเรียนรู้ที่ช่วยสนับสนุนการเรียนรู้เชิงสร้างสรรค์และการแก้ปัญหา โดย
กลุ่มตัวอย่างที่เลือกใช้เป็นนักเรียนชั้นประถมศึกษาปีที่ 3 จำนวน 10 คน ซึ่งได้รับการคัดเลือกอย่างมีเป้าหมาย เพื่อให้ได้
ข้อมูลที่มีความลึกซึ้งเกี่ยวกับผลการเรียนรู้ที่แท้จริง การจัดการเรียนรู้แบบสะเต็มศึกษาในงานวิจัยนี้มุ่งเน้นให้ผู้เรียนมีส่วนร่วม
ในการคิด วิเคราะห์ และแก้ปัญหาผ่านกิจกรรมการเรียนรู้ที่ออกแบบมาเฉพาะสำหรับหัวข้อไฟฟ้าและแหล่งพลังงาน โดย
กระบวนการเรียนรู้ประกอบด้วยการสร้างสถานการณ์ปัญหา การให้ผู้เรียนออกแบบและทดลอง รวมถึงการสรุปผลที่ได้จาก
การทดลองเพื่อสร้างความเข้าใจที่ลึกซึ้ง ผลจากการดำเนินการวิจัยจะถูกวัดผลผ่านการเปรียบเทียบผลสัมฤทธิ์ทางการเรียน
ก่อนและหลังการเรียนรู้ เพื่อให้มั่นใจว่าการเรียนรู้แบบสะเต็มศึกษาที่ถูกนำมาใช้นั้นสามารถส่งเสริมการพัฒนาทักษะและ
ความรู้ของผู้เรียนได้อย่างแท้จริง ในภาพรวม งานวิจัยนี้มีความสำคัญไม่เพียงแต่ในเชิงวิชาการ แต่ยังเป็นกรณีศึกษาสำหรับ
การพัฒนาการเรียนรู้ในระดับประถมศึกษา โดยเฉพาะการนำสะเต็มศึกษามาใช้ในห้องเรียน ซึ่งเป็นแนวทางที่สามารถปรับ
ใช้ได้ในโรงเรียนอื่นๆ ในอนาคต ด้วยเป้าหมายที่มุ่งเน้นการพัฒนานักเรียนให้เป็นบุคลากรที่มีคุณภาพในอนาคต งานวิจัยนี้จึง
เป็นก้าวสำคัญที่สามารถช่วยยกระดับการเรียนการสอนในประเทศไทยไปสู่มาตรฐานที่สูงขึ้น และสอดคล้องกับการ
เปลี่ยนแปลงของโลกในศตวรรษที่ 21

2. วัตถุประสงค์ของการวิจัย

เพื่อศึกษาการพัฒนากระบวนการเรียนรู้วิชาวิทยาศาสตร์ เรื่อง ไฟฟ้าและแหล่งพลังงานของนักเรียนชั้น
ประถมศึกษาปีที่ 3 โรงเรียนสุวิทย์เสรีอนุสรณ์ โดยการจัดการเรียนรู้แบบสะเต็มศึกษา

3. สมมติฐานการวิจัย

การพัฒนากระบวนการเรียนรู้วิชาวิทยาศาสตร์ เรื่อง ไฟฟ้าและแหล่งพลังงานของนักเรียนชั้นประถมศึกษาปีที่ 3
โรงเรียนสุวิทย์เสรีอนุสรณ์ โดยการจัดการเรียนรู้แบบสะเต็มศึกษา หลังเรียนสูงกว่าก่อนเรียน

4. วิธีดำเนินการวิจัย

การวิจัยครั้งนี้เป็นการวิจัยเชิงทดลองเบื้องต้น (Pre-Experimental design) ใช้แบบแผนการวิจัยแบบกลุ่มเดียว สอบก่อนสอบหลัง (One group pretest-posttest design) โดยมีรายละเอียดวิธีดำเนินการวิจัยดังต่อไปนี้

ประชากรและกลุ่มตัวอย่าง

ประชากร ได้แก่ นักเรียนชั้นประถมศึกษาปีที่ 3 โรงเรียนสุวิทย์เสรีอนุสรณ์ โดยการจัดการเรียนรู้แบบสะเต็มศึกษา กรุงเทพมหานคร ภาคเรียนที่ 2 ปีการศึกษา 2567 จำนวนรวมนักเรียน 20 คน

กลุ่มตัวอย่าง ได้แก่ นักเรียนชั้นประถมศึกษาปีที่ 3 โรงเรียนสุวิทย์เสรีอนุสรณ์ โดยการจัดการเรียนรู้แบบสะเต็ม ศึกษา กรุงเทพมหานคร ภาคเรียนที่ 2 ปีการศึกษา 2567 ด้วยวิธีการเลือกแบบเฉพาะเจาะจง (Purposive Sampling) จำนวน 10 คน

เครื่องมือที่ใช้ในการวิจัย

เครื่องมือที่ใช้ในการเก็บรวบรวมข้อมูล ประกอบด้วย แบบทดสอบวัดความรู้ความเข้าใจ มีความยากง่ายอยู่ระหว่าง 0.20-0.80 มีค่าอำนาจจำแนกมากกว่า 0.20 มีค่าความเชื่อมั่น เท่ากับ .80

เครื่องมือที่ใช้ในการวิจัยครั้งนี้ ประกอบด้วย

1) แผนการจัดการเรียนรู้วิชาวิทยาศาสตร์ เรื่อง ไฟฟ้าและแหล่งพลังงานของนักเรียนชั้นประถมศึกษาปีที่ 3 โรงเรียนสุวิทย์เสรีอนุสรณ์ โดยการจัดการเรียนรู้แบบสะเต็มศึกษา

2) แบบทดสอบวัดผลสัมฤทธิ์ทางการเรียนวิทยาศาสตร์วิชาวิทยาศาสตร์ เรื่อง ไฟฟ้าและแหล่งพลังงานของนักเรียน ชั้นประถมศึกษาปีที่ 3 โรงเรียนสุวิทย์เสรีอนุสรณ์ โดยการจัดการเรียนรู้แบบสะเต็มศึกษา

ขั้นตอนการสร้างเครื่องมือ

1) ศึกษาหลักสูตรแกนกลางการศึกษาขั้นพื้นฐาน พุทธศักราช 2551

2) วิเคราะห์คำอธิบายรายวิชา สาระการเรียนรู้และหน่วยการเรียนรู้

3) วิเคราะห์ตัวชี้วัด เพื่อนำมาเขียนเป็นจุดประสงค์การเรียนรู้โดยให้ควบคุมพฤติกรรมด้านความรู้ ทักษะ กระบวนการ เจตคติ

4) วิเคราะห์สาระการเรียนรู้โดยเลือกเนื้อหาสาระการเรียนรู้ให้สอดคล้องกับผู้เรียน ชุมชนและท้องถิ่น

5) วิเคราะห์การประเมินผลโดยการเลือกสื่อและแหล่งการเรียนรู้ทั้งในและนอกห้องเรียน ให้เหมาะสมและ สอดคล้องกับกระบวนการเรียนรู้

6) ขั้นออกแบบและจัดทำแผนการจัดการเรียนรู้ ซึ่งมีองค์ประกอบดังนี้

- เวลาเรียน

- สาระสำคัญ

- จุดประสงค์การเรียนรู้

- สาระการเรียนรู้

- กิจกรรมการเรียนรู้

- สื่อการเรียนรู้

- การวัดผลประเมินผล

- บันทึกผลหลังการสอน

การเก็บรวบรวมข้อมูล

ในการวิจัยครั้งนี้ ผู้วิจัยทำการทดลองและเก็บรวบรวมข้อมูลกลุ่มตัวอย่าง ในภาคเรียนที่ 2 ปีการศึกษา 2567 โดยดำเนินการเก็บรวบรวมข้อมูล ดังนี้

1) ผู้วิจัยวิเคราะห์ปัญหาการจัดการเรียนรู้วิชาวิทยาศาสตร์ เรื่อง ไฟฟ้าและแหล่งพลังงานของนักเรียนชั้นประถมศึกษาปีที่ 3 โรงเรียนสุวิทย์เสรีอนุสรณ์ โดยการจัดการเรียนรู้แบบสะเต็มศึกษา จากการสอบถามครูและสัมภาษณ์นักเรียนที่เคยเรียนเรื่องนี้มาแล้ว รวมทั้งศึกษาสภาพสังคมของชุมชนของนักเรียน

2) ปฐมนิเทศชี้แจงวัตถุประสงค์ของการวิจัยให้นักเรียนกลุ่มตัวอย่างทราบ และอธิบายถึงบทบาทหน้าที่ของนักเรียนและผู้วิจัย

3) ผู้วิจัยทำการทดสอบก่อนการทดลอง (Pretest) โดยให้นักเรียนได้ทำแบบทดสอบวัดผลสัมฤทธิ์ทางการเรียนวิชาวิทยาศาสตร์ เรื่อง ไฟฟ้าและแหล่งพลังงานของนักเรียนชั้นประถมศึกษาปีที่ 3 โรงเรียนสุวิทย์เสรีอนุสรณ์ โดยการจัดการเรียนรู้แบบสะเต็มศึกษา ฉบับจริงที่ผู้วิจัยสร้างขึ้น จำนวน 10 ข้อ โดยมีระยะเวลาทำแบบทดสอบ 30 นาที

4) ดำเนินการจัดการวิชาวิทยาศาสตร์ เรื่อง ไฟฟ้าและแหล่งพลังงานของนักเรียนชั้นประถมศึกษาปีที่ 3 โรงเรียนสุวิทย์เสรีอนุสรณ์

5) เมื่อสิ้นสุดการจัดการเรียนรู้ตามแผนที่วางไว้ จึงทำการทดสอบวัดหลังการทดลอง (Post-test) โดยนำแบบทดสอบวัดผลสัมฤทธิ์ทางการเรียนวิชาวิทยาศาสตร์ เรื่อง ไฟฟ้าและแหล่งพลังงานของนักเรียนชั้นประถมศึกษาปีที่ 3 โรงเรียนสุวิทย์เสรีอนุสรณ์ โดยการจัดการเรียนรู้แบบสะเต็มศึกษา ฉบับเดิม ที่ใช้ทำการทดสอบก่อนการทดลอง มาให้นักเรียนทดสอบอีกครั้ง มีระยะเวลาในการทำแบบทดสอบ 20 นาที

6) ผู้วิจัยนำข้อมูลที่ได้จากคะแนนผลการเรียนระหว่างเรียน และคะแนนจากการทำแบบทดสอบวัดผลสัมฤทธิ์ทางการเรียนวิชาวิทยาศาสตร์ เรื่อง ไฟฟ้าและแหล่งพลังงานของนักเรียนชั้นประถมศึกษาปีที่ 3 โรงเรียนสุวิทย์เสรีอนุสรณ์ โดยการจัดการเรียนรู้แบบสะเต็มศึกษา วิเคราะห์ด้วยวิธีการทางสถิติ โดยใช้โปรแกรมคอมพิวเตอร์ และเก็บรวบรวมข้อมูลเชิงคุณภาพ ประมวลผลและเรียบเรียงนำเสนอในรูปความเรียง

การวิเคราะห์ข้อมูล

ในการวิเคราะห์ข้อมูลเกี่ยวกับผลสัมฤทธิ์ทางการเรียนวิชาวิทยาศาสตร์ เรื่อง ไฟฟ้าและแหล่งพลังงานของนักเรียนชั้นประถมศึกษาปีที่ 3 โรงเรียนสุวิทย์เสรีอนุสรณ์ โดยการจัดการเรียนรู้แบบสะเต็มศึกษา ผู้วิจัยดำเนินการโดยใช้โปรแกรมสำเร็จรูปทางสถิติ ตามขั้นตอนดังนี้

1) วิเคราะห์ผลสัมฤทธิ์ทางการเรียนวิชาวิทยาศาสตร์ เรื่อง ไฟฟ้าและแหล่งพลังงานของนักเรียนชั้นประถมศึกษาปีที่ 3 โรงเรียนสุวิทย์เสรีอนุสรณ์

2) เปรียบเทียบคะแนนผลสัมฤทธิ์ทางการเรียนวิชาวิทยาศาสตร์ เรื่อง ไฟฟ้าและแหล่งพลังงานของนักเรียนชั้นประถมศึกษาปีที่ 3 โรงเรียนสุวิทย์เสรีอนุสรณ์ โดยการจัดการเรียนรู้แบบสะเต็มศึกษา ระหว่างก่อนและหลังการจัดการเรียนรู้ โดยใช้สถิติการทดสอบที ชนิดกลุ่มตัวอย่างไม่เป็นอิสระต่อกัน (t-test for Dependent)

สถิติที่ใช้ในการวิจัย

วิเคราะห์ข้อมูลโดยใช้สถิติค่าเฉลี่ย ($\overline{X}$) ส่วนเบี่ยงเบนมาตรฐาน (S.D.) และใช้การทดสอบค่าที (t-test for Dependent)

5. ผลการวิจัย

ผลการเปรียบเทียบคะแนนผลสัมฤทธิ์ทางการเรียนวิชาวิทยาศาสตร์ เรื่อง วงจรไฟฟ้าอย่างง่ายผ่านการเรียนรู้แบบสืบเสาะหาความรู้ 5E โดยใช้เกมเป็นฐาน ปรากฏผลดังตารางที่ 1

ตารางที่ 1 ผลการเปรียบเทียบคะแนนผลสัมฤทธิ์ทางการเรียนวิชาวิทยาศาสตร์ เรื่อง ไฟฟ้าและแหล่งพลังงานของนักเรียนชั้นประถมศึกษาปีที่ 3 โรงเรียนสุวิทย์เสรีอนุสรณ์

กลุ่มตัวอย่าง	n	คะแนนเต็ม	ก่อนเรียน		หลังเรียน		t	df	sig
			$\bar{X}$	S.D.	$\bar{X}$	S.D.			
ผู้เรียน	10	20	8.18	1.85	17.88	0.85	-28.83	9	.000

*ค่านัยสำคัญทางสถิติที่ระดับ .05

จากตารางที่ 1 ผลการเปรียบเทียบคะแนนผลสัมฤทธิ์ทางการเรียนก่อนเรียน และหลังเรียนวิชาวิทยาศาสตร์ เรื่อง ไฟฟ้าและแหล่งพลังงานของนักเรียนชั้นประถมศึกษาปีที่ 3 โรงเรียนสุวิทย์เสรีอนุสรณ์ โดยการจัดการเรียนรู้แบบสะเต็มศึกษา พบว่า คะแนนทดสอบหลังเรียนสูงกว่าคะแนนการทดสอบก่อนเรียน อย่างมีนัยสำคัญทางสถิติที่ระดับ .05 จึงกล่าวได้ว่า คะแนนก่อนเรียน และหลังเรียน มีความแตกต่างกันจริง โดยคะแนนหลังเรียนมีค่าสูงกว่าก่อนเรียน และแสดงว่านักเรียนมีการพัฒนาผลการเรียนสูงขึ้น หลังจากการใช้ชุดกิจกรรมการเรียนรู้วิชาวิทยาศาสตร์ เรื่อง ไฟฟ้าและแหล่งพลังงานของนักเรียนชั้นประถมศึกษาปีที่ 3 โรงเรียนสุวิทย์เสรีอนุสรณ์

6. สรุปและอภิปรายผล

การศึกษาวิจัยครั้งนี้เป็นการวิจัย เรื่อง ไฟฟ้าและแหล่งพลังงานของนักเรียนชั้นประถมศึกษาปีที่ 3 โรงเรียนสุวิทย์เสรีอนุสรณ์ โดยการจัดการเรียนรู้แบบสะเต็มศึกษา สามารถนำมาอภิปรายผลได้ดังนี้ ผลการวิจัยครั้งนี้สอดคล้องกับแนวคิดของการจัดการเรียนรู้แบบสะเต็มศึกษา ที่เน้นการบูรณาการความรู้ในหลายสาขาวิชาเข้าด้วยกัน เช่น วิทยาศาสตร์ เทคโนโลยี วิศวกรรมศาสตร์ และคณิตศาสตร์ ซึ่งไม่เพียงแต่เสริมสร้างความรู้ทางวิชาการ แต่ยังช่วยให้นักเรียนได้พัฒนาทักษะกระบวนการคิด วิเคราะห์ และการแก้ปัญหาอย่างเป็นระบบ การใช้กิจกรรมที่ออกแบบมาให้เหมาะสมกับช่วงวัยและเนื้อหาช่วยให้นักเรียนสามารถเชื่อมโยงความรู้กับสถานการณ์จริง ทำให้การเรียนรู้มีความหมายและนำไปใช้ได้ในชีวิตประจำวัน

การที่นักเรียนสามารถเพิ่มคะแนนผลสัมฤทธิ์ทางการเรียนได้หลังจากการเรียนรู้สะเต็มศึกษา สะท้อนให้เห็นถึงความสำคัญของกระบวนการเรียนรู้ที่ให้ผู้เรียนมีส่วนร่วมอย่างแท้จริง การเรียนรู้แบบลงมือปฏิบัติผ่านกิจกรรมที่หลากหลาย เช่น การทดลอง การวิเคราะห์สถานการณ์ และการแก้ปัญหา ช่วยกระตุ้นความสนใจและความตั้งใจของนักเรียน ซึ่งเป็นปัจจัยสำคัญที่นำไปสู่ความสำเร็จในการเรียนรู้ เมื่อพิจารณาเชิงคุณภาพพบว่า นักเรียนที่เข้าร่วมการทดลองมีทักษะการสังเกตและการตั้งคำถามที่พัฒนาขึ้นอย่างชัดเจน นักเรียนสามารถอธิบายปรากฏการณ์และเชื่อมโยงเนื้อหากับการใช้พลังงานในชีวิตประจำวันได้ดียิ่งขึ้น โดยเฉพาะในเรื่องของการประหยัดพลังงานและการตระหนักถึงความสำคัญของการใช้ทรัพยากรอย่างรู้คุณค่า นอกจากนี้ นักเรียนยังแสดงออกถึงความมั่นใจในตนเองมากขึ้น ซึ่งเกิดจากการที่พวกเขาได้รับโอกาสในการนำเสนอความคิดและผลงานของตนเองในกิจกรรมกลุ่ม

จากการเปรียบเทียบผลการศึกษากับการวิจัยที่เกี่ยวข้อง พบว่าการจัดการเรียนรู้แบบสะเต็มศึกษาในหัวข้อไฟฟ้าและแหล่งพลังงานสอดคล้องกับผลวิจัยของหลายประเทศที่ชี้ให้เห็นว่า การเรียนรู้ที่บูรณาการเนื้อหาและกิจกรรมสร้างสรรค์ช่วยเสริมสร้างการเรียนรู้ที่ลึกซึ้งและยั่งยืน การวิจัยในครั้งนี้ยังยืนยันถึงประโยชน์ของการเรียนรู้แบบสะเต็มศึกษาในการพัฒนาทักษะในศตวรรษที่ 21 เช่น การคิดเชิงวิพากษ์ การสื่อสาร และการทำงานร่วมกัน อย่างไรก็ตาม ในการวิจัยครั้งนี้พบ

ข้อจำกัดบางประการ เช่น ขนาดของกลุ่มตัวอย่างที่ค่อนข้างเล็ก ซึ่งอาจส่งผลต่อการทั่วไปผลการวิจัย นอกจากนี้ ระยะเวลาใน
การดำเนินการวิจัยยังจำกัด ส่งผลให้อาจไม่สามารถวัดผลระยะยาวของการพัฒนาทักษะและความรู้ที่ได้รับจากการเรียนรู้ส
เต็มศึกษาได้ ดังนั้น การวิจัยในอนาคตควรขยายขนาดของกลุ่มตัวอย่างและระยะเวลาในการศึกษาวิจัย เพื่อเพิ่มความ
น่าเชื่อถือและสามารถวัดผลในระยะยาวได้ ในภาพรวม การวิจัยครั้งนี้ชี้ให้เห็นว่าการจัดการเรียนรู้แบบสะเต็มศึกษาในหัวข้อ
ไฟฟ้าและแหล่งพลังงานมีศักยภาพในการยกระดับผลสัมฤทธิ์ทางการเรียนของนักเรียนระดับประถมศึกษาได้อย่างมี
ประสิทธิภาพ การเรียนรู้ที่ออกแบบมาอย่างเหมาะสมช่วยให้นักเรียนเข้าใจเนื้อหาในเชิงลึก มีทักษะที่สามารถนำไปประยุกต์ใช้
ได้จริง และมีความพร้อมต่อการเรียนรู้ในระดับที่สูงขึ้น งานวิจัยนี้จึงถือเป็นตัวอย่างที่สำคัญของการนำแนวคิดสะเต็มศึกษามา
ปรับใช้ในบริบทการศึกษาไทย และเป็นจุดเริ่มต้นของการพัฒนารูปแบบการเรียนรู้ที่ตอบสนองต่อความต้องการในศตวรรษที่
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7. ข้อเสนอแนะ

ข้อเสนอแนะในการนำผลวิจัยไปใช้

1. ก่อนการจัดการเรียนรู้ไฟฟ้าและแหล่งพลังงานของนักเรียนชั้นประถมศึกษาปีที่ 3 โรงเรียนสุวิทย์เสรีอนุสรณ์
ครูผู้สอนควรมีความรู้ความเข้าใจในการจัดการเรียนรู้ตามแนวคิดสะเต็มศึกษาได้เป็นอย่างดี ครูผู้สอนควรเตรียมตัวและทำ
หน้าที่ตนเองให้พร้อมต่อการจัดการเรียนรู้ เช่น การวางแผนการจัดการเรียนรู้อย่างรอบคอบและมีประสิทธิภาพ การ
ดำเนินการจัดการเรียนรู้ตามขั้นตอนที่วางแผนไว้เพื่อให้การจัดการเรียนรู้เป็นไปอย่างมีประสิทธิภาพ

2. ก่อนการจัดการเรียนรู้ ครูผู้สอนควรชี้แจงทำความเข้าใจให้นักเรียนเข้าใจรูปแบบการจัดการเรียนรู้ให้ชัดเจน
เพื่อให้นักเรียนเข้าใจในบทบาทหน้าที่ของตนเอง โดยให้นักเรียนมีอิสระในด้านการคิด โดยครูผู้สอนมีหน้าที่คอยชี้แนะให้
คำปรึกษาอย่างใกล้ชิด

3. ครูผู้สอนควรศึกษาการจัดการเรียนรู้ไฟฟ้าและแหล่งพลังงานของนักเรียนชั้นประถมศึกษาปีที่ 3 โรงเรียนสุวิทย์
เสรีอนุสรณ์ให้เข้าใจอย่างลึกซึ้งเพื่อการจัดการเรียนรู้ที่มีประสิทธิภาพและเกิดประโยชน์ต่อผู้นักเรียนมากที่สุด

4. การจัดการเรียนรู้ไฟฟ้าและแหล่งพลังงานของนักเรียนชั้นประถมศึกษาปีที่ 3 โรงเรียนสุวิทย์เสรีอนุสรณ์มี
ข้อจำกัดเรื่องเวลา ครูผู้สอนควรยืดหยุ่นเรื่องระยะเวลาที่ใช้ในการดำเนินกิจกรรมในแต่ละขั้นตอนของการจัดการเรียนรู้ตาม
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(105-TH-EDU)
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บทคัดย่อ

บทความวิจัยนี้มีวัตถุประสงค์เพื่อนำเสนอเนื้อหาแนวทางการปฏิบัติกลองสแนร์มาร์ชชิ่งขั้นพื้นฐาน สำหรับนักเรียนวงโยธวาทิต เพื่อนำไปใช้ในการศึกษาหาความรู้ และสามารถนำมาประยุกต์ใช้ในการปฏิบัติกลองสแนร์มาร์ชชิ่ง นำเสนอเนื้อหาจากการสัมภาษณ์ อาจารย์อนุสรณ์ พรเนรมิต ผู้มีประสบการณ์มากกว่า 20 ปีในการทำงานด้านเพอร์คัชชั่น และได้รับคัดเลือกเป็นสมาชิกของ Southwind Drum เข้าร่วมแข่งขันในรายการ DCI เมื่อปี 2002 โดยสัมภาษณ์ใน 5 ประเด็น ดังต่อไปนี้ 1) ลักษณะการฝึกซ้อมที่เหมาะสม 2) ท่าทางการยืน และการซอยเท้า 3) การจับไม้กลอง 4) รูปแบบของ Stroke 5) แบบฝึกหัดขั้นพื้นฐาน จากนั้นผู้วิจัยนำข้อมูลที่ได้นำมาวิเคราะห์เรียบเรียงและนำเสนอออกมาเป็นแนวทางให้ผู้สนใจในการปฏิบัติกลอง

สแนร์มาร์ชชิ่งสำหรับวงโยธวาทิต ผลของการศึกษา 1) ลักษณะการฝึกซ้อมที่ดีต้องให้ความสำคัญในเรื่องของพื้นฐาน ได้แก่ ท่าทางการยืนการซอยเท้า การจับไม้กลอง รูปแบบของการใช้ Stroke และการฝึกฝนด้วยแบบฝึกหัด 2) ท่าทางการยืน และการซอยเท้าที่เหมาะสม ยืนตัวตรง ผ่อนคลาย ทรงตัวให้นิ่ง และมั่นใจโดยวางเท้าในตำแหน่งที่ถูกต้อง การซอยเท้า ให้ความสนใจไปที่ท่าทางการยืนก่อนสำคัญที่สุด เท้าต้องมีความขนานกัน ชิดกัน และส้นเท้าสัมผัสกัน ปลายเท้าชี้ไปข้างหน้า เหยียบจังหวะลงไปให้แข็งแรง 3) การจับไม้กลอง การจับไม้ที่ถูกวิธีสามารถสร้างคุณภาพของเสียงที่ดี การจับที่ดีจะต้องไม่หลวมและไม่แน่นเกินไป วิธีการจับไม้กลองของสแนร์มาร์ชชิ่ง มีนิยมใช้กันอยู่ 2 ประเภท คือ การจับไม้แบบ Match Grip และ Traditional Grip 4) รูปแบบของ Stroke ที่สำคัญของการตีกองเสน่ห์มาร์ชชิ่งมีทั้งหมด 4 รูปแบบ ได้แก่ Full Stroke, Down Stroke, Tap Stroke, Up Stroke 5) แบบฝึกหัดขั้นพื้นฐาน ที่ผู้ตีสแนร์เบื้องต้นควรฝึกฝนให้แก่ความชำนาญมีอยู่ทั้งหมด 3 รูป คือ Single Stroke , Double Stroke , Triple Stroke

คำสำคัญ: กลองสแนร์มาร์ชชิ่ง; แนวทางการปฏิบัติกลองสแนร์; วงโยธวาทิต

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Basic Snare Drum Marching Techniques for Marching Band Students

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Abstract

This research article aims to present a basic guideline for performing snare drum marching techniques for students in marching bands. The content serves as an educational resource and can be applied to enhance practical snare drum marching skills. The study is based on an interview with Mr. Anusorn Pornnaramit, a percussionist with over 20 years of experience and a member of the Southwind Drum Corps who participated in the DCI competition in 2002. The interview covers five key aspects: appropriate training practices, posture and footwork, drumstick grip, stroke patterns, and fundamental exercises. The researcher analyzed and compiled the data into practical guidelines for those interested in snare drum marching techniques for marching bands. The research findings highlight several points. First, effective training practices require emphasis on mastering the basics, including posture, footwork, drumstick grip, stroke patterns, and practice exercises. Second, proper posture involves standing upright, relaxed, and balanced, with feet positioned correctly. Footwork should prioritize posture first, ensuring parallel feet with heels touching and toes pointing forward, striking firmly in rhythm. Third, proper drumstick grip enhances sound quality and should neither be too loose nor too tight. Two common grip methods for snare drum marching are the Match Grip and Traditional Grip. Fourth, there are four key stroke patterns for snare drum marching: Full Stroke, Down Stroke, Tap Stroke, and Up Stroke. Lastly, fundamental exercises for beginners include mastering three basic patterns: Single Stroke, Double Stroke, and Triple Stroke. This study provides practical insights and guidelines to enhance foundational snare drum marching skills for marching band students.

Keywords: Snare Drum Marching; Marching Band; The Practice Approach for Snare Drum

1. บทนำ

ในปัจจุบันเครื่องดนตรีประเภทเครื่องกระทบสามารถจำแนกออกเป็น 2 ประเภทคือกลุ่มเครื่องกระทบที่มีระดับเสียงแน่นอน และกลุ่มเครื่องกระทบที่มีระดับเสียงไม่แน่นอน มีหน้าที่ให้จังหวะ และ เป็นทำนองหลักให้แก่วงดนตรีต่างๆ (Cook, 2005) เครื่องกระทบเริ่มแพร่หลายออกไปตามหน่วยงานต่าง ๆ ทั้งโรงเรียนในระดับชั้นประถมศึกษามัธยมศึกษาและระดับอุดมศึกษา มีการนำไปใช้ในกิจกรรมพัฒนาผู้เรียน ในการแข่งขันดนตรี การแสดงคอนเสิร์ต และงานพิธีการต่าง ๆ มักสามารถเห็นเครื่องดนตรีประเภทกระทบต่างๆได้ในวงดนตรีประเภทซิมโฟนีออร์เคสตรา (Symphony Orchestra) วงดุริยางค์เครื่องลม (Wind Band) วงโยธวาทิต (Military Band) การบรรเลงเดินแถว (Marching) วงแปรขบวน (Display) (สธน โรจนตระกูล, 2554)

กลุ่มเครื่องกระทบที่ไม่มีระดับเสียงแน่นอน (Indefinite Pitch Instruments) เครื่องดนตรีกลุ่มนี้จะไม่มีระดับเสียงที่แน่นอน มีหน้าที่สำคัญคือ ใช้เป็นเครื่องดนตรีประกอบจังหวะ เกิดเสียงโดยการตี สั่น เขย่า เคาะ หรือขูด โดยเครื่องดนตรีส่วนใหญ่สามารถเห็นได้ในวงโยธวาทิต หรือ กลุ่มกลองสนาม (Marching Percussion) หมายถึงเครื่องกระทบประเภทที่ใช้แขวนเพื่อเดินพาเหรด และแปรขบวนในสนาม ประกอบไปด้วย กลองสแนร์ กลองเทเนอร์ กลองใหญ่ และ ฉาบ

กลองสแนร์ เป็นหนึ่งในเครื่องดนตรีตีกระทบที่สำคัญ และมีประวัติยาวนานนับเป็นกลองที่มีความหลากหลายในด้านการใช้ทั้งใน วงดุริยางค์ วงดนตรีสากล และวงดนตรีพื้นบ้าน กลองสแนร์ มีต้นกำเนิดจากเครื่องดนตรีที่ใช้ในแอฟริกา และยุโรปในยุคกลาง (Medieval Period) โดยมีการใช้กลองที่คล้ายกับสแนร์ในการส่งสัญญาณในการทำศึกสงคราม ต่อมาในศตวรรษที่ 14-15 ได้มีการพัฒนาเครื่องดนตรีชนิดนี้ในยุโรป โดยเฉพาะในฝรั่งเศส และเยอรมนี ซึ่งทำให้เกิดการพัฒนารูปแบบที่ทันสมัยมากขึ้นในศตวรรษที่ 16 ในยุคเรเนซองส์ (Renaissance Period) และยุคบาโรก (Baroque Period) สแนร์ได้ถูกใช้ในดนตรีทหาร (Military Music) และต่อมาได้ถูกนำมาใช้ในวงดนตรีคลาสสิกในยุคโรแมนติก (Romantic Period) โดยมีการปรับปรุงให้เข้ากับวงออร์เคสตรา เช่น การใช้วัสดุที่ดีกว่าในการทำสแนร์ หรือ แส้สแนร์ ซึ่งจะให้เสียงที่คมชัดและสามารถปรับเสียงได้มากขึ้น ในช่วงคริสต์ศตวรรษที่ 20 กลองสแนร์ได้รับการพัฒนาให้ทันสมัยมากยิ่งขึ้น โดยมีการใช้ในดนตรีหลากหลายแนว ไม่ว่าจะเป็นแจ๊ส ร็อก และป๊อป รวมถึงยังเป็นส่วนหนึ่งของชุดกลองที่นิยมใช้ในวงดนตรีสมัยใหม่ (Blades, 2005; Holland, 2005)

สแนร์มาร์ชชิ่ง พัฒนามาจากกลองสแนร์ ที่ใช้ในวงดนตรีทหาร โดยเฉพาะอย่างยิ่งในช่วงคริสต์ศตวรรษที่ 19 ที่วงดนตรีทหารมีบทบาทสำคัญในยุโรปและอเมริกา กลองชนิดนี้ถูกออกแบบมาให้มีน้ำหนักเบา และสามารถสะพายได้สะดวก มีขนาดที่ลึกกว่า สแนร์ ทั่วไป ทำให้เสียงที่เกิดขึ้นมีความลึกและหนักแน่นมากขึ้นในช่วงสงครามโลกครั้งที่ 1 และครั้งที่ 2 สแนร์มาร์ชชิ่ง ได้รับความนิยมอย่างแพร่หลายในกองทัพต่างๆ ทั่วโลก ไม่เพียงแต่ใช้ในการควบคุมจังหวะ และการเดินขบวน แต่ยังใช้ในการส่งสัญญาณในสนามรบอีกด้วย หลังสงคราม วงโยธวาทิต (Marching Band) ได้ถือกำเนิดขึ้นในโรงเรียน และมหาวิทยาลัย โดย สแนร์มาร์ชชิ่ง กลายเป็นหนึ่งในเครื่องดนตรีหลักที่ใช้ในวง ซึ่งมีการปรับปรุงในด้านวัสดุและเทคนิคการเล่นอย่างต่อเนื่อง นอกจากจะเน้นความดังและชัดเจนของเสียงแล้ว ยังมีการออกแบบให้ทนทานต่อสภาพอากาศ และการใช้งานที่ยาวนานในกิจกรรมกลางแจ้ง มักติดตั้งสายสะพายเพื่อให้ผู้เล่นสามารถเดินขบวนพร้อมกับเล่นได้ สแนร์มาร์ชชิ่งยังมีบทบาทสำคัญในวงการดนตรีสมัยใหม่ โดยเฉพาะในวงโยธวาทิต และวงดุริยางค์ทหารที่เป็นที่รู้จักทั่วโลก (Smith, 2008)

วงโยธวาทิตเป็นกิจกรรมดนตรีที่นิยมอย่างมากในหลายประเทศ ทั่วโลก รวมทั้ง ประเทศไทย เนื่องจากเป็นกิจกรรมที่ต้องมีภายในโรงเรียนประถมศึกษา มัธยมศึกษา และในระดับอุดมศึกษา เพื่อใช้ในงานพิธีการต่าง ๆ ของโรงเรียน รวมถึงมีการใช้ในการเข้าร่วมการประกวดทั่วประเทศ และระดับนานาชาติ เพื่อพัฒนาทักษะทางด้านดนตรีให้กับนักเรียน ทั้งนี้กิจกรรมวงโยธวาทิตภายในโรงเรียนในประเทศไทยมีการมุ่งเน้นเพียงการปฏิบัติทักษะดนตรี ยังขาดความเข้าใจในทางทฤษฎีดนตรี รวมไปถึงยังขาดความรู้ในการปฏิบัติเครื่องดนตรีต่างๆอย่างถูกต้อง ซึ่งเป็นพื้นฐานสำคัญของการเรียนดนตรีต่อใน

อนาคต (ณรุทธ์ สุทธจิตต์, 2544) กลองสแนร์มาร์ชในวงโยธวาทิตมีความสำคัญเทียบเท่ากับเครื่องดนตรีอื่นๆ เทคนิคขั้น
พื้นฐานที่นักเรียนควรได้รับการฝึกฝนตั้งแต่แรกเริ่มจึงมีความสำคัญจะช่วยให้นักเรียนมีพื้นฐานที่ดี และสามารถพัฒนา
ความสามารถไปได้ไกลยิ่งขึ้น แต่ในประเทศไทยยังขาดความรู้ทางด้านเทคนิคขั้นพื้นฐาน ส่วนใหญ่จะไม่ได้ให้ความสำคัญ
ทางด้านเทคนิค แต่ไปให้ความสำคัญกับการตี เพียงอย่างเดียวจึงทำให้นักเรียนไม่สามารถพัฒนาไปได้ไกลเนื่องจากมีพื้นฐานที่
ไม่แข็งแรง โดยเฉพาะโรงเรียนต่างจังหวัดในประเทศไทยจากที่ผู้วิจัยไปเข้าร่วมอบรมการปฏิบัติกลองมาร์ชชิ่งเพอร์คัสชั่น
สังเกตเห็นได้ว่า ยังมีอีกหลายโรงเรียนที่ยังขาดความรู้ขั้นพื้นฐานในการปฏิบัติกลองสแนร์มาร์ชชิ่งได้อย่างถูกต้อง จึงคิดว่าแนว
ทางการปฏิบัติกลองสแนร์มาร์ชชิ่งจะช่วยให้ครู และนักเรียน ได้รับความรู้ที่จำเป็นต่อการปฏิบัติกลองสแนร์มาร์ชชิ่งได้

จากการศึกษาเอกสารและงานวิจัยที่เกี่ยวข้องพบว่ามีผู้ศึกษาในประเด็นดังนี้ 1) การศึกษากระบวนการเพื่อสู่ความ
เป็นเลิศของวงโยธวาทิตที่ได้รับรางวัลระดับชาติ (ถวัลย์ชัย สวนมณฑา, 2565) 2) การพัฒนาแบบฝึกทักษะปฏิบัติดนตรีสากล
(เครื่องเป่าวงโยธวาทิต) โดยประยุกต์ตามแนวคิดของดาลโครซ ออร์ฟ และโคดาย เพื่อเสริมสร้างทักษะการปฏิบัติ เครื่อง
ดนตรีสากล สำหรับนักเรียนชั้นมัธยมศึกษาปีที่ 1 โรงเรียนหนองโนประชาสรรค์ (ธีรพงศ์ พุทธขาว, 2564) 3) การศึกษา
รูปแบบการจัดการวงโยธวาทิต กรณีศึกษาโรงเรียนมัธยมศึกษาในเขตพื้นที่การศึกษาภาคตะวันออก (สราวุธ โรจนศิริ, 2564)
4) แนวทางการพัฒนาวงโยธวาทิตไทยในศตวรรษที่ 21 (อัครวัตร เชื่อมกลาง, 2562) จากงานวิจัยส่วนใหญ่ กล่าวถึงการ
ฝึกซ้อมขั้นพื้นฐาน ให้ความสำคัญกับแนวทางการฝึกทักษะขั้นพื้นฐานของนักเรียนวงโยธวาทิต มุ่งเน้นไปในการพัฒนาเทคนิค
ขั้นพื้นฐานในเครื่องดนตรีต่างๆ ก่อนเพื่อที่จะพัฒนาทักษะอื่นๆต่อไป โดยผู้วิจัยยังไม่พบเห็นแนวทางการปฏิบัติการตีกลองส
แนร์มาร์ชชิ่งขั้นพื้นฐานสำหรับนักเรียนวงโยธวาทิต ซึ่งเป็นเครื่องดนตรีที่มีความสำคัญ และสามารถพบเห็นได้ในวงโยธวาทิต
ในโรงเรียนทั่วประเทศไทย

จากเหตุผลข้างต้นผู้วิจัยจึงมีความสนใจโดยได้ทำการศึกษาหาข้อมูล จากการสัมภาษณ์อาจารย์อนุสรณ์ พรเนรมิต
ผู้มีประสบการณ์มากกว่า 20 ปีในการทำงานด้าน Percussion และได้รับคัดเลือกเป็นสมาชิกของ Southwind Drum และ
Bugle Corps และเข้าร่วมแข่งขันในรายการ DCI เมื่อปี 2002 ปัจจุบันได้ทำงานด้านการสอนวงโยธวาทิต เรียบเรียงประพันธ์
เพลงวงโยธวาทิต มีการจัดอบรมและให้คำปรึกษาให้กับวงโยธวาทิตในโรงเรียนมัธยมต่างๆ และวง Drumline ทั้งในประเทศ
ไทยและต่างประเทศ ได้เป็นกรรมการผู้ตัดสินวงโยธวาทิตและได้ตัดสินในการแข่งขันวงโยธวาทิตในรายการต่างๆ ทั้งใน
ประเทศไทยและต่างประเทศ (เช่น Thailand World Music Championship , Jember Open Marching Band
Competition) มีโอกาสได้ทำงานให้กับวงโยธวาทิตและได้รับรางวัลมากมายทั้งในประเทศไทยและระดับนานาชาติ (ชนะเลิศ
จากการแข่งขัน Drumline 16 ครั้ง / Drumline Battle 6 ครั้ง / ชนะเลิศการประกวดวงโยธวาทิต 9 10 ครั้ง ฯลฯ)
นอกจากนี้เขายังเป็น Percussion Artist ของ Yamaha, Evans drumheads และ Innovative โดยผู้วิจัยจะทำการศึกษา
สัมภาษณ์ในประเด็น 5 หัวข้อ 1) ลักษณะการฝึกซ้อมที่เหมาะสม 2) ท่าทางการยืน และการซอยเท้า 3) การจับไม้กลอง 4)
รูปแบบของ Stroke 5) แบบฝึกหัดขั้นพื้นฐาน ทำการวิเคราะห์ เรียบเรียง เพื่อนำเสนอเทคนิคการฝึกซ้อมขั้นพื้นฐานสำหรับ
กลองสแนร์มาร์ชชิ่งใน วงโยธวาทิต เพื่อเป็นแนวทางในการใช้ในการฝึกซ้อม ศึกษาหาความรู้ และนำไปใช้ในการพัฒนาผู้สอน
ผู้เรียน ที่มีความสนใจในเครื่องดนตรีสแนร์มาร์ชชิ่งต่อไป

2. วัตถุประสงค์การวิจัย

เพื่อศึกษาแนวทางการปฏิบัติกลองสแนร์มาร์ชชิ่งขั้นพื้นฐานสำหรับนักเรียนวงโยธวาทิต

การประชุมวิชาการระดับชาติและนานาชาติบ้านสมเด็จเจ้าพระยา ครั้งที่ 1 (BS2C 2025)
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3. ขอบเขตการวิจัย

      1.ขอบเขตผู้ให้ข้อมูล

            ผู้ให้ข้อมูลคือ อาจารย์อนุสรณ์ พรเนรมิต Percussion Artist ของ Yamaha, Evans Drumheads และ Innovative โดยมีเกณฑ์การคัดเลือกผู้ให้ข้อมูลดังนี้

            1.1 เป็นผู้เคยผ่านการเข้าร่วมการแข่งขันรายการระดับโลก DCI

            1.2 เป็นผู้มีประสบการณ์ในการสอนวงโยธวาทิตในไทย

            1.3 เป็นผู้มีประสบการณ์พาวงโยธวาทิตเข้าร่วมการประกวดมามากกว่า 15 ปี

            1.4 เป็นผู้มีประสบการณ์ในการตัดสินการประกวดระดับประเทศและต่างประเทศ

      2.ขอบเขตด้านเนื้อหา

            2.1. ลักษณะการฝึกซ้อมที่เหมาะสม

            2.2 ท่าทางการยืน และการซอยเท้า

            2.3 การจับไม้กลอง

            2.4 รูปแบบของ Stroke

            2.5 แบบฝึกหัดขั้นพื้นฐาน

      3.ประโยชน์ที่คาดว่าจะได้รับจากการวิจัย

            3.1 เพื่อให้ทราบถึงแนวทางการปฏิบัติกลองสแนร์มาร์ชชิ่งขั้นพื้นฐานสำหรับนักเรียนวงโยธวาทิต

            3.2 เพื่อให้ทราบถึงเทคนิคสำคัญในการฝึกซ้อมการปฏิบัติกลองสแนร์มาร์ชชิ่ง

4. นิยามศัพท์เฉพาะ

        1.แนวทางการปฏิบัติกลองสแนร์มาร์ชชิ่งขั้นพื้นฐานสำหรับนักเรียนวงโยธวาทิต หมายถึง แนวทางการปฏิบัติกลองสแนร์มาร์ชชิ่ง ที่ได้รับข้อมูลมาจากการสัมภาษณ์ อาจารย์ อนุสรณ์ พรเนรมิต ที่มีเนื้อหาอยู่ 5 ประเด็น 1) ลักษณะการฝึกซ้อมที่เหมาะสม 2) ท่าทางการยืน และการซอยเท้า 3) การจับไม้กลอง 4) รูปแบบของ Stroke 5) แบบฝึกหัดขั้นพื้นฐาน

        2.แบบฝึกหัดขั้นพื้นฐาน หมายถึง แบบฝึกหัดที่ควรใช้ในการฝึกสแนร์มาร์ชชิ่งเบื้องต้น ที่ได้รับคำแนะนำมาจากอาจารย์อนุสรณ์ พรเนรมิต

        3.Stroke หมายถึง การตี ในบริบทการใช้เครื่องมือ เช่น ไม้กลอง หมายถึงการตีหรือการกระทบหนึ่งครั้ง

5. วิธีดำเนินการวิจัย

      เครื่องมือการวิจัย

      เครื่องมือที่ใช้ในการเก็บรวมรวบข้อมูลได้แก่

      แบบสัมภาษณ์แบบกึ่งโครงสร้างโดยผู้วิจัยนำแบบสัมภาษณ์ที่สร้างขึ้นให้ผู้เชี่ยวชาญพิจารณาตรวจสอบความเที่ยงตรงของ เนื้อหา (IOC: Index of Objective Congrueuec) 3 ท่าน โดยมีความเที่ยงตรงในทุกรายข้อ ไม่ต่ำกว่า 0.5 โดยมีผู้เชี่ยวชาญทางดนตรีศึกษา 2 คน และ ผู้เชี่ยวชาญทางเครื่องดนตรีเพอร์คัสชั่น 1 คน

6. การเก็บรวบรวมข้อมูลวิจัย

        ทำการเก็บข้อมูลเชิงคุณภาพ โดยใช้กระบวนการคัดเลือกผู้ให้ข้อมูลแบบเฉพาะเจาะจง (Purposive Sampling) โดยการสัมภาษณ์จาก อาจารย์อนุสรณ์ พรเนรมิต เป็นผู้ที่ให้ข้อมูลหลักเกี่ยวกับแนวทางการปฏิบัติกลองสแนร์มาร์ชชิ่งขั้นพื้นฐานสำหรับนักเรียนวงโยธวาทิต

การวิเคราะห์ข้อมูล

การวิเคราะห์ข้อมูลครั้งนี้ วิเคราะห์ข้อมูลตามความมุ่งหมายของการวิจัย ด้วยวิธีวิเคราะห์เนื้อหา (Content Analysis) เน้นที่ความถูกต้องรัดกุมขัดเจน มีความต่อเนื่องและตอบวัตถุประสงค์ โดยวิเคราะห์ข้อมูลจากการสัมภาษณ์ อาจารย์อนุสรณ์ พรเนรมิต ตามหัวข้อทั้ง 5 หัวข้อ 1) ลักษณะการฝึกซ้อมที่เหมาะสม 2) ท่าทางการยืน และการซอยเท้า 3) การจับไม้กลอง 4) รูปแบบของ Stroke 5) แบบฝึกหัดขั้นพื้นฐาน สัมภาษณ์ทั้งหมด 1 ครั้ง ระยะเวลาในการสัมภาษณ์ 60 นาที สถานที่โรงเรียนอุดมศึกษา

7. ผลการวิจัย

1. ลักษณะการฝึกซ้อมที่เหมาะสม

บทสัมภาษณ์

"อย่างแรกก็คือต้องให้ความสำคัญกับเรื่องที่เป็นพื้นฐานของการตีเล่นสแนร์ จริง ๆ ไม่ใช่เพียงแค่สแนร์อย่าง เดียวเรียกได้ว่าเครื่องเพอร์คัชชั่นเกือบทั้งหมดนะครับคือต้องสนใจเรื่องของเทคนิคอยู่ตลอดเวลา คือการจับไม้ ท่าทางการยืน การใช้รูปแบบของ Stroke และการฝึกฝนกับแบบฝึกหัด การฝึกซ้อมที่ดีนี้ของเครื่องเพอร์คัชชั่นหรือกลองนะครับควรจะใช้ เมโทรนอมในการฝึกซ้อมอยู่อย่างสม่ำเสมอเพื่อเช็คว่าเราเล่นตรงจังหวะ ควรฝึกช้าๆแล้วโฟกัสไปที่เทคนิคให้ดีก่อนแล้วค่อย เล่นเร็วขึ้น ฝึกฝนอยู่สม่ำเสมอเพื่อพัฒนาตนเองทำให้กล้ามเนื้อมีการจดจำและที่สำคัญในช่วงแรกควรจะเล่นหน้ากระจก เพื่อให้ความสำคัญกับเทคนิค การจับไม้ และท่าทางการยืนครับ"

จากการสัมภาษณ์เรื่องลักษณะการฝึกซ้อมที่เหมาะสมสามารถสรุปประเด็นได้ดังนี้

จากคำแนะนำจากการสัมภาษณ์ อาจารย์อนุสรณ์ พรเนรมิต สามารถสรุปเนื้อหาได้ดังนี้ ลักษณะการฝึกซ้อมที่ เหมาะสมสำหรับการตีสแนร์มาร์ชชิ่งขั้นพื้นฐาน สิ่งที่ควรให้ความสำคัญสามารถสรุปได้ประเด็นดังนี้

1.ให้ความสำคัญกับเทคนิคพื้นฐานเป็นสำคัญก่อน

    1.1 ท่าทางการยืน การซอยเท้า

    1.2 การจับไม้ที่ถูกต้อง

    1.3 การใช้รูปแบบของ Stroke

    1.4 การฝึกฝนกับแบบฝึกหัด

2.ใช้เครื่องเมโทรนอมในการฝึกซ้อมเสมอ

3.เล่นช้าๆ ในตอนแรก และค่อยเร่งความเร็วหลังจากที่แน่ใจว่าเล่นถูกต้องแล้ว

4.ฝึกฝนทุกวัน เพื่อการพัฒนาของตนเอง และกล้ามเนื้อมีการจดจำ

5.เล่นหน้ากระจก โดยให้ความสำคัญกับท่าทาง และเทคนิคเป็นพิเศษ

2. ท่าทางการยืน และการซอยเท้า

บทสัมภาษณ์

"ท่าทางการยืนและการซอยเท้า การยืนควร ยืนตัวตรง รู้สึกผ่อนคลาย ทรงตัวให้นิ่ง และมั่นใจโดยวางเท้า ในตำแหน่งที่ถูกต้อง แล้วก็อย่าเกร็งโดยเฉพาะช่วงบริเวณหัวไหล่มีกล้ามเนื้อต่างๆที่เกี่ยวข้องกับการตีกลองไม่ว่าจะเป็นแขน ข้อมือหรือนิ้วเนี่ยก็คือให้ลองผ่อนคลายไว้ ที่สำคัญอย่าเกร็ง การซอยเท้าที่ดีความสนใจไปที่ท่าทางการยืนก่อนสำคัญที่สุด เท้าต้องมีความขนานกัน ชิดกัน และส้นเท้าสัมผัสกัน การซอยเท้า ส้นเท้ากระแทกพื้นด้วยการยกส้นเท้าสูง 2 นิ้ว ปลายเท้าชี้ ไปข้างหน้าควรเหยียบจังหวะลงไปให้แข็งแรงและรู้สึกถึงจังหวะตกของบทเพลงหรือแบบฝึกหัดที่เล่น และที่สำคัญที่สุดของการ ซอยเท้าคือทั้งวงต้องใช้วิธีการเดียวกันเหมือนกัน"

จากการสัมภาษณ์เรื่องท่าทางการยืนและการซอยเท้าสามารถสรุปประเด็นได้ดังนี้

ท่าทางการยืนที่เหมาะสมสำหรับกลองสแนร์มาร์ชชิ่ง ยืนตัวตรง ผ่อนคลาย ทรงตัวให้นิ่ง และมั่นใจโดยวางเท้าใน ตำแหน่งที่ถูกต้อง เก็บไม้ตีกลองให้ตรงในขณะที่อยู่ในท่าเตรียมพร้อม เงยหน้าขึ้นโดยให้ดวงตาทั้งสองข้างเพ่งตรงไปข้างหน้า ตลอดเวลา มีสีหน้ามั่นใจ ไม่มีการเคลื่อนไหวใด ๆ ในขณะที่ยืนบรรเลง

เทคนิคการซอยเท้าสำหรับกลองสแนร์มาร์ชชิ่ง สำหรับการซอยเท้า ให้ความสนใจไปที่ท่าทางการยืนก่อนสำคัญที่สุด เท้าต้องมีความขนานกัน ชิดกัน และส้นเท้าสัมผัสกัน การซอยเท้า ส้นเท้ากระแทกพื้นด้วยการยกส้นเท้าสูง 2 นิ้ว ปลายเท้าชี้ ไปข้างหน้าเหยียบจังหวะลงไปให้แข็งแรงและรู้สึกถึงจังหวะตกของบทเพลงหรือแบบฝึกหัดที่เล่น และที่สำคัญที่สุดของการ ซอยเท้าคือทั้งวงต้องใช้วิธีการเดียวกันเหมือนกัน

ภาพที่ 1 ท่ายืนเตรียมพร้อม และท่าเก็บไม้

ที่มา : อานนท์ ผลพรวิทูร

ภาพที่ 2 ท่ายืนเตรียมพร้อม และท่าออกไม้

ที่มา : อานนท์ ผลพรวิทูร

3. การจับไม้กลอง

บทสัมภาษณ์

"การจับไม้เนี่ยเป็นสิ่งที่สำคัญมากๆ เพราะถ้าเราจับไม้ถูกวิธีเนี่ยมันจะทำให้เราต่อยอดไปได้ง่ายนะครับถ้าเราจับไม้ ผิดวิธีในช่วงเล่นแรกๆ เนี่ยมันจะรู้สึกว่ามันพอตีได้ แต่ตอนเริ่มเล่นอะไรที่มันยากยิ่งขึ้นมันจะรู้สึกได้เลยว่ามันจะลำบากยากขึ้น เพราะการจับไม้ที่ผิดวิธี จับหมายที่ได้คุณภาพที่ดีมันก็จะได้เสียงที่ดีด้วยนะครับแน่นไปมันก็จะได้เสียงไม่ค่อยเต็ม การจับไม้ที่ ถูกต้องจะต้องมันหลวมและไม่แน่นเกินไป การจับไม้สองรูปแบบก็คือ Traditional Grip กับ Match Grip ครับ Match Grip มือทั้งสองข้างจะคว่ำๆลง และจับเหมือนกันทั้งสองข้าง อันนี้ก็จะนิยมสำหรับการเล่นเครื่องดนตรีประเภทเทรนเนอร์หรือ เบสดรัม หรือถ้าในกลุ่มคอนเสิร์ตก็จะเป็น Mallet หรือ Timpani ก็ได้นะครับ วิธีการจับเริ่มต้นด้วยการทำอนิ้วชี้คล้ายกับ เบ็ดปลาด้วยนิ้วชี้แล้ววางไม้ไว้ตรงกลาง ร่องนิ้ว ใช้นิ้วหัวแม่มือกดและพยุงไม้จากอีกด้าน ในลักษณะการจีบ นิ้วชี้กับนิ้วโป้ง เป็นจุดศูนย์กลาง และทำหน้าที่เป็นจุดหมุนของไม้ นำสามนิ้วที่เหลือมาพยุงไม้ไว้ เบา ๆ มีความรู้สึกผ่อนคลายจากสามนิ้วหลัง หลีกเลี่ยงการบีบไม้โดยไม่จำเป็น ส่วน Traditional Grip มือข้างขวาจะจับแบบคว่ำ และข้างซ้ายจะจับแบบหงาย นิยมใช้ใน เครื่องสแนร์ วิธีการจับมือขวา ใช้วิธีการเดียวกันกับ การจับไม้แบบ Match Grip มือซ้าย เริ่มต้นด้วยการวางส่วนท้ายของไม้ไว้ ในร่องระหว่างนิ้วโป้ง กับ นิ้วชี้ ตรวจสอบให้แน่ใจว่าวางไม้ไว้ที่จุดสมดุล ซึ่ง เหมือนกับมือขวา นี่จะเป็น ศูนย์กลองของการจับ ไม้ และจะเป็นจุดหมุน ปลายไม้กลองควรวางบนข้อต่อของนิ้วนาง นิ้วก้อยแนบอยู่ใต้แนวนิ้วนางอย่างผ่อนคลาย โดยหลีกเลี่ยง การสร้างช่องว่างที่ไม่จำเป็นระหว่างนิ้วนางและนิ้วก้อย นิ้วโป้งควรเชื่อมต่อกับข้อต่อตรงกลางของนิ้วชี้ (เชื่อมต่อประมาณ 1/3

ของความยาวไม้กลองเพื่อให้ตรงกับจุดหมุนของมือขวา) นิ้วกลางควรงอไปตามไม้กลองอย่างเป็นธรรมชาติและนุ่มนวล อย่าใช้
แรงกดลงบนไม้กลอง นิ้วชี้มีหน้าที่แค่ประคองไม้"

จากการสัมภาษณ์เรื่องวิธีการจับไม้กลองสามารถสรุปประเด็นได้ดังนี้

การจับไม้ที่ถูกวิธีสามารถทำให้ต่อยอดการเล่นไปในระดับที่ยากขึ้นได้ง่ายกว่าการจับแบบผิดๆ และการจับไม้ที่ถูกวิธี
สามารถสร้างคุณภาพของเสียงที่ดีได้อีกด้วย การจับที่ดีจะต้องไม่หลวมและไม่แน่นเกินไป วิธีการจับไม้กลองของสแนร์มาร์ชชิ่ง
มีที่นิยมใช้กันอยู่ 2 ประเภท คือ การจับไม้แบบ Match Grip และ Traditional Grip

<table>
<tr>
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<tr>
<td align="center">ภาพที่ 3 การจับไม้แบบ Match Grip
ที่มา : อานนท์ ผลพรวิทูร</td>
<td align="center">ภาพที่ 4 การจับไม้แบบ Traditional Grip
ที่มา : อานนท์ ผลพรวิทูร</td>
</tr>
</table>
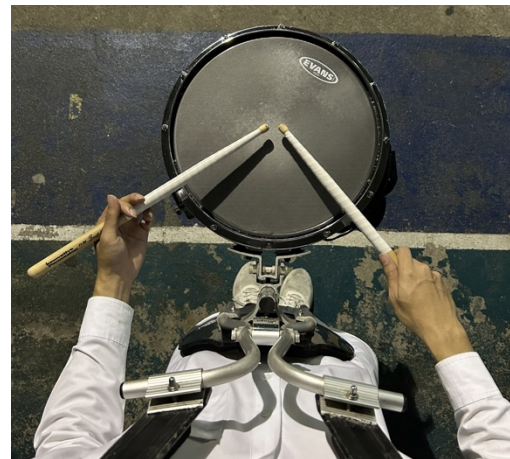
วิธีการจับไม้แบบ Match Grip

การจับแบบ Match Grip ทั้งมือขวา และมือซ้ายจับในรูปแบบเดียวกันโดย เริ่มต้นด้วยการทำงอนิ้วชี้คล้ายกับเบ็ด
ปลาด้วยนิ้วชี้แล้ววางไม้ไว้ตรงกลาง ร่องนิ้ว ใช้นิ้วหัวแม่มือกดและพยุงไม้จากอีกด้าน ในลักษณะการจีบ นิ้วชี้กับนิ้วโป้งเป็นจุด
ศูนย์กลาง และทำหน้าที่เป็นจุดหมุนของไม้ นำสามนิ้วที่เหลือมาพยุงไม้ไว้ เบา ๆ มีความรู้สึกผ่อนคลายจากสามนิ้วหลัง
หลีกเลี่ยงการบีบไม้โดยไม่จำเป็น

วิธีการจับไม้แบบ Traditional Grip

มือขวา ใช้วิธีการเดียวกันกับ การจับไม้แบบ Match Grip มือซ้าย เริ่มต้นด้วยการวางส่วนท้ายของไม้ไว้ในร่อง
ระหว่างนิ้วโป้ง กับ นิ้วชี้ ตรวจสอบให้แน่ใจว่าวางไม้ไว้ที่จุดสมดุล ซึ่ง เหมือนกับมือขวา นี่จะเป็น ศูนย์กลองของการจับไม้
และจะเป็นจุดหมุน ปลายไม้กลองควรวางบนข้อต่อของนิ้วนาง นิ้วก้อยแนบอยู่ใต้แนวนิ้วนางอย่างผ่อนคลาย โดยหลีกเลี่ยง
การสร้างช่องว่างที่ไม่จำเป็นระหว่างนิ้วนางและนิ้วก้อย นิ้วโป้งควรเชื่อมต่อกับข้อต่อตรงกลางของนิ้วชี้ (เชื่อมต่อประมาณ 1/3
ของความยาวไม้กลองเพื่อให้ตรงกับจุดหมุนของมือขวา) นิ้วกลางควรงอไปตามไม้กลองอย่างเป็นธรรมชาติและนุ่มนวล อย่าใช้
แรงกดลงบนไม้กลอง นิ้วชี้มีหน้าที่แค่ประคองไม้

การประชุมวิชาการระดับชาติและนานาชาติบ้านสมเด็จเจ้าพระยา ครั้งที่ 1 (BS2C 2025)
The 1st Bansomdejchaopraya National and International Conference (BS2C 2025)

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4. รูปแบบของ Stroke

บทสัมภาษณ์

" เรื่องของ รูปแบบของ Stroke ที่สำคัญของการตีกลองเสน่ห์มาร์ชชิ่งมีทั้งหมด 4 รูปแบบ ได้แก่ Full, Down, Tap, Up 1.Full Stroke คือการเริ่มตีไม้จากที่สูงจบที่สูง ใช้เล่นในโน้ตที่ต้องการความดังที่สม่ำเสมอในลักษณะของเสียงที่เชื่อมต่อกันมีการรีบาวน์ต่อกันคล้ายกับการเดาะบาสเกตบอล ใช้ในการตีในแบบฝึกหัด 8-8-16 และ Strick Control เป็นต้น 2.Down Stroke คือการเริ่มตีไม้จากที่สูงจบในตำแหน่งต่ำใช้เล่นโน้ตจากดังมาเบา สิ่งสำคัญคือเมื่อหยุดการเคลื่อนไหวของไม้ลง อย่าบีบไม้กลอง 3.Tap Stroke คือการเริ่มตีไม้จากที่ต่ำจบที่ตำแหน่งต่ำ ใช้เล่นโน้ตเบาในบทเพลง แต่ถือจะใช้เล่นในโน้ตเบาการออกแรงยังคงคล้ายกับ Full Stroke ที่ต่างกันคือระดับความสูงของไม้ที่ยก 4.Up Stroke เริ่มตีไม้จากที่ต่ำแล้วจบที่สูง ใช้เล่นโน้ตจากเบาและไปดัง "

จากการสัมภาษณ์เรื่องรูปแบบของ Strokeสามารถสรุปประเด็นได้ดังนี้

4.1 **Full Stroke** เป็นการตีที่ต้องมีความผ่อนคลาย โดยเริ่มจากตำแหน่งที่ไม้สูงและจบลงที่ตำแหน่งไม้สูงเช่นเดียวกัน ความเร็วของการตีสามารถกำหนดได้ว่าเสียงที่ออกมาจะเป็นแบบ Legato (เสียงที่เชื่อมต่อกัน) หรือ Staccato (เสียงสั้นและชัดเจน) แต่ตำแหน่งเริ่มต้นของการตีและตำแหน่งสุดท้ายจะอยู่ที่เดียวกัน แขนและข้อมือจะทำงานร่วมกันในการตีแบบ Full Stroke สิ่งสำคัญคือการหมุนข้อมือและรู้สึกถึงการสะท้อนกลับจากกลองที่ทำให้ไม้กลองกลับขึ้นมา สามารถเปรียบเทียบการกระทำนี้ได้กับการเดาะบาสเกตบอล การตีแบบนี้สามารถพบได้ในแบบฝึก 8-8-16 และ Stick Control เป็นต้น

4.2 **Down Stroke** เริ่มจากตำแหน่งที่ไม้สูงและจบลงที่ไม้ตำแหน่งต่ำ สิ่งสำคัญคือเมื่อหยุดการเคลื่อนไหวของไม้ลงอย่าบีบไม้กลอง น้ำหนักของมือที่หยุดลงจะทำให้ไม้กลองหยุดการเคลื่อนไหวเช่นกัน

4.3 **Tap Stroke** แม้ว่า Tap Stroke จะเป็นการตีที่สำคัญ แต่ไม่ควรถือว่าแตกต่างจาก Full Stroke มากนัก Tap Stroke เริ่มจากตำแหน่งไม้ที่ต่ำและจบลงที่ตำแหน่งไม้ต่ำ แต่ในสาระสำคัญเช่นเดียวกับ Full Stroke มันเริ่มและจบลงในตำแหน่งเดียวกัน สิ่งนี้สำคัญในการคิด เพื่อไม่ให้คุณฝึกการตีที่อ่อนหรือเบาเกินไป การตีควรมีน้ำหนักและความรู้สึกเดียวกันกับ Full Stroke แต่เพียงแค่เป็นการตีที่ความสูงต่างกัน การตีแบบนี้ใช้กับจังหวะที่ไม่มีการเน้นเสียง (un-accented beats) และเป็นส่วนประกอบของจังหวะภายในของการฝึกและเพลง สิ่งสำคัญคือจังหวะเหล่านั้นยังคงต้องมีน้ำหนัก เสียง เพื่อไม่ให้จังหวะ และอารมณ์ของเพลงเสียไป

4.4 **Up Stroke** เป็นการเตรียมการที่ต้องมีทั้งก่อนการฝึก หรือระหว่างการเล่นเพลง การเริ่มต้นนี้ควรมาจากไม้กลอง และจุดหมุนศูนย์กลางเหมือนกับว่ามีเชือกที่ผูกติดอยู่กับปลายไม้กลองและถูกดึงขึ้นมาตามธรรมชาติ การตีแบบนี้ควรมีความเร็ว และความสมบูรณ์แบบเดียวกับที่คุณตั้งใจจะเล่นเริ่มที่ตำแหน่งไม้ต่ำจบที่ตำแหน่งไม้สูง

5. แบบฝึกหัดขั้นพื้นฐาน

บทสัมภาษณ์

" ส่วนในเรื่องสุดท้ายคือการฝึกฝนแบบฝึกหัดจริงต้องบอกอย่างนี้ว่าหัวใจของการตีกลองเนี่ยคือเรื่องของ Rudiment อะไรคือ Rudiment กลุ่มพื้นฐานที่ผู้เล่นควรจะเล่นได้ก็จะมี Single, Double , และ Triple ดังนั้น Rudiment ต่างๆในแนวทางการฝึกซ้อมที่ยากขึ้นไปเนี่ยเราจะนิยมการฝึกซ้อมแบบเรียกว่า เบรกดาวน์ หรือการแยกมือโน้ตที่ได้แยกออกมาเนี่ยมันจะวนเวียนอยู่ใน 3 รูปแบบนี้ เมื่อผู้เล่นฝึกเล่น Rudiment พื้นฐานทั้ง 3 รูปแบบนี้ได้อย่างชำนาญแล้วจะสามารถพัฒนาไปเล่น Rudiment ในรูปแบบต่างๆ ที่ยาก ได้ง่ายขึ้นในอนาคต "

จากการสัมภาษณ์เรื่องรูปแบบของ Stroke สามารถสรุปประเด็นได้ดังนี้

การฝึกซ้อมแบบฝึกหัดขั้นพื้นฐานสำหรับการตีกลองสแนร์มาร์ชชิ่ง จะมีสิ่งสำคัญอยู่ทั้งหมด 3 รูปแบบคือ

1. Single Stroke

Single Stroke หมายถึงเทคนิคการตีไม้กลองสลับมือซ้าย และขวาอย่างต่อเนื่อง โดยตีเพียงครั้งเดียวต่อมือ เช่น "ซ้าย-ขวา-ซ้าย-ขวา" (L-R-L-R) เป็นจังหวะพื้นฐานในการตีกลองที่สำคัญ ซึ่งจะช่วยสร้างความมั่นคงในการตีและเป็นพื้นฐานในการพัฒนาการตีกลองขั้นสูง

ภาพที่ 5 ยกตัวอย่างแบบฝึกหัด Single Stroke

ที่มา : อานนท์ ผลพรวิทูร

2. Double Stroke

ในการตีกลอง Double Stroke หมายถึงเทคนิคการตีที่ใช้การตีสองครั้งต่อมือสลับกัน โดยรูปแบบจะเป็น "ขวา-ขวา-ซ้าย-ซ้าย" (R-R-L-L) ซึ่งแตกต่างจาก Single Stroke ที่ตีเพียงครั้งเดียวต่อมือ (R-L-R-L)Double Stroke Roll เป็นการฝึกที่สำคัญสำหรับมือกลอง ช่วยพัฒนาความคล่องตัวและความสมดุลของมือทั้งสองข้าง เทคนิคนี้มักใช้ในการสร้างเสียงโรล (roll) ที่นุ่มนวลและต่อเนื่อง การฝึก Double Stroke จะช่วยให้คุณสามารถเล่นจังหวะที่ซับซ้อนและเร็วขึ้นได้อย่างมีประสิทธิภาพ

ภาพที่ 6 ยกตัวอย่างแบบฝึกหัด Double Stroke

ที่มา : อานนท์ ผลพรวิทูร

3. Triple Stroke

Triple Stroke ในการตีกลอง หมายถึงเทคนิคการตีไม้กลองสามครั้งต่อมืออย่างต่อเนื่อง โดยจะเป็นรูปแบบ "ขวา-ขวา-ขวา-ซ้าย-ซ้าย-ซ้าย" (R-R-R-L-L-L) เทคนิคนี้คล้ายกับ Single Stroke และ Double Stroke แต่ต้องใช้การควบคุมมือและการใช้แรงที่เหมาะสม เพื่อให้สามารถตีได้สามครั้งต่อเนื่องด้วยมือข้างเดียวประโยชน์ของ Triple Stroke การฝึก Triple Stroke จะช่วยเพิ่มความแข็งแรงและความยืดหยุ่นของข้อมือและนิ้ว และพัฒนาการควบคุมไม้กลองให้ดียิ่งขึ้น อีกทั้งยังเป็นพื้นฐานสำหรับการเล่นเสียงโรล (roll) ที่ซับซ้อนและมีจังหวะเร็ว เช่นในเพลงที่ต้องการเทคนิคการตีเร็วและต่อเนื่อง

ภาพที่ 7 ยกตัวอย่างแบบฝึกหัด Triple Stroke

ที่มา : อานนท์ ผลพรวิทูร

ภาพที่ 8 สรุปแนวทางการปฏิบัติกลองสแนร์มาร์ชชิ่งขั้นพื้นฐานสำหรับนักเรียนวงโยธวาทิต

ที่มา : อานนท์ ผลพรวิทูร

8. บทสรุป

แนวทางการปฏิบัติกลองสแนร์มาร์ชชิ่งขั้นพื้นฐานสำหรับนักเรียนวงโยธวาทิตจากการสัมภาษณ์อาจารย์ อนุสรณ์ พรเนรมิต ผู้วิจัยสามารถสรุปออกมาใน 5 ประเด็น 1) ลักษณะการฝึกซ้อมที่ดีต้องให้ความสำคัญในเรื่องของพื้นฐาน และเทคนิคของการตีสแนร์อยู่เสมอ ได้แก่ ท่าทางการยืนการซอยเท้า การจับไม้กลอง รูปแบบของการใช้ Stroke และการฝึกฝนด้วยแบบฝึกหัด เป็นประจำจะช่วยให้สามารถพัฒนาทักษะขั้นพื้นฐานได้เพื่อที่จะต่อยอดไปในรูปแบบการตีที่ยากขึ้นในอนาคต 2) ท่าทางการยืนและการซอยเท้า ท่าทางการยืนที่เหมาะสมสำหรับกลองสแนร์มาร์ชชิ่ง ยืนตัวตรง ผ่อนคลาย ทรงตัวให้นิ่ง และมั่นใจโดยวางเท้าในตำแหน่งที่ถูกต้อง การซอยเท้า ให้ความสนใจไปที่ท่าทางการยืนก่อนสำคัญที่สุด เท้าต้องมีความขนานกัน ชิดกัน และส้นเท้าสัมผัสกัน การซอยเท้า ส้นเท้ากระแทกพื้นด้วยการยกส้นเท้าสูง 2 นิ้ว ปลายเท้าชี้ไปข้างหน้าเหยียบจังหวะลงไปให้แข็งแรง 3) การจับไม้กลอง การจับไม้ที่ถูกวิธีสามารถทำให้ต่อยอดการเล่นไปในระดับที่ยากขึ้นได้ง่ายกว่าการจับแบบผิดๆ และการจับไม้ที่ถูกวิธีสามารถสร้างคุณภาพของเสียงที่ดีได้อีกด้วย การจับที่ดีจะต้องไม่หลวมและไม่แน่นเกินไป วิธีการจับไม้กลองของสแนร์มาร์ชชิ่ง มีที่นิยมใช้กันอยู่ 2 ประเภท คือ การจับไม้แบบ Match Grip และ Traditional Grip

4) รูปแบบของ Stroke ที่สำคัญของการตีกองเสน่ห์มาร์ชชิ่งมีทั้งหมด 4 รูปแบบ ได้แก่ Full Stroke คือการเริ่มตี ไม้จากที่สูงจบที่สูง ใช้เล่นในโน้ตที่ต้องการความดังที่สม่ำเสมอในลักษณะของเสียงที่เชื่อมต่อกันมีการรีบาวน์ต่อกันคล้ายกับ การเดาะบาสเกตบอล Down Stroke คือการเริ่มตีไม้จากที่สูงจบในตำแหน่งต่ำใช้เล่นโน้ตจากดังมาเบา สิ่งสำคัญคือเมื่อหยุด การเคลื่อนไหวของไม้ลง อย่าบีบไม้กลอง Tap Stroke คือการเริ่มตีไม้จากที่ต่ำจบที่ตำแหน่งต่ำ ใช้เล่นโน้ตเบาในบทเพลง แต่ ถือจะใช้เล่นในโน้ตเบาการออกแรงยังคงคล้ายกับ Full Stroke ที่ต่างกันคือระดับความสูงของไม้ที่ยก Up Stroke เริ่มตีไม้ จากที่ต่ำแล้วจบที่สูง ใช้เล่นโน้ตจากเบาและไปดัง 5) แบบฝึกหัดขั้นพื้นฐาน ที่ผู้ตีสแนร์เบื้องต้นควรฝึกฝนให้แก่ความชำนาญมี อยู่ทั้งหมด 3 รูป คือ Single Stroke , Double Stroke , Triple Stroke การฝึกฝน 3 แบบฝึกหัดนี้จะช่วยให้สามารถ พัฒนาการตีขั้นพื้นฐานของผู้เล่นให้เกิดความแข็งแรง และสามารถเล่น Rudiment ต่างๆในระดับที่ยากขึ้นได้อย่างมี ประสิทธิภาพในอนาคต

อภิปรายผล

จากการศึกษาสัมภาษณ์แนวทางการปฏิบัติกลองสแนร์มาร์ชชิ่งขั้นพื้นฐานสำหรับนักเรียนวงโยธวาทิต พบว่า การให้ ความสำคัญเกี่ยวกับเทคนิค และการฝึกซ้อมขั้นพื้นฐาน ตั้งแต่ ท่าทางการยืน การจับไม้กลอง การฝึกซ้อมที่ดี การเรียนรู้ ทางด้านทฤษฎีไปพร้อมกับการปฏิบัติจริง และการฝึกฝนอย่างสม่ำเสมอ จะช่วยให้นักเรียนมีการพัฒนาได้อย่างรวดเร็ว มี คุณภาพ สามารถต่อยอดความสามารถพัฒนาทักษะไปได้อย่างดียิ่งขึ้น รวมไปถึงการจับไม้กลอง ในการตีกลองต่างๆ เสียงที่ดี ขึ้นอยู่กับการจับไม้ และการฝึกฝนอย่างสม่ำเสมอ ดังนั้นการให้ความสำคัญกับการปฏิบัติที่ถูกวิธีตั้งแต่แรกเริ่มจึงมีความสำคัญ ต่อตัวนักเรียน และครู จะช่วยให้สามารถพัฒนาทักษะที่ดี บรรเลงเสียงออกมาได้ดี ปฏิบัติโน้ตที่ยากได้ดี และต่อยอดไปใน อนาคตได้อย่างมีประสิทธิภาพ ซึ่งสอดคล้องกับงานวิจัยที่เกี่ยวข้อง งานวิจัยที่เกี่ยวข้องกับวงโยธวาทิตจะมุ่งเน้นพัฒนาทักษะ ทางด้านต่างๆให้กับผู้เรียน โดยให้ความสำคัญกับเทคนิคขั้นพื้นฐานที่ถูกต้องตั้งแต่แรกเริ่ม และ ปัญหาที่นักเรียนไม่สามารถ บรรเลงได้ดีขึ้นอยู่กับปัจจัยในเรื่องของเทคนิคขั้นพื้นฐานมีการปฏิบัติมาอย่างผิดวิธี จึงส่งผลกระทบกับการปฏิบัติในขั้นที่ ยากขึ้นไป ดังนั้นแนวทางการปฏิบัติกลองสแนร์มาร์ชชิ่งขั้นพื้นฐานจะช่วยให้ นักเรียน และครูที่สนใจในการปฏิบัติกลอง สแนร์มาร์ชชิ่งมีแนวทางในการศึกษาในเรื่องของเทคนิคขั้นพื้นฐาน และการฝึกซ้อมที่เหมาะสมเพื่อพัฒนาทักษะทางด้านการตี กลองสแนร์มาร์ชชิ่งขั้นพื้นฐานได้ต่อไป

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การสร้างนวัตกรรมแบบง่ายจากการออกแบบการเรียนรู้แบบ STAD ของนักเรียนระดับมัธยมศึกษาตอนต้นเพื่อพัฒนาความสามารถเชิงการแก้ปัญหาเป็นทีม

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บทคัดย่อ

การวิจัยนี้มีวัตถุประสงค์เพื่อศึกษาผลสัมฤทธิ์ทางการเรียนการสร้างนวัตกรรมแบบง่ายจากการออกแบบการเรียนรู้แบบ STAD ของนักเรียนระดับมัธยมศึกษาตอนต้นเพื่อพัฒนาความสามารถเชิงการแก้ปัญหาเป็นทีม กลุ่มตัวอย่าง ได้แก่ นักเรียนชั้นมัธยมศึกษาปีที่ 1 โรงเรียนทุ่งกุลาวิทยาคาร จำนวน 10 คน ที่กำลังศึกษาอยู่ในภาคเรียนที่ 2 ปีการศึกษา 2567 ได้มาจากการเลือกด้วยวิธีเฉพาะเจาะจง (Purposive Sampling) เครื่องมือที่ใช้ในการเก็บรวบรวมข้อมูล ประกอบด้วย แบบทดสอบวัดความรู้ความเข้าใจ มีความยากง่ายอยู่ระหว่าง 0.20-0.80 มีค่าอำนาจจำแนกมากกว่า 0.20 มีค่าความเชื่อมั่นเท่ากับ .85 วิเคราะห์ข้อมูลโดยใช้สถิติค่าเฉลี่ย ส่วนเบี่ยงเบนมาตรฐาน และใช้การทดสอบค่าที (t-test for Dependent)

ผลการวิจัย พบว่า

ผลสัมฤทธิ์ทางการเรียนการสร้างนวัตกรรมแบบง่ายจากการออกแบบการเรียนรู้แบบ STAD ของนักเรียนระดับมัธยมศึกษาตอนต้นเพื่อพัฒนาความสามารถเชิงการแก้ปัญหาเป็นทีม มีผลสัมฤทธิ์ทางการเรียนหลังเรียนสูงกว่าก่อนเรียนอย่างมีนัยสำคัญทางสถิติที่ระดับ .05

คำสำคัญ: การแก้ปัญหาวิทยาศาสตร์; ผลสัมฤทธิ์; รถพลังงานลม

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Creating simple innovations from STAD learning design of early secondary school students to develop team problem-solving ability

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Abstract

This research aimed to study the academic achievement of creating simple innovations from STAD design of lower secondary school students to develop team problem-solving ability. The sample group consisted of 10 first-year students of Thung Kula Witthayakhan School who were studying in the second semester of the academic year 2024, selected by purposive sampling. The data collection tools consisted of a knowledge and understanding test with a difficulty level between 0.20-0.80, a discrimination power greater than 0.20, and a reliability value of .85. Data were analyzed using mean, standard deviation, and t-test for Dependent. The research results found that:

The academic achievement of creating simple innovations from STAD learning design of lower secondary school students to develop team problem-solving ability had significantly higher academic achievement after learning than before learning at a statistical level of .05.

Keywords: Achievement; Science problem solving; Wind power vehicle

1. บทนำ

การจัดกิจกรรมทางวิทยาศาสตร์สำหรับนักเรียนเพื่อให้เกิดแนวคิดและการทำงานเป็นกลุ่มแบบสร้างสรรค์นั้น ครูผู้สอนควรต้องศึกษาหลักการรูปแบบการสอนที่เหมาะสมกับวัตถุประสงค์ของการจัดการเรียนการสอนเพื่อให้บรรลุตามวัตถุประสงค์และครอบคลุมตามตัวชี้วัดการเรียนรู้

การสอนแบบร่วมมือด้วยเทคนิค STAD เป็นเทคนิคหนึ่งของการสอนแบบร่วมมือ (Cooperative learning) พัฒนาขึ้นโดย Robert E. Slavin ผู้อำนวยการศึกษาโครงการระดับประถมศึกษา ศูนย์วิจัยประสิทธิภาพการเรียนรู้ของผู้เรียนมีปัญหาทางด้านวิชาการแห่งมหาวิทยาลัยจอห์นฮอฟกินส์ สหรัฐอเมริกา และเป็นผู้เชี่ยวชาญการสอนคณิตศาสตร์ ได้พัฒนาเทคนิคขึ้นเพื่อขจัดปัญหาทางการศึกษา โดยมุ่งเน้นทักษะการคิด การเรียนที่เป็นระบบ เป็นทางเลือกหนึ่งสำหรับการเรียนเป็นกลุ่ม และเป็นวิธีการสร้างสัมพันธภาพระหว่างผู้เรียน ซึ่งเป็นการเรียนที่เปิดโอกาสให้ผู้เรียนได้คิดร่วมกันแลกเปลี่ยนประสบการณ์ความคิด เหตุผลซึ่งกันและกันได้เรียนรู้สภาพอารมณ์ ความรู้สึกนึกคิดของคนในกลุ่ม เพื่อเป็นแนวคิดไปใช้ให้เป็นประโยชน์ในชีวิตประจำวัน ตามความเหมาะสมของแต่ละบุคคลตลอดจนเพื่อจะเรียนรู้และรับผิดชอบงานของผู้อื่นเสมือนงานของตนโดยมุ่งเน้นผลประโยชน์และความสำเร็จของกลุ่ม โดยการจัดการเรียนรู้โดยใช้รูปแบบ STAD เป็นรูปแบบการจัดการเรียนรู้ที่ Robert Slavin และคณะจากมหาวิทยาลัย John Hopkins ได้ร่วมมือกันพัฒนาขึ้น เป็นการจัดการเรียนรู้แบบร่วมมือรูปแบบหนึ่งคล้ายกับเทคนิค TGT ที่แบ่งผู้เรียนที่มีความสามารถแตกต่างกันออกเป็นกลุ่มเพื่อทำงานร่วมกัน กลุ่มละประมาณ 4-5 คน โดยกำหนดให้สมาชิกของกลุ่มได้เรียนรู้ในเนื้อหาสาระที่ผู้สอนจัดเตรียมไว้แล้ว และให้ทำการทดสอบความรู้ที่ได้รับคะแนนที่ได้จากการทดสอบของสมาชิกแต่ละคนนำเอามาบวกเป็นคะแนนรวมของทีม ผู้สอนจะต้องใช้วิธีเสริมแรง

หลักการพื้นฐานของรูปแบบการเรียนแบบเป็นทีมของ Robert E. Slavin ประกอบด้วย 1) การให้รางวัลเป็นทีม (Team Rewards) ซึ่งเป็นวิธีการหนึ่งในการวางเงื่อนไขให้นักเรียนพึ่งพากัน 2) การจัดสภาพการณ์ให้เกิดความรับผิดชอบในส่วนบุคคลที่จะเรียนรู้ (Individual Accountability) ความสำเร็จของทีมหรือกลุ่มอยู่ที่การเรียนรู้ของสมาชิกแต่ละคนในทีม 3) การจัดให้มีโอกาสเท่าเทียมกันที่จะประสบความสำเร็จ (Equal Opportunities For Success)นักเรียนมีส่วนช่วยให้ทีมประสบความสำเร็จด้วยการพยายามทำผลงานให้ดีขึ้นกว่าเดิมในรูปของคะแนนปรับปรุง ดังนั้น แม้แต่คนที่เรียนอ่อนก็สามารถมีส่วนช่วยทีมได้ ด้วยการพยายามทำคะแนนให้ดีกว่าครั้งก่อนๆ นักเรียนทั้งเก่ง ปานกลาง และอ่อนต่างได้รับการส่งเสริมให้ตั้งใจเรียนให้ดีสุด ผลงานของทุกคนในทีมมีค่าภายใต้รูปแบบการจัดกิจกรรมการเรียนแบบนี้ แนวทางการจัดการเรียนรู้ขั้นตอนการสอนแบบร่วมมือด้วยเทคนิค STAD ที่ Slavin ได้เสนอไว้ ประกอบไปด้วย 5 ขั้นตอนหลักดังนี้ (Slavin,1995: 71-73) 1. การนำเสนอสิ่งที่ต้องเรียน (Class Presentation) ครูเป็นผู้นำเสนอสิ่งที่นักเรียนต้องเรียน ไม่ว่าจะเป็นมโนทัศน์ ทักษะและ/หรือกระบวนการ การนำเสนอสิ่งที่ต้องเรียนนี้อาจใช้การบรรยาย การสาธิตประกอบการบรรยาย การใช้วิดีทัศน์ หรือแม้แต่การให้นักเรียนลงมือปฏิบัติการทดลองตามหนังสือเรียน 2. การทำงานเป็นกลุ่ม (Teams) ครูจะแบ่งนักเรียนออกเป็นกลุ่มๆ แต่ละกลุ่มจะประกอบด้วยนักเรียนประมาณ 4-5 คน ที่มีความสามารถแตกต่างกัน มีทั้งเพศหญิงและเพศชาย และมีหลายเชื้อชาติ ครูต้องชี้แจงให้นักเรียนในกลุ่มได้ทราบถึงหน้าที่ของสมาชิกในกลุ่มว่านักเรียนต้องช่วยเหลือกันเรียนร่วมกันอภิปรายปัญหาร่วมกัน ตรวจสอบคำตอบของงานที่ได้รับมอบหมายและแก้ไขคำตอบร่วมกัน สมาชิกทุกคนในกลุ่มต้องทำงานให้ดีที่สุดเพื่อให้เกิดการเรียนรู้ ให้กำลังใจและทำงานร่วมกันได้หลังจากครูจัดกลุ่มเสร็จเรียบร้อยแล้ว ควรให้นักเรียนแต่ละกลุ่มทำงานร่วมกันจากใบงานที่ครูเตรียมไว้ ครูอาจจัดเตรียมใบงานที่มีคำถามสอดคล้องกับวัตถุประสงค์ของบทเรียน เพื่อใช้เป็นบทเรียนของการเรียนแบบร่วมมือ ครูควรบอกนักเรียนว่า ใบงานนี้ออกแบบมาให้นักเรียนช่วยกันตอบคำถาม เพื่อเตรียมตัวสำหรับการทดสอบย่อย สมาชิกแต่ละคนในกลุ่มจะต้องช่วยกันตอบคำถาม เพื่อเตรียมตัวสำหรับการทดสอบย่อย สมาชิกแต่ละคนในกลุ่มจะต้องช่วยกันตอบคำถามทุกคำถาม โดยแบ่งกันตอบคำถามเป็นคู่ๆ และเมื่อตอบคำถามเสร็จแล้วก็จะเอาคำตอบมาแลกเปลี่ยนกัน โดยสมาชิกแต่ละคนจะต้องมีความรับผิดชอบซึ่งกันและกันในการตอบคำถามแต่ละข้อให้ได้ ใน

การกระตุ้นให้สมาชิกแต่ละคนมีความรับผิดชอบซึ่งกันและกันควรปฏิบัติดังต่อไปนี้ 2.1) ต้องแน่ใจว่าสมาชิกแต่ละคนในกลุ่ม สามารถตอบคำถามแต่ละข้อได้อย่างถูกต้อง 2.2) ให้นักเรียนช่วยกันตอบคำถามทุกข้อให้ได้โดยไม่ต้องขอความช่วยเหลือจาก เพื่อนนอกกลุ่มหรือขอความช่วยเหลือจากครูให้น้อยลง 2.3) ต้องให้แน่ใจว่าสมาชิกแต่ละคนสามารถอธิบายคำตอบแต่ละข้อได้ ถ้าคำถามแต่ละข้อเป็นแบบเลือกตอบ 3.การทดสอบย่อย (Quizzes) หลังจากที่นักเรียนแต่ละกลุ่มทำงานเสร็จเรียบร้อยแล้ว ครูก็ทำการทดสอบย่อยนักเรียน โดยนักเรียนต่างคนต่างทำ เพื่อเป็นการประเมินความรู้ที่ นักเรียนได้เรียนมา สิ่งนี้จะเป็น ตัวกระตุ้นความรับผิดชอบของนักเรียน 4.คะแนนพัฒนาการของนักเรียนแต่ละคน (Individual Improvement Score) คะแนนพัฒนาการของนักเรียนจะเป็นตัวกระตุ้นให้นักเรียนทำงานหนักขึ้น ในการทดสอบแต่ละครั้งครูจะมีคะแนนพื้นฐาน (Base Score) ซึ่งเป็นคะแนนต่ำสุดของนักเรียนในการทดสอบย่อยแต่ละครั้ง ซึ่งคะแนนพัฒนาการของนักเรียนแต่ละคนได้ จากความแตกต่างระหว่างคะแนนพื้นฐาน (คะแนนต่ำสุดในการทดสอบ) กับคะแนนที่นักเรียนสอบได้ในการทดสอบย่อยนั้นๆ ส่วนคะแนนของกลุ่ม (Team Score) ได้จากการรวมคะแนนพัฒนาการของนักเรียนทุกคนในกลุ่มเข้าด้วยกัน 5.การรับรอง ผลงานของกลุ่ม (Team Recognition) โดยการประกาศคะแนนของกลุ่มแต่ละกลุ่มให้ทราบพร้อมกับให้คำชมเชย หรือให้ ประกาศนียบัตรหรือให้ รางวัลกับกลุ่มที่มีคะแนนพัฒนาการของกลุ่มสูงสุด โปรดจำไว้ว่า คะแนนพัฒนาการของนักเรียนแต่ละ คนมีความสำคัญเท่าเทียมกับคะแนนที่นักเรียนแต่ละคนได้รับจากการทดสอบ ตัวอย่างเกณฑ์ระดับคุณภาพ คะแนนการ พัฒนา ระดับคุณภาพ เทคนิคการเรียนรู้แบบร่วมมือรูปแบบ STAD ส่วนประกอบของกิจกรรมการเรียนแบบ STAD (Student Teams Achievement Divisions) มีส่วนประกอบพื้นฐานที่สำคัญอยู่ 2 ส่วน คือ 1) กลุ่มหรือทีม (Student Teams) 2) กลุ่มสัมฤทธิ์ (Achievement Divisions) ส่วนประกอบทั้งสองส่วนมีความสำคัญต่อการจัดการเรียนการสอนดังนี้ 1. กลุ่มหรือ ทีม (Student Teams) กลุ่มนักเรียนในกิจกรรมการเรียนการสอนแบบ STAD นั้น ในแต่ละกลุ่มหรือทีม จะมีสมาชิก 4-5 คน ซึ่งประกอบด้วยนักเรียนที่มีผลสัมฤทธิ์ทางการเรียนสูง ปานกลางและต่ำ นักเรียนที่มีผิวขาว ผิวดำ ต่างชาติและต่างเพศ สมาชิกในแต่ละกลุ่มหรือทีมจะต้องร่วมมือกันให้ความช่วยเหลือซึ่งกันและกันในด้านการเรียน เพื่อที่จะให้แต่ละคนมีความรู้ ความเข้าใจในเนื้อหาที่เรียน ในแต่ละกลุ่มหรือทีมจะต้องเตรียมสมาชิกประมาณสัปดาห์ละ 2 ครั้ง คะแนนที่แต่ละคนทำได้จะ ถูกแปลงให้เป็นคะแนนของแต่ละกลุ่ม โดยใช้ระบบผลสัมฤทธิ์ จากนั้นนำคะแนนที่ได้มารวมกันเพื่อเป็นคะแนนของกลุ่มหรือ ข่าว หรือทีม ในแต่ละสัปดาห์จะมีการประกาศผลทีมที่ได้คะแนนสูงสุดในลักษณะของจดหมายข่าว (Newsletter) สมาชิก ภายในกลุ่มหรือทีมจะร่วมมือกันในการทำงานเพื่อที่จะแข่งขันกับกลุ่มหรือทีมอื่น 2. ระบบกลุ่มสัมฤทธิ์ (Achievement Divisions) ระบบกลุ่มสัมฤทธิ์เป็นวิธีทางที่จะช่วยให้เด็กทุกระดับความสามารถทางการเรียนสามารถที่จะทำคะแนนได้สูงสุด เต็มความสามารถของตนเอง ระบบกลุ่มสัมฤทธิ์จะเริ่มจากการนำคะแนนทดสอบของครั้งที่ผ่านมาของนักเรียนทุกคน มา เรียงลำดับจากคะแนนมากที่สุดไปหาน้อยที่สุด นักเรียนที่ได้คะแนนสูงสุด 6 คนแรก จะถือได้ว่าเป็นกลุ่มผลสัมฤทธิ์ที่ 1(Divisions 1) นักเรียนที่ได้คะแนนรองลงไปอีก 6 คน จะถือว่าเป็นกลุ่มสัมฤทธิ์ที่ 2 (Divisions2) เช่นนี้ไปเรื่อยๆ ระบบกลุ่ม สัมฤทธิ์นี้จะใช้สำหรับคะแนนการทดสอบที่นักเรียนแต่ละคน ได้รับจากการทดสอบแต่ละครั้งให้เป็นคะแนนของกลุ่มหรือทีม ของตนโดยการแปลงคะแนนนี้จะพิจารณาของนักเรียนในแต่ละกลุ่มสัมฤทธิ์ (Achievement Divisions) โดยนักเรียนได้ คะแนนสูงสุดในแต่ละกลุ่มสัมฤทธิ์จะได้รับคะแนนสำหรับกลุ่มหรือทีมของตนอยู่ 8 คะแนน นักเรียนที่ได้เป็นอันดับสองของแต่ ละกลุ่มสัมฤทธิ์จะได้คะแนนสำหรับกลุ่มหรือทีมของตนเท่ากับ 6 คะแนน ส่วนนักเรียนที่ได้คะแนนเป็นอันดับ การเรียนโดยใช้ กิจกรรมการเรียนแบบ STAD สมาชิกในกลุ่มทุกคนต้องปฏิบัติตามหลักการพื้นฐาน 5 ประการดังต่อไปนี้ 1. การพึ่งพาอาศัยซึ่ง กันและกันเชิงบวก (Positive Interdependent) นักเรียนจะรู้สึกว่าตนจำเป็นจะต้องอาศัยผู้อื่น ในการที่จะทำงานกลุ่มให้ สำเร็จ กล่าวคือ "ร่วมเป็นร่วมตาย" วิธีการที่จะทำให้เกิดความรู้สึกแบบนี้ อาจจะทำได้โดยให้มีจุดมุ่งหมายร่วมกัน เช่น ถ้า นักเรียนทำคะแนนกลุ่มได้สูง แต่ละคนจะได้รับรางวัลร่วมกันประเด็นที่สำคัญคือ สมาชิกทุกคนในกลุ่มจะต้องทำงานกลุ่มให้ เป็นผลสำเร็จ ซึ่งความสำเร็จนี้จะขึ้นอยู่กับความร่วมมือร่วมใจของสมาชิกทุกคน จะไม่มีการยอมรับความสำคัญหรือ

ความสามารถของบุคคลเพียงคนเดียว 2. การติดต่อสัมพันธ์โดยตรง (Face to Face Promotive Interaction) เนื่องจากการ พึ่งพาอาศัยซึ่งกันและกันเชิงบวก มิใช่จะทำให้เกิดผลอย่างปาฏิหารย์ แต่ผลที่เกิดขึ้นจากการพึ่งพาอาศัยซึ่งกันและกันนั้น จะต้องมีการพูดคุย แลกเปลี่ยนความคิดเห็นซึ่งกันและกัน โดยเปิดโอกาสให้สมาชิกได้เสนอแนวคิดใหม่ๆ เพื่อเลือกสิ่งที่ดี สิ่งที่ ถูกต้องและเหมาะสม 3. การรับผิดชอบงานของกลุ่ม (Individual Accountability at Group Work)การเรียนโดยใช้กิจกรรม การเรียนแบบ STAD จะถือว่าไม่สำเร็จจนกว่าสมาชิกทุกคนในกลุ่มจะได้เรียนรู้เรื่องในบทเรียนได้ทุกคน เพราะฉะนั้นจึง จำเป็นต้องวัดผลการเรียนของแต่ละคน เพื่อให้ สมาชิกในกลุ่มได้ช่วยเหลือเพื่อนที่เรียนไม่เก่ง บางทีครูอาจจะใช้วิธีทดสอบ สมาชิกในกลุ่มเป็นรายบุคคลหรือสุ่มเรียกบุคคลใดบุคคลหนึ่งในกลุ่มเป็นผู้ตอบ ซึ่งกลุ่มจะต้องช่วยกันเรียนรู้และช่วยกันทำงาน มีความรับผิดชอบงานของตนเป็นพื้นฐานซึ่งทุกคนจะต้องเข้าใจ และรู้แจ้งในงานที่ตนรับผิดชอบอันจะก่อให้เกิดผลสำเร็จ ตามมา 4. ทักษะในความสัมพันธ์กับกลุ่มเล็กและผู้อื่น (Social Skills) นักเรียนทุกคนไม่ได้มาโรงเรียนพร้อมกับทักษะในการ ติดต่อสัมพันธ์กับผู้อื่น เพราะฉะนั้นจึงเป็นหน้าที่ของครูที่จะช่วยนักเรียนในการสื่อสารการเป็นผู้นำ การไว้ใจผู้อื่น การตัดสินใจ การแก้ปัญหาความขัดแย้ง ครูควรแจ้งสถานการณ์ที่จะส่งเสริมให้นักเรียนได้ใช้ทักษะมนุษยสัมพันธ์เพื่อให้สามารถทำงานได้ อย่างมีประสิทธิภาพ นอกจากนั้นครูควรสอนทักษะและมีการประเมินการทำงานของกลุ่มนักเรียนด้วย การที่จัดนักเรียนที่ขาด ทักษะในการทำงานกลุ่มมาทำงานร่วมกัน จะทำให้การทำงานนั้นไม่ประสบผลสำเร็จ เพราะกิจกรรมการเรียนแบบ STAD ไม่ได้หมายถึงแต่เพียงการที่จัดให้นักเรียนมานั่งทำงานเป็นกลุ่มเท่านั้น ซึ่งจุดนี้เป็นหลักการหนึ่งที่ทำให้นักเรียนที่เรียนโดยการ ใช้กิจกรรมการเรียนแบบ STAD แตกต่างจากการเรียนเป็นกลุ่มแบบเดิมที่เคยใช้กันมานาน 5. กระบวนการกลุ่ม (Group Processing) กระบวนการกลุ่ม หมายถึง การให้นักเรียนมีเวลาและใช้กระบวนการในการวิเคราะห์ว่ากลุ่มทำงานได้เพียงใด และสามารถใช้ทักษะสังคมและมนุษยสัมพันธ์ได้อย่างเหมาะสมกับกระบวนการกลุ่มนี้ช่วยให้สมาชิกในกลุ่มทำงานได้ผล สามารถจัดกระบวนการกลุ่ม และสามารถแก้ปัญหาด้วยตัวของพวกเขาเอง ทั้งนี้ข้อมูลย้อนกลับจากครูหรือเพื่อนนักเรียนที่ เป็นผู้สังเกต จะช่วยให้กลุ่มดำเนินการได้เป็นอย่างดี และมีประสิทธิภาพมากขึ้น

      ดังนั้น ผู้วิจัยจึงมีความสนใจที่จะศึกษา เรื่อง การสร้างนวัตกรรมแบบง่ายจากการออกแบบการเรียนรู้แบบ STAD ของนักเรียนระดับมัธยมศึกษาตอนต้นเพื่อพัฒนาความสามารถเชิงการแก้ปัญหาเป็นทีม เพื่อให้สอดคล้องกับแนวคิดการ จัดการเรียนรู้เพื่อพัฒนาทักษะการสอนของนักศึกษาครูประถมศึกษาที่มีความซับซ้อนในเชิงของการออกแบบการแก้ปัญหาใน ชั้นเรียนเพื่อให้สอดคล้องกับพฤติกรรมของผู้เรียนในแต่ละช่วงชั้น ความคิดเชิงสร้างสรรค์เชิงวิทยาศาสตร์

2. วัตถุประสงค์ของการวิจัย

      เพื่อศึกษาผลสัมฤทธิ์ทางการเรียนการสร้างนวัตกรรมแบบง่ายจากการออกแบบการเรียนรู้แบบ STAD ของนักเรียน ระดับมัธยมศึกษาตอนต้นเพื่อพัฒนาความสามารถเชิงการแก้ปัญหาเป็นทีม

3. สมมติฐานการวิจัย

      ผลสัมฤทธิ์ทางการเรียนการสร้างนวัตกรรมแบบง่ายจากการออกแบบการเรียนรู้แบบ STAD ของนักเรียนระดับ มัธยมศึกษาตอนต้นเพื่อพัฒนาความสามารถเชิงการแก้ปัญหาเป็นทีม หลังเรียนสูงกว่าก่อนเรียน

4. วิธีดำเนินการวิจัย

      การวิจัยครั้งนี้เป็นการวิจัยเชิงทดลองเบื้องต้น (Pre-Experimental design) ใช้แบบแผนการวิจัยแบบกลุ่มเดียว สอบก่อนสอบหลัง (One group pretest-posttest design) โดยมีรายละเอียดวิธีดำเนินการวิจัยดังต่อไปนี้

การประชุมวิชาการระดับชาติและนานาชาติบ้านสมเด็จเจ้าพระยา ครั้งที่ 1 (BS2C 2025)
The 1st Bansomdejchaopraya National and International Conference (BS2C 2025)

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ประชากรและกลุ่มตัวอย่าง

ประชากร ได้แก่ นักเรียนชั้นมัธยมศึกษาปีที่ 1 โรงเรียนทุ่งกุลาวิทยาคาร จังหวัดสุรินทร์ ภาคเรียนที่ 2 ปีการศึกษา 2567 จำนวนรวมนักเรียน 10 คน

กลุ่มตัวอย่าง ได้แก่ นักเรียนชั้นมัธยมศึกษาปีที่ 1 โรงเรียนทุ่งกุลาวิทยาคาร จังหวัดสุรินทร์ ภาคเรียนที่ 2 ปีการศึกษา 2567 ด้วยวิธีการเลือกแบบเฉพาะเจาะจง (Purposive Sampling) จำนวน 10 คน

เครื่องมือที่ใช้ในการวิจัย

เครื่องมือที่ใช้ในการเก็บรวบรวมข้อมูล ประกอบด้วย แบบทดสอบวัดความรู้ความเข้าใจ มีความยากง่ายอยู่ระหว่าง 0.20-0.80 มีค่าอำนาจจำแนกมากกว่า 0.20 มีค่าความเชื่อมั่น เท่ากับ .85

เครื่องมือที่ใช้ในการวิจัยครั้งนี้ ประกอบด้วย

1) แผนการจัดการเรียนรู้วิชาวิทยาศาสตร์ ทางการเรียนการสร้างนวัตกรรมแบบง่ายจากการออกแบบการเรียนรู้แบบ STAD ของนักเรียนระดับมัธยมศึกษาตอนต้นเพื่อพัฒนาความสามารถเชิงการแก้ปัญหาเป็นทีม

2) แบบทดสอบวัดผลสัมฤทธิ์ทางการเรียนวิทยาศาสตร์วิชาวิทยาศาสตร์ การเรียนการสร้างนวัตกรรมแบบง่ายจากการออกแบบการเรียนรู้แบบ STAD ของนักเรียนระดับมัธยมศึกษาตอนต้นเพื่อพัฒนาความสามารถเชิงการแก้ปัญหาเป็นทีม

ขั้นตอนการสร้างเครื่องมือ

1) ศึกษาหลักสูตรแกนกลางการศึกษาขั้นพื้นฐาน พุทธศักราช 2551

2) วิเคราะห์คำอธิบายรายวิชา สาระการเรียนรู้และหน่วยการเรียนรู้

3) วิเคราะห์ตัวชี้วัด เพื่อนำมาเขียนเป็นจุดประสงค์การเรียนรู้โดยให้ควบคุมพฤติกรรมด้านความรู้ ทักษะกระบวนการ เจตคติ

4) วิเคราะห์สาระการเรียนรู้โดยเลือกเนื้อหาสาระการเรียนรู้ให้สอดคล้องกับผู้เรียน ชุมชนและท้องถิ่น

5) วิเคราะห์การประเมินผลโดยการเลือกสื่อและแหล่งการเรียนรู้ทั้งในและนอกห้องเรียน ให้เหมาะสมและสอดคล้องกับกระบวนการเรียนรู้

6) ขั้นออกแบบและจัดทำแผนการจัดการเรียนรู้ ซึ่งมีองค์ประกอบดังนี้

- เวลาเรียน
- สาระสำคัญ
- จุดประสงค์การเรียนรู้
- สาระการเรียนรู้
- กิจกรรมการเรียนรู้
- สื่อการเรียนรู้
- การวัดผลประเมินผล
- บันทึกผลหลังการสอน

การเก็บรวมรวมข้อมูล

ในการวิจัยครั้งนี้ ผู้วิจัยทำการทดลองและเก็บรวบรวมข้อมูลกลุ่มตัวอย่าง ในภาคเรียนที่ 2 ปีการศึกษา 2567 โดยดำเนินการเก็บรวบรวมข้อมูล ดังนี้

1) ผู้วิจัยวิเคราะห์ปัญหาการจัดการเรียนรู้วิชาวิทยาศาสตร์ การเรียนการสร้างนวัตกรรมแบบง่ายจากการออกแบบการเรียนรู้แบบ STAD ของนักเรียนระดับมัธยมศึกษาตอนต้นเพื่อพัฒนาความสามารถเชิงการแก้ปัญหาเป็นทีม จากการสอบถามครูและสัมภาษณ์ นักเรียนที่เคยเรียนเรื่องนี้มาแล้ว รวมทั้งศึกษาสภาพสังคมของชุมชนของนักเรียน

2) ปฐมนิเทศชี้แจงวัตถุประสงค์ของการวิจัยให้นักเรียนกลุ่มตัวอย่างทราบ และอธิบายถึงบทบาทหน้าที่ของนักเรียนและผู้วิจัย

3) ผู้วิจัยทำการทดสอบก่อนการทดลอง (Pretest) โดยให้นักเรียนได้ทำแบบทดสอบวัดผลสัมฤทธิ์ทางการเรียนวิชาวิทยาศาสตร์ การเรียนการสร้างนวัตกรรมแบบง่ายจากการออกแบบการเรียนรู้แบบ STAD ของนักเรียนระดับมัธยมศึกษาตอนต้นเพื่อพัฒนาความสามารถเชิงการแก้ปัญหาเป็นทีม ฉบับจริงที่ผู้วิจัยสร้างขึ้น จำนวน 10 ข้อ โดยมีระยะเวลาทำแบบทดสอบ 30 นาที

4) ดำเนินการจัดการวิชาวิทยาศาสตร์ การเรียนการสร้างนวัตกรรมแบบง่ายจากการออกแบบการเรียนรู้แบบ STAD ของนักเรียนระดับมัธยมศึกษาตอนต้นเพื่อพัฒนาความสามารถเชิงการแก้ปัญหาเป็นทีม

5) เมื่อสิ้นสุดการจัดการเรียนรู้ตามแผนที่วางไว้ จึงทำการทดสอบวัดหลังการทดลอง (Post-test) โดยนำแบบทดสอบวัดผลสัมฤทธิ์ทางการเรียนวิชาวิทยาศาสตร์ การเรียนการสร้างนวัตกรรมแบบง่ายจากการออกแบบการเรียนรู้แบบ STAD ของนักเรียนระดับมัธยมศึกษาตอนต้นเพื่อพัฒนาความสามารถเชิงการแก้ปัญหาเป็นทีม ฉบับเดิม ที่ใช้ทำการทดสอบก่อนการทดลอง มาให้นักเรียนทดสอบอีกครั้ง มีระยะเวลาในการทำแบบทดสอบ 20 นาที

6) ผู้วิจัยนำข้อมูลที่ได้จากคะแนนผลการเรียนระหว่างเรียน และคะแนนจากการทำแบบทดสอบวัดผลสัมฤทธิ์ทางการเรียนวิชาวิทยาศาสตร์ การเรียนการสร้างนวัตกรรมแบบง่ายจากการออกแบบการเรียนรู้แบบ STAD ของนักเรียนระดับมัธยมศึกษาตอนต้นเพื่อพัฒนาความสามารถเชิงการแก้ปัญหาเป็นทีม วิเคราะห์ด้วยวิธีการทางสถิติ โดยใช้โปรแกรมคอมพิวเตอร์ และเก็บรวบรวมข้อมูลเชิงคุณภาพ ประมวลผลและเรียบเรียงนำเสนอในรูปความเรียง

การวิเคราะห์ข้อมูล

ในการวิเคราะห์ข้อมูลเกี่ยวกับผลสัมฤทธิ์ทางการเรียนวิชาวิทยาศาสตร์ การเรียนการสร้างนวัตกรรมแบบง่ายจากการออกแบบการเรียนรู้แบบ STAD ของนักเรียนระดับมัธยมศึกษาตอนต้นเพื่อพัฒนาความสามารถเชิงการแก้ปัญหาเป็นทีม ผู้วิจัยดำเนินการโดยใช้โปรแกรมสำเร็จรูปทางสถิติ ตามขั้นตอนดังนี้

1) วิเคราะห์ผลสัมฤทธิ์ทางการเรียนวิชาวิทยาศาสตร์ การเรียนการสร้างนวัตกรรมแบบง่ายจากการออกแบบการเรียนรู้แบบ STAD ของนักเรียนระดับมัธยมศึกษาตอนต้นเพื่อพัฒนาความสามารถเชิงการแก้ปัญหาเป็นทีม

2) เปรียบเทียบคะแนนผลสัมฤทธิ์ทางการเรียนวิชาวิทยาศาสตร์ การเรียนการสร้างนวัตกรรมแบบง่ายจากการออกแบบการเรียนรู้แบบ STAD ของนักเรียนระดับมัธยมศึกษาตอนต้นเพื่อพัฒนาความสามารถเชิงการแก้ปัญหาเป็นทีม ระหว่างก่อนและหลังการจัดการเรียนรู้ โดยใช้สถิติการทดสอบที ชนิดกลุ่มตัวอย่างไม่เป็นอิสระต่อกัน (t-test for Dependent)

สถิติที่ใช้ในการวิจัย

วิเคราะห์ข้อมูลโดยใช้สถิติค่าเฉลี่ย ($\overline{X}$) ส่วนเบี่ยงเบนมาตรฐาน (S.D.) และใช้การทดสอบค่าที (t-test for Dependent)

5. ผลการวิจัย

ผลการเปรียบเทียบคะแนนผลสัมฤทธิ์ทางการเรียนวิชาวิทยาศาสตร์ เรื่อง การเรียนการสร้างนวัตกรรมแบบง่ายจากการออกแบบการเรียนรู้แบบ STAD ของนักเรียนระดับมัธยมศึกษาตอนต้นเพื่อพัฒนาความสามารถเชิงการแก้ปัญหาเป็นทีม ปรากฏผลดังตารางที่ 1

ตารางที่ 1 ผลการเปรียบเทียบคะแนนผลสัมฤทธิ์ทางการเรียนวิชาวิทยาศาสตร์ การเรียนการสร้างนวัตกรรมแบบง่ายจากการ
ออกแบบการเรียนรู้แบบ STAD ของนักเรียนระดับมัธยมศึกษาตอนต้นเพื่อพัฒนาความสามารถเชิงการแก้ปัญหา
เป็นทีม

กลุ่ม ตัวอย่าง	n	คะแนน เต็ม	ก่อนเรียน		หลังเรียน		t	df	sig
			$\overline{\text{X}}$	S.D.	$\overline{\text{X}}$	S.D.			
ผู้เรียน	10	10	4.62	1.73	9.18	0.56	-18.55	9	.000

*ค่านัยสำคัญทางสถิติที่ระดับ .05

จากตารางที่ 1 ผลการเปรียบเทียบคะแนนผลสัมฤทธิ์ทางการเรียนก่อนเรียน และหลังเรียนวิชาวิทยาศาสตร์ การ
เรียนการสร้างนวัตกรรมแบบง่ายจากการออกแบบการเรียนรู้แบบ STAD ของนักเรียนระดับมัธยมศึกษาตอนต้นเพื่อพัฒนา
ความสามารถเชิงการแก้ปัญหาเป็นทีม พบว่า คะแนนทดสอบหลังเรียนสูงกว่าคะแนนการทดสอบก่อนเรียน อย่างมีนัยสำคัญ
ทางสถิติที่ระดับ .05 จึงกล่าวได้ว่า คะแนนก่อนเรียน และหลังเรียน มีความแตกต่างกันจริง โดยคะแนนหลังเรียนมีค่าสูงกว่า
ก่อนเรียน และแสดงว่านักเรียนมีการพัฒนาผลการเรียนสูงขึ้น หลังจากการใช้ชุดกิจกรรมการเรียนรู้วิชาวิทยาศาสตร์ การ
เรียนการสร้างนวัตกรรมแบบง่ายจากการออกแบบการเรียนรู้แบบ STAD ของนักเรียนระดับมัธยมศึกษาตอนต้นเพื่อพัฒนา
ความสามารถเชิงการแก้ปัญหาเป็นทีม

6. สรุปและอภิปรายผล

การศึกษาวิจัยครั้งนี้เป็นการวิจัย การเรียนการสร้างนวัตกรรมแบบง่ายจากการออกแบบการเรียนรู้แบบ STAD ของ
นักเรียนระดับมัธยมศึกษาตอนต้นเพื่อพัฒนาความสามารถเชิงการแก้ปัญหาเป็นทีม สามารถนำมาอภิปรายผลได้ดังนี้ นักเรียน
สามารถประกอบการประดิษฐ์ของเล่นแบบง่ายๆจากวัสดุท้องถิ่นและมีการทำงานเป็นทีม เข้าใจความสัมพันธ์เชิงเหตุผลทาง
วิทยาศาสตร์ ซึ่งสอดคล้องกับ การจัดการเรียนรู้วัดผลการเรียนของแต่ละคน เพื่อให้ สมาชิกในกลุ่มได้ช่วยเหลือเพื่อนที่เรียน
ไม่เก่ง บางทีครูอาจจะใช้วิธีทดสอบสมาชิกในกลุ่มเป็นรายบุคคลหรือสุ่มเรียกบุคคลใดบุคคลหนึ่งในกลุ่มเป็นผู้ตอบ ซึ่งกลุ่ม
จะต้องช่วยกันเรียนรู้และช่วยกันทำงาน มีความรับผิดชอบงานของตนเป็นพื้นฐานซึ่งทุกคนจะต้องเข้าใจ และรู้แจ้งในงานที่ตน
รับผิดชอบอันจะก่อให้เกิดผลสำเร็จตามมา 4. ทักษะในความสัมพันธ์กับกลุ่มเล็กและผู้อื่น (Social Skills) นักเรียนทุกคนไม่
ได้มาโรงเรียนพร้อมกับทักษะในการติดต่อสัมพันธ์กับผู้อื่น เพราะฉะนั้นจึงเป็นหน้าที่ของครูที่จะช่วยนักเรียนในการสื่อสารการ
เป็นผู้นำ การไว้ใจผู้อื่น การตัดสินใจ การแก้ปัญหาความขัดแย้ง ครูควรแจ้งสถานการณ์ที่จะส่งเสริมให้นักเรียนได้ใช้ทักษะ
มนุษย์สัมพันธ์เพื่อให้สามารถทำงานได้อย่างมีประสิทธิภาพ นอกจากนั้นครูควรสอนทักษะและมีการประเมินการทำงานของ
กลุ่มนักเรียนด้วย การที่จัดนักเรียนที่ขาดทักษะในการทำงานกลุ่มมาทำงานร่วมกัน จะทำให้การทำงานนั้นไม่ประสบผลสำเร็จ
เพราะกิจกรรมการเรียนแบบ STAD ไม่ได้หมายถึงแต่เพียงการที่จัดให้นักเรียนมานั่งทำงานเป็นกลุ่มเท่านั้น ซึ่งจุดนี้เป็น
หลักการหนึ่งที่ทำให้นักเรียนที่เรียนโดยการใช้กิจกรรมการเรียนแบบ STAD แตกต่างจากการเรียนเป็นกลุ่มแบบเดิมที่เคยใช้
กันมานาน 5. กระบวนการกลุ่ม (Group Processing) กระบวนการกลุ่ม หมายถึง การให้นักเรียนมีเวลาและใช้กระบวนการใน
การวิเคราะห์ว่ากลุ่มทำงานได้เพียงใด และสามารถใช้ทักษะสังคมและมนุษย์สัมพันธ์ได้อย่างเหมาะสมกับกระบวนการกลุ่มนี้
ช่วยให้สมาชิกในกลุ่มทำงานได้ผล สามารถจัดกระบวนการกลุ่ม และสามารถแก้ปัญหาด้วยตัวของพวกเขาเอง ทั้งนี้ข้อมูล
ย้อนกลับจากครูหรือเพื่อนนักเรียนที่เป็นผู้สังเกต จะช่วยให้กลุ่มดำเนินการได้เป็นอย่างดี และมีประสิทธิภาพมากขึ้น

7. ข้อเสนอแนะ

ข้อเสนอแนะในการนำผลวิจัยไปใช้

1. ก่อนการจัดการเรียนรู้ทางการเรียนการสร้างนวัตกรรมแบบง่ายจากการออกแบบการเรียนรู้แบบ STAD ของนักเรียนระดับมัธยมศึกษาตอนต้นเพื่อพัฒนาความสามารถเชิงการแก้ปัญหาเป็นทีม และการแก้ปัญหาเชิงระบบครูผู้สอนควรมีความรู้ความเข้าใจในการจัดการเรียนรู้ตามแนวคิดสะเต็มศึกษาได้เป็นอย่างดี ครูผู้สอนควรเตรียมตัวและทำหน้าที่ตนเองให้พร้อมต่อการจัดการเรียนรู้ เช่น การวางแผนการจัดการเรียนรู้อย่างรอบคอบและมีประสิทธิภาพ การดำเนินการจัดการเรียนรู้ตามขั้นตอนที่วางแผนไว้เพื่อให้การจัดการเรียนรู้เป็นไปอย่างมีประสิทธิภาพ

2. ก่อนการจัดการเรียนรู้ ครูผู้สอนควรชี้แจงทำความเข้าใจให้นักเรียนเข้าใจรูปแบบการจัดการเรียนรู้ให้ชัดเจนเพื่อให้นักเรียนเข้าใจในบทบาทหน้าที่ของตนเอง โดยให้นักเรียนมีอิสระในด้านการคิด โดยครูผู้สอนมีหน้าที่คอยชี้แนะให้คำปรึกษาอย่างใกล้ชิด

3. ครูผู้สอนควรศึกษาการจัดการเรียนรู้การเรียนการเรียนการสร้างนวัตกรรมแบบง่ายจากการออกแบบการเรียนรู้แบบ STAD ของนักเรียนระดับมัธยมศึกษาตอนต้นเพื่อพัฒนาความสามารถเชิงการแก้ปัญหาเป็นทีม ให้เข้าใจอย่างลึกซึ้งเพื่อการจัดการเรียนรู้ที่มีประสิทธิภาพและเกิดประโยชน์ต่อผู้นักเรียนมากที่สุด

4. การจัดการเรียนรู้ผลสัมฤทธิ์ทางการเรียนการเรียนการสร้างนวัตกรรมแบบง่ายจากการออกแบบการเรียนรู้แบบ STAD ของนักเรียนระดับมัธยมศึกษาตอนต้นเพื่อพัฒนาความสามารถเชิงการแก้ปัญหาเป็นทีมมีข้อจำกัดเรื่องเวลา ครูผู้สอนควรยืดหยุ่นเรื่องระยะเวลาที่ใช้ในการดำเนินกิจกรรมในแต่ละขั้นตอนของการจัดการเรียนรู้ตามความเหมาะสม

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        สังเคราะห์ด้วยแสงของพืชโดยใช้การจัดกิจกรรมการเรียนรู้แบบร่วมมือรูปแบบ STAD ร่วมกับการใช้ผังมโนทัศน์
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(115-TH-EDU)

การพัฒนานักเรียนระดับประถมศึกษาด้วยเกมส์การเรียนรู้แบบ STEM ศึกษาเพื่อสร้างทักษะการคิดสร้างสรรค์ และการแก้ปัญหาเชิงระบบของนักเรียนโรงเรียนทุ่งกุลาวิทยาคาร จังหวัดสุรินทร์

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บทคัดย่อ

การวิจัยนี้มีวัตถุประสงค์เพื่อศึกษาผลสัมฤทธิ์การพัฒนานักเรียนระดับประถมศึกษาด้วยเกมส์การเรียนรู้แบบ STEM ศึกษาเพื่อสร้างทักษะการคิดสร้างสรรค์ และการแก้ปัญหาเชิงระบบของนักเรียนโรงเรียนทุ่งกุลาวิทยาคาร จังหวัดสุรินทร์ กลุ่มตัวอย่าง ได้แก่ นักเรียนชั้นมัธยมศึกษาปีที่ 1 โรงเรียนทุ่งกุลาวิทยาคาร จำนวน 10 คน ที่กำลังศึกษาอยู่ในภาคเรียนที่ 2 ปีการศึกษา 2567 ได้มาจากการเลือกด้วยวิธีเฉพาะเจาะจง (Purposive Sampling) เครื่องมือที่ใช้ในการเก็บรวบรวมข้อมูลประกอบด้วย แบบทดสอบวัดความรู้ความเข้าใจ มีความยากง่ายอยู่ระหว่าง 0.20-0.80 มีค่าอำนาจจำแนกมากกว่า 0.20 มีค่าความเชื่อมั่น เท่ากับ .85 วิเคราะห์ข้อมูลโดยใช้สถิติค่าเฉลี่ย ส่วนเบี่ยงเบนมาตรฐาน และใช้การทดสอบค่าที (t-test for Dependent)

ผลการวิจัย พบว่า

ผลสัมฤทธิ์การพัฒนานักเรียนระดับประถมศึกษาด้วยเกมส์การเรียนรู้แบบ STEM ศึกษาเพื่อสร้างทักษะการคิดสร้างสรรค์ และการแก้ปัญหาเชิงระบบของนักเรียนโรงเรียนทุ่งกุลาวิทยาคาร จังหวัดสุรินทร์ มีผลสัมฤทธิ์ทางการเรียนหลังเรียนสูงกว่าก่อนเรียนอย่างมีนัยสำคัญทางสถิติที่ระดับ .05

คำสำคัญ: เกมส์การเรียนรู้; แก้ปัญหาเชิงระบบ; ความคิดสร้างสรรค์; โรงเรียนทุ่งกุลาวิทยาคาร; STEM

การประชุมวิชาการระดับชาติและนานาชาติบ้านสมเด็จเจ้าพระยา ครั้งที่ 1 (BS2C 2025)
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Developing Elementary School Students with STEM Learning Games to Develop Creative Thinking Skills and Systemic Problem Solving of Thung Kula Witthayakarn School Students of Surin Province

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Abstract

This research aimed to study the achievement of primary school students with STEM learning games to develop creative thinking skills and systematic problem solving of students at Thung Kula Witthayakhan School, Surin Province. The sample group consisted of 10 Mathayom 1 students of Thung Kula Witthayakhan School who were studying in the second semester of the academic year 2024, selected by purposive sampling. The tools used to collect data consisted of a knowledge and understanding test with a difficulty level between 0.20-0.80, a discrimination power of more than 0.20, and a reliability value of .85. Data were analyzed using statistics of mean, standard deviation, and t-test for Dependent.

The research results found that:

The achievement of primary school students with STEM learning games to develop creative thinking skills and systematic problem solving of students at Thung Kula Witthayakhan School, Surin Province had significantly higher academic achievement after learning than before learning at a statistical level of .05.

Keywords: Learning games; Systemic problem solving; Creativity; Thung Kula Witthayakarn School; STEM.

การประชุมวิชาการระดับชาติและนานาชาติบ้านสมเด็จเจ้าพระยา ครั้งที่ 1 (BS2C 2025)
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1. บทนำ

การเรียนรู้ในปัจจุบันมีการเปลี่ยนแปลงไปอย่างมาก เพื่อให้สอดคล้องกับความต้องการของศตวรรษที่ 21 ซึ่งเน้นการพัฒนาทักษะที่จำเป็นสำหรับการเรียนรู้และการดำรงชีวิต เช่น การคิดสร้างสรรค์ การแก้ปัญหาเชิงระบบ และการทำงานร่วมกัน แนวคิด *STEM Education* (Science, Technology, Engineering, and Mathematics) ได้รับการยอมรับว่าเป็นวิธีการเรียนรู้ที่ส่งเสริมความสามารถดังกล่าว โดยเฉพาะเมื่อผสานกับกิจกรรมที่สร้างความสนุกสนานและความท้าทาย เช่น เกมส์การเรียนรู้ ซึ่งสามารถกระตุ้นความสนใจและการมีส่วนร่วมของผู้เรียนได้อย่างมีประสิทธิภาพ

ประเทศไทยได้ตระหนักถึงความสำคัญของการพัฒนาทักษะดังกล่าวและส่งเสริมการจัดการเรียนรู้ตามแนวคิด STEM อย่างกว้างขวาง โดยเน้นการประยุกต์ให้เหมาะสมกับบริบทของชุมชนและท้องถิ่น อย่างไรก็ตาม การบูรณาการแนวคิด STEM กับการเรียนรู้ในรูปแบบเกมส์ยังคงเป็นความท้าทายสำหรับครูและผู้สอน โดยเฉพาะในระดับประถมศึกษา เนื่องจากต้องออกแบบกิจกรรมที่เหมาะสมกับวัยและความสามารถของผู้เรียน

โรงเรียนทุ่งกุลาวิทยาคาร จังหวัดสุรินทร์ เป็นหนึ่งในพื้นที่ที่มีศักยภาพในการนำแนวคิด STEM ไปประยุกต์ใช้เพื่อพัฒนาทักษะการคิดสร้างสรรค์และการแก้ปัญหาเชิงระบบของนักเรียน การศึกษาวิจัยในครั้งนี้จึงมุ่งเน้นการพัฒนานักเรียนระดับประถมศึกษาผ่านการใช้เกมส์การเรียนรู้แบบ STEM โดยมีเป้าหมายเพื่อศึกษาผลสัมฤทธิ์ทางการเรียนที่เกิดขึ้น รวมถึงประเมินประสิทธิภาพของรูปแบบการเรียนรู้ดังกล่าว

ผลการศึกษาในเบื้องต้นพบว่า การใช้เกมส์การเรียนรู้แบบ STEM ช่วยส่งเสริมให้นักเรียนมีความกระตือรือร้นและสามารถพัฒนาความสามารถด้านการคิดวิเคราะห์เชิงระบบได้อย่างชัดเจน การวิจัยในครั้งนี้จึงเป็นการสร้างองค์ความรู้เพิ่มเติมเพื่อสนับสนุนการนำแนวทางดังกล่าวไปประยุกต์ใช้ในสถานศึกษาอื่นๆ นอกจากนี้ การวิจัยยังให้ความสำคัญกับการออกแบบเครื่องมือและกระบวนการที่เน้นการมีส่วนร่วมของนักเรียน เช่น การวางแผนการเรียนรู้ที่เหมาะสม การประเมินผลที่ชัดเจน และการจัดการกิจกรรมที่เอื้อให้ผู้เรียนได้ลงมือปฏิบัติจริง ข้อมูลเชิงคุณภาพและเชิงปริมาณที่ได้จากการวิจัยจะถูกนำไปใช้เพื่อพัฒนาวิธีการเรียนการสอนในอนาคต ในภาพรวม

การวิจัยครั้งนี้ไม่ได้มุ่งเน้นเพียงแค่การวัดผลสัมฤทธิ์ทางการเรียนเท่านั้น แต่ยังมีเป้าหมายในการสร้างรูปแบบการเรียนรู้ที่ยั่งยืนและสอดคล้องกับการเปลี่ยนแปลงของสังคมในยุคปัจจุบัน อีกทั้งยังเน้นการส่งเสริมความเข้าใจและความร่วมมือระหว่างครู นักเรียน และชุมชนเพื่อให้การเรียนรู้มีความหมายและเชื่อมโยงกับชีวิตประจำวันของนักเรียนมากยิ่งขึ้น

2. วัตถุประสงค์ของการวิจัย

เพื่อศึกษาผลสัมฤทธิ์การพัฒนานักเรียนระดับประถมศึกษาด้วยเกมส์การเรียนรู้แบบ STEM ศึกษาเพื่อสร้างทักษะการคิดสร้างสรรค์ และการแก้ปัญหาเชิงระบบของนักเรียนโรงเรียนทุ่งกุลาวิทยาคาร จังหวัดสุรินทร์

3. สมมติฐานการวิจัย

ผลสัมฤทธิ์การพัฒนานักเรียนระดับประถมศึกษาด้วยเกมส์การเรียนรู้แบบ STEM ศึกษาเพื่อสร้างทักษะการคิดสร้างสรรค์ และการแก้ปัญหาเชิงระบบของนักเรียนโรงเรียนทุ่งกุลาวิทยาคาร จังหวัดสุรินทร์ หลังเรียนสูงกว่าก่อนเรียน

4. วิธีดำเนินการวิจัย

การวิจัยครั้งนี้เป็นการวิจัยเชิงทดลองเบื้องต้น (Pre-Experimental design) ใช้แบบแผนการวิจัยแบบกลุ่มเดียวสอบก่อนสอบหลัง (One group pretest-posttest design) โดยมีรายละเอียดวิธีดำเนินการวิจัยดังต่อไปนี้

ประชากรและกลุ่มตัวอย่าง

ประชากร ได้แก่ นักเรียนชั้นมัธยมศึกษาปีที่ 1 โรงเรียนทุ่งกุลาวิทยาคาร จังหวัดสุรินทร์ ภาคเรียนที่ 2 ปีการศึกษา 2567 จำนวนรวมนักเรียน 10 คน

กลุ่มตัวอย่าง ได้แก่ นักเรียนชั้นมัธยมศึกษาปีที่ 1 โรงเรียนทุ่งกุลาวิทยาคาร จังหวัดสุรินทร์ ภาคเรียนที่ 2 ปีการศึกษา 2567 ด้วยวิธีการเลือกแบบเฉพาะเจาะจง (Purposive Sampling) จำนวน 10 คน

เครื่องมือที่ใช้ในการวิจัย

เครื่องมือที่ใช้ในการเก็บรวบรวมข้อมูล ประกอบด้วย แบบทดสอบวัดความรู้ความเข้าใจ มีความยากง่ายอยู่ระหว่าง 0.20-0.80 มีค่าอำนาจจำแนกมากกว่า 0.20 มีค่าความเชื่อมั่น เท่ากับ .85

เครื่องมือที่ใช้ในการวิจัยครั้งนี้ ประกอบด้วย

1) แผนการจัดการเรียนรู้วิชาวิทยาศาสตร์ เรื่อง วงจรไฟฟ้าอย่างง่าย

2) แบบทดสอบวัดผลสัมฤทธิ์ทางการเรียนวิทยาศาสตร์วิชาวิทยาศาสตร์ การพัฒนานักเรียนระดับประถมศึกษาด้วยเกมส์การเรียนรู้แบบ STEM ศึกษาเพื่อสร้างทักษะการคิดสร้างสรรค์ และการแก้ปัญหาเชิงระบบของนักเรียนโรงเรียนทุ่งกุลาวิทยาคาร จังหวัดสุรินทร์

ขั้นตอนการสร้างเครื่องมือ

1) ศึกษาหลักสูตรแกนกลางการศึกษาขั้นพื้นฐาน พุทธศักราช 2551

2) วิเคราะห์คำอธิบายรายวิชา สาระการเรียนรู้และหน่วยการเรียนรู้

3) วิเคราะห์ตัวชี้วัด เพื่อนำมาเขียนเป็นจุดประสงค์การเรียนรู้โดยให้ควบคุมพฤติกรรมด้านความรู้ ทักษะกระบวนการ เจตคติ

4) วิเคราะห์สาระการเรียนรู้โดยเลือกเนื้อหาสาระการเรียนรู้ให้สอดคล้องกับผู้เรียน ชุมชนและท้องถิ่น

5) วิเคราะห์การประเมินผลโดยการเลือกสื่อและแหล่งการเรียนรู้ทั้งในและนอกห้องเรียน ให้เหมาะสมและสอดคล้องกับกระบวนการเรียนรู้

6) ขั้นออกแบบและจัดทำแผนการจัดการเรียนรู้ ซึ่งมีองค์ประกอบดังนี้

- เวลาเรียน
- สาระสำคัญ
- จุดประสงค์การเรียนรู้
- สาระการเรียนรู้
- กิจกรรมการเรียนรู้
- สื่อการเรียนรู้
- การวัดผลประเมินผล
- บันทึกผลหลังการสอน

การเก็บรวมรวมข้อมูล

ในการวิจัยครั้งนี้ ผู้วิจัยทำการทดลองและเก็บรวบรวมข้อมูลกลุ่มตัวอย่าง ในภาคเรียนที่ 2 ปีการศึกษา 2567 โดยดำเนินการเก็บรวบรวมข้อมูล ดังนี้

1) ผู้วิจัยวิเคราะห์ปัญหาการจัดการเรียนรู้วิชาวิทยาศาสตร์ การพัฒนานักเรียนระดับประถมศึกษาด้วยเกมส์การเรียนรู้แบบ STEM ศึกษาเพื่อสร้างทักษะการคิดสร้างสรรค์ และการแก้ปัญหาเชิงระบบของนักเรียนโรงเรียนทุ่งกุลาวิทยา

คาร จังหวัดสุรินทร์ จากการสอบถามครูและสัมภาษณ์ นักเรียนที่เคยเรียนเรื่องนี้มาแล้ว รวมทั้งศึกษาสภาพสังคมของชุมชน
ของนักเรียน

2) ปฐมนิเทศชี้แจงวัตถุประสงค์ของการวิจัยให้นักเรียนกลุ่มตัวอย่างทราบ และอธิบายถึงบทบาทหน้าที่ของ
นักเรียนและผู้วิจัย

3) ผู้วิจัยทำการทดสอบก่อนการทดลอง (Pretest) โดยให้นักเรียนได้ทำแบบทดสอบวัดผลสัมฤทธิ์ทางการ
เรียนวิชาวิทยาศาสตร์ การพัฒนานักเรียนระดับประถมศึกษาด้วยเกมส์การเรียนรู้แบบ STEM ศึกษาเพื่อสร้างทักษะการคิด
สร้างสรรค์ และการแก้ปัญหาเชิงระบบของนักเรียนโรงเรียนทุ่งกุลาวิทยาคาร จังหวัดสุรินทร์ ฉบับจริงที่ผู้วิจัยสร้างขึ้น จำนวน
10 ข้อ โดยมีระยะเวลาทำแบบทดสอบ 30 นาที

4) ดำเนินการจัดการวิชาวิทยาศาสตร์ การพัฒนานักเรียนระดับประถมศึกษาด้วยเกมส์การเรียนรู้แบบ STEM
ศึกษาเพื่อสร้างทักษะการคิดสร้างสรรค์ และการแก้ปัญหาเชิงระบบของนักเรียนโรงเรียนทุ่งกุลาวิทยาคาร จังหวัดสุรินทร์

5) เมื่อสิ้นสุดการจัดการเรียนรู้ตามแผนที่วางไว้ จึงทำการทดสอบวัดหลังการทดลอง (Post-test) โดยนำ
แบบทดสอบวัดผลสัมฤทธิ์ทางการเรียนวิชาวิทยาศาสตร์ การพัฒนานักเรียนระดับประถมศึกษาด้วยเกมส์การเรียนรู้แบบ
STEM ศึกษาเพื่อสร้างทักษะการคิดสร้างสรรค์ และการแก้ปัญหาเชิงระบบของนักเรียนโรงเรียนทุ่งกุลาวิทยาคาร จังหวัด
สุรินทร์ ฉบับเดิม ที่ใช้ทำการทดสอบก่อนการทดลอง มาให้นักเรียนทดสอบอีกครั้ง มีระยะเวลาในการทำแบบทดสอบ 20
นาที

6) ผู้วิจัยนำข้อมูลที่ได้จากคะแนนผลการเรียนระหว่างเรียน และคะแนนจากการทำแบบทดสอบวัดผล
สัมฤทธิ์ทางการเรียนวิชาวิทยาศาสตร์ การพัฒนานักเรียนระดับประถมศึกษาด้วยเกมส์การเรียนรู้แบบ STEM ศึกษาเพื่อสร้าง
ทักษะการคิดสร้างสรรค์ และการแก้ปัญหาเชิงระบบของนักเรียนโรงเรียนทุ่งกุลาวิทยาคาร จังหวัดสุรินทร์ วิเคราะห์ด้วย
วิธีการทางสถิติ โดยใช้โปรแกรมคอมพิวเตอร์ และเก็บรวบรวมข้อมูลเชิงคุณภาพ ประมวลผลและเรียบเรียงนำเสนอในรูป
ความเรียง

การวิเคราะห์ข้อมูล

ในการวิเคราะห์ข้อมูลเกี่ยวกับผลสัมฤทธิ์ทางการเรียนวิชาวิทยาศาสตร์ การพัฒนานักเรียนระดับ
ประถมศึกษาด้วยเกมส์การเรียนรู้แบบ STEM ศึกษาเพื่อสร้างทักษะการคิดสร้างสรรค์ และการแก้ปัญหาเชิงระบบของ
นักเรียนโรงเรียนทุ่งกุลาวิทยาคาร จังหวัดสุรินทร์ ผู้วิจัยดำเนินการโดยใช้โปรแกรมสำเร็จรูปทางสถิติ ตามขั้นตอนดังนี้

1) วิเคราะห์ผลสัมฤทธิ์ทางการเรียนวิชาวิทยาศาสตร์ การพัฒนานักเรียนระดับประถมศึกษาด้วยเกมส์การ
เรียนรู้แบบ STEM ศึกษาเพื่อสร้างทักษะการคิดสร้างสรรค์ และการแก้ปัญหาเชิงระบบของนักเรียนโรงเรียนทุ่งกุลาวิทยาคาร
จังหวัดสุรินทร์

2) เปรียบเทียบคะแนนผลสัมฤทธิ์ทางการเรียนวิชาวิทยาศาสตร์ การพัฒนานักเรียนระดับประถมศึกษาด้วย
เกมส์การเรียนรู้แบบ STEM ศึกษาเพื่อสร้างทักษะการคิดสร้างสรรค์ และการแก้ปัญหาเชิงระบบของนักเรียนโรงเรียนทุ่งกุลา
วิทยาคาร จังหวัดสุรินทร์ ระหว่างก่อนและหลังการจัดการเรียนรู้ โดยใช้สถิติการทดสอบที ชนิดกลุ่มตัวอย่างไม่เป็นอิสระต่อ
กัน (t-test for Dependent)

สถิติที่ใช้ในการวิจัย

วิเคราะห์ข้อมูลโดยใช้สถิติค่าเฉลี่ย ($\overline{X}$) ส่วนเบี่ยงเบนมาตรฐาน (S.D.) และใช้การทดสอบค่าที (t-test for
Dependent)

การประชุมวิชาการระดับชาติและนานาชาติบ้านสมเด็จเจ้าพระยา ครั้งที่ 1 (BS2C 2025)
The 1ˢᵗ Bansomdejchaopraya National and International Conference (BS2C 2025)

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5. ผลการวิจัย

      ผลการเปรียบเทียบคะแนนผลสัมฤทธิ์ทางการเรียนวิชาวิทยาศาสตร์ เรื่อง การพัฒนานักเรียนระดับประถมศึกษาด้วยเกมส์การเรียนรู้แบบ STEM ศึกษาเพื่อสร้างทักษะการคิดสร้างสรรค์ และการแก้ปัญหาเชิงระบบของนักเรียนโรงเรียนทุ่งกุลาวิทยาคาร จังหวัดสุรินทร์ ปรากฏผลดังตารางที่ 1

ตารางที่ 1 ผลการเปรียบเทียบคะแนนผลสัมฤทธิ์ทางการเรียนวิชาวิทยาศาสตร์ การพัฒนานักเรียนระดับประถมศึกษาด้วย
          เกมส์การเรียนรู้แบบ STEM ศึกษาเพื่อสร้างทักษะการคิดสร้างสรรค์ และการแก้ปัญหาเชิงระบบของนักเรียน
          โรงเรียนทุ่งกุลาวิทยาคาร จังหวัดสุรินทร์

กลุ่มตัวอย่าง	n	คะแนนเต็ม	ก่อนเรียน		หลังเรียน		t	df	sig
			$\bar{X}$	S.D.	$\bar{X}$	S.D.			
ผู้เรียน	10	10	3.27	1.76	9.22	0.68	-20.63	9	.000

*ค่านัยสำคัญทางสถิติที่ระดับ .05

      จากตารางที่ 1 ผลการเปรียบเทียบคะแนนผลสัมฤทธิ์ทางการเรียนก่อนเรียน และหลังเรียนวิชาวิทยาศาสตร์ การพัฒนานักเรียนระดับประถมศึกษาด้วยเกมส์การเรียนรู้แบบ STEM ศึกษาเพื่อสร้างทักษะการคิดสร้างสรรค์ และการแก้ปัญหาเชิงระบบของนักเรียนโรงเรียนทุ่งกุลาวิทยาคาร จังหวัดสุรินทร์ พบว่า คะแนนทดสอบหลังเรียนสูงกว่าคะแนนการทดสอบก่อนเรียน อย่างมีนัยสำคัญทางสถิติที่ระดับ .05 จึงกล่าวได้ว่า คะแนนก่อนเรียน และหลังเรียน มีความแตกต่างกันจริง โดยคะแนนหลังเรียนมีค่าสูงกว่าก่อนเรียน และแสดงว่านักเรียนมีการพัฒนาผลการเรียนสูงขึ้น หลังจากการใช้ชุดกิจกรรมการเรียนรู้วิชาวิทยาศาสตร์ การพัฒนานักเรียนระดับประถมศึกษาด้วยเกมส์การเรียนรู้แบบ STEM ศึกษาเพื่อสร้างทักษะการคิดสร้างสรรค์ และการแก้ปัญหาเชิงระบบของนักเรียนโรงเรียนทุ่งกุลาวิทยาคาร จังหวัดสุรินทร์

6. สรุปและอภิปรายผล

      การศึกษาวิจัยครั้งนี้เป็นการวิจัย การพัฒนานักเรียนระดับประถมศึกษาด้วยเกมส์การเรียนรู้แบบ STEM ศึกษาเพื่อสร้างทักษะการคิดสร้างสรรค์ และการแก้ปัญหาเชิงระบบของนักเรียนโรงเรียนทุ่งกุลาวิทยาคาร จังหวัดสุรินทร์ สามารถนำมาอภิปรายผลได้ดังนี้ การวิจัยครั้งนี้มีจุดมุ่งหมายเพื่อศึกษาผลสัมฤทธิ์ของนักเรียนระดับประถมศึกษาที่พัฒนาผ่านเกมส์การเรียนรู้แบบ STEM ซึ่งเน้นการเสริมสร้างทักษะการคิดสร้างสรรค์และการแก้ปัญหาเชิงระบบ กลุ่มตัวอย่างในการวิจัยคือนักเรียนชั้นมัธยมศึกษาปีที่ 1 โรงเรียนทุ่งกุลาวิทยาคาร จังหวัดสุรินทร์ จำนวน 10 คน ผลการศึกษาแสดงให้เห็นว่าหลังจากที่นักเรียนได้เข้าร่วมกิจกรรมการเรียนรู้ คะแนนผลสัมฤทธิ์ทางการเรียนหลังเรียนมีค่าสูงกว่าก่อนเรียนอย่างมีนัยสำคัญทางสถิติที่ระดับ .05

      จากผลลัพธ์นี้ สามารถสรุปได้ว่าการใช้เกมส์การเรียนรู้แบบ STEM มีประสิทธิภาพในการพัฒนาทักษะทางการเรียนรู้และความสามารถของนักเรียนในด้านต่างๆ โดยเฉพาะการส่งเสริมการคิดวิเคราะห์เชิงระบบและความคิดสร้างสรรค์ ซึ่งเป็นทักษะสำคัญสำหรับศตวรรษที่ 21 เมื่ออภิปรายถึงผลการวิจัย พบว่าผลลัพธ์ที่ได้นั้นสอดคล้องกับแนวคิดของ STEM Education ซึ่งเน้นการเรียนรู้ที่ผสมผสานองค์ความรู้ด้านวิทยาศาสตร์ เทคโนโลยี วิศวกรรม และคณิตศาสตร์เข้าด้วยกัน กระบวนการเรียนรู้แบบนี้ช่วยให้ผู้เรียนได้ฝึกการเชื่อมโยงความรู้ในหลายมิติและนำไปใช้แก้ไขปัญหาในชีวิตจริง การประยุกต์ใช้เกมส์การเรียนรู้ยังช่วยเพิ่มความสนุกสนาน กระตุ้นความสนใจ และสร้างบรรยากาศการเรียนรู้ที่ผ่อนคลาย ส่งผลให้นักเรียนมีความกระตือรือร้นในการเรียน

ในส่วนของการพัฒนาทักษะการแก้ปัญหาเชิงระบบ ผลการวิจัยชี้ว่าเกมส์การเรียนรู้ที่ออกแบบมาอย่างดีช่วยให้นักเรียนเข้าใจและสามารถแก้ไขปัญหาที่ซับซ้อนได้อย่างเป็นขั้นตอน โดยนักเรียนมีโอกาสฝึกการคิดเชิงวิเคราะห์ วางแผน และทดสอบวิธีการแก้ปัญหาผ่านสถานการณ์จำลองในเกมส์ การทำเช่นนี้ไม่เพียงพัฒนาความรู้ทางวิชาการ แต่ยังเสริมสร้างทักษะชีวิตที่มีความสำคัญ อย่างไรก็ตาม การนำแนวคิด STEM ไปใช้ในบริบทของโรงเรียนต่างๆ อาจต้องพิจารณาปัจจัยหลายประการ เช่น การเตรียมความพร้อมของครูผู้สอน การออกแบบกิจกรรมที่เหมาะสมกับวัยและระดับความสามารถของนักเรียน รวมถึงการจัดสรรทรัพยากรที่เพียงพอ การศึกษานี้แสดงให้เห็นว่า การจัดการเรียนรู้ที่ผสมผสานความรู้กับความสนุกสามารถสร้างผลลัพธ์ที่ดีในด้านการเรียนรู้ได้ หากครูสามารถปรับกิจกรรมให้เหมาะสมกับบริบทของผู้เรียนในภาพรวม ผลการวิจัยนี้แสดงให้เห็นถึงศักยภาพของการใช้เกมส์การเรียนรู้แบบ STEM ในการพัฒนาผู้เรียนทั้งในด้านผลสัมฤทธิ์ทางการเรียนและทักษะการคิดเชิงสร้างสรรค์ การวิจัยในอนาคตอาจมุ่งเน้นการขยายขอบเขตการศึกษาในกลุ่มนักเรียนที่หลากหลายมากขึ้น รวมถึงการพัฒนาเครื่องมือและวิธีการเรียนรู้ที่ยั่งยืนเพื่อสนับสนุนการเรียนรู้ในศตวรรษที่ 21 อย่างเต็มรูปแบบ

7. ข้อเสนอแนะ

ข้อเสนอแนะในการนำผลวิจัยไปใช้

1. ก่อนการจัดการเรียนรู้การพัฒนานักเรียนระดับประถมศึกษาด้วยเกมส์การเรียนรู้แบบ STEM ศึกษาเพื่อสร้างทักษะการคิดสร้างสรรค์ และการแก้ปัญหาเชิงระบบครูผู้สอนควรมีความรู้ความเข้าใจในการจัดการเรียนรู้ตามแนวคิดสะเต็มศึกษาได้เป็นอย่างดี ครูผู้สอนควรเตรียมตัวและทำหน้าที่ตนเองให้พร้อมต่อการจัดการเรียนรู้ เช่น การวางแผนการจัดการเรียนรู้อย่างรอบคอบและมีประสิทธิภาพ การดำเนินการจัดการเรียนรู้ตามขั้นตอนที่วางแผนไว้เพื่อให้การจัดการเรียนรู้เป็นไปอย่างมีประสิทธิภาพ

2. ก่อนการจัดการเรียนรู้ ครูผู้สอนควรชี้แจงทำความเข้าใจให้นักเรียนเข้าใจรูปแบบการจัดการเรียนรู้ให้ชัดเจนเพื่อให้นักเรียนเข้าใจในบทบาทหน้าที่ของตนเอง โดยให้นักเรียนมีอิสระในด้านการคิด โดยครูผู้สอนมีหน้าที่คอยชี้แนะให้คำปรึกษาอย่างใกล้ชิด

3.ครูผู้สอนควรศึกษาการจัดการเรียนรู้การพัฒนานักเรียนระดับประถมศึกษาด้วยเกมส์การเรียนรู้แบบ STEM ศึกษาเพื่อสร้างทักษะการคิดสร้างสรรค์ และการแก้ปัญหาเชิงระบบของนักเรียนโรงเรียนทุ่งกุลาวิทยาคาร จังหวัดสุรินทร์ ให้เข้าใจอย่างลึกซึ้งเพื่อการจัดการเรียนรู้ที่มีประสิทธิภาพและเกิดประโยชน์ต่อผู้นักเรียนมากที่สุด

4.การจัดการเรียนรู้วการพัฒนานักเรียนระดับประถมศึกษาด้วยเกมส์การเรียนรู้แบบ STEM ศึกษาเพื่อสร้างทักษะการคิดสร้างสรรค์ และการแก้ปัญหาเชิงระบบของนักเรียนมีข้อจำกัดเรื่องเวลา ครูผู้สอนควรยืดหยุ่นเรื่องระยะเวลาที่ใช้ในการดำเนินกิจกรรมในแต่ละขั้นตอนของการจัดการเรียนรู้ตามความเหมาะสม

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และผลสัมฤทธิ์ทางการเรียน ของนักเรียนชั้นมัธยมศึกษาปีที่ 1 3 : 2-4.

(120-TH-EDU)

การศึกษาผลสัมฤทธิ์ทางการเรียนวิชาวิทยาศาสตร์ เรื่อง การแยกสารผสม
ของนักเรียนชั้นมัธยมศึกษาปีที่ 2 โรงเรียนสมุทรสาครวิทยาลัย
ที่ได้รับการจัดการเรียนรู้แบบการทดลอง

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บทคัดย่อ

การวิจัยนี้มีวัตถุประสงค์เพื่อศึกษาผลสัมฤทธิ์ทางการเรียนวิชาวิทยาศาสตร์ เรื่อง การแยกสารผสมของนักเรียนชั้นมัธยมศึกษาปีที่ 2 โรงเรียนสมุทรสาคร วิทยาลัยที่ได้รับการจัดการเรียนรู้แบบการทดลอง กลุ่มตัวอย่าง ได้แก่ นักเรียนชั้นมัธยมศึกษาปีที่ 2 โรงเรียนสมุทรสาคร จำนวน 40 คน ที่กำลังศึกษาอยู่ในภาคเรียนที่ 1 ปีการศึกษา 2567 ได้มาจากการเลือกด้วยวิธีเฉพาะเจาะจง (Purposive Sampling) เครื่องมือที่ใช้ในการเก็บรวบรวมข้อมูล ประกอบด้วย แบบทดสอบวัดความรู้ความเข้าใจ มีความยากง่ายอยู่ระหว่าง 0.20-0.80 มีค่าอำนาจจำแนกมากกว่า 0.20 มีค่าความเชื่อมั่น เท่ากับ .83 วิเคราะห์ข้อมูลโดยใช้สถิติค่าเฉลี่ย ส่วนเบี่ยงเบนมาตรฐาน และใช้การทดสอบค่าที (t-test for Dependent)

ผลการวิจัย พบว่า

การพัฒนากระบวนการเรียนรู้วิชาวิทยาศาสตร์ เรื่อง การแยกสารผสมของนักเรียนชั้นมัธยมศึกษาปีที่ 2 โรงเรียนสมุทรสาคร วิทยาลัยที่ได้รับการจัดการเรียนรู้แบบการทดลอง มีผลสัมฤทธิ์ทางการเรียนหลังเรียนสูงกว่าก่อนเรียนอย่างมีนัยสำคัญทางสถิติที่ระดับ .05

คำสำคัญ: การทดลอง; การแยกสารผสม; โรงเรียนสมุทรสาคร; วิทยาศาสตร์

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A study of the achievement in science subject on the separation of mixed substances of Mathayom 2 students at Samut Sakhon Wittayalai School who received an experimental learning management

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Abstract

This research aimed to study the learning achievement in science subject on the separation of mixtures of Mathayom 2 students at Samut Sakhon College who received experimental learning management. The sample group consisted of 30 Prathom 2 students of Samut Sakhon College who were studying in the second semester of the academic year 2024. They were selected by purposive sampling. The tools used to collect data consisted of a knowledge and understanding test with a difficulty level between 0.20-0.80, a discrimination power of more than 0.20, and a reliability value of .83. Data were analyzed using statistics of mean, standard deviation, and t-test for Dependent.

The research results found that:

The development of the learning process in science subject on the separation of mixtures of Mathayom 2 students at Samut Sakhon College who received experimental learning management had a significantly higher learning achievement after learning than before learning at a statistical level of .05.

Keywords: Science; Separation of mixtures; Experiment; Samut Sakhon School

1.บทนำ

ในยุคปัจจุบันที่การพัฒนาทางวิทยาศาสตร์และเทคโนโลยีก้าวหน้าอย่างรวดเร็ว การส่งเสริมให้ผู้เรียนมีความรู้ความเข้าใจในวิทยาศาสตร์และสามารถนำความรู้นั้นไปปรับใช้ในชีวิตประจำวันได้อย่างเหมาะสมถือเป็นสิ่งสำคัญ การเรียนรู้วิทยาศาสตร์จึงไม่ควรจำกัดอยู่เพียงแค่การอ่านและท่องจำเนื้อหา แต่ควรเป็นการสร้างประสบการณ์ผ่านการปฏิบัติจริงที่ช่วยให้นักเรียนสามารถเข้าใจหลักการและทฤษฎีต่างๆ ได้อย่างลึกซึ้งมากยิ่งขึ้น หัวข้อการแยกสารผสมในวิชาวิทยาศาสตร์ เป็นหนึ่งในเนื้อหาที่มีความสำคัญ เนื่องจากเกี่ยวข้องโดยตรงกับการดำเนินชีวิตในหลากหลายมิติ ไม่ว่าจะเป็นกระบวนการแยกน้ำกับน้ำมัน การกรองน้ำ หรือการแยกองค์ประกอบของสารอาหารต่างๆ ความเข้าใจในกระบวนการเหล่านี้ไม่เพียงช่วยให้นักเรียนมีพื้นฐานทางวิทยาศาสตร์ที่ดีขึ้น แต่ยังเป็นการปลูกฝังแนวคิดเรื่องการใช้ทรัพยากรอย่างคุ้มค่าและการอนุรักษ์สิ่งแวดล้อม อย่างไรก็ตาม ในบริบทของประเทศไทย การเรียนการสอนวิทยาศาสตร์ในบางโรงเรียนยังคงประสบปัญหาเรื่องการขาดแคลนอุปกรณ์การทดลอง หรือกระบวนการสอนที่ไม่สามารถกระตุ้นความสนใจและความกระตือรือร้นของนักเรียนได้ ส่งผลให้นักเรียนขาดแรงจูงใจและความเข้าใจในบทเรียนอย่างแท้จริง การเรียนรู้แบบการทดลอง (Experimental Learning) จึงเป็นวิธีการสอนที่เหมาะสมอย่างยิ่งในบริบทดังกล่าว เนื่องจากเน้นให้นักเรียนได้ลงมือปฏิบัติจริง ฝึกฝนการคิดวิเคราะห์และพัฒนาทักษะการแก้ปัญหา

การวิจัยครั้งนี้มุ่งเน้นไปที่การพัฒนาผลสัมฤทธิ์ทางการเรียนวิชาวิทยาศาสตร์ เรื่องการแยกสารผสมของนักเรียนชั้นมัธยมศึกษาปีที่ 2 โรงเรียนสมุทรสาครวิทยาลัย โดยใช้กระบวนการจัดการเรียนรู้แบบการทดลอง กลุ่มเป้าหมายของการวิจัยคือ นักเรียนจำนวน 40 คน ซึ่งได้รับการคัดเลือกอย่างเฉพาะเจาะจง (Purposive Sampling) ในภาคเรียนที่ 1 ปีการศึกษา 2567 การเรียนรู้แบบการทดลองช่วยให้นักเรียนสามารถเข้าใจบทเรียนผ่านกระบวนการสังเกต ตั้งคำถาม ทดลอง และวิเคราะห์ผลด้วยตนเอง กระบวนการนี้ยังช่วยให้นักเรียนสามารถนำทฤษฎีมาใช้ในการแก้ปัญหาในสถานการณ์จริง และพัฒนาความคิดเชิงระบบ (Systematic Thinking) การศึกษาวิจัยในครั้งนี้ได้ออกแบบการทดลองที่เน้นให้ผู้เรียนมีส่วนร่วมในทุกขั้นตอน ตั้งแต่การวางแผนการทดลอง การรวบรวมข้อมูล ไปจนถึงการสรุปผลและอภิปราย การเรียนรู้ในลักษณะนี้ไม่เพียงช่วยให้นักเรียนเข้าใจเนื้อหาวิชาเท่านั้น แต่ยังส่งเสริมให้เกิดทักษะสำคัญในศตวรรษที่ 21 เช่น การสื่อสาร การทำงานร่วมกัน และความสามารถในการคิดอย่างสร้างสรรค์

ผลจากการวิจัยคาดว่าจะช่วยยืนยันประสิทธิภาพของการเรียนรู้แบบการทดลองในหัวข้อการแยกสารผสม และแสดงให้เห็นถึงศักยภาพของกระบวนการเรียนรู้ที่มุ่งเน้นการลงมือปฏิบัติจริงในการเพิ่มผลสัมฤทธิ์ทางการเรียนของนักเรียน นอกจากนี้ ผลการวิจัยยังสามารถนำไปประยุกต์ใช้กับเนื้อหาอื่นๆ ในวิชาวิทยาศาสตร์ หรือใช้เป็นแนวทางสำหรับการพัฒนากระบวนการเรียนการสอนในระดับมัธยมศึกษาต่อไป

ความสำคัญของงานวิจัยนี้ไม่ได้จำกัดอยู่เพียงแค่การพัฒนาผลสัมฤทธิ์ทางการเรียน แต่ยังมุ่งเน้นไปที่การพัฒนาทักษะการเรียนรู้ของนักเรียนในระยะยาว ซึ่งเป็นรากฐานสำคัญสำหรับการพัฒนาทรัพยากรมนุษย์ที่มีคุณภาพ งานวิจัยนี้จึงเป็นก้าวสำคัญในการยกระดับการเรียนการสอนวิทยาศาสตร์ในประเทศไทยให้ตอบสนองต่อความต้องการของสังคมและเศรษฐกิจในยุคที่การเปลี่ยนแปลงเกิดขึ้นอย่างรวดเร็ว

2. วัตถุประสงค์ของการวิจัย

เพื่อศึกษาการพัฒนากระบวนการเรียนรู้วิชาวิทยาศาสตร์ เรื่อง การแยกสารผสมของนักเรียนชั้นมัธยมศึกษาปีที่ 2 โรงเรียนสมุทรสาคร วิทยาลัยที่ได้รับการจัดการเรียนรู้แบบการทดลอง

การประชุมวิชาการระดับชาติและนานาชาติบ้านสมเด็จเจ้าพระยา ครั้งที่ 1 (BS2C 2025)
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3. สมมติฐานการวิจัย

      การพัฒนากระบวนการเรียนรู้วิชาวิทยาศาสตร์ เรื่อง การแยกสารผสมของนักเรียนชั้นมัธยมศึกษาปีที่ 2 โรงเรียนสมุทรสาคร วิทยาลัยที่ได้รับการจัดการเรียนรู้แบบการทดลอง หลังเรียนสูงกว่าก่อนเรียน

4. วิธีดำเนินการวิจัย

      การวิจัยครั้งนี้เป็นการวิจัยเชิงทดลองเบื้องต้น (Pre-Experimental design) ใช้แบบแผนการวิจัยแบบกลุ่มเดียวสอบก่อนสอบหลัง (One group pretest-posttest design) โดยมีรายละเอียดวิธีดำเนินการวิจัยดังต่อไปนี้

      ประชากรและกลุ่มตัวอย่าง

      ประชากร ได้แก่ นักเรียนชั้นมัธยมศึกษาปีที่ 2 โรงเรียนสมุทรสาครวิทยาลัย โดยการจัดการเรียนรู้แบบทดลอง โรงเรียนสมุทรสาครวิทยาลัย ภาคเรียนที่ 1 ปีการศึกษา 2567 จำนวนรวมนักเรียน 40 คน

      กลุ่มตัวอย่าง ได้แก่ นักเรียนชั้นมัธยมศึกษาปีที่ 2 โรงเรียนสมุทรสาครวิทยาลัย โดยการจัดการเรียนรู้แบบทดลอง ภาคเรียนที่ 1 ปีการศึกษา 2567 ด้วยวิธีการเลือกแบบเฉพาะเจาะจง (Purposive Sampling) จำนวน 40 คน

      เครื่องมือที่ใช้ในการวิจัย

      เครื่องมือที่ใช้ในการเก็บรวบรวมข้อมูล ประกอบด้วย แบบทดสอบวัดความรู้ความเข้าใจ มีความยากง่ายอยู่ระหว่าง 0.20-0.80 มีค่าอำนาจจำแนกมากกว่า 0.20 มีค่าความเชื่อมั่น เท่ากับ .80

      เครื่องมือที่ใช้ในการวิจัยครั้งนี้ ประกอบด้วย

      1) แผนการจัดการเรียนรู้วิชาวิทยาศาสตร์ เรื่อง การแยกสารผสมของนักเรียนชั้นมัธยมศึกษาาปีที่ 2 โรงเรียนสมุทรสาคร วิทยาลัยที่ได้รับการจัดการเรียนรู้แบบการทดลอง

      2) แบบทดสอบวัดผลสัมฤทธิ์ทางการเรียนวิทยาศาสตร์วิชาวิทยาศาสตร์ เรื่อง การแยกสารผสมของนักเรียนชั้นมัธยมศึกษาปีที่ 2 โรงเรียนสมุทรสาคร วิทยาลัยที่ได้รับการจัดการเรียนรู้แบบการทดลอง

      ขั้นตอนการสร้างเครื่องมือ

      1) ศึกษาหลักสูตรแกนกลางการศึกษาขั้นพื้นฐาน พุทธศักราช 2551

      2) วิเคราะห์คำอธิบายรายวิชา สาระการเรียนรู้และหน่วยการเรียนรู้

      3) วิเคราะห์ตัวชี้วัด เพื่อนำมาเขียนเป็นจุดประสงค์การเรียนรู้โดยให้ควบคุมพฤติกรรมด้านความรู้ ทักษะกระบวนการ เจตคติ

      4) วิเคราะห์สาระการเรียนรู้โดยเลือกเนื้อหาสาระการเรียนรู้ให้สอดคล้องกับผู้เรียน ชุมชนและท้องถิ่น

      5) วิเคราะห์การประเมินผลโดยการเลือกสื่อและแหล่งการเรียนรู้ทั้งในและนอกห้องเรียน ให้เหมาะสมและสอดคล้องกับกระบวนการเรียนรู้

      6) ขั้นออกแบบและจัดทำแผนการจัดการเรียนรู้ ซึ่งมีองค์ประกอบดังนี้

         - เวลาเรียน

         - สาระสำคัญ

         - จุดประสงค์การเรียนรู้

         - สาระการเรียนรู้

         - กิจกรรมการเรียนรู้

         - สื่อการเรียนรู้

         - การวัดผลประเมินผล

- บันทึกผลหลังการสอน

การเก็บรวบรวมข้อมูล

ในการวิจัยครั้งนี้ ผู้วิจัยทำการทดลองและเก็บรวบรวมข้อมูลกลุ่มตัวอย่าง ในภาคเรียนที่ 1 ปีการศึกษา 2567 โดยดำเนินการเก็บรวบรวมข้อมูล ดังนี้

1) ผู้วิจัยวิเคราะห์ปัญหาการจัดการเรียนรู้วิชาวิทยาศาสตร์ เรื่อง การแยกสารผสมของนักเรียนชั้นมัธยมศึกษาปีที่ 2 โรงเรียนสมุทรสาครวิทยาลัยที่ได้รับการจัดการเรียนรู้แบบการทดลอง จากการสอบถามครูและสัมภาษณ์ นักเรียนที่เคยเรียนเรื่องนี้มาแล้ว รวมทั้งศึกษาสภาพสังคมของชุมชนของนักเรียน

2) ปฐมนิเทศชี้แจงวัตถุประสงค์ของการวิจัยให้นักเรียนกลุ่มตัวอย่างทราบ และอธิบายถึงบทบาทหน้าที่ของนักเรียนและผู้วิจัย

3) ผู้วิจัยทำการทดสอบก่อนการทดลอง (Pretest) โดยให้นักเรียนได้ทำแบบทดสอบวัดผลสัมฤทธิ์ทางการเรียนวิชาวิทยาศาสตร์ เรื่อง การแยกสารผสมของนักเรียนชั้นมัธยมศึกษาปีที่ 2 โรงเรียนสมุทรสาคร วิทยาลัยที่ได้รับการจัดการเรียนรู้แบบการทดลอง ฉบับจริงที่ผู้วิจัยสร้างขึ้น จำนวน 10 ข้อ โดยมีระยะเวลาทำแบบทดสอบ 30 นาที

4) ดำเนินการจัดการวิชาวิทยาศาสตร์ เรื่อง การแยกสารผสม โรงเรียนสมุทรสาครวิทยาลัย

5) เมื่อสิ้นสุดการจัดการเรียนรู้ตามแผนที่วางไว้ จึงทำการทดสอบวัดหลังการทดลอง (Post-test) โดยนำแบบทดสอบวัดผลสัมฤทธิ์ทางการเรียนวิชาวิทยาศาสตร์ เรื่อง การแยกสารผสมของนักเรียนชั้นมัธยมศึกษาปีที่ 2 โรงเรียนสมุทรสาคร วิทยาลัยที่ได้รับการจัดการเรียนรู้แบบการทดลอง ฉบับเดิม ที่ใช้ทำการทดสอบก่อนการทดลอง มาให้นักเรียนทดสอบอีกครั้ง มีระยะเวลาในการทำแบบทดสอบ 20 นาที

6) ผู้วิจัยนำข้อมูลที่ได้จากคะแนนผลการเรียนระหว่างเรียน และคะแนนจากการทำแบบทดสอบวัดผลสัมฤทธิ์ทางการเรียนวิชาวิทยาศาสตร์ เรื่อง การแยกสารผสมของนักเรียนชั้นมัธยมศึกษาปีที่ 2 โรงเรียนสมุทรสาคร วิทยาลัยที่ได้รับการจัดการเรียนรู้แบบการทดลอง วิเคราะห์ด้วยวิธีการทางสถิติ โดยใช้โปรแกรมคอมพิวเตอร์ และเก็บรวบรวมข้อมูลเชิงคุณภาพ ประมวลผลและเรียบเรียงนำเสนอในรูปความเรียง

การวิเคราะห์ข้อมูล

ในการวิเคราะห์ข้อมูลเกี่ยวกับผลสัมฤทธิ์ทางการเรียนวิชาวิทยาศาสตร์ เรื่อง การแยกสารผสมของนักเรียนชั้นมัธยมศึกษาปีที่ 2 โรงเรียนสมุทรสาคร วิทยาลัยที่ได้รับการจัดการเรียนรู้แบบการทดลอง ผู้วิจัยดำเนินการโดยใช้โปรแกรมสำเร็จรูปทางสถิติ ตามขั้นตอนดังนี้

1) วิเคราะห์ผลสัมฤทธิ์ทางการเรียนวิชาวิทยาศาสตร์ เรื่อง การแยกสารผสม โรงเรียนสมุทรสาครวิทยาลัย

2) เปรียบเทียบคะแนนผลสัมฤทธิ์ทางการเรียนวิชาวิทยาศาสตร์ เรื่อง การแยกสารผสมของนักเรียนชั้นมัธยมศึกษาปีที่ 2 โรงเรียนสมุทรสาคร วิทยาลัยที่ได้รับการจัดการเรียนรู้แบบการทดลอง ระหว่างก่อนและหลังการจัดการเรียนรู้ โดยใช้สถิติการทดสอบที ชนิดกลุ่มตัวอย่างไม่เป็นอิสระต่อกัน (t-test for Dependent)

สถิติที่ใช้ในการวิจัย

วิเคราะห์ข้อมูลโดยใช้สถิติค่าเฉลี่ย ($\overline{X}$) ส่วนเบี่ยงเบนมาตรฐาน (S.D.) และใช้การทดสอบค่าที (t-test for Dependent)

5. ผลการวิจัย

ผลการเปรียบเทียบคะแนนผลสัมฤทธิ์ทางการเรียนวิชาวิทยาศาสตร์ เรื่อง การแยกสารผสมของนักเรียนชั้นมัธยมศึกษาปีที่ 2 โรงเรียนสมุทรสาคร วิทยาลัยที่ได้รับการจัดการเรียนรู้แบบการทดลอง ปรากฏผลดังตารางที่ 1

ตารางที่ 1 ผลการเปรียบเทียบคะแนนผลสัมฤทธิ์ทางการเรียนวิชาวิทยาศาสตร์ เรื่อง การแยกสารผสมของนักเรียนชั้นมัธยม
ศึกษาปีที่ 2 โรงเรียนสมุทรสาคร วิทยาลัยที่ได้รับการจัดการเรียนรู้แบบการทดลอง

กลุ่ม ตัวอย่าง	n	คะแนน เต็ม	ก่อนเรียน		หลังเรียน		t	df	sig
			$\overline{X}$	S.D.	$\overline{X}$	S.D.			
ผู้เรียน	30	20	7.56	1.68	16.73	0.56	-21.56	29	.000

*ค่านัยสำคัญทางสถิติที่ระดับ .05

จากตารางที่ 1 ผลการเปรียบเทียบคะแนนผลสัมฤทธิ์ทางการเรียนก่อนเรียน และหลังเรียนวิชาวิทยาศาสตร์ เรื่อง
การแยกสารผสมของนักเรียนชั้นมัธยมศึกษาปีที่ 2 โรงเรียนสมุทรสาคร วิทยาลัยที่ได้รับการจัดการเรียนรู้แบบการทดลอง
พบว่า คะแนนทดสอบหลังเรียนสูงกว่าคะแนนการทดสอบก่อนเรียน อย่างมีนัยสำคัญทางสถิติที่ระดับ .05 จึงกล่าวได้ว่า
คะแนนก่อนเรียน และหลังเรียน มีความแตกต่างกันจริง โดยคะแนนหลังเรียนมีค่าสูงกว่าก่อนเรียน และแสดงว่านักเรียนมีการ
พัฒนาผลการเรียนสูงขึ้น หลังจากการใช้การทดลองวิชาวิทยาศาสตร์ เรื่อง การแยกสารผสม โรงเรียนสมุทรสาครวิทยาลัย

6. สรุปและอภิปรายผล

การศึกษาวิจัยครั้งนี้เป็นการวิจัย เรื่อง การแยกสารผสมของนักเรียนชั้นมัธยมศึกษาปีที่ 2 โรงเรียนสมุทรสาคร
วิทยาลัยที่ได้รับการจัดการเรียนรู้แบบการทดลอง สามารถนำมาอภิปรายผลได้ดังนี้ การจัดการเรียนรู้แบบการทดลองช่วยให้
นักเรียนได้สัมผัสกับประสบการณ์จริงผ่านกิจกรรมการเรียนรู้ นักเรียนมีโอกาสทดลอง ค้นหาคำตอบ และแก้ไขปัญหาด้วย
ตัวเอง กระบวนการนี้ส่งเสริมให้นักเรียนเข้าใจเนื้อหาอย่างลึกซึ้งมากขึ้น และสามารถเชื่อมโยงความรู้กับสถานการณ์ในชีวิต
จริงได้ การเรียนรู้เชิงปฏิบัติยังช่วยกระตุ้นความสนใจและสร้างแรงจูงใจในการเรียนรู้ ซึ่งเป็นปัจจัยสำคัญที่ทำให้นักเรียนมี
ความกระตือรือร้นที่จะเรียนรู้มากขึ้น

จากการสังเกตในระหว่างการทดลอง นักเรียนแสดงความสามารถในการตั้งคำถาม การคิดวิเคราะห์ และการ
ตัดสินใจได้ดีขึ้น อีกทั้งยังมีความมั่นใจในการนำเสนอผลการทดลองและการทำงานร่วมกันเป็นทีม นอกจากนี้ นักเรียนยัง
สามารถอธิบายกระบวนการแยกสารผสมและเหตุผลเบื้องหลังการทดลองได้อย่างมีเหตุผล ซึ่งสะท้อนให้เห็นว่าการจัดการ
เรียนรู้แบบการทดลองช่วยส่งเสริมพัฒนาการทางด้านความคิด ความรู้ และทักษะทางวิทยาศาสตร์ได้อย่างรอบด้าน

ผลการวิจัยนี้สอดคล้องกับทฤษฎีการเรียนรู้เชิงประสบการณ์ (Experiential Learning Theory) ที่ระบุว่าผู้เรียนจะ
เข้าใจเนื้อหาได้ดีที่สุดเมื่อได้มีส่วนร่วมในกระบวนการเรียนรู้ที่เชื่อมโยงระหว่างทฤษฎีและการปฏิบัติ นอกจากนี้ยังสนับสนุน
ผลการวิจัยจากงานวิจัยก่อนหน้าที่ชี้ให้เห็นว่า การจัดการเรียนรู้ที่เน้นการทดลองสามารถช่วยพัฒนาผลสัมฤทธิ์ทางการเรียน
ในวิชาวิทยาศาสตร์ และช่วยเสริมสร้างทักษะการคิดอย่างเป็นระบบและการแก้ปัญหา

อย่างไรก็ตาม ในการวิจัยครั้งนี้ยังพบข้อจำกัดบางประการ เช่น ขนาดของกลุ่มตัวอย่างที่ค่อนข้างเล็ก อาจทำให้
ผลการวิจัยไม่สามารถทั่วไปได้กับกลุ่มนักเรียนอื่นๆ ได้อย่างกว้างขวาง นอกจากนี้ ระยะเวลาในการดำเนินการวิจัยยังมี
ข้อจำกัด ส่งผลให้การวัดผลลัพธ์ในระยะยาวไม่สามารถดำเนินการได้เต็มที่ เพื่อให้การวิจัยในอนาคตมีความครอบคลุมและ
สมบูรณ์ยิ่งขึ้น ควรมีการขยายกลุ่มตัวอย่างให้หลากหลายมากขึ้น และเพิ่มระยะเวลาในการติดตามผลการเรียนรู้ระยะยาว
ในภาพรวม การศึกษาครั้งนี้ชี้ให้เห็นถึงประโยชน์ของการจัดการเรียนรู้แบบการทดลองในการพัฒนาผลสัมฤทธิ์ทางการเรียน
วิชาวิทยาศาสตร์ การเรียนรู้เชิงปฏิบัติไม่ได้เพียงแค่ช่วยให้นักเรียนเข้าใจเนื้อหา แต่ยังปลูกฝังทักษะสำคัญในศตวรรษที่ 21
เช่น การคิดวิเคราะห์ การแก้ปัญหา และการทำงานร่วมกัน งานวิจัยนี้จึงเป็นตัวอย่างที่ดีของการนำแนวทางการเรียนรู้ที่มี

ประสิทธิภาพมาปรับใช้ในห้องเรียน และมีศักยภาพที่จะพัฒนาไปสู่การปรับปรุงรูปแบบการเรียนการสอนในระดับมัธยมศึกษาของประเทศไทยต่อไป

7. ข้อเสนอแนะ

ข้อเสนอแนะในการนำผลวิจัยไปใช้

1. ก่อนการจัดการเรียนรู้การแยกสารผสมของนักเรียนชั้นมัธยมศึกษาปีที่ 2 โรงเรียนสมุทรสาคร วิทยาลัยที่ได้รับการจัดการเรียนรู้แบบการทดลองครูผู้สอนควรมีความรู้ความเข้าใจในการจัดการเรียนรู้ตามแนวคิดสะเต็มศึกษาได้เป็นอย่างดี ครูผู้สอนควรเตรียมตัวและทำหน้าที่ตนเองให้พร้อมต่อการจัดการเรียนรู้ เช่น การวางแผนการจัดการเรียนรู้อย่างรอบคอบและมีประสิทธิภาพ การดำเนินการจัดการเรียนรู้ตามขั้นตอนที่วางแผนไว้เพื่อให้การจัดการเรียนรู้เป็นไปอย่างมีประสิทธิภาพ

2. ก่อนการจัดการเรียนรู้ ครูผู้สอนควรชี้แจงทำความเข้าใจให้นักเรียนเข้าใจรูปแบบการจัดการเรียนรู้ให้ชัดเจน เพื่อให้นักเรียนเข้าใจในบทบาทหน้าที่ของตนเอง โดยให้นักเรียนมีอิสระในด้านการคิด โดยครูผู้สอนมีหน้าที่คอยชี้แนะให้คำปรึกษาอย่างใกล้ชิด

3.ครูผู้สอนควรศึกษาการแยกสารผสมของนักเรียนชั้นมัธยมศึกษาปีที่ 2 โรงเรียนสมุทรสาคร วิทยาลัยที่ได้รับการจัดการเรียนรู้แบบการทดลองให้เข้าใจอย่างลึกซึ้งเพื่อการจัดการเรียนรู้ที่มีประสิทธิภาพและเกิดประโยชน์ต่อผู้นักเรียนมากที่สุด

4.การจัดการเรียนรู้การแยกสารผสมของนักเรียนชั้นมัธยมศึกษาปีที่ 2 โรงเรียนสมุทรสาคร วิทยาลัยที่ได้รับการจัดการเรียนรู้แบบการทดลองมีข้อจำกัดเรื่องเวลา ครูผู้สอนควรยืดหยุ่นเรื่องระยะเวลาที่ใช้ในการดำเนินกิจกรรมในแต่ละขั้นตอนของการจัดการเรียนรู้ตามความเหมาะสม

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การศึกษาแนวทางการบริหารการจัดการเรียนรู้เพื่อฟื้นฟูภาวะถดถอยทางการเรียนรู้ของผู้เรียนโรงเรียนในสังกัดสำนักงานเขตพื้นที่การศึกษามัธยมศึกษาพิษณุโลก

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บทคัดย่อ

การวิจัยในครั้งนี้มีวัตถุประสงค์ 1) เพื่อศึกษาการบริหารการจัดการเรียนรู้การฟื้นฟูภาวะถดถอยทางการเรียนรู้ของผู้เรียนโรงเรียนในสังกัดสำนักงานเขตพื้นที่การศึกษามัธยมศึกษาพิษณุโลก 2) เพื่อศึกษาแนวทางการบริหารการจัดการเรียนรู้เพื่อฟื้นฟูภาวะถดถอยทางการเรียนรู้ของผู้เรียนโรงเรียนในสังกัดสำนักงานเขตพื้นที่การศึกษามัธยมศึกษาพิษณุโลก โดยมีการดำเนินการวิจัย แบ่งออกเป็น 2 ขั้นตอน ได้แก่ ขั้นตอนที่ 1 การบริหารจัดการเรียนรู้เพื่อฟื้นฟูภาวะถดถอยทางการเรียนรู้ของผู้เรียนโรงเรียนในสังกัดสำนักงานเขตพื้นที่การศึกษามัธยมศึกษาพิษณุโลก กลุ่มตัวอย่าง ผู้บริหารสถานศึกษา ครูและบุคลากรทางการศึกษาโรงเรียนในสังกัดสำนักงานเขตพื้นที่การศึกษามัธยมศึกษาพิษณุโลก จำนวน 310 คน กำหนดขนาดตัวอย่างโดยใช้ตารางกำหนดขนาดกลุ่มตัวอย่างของเครจซี่และมอร์แกน โดยใช้โรงเรียนเป็นชั้นในการแบ่งกลุ่มตัวอย่าง เก็บรวบรวมข้อมูลด้วยแบบสอบถาม มีลักษณะเป็นมาตรประมาณค่า 5 ระดับ วิเคราะห์ข้อมูลด้วยค่าเฉลี่ยและส่วนเบี่ยงเบนมาตรฐาน ขั้นตอนที่ 2 แนวทางการบริหารการจัดการเรียนรู้เพื่อฟื้นฟูภาวะถดถอยทางการเรียนรู้ของผู้เรียนโรงเรียนในสังกัดสำนักงานเขตพื้นที่การศึกษามัธยมศึกษาพิษณุโลก กลุ่มผู้ให้ข้อมูลในการสัมภาษณ์ ได้แก่ ผู้ทรงคุณวุฒิที่มีความรู้และประสบการณ์ในการปฏิบัติงาน จำนวน 5 คน ได้มาจากการเลือกแบบเฉพาะเจาะจง เก็บรวบรวมข้อมูลด้วยแบบสัมภาษณ์ วิเคราะห์ข้อมูลด้วยการวิเคราะห์เนื้อหา ผลการวิจัยพบว่า

1. ผลการศึกษาการบริหารการจัดการเรียนรู้เพื่อฟื้นฟูภาวะถดถอยทางการเรียนรู้ของผู้เรียนโรงเรียนในสังกัดสำนักงานเขตพื้นที่การศึกษามัธยมศึกษาพิษณุโลก ในภาพรวมพบว่า ด้านที่มีค่าเฉลี่ยสูงสุด คือ ด้านการดำเนินการจัดกิจกรรมการเรียนรู้ และด้านที่มีค่าเฉลี่ยต่ำสุด คือ ด้านการวางแผนการออกแบบการเรียนรู้

2. แนวทางการบริหารการจัดการเรียนรู้เพื่อฟื้นฟูภาวะถดถอยทางการเรียนรู้ของผู้เรียนโรงเรียนในสังกัดสำนักงานเขตพื้นที่การศึกษามัธยมศึกษาพิษณุโลก พบว่า มีการการวางแผนการออกแบบการเรียนรู้บริหารจัดการเรียนรู้อย่างเป็นระบบ ทั้งครูและนักเรียนส่วนใหญ่มีอุปกรณ์ สื่อ เทคโนโลยีสารสนเทศ เพียงพอต่อในการจัดการเรียนรู้ มีสัญญาณอินเทอร์เน็ตทั่วถึง การดำเนินการจัดกิจกรรมการเรียนรู้ การบริหารหลักสูตรสถานศึกษามีการกำหนดสิ่งที่ต้องเรียนรู้และควรเรียนรู้ ครูจัดการเรียนรู้โดยใช้วิธีการที่หลากหลาย แผนการจัดการเรียนรู้ที่ยืดหยุ่น มีการการสะท้อนและประเมินการเรียนรู้ มีการวัดและประเมินผลที่มีความหลากหลาย มีการวัดและประเมินผลตามสภาพจริง นิเทศและประเมินคุณภาพการจัดการเรียนรู้ ส่งเสริมให้ผู้สอนเก็บข้อมูลผู้เรียนเพื่อปรับแผนการจัดการเรียนรู้ การพัฒนาและปรับปรุงการจัดการเรียนรู้ ใช้กระบวนการ PLC กับกลุ่มบริหารวิชาการ หัวหน้ากลุ่มสาระการเรียนรู้ในการแลกเปลี่ยนวิเคราะห์ผลการนิเทศ เพื่อให้เป็นไปตามเป้าหมายของการนิเทศ และนำข้อมูลเชิงลึกมาใช้เป็นแนวทางในการกำหนดแนวทางการจัดการเรียนรู้ให้มีความชัดเจนในการแก้ไขฟื้นฟูภาวะถดถอยทางการเรียนรู้ของผู้เรียน

คำสำคัญ: แนวทางการบริหารการจัดการเรียนรู้เพื่อฟื้นฟูภาวะถดถอยทางการเรียนรู้; ภาวะถดถอยทางการเรียนรู้

A STUDY OF LEARNING MANAGEMENT APPROACHES TO REVIVE THE LEARNING DECLINE OF STUDENTS IN SCHOOLS UNDER THE JURISDICTION OF THE PHITSANULOK SECONDARY EDUCATION SERVICE AREA OFFICE

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Abstract

This research aimed to 1) study the learning management to restore learning regression of students in schools under the Office of the Secondary Education Service Area, Phitsanulok, and 2) study the learning management approach to restore learning regression of students in schools under the Office of the Secondary Education Service Area, Phitsanulok. The research was conducted in 2 steps: Step 1: Learning management to restore learning regression of students in schools under the Office of the Secondary Education Service Area, Phitsanulok. The sample group consisted of 310 school administrators, teachers, and educational personnel in schools under the Office of the Secondary Education Service Area, Phitsanulok. The sample size was determined using the Krejci and Morgan sample size table, using schools as strata for dividing the sample groups. Data were collected using a questionnaire with a 5-level rating scale. Data were analyzed using the mean and standard deviation. Step 2: Learning management approach to restore learning regression of students in schools under the Office of the Secondary Education Service Area, Phitsanulok. The group of informants for the interview consisted of 5 qualified persons with knowledge and experience in their work, selected by purposive sampling. Data were collected using an interview form and analyzed using content analysis. The research results found that

1. The results of the study on learning management to restore the learning regression of students in schools under the Office of the Secondary Education Area, Phitsanulok, overall, found that the aspect with the highest average value was the aspect of organizing learning activities, and the aspect with the lowest average value was the aspect of planning and designing learning.

2. The results of the study on the learning management approach to restore the learning regression of students in schools under the Office of the Secondary Education Area, Phitsanulok, found that there was a systematic planning and design of learning management. Most teachers and students had sufficient equipment, media, and information technology for organizing learning, and there was a widespread internet signal. The implementation of learning activities, the management of the school curriculum, determined what had to be learned and should be learned. Teachers organized learning using a variety of methods, flexible learning management plans, reflection and assessment of learning, a variety of

measurement and assessment, and measurement and assessment based on real conditions. Supervised and assessed the quality of learning management, encouraged teachers to collect student data to adjust the learning management plan, developed and improved learning management, used the PLC process with the academic administration group, the head of the learning subject group to exchange and analyze the results of the supervision in order to meet the goals of the supervision. and use insights as a guideline to determine clear learning management guidelines to correct and restore learners' learning regression.

Keywords: Guidelines for learning management to restore students' learning regression, learning regression

1. บทนำ

แนวโน้มการเปลี่ยนแปลงที่สำคัญและส่งผลต่อการศึกษาขั้นพื้นฐาน การเปลี่ยนแปลงโครงสร้างของประชากร ซึ่งภาวะประชากรสูงอายุในประเทศไทยมีสาเหตุมาจากการที่คนไทยมีอายุยืนมาขึ้นประกอบกับการลดลงของภาวะเจริญพันธุ์หรือการเกิดน้อยลง ส่งผลให้ประชากรวัยเด็กหรือประชากรวัยเด็กหรือวัยเรียนมีแนวโน้มลดลงอย่างต่อเนื่อง การพัฒนาประเทศให้มีความเจริญเติบโตด้านเศรษฐกิจอย่างต่อเนื่องจำเป็นต้องเตรียมกำลังคนให้มีสมรรถนะเพื่อสร้างผลิตภาพ (Productivity) ที่สูงขึ้น การจัดการศึกษาต้องวางแผนและพัฒนาทรัพยากรมนุษย์ของประเทศให้มีทักษะและสมรรถนะสูง และปรับหลักสูตรการเรียนการสอนให้บูรณาการศึกษาและการเรียนรู้ตลอดชีวิต ความก้าวหน้าทางด้านเทคโนโลยีและดิจิทัลอย่างรวดเร็ว (Digital Disruption) เป็นการเปลี่ยนแปลงสังคมไปสู่สังคมดิจิทัลส่งผลต่อการศึกษาและมีแนวโน้มที่การจัดการศึกษาจะเปลี่ยนรูปแบบการศึกษาให้สอดคล้องกับความก้าวหน้าทางเทคโนโลยีตอบสนองต่อความต้องการของผู้เรียนโดยนำเทคโนโลยีและสื่อต่าง ๆ มาประยุกต์ใช้ร่วมกับการเรียนการสอน การเปลี่ยนแปลงทางสังคม วัฒนธรรม เศรษฐกิจ สิ่งแวดล้อม และสถานการณ์โรคอุบัติใหม่ โรคอุบัติซ้ำ ส่งผลให้เกิดการเปลี่ยนแปลงอย่างรวดเร็ว ซึ่งหลีกเลี่ยงไม่ได้ ส่งผลให้การขับเคลื่อนและพัฒนาประเทศโดยเฉพาะอย่างยิ่งการพัฒนาการจัดการศึกษามีความจำเป็นจะต้องปรับเปลี่ยนและพัฒนารูปแบบแนวทางและมาตรการในการจัดการศึกษาที่เหมาะสมสอดคล้องกับภาวะการเปลี่ยนแปลงอย่างพลิกผันเพื่อการพัฒนาประเทศต่อไป จากการเปลี่ยนแปลงของเทคโนโลยีและเกิดการแพร่ระบาดของโควิด-19 ส่งผลต่อการศึกษาโดยเฉพาะในการจัดการเรียนการสอนหรือการใช้ชีวิตของเด็กเปลี่ยนไป ครู โรงเรียนก็ต้องปรับตัวเองเปลี่ยนแปลงไปด้วย (วรวงศ์ รักเรืองเดช, 2564) ในช่วงสภาวะตอนนี้ทุกคนใช้ชีวิตอยู่ในโลกเทคโนโลยีดิจิทัลและต่อให้เป็นช่วง Next New Normal เด็กก็ยังคงใช้ชีวิตอยู่ในโลกออนไลน์ ซึ่งการเติบโตของเด็กรุ่นใหม่จะใช้ประสาทสัมผัสจากตาและหูเป็นหลัก แตกต่างจากเด็กยุคเก่าที่ใช้ประสาทสัมผัสทั้ง 5 ดังนั้น ในการเข้าถึงผู้คน การเรียนรู้แตกต่างกัน พอเกิดโควิด ทำให้ทุกคนไม่ได้เจอหน้ากันหรือพบปะกันโดยตรง และไม่รู้ว่าโรงเรียนจะเปิดได้เมื่อใด การเรียนการสอน จึงเป็นแบบผสมผสาน และเป็นความท้าทายของเด็กในการเจอประสบการณ์จริง ทิศทางการศึกษาต้องมีการปรับกันทั้งระบบ ทั้งห้องเรียนซึ่งเป็นแก่นหัวใจการศึกษา เพราะห้องเรียนมีทั้งครู นักเรียน โดยเฉพาะครู ที่ต้องปรับกระบวนทัศน์ในการเรียนการสอน ทำอย่างไรให้เด็กได้รู้ศักยภาพของตนเอง มีทักษะทัศนคติ และมีความรู้ที่ดี ซึ่งปัจจุบันและในอนาคตจะมีการจัดการศึกษาหลักสูตรฐานสมรรถนะเป็นการส่งเสริมให้เด็กได้เรียนรู้และมีทักษะที่เกิดจากการปฏิบัติเรียนรู้จากของจริง โดยจะมีเทคโนโลยีเข้ามาช่วยเพิ่มเติมในการเรียนรู้ของเด็ก ครูกับเด็กจะเรียนรู้พัฒนาตนเองไปพร้อม ๆ กัน (กระทรวงศึกษาธิการ, 2566)

จากการศึกษาสภาพการณ์และสาเหตุภาวะถดถอยทางการเรียนรู้ของผู้เรียนในระดับการศึกษาขั้นพื้นฐานจากสถานการณ์การแพร่ระบาดของไวรัสโควิด-19 เชิงคุณภาพ ปรากฏผลดังนี้ ด้านสภาพการณ์ พบว่าสถานศึกษามีการจัดการเรียนการสอนในหลากหลายรูปแบบมีการใช้เครื่องมือและเทคโนโลยีในการเรียนการสอนอย่างหลากหลาย ด้านสภาพปัญหาและสาเหตุภาวะถดถอยทางการเรียนรู้ของผู้เรียน พบว่า ผู้เรียนเกิดภาวะถดถอยทางการเรียนรู้ในด้านต่าง ๆ เช่น ทักษะการอ่าน ทักษะการคิด ทักษะชีวิต ทักษะการเชื่อมโยงความรู้ ทักษะทางวิทยาศาสตร์และการปฏิบัติ ด้านสุขภาพจิตและภาวะทางอารมณ์ ทักษะทางสังคม ตลอดจนการขาดการสนับสนุนในด้านสื่ออุปกรณ์และเทคโนโลยีในการเรียนรู้ ปัจจัยเชิงสาเหตุที่ส่งผลต่อภาวะถดถอยทางการเรียนรู้ของผู้เรียนในระดับการศึกษาขั้นพื้นฐานจากสถานการณ์การแพร่ระบาดของโรคโควิด-19 ปัจจัยเชิงสาเหตุที่ส่งผลต่อการรับรู้ภาวะถดถอยทางการเรียนรู้ของผู้เรียนชั้นประถมศึกษาปีที่ 1-6 และผู้เรียนชั้นมัธยมศึกษาปีที่ 1-6 พบว่า "การกำกับตนเองในการเรียนรู้" เป็นปัจจัยที่ส่งอิทธิพลทางตรงและโดยรวมต่อการรับรู้ภาวะถดถอยทางการเรียนรู้ของผู้เรียนทุกระดับชั้น ขณะที่ "ทักษะด้านสารสนเทศ สื่อ และเทคโนโลยี" ส่งอิทธิพลทางตรงและโดยรวมต่อการรับรู้ภาวะถดถอยทางการเรียนรู้ของผู้เรียนเฉพาะในชั้นมัธยมศึกษาเท่านั้น ส่วน "ทักษะของครู" เป็นปัจจัยหนึ่งที่มีบทบาทสำคัญ สามารถส่งอิทธิพลโดยรวมต่อการรับรู้ภาวะถดถอยทางการเรียนรู้ของผู้เรียนในระดับชั้นประถมศึกษาและระดับชั้นมัธยมศึกษาตอนต้นและ "การมีส่วนร่วมของพ่อ

แม้ในการส่งเสริมการเรียนรู้ที่บ้าน" มีบทบาทในการส่งอิทธิพลทางอ้อมต่อการรับรู้ภาวะถดถอยทางการเรียนรู้ของผู้เรียนในระดับประถมศึกษาตอนต้นเท่านั้น (สำนักงานเลขาธิการสภาการศึกษา, 2564)

จากความเป็นมาและปัญหาดังกล่าวผู้วิจัยจึงตั้งใจศึกษาค้นคว้างานวิจัยนี้โดยมีเป้าหมายหมายที่จะศึกษาการบริหารจัดการ และศึกษาหาแนวทางในการบริหารจัดการเรียนรู้เพื่อฟื้นฟูปัญหาภาวะถดถอยทางการเรียนรู้ของผู้เรียน เพื่อให้ผู้บริหารสถานศึกษา ครู บุคลากรทางการศึกษาหรือผู้ที่มีส่วนเกี่ยวข้องสามารถใช้ข้อมูลเป็นแนวทางในการบริหารสถานศึกษา จัดการเรียนการสอน และช่วยเหลือฟื้นฟูภาวะถดถอยทางการเรียนรู้ที่เกิดขึ้นกับผู้เรียนให้ลดลงจากการได้รับผลกระทบจากการเปลี่ยนรูปแบบการเรียนการสอนในสถานการณ์โควิด-19

2. วัตถุประสงค์ของการวิจัย

1. เพื่อศึกษาการบริหารการจัดการเรียนรู้การฟื้นฟูภาวะถดถอยทางการเรียนรู้ของผู้เรียนโรงเรียนในสังกัดสำนักงานเขตพื้นที่การศึกษามัธยมศึกษาพิษณุโลก

2. เพื่อศึกษาแนวทางการบริหารการจัดการเรียนรู้เพื่อฟื้นฟูภาวะถดถอยทางการเรียนรู้ของผู้เรียนโรงเรียนในสังกัดสำนักงานเขตพื้นที่การศึกษามัธยมศึกษาพิษณุโลก

3. วิธีดำเนินงานวิจัย

1. ขั้นตอนการดำเนินการวิจัย

การวิจัยเรื่อง การศึกษาแนวทางการบริหารการจัดการเรียนรู้เพื่อฟื้นฟูภาวะถดถอยทางการเรียนรู้ของผู้เรียนโรงเรียนในสังกัดสำนักงานเขตพื้นที่การศึกษามัธยมศึกษาพิษณุโลก เป็นการวิจัยเชิงพรรณา ผู้วิจัยมีวิธีดำเนินการวิจัย แบ่งเป็น 2 ขั้นตอน โดยมีวิธีดำเนินงานวิจัย ดังนี้

ขั้นตอนที่ 1 ศึกษาการบริหารจัดการเรียนรู้เพื่อฟื้นฟูภาวะถดถอยทางการเรียนรู้ของผู้เรียนโรงเรียนในสังกัดสำนักงานเขตพื้นที่การศึกษามัธยมศึกษาพิษณุโลก

ขั้นตอนที่ 2 ศึกษาแนวทางการบริหารการจัดการเรียนรู้เพื่อฟื้นฟูภาวะถดถอยทางการเรียนรู้ของผู้เรียนโรงเรียนในสังกัดสำนักงานเขตพื้นที่การศึกษามัธยมศึกษาพิษณุโลก

2. ประชากรและกลุ่มตัวอย่าง/กลุ่มผู้ให้ข้อมูล

2.1 ประชากร ได้แก่ ผู้บริหารสถานศึกษา ครูและบุคลากรทางการศึกษาโรงเรียนในสังกัดสำนักงานเขตพื้นที่การศึกษามัธยมศึกษาพิษณุโลก จำนวน 1,480 คน (ข้อมูลสารสนเทศทางการศึกษา ปีการศึกษา 2567 สำนักงานเขตพื้นที่การศึกษามัธยมศึกษาพิษณุโลก อุตรดิตถ์ ณ วันที่ วันที่ 10 พฤศจิกายน 2567)

2.2 กลุ่มตัวอย่าง ได้แก่ ผู้บริหารสถานศึกษา ครูและบุคลากรทางการศึกษาโรงเรียนในสังกัดสำนักงานเขตพื้นที่การศึกษามัธยมศึกษาพิษณุโลก จำนวน 310 คน กำหนดขนาดกลุ่มตัวอย่างโดยการเปิดตารางเครจซี่และมอร์แกน (Ktejcie & Morgan) ใช้วิธีการสุ่มแบบแบ่งชั้น (Stratified Random Sampling) ตามสัดส่วนของครูแต่ละอำเภอในจังหวัดพิษณุโลก

2.3 กลุ่มผู้ให้ข้อมูลในการสัมภาษณ์ ได้แก่ ผู้ทรงคุณวุฒิที่มีความรู้และประสบการณ์ในการปฏิบัติงานจำนวน 5 คน ได้มาจากการเลือกแบบเฉพาะเจาะจง (Purposive Sampling) ประกอบด้วย 1) ผู้บริหารสถานศึกษาที่มีวุฒิการศึกษาปริญญาโททางการศึกษาหรือเทียบเท่า มีวิทยฐานะไม่ต่ำกว่าชำนาญการพิเศษ มีความรู้ ความเชี่ยวชาญและประสบการณ์ทางด้านการบริหารในสถานศึกษา จำนวน 2 คน 2) ข้าราชการครู ในตำแหน่งหัวหน้ากลุ่มงานบริหารวิชาการ มีวิทยฐานะชำนาญการพิเศษขึ้นไป และมีความรู้และประสบการณ์ในการบริหารงานวิชาการ ไม่น้อยกว่า 5 ปี จำนวน 2 คน 3) ศึกษานิเทศก์ ที่มีประสบการณ์ในการบริหารการจัดการศึกษาหรือเกี่ยวข้องกับการบริหารด้านวิชาการ ปฏิบัติหน้าที่ดูแล

เกี่ยวกับการบริหารการจัดการศึกษาหรือเกี่ยวข้องกับการบริหารด้านวิชาการ หรือดูแลรับผิดชอบเกี่ยวกับการฟื้นฟูภาวะ
ถดถอยทางการเรียนรู้ของผู้เรียน มีวิทยฐานะชำนาญการ ไม่น้อยกว่า 3 ปี จำนวน 1 คน

3. เครื่องมือที่ใช้ในการเก็บรวบรวมข้อมูล

3.1 เครื่องมือที่ใช้ในการเก็บรวบรวมข้อมูล ได้แก่ แบบสอบถาม เรื่อง การศึกษาแนวทางการบริหารการจัดการ
เรียนรู้เพื่อฟื้นฟูภาวะถดถอยทางการเรียนรู้ของผู้เรียนโรงเรียนในสังกัดสำนักงานเขตพื้นที่การศึกษามัธยมศึกษาพิษณุโลก แบ่ง
ออกเป็น 2 ตอน ได้แก่ ตอนที่ 1 ข้อมูลทั่วไปของผู้ตอบแบบสอบถาม ประกอบด้วย เพศ ตำแหน่งประสบการณ์ในการทำงาน
ในตำแหน่งปัจจุบัน และวุฒิการศึกษาสูงสุด มีลักษณะเป็นแบบตรวจสอบรายการ (Check List) ตอนที่ 2 แบบสอบถามการ
บริหารการจัดการเรียนรู้เพื่อฟื้นฟูภาวะถดถอยทางการเรียนรู้ของผู้เรียนโรงเรียนในสังกัดสำนักงานเขตพื้นที่การศึกษา
มัธยมศึกษาพิษณุโลก ประกอบด้วย 5 ด้าน ข้อคำถาม รวมทั้งสิ้น 38 ข้อ เป็นแบบมาตราส่วนประมาณค่า (Rating Scale)
แบ่งเป็น 5 ระดับ โดยตรวจสอบความตรงเชิงเนื้อหา (Content Validity) เพื่อตรวจสอบความสอดคล้องระหว่างนิยามศัพท์
เฉพาะกับข้อคำถาม ได้ค่าดัชนีความสอดคล้องของแบบสอบถาม (Index of Item Objective Congruence : IOC) เท่ากับ
0.67 – 1.00 และนำแบบสอบถามไปทดลอง (Try-out) กับผู้บริหารสถานศึกษา ครูและบุคลากรในโรงเรียนมัธยมศึกษา
จังหวัดพิจิตร ปีการศึกษา 2567 จำนวน 30 คน ที่ไม่ใช่กลุ่มตัวอย่างในการวิจัยเพื่อหาความเชื่อมั่น (Reliability) ของ
แบบสอบถาม ด้วยการวิเคราะห์ค่าสัมประสิทธิ์แอลฟา (Alpha-coefficient) ของครอนบัค (Cronbach) มีค่าเท่ากับ 0.93

3.2 แบบสัมภาษณ์แนวทางการบริหารการจัดการเรียนรู้เพื่อฟื้นฟูภาวะถดถอยทางการเรียนรู้ของผู้เรียนโรงเรียน
ในสังกัดสำนักงานเขตพื้นที่การศึกษามัธยมศึกษาพิษณุโลก โดยนำข้อมูลจากการศึกษาการบริหารการจัดการเรียนรู้เพื่อฟื้นฟู
ภาวะถดถอยทางการเรียนรู้ของผู้เรียนโรงเรียนในสังกัดสำนักงานเขตพื้นที่การศึกษามัธยมศึกษาพิษณุโลก แต่ละด้านมาใช้ใน
การศึกษาแนวทาง โดยเลือกข้อที่มีค่าเฉลี่ยต่ำสุดในแต่ละด้านมากำหนดเป็นข้อคำถามในเครื่องมือมาสร้างแบบสัมภาษณ์แบบ
มีโครงสร้าง (Structured Interview) จำนวน 5 ด้าน 5 ข้อ ประกอบด้วย 1. ด้านการวางแผนการออกแบบการเรียนรู้ 2. ด้าน
การดำเนินการจัดกิจกรรมการเรียนรู้ 3. ด้านการสะท้อนและประเมินการเรียนรู้ 4. ด้านการนิเทศและประเมินคุณภาพการ
จัดการเรียนรู้ 5. ด้านการพัฒนาและปรับปรุงการจัดการเรียนรู้

4. การเก็บรวบรวมข้อมูล

4.1 จากการศึกษาการบริหารการจัดการเรียนรู้เพื่อฟื้นฟูภาวะถดถอยทางการเรียนรู้ของผู้เรียนโรงเรียนในสังกัด
สำนักงานเขตพื้นที่การศึกษามัธยมศึกษาพิษณุโลก ผู้วิจัยติดต่อขอหนังสือจากบัณฑิตวิทยาลัย มหาวิทยาลัยนเรศวร ถึง
ผู้บริหารสถานศึกษา สังกัดสำนักงานเขตพื้นที่การศึกษามัธยมศึกษาพิษณุโลก อุตรดิตถ์ เพื่อขอความอนุเคราะห์เก็บรวบรวม
ข้อมูลจากผู้บริหารสถานศึกษา ครูและบุคลากรทางการศึกษาโรงเรียนมัธยมศึกษา จังหวัดพิษณุโลก สังกัดสำนักงานเขตพื้นที่
การศึกษามัธยมศึกษาพิษณุโลก อุตรดิตถ์ ส่งแบบสอบถามพร้อมกับหนังสือขอความอนุเคราะห์เก็บรวบรวมข้อมูลไปยัง
โรงเรียนที่เป็นกลุ่มตัวอย่างและประสานขอความร่วมมือในการตอบแบบสอบถาม ผ่าน Google Form จำนวน 310 คน ได้รับ
แบบสอบถามคืน จำนวน 310 คนคิดเป็นร้อยละ 100

4.2 การศึกษาแนวทางการบริหารการจัดการเรียนรู้เพื่อฟื้นฟูภาวะถดถอยทางการเรียนรู้ของผู้เรียนโรงเรียนใน
สังกัดสำนักงานเขตพื้นที่การศึกษามัธยมศึกษาพิษณุโลก ผู้วิจัยขอหนังสือจากบัณฑิตวิทยาลัยมหาวิทยาลัยนเรศวร เพื่อขอ
ความอนุเคราะห์เก็บรวบรวมข้อมูลด้วยการสัมภาษณ์ ติดต่อนัดหมายกับผู้ทรงคุณวุฒิที่ให้สัมภาษณ์เป็นรายบุคคล นัดวัน และ
เวลาในการสัมภาษณ์ และดำเนินการสัมภาษณ์ตามแนวประเด็นที่กำหนดไว้ในแบบสัมภาษณ์

5. การวิเคราะห์ข้อมูล

5.1 การศึกษาการบริหารการจัดการเรียนรู้เพื่อฟื้นฟูภาวะถดถอยทางการเรียนรู้ของผู้เรียนโรงเรียนในสังกัด
สำนักงานเขตพื้นที่การศึกษามัธยมศึกษาพิษณุโลก ผู้วิจัยวิเคราะห์ข้อมูลทั่วไปของผู้ตอบแบบสอบถามโดยใช้สถิติพื้นฐาน

การประชุมวิชาการระดับชาติและนานาชาติบ้านสมเด็จเจ้าพระยา ครั้งที่ 1 (BS2C 2025)
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ได้แก่ ความถี่และร้อยละ วิเคราะห์ข้อมูลเกี่ยวกับการศึกษาการบริหารการจัดการเรียนรู้เพื่อฟื้นฟูภาวะถดถอยทางการเรียนรู้ของผู้เรียนโรงเรียนในสังกัดสำนักงานเขตพื้นที่การศึกษามัธยมศึกษาพิษณุโลก โดยใช้สถิติพื้นฐาน ได้แก่ ค่าเฉลี่ย ($\bar{x}$) และค่าส่วนเบี่ยงเบนมาตรฐาน (S.D.) แปลความหมายค่าเฉลี่ยของการบริหารการจัดการเรียนรู้เพื่อฟื้นฟูภาวะถดถอยทางการเรียนรู้ของผู้เรียนโรงเรียนในสังกัดสำนักงานเขตพื้นที่การศึกษามัธยมศึกษาพิษณุโลก โดยมีเกณฑ์ ดังนี้ (บุญชม ศรีสะอาด, 2560, น. 121)

ค่าเฉลี่ย 4.51 - 5.00 หมายถึง การบริหารการจัดการเรียนรู้เพื่อฟื้นฟูภาวะถดถอย อยู่ในระดับมากที่สุด

ค่าเฉลี่ย 3.51 - 4.50 หมายถึง การบริหารการจัดการเรียนรู้เพื่อฟื้นฟูภาวะถดถอย อยู่ในระดับมาก

ค่าเฉลี่ย 2.51 - 3.50 หมายถึง การบริหารการจัดการเรียนรู้เพื่อฟื้นฟูภาวะถดถอย อยู่ในระดับปานกลาง

ค่าเฉลี่ย 1.51 - 2.50 หมายถึง การบริหารการจัดการเรียนรู้เพื่อฟื้นฟูภาวะถดถอย อยู่ในระดับน้อย

ค่าเฉลี่ย 1.00 - 1.50 หมายถึง การบริหารการจัดการเรียนรู้เพื่อฟื้นฟูภาวะถดถอย อยู่ในระดับน้อยที่สุด

5.2 การศึกษาแนวทางการบริหารการจัดการเรียนรู้เพื่อฟื้นฟูภาวะถดถอยทางการเรียนรู้ของผู้เรียนโรงเรียนในสังกัดสำนักงานเขตพื้นที่การศึกษามัธยมศึกษาพิษณุโลก ผู้วิจัยนำข้อมูลที่ได้จากการสัมภาษณ์มาจัดกระทำข้อมูลและสรุปข้อมูลด้วยการวิเคราะห์เนื้อหา (Content Analysis)

4. ผลการวิจัย

1. ผลการศึกษาการบริหารการจัดการเรียนรู้เพื่อฟื้นฟูภาวะถดถอยทางการเรียนรู้ของผู้เรียนโรงเรียนในสังกัดสำนักงานเขตพื้นที่การศึกษามัธยมศึกษาพิษณุโลก ปรากฏผลตามที่แสดงในตารางที่ 1

ตารางที่ 1 แสดงค่าเฉลี่ย และส่วนเบี่ยงเบนมาตรฐาน การบริหารการจัดการเรียนรู้เพื่อฟื้นฟูภาวะถดถอยทางการเรียนรู้ของผู้เรียน โดยภาพรวมและรายด้าน

ที่	การบริหารการจัดการเรียนรู้เพื่อฟื้นฟูภาวะถดถอยทางการเรียนรู้ของผู้เรียน	กลุ่มตัวอย่าง (n = 310)		ระดับการบริหารการจัดการเรียนรู้เพื่อฟื้นฟูภาวะถดถอยทางการเรียนรู้ของผู้เรียน
		$\bar{x}$	S.D.	
1	ด้านการวางแผนการออกแบบการเรียนรู้	4.16	0.73	มาก
2	ด้านการดำเนินการจัดกิจกรรมการเรียนรู้	4.40	0.69	มาก
3	ด้านการสะท้อนและประเมินการเรียนรู้	4.33	0.61	มาก
4	ด้านการนิเทศและประเมินคุณภาพการจัดการเรียนรู้	4.29	0.70	มาก
5	ด้านการพัฒนาและปรับปรุงการจัดการเรียนรู้	4.30	0.68	มาก
	รวม	4.29	0.58	**มาก**

จากตาราง 1 แสดงค่าเฉลี่ย และส่วนเบี่ยงเบนมาตรฐาน การบริหารการจัดการเรียนรู้เพื่อฟื้นฟูภาวะถดถอยทางการเรียนรู้ของผู้เรียนโรงเรียนในสังกัดสำนักงานเขตพื้นที่การศึกษามัธยมศึกษาพิษณุโลก ในภาพรวม อยู่ในระดับมาก ($\bar{x}$= 4.29, S.D. = 0.53) เมื่อพิจารณาเป็นรายด้าน พบว่า ด้านที่มีค่าเฉลี่ยสูงสุด คือ ด้านการดำเนินการจัดกิจกรรมการเรียนรู้ อยู่ใน

ระดับมาก ($\bar{x}$ = 4.40, S.D. = 0.69) รองลงมา คือ ด้านการสะท้อนและประเมินการเรียนรู้ อยู่ในระดับมาก ($\bar{x}$ = 4.33, S.D. = 0.61) และด้านที่มีค่าเฉลี่ยต่ำสุด คือ ด้านการวางแผนการออกแบบการเรียนรู้ อยู่ในระดับมาก ($\bar{x}$ = 4.16, S.D. = 0.73)

2. ผลการศึกษาแนวทางการบริหารการจัดการเรียนรู้เพื่อฟื้นฟูภาวะถดถอยทางการเรียนรู้ของผู้เรียนโรงเรียนในสังกัดสำนักงานเขตพื้นที่การศึกษามัธยมศึกษาพิษณุโลก สรุปได้ดังนี้

2.1 ด้านการวางแผนการออกแบบการเรียนรู้

ผู้บริหารสถานศึกษา ครูและบุคลากรทางการศึกษามีการสำรวจความต้องการของผู้เรียน สำรวจทรัพยากรที่ใช้ในการแก้ไขปัญหาแล้วจึงกำหนดกลยุทธ์ในการแก้ปัญหาโดยแนวทางในการฟื้นฟูภาวะถดถอยทางการเรียนรู้ของผู้เรียน มีการจัดสรรงบประมาณในการพัฒนาบุคลากร พัฒนาด้านสื่อและเทคโนโลยีให้ผู้เรียนได้เรียนรู้ทุกที่ทุกเวลา

2.2 ด้านการดำเนินการจัดกิจกรรมการเรียนรู้

ผู้บริหารสถานศึกษาส่งเสริมให้ครูออกแบบแผนการจัดการเรียนรู้แบบยืดหยุ่น สามารถใช้ในเวลาที่มีอยู่อย่างจำกัดได้ หรือสามารถปรับกิจกรรมไปใช้ในรูปแบบออนไลน์ได้ ผู้เรียนสามารถเรียนรู้ด้วยตนเองได้ ซึ่งจะทำให้เกิดความต่อเนื่องในการเรียนรู้ของผู้เรียน รวมไปถึงการวัดและประเมินผลผู้เรียนแบบระยะสั้น ๆ ไม่ควรใช้บทเรียนที่ยาวจนเกินไป

2.3 ด้านการสะท้อนและประเมินการเรียนรู้

ผู้บริหารสถานศึกษามีนโยบายการวัดและประเมินผลที่มีความหลากหลาย มีการวัดและประเมินผลตามสภาพจริง การดำเนินการนิเทศติดตาม และมีการสะท้อนกับผู้สอนตามกลุ่มสาระการเรียนรู้ต่าง ๆ

2.4 ด้านการนิเทศและประเมินคุณภาพการจัดการเรียนรู้

ผู้บริหารสถานศึกษาส่งเสริมและสนับสนุนการพัฒนาทักษะของครูผู้สอน ให้เน้นย้ำเรื่องการติดตามความก้าวหน้าของผู้เรียน โดยการจัดกิจกรรมการเรียนรู้ของผู้สอนควรเน้นการมีส่วนร่วม นิเทศครูผู้สอนใช้การประเมินตามสภาพจริง รวมถึงส่งเสริมให้ผู้สอนเก็บข้อมูลผู้เรียนเพื่อปรับแผนการจัดการเรียนรู้ และงานวิชาการนำข้อมูลนี้พูดคุยกับผู้ปกครองเพื่อส่งเสริมการเรียนรู้ของผู้เรียนนอกห้องเรียน

2.5 ด้านการพัฒนาและปรับปรุงการจัดการเรียนรู้

ผู้บริหารสถานศึกษา และครูใช้กระบวนการ PLC ในการแลกเปลี่ยนวิเคราะห์ผลการนิเทศ เพื่อให้เป็นไปตามเป้าหมายของการนิเทศ และนำข้อมูลเชิงลึกมาใช้เป็นแนวทางในการกำหนดแนวทางการจัดการเรียนรู้ให้มีความชัดเจนในการแก้ไขฟื้นฟูภาวะถดถอยทางการเรียนรู้ของผู้เรียน โดยวิธีการต่าง ๆ ในการแก้ไขปัญหา

5. อภิปรายผล

จากการวิจัยเรื่องการศึกษาแนวทางการบริหารการจัดการเรียนรู้เพื่อฟื้นฟูภาวะถดถอยทางการเรียนรู้ของผู้เรียนโรงเรียนในสังกัดสำนักงานเขตพื้นที่การศึกษามัธยมศึกษาพิษณุโลก สามารถอภิปรายผลการวิจัยได้ ดังนี้

1. การบริหารการจัดการเรียนรู้เพื่อฟื้นฟูภาวะถดถอยทางการเรียนรู้ของผู้เรียนโรงเรียนในสังกัดสำนักงานเขตพื้นที่การศึกษามัธยมศึกษาพิษณุโลก ในภาพรวม อยู่ในระดับมาก เมื่อพิจารณารายด้าน พบว่า ด้านที่มีค่าเฉลี่ยสูงสุด คือ ด้านการดำเนินการจัดกิจกรรมการเรียนรู้ และด้านที่มีค่าเฉลี่ยต่ำสุด คือ ด้านการวางแผนการออกแบบการเรียนรู้ ทั้งนี้อาจเนื่องมาจากผู้บริหารสถานศึกษาและครูผู้สอนของโรงเรียนในจังหวัดพิษณุโลก สังกัดสำนักงานเขตพื้นที่การศึกษามัธยมศึกษาพิษณุโลก ให้ความสำคัญในการจัดกิจกรรมการเรียนรู้ที่หลากหลาย สอดคล้องกับความสนใจและความต้องการของผู้เรียน กิจกรรมกลุ่ม กิจกรรมเดี่ยว กิจกรรมที่ใช้สื่อเทคโนโลยีใช้สื่อการเรียนรู้ที่หลากหลาย น่าสนใจและเหมาะสมกับผู้เรียนแต่ละคน ปรับเปลี่ยนรูปแบบการเรียนการสอนให้มีความยืดหยุ่นและตอบสนองความต้องการของผู้เรียนแต่ละคน สอดคล้องกับสำนักงานคณะกรรมการการศึกษาขั้นพื้นฐาน (2565) ที่ได้เสนอมาตรการการฟื้นฟูภาวะถดถอยทางการเรียนรู้ของผู้เรียน การจัดการเรียน

การสอน สถานศึกษาสำรวจความพร้อมของผู้เรียนและผู้ปกครองเป็นข้อมูลพื้นฐานในการจัดการศึกษา พัฒนาหลักสูตรและกระบวนการเรียนรู้ให้สอดคล้องกับสถานการณ์ที่เปลี่ยนแปลง จัดหาช่องทางการสื่อสารอย่างทั่วถึง จัดทำคู่มือการวัดผล การนิเทศ ติดตามการเรียนการสอน และประสานความร่วมมือกับผู้ปกครองในการกำกับติดตามผู้เรียน ซึ่งสอดคล้องกับงานวิจัยของ สิริพรชัย บัวกองกุลรัตน์ และคณะ (2567) ที่ศึกษาเรื่อง "แนวทางการบริหารงานวิชาการในภาวะถดถอยทางการเรียนรู้ของนักเรียนในโรงเรียนสังกัดสำนักงานเขตพื้นที่การศึกษามัธยมศึกษาเลยหนองบัวลำภู" ผลการวิจัยพบว่า การบริหารงานวิชาการเป็นภารกิจที่สำคัญของการบริหารโรงเรียน ถือเป็นงานที่มีความสำคัญที่สุด เป็นหัวใจของการจัดการศึกษา เพื่อให้ครูและผู้เรียนมีความรู้ ทักษะในการใช้เทคโนโลยีเพื่อให้บรรลุตามเป้าหมายของการจัดการศึกษา 1) ควรปรับการจัดการเรียนการสอนและหลักสูตรให้มีความทันสมัยด้วยวงจรการบริหารงานคุณภาพแบบ PDCA 2) นักเรียนได้ลงมือปฏิบัติอย่างทั่วถึง มีบทบาทมีส่วนร่วมในการจัดกิจกรรมการเรียนการสอนโดยกระบวนการสอนแบบ Active learning มีการใช้เทคโนโลยีช่วยพัฒนาการสอนผ่านแอพพลิเคชั่นทางการศึกษา ครูผู้สอนควรมีการพัฒนาสื่อ เทคโนโลยี นักเรียนควรมีโอกาสสร้างและพัฒนาสื่อการสอนขึ้นด้วยตนเอง มีการวัดผลและประเมินผลตามสภาพจริงและมีความหลากหลาย และสอดคล้องกับงานวิจัย

2. แนวทางการบริหารการจัดการเรียนรู้เพื่อฟื้นฟูภาวะถดถอยทางการเรียนรู้ของผู้เรียนโรงเรียนในสังกัดสำนักงานเขตพื้นที่การศึกษามัธยมศึกษาพิษณุโลก พบว่า ผู้บริหารสถานศึกษา ครูและบุคลากรทางการศึกษามีการสำรวจความต้องการของผู้เรียนและทรัพยากรที่มีอยู่ก่อนการดำเนินการ ซึ่งเป็นพื้นฐานสำคัญในการแก้ไขปัญหา จัดสรรงบประมาณเพื่อพัฒนาบุคลากร สื่อ และเทคโนโลยี รวมถึงการออกแบบกิจกรรมการเรียนรู้ที่ยืดหยุ่น สามารถปรับใช้ได้ตามสถานการณ์ วัดและประเมินผลผู้เรียนอย่างสม่ำเสมอ และมีการปรับแผนการเรียนรู้ตามความต้องการของผู้เรียนแต่ละคน นิเทศและให้คำปรึกษาแก่ครู เพื่อพัฒนาทักษะและความรู้ในการจัดการเรียนรู้ เก็บรวบรวมข้อมูลและนำมาวิเคราะห์เพื่อปรับปรุงการจัดการเรียนรู้ ต้องอาศัยความร่วมมือจากทุกฝ่าย และการปรับใช้แนวทางที่เหมาะสมกับแต่ละบุคคล หากมีการวางแผนและดำเนินการอย่างเป็นระบบ นักเรียนทุกคนจะมีโอกาสได้พัฒนาศักยภาพอย่างเต็มที่ ทั้งนี้อาจเนื่องมาจากผู้บริหารสถานศึกษาและครูของโรงเรียนในจังหวัดพิษณุโลก สังกัดสำนักงานเขตพื้นที่การศึกษามัธยมศึกษาพิษณุโลก ตระหนักดีว่ากิจกรรมที่หลากหลายและน่าสนใจเป็นปัจจัยสำคัญในการดึงดูดและกระตุ้นให้ผู้เรียนมีส่วนร่วมในการเรียนรู้และการใช้สื่อ เทคโนโลยีมีความจำเป็นในการจัดกิจกรรมการเรียนรู้ให้แก่ผู้เรียน จึงจำเป็นต้องมีการวางแผนจัดสรรทรัพยากรเพื่อสนับสนุนการจัดกิจกรรมการเรียนการสอนของครูให้แก่ผู้เรียน มีการพัฒนาครูและกำกับติดตามประเมินผลการจัดการเรียนรู้เพื่อปรับแก้ไขต่อไป สอดคล้องกับงานวิจัยของ ของเมธาวัลย์ วิพัฒน์ครุฑ และมัทนา วังถนอมศักดิ์ (2567) ที่ศึกษาแนวทางการพัฒนาการดำเนินงานตามมาตรการฟื้นฟูภาวะถดถอยทางการเรียนรู้ของโรงเรียนประชาอุปถัมภ์ ผลการวิจัยพบว่า มาตรการที่ 2 เสริมพลังพัฒนาครูและผู้บริหารสถานศึกษา มี 3 แนวทาง ได้แก่ 1) การอบรมเพื่อส่งเสริมศักยภาพครู 2) การนิเทศการเรียนรู้ อย่างน้อย 1 ครั้ง/เดือน 3) สะท้อนปัญหาผ่านกระบวนการชุมชนแห่งการเรียนรู้ เพื่อนำไปสู่การสร้างกลยุทธ์ของโรงเรียน มาตรการที่ 3 สร้างการมีส่วนร่วมในการจัดการเรียนรู้อย่าง   มีประสิทธิภาพระหว่างสถานศึกษา ครู ผู้ปกครอง ชุมชน และทุกภาคส่วนที่เกี่ยวข้องมี 3 แนวทาง ได้แก่ 1) การจัดทำคู่มือเพื่อชี้แจงนโยบายและแนวทางการจัดการเรียนรู้ 2) สร้างช่องทางประชาสัมพันธ์ 3) โรงเรียนขอความร่วมมือการสนับสนุนจากหน่วยงานทั้งภาครัฐและเอกชนเพิ่มมากขึ้น โดยเฉพาะเรื่องการวางแผนการเรียนรู้ให้ผู้เรียนที่มีภาวะถดถอยทางการเรียนรู้รายบุคคล มาตรการที่ 4 พัฒนาคลังสื่อดิจิทัลเพื่อการเรียนรู้แบบเปิดและเชื่อมโยงข้อมูลสารสนเทศทางการศึกษา

6. บทสรุป

จากผลการวิจัย พบว่า การบริหารการจัดการเรียนรู้เพื่อฟื้นฟูภาวะถดถอยทางการเรียนรู้ของผู้เรียนโรงเรียนในสังกัดสำนักงานเขตพื้นที่การศึกษามัธยมศึกษาพิษณุโลก ประกอบด้วย 5 ด้าน ได้แก่ การวางแผนการออกแบบการเรียนรู้ การ

ดำเนินการจัดกิจกรรมการเรียนรู้ การสะท้อนและประเมินการเรียนรู้ การนิเทศและประเมินคุณภาพการจัดการศึกษา และการพัฒนาและปรับปรุงการจัดการเรียนรู้ ดังนั้น แนวทางการบริหารการจัดการเรียนรู้เพื่อฟื้นฟูภาวะถดถอยทางการเรียนรู้ เป็นกระบวนการที่ต้องอาศัยความร่วมมือจากทุกภาคส่วน ทั้งผู้บริหารสถานศึกษา ครู ผู้ปกครอง และนักเรียนเอง มีการวางแผนและดำเนินการอย่างเป็นระบบ โดยให้ความสำคัญกับการออกแบบการเรียนรู้ที่ตรงตามความต้องการของผู้เรียน การจัดกิจกรรมที่หลากหลาย และการประเมินผลอย่างต่อเนื่อง จะช่วยให้ผู้เรียนสามารถฟื้นฟูภาวะถดถอยทางการเรียนรู้และกลับมาเรียนรู้ได้อย่างเต็มศักยภาพ สามารถปรับตัวให้เข้ากับสถานการณ์ที่เปลี่ยนแปลงไปอย่างรวดเร็ว นำเทคโนโลยีมาใช้ในการเรียนการสอน และสร้างสภาพแวดล้อมที่เอื้อต่อการเรียนรู้ จะเป็นปัจจัยสำคัญที่ช่วยให้การฟื้นฟูภาวะถดถอยทางการเรียนรู้ประสบความสำเร็จ อันส่งผลต่อการพัฒนาการจัดการศึกษาของสถานศึกษาให้มีคุณภาพและมีประสิทธิภาพสูงสุดต่อไป

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แนวทางการส่งเสริมคุณลักษณะการเรียนรู้ทางอารมณ์และสังคมของนักเรียน
โรงเรียนมัธยมศึกษา จังหวัดพิษณุโลก

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บทคัดย่อ

การวิจัยในครั้งนี้มีวัตถุประสงค์เพื่อศึกษาคุณลักษณะการเรียนรู้ทางอารมณ์และสังคมและแนวทางการส่งเสริมคุณลักษณะการเรียนรู้ทางอารมณ์และสังคมของนักเรียนโรงเรียนมัธยมศึกษา จังหวัดพิษณุโลก โดยมีการดำเนินการวิจัยแบ่งออกเป็น 2 ขั้นตอน ได้แก่ ขั้นตอนที่ 1 การศึกษาคุณลักษณะการเรียนรู้ทางอารมณ์และสังคมของนักเรียน โรงเรียนมัธยมศึกษา จังหวัดพิษณุโลก กลุ่มตัวอย่าง ได้แก่ นักเรียนในโรงเรียนมัธยมศึกษา จังหวัดพิษณุโลก ปีการศึกษา 2567 จำนวน 379 คน กำหนดขนาดตัวอย่างโดยใช้ตารางกำหนดขนาดกลุ่มตัวอย่างของเครจซี่และมอร์แกน การได้มาของกลุ่มตัวอย่างใช้วิธีการสุ่มแบบแบ่งชั้นภูมิ ตามสัดส่วนของนักเรียนแต่ละอำเภอในจังหวัดพิษณุโลก เก็บรวบรวมข้อมูลด้วยแบบสอบถาม มีลักษณะเป็นมาตรประมาณค่า 5 ระดับ วิเคราะห์ข้อมูลด้วยค่าเฉลี่ยและส่วนเบี่ยงเบนมาตรฐาน ขั้นตอนที่ 2 การศึกษาแนวทางการส่งเสริมคุณลักษณะการเรียนรู้ทางอารมณ์และสังคมของนักเรียนโรงเรียนมัธยมศึกษา จังหวัดพิษณุโลก กลุ่มผู้ให้ข้อมูลในการสัมภาษณ์ ได้แก่ ผู้ทรงคุณวุฒิที่มีความรู้และประสบการณ์ในการปฏิบัติงาน จำนวน 5 คน ได้มาจากการเลือกแบบเฉพาะเจาะจง เก็บรวบรวมข้อมูลด้วยแบบสัมภาษณ์ วิเคราะห์ข้อมูลด้วยการวิเคราะห์เนื้อหา ผลการวิจัยพบว่า

1. ผลการศึกษาคุณลักษณะการเรียนรู้ทางอารมณ์และสังคมของนักเรียนโรงเรียนมัธยมศึกษา จังหวัดพิษณุโลกในภาพรวมพบว่า ด้านที่มีค่าเฉลี่ยสูงสุด คือ ด้านการตระหนักรู้สังคม (Social - Awareness) และด้านที่มีค่าเฉลี่ยต่ำสุด คือ ด้านการจัดการตนเอง (Self - Management)

2. ผลการศึกษาแนวทางการส่งเสริมคุณลักษณะการเรียนรู้ทางอารมณ์และสังคมของนักเรียนโรงเรียนมัธยมศึกษา จังหวัดพิษณุโลก พบว่า ผู้บริหารและครูควรส่งเสริมให้นักเรียนสามารถระบุวิชาหรือกิจกรรมที่สนใจ มีความเชื่อมั่นในความสามารถของตนเอง ส่งเสริมให้นักเรียนกล้าที่จะทักท้วงเมื่อเห็นการกระทำที่ไม่ถูกต้องหรือไม่เป็นธรรม สามารถขอความช่วยเหลือจากผู้อื่นเมื่อตนเองต้องการและให้นักเรียนสามารถตัดสินใจโดยคำนึงถึงความถูกต้องตามหลักคุณธรรมและจริยธรรมได้

คำสำคัญ: การเรียนรู้ทางอารมณ์และสังคม; การส่งเสริมคุณลักษณะ; คุณลักษณะของนักเรียน

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Guidelines for Promoting Social and Emotional Learning Characteristics of Students in Secondary Schools in Phitsanulok Province

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Abstract

The purpose of this research is to study the social and emotional learning characteristics and study guidelines for promoting social and emotional learning characteristics of students in secondary schools in Phitsanulok Province. The first step was to study the social and emotional learning characteristics of students in secondary schools in Phitsanulok Province. The 379 students by stratified sampling. The research instrument was a questionnaire. The statistics used for data analysis were mean and standard deviation. The second step was to study guidelines for promoting social and emotional learning characteristics of students in secondary schools in Phitsanulok Province. The informants were 5 experts, selected by purposive sampling. The in-depth interview was used for collecting information. The data were statistically analyzed using content analysis. The results were as follows.

1. Regarding the social and emotional learning characteristics of students, social awareness had the highest mean score, while self-management had the lowest.

2. In terms of promoting these characteristics, it was suggested that administrators and teachers encourage students to identify subjects or activities of interest, build self-confidence, speak up against unfair actions, seek help when needed, and make decisions based on moral and ethical principles.

Keywords: Social and emotional learning; Character development; Student characteristics

1. บทนำ

    การศึกษามีความสำคัญในการพัฒนาคนในประเทศให้มีองค์ความรู้และสามารถใช้ชีวิตในสังคมได้อย่างมีความสุข โดยมีหัวใจสำคัญในการพัฒนาคุณภาพผู้เรียน (กระทรวงศึกษาธิการ, 2560, น.5) แต่สภาวการณ์ด้านการศึกษาของประเทศไทย ในช่วงที่ผ่านมายังคงมีข้อจำกัดในหลายมิติ ส่งผลให้ผู้เรียนขาดกระบวนการคิดวิเคราะห์ ความคิดสร้างสรรค์และทักษะการแก้ปัญหาที่มีประสิทธิภาพ (ประกาศสำนักนายกรัฐมนตรี เรื่อง การประกาศแผนการปฏิรูปประเทศ (ฉบับปรับปรุง), 2564) ผู้บริหารและบุคลากรในโรงเรียนควรให้ความช่วยเหลือดูแลนักเรียนให้ดำเนินชีวิตอยู่ในโรงเรียนอย่างมีความสุขในบรรยากาศ หรือสถานการณ์ที่เอื้ออำนวยให้นักเรียน สามารถเรียนรู้ได้อย่างเต็มที่และมีความเจริญงอกงามในบุคลิกภาพทุกๆด้าน ทั้งทางร่างกายสังคม อารมณ์ และสติปัญญา ยิ่งหากเป็นนักเรียนมัธยมศึกษาควรมีการพัฒนาและการส่งเสริมให้มีทักษะชีวิต รู้จักตนเอง รู้ข้อดี ข้อที่ต้องพัฒนา มีความภูมิใจในตนเอง เพื่อเป็นการเตรียมตัวให้สามารถใช้ชีวิตในสภาพสังคมปัจจุบัน ตลอดจนมีทักษะในการเผชิญปัญหาสามารถแก้ไขปัญหาที่จะเกิดขึ้นในท่ามกลางสังคมได้

    นักเรียนมัธยมศึกษาจัดอยู่ในช่วงวัยรุ่น ซึ่งเป็นช่วงที่มีการเปลี่ยนแปลงทางด้านร่างกาย จิตใจและอารมณ์ทำให้วัยรุ่นประสบปัญหามากมาย เช่น ปัญหาสุขภาพจิต โดยเฉพาะความเครียดเกิดขึ้นได้หลายปัจจัย ทั้งปัญหาความรุนแรงในครอบครัว ปัญหาการกลั่นแกล้ง (Bully) ในโรงเรียน จากข้อมูลการประเมินสุขภาพจิตตนเอง (Mental Health Check In) ของกรมสุขภาพจิต ในปี 2566 พบว่า เยาวชนร้อยละ 18.0 มีความเครียดสูง เสี่ยงตกอยู่ในภาวะซึมเศร้าร้อยละ 26.0 และเสี่ยงที่จะฆ่าตัวตาย ร้อยละ 12.5 และในส่วนของผลการประเมิน 3 เดือนแรกของปี 2567 พบว่า วัยรุ่นร้อยละ 26.8 และ 18.3 กำลังอยู่ในภาวะหมดไฟในการเรียนรู้และมีความเครียดสูงตามลำดับ ขณะเดียวกันการกลั่นแกล้ง (Bully) ยังเป็นอีกหนึ่งสาเหตุที่ทำให้เด็กและเยาวชนเกิดภาวะซึมเศร้า โดยข้อมูลจากกรมสนับสนุนบริการสุขภาพในปี 2566 พบว่า เด็กและเยาวชนไทย เคยถูกกลั่นแกล้งร้อยละ 44.3 และส่วนใหญ่เกิดขึ้นภายในโรงเรียนมากถึงร้อยละ 86.9 ซึ่งเป็นการกระทำความรุนแรงรูปแบบหนึ่งที่ส่งผลกระทบต่อสภาพจิตใจ จนทำให้เกิดความเครียด ความรู้สึกอับอาย และมีความมั่นใจในตนเองต่ำลง ซึ่งปัญหาเหล่านี้ไม่เพียงแต่ส่งผลกระทบในช่วงระยะเวลาหนึ่งเท่านั้น แต่อาจเป็นอุปสรรคต่อเป้าหมายชีวิตในอนาคต (รายงานภาวะสังคมไทย ไตรมาสหนึ่ง ปี 2567, 2567) ดังนั้น นักเรียนที่อยู่ในกลุ่มวัยนี้ควรได้รับการสร้างเสริมความปลอดภัยและการดูแลสุขภาพ เพราะนอกจากจะทำให้นักเรียนได้เรียนรู้อย่างมีความสุขแล้ว ยังมีผลต่อการพัฒนาด้านอื่นๆ อีกด้วย ความปลอดภัยในมิติส่วนตัวและสังคมจึงเป็นแนวทางการวางแผนการรักษาความปลอดภัยให้แก่นักเรียนในการป้องกันและแก้ไขปัญหาพฤติกรรม อารมณ์ และทักษะสังคม เพราะเป็นกระบวนการที่ให้การคัดกรอง ดูแล ส่งเสริมและป้องกันปัญหาสุขภาพจิตของนักเรียนได้ตั้งแต่ในระยะเริ่มต้น ตั้งแต่การสังเกตเฝ้าระวัง และคัดกรองนักเรียนในชั้นเรียน โดยมีพื้นฐานแนวความคิดมาจากความต้องการให้นักเรียนได้รับการดูแลที่เหมาะสมตามบริบทและความแตกต่างของปัญหาที่ต่างกัน

    การสร้างเสริมความปลอดภัยในมิติส่วนตัว สังคม และสุขภาพจิตในโรงเรียนของนักเรียนวัยรุ่นให้เกิดการรับรู้ เข้าใจในตนเองและผู้อื่น จัดการกับอารมณ์ และแสดงออกในสังคมอย่างเหมาะสม รวมถึงมีความสัมพันธ์อันดีกับบุคคลอื่น รับผิดชอบต่อการตัดสินใจของตนเอง ตลอดจนการแก้ปัญหาได้ด้วยวิธีการที่เหมาะสมตามพัฒนาการช่วงวัย สามารถพัฒนาได้ด้วยกระบวนการเสริมสร้างการเรียนรู้ทางอารมณ์และสังคม โดยองค์กรความร่วมมือเพื่อการเรียนรู้และส่งเสริมทักษะทางวิชาการ อารมณ์ และสังคม (Collaborative for Academic Social and Emotional Learning: CASEL) ได้ศึกษารูปแบบการเรียนรู้ทางอารมณ์และสังคม ประกอบด้วย 5 ด้าน ได้แก่ การตระหนักรู้ตนเอง การจัดการตนเอง การตระหนักรู้สังคม การสร้างสัมพันธภาพ และการตัดสินใจอย่างรับผิดชอบ ซึ่งสามารถพัฒนาให้นักเรียนมีความเข้าใจ รับรู้ ด้านความคิด ความรู้สึก และพฤติกรรมที่เกิดขึ้นของตนเองและผู้อื่นได้ โดยควบคุมอารมณ์จากการกระทำ รวมถึงการแสดงออกทางพฤติกรรมของตนได้อย่างเหมาะสม มีทักษะการตัดสินใจและรับผิดชอบสิ่งที่เกิดจากการกระทำของตน มีการสร้างสัมพันธภาพสื่อสารกันได้เป็นอย่างดี ดังนั้น หากจะพัฒนานักเรียนให้มีการเรียนรู้ทางอารมณ์และสังคมจึงเป็นเรื่องสำคัญมาก มาร์ธาและคนอื่นๆ (Martha K; et al, 2017) ได้กล่าวถึง การเรียนรู้ทางอารมณ์

และสังคมสามารถป้องกันความเสี่ยง สามารถปรับเปลี่ยนพฤติกรรมที่เป็นปัญหาของนักเรียนอย่างมีประสิทธิภาพได้จากการส่งเสริม
พฤติกรรมที่พึงประสงค์ให้เกิดขึ้น จึงมีความจำเป็นอย่างยิ่งที่ผู้มีความเกี่ยวข้องทางด้านการศึกษาตลอดจนผู้ที่ใกล้ชิดกับนักเรียน
ควรตระหนักและให้ความสำคัญในการส่งเสริมความสามารถในการเรียนรู้ทางอารมณ์ และสังคมให้แก่นักเรียน ควบคู่ไปกับ
การส่งเสริมด้านสติปัญญา

ด้วยเหตุนี้ ผู้วิจัยจึงสนใจที่จะศึกษาแนวทางการส่งเสริมคุณลักษณะการเรียนรู้ทางอารมณ์และสังคมของนักเรียน
เพื่อเป็นแนวทางในการสนับสนุนและส่งเสริมให้สถานศึกษาได้ดำเนินการพัฒนาผู้เรียนให้เป็นมนุษย์มีความสมบูรณ์ทั้งทางร่างกาย
จิตใจ อารมณ์ สังคม สติปัญญา มีความรู้และมีคุณธรรม จริยธรรม สามารถดำรงชีวิตได้อย่างมีประสิทธิภาพเป็นไปตามความต้องการ
ของสังคม อันส่งผลต่อการพัฒนาการจัดการศึกษาของสถานศึกษาให้มีคุณภาพและมีประสิทธิภาพสูงสุดต่อไป

2. วัตถุประสงค์ของการวิจัย

    1. เพื่อศึกษาคุณลักษณะการเรียนรู้ทางอารมณ์และสังคมของนักเรียนโรงเรียนมัธยมศึกษา จังหวัดพิษณุโลก

    2. เพื่อศึกษาแนวทางการส่งเสริมคุณลักษณะการเรียนรู้ทางอารมณ์และสังคมของนักเรียนโรงเรียนมัธยมศึกษา
จังหวัดพิษณุโลก

3. วิธีดำเนินงานวิจัย

    1. ขั้นตอนการดำเนินการวิจัย

การวิจัยเรื่อง แนวทางการส่งเสริมคุณลักษณะการเรียนรู้ทางอารมณ์และสังคมของนักเรียนโรงเรียนมัธยมศึกษา
จังหวัดพิษณุโลก เป็นการวิจัยเชิงพรรณา ผู้วิจัยมีวิธีดำเนินการวิจัย แบ่งเป็น 2 ขั้นตอน โดยมีวิธีดำเนินงานวิจัย ดังนี้

ขั้นตอนที่ 1 การศึกษาคุณลักษณะการเรียนรู้ทางอารมณ์และสังคมของนักเรียนโรงเรียนมัธยมศึกษา จังหวัดพิษณุโลก

ขั้นตอนที่ 2 การศึกษาแนวทางการส่งเสริมคุณลักษณะการเรียนรู้ทางอารมณ์และสังคมของนักเรียนโรงเรียน
มัธยมศึกษา จังหวัดพิษณุโลก

    2. ประชากรและกลุ่มตัวอย่าง/กลุ่มผู้ให้ข้อมูล

2.1 ประชากร ได้แก่ นักเรียนในโรงเรียนมัธยมศึกษา จังหวัดพิษณุโลก ปีการศึกษา 2567 จำนวน 39 โรงเรียน
จำนวน 28,858 คน (ข้อมูลสารสนเทศทางการศึกษา ปีการศึกษา 2567 สำนักงานเขตพื้นที่การศึกษามัธยมศึกษา พิษณุโลก
อุตรดิตถ์ ณ วันที่ 10 มิถุนายน 2567)

2.2 กลุ่มตัวอย่าง ได้แก่ นักเรียนในโรงเรียนมัธยมศึกษา จังหวัดพิษณุโลก จำนวน 379 คน กำหนดขนาดตัวอย่าง
โดยใช้ตารางกำหนดขนาดกลุ่มตัวอย่างของเครจซี่และมอร์แกน การได้มาของกลุ่มตัวอย่างใช้วิธีการสุ่มแบบแบ่งชั้นภูมิ
(Stratified Random Sampling) ตามสัดส่วนของนักเรียนแต่ละอำเภอในจังหวัดพิษณุโลก

2.3 กลุ่มผู้ให้ข้อมูลในการสัมภาษณ์ ได้แก่ ผู้ทรงคุณวุฒิที่มีความรู้และประสบการณ์ในการปฏิบัติงาน จำนวน
5 คน ได้มาจากการเลือกแบบเฉพาะเจาะจง (Purposive Selection) ประกอบด้วย ผู้บริหารสถานศึกษาที่มีวุฒิการศึกษา
ปริญญาโททางการศึกษาหรือเทียบเท่า มีวิทยฐานะไม่ต่ำกว่าชำนาญการพิเศษ มีความรู้ ความเชี่ยวชาญและประสบการณ์
ทางด้านการบริหารในสถานศึกษา จำนวน 2 คน ศึกษานิเทศก์ผู้มีความรู้ ประสบการณ์ด้านบริหารและการส่งเสริมพัฒนา
ระบบประกันคุณภาพการศึกษา จำนวน 1 คน และครูผู้สอนรายวิชาแนะแนวหรือปฏิบัติหน้าที่งานกิจการนักเรียน จำนวน
2 คน

    3. เครื่องมือที่ใช้ในการเก็บรวบรวมข้อมูล

3.1 เครื่องมือที่ใช้ในการเก็บรวบรวมข้อมูล ได้แก่ แบบสอบถามเรื่องคุณลักษณะการเรียนรู้ทางอารมณ์และสังคม
ของนักเรียน โรงเรียนมัธยมศึกษา จังหวัดพิษณุโลก แบ่งออกเป็น 2 ตอน ได้แก่ ตอนที่ 1 ข้อมูลทั่วไปของผู้ตอบแบบสอบถาม

ประกอบด้วย เพศ และระดับชั้น ลักษณะเป็นแบบตรวจสอบรายการ (Check List) ตอนที่ 2 คุณลักษณะการเรียนรู้ทางอารมณ์และสังคมของนักเรียน จำนวน 5 ด้าน รวมทั้งสิ้น 41 ข้อ เป็นแบบมาตราส่วนประมาณค่า (Rating Scale) แบ่งเป็น 5 ระดับ โดยตรวจสอบความตรงเชิงเนื้อหา (Content Validity) เพื่อตรวจสอบความสอดคล้องระหว่างนิยามศัพท์เฉพาะกับข้อคำถาม ได้ค่าดัชนีความสอดคล้องของแบบสอบถาม (Index of Item Objective Congruence : IOC) เท่ากับ 0.67 – 1.00 และนำแบบสอบถามไปทดลอง (Try-out) กับนักเรียนในโรงเรียนมัธยมศึกษา จังหวัดพิจิตร ปีการศึกษา 2567 จำนวน 30 คน ที่ไม่ใช่กลุ่มตัวอย่างในการวิจัยเพื่อหาความเชื่อมั่น (Reliability) ของแบบสอบถาม ด้วยการวิเคราะห์ค่าสัมประสิทธิ์แอลฟา (Alpha-coefficient) ของครอนบัค (Cronbach) มีค่าเท่ากับ 0.93

        3.2 แบบสัมภาษณ์แนวทางการส่งเสริมคุณลักษณะการเรียนรู้ทางอารมณ์และสังคมของนักเรียนโรงเรียนมัธยมศึกษา จังหวัดพิษณุโลก โดยนำข้อมูลจากการศึกษาคุณลักษณะการเรียนรู้ทางอารมณ์และสังคมของนักเรียนโรงเรียนมัธยมศึกษา จังหวัดพิษณุโลกในแต่ละด้านมาใช้ในการศึกษาแนวทาง โดยเลือกข้อที่มีค่าเฉลี่ยต่ำสุดในแต่ละด้านมากำหนดเป็นข้อคำถามในเครื่องมือมาสร้างแบบสัมภาษณ์แบบมีโครงสร้าง (Structured Interview) จำนวน 5 ด้าน 5 ข้อ ประกอบด้วย 1. การตระหนักรู้ตนเอง (Self - Awareness) 2. การจัดการตนเอง (Self - Management) 3. การตระหนักรู้สังคม (Social - Awareness) 4. การสร้างสัมพันธภาพ (Relationship Skills) 5. การรับผิดชอบต่อการตัดสินใจ (Responsible Decision Making)

    4. การเก็บรวบรวมข้อมูล

        4.1 การศึกษาคุณลักษณะการเรียนรู้ทางอารมณ์และสังคมของนักเรียน โรงเรียนมัธยมศึกษา จังหวัดพิษณุโลก ผู้วิจัยติดต่อขอหนังสือจากบัณฑิตวิทยาลัย มหาวิทยาลัยนเรศวร ถึงผู้บริหารสถานศึกษา สังกัดสำนักงานเขตพื้นที่การศึกษามัธยมศึกษาพิษณุโลก อุตรดิตถ์ เพื่อขอความอนุเคราะห์เก็บรวบรวมข้อมูลจากนักเรียนโรงเรียนมัธยมศึกษา จังหวัดพิษณุโลก สังกัดสำนักงานเขตพื้นที่การศึกษามัธยมศึกษาพิษณุโลก อุตรดิตถ์ ส่งแบบสอบถามพร้อมกับหนังสือขอความอนุเคราะห์เก็บรวบรวมข้อมูลไปยังโรงเรียนที่เป็นกลุ่มตัวอย่างและประสานขอความร่วมมือจากนักเรียนในการตอบแบบสอบถามผ่าน Google Form จำนวน 379 คน ได้รับแบบสอบถามคืน จำนวน 379 คนคิดเป็นร้อยละ 100

        4.2 การศึกษาแนวทางการส่งเสริมคุณลักษณะการเรียนรู้ทางอารมณ์และสังคมของนักเรียนโรงเรียนมัธยมศึกษา จังหวัดพิษณุโลก ผู้วิจัยขอหนังสือจากบัณฑิตวิทยาลัยมหาวิทยาลัยนเรศวร เพื่อขอความอนุเคราะห์เก็บรวบรวมข้อมูลด้วยการสัมภาษณ์ ติดต่อนัดหมายกับผู้ทรงคุณวุฒิที่ให้สัมภาษณ์เป็นรายบุคคล นัดวัน และเวลาในการสัมภาษณ์ และดำเนินการสัมภาษณ์ตามแนวประเด็นที่กำหนดไว้ในแบบสัมภาษณ์

    5. การวิเคราะห์ข้อมูล

        5.1 การศึกษาคุณลักษณะการเรียนรู้ทางอารมณ์และสังคมของนักเรียน โรงเรียนมัธยมศึกษา จังหวัดพิษณุโลก ผู้วิจัยวิเคราะห์ข้อมูลทั่วไปของผู้ตอบแบบสอบถามโดยใช้สถิติพื้นฐาน ได้แก่ ค่าความถี่และค่าร้อยละ วิเคราะห์ข้อมูลเกี่ยวกับการศึกษาคุณลักษณะการเรียนรู้ทางอารมณ์และสังคมของนักเรียนโรงเรียนมัธยมศึกษา จังหวัดพิษณุโลก โดยใช้สถิติพื้นฐาน ได้แก่ ค่าเฉลี่ย ($\bar{x}$) ค่าส่วนเบี่ยงเบนมาตรฐาน (S.D.) แปลความหมายค่าเฉลี่ยของการศึกษาคุณลักษณะการเรียนรู้ทางอารมณ์และสังคมของนักเรียน โรงเรียนมัธยมศึกษา จังหวัดพิษณุโลก โดยมีเกณฑ์ ดังนี้ (บุญชม ศรีสะอาด, 2560, น. 121)

        ค่าเฉลี่ย 4.51 - 5.00 หมายถึง ความคิด ความรู้สึก พฤติกรรมหรือการแสดงออกของนักเรียนอยู่ในระดับมากที่สุด

        ค่าเฉลี่ย 3.51 - 4.50 หมายถึง ความคิด ความรู้สึก พฤติกรรมหรือการแสดงออกของนักเรียนอยู่ในระดับมาก

        ค่าเฉลี่ย 2.51 - 3.50 หมายถึง ความคิด ความรู้สึก พฤติกรรมหรือการแสดงออกของนักเรียนอยู่ในระดับปานกลาง

        ค่าเฉลี่ย 1.51 - 2.50 หมายถึง ความคิด ความรู้สึก พฤติกรรมหรือการแสดงออกของนักเรียนอยู่ในระดับน้อย

        ค่าเฉลี่ย 1.00 - 1.50 หมายถึง ความคิด ความรู้สึก พฤติกรรมหรือการแสดงออกของนักเรียนอยู่ในระดับน้อยที่สุด

5.2 การศึกษาแนวทางการส่งเสริมคุณลักษณะการเรียนรู้ทางอารมณ์และสังคมของนักเรียนโรงเรียนมัธยมศึกษา จังหวัดพิษณุโลก ผู้วิจัยนำข้อมูลที่ได้จากการสัมภาษณ์มาจัดกระทำข้อมูล ประมวลผลและวิเคราะห์ข้อมูลไปพร้อมๆ กัน ทุกครั้งที่ได้ข้อมูลมาจะต้องจัดประเภทและจัดหมวดหมู่ของข้อมูลโดยการสังเคราะห์ แปลความหมายและตีความข้อมูลที่ได้ รวบรวมมาหลังการสัมภาษณ์ทุกครั้ง ผู้วิจัยได้นำข้อมูลไปถอดบันทึกเสียง รวบรวม เรียบเรียงความ และตรวจสอบความหมาย กับผู้ให้ข้อมูลที่เป็นผู้ให้ข้อมูลในแต่ละกลุ่ม พร้อมทำการแก้ไขข้อมูลให้ถูกต้องจนครบและสมบูรณ์ และสรุปข้อมูลด้วยการ วิเคราะห์เนื้อหา (Content Analysis)

4. ผลการวิจัย

1. ผลการศึกษาคุณลักษณะการเรียนรู้ทางอารมณ์และสังคมของนักเรียนโรงเรียนมัธยมศึกษา จังหวัดพิษณุโลก ปรากฏผลตามที่แสดงในตารางที่ 1

ตารางที่ 1 แสดงค่าเฉลี่ย ส่วนเบี่ยงเบนมาตรฐาน และระดับคุณลักษณะการเรียนรู้ทางอารมณ์และสังคมของนักเรียนโรงเรียน
มัธยมศึกษา จังหวัดพิษณุโลก โดยภาพรวมและรายด้าน

ที่	คุณลักษณะการเรียนรู้ ทางอารมณ์และสังคมของนักเรียน	กลุ่มตัวอย่าง (n = 379)		ระดับคุณลักษณะ การเรียนรู้ทางอารมณ์ และสังคมของนักเรียน
		$\bar{x}$	S.D.	
1	การตระหนักรู้ตนเอง (Self - Awareness)	3.79	0.55	มาก
2	การจัดการตนเอง (Self - Management)	3.63	0.60	มาก
3	การตระหนักรู้สังคม (Social - Awareness)	3.92	0.62	มาก
4	การสร้างสัมพันธภาพ (Relationship Skills)	3.74	0.61	มาก
5	การรับผิดชอบต่อการตัดสินใจ (Responsible Decision Making)	3.80	0.65	มาก
	รวม	3.78	0.53	มาก

จากตารางที่ 1 แสดงค่าเฉลี่ย ส่วนเบี่ยงเบนมาตรฐาน และระดับคุณลักษณะการเรียนรู้ทางอารมณ์และสังคม ของนักเรียนโรงเรียนมัธยมศึกษา จังหวัดพิษณุโลก ในภาพรวม อยู่ในระดับมาก ($\bar{x}$= 3.78, S.D. = 0.53) เมื่อพิจารณา เป็นรายด้าน พบว่า ด้านที่มีค่าเฉลี่ยสูงสุด คือ ด้านการตระหนักรู้สังคม (Social - Awareness) อยู่ในระดับมาก ($\bar{x}$= 3.92, S.D. = 0.62) รองลงมา คือ ด้านการรับผิดชอบต่อการตัดสินใจ (Responsible Decision Making) อยู่ในระดับมาก ($\bar{x}$= 3.80, S.D. = 0.65) และด้านที่มีค่าเฉลี่ยต่ำสุด คือ ด้านการจัดการตนเอง (Self - Management) อยู่ในระดับมาก ($\bar{x}$= 3.63, S.D. = 0.60)

2. การศึกษาแนวทางการส่งเสริมคุณลักษณะการเรียนรู้ทางอารมณ์และสังคมของนักเรียนโรงเรียนมัธยมศึกษาจังหวัด พิษณุโลก สรุปได้ดังนี้

2.1 ด้านการตระหนักรู้ตนเอง (Self - Awareness)

ผู้บริหารควรส่งเสริมให้ครูผู้สอนออกแบบการจัดการเรียนรู้ที่หลากหลาย โดยคำนึงถึงความแตกต่างระหว่าง บุคคล และเรียนรู้ตามความสนใจ ครูผู้สอนควรมีการจัดกิจกรรมสะท้อนตนเองให้แก่นักเรียน หรืออาจใช้แบบทดสอบ

การประชุมวิชาการระดับชาติและนานาชาติบ้านสมเด็จเจ้าพระยา ครั้งที่ 1 (BS2C 2025)
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แบบสำรวจที่ช่วยให้นักเรียนค้นพบจุดแข็ง ความสามารถพิเศษ และความชอบของตนเองที่ส่งเสริมให้นักเรียนรู้จักตนเอง
มากยิ่งขึ้น

2.2 ด้านการจัดการตนเอง (Self -Management)

ผู้บริหารและครูควรส่งเสริมให้นักเรียนได้พัฒนาทักษะทางด้านอารมณ์ ด้วยการบูรณาการเทคนิค วิธีการการสอน
ต่างๆ เข้าสู่กิจกรรมในชั้นเรียน โดยเปิดโอกาสให้นักเรียนมีส่วนร่วมในการกำหนดกฎและข้อตกลง พร้อมทั้งฝึกฝนทักษะ
สำคัญ เช่น การวางแผนและตั้งเป้าหมาย การควบคุมอารมณ์และพฤติกรรม ตลอดจนการเผชิญและแก้ไขปัญหา

2.3 ด้านการตระหนักรู้สังคม (Social - Awareness)

ผู้บริหารควรสนับสนุนให้โรงเรียนมีการนำหลักสูตรต้านทุจริตศึกษา ระดับการศึกษาขั้นพื้นฐาน รายวิชา
เพิ่มเติม "การป้องกันการทุจริต" ไปใช้ตามบริบทของโรงเรียน ปลูกฝังคุณธรรม จริยธรรม ค่านิยมที่ถูกต้องให้แก่นักเรียน
โดยบูรณาการในทุกรายวิชาและจัดกิจกรรมเสริมหลักสูตรที่สอดคล้องตามคุณลักษณะที่พึงประสงค์

2.4 ด้านการสร้างสัมพันธภาพ (Relationship Skills)

ผู้บริหารควรมีการส่งเสริมด้านการบริหารจัดการอย่างเป็นระบบ โดยใช้ระบบการดูแลช่วยเหลือนักเรียน มุ่งเน้นใ
ห้นักเรียนสามารถป้องกันและแก้ไขปัญหาที่เกิดขึ้น มีการประชาสัมพันธ์หรือเปิดช่องทางการสื่อสารที่หลากหลายเพื่อให้นักเรียน
ได้แสดงความคิดเห็น พูดคุย ปรึกษาซึ่งเป็นการช่วยเหลือและป้องกันปัญหาของนักเรียนทั้งด้านความคิด อารมณ์ ความรู้สึก
และความประพฤติของนักเรียน ฝึกทักษะการขอความช่วยเหลือให้นักเรียนได้เรียนรู้และพัฒนาตนเองด้วยทักษะใหม่ๆ เทคนิค
และวิธีคิดจากผู้ที่มีประสบการณ์ เพิ่มทางเลือกในการตัดสินใจ รวมถึงเป็นการเปิดโอกาสให้ผู้อื่นได้แสดงความสามารถ
รู้สึกมีคุณค่า และมีส่วนร่วมในการช่วยเหลือผู้อื่น

2.5 การรับผิดชอบต่อการตัดสินใจ (Responsible Decision Making)

ผู้บริหารและครูผู้สอนควรส่งเสริมความสามารถทางกระบวนการทางปัญญาที่เกี่ยวข้องกับการรับรู้ การจำ เข้าใจ
วิเคราะห์ สังเคราะห์ และประเมินค่า เพื่อตัดสินความถูกต้องของข้อมูลที่มีอยู่อย่างเหมาะสม ควรมีการจัดกิจกรรมการเรียนรู้
เพื่อสร้างเสริมทักษะการคิดอย่างมีวิจารณญาณให้แก่ผู้เรียน ด้วยวิธีการที่หลากหลายและเน้นการเรียนรู้ที่ยึดนักเรียนเป็นศูนย์กลาง
เปิดกว้างและยอมรับความคิดเห็นที่หลากหลาย จัดกิจกรรมพิเศษ เช่น การโต้วาที การอภิปราย หรือการจัดนิทรรศการ ที่เน้นการ
แสดงออกทางความคิด

5. อภิปรายผล

จากการศึกษาแนวทางการส่งเสริมคุณลักษณะการเรียนรู้ทางอารมณ์และสังคมของนักเรียนโรงเรียนมัธยมศึกษา
จังหวัดพิษณุโลก สามารถอภิปรายผลการวิจัยได้ ดังนี้

1. จากการศึกษาคุณลักษณะการเรียนรู้ทางอารมณ์และสังคมของนักเรียนโรงเรียนมัธยมศึกษา จังหวัดพิษณุโลก
ในภาพรวมพบว่า ด้านที่มีค่าเฉลี่ยสูงสุด คือ ด้านการตระหนักรู้สังคม (Social - Awareness) และด้านที่มีค่าเฉลี่ยต่ำสุด คือ
ด้านการจัดการตนเอง (Self - Management)

1.1 ด้านการตระหนักรู้สังคม (Social - Awareness) มีค่าเฉลี่ยสูงสุด ทั้งนี้อาจเนื่องมาจากนักเรียนอยู่ในช่วงวัยรุ่น
มักสนใจสังคมสิ่งแวดล้อม มีการปรับตัวเองให้เข้ากับกฎเกณฑ์กติกาของกลุ่มหรือสังคม และสามารถทำงานร่วมกับผู้อื่น
ได้ดีขึ้น สอดคล้องกับแนวคิดของ โคเบิร์ก (อ้างถึงใน อัชรา เอิบสุขสิริ, 2561) ได้อธิบายพัฒนาการทางจริยธรรมไว้ว่า
พัฒนาการในช่วงวัยรุ่นในระดับที่ 2 เป็นระดับมีจริยธรรมอย่างมีกฎเกณฑ์ (Conventional Level) เป็นการให้เหตุผลทาง
จริยธรรมของวัยรุ่น ระยะนี้เด็กและวัยรุ่นเริ่มเข้าใจและยอมรับกฎเกณฑ์ของสังคม โดยประพฤติปฏิบัติในสิ่งที่เป็นความ
คาดหวังของครอบครัว เพื่อนหรือสังคม มีการพัฒนาการทางความคิด

1.2 ด้านการจัดการตนเอง (Self - Management) มีค่าเฉลี่ยต่ำสุด ทั้งนี้อาจเนื่องมาจากนักเรียนอยู่ในช่วงวัยรุ่น ยังไม่สามารถควบคุมอารมณ์และจัดการตนเองได้ดีเท่าที่ควรเพราะมีพัฒนาการทางด้านร่างกาย อารมณ์ สังคม และสติปัญญา ที่เปลี่ยนแปลงไป สอดคล้องกับ ธัญญรัศม์ ธนวัติอภิชาติโชติ (2566) ที่กล่าวว่า วัยรุ่นเป็นวัยที่อยู่ในช่วงของการเปลี่ยนแปลง ทั้งด้านร่างกาย อารมณ์จิตใจ ทักษะทางสังคม โดยเฉพาะอย่างยิ่งเรื่องอารมณ์ที่แปรปรวน ไม่มั่นคง และบ่อยครั้งไม่สามารถ จัดการอารมณ์ของตนเองได้

2. จากการศึกษาแนวทางการส่งเสริมคุณลักษณะการเรียนรู้ทางอารมณ์และสังคมของนักเรียนโรงเรียนมัธยมศึกษา จังหวัดพิษณุโลก พบว่า ผู้บริหารและครูควรส่งเสริมคุณลักษณะการเรียนรู้ทางอารมณ์และสังคมของนักเรียน ดังนี้

2.1 ด้านการตระหนักรู้ตนเอง (Self - Awareness) ผู้ทรงคุณวุฒิได้ให้แนวทางการส่งเสริมคุณลักษณะการเรียนรู้ ทางอารมณ์และสังคมของนักเรียน ไว้ดังนี้

ผู้บริหารควรส่งเสริมให้ครูผู้สอนออกแบบการจัดการเรียนรู้ที่หลากหลาย โดยคำนึงถึงความแตกต่างระหว่างบุคคล และเรียนรู้ตามความสนใจ ครูผู้สอนควรมีการจัดกิจกรรมสะท้อนตนเองให้แก่นักเรียน หรืออาจใช้แบบทดสอบ แบบสำรวจ ที่ช่วยให้นักเรียนค้นพบจุดแข็ง ความสามารถพิเศษ และความชอบของตนเองที่ส่งเสริมให้นักเรียนรู้จักตนเองมากยิ่งขึ้น สอดคล้องกับ ศิริวรรณ วณิชวัฒนวรชัย (2559, หน้า 65-75) กล่าวว่า ผู้สอนต้องมีกระบวนการให้ผู้เรียนได้ริเริ่มวิเคราะห์ ความต้องการในการเรียน ตั้งเป้าหมายการเรียนด้วยตนเอง และหาวิธีไปสู่ความสำเร็จที่ตั้งไว้พร้อมกับสะท้อนความคิด ในความสำเร็จโดยต้องคำนึงถึงความแตกต่างระหว่างบุคคลจะช่วยให้ผู้เรียนพัฒนาและเพิ่มศักยภาพของตนเอง โดยค้นพบ ความสามารถและสิ่งที่มีคุณค่าในตนเองได้

2.2 ด้านการจัดการตนเอง (Self - Management) ผู้ทรงคุณวุฒิได้ให้แนวทางการส่งเสริมคุณลักษณะการเรียนรู้ ทางอารมณ์และสังคมของนักเรียน ไว้ดังนี้

ผู้บริหารและครูควรส่งเสริมให้นักเรียนได้พัฒนาทักษะทางด้านอารมณ์ ด้วยการบูรณาการเทคนิค วิธีการการสอน ต่างๆ เข้าสู่กิจกรรมในชั้นเรียน โดยเปิดโอกาสให้นักเรียนมีส่วนร่วมในการกำหนดกฎและข้อตกลง พร้อมทั้งฝึกฝนทักษะ สำคัญ เช่น การวางแผนและตั้งเป้าหมาย การควบคุมอารมณ์และพฤติกรรม ตลอดจนการเผชิญและแก้ไขปัญหา สอดคล้อง กับงานวิจัยของ สุภารัตน์ พัฒนแหวว (2563) ได้ทำวิจัยเรื่อง การเสริมสร้างการเรียนรู้ทางอารมณ์และสังคมของนักเรียน มัธยมศึกษาตอนต้นโดยการให้คำปรึกษากลุ่ม ได้นำทฤษฎีการให้คำปรึกษากลุ่มแบบการรู้คิด - พฤติกรรม โดยใช้เทคนิค การสอน การฝึกซ้อมพฤติกรรม และเทคนิคการให้ข้อมูลย้อนกลับ เพื่อให้นักเรียนอธิบายถึงวิธีจัดการความเครียดและการ ควบคุมการแสดงออกทางอารมณ์และพฤติกรรมของตนเองได้อย่างเหมาะสม พบว่า สมาชิกมีการพัฒนาจัดการกับอารมณ์และ ความรู้สึก การปรับเปลี่ยนพฤติกรรม เมื่อต้องประสบอยู่ในสถานการณ์ที่ส่งผลกระทบต่ออารมณ์มากยิ่งขึ้น

2.3 ด้านการตระหนักรู้สังคม (Social - Awareness) ผู้ทรงคุณวุฒิได้ให้แนวทางการส่งเสริมคุณลักษณะการเรียนรู้ ทางอารมณ์และสังคมของนักเรียน ไว้ดังนี้

ผู้บริหารควรสนับสนุนให้โรงเรียนมีการนำหลักสูตรต้านทุจริตศึกษา ระดับการศึกษาขั้นพื้นฐาน รายวิชาเพิ่มเติม "การป้องกันการทุจริต" ไปใช้ตามบริบทของโรงเรียน ปลูกฝังคุณธรรม จริยธรรม ค่านิยมที่ถูกต้องให้แก่นักเรียน โดยบูรณาการในทุกรายวิชาและจัดกิจกรรมเสริมหลักสูตรที่สอดคล้องตามคุณลักษณะที่พึงประสงค์ สอดคล้องกับงานวิจัยของ สันติ ทองแก้วเกิด (2566) ได้ทำวิจัยเรื่อง การพัฒนาคู่มือแนวทางการนำหลักสูตรต้านทุจริตศึกษาไปใช้สำหรับสถานศึกษา อาชีวศึกษา ได้ให้ข้อเสนอแนะในการนำผลการวิจัยไปใช้ประโยชน์ว่าการนำหลักสูตรต้านทุจริตศึกษาไปใช้สำหรับสถานศึกษา อาชีวศึกษาจะทำให้มีความเข้าใจและวิธีการนำหลักสูตรต้านทุจริตศึกษาไปใช้ในการจัดการเรียนรู้เพื่อปลูกฝังคุณธรรม จริยธรรม การป้องกันการทุจริตและสร้างวัฒนธรรมต่อต้านการทุจริตให้แก่ผู้เรียนได้ สอดคล้องกับงานวิจัยของ กิตติคุณกฤดากร สุขปัญญา (2563) ได้ทำวิจัยเรื่อง ปัจจัยที่ส่งผลต่อความสำเร็จในการนำหลักสูตรการป้องกันการทุจริตไปใช้

ของโรงเรียนสุจริตต้นแบบ สังกัดสำนักงานคณะกรรมการการศึกษาขั้นพื้นฐาน พบว่า โรงเรียนควรส่งเสริมและสนับสนุนผู้เรียน เข้าร่วมกิจกรรมเสริมหลักสูตรทั้งภายในและภายนอกโรงเรียนซึ่งกิจกรรมเสริมหลักสูตรจะช่วยให้ผู้เรียนตระหนักถึงการ ป้องกันการทุจริตทุกรูปแบบ สามารถคิดแยกแยะระหว่างผลประโยชน์ส่วนตนกับผลประโยชน์ส่วนรวมได้

2.4 ด้านการสร้างสัมพันธภาพ (Relationship Skills) ผู้ทรงคุณวุฒิได้ให้แนวทางการส่งเสริมคุณลักษณะการ เรียนรู้ทางอารมณ์และสังคมของนักเรียน ไว้ดังนี้

ผู้บริหารควรมีการส่งเสริมด้านการบริหารจัดการอย่างเป็นระบบ โดยใช้ระบบการดูแลช่วยเหลือนักเรียน มุ่งเน้นให้ นักเรียนสามารถป้องกันและแก้ไขปัญหาที่เกิดขึ้น มีการประชาสัมพันธ์หรือเปิดช่องทางการสื่อสารที่หลากหลายเพื่อให้ นักเรียนได้แสดงความคิดเห็น พูดคุย ปรึกษาซึ่งเป็นการช่วยเหลือและป้องกันปัญหาของนักเรียน ทั้งด้านความคิด อารมณ์ ความรู้สึก และความประพฤติของนักเรียน ฝึกทักษะการขอความช่วยเหลือให้นักเรียนได้เรียนรู้และพัฒนาตนเองด้วยทักษะ ใหม่ๆ เทคนิค และวิธีคิดจากผู้ที่มีประสบการณ์ เพิ่มทางเลือกในการตัดสินใจ รวมถึงเป็นการเปิดโอกาสให้ผู้อื่นได้แสดง ความสามารถ รู้สึกมีคุณค่า และมีส่วนร่วมในการช่วยเหลือผู้อื่น สอดคล้องกับงานวิจัยของ ชุติมา ถาวรแก้ว (2559) ได้ทำวิจัย เรื่อง การดำเนินงานตามระบบดูแลช่วยเหลือนักเรียนที่ส่งผลต่อคุณภาพชีวิตนักเรียนของสถานศึกษาในจังหวัดปทุมธานี สังกัดสำนักงานเขตพื้นที่การศึกษามัธยมศึกษา เขต 4 พบว่า ระบบดูแลช่วยเหลือนักเรียนเป็นระบบที่ครูและผู้ที่เกี่ยวข้องจะ ได้ร่วมมือกันช่วยเหลือดูแลนักเรียนให้ได้มีพัฒนาการที่ก้าวหน้า สามารถปรับตัวแก้ปัญหา มีการพัฒนาทางอารมณ์ ซึ่งจะเป็น รากฐานในการพัฒนาความเก่ง คุณธรรมจริยธรรม และความมุ่งมั่นที่จะเอาชนะอุปสรรคพัฒนาตนเองให้ประสบความสำเร็จ และอยู่ได้อย่างมีความสุข

2.5 ด้านการรับผิดชอบต่อการตัดสินใจ (Responsible Decision Making) ผู้ทรงคุณวุฒิได้ให้แนวทางการส่งเสริม คุณลักษณะการเรียนรู้ทางอารมณ์และสังคมของนักเรียน ไว้ดังนี้

ผู้บริหารและครูผู้สอนควรส่งเสริมความสามารถทางกระบวนการทางปัญญาที่เกี่ยวข้องกับการรับรู้ การจำ เข้าใจ วิเคราะห์สังเคราะห์ และประเมินค่าเพื่อตัดสินความถูกต้องของข้อมูลที่มีอยู่อย่างเหมาะสม ควรจัดกิจกรรมการเรียนรู้ เพื่อสร้างเสริมทักษะการคิดอย่างมีวิจารณญาณให้แก่ผู้เรียนด้วยวิธีการที่หลากหลายและเน้นการเรียนรู้ที่ยึดนักเรียนเป็น ศูนย์กลาง เปิดกว้างและยอมรับความคิดเห็นที่หลากหลาย จัดกิจกรรมพิเศษ เช่น การโต้วาที การอภิปราย หรือการจัด นิทรรศการที่เน้นการแสดงออกทางความคิด ทั้งนี้อาจเนื่องมาจาก สอดคล้องกับ แนวคิดของ ทิศนา แขมมณี (2559) ที่กล่าวว่า การคิดอย่างมีวิจารณญาณจะทำให้ผู้เรียนสามารถตัดสินใจได้ดีขึ้นอย่างสมเหตุสมผล มีประสิทธิภาพ และนอกจากนี้ ยังส่งผลให้นักเรียนมีความสามารถในการคิดกว้าง คิดลึก คิดถูกทาง คิดชัดเจน คิดถูกต้อง และคิดอย่างมีเหตุผล โดยอาศัย ความสามารถทางความคิดไตร่ตรองอย่างรอบคอบ เกี่ยวกับข้อมูลที่เป็นปัญหาสถานการณ์ที่ปรากฏ ข้อโต้แย้งหรือข้อมูลที่มี ความคลุมเครือ และใช้ความรู้ ความคิด และประสบการณ์ของตนเองในการตัดสินใจ เพื่อสรุปเป็นข้อยุติที่สมเหตุสมผล

6. ข้อเสนอแนะ

1. ข้อเสนอแนะในการนำผลการวิจัยไปใช้

1.1 ด้านการจัดการตนเอง (Self - Management) เป็นด้านที่มีค่าเฉลี่ยต่ำสุด ดังนั้น ผู้บริหารและครูผู้สอน ควรส่งเสริมความสามารถของนักเรียนโดยใช้วิธีการเสริมพลังทางบวก สร้างความตระหนัก กระตุ้นให้นักเรียนมีกระบวนการ ค้นหาตนเอง ให้รู้จักตนเองอย่างลึกซึ้ง มีการออกแบบและจัดกิจกรรมที่เน้นการแสดงออกถึงศักยภาพของนักเรียน ให้คำปรึกษาและปรับแผนตามความเหมาะสมเพื่อช่วยให้นักเรียนสามารถค้นพบศักยภาพและวางแผนชีวิตได้อย่างมีความสุข

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1.2 ผู้อำนวยการสำนักงานเขตพื้นที่การศึกษามัธยมศึกษาพิษณุโลก อุตรดิตถ์ ควรนำแนวทางการส่งเสริมคุณลักษณะการเรียนรู้ทางอารมณ์และสังคมของนักเรียน โรงเรียนมัธยมศึกษาจังหวัดพิษณุโลก ไปจัดทำเป็นแผนกลยุทธ์และแนวทางพัฒนาในแผนปฏิบัติการประจำปี

2. ข้อเสนอแนะในการทำวิจัยครั้งต่อไป

2.1 ควรศึกษาปัจจัยที่ส่งผลต่อการส่งเสริมคุณลักษณะการเรียนรู้ทางอารมณ์และสังคมของนักเรียน โรงเรียนมัธยมศึกษา จังหวัดพิษณุโลก

2.2 ควรศึกษาการพัฒนารูปแบบการส่งเสริมคุณลักษณะการเรียนรู้ทางอารมณ์และสังคมของนักเรียน โรงเรียนมัธยมศึกษา จังหวัดพิษณุโลก

7. บทสรุป

จากผลการวิจัย พบว่า การส่งเสริมคุณลักษณะการเรียนรู้ทางอารมณ์และสังคมของนักเรียน ประกอบด้วย 5 ด้าน ได้แก่ การตระหนักรู้ตนเอง การจัดการตนเอง การตระหนักรู้สังคม การสร้างสัมพันธภาพ และการตัดสินใจอย่างรับผิดชอบ สามารถพัฒนาให้นักเรียนมีความเข้าใจ รับรู้ ด้านความคิด ความรู้สึก และพฤติกรรมที่เกิดขึ้นของตนเองและผู้อื่นได้ ดังนั้น ผู้บริหารและครูควรส่งเสริมให้นักเรียนสามารถระบุวิชาหรือกิจกรรมที่สนใจ มีความเชื่อมั่นในความสามารถของตนเอง ส่งเสริมให้นักเรียนกล้าที่จะทักท้วงเมื่อเห็นการกระทำที่ไม่ถูกต้องหรือไม่เป็นธรรม สามารถขอความช่วยเหลือจากผู้อื่นเมื่อตนเองต้องการและให้นักเรียนสามารถตัดสินใจโดยคำนึงถึงความถูกต้องตามหลักคุณธรรมและจริยธรรมได้ เพื่อเป็นแนวทางในการสนับสนุนและส่งเสริมให้สถานศึกษาได้ดำเนินการพัฒนาผู้เรียนให้เป็นมนุษย์มีความสมบูรณ์ทั้งทางร่างกาย จิตใจ อารมณ์ สังคม สติปัญญา มีความรู้และมีคุณธรรม จริยธรรม สามารถดำรงชีวิตได้อย่างมีประสิทธิภาพ เป็นไปตามความต้องการของสังคม อันส่งผลต่อการพัฒนาการจัดการศึกษาของสถานศึกษาให้มีคุณภาพและมีประสิทธิภาพสูงสุดต่อไป

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วิทยาลัยการดนตรี มหาวิทยาลัยราชภัฏบ้านสมเด็จเจ้าพระยา

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บทคัดย่อ

บทความนี้มีวัตถุประสงค์เพื่อชี้ให้เห็นถึงรูปแบบการจัดการเรียนการสอนวิชาปฏิบัติกีตาร์สมัยนิยม ในวิทยาลัยการดนตรี มหาวิทยาลัยราชภัฏบ้านสมเด็จเจ้าพระยา โดยศึกษารูปแบบการจัดการเรียนการสอนวิชาปฏิบัติกีตาร์สมัยนิยมของวิทยาลัยการดนตรี มหาวิทยาลัยราชภัฏบ้านสมเด็จเจ้าพระยา ใช้วิธีการเก็บรวบรวมข้อมูลโดยการสัมภาษณ์แบบเจาะจง และวิเคราะห์ขอมูลตามหัวข้อแบบสัมภาษณ์แบบสามเส้า ผลการวิจัยแบ่งออกเป็น 3 ประเด็นพบว่า 1. ด้านการเตรียมความพร้อม พบว่ามีการเตรียมความพร้อมเน้นผู้เรียนเป็นศูนย์กลางอิงเนื้อหาตามหลักสูตร และมีการวัดประเมินผลที่ชัดเจน 2. ด้านรูปแบบการจัดการเรียนการสอน พบว่ารูปแบบการจัดการเรียนการสอนมีความยืดหยุ่น และให้ความสำคัญกับความแตกต่างระหว่างบุคคลมีการเรียงลำดับเนื้อหาและแบบฝึกหัด เทคนิค, ทฤษฎี, การปฏิบัติ, ความเข้าใจในดนตรี และการนำเสนอ 3. ด้านการวัดและประเมินผลสัมฤทธิ์ผู้เรียน พบว่าการวัดและประเมินผลสัมฤทธิ์ผู้เรียนเน้นผู้เรียนเป็นสำคัญโดยวัดจากพัฒนาการจุดอ่อนของแต่ละคนให้กลายเป็นจุดแข็งหรือทักษะที่เพิ่มพูนขึ้นให้เห็นเป็นรูปธรรม

คำสำคัญ: การสอน; ทักษะกีตาร์; สมัยนิยม

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A study of the teaching and learning model of the popular guitar skills practice course.
of the College of Music Bansomdejchaopraya Rajabhat University

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Abstract

This article aims to point out the teaching model of modern guitar practice course in the College of Music, Rajabhat Bansomdejchaopraya University by studying the teaching model of modern guitar practice course in the College of Music, Rajabhat Bansomdejchaopraya University. By studying the teaching model of the modern guitar practice course at the College of Music, Rajabhat Bansomdejchaopraya University, using the data collection method of purposive interviews and analyzing data according to the topics of the triangular interview. The research results were divided into 3 issues: 1. In terms of preparation, it was found that preparation focused on learners as the center based on the curriculum content and had clear measurement and evaluation. 2. In terms of teaching and learning management format, it was found that the teaching and learning management format was flexible and gave importance to individual differences. The content and exercises, techniques, theories, practices, understanding of music, and presentations were arranged. 3. In terms of measuring and evaluating learners' achievement, it was found that the measurement and evaluating learners' achievement focused on learners by measuring the development of each person's weaknesses into strengths or skills that were increased to be seen as tangible.

Keywords: Teaching; Guitar skills; Popular

1. บทนำ

    ดนตรีสมัยนิยมเป็นแนวดนตรีที่เป็นที่นิยมอย่างกว้างขวางในแต่ละยุคสมัยรวมถึงปัจจุบัน โดยแต่ละแนวดนตรีล้วนมีเอกลักษณ์ และรูปแบบการนำเสนอในเรื่องของเนื้อหาที่แตกต่างกัน บทเพลงที่เรียบเรียงในรูปแบบที่ไม่ซับซ้อนแหวกแนวทางทฤษฎีดนตรี และการแต่งตัวที่กลายมาเป็นวัฒนธรรมร่วมกับดนตรีศิลปะแขนงอื่น ๆ เช่น แฟชั่น ดนตรีอิเล็กทรอนิกส์ดนตรีร่วมสมัย และศิลปะการแสดง เป็นต้น ดนตรีสมัยนิยมหลากหลายแนวได้เกิดการพัฒนาอย่างต่อเนื่องในแบบที่ซับซ้อนขึ้น และง่ายลงในด้านการแสดงดนตรี จึงเป็นข้อสรุปว่าดนตรีสมัยนิยมมีความเคลื่อนไหวทางด้านพัฒนาการอยู่เสมอ และมีรูปแบบที่หลากหลาย (ภาคภูมิ เตี่ยวงษ์สุวรรณ, 2562 : 84) ดังนั้น ดนตรีสมัยนิยมเป็นรูปแบบทางดนตรีที่มีความหลากหลายและมี

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ความแตกต่างเป็นอย่างมาก และการที่ดนตรีสมัยนิยมได้รับความนิยม เป็นเพราะรูปแบบทางดนตรีที่มีการพัฒนามาอย่าง
ต่อเนื่อง มีผู้ฟังและผู้นำมาบรรเลงและสามารถพัฒนารูปแบบของดนตรีไปได้อย่างหลากหลายมิติด้วยเช่นเดียวกัน

จากรูปแบบของดนตรีสมัยนิยมดังกล่าว จึงถือได้ว่าเป็นดนตรีสาขาหนึ่งที่มีความสำคัญกับมนุษย์ และได้มีการถูก
บรรจุอยู่ในหลักสูตรการศึกษาระดับอุดมศึกษาทั้งในประเทศ และต่างประเทศ ดนตรีสมัยนิยมของประเทศไทยใน
ระดับอุดมศึกษานั้น เกิดขึ้นครั้งแรกในประเทศไทยที่วิทยาลัยดุริยางคศิลป์มหาวิทยาลัยมหิดลในปี พ.ศ. 2544 ในส่วนของ
มหาวิทยาลัยอื่น ๆ ในประเทศไทยที่ทำการเปิดการเรียนการสอนดนตรีสมัยนิยมนั้น ได้แก่ มหาวิทยาลัยหาดใหญ่ ทางภาคใต้
หากนับเพียงมหาวิทยาลัยในเขตกรุงเทพมหานคร และปริมณฑล ได้แก่ วิทยาลัยดุริยางคศิลป์ มหาวิทยาลัยมหิดล วิทยาลัย
ดนตรี มหาวิทยาลัยรังสิต คณะดุริยางคศาสตร์ มหาวิทยาลัยศิลปากร และวิทยาลัยการดนตรี มหาวิทยาลัยราชภัฏบ้านสมเด็จ
เจ้าพระยา (ภาคภูมิ เตี้ยวงษ์สุวรรณ, 2562 : 85) จากความสำคัญของดนตรีสมัยนิยมที่นำมาใช้ในการจัดการเรียนการสอนใน
หลักสูตรระดับอุดมศึกษานั้น จึงทำให้ในปัจจุบันนั้นมีการเรียนการสอนในรายวิชาปฏิบัติกีตาร์สมัยนิยม ในระดับอุดมศึกษา
ประเทศไทยเพิ่มขึ้น ซึ่งสำหรับสาขาดนตรีสมัยนิยมนั้นยังใหม่สำหรับการศึกษาในระดับอุดมศึกษาของประเทศไทยถ้า
เปรียบเทียบกับสาขาดนตรีคลาสสิก และสาขาดนตรีแจ๊ส จากการสืบค้นงานวิจัยทางด้านดนตรีศึกษาที่เกี่ยวข้องกับแนว
ทางการสอนปฏิบัติกีตาร์สมัยนิยมในระดับอุดมศึกษาพบว่าในประเทศไทยนั้นยังไม่เป็นที่แพร่หลาย (ธนญชัย ไกรเทพ, 2561 :
2)

เนื่องจากดนตรีสมัยนิยมได้ถูกนำมาใช้ในการสอนในระดับอุดมศึกษา โดยเฉพาะกลุ่มวิชาดนตรีสมัยนิยมในวิทยาลัย
การดนตรี มหาวิทยาลัยราชภัฏบ้านสมเด็จเจ้าพระยาโดยทั่วไปจะมุ่งเน้นเนื้อหาไปที่ทฤษฎีปฏิบัติ และคุณลักษณะทางดนตรี
ในบางแนวขึ้นอยู่กับความสนใจของผู้สอนแต่ส่วนใหญ่จะขาดเนื้อหาที่พูดถึงประวัติดนตรีสมัยนิยมในเชิงสังคมและมนุษย์ทั้งที่
เป็นเรื่องสำคัญสำหรับนักดนตรีที่จะต้องทำความเข้าใจดนตรีให้สอดคล้องกับบริบทสังคม เข้าใจรสนิยมของกลุ่มผู้ฟังเพื่อ
ขับเคลื่อนและสร้างสรรค์ดนตรีให้เกิดเอกลักษณ์ใหม่ๆแบบในกรณีเดียวกับดนตรีสมัยนิยมในแต่ละยุคที่เกิดพัฒนาการมาเป็นที่
นิยม จุดประสงค์ของการจัดการเรียนการสอนของกลุ่มวิชาดนตรีสมัยนิยมวิทยาลัยการดนตรี มหาวิทยาลัยราชภัฏบ้านสมเด็จ
เจ้าพระยาคือการสร้างสมดุลความรู้ความเข้าใจ และการเข้าถึงทรัพยากรทางดนตรีระหว่างผู้ปฏิบัติ และผู้ฟัง มีการกระจาย
ทรัพยากรความรู้ทางดนตรีด้วยการให้บุคคลทั่วไปเข้าถึงสื่อการเรียนการสอนที่เป็นสาธารณะมากขึ้น และเสริมสร้างคุณค่า
จรรยาบรรณอาชีพนักดนตรีให้เป็นที่ยอมรับในสังคมส่งผลให้เป็นอาชีพที่ยั่งยืนเพื่อประโยชน์ของผู้สำเร็จการศึกษาเพื่อที่จะ
ประกอบอาชีพดนตรีโดยตรง นอกจากนี้ การเกิดขึ้นของดนตรีสมัยนิยมตามมหาวิทยาลัยต่าง ๆ ในประเทศไทยถือว่ายังขาด
บุคลากรที่ตรงสาขา ถึงแม้ว่าปัจจุบันบางมหาวิทยาลัยจะได้เริ่มทำการจ้างอาจารย์ประจำ อาจารย์พิเศษ และผู้เชี่ยวชาญจาก
ภายนอกเข้ามาทำการเรียนการสอน จึงทำให้รูปแบบการเรียนการสอนปฏิบัติดนตรีมีการเปลี่ยนแปลงอยู่ตลอดเวลา (ฮามีร
อ่อนทอง, 2563 : 119)

จากสภาพของการจัดการเรียนการสอนดนตรีสมัยนิยมในระดับอุดมศึกษาต่าง ๆ ควบคู่ไปกับบริบทที่หลากหลาย
ของดนตรีสมัยนิยมที่มีพัฒนาการของความซับซ้อนในดนตรีมากขึ้นตามยุคสมัย ในการจัดการเรียนการสอนดนตรีสมัยนิยมจึง
ต้องมีการปรับเปลี่ยนรูปแบบการจัดการเรียนการสอนให้เท่าทันต่อยุคสมัยและพัฒนาการของดนตรีสมัยนิยมได้อย่างเท่าทัน
โดยเฉพาะหลักสูตรดุริยางคศาสตรบัณฑิต วิทยาลัยการดนตรี มหาวิทยาลัยราชภัฏบ้านสมเด็จเจ้าพระยา ซึ่งเป็นหลักสูตรที่
มุ่งเน้นการจัดการเรียนการสอนและผลิตบัณฑิตทางด้านการประกอบอาชีพศิลปิน และศาสตร์อื่นๆในวิชาชีพดนตรีที่ตอบ
โจทย์ต่อตลาดแรงงานในปัจจุบัน และอนาคต ในการจัดการเรียนการสอนในกลุ่มวิชาเอกดนตรีสมัยนิยม เพื่อตอบสนองต่อ
ความต้องการของผู้เรียนและผู้ที่ต้องประกอบอาชีพศิลปินในรูปแบบดนตรีสมัยนิยมได้มากยิ่งขึ้น โดยเฉพาะกลุ่มผู้เรียนเครื่อง
เอกกีตาร์สมัยนิยม ที่ได้รับความสนใจจากผู้เรียนเป็นจำนวนมาก จึงทำให้ต้องมีการจัดการเรียนการสอนในกลุ่มวิชาเอกดนตรี
สมัยนิยมให้มีความครอบคลุม สอดคล้องตอบริบทของพัฒนาการดนตรีสมัยนิยมมากยิ่งขึ้น และเป็นกลุ่มวิชาเอกดนตรีสมัย

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นิยมที่มีผู้เรียนให้ความสนใจเลือกเรียนเป็นจำนวนมาก จึงได้มีการจัดแบ่งกลุ่มผู้สอนแบ่งออกไปตามรายวิชาและชั้นปี จึงทำให้ ผู้สอนในแต่ละชั้นปี จะมีการดำเนินการจัดการเรียนการสอนที่มีการกำหนดเนื้อหาและทักษะภายใต้กรอบของคำอธิบาย รายวิชาที่กำหนด แต่รูปแบบและวิธีการสอนของอาจารย์ผู้สอนแต่ละคน และในแต่ละชั้นปีมีความแตกต่างกัน ดังนั้น ผู้วิจัยจึง ได้มีความสนใจในการศึกษารูปแบบการจัดการเรียนการสอนรายวิชาปฏิบัติทักษะกีตาร์สมัยนิยม เนื่องจากผู้วิจัยเป็นอาจารย์ พิเศษในรายวิชาปฏิบัติทักษะกีตาร์สมัยนิยม จึงมีความจำเป็นที่จะต้องมีการศึกษารูปแบบการจัดการเรียนการสอนรายวิชา ปฏิบัติทักษะกีตาร์สมัยนิยมในภาพรวม เพื่อให้ทราบถึงรูปแบบของการจัดการเรียนการสอนของอาจารย์ผู้สอน เพื่อนำไปสู่การ ออกแบบกิจกรรมการจัดการเรียนการสอนของผู้วิจัยในรายวิชาที่ผู้เรียนต้องเรียนต่อเนื่องให้มีความสอดคล้องกัน และ ต่อเนื่องกัน อีกทั้งยังทำให้ผู้เรียนเกิดผลสัมฤทธิ์ของการเรียนในรายวิชาดังกล่าวได้อย่างมีประสิทธิภาพมากยิ่งขึ้นต่อไป

2. วัตถุประสงค์ของการวิจัย

เพื่อศึกษารูปแบบการจัดการเรียนการสอนวิชาปฏิบัติกีตาร์สมัยนิยมของวิทยาลัยการดนตรี มหาวิทยาลัยราชภัฏ บ้านสมเด็จเจ้าพระยา

3. ประโยชน์ที่ได้รับ

3.1 ได้ทราบรูปแบบการจัดการเรียนการสอนวิชาปฏิบัติกีตาร์สมัยนิยม ในวิทยาลัยการดนตรีมหาวิทยาลัยราชภัฏ บ้านสมเด็จเจ้าพระยา

3.2 ได้นำรูปแบบการจัดการเรียนการสอนวิชาปฏิบัติกีตาร์สมัยนิยม ในวิทยาลัยการดนตรีมหาวิทยาลัยราชภัฏบ้าน สมเด็จเจ้าพระยา ไปเป็นแนวทางในการพัฒนารูปแบบการจัดการเรียนการสอนให้มีประสิทธิภาพมากยิ่งขึ้น

นิยามศัพท์เฉพาะ

การสอน หมายถึง เป็นการถ่ายทอดความรู้ ทักษะ เจตคติโดยผู้รับและผู้ให้มีปฏิสัมพันธ์ต่อกันในกระบวนการ เรียนรู้ที่ครูมีบทบาทสำคัญ

ทักษะกีตาร์ หมายถึง การปฏิบัติกีตาร์ในด้านทฤษฎี และเทคนิคต่างๆ

สมัยนิยม หมายถึง เป็นแนวดนตรีที่เป็นที่นิยมอย่างกว้างขวางในแต่ละยุคสมัยรวมถึงปัจจุบัน โดยแต่ละแนวดนตรี ล้วนมีเอกลักษณ์ และรูปแบบการนำเสนอในเรื่องของเนื้อหาที่แตกต่างกัน

4. ขอบเขตการวิจัย

4.1 ขอบเขตด้านประชากรและกลุ่มตัวอย่าง (ขอบเขตผู้ให้ข้อมูล)

เนื่องจากอาจารย์ผู้ดูแลหลักสูตร และอาจารย์ประจำที่สอนในรายวิชาปฏิบัติทักษะกีตาร์สมัยนิยม วิทยาลัยการดนตรี มหาวิทยาลัยราชภัฏบ้านสมเด็จเจ้าพระยา มีจำนวน 1 คนผู้วิจัยจึงใช้วิธีเลือกประชากรและกลุ่มตัวอย่าง แบบเจาะจง

ประชากร คือ อาจารย์ประจำที่สอนในรายวิชาปฏิบัติทักษะกีตาร์สมัยนิยม วิทยาลัยการดนตรี มหาวิทยาลัยราชภัฏบ้านสมเด็จเจ้าพระยา จำนวน 1 คน เป็นผู้ให้ข้อมูล

กลุ่มตัวอย่าง คือ อาจารย์ประจำที่สอนในรายวิชาปฏิบัติทักษะกีตาร์สมัยนิยม วิทยาลัยการดนตรี มหาวิทยาลัยราชภัฏบ้านสมเด็จเจ้าพระยา เฉพาะหลักสูตรดุริยางคศาสตรบัณฑิต จำนวน 1 คน เป็นผู้ให้ข้อมูล

4.2 ขอบเขตด้านเนื้อหา

1) ขอบเขตด้านรายวิชา ผู้วิจัยศึกษารูปแบบการจัดการเรียนการสอนรายวิชาปฏิบัติทักษะกีตาร์สมัยนิยม

การประชุมวิชาการระดับชาติและนานาชาติบ้านสมเด็จเจ้าพระยา ครั้งที่ 1 (BS2C 2025)
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โดยทำการศึกษาในภาคเรียนที่ 1 ปีการศึกษา 2566

2) ขอบเขตด้านเนื้อหาของการศึกษา มีดังนี้

2.1) การเตรียมความพร้อม เช่น การกำหนดเนื้อหา เป้าหมาย ผลสัมฤทธิ์ผู้เรียนในรายวิชา รวมถึงรูปแบบการจัดกลุ่มเรียน และการวางแผนการจัดการเรียนการสอน

2.2) แบบฝึกหัด บทเพลง แนวคิดการเลือกบทเพลงที่เหมาะสมกับทักษะของผู้เรียน ปัญหา อุปสรรค และแนวทางการแก้ไขปัญหาที่เกิดขึ้น

2.3) การวัดและประเมินผลสัมฤทธิ์ของผู้เรียน เช่น รูปแบบการวัดและการประเมิน เกณฑ์การประเมินผล

4.3 ขอบเขตด้านระยะเวลาในการศึกษา

การศึกษาวิจัยในครั้งนี้ใช้ระยะเวลาในการศึกษาจำนวน 2 ภาคเรียน ในปีการศึกษา 2566

5. วิธีดำเนินการวิจัย

5.1 ประชากรและกลุ่มตัวอย่าง

ประชากร คือ อาจารย์ประจำที่สอนในรายวิชาปฏิบัติทักษะกีตาร์สมัยนิยม วิทยาลัยการดนตรี มหาวิทยาลัยราชภัฏบ้านสมเด็จเจ้าพระยา จำนวน 1 คน

กลุ่มตัวอย่าง คือ อาจารย์ประจำที่สอนในรายวิชาปฏิบัติทักษะกีตาร์สมัยนิยม วิทยาลัยการดนตรี มหาวิทยาลัยราชภัฏบ้านสมเด็จเจ้าพระยา เฉพาะหลักสูตรดุริยางคศาสตรบัณฑิต ซึ่งเป็นอาจารย์เป็นผู้ดูแลหลักสูตรของรายวิชาปฏิบัติทักษะกีตาร์สมัยนิยมทั้งหมด จำนวน 1 คน เนื่องจากมีอาจารย์เพียงคนเดียวที่ดูแลหลักสูตรสมัยนิยม

5.2 เครื่องมือที่ใช้ในการวิจัย

เครื่องมือที่ใช้ในการวิจัยคือ แบบสัมภาษณ์จำนวน 1 ฉบับ สำหรับใช้ในการสัมภาษณ์กลุ่มตัวอย่างของผู้ให้ข้อมูล ประกอบไปด้วยประเด็นต่าง ๆ ดังนี้

1) ส่วนที่ 1 ข้อคำถามด้านข้อมูลทั่วไป เช่น ชื่อ-สกุล รายวิชาที่สอน ผลงาน ฯลฯ

2) ส่วนที่ 2 ข้อคำถามที่เกี่ยวข้องกับงานวิจัย เช่น การเตรียมความพร้อม รูปแบบการจัดการเรียนการสอน การจัดกลุ่มเรียน การวัดและประเมินผลในแต่ละรายวิชา

การสร้างเครื่องมือวิจัยและการหาประสิทธิภาพของเครื่องมือวิจัย

1) ผู้วิจัยทำการศึกษาข้อมูลจากเอกสาร ตำรา และงานวิจัยที่เกี่ยวข้อง เช่น หลักสูตร คำอธิบายรายวิชา ดนตรีสมัยนิยม และทักษะการปฏิบัติกีตาร์

2) ผู้วิจัยนำองค์ความรู้ที่ได้รับจากการศึกษา ไปออกแบบข้อคำถามในแบบสัมภาษณ์

3) ดำเนินการจัดกลุ่มส่วนต่าง ๆ ของแบบสัมภาษณ์

4) นำแบบสัมภาษณ์ไปหาประสิทธิภาพของเครื่องมือวิจัยโดยผู้เชี่ยวชาญ (IOC : Index of item objective congruence) โดยจะต้องได้รับค่าเฉลี่ยประสิทธิภาพไม่น้อยกว่า 0.5 ขึ้นไป จึงจะถือว่าเครื่องมือมีประสิทธิภาพ

การเก็บรวบรวมข้อมูล

1) ผู้วิจัยทำการนัดหมายกลุ่มตัวอย่าง พร้อมทั้งดำเนินการสัมภาษณ์แบบรายคน

2) สังเกตการณ์แบบมีส่วนร่วม เพื่อรวบรวมข้อมูลที่ได้จากการสัมภาษณ์

3) นำข้อมูลที่ได้จากการสัมภาษณ์มาวิเคราะห์ผล และเรียบเรียงแบบรายงานผลในรูปแบบ
บรรยายและพรรณนาโดยการจัดเรียงตามหัวขอของแบบสัมภาษณ์

4) นำผลข้อมูลรูปแบบบรรยายและพรรณนาตรวจสอบข้อมูลแบบสามเส้าเพื่อความถูกต้อง
ของข้อมูลทั้งหมด

5) นำผลข้อมูลที่ได้จากการรายงานผลนำมาสรุปผล อภิปรายผล และข้อเสนอแนะ

6. ผลการวิจัย

จากการศึกษาได้แบ่งหัวข้อตามแบบสัมภาษณ์ 4 หัวข้อดังนี้

1.ด้านการเตรียมความพร้อม

การกำหนดเนื้อหาสำหรับการจัดการเรียนการสอนในรายวิชา "ขึ้นอยู่กับความต้องการของผู้เรียนเป็นหลัก โดยจะมี
การสนทนาแลกเปลี่ยนกันก่อนเรียนในคาบแรก ในขณะเดียวกันทางผู้สอนก็ได้จัดเตรียมเนื้อหาที่ครอบคลุมรอไว้เช่น การสอน
เทคนิคที่สอดคล้องกับทฤษฎีดนตรีไว้ในที่เดียวกันเพื่อให้ผู้เรียนเข้าใจการนำไปปฏิบัติจริงได้เลย จึงเกิดเป็นทักษะตามมาโดย
ปริยาย"

การจัดรูปแบบการเรียนการสอน "กลุ่ม เนื่องจากปัญหาของการบริหารจัดการทรัพยากรไม่ว่าจะเป็นเรื่องความพร้อม
ของสถานที่และบุคลากร จึงมีความจำเป็นต้องจัดการเรียนการสอนแบบกลุ่ม แต่จะให้มีการทดลองหลังเรียนทุกคาบ"

การกำหนดเป้าหมาย หรือการวัดและประเมินผลสัมฤทธิ์ของผู้เรียน "เรื่องที่ทำไม่ได้ในต้นเทอม แต่ทำได้ในปลาย
เทอมเท่ากับผ่าน เพราะเป็นการแสดงให้เห็นถึงพัฒนาการที่ชัดเจน"

เกณฑ์ในการวัดและประเมินผลสัมฤทธิ์ผู้เรียน "ความเข้าใจในทฤษฎี เทคนิค ปฏิบัติ และการนำเสนอทางดนตรี
(Musicality) อย่างละ 25 คะแนน เต็ม 100 คะแนน"

2.ด้านรูปแบบการจัดการเรียนการสอน

รูปแบบการสอน "นักเรียนแทบทุกคนมีความเข้าใจและปัญหาต่างกัน จึงต้องการปรับรูปแบบการสอนผ่านการ
สังเกตการณ์ผู้เรียนอย่างน้อย 1-2 ครั้งก่อนตัดสินใจใช้รูปแบบการสอนแบบใดที่เหมาะสมที่สุด"

ลำดับในการสอนทักษะ และเทคนิคการบรรเลง "1. เทคนิค 2. ทฤษฎี 3. การปฏิบัติ 4. ความเข้าใจในดนตรี 5. การ
นำเสนอ"

การเลือกแบบฝึกหัด หรือบทเพลง "ขึ้นอยู่กับระดับความซับซ้อนที่ผู้เรียนพร้อมจะก้าวข้ามขีดจำกัดของตนเองแต่ไม่
มากจนเกินไป เพราะจะทำให้การแสดงออกมาไม่ได้มาตรฐานและส่งผลเสียด้านความเข้าใจต่อผู้เรียน ผู้เรียนควรเข้าใจอย่าง
ถ่องแท้จึงลงมือปฏิบัติได้อย่างมีประสิทธิภาพ ไม่เช่นนั้นจะเหมือนการท่องจำมาเล่นสอบให้ผ่านไปต่อเทอม เพราะฉะนั้นควรมี
การสำรวจอย่างรอบคอบก่อนตัดสินใจ"

ปัญหา อุปสรรค และแนวทางการแก้ไขปัญหา "ผู้เรียนบางคนอยากเล่นหรืออยากเข้าใจเฉพาะในสิ่งที่ชอบ หรือทำได้
อยู่แล้ว จึงไม่เปิดโอกาสเรียนรู้ทดลองสิ่งใหม่ในห้องเรียน ทำให้เป็นอุปสรรคในการสอน ทั้งที่เจตนาของผู้สอนคือการให้ค้นหา
ตัวเอง แต่เพียงแนวทางที่ผู้เรียนบางคนมีอาจจะยังไม่เพียงพอในการสรุปได้ว่าค้นหาแนวทางของตัวเองได้แล้ว ด้วยแนวคิด
เช่นนี้ถือเป็นการปิดโอกาสในการเรียนเรื่องอื่นๆ"

3.ด้านการวัดและประเมินผลสัมฤทธิ์ผู้เรียน

การพิจารณาผู้เรียนในการวัดประเมินผลสัมฤทธิ์ผู้เรียนแต่ละคน "ในเมื่อแต่ละคนมีระดับความเข้าใจ พื้นฐานที่ต่างกัน
จึงชี้วัดในเรื่องที่เป็นจุดอ่อนของแต่ละคนให้กลายเป็นจุดแข็งหรือทักษะที่เพิ่มพูนขึ้น การชี้วัดจากตรงนั้นนอกจากมีความชัดเจน
และยังสร้างผลสัมฤทธิ์ให้กับการสอนได้เป็นอย่างดี"

การประชุมวิชาการระดับชาติและนานาชาติบ้านสมเด็จเจ้าพระยา ครั้งที่ 1 (BS2C 2025)
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การจัดสอบหรือวัดประเมินผล "สอบวัดผลจากเรื่องที่ทำไม่ได้ให้ทำได้ โดยมีเนื้อหาแตกต่างกันออกไปเป็นรายบุคคล"

4.ข้อเสนอแนะอื่น ๆ

ถึงแม้จะสอนเป็นกลุ่ม แต่ผู้สอนควรสังเกตผู้เรียนรายคนอย่างรอบคอบ และเฝ้าดูพัฒนาการหรือปัญหาที่เกิดขึ้น เพื่อการส่งเสริมและแก้ปัญหาที่ถูกต้องต่อผู้เรียน

7. อภิปรายผลการวิจัย

การอภิปรายผลการวิจัยได้แบ่งหัวข้อตามแบบสัมภาษณ์ 4 หัวข้อดังนี้

1.ด้านการเตรียมความพร้อม

พบว่าการเตรียมความพร้อมเน้นผู้เรียนเป็นศูนย์กลาง โดยมีการสนทนากับนักเรียนในคาบแรกเพื่อให้ทราบถึงเนื้อหา และกิจกรรมที่ใช้ในการเรียนการสอน โดยเนื้อหาอิงตามหลักสูตรของวิทยาลัยการดนตรี มหาวิทยาลัยราชภัฏบ้านสมเด็จ เจ้าพระยา ในขณะเดียวกันทางผู้สอนต้องจัดเตรียมเนื้อหาที่ครอบคลุมรอไว้ โดยการสอนจะจัดแบ่งเป็นกลุ่มมีการทดลองหลัง เรียนทุกคาบ มีเกณฑ์ในการวัดและประเมินผลดังนี้ ความเข้าใจในทฤษฎี 25 คะแนน, เทคนิค 25 คะแนน, ปฏิบัติ 25 คะแนน, และการนำเสนอทางดนตรี 25 คะแนน รวม 100 คะแนน สอดคล้องกับ วิภาวรรณ จำเนียรพันธุ์ (2567) กล่าวถึง การเตรียมความพร้อมว่าครูผู้สอน มีการเตรียมความพร้อมในการสอน เตรียมหลักสูตร เนื้อหา กิจกรรมการสอน และมีการวัด ประเมินผลจากหลายทักษะ และเก็บคะแนนเป็นระยะๆ

2.ด้านรูปแบบการจัดการเรียนการสอน

พบว่ารูปแบบการจัดการเรียนการสอนมีความยืดหยุ่น และให้ความสำคัญกับความแตกต่างระหว่างบุคคล เพราะ นักเรียนทุกคนมีความเข้าใจและปัญหาต่างกัน จึงจำเป็นต้องปรับรูปแบบการสอนโดยเริ่มจากการสังเกตการณ์ผู้เรียนเพื่อให้ พบถึงจุดเด่น และจุดด้อยของนักเรียนแต่ละบุคคล โดยมีการเรียงลำดับเนื้อหาและแบบฝึกหัด 1. เทคนิค 2. ทฤษฎี 3. การ ปฏิบัติ 4. ความเข้าใจในดนตรี 5. การนำเสนอ สอดคล้องกับ รพีพล หล้าวงษา และคณะ (2565) ที่กล่าวถึงการจัดการเรียน การสอนว่าการพัฒนาผู้เรียนเพื่อให้มีความสามารถทางดนตรีผู้เรียนจำเป็นต้องมีความรู้ความเข้าใจในทฤษฎี และองค์ประกอบ ของดนตรีซึ่งเป็นเครื่องมือที่ช่วยให้ผู้เรียนสามารถต่อยอดนำไปใช้ในทักษะการปฏิบัติทางดนตรี อันได้แก่ การฟัง การอ่าน การเขียน การเล่น และการสร้างสรรค์ ส่งผลให้ผู้เรียนเกิดความซาบซึ้ง และเห็นคุณค่าของดนตรี หรือภูมิรู้ทางดนตรี

3.ด้านการวัดและประเมินผลสัมฤทธิ์ผู้เรียน

พบว่าการวัดและประเมินผลสัมฤทธิ์ผู้เรียนเน้นผู้เรียนเป็นสำคัญโดยวัดจากพัฒนาการจุดอ่อนของแต่ละคนให้ กลายเป็นจุดแข็งหรือทักษะที่เพิ่มพูนขึ้นให้เห็นเป็นรูปธรรม การชี้วัดจากตรงนี้นอกจากมีความชัดเจนและยังสร้างผลสัมฤทธิ์ ให้กับการสอนได้เป็นอย่างดี สอดคล้องกับ ธันยาภรณ์ โพธิกาวิน (2563) ที่กล่าวว่าการวัดและประเมินผลควรมีการผลักดันให้ เกิดการจัดระบบการวัดและประเมินผลที่เป็นรูปธรรม มีความถูกต้องตามเกณฑ์ที่กำหนด และสามารถนำไปใช้ในการ พัฒนาการเรียนการสอนดนตรีได้จริง

8. ข้อเสนอแนะ

1. ควรนำรูปแบบการจัดการเรียนการสอนรายวิชาปฏิบัติทักษะกีตาร์สมัยนิยมวิทยาลัยการดนตรี มหาวิทยาลัยราช ภัฏบ้านสมเด็จเจ้าพระยา ไปใช้กับการเรียนการสอนในบริบทอื่นๆ เช่น การสอนเบสไฟฟ้า หรือ คีย์บอร์ดไฟฟ้า

2. ผู้เรียนควรได้รับ สื่อ อุปกรณ์ สถานที่ ให้เหมาะสมและสอดคล้องกับบริบทสภาพสังคมของผู้เรียน และ สถานศึกษา

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(141-TH-EDU)

การศึกษารูปแบบการจัดการเรียนการสอนและการใช้สื่อประกอบการสอนรายวิชาประวัติศาสตร์ดนตรีตะวันตก ระดับชั้นอุดมศึกษา กรณีศึกษามหาวิทยาลัยราชภัฏในเขตกรุงเทพมหานคร

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บทคัดย่อ

การวิจัยนี้มีวัตถุประสงค์เพื่อศึกษาความต้องการและแนวทางการใช้สื่อประกอบการสอนในรายวิชาประวัติศาสตร์ดนตรีตะวันตกระดับอุดมศึกษาในมหาวิทยาลัยราชภัฏเขตกรุงเทพมหานคร โดยมุ่งเน้นการพัฒนารูปแบบการสอนที่มีประสิทธิภาพและส่งเสริมการเรียนรู้ของผู้เรียน การศึกษาใช้ระเบียบวิธีวิจัยเชิงคุณภาพ โดยการสัมภาษณ์เชิงลึกกับอาจารย์ผู้สอนรายวิชาประวัติศาสตร์ดนตรีตะวันตกในมหาวิทยาลัยราชภัฏ 4 แห่งในเขตกรุงเทพมหานคร เพื่อรวบรวมข้อมูลเกี่ยวกับรูปแบบการจัดการเรียนการสอน การใช้สื่อการสอน และแนวทางการปรับปรุงที่ตอบสนองต่อความต้องการของผู้เรียน ผลการศึกษาพบว่า 1) การจัดการเรียนการสอนรายวิชาประวัติศาสตร์ดนตรีตะวันตกถูกพัฒนาตามแผนการสอนมาตรฐานหลักสูตร โดยเน้นให้ผู้เรียนบรรลุผลการเรียนรู้ภายในเวลาที่กำหนด เนื้อหาครอบคลุมตั้งแต่ดนตรียุคโบราณถึงศตวรรษที่ 20 โดยเชื่อมโยงกับบริบททางสังคมและวัฒนธรรม อย่างไรก็ตาม ผู้เรียนมักเผชิญกับปัญหาในการเข้าใจเนื้อหาที่ซับซ้อน เช่น ศัพท์เฉพาะทางดนตรี 2) ด้านการใช้สื่อการสอน พบว่ามหาวิทยาลัยมีการใช้สื่อออนไลน์ เช่น วิดีโอ YouTube และภาพยนตร์ เพื่อช่วยให้เนื้อหาที่ซับซ้อนเข้าใจง่ายขึ้น การใช้แพลตฟอร์มออนไลน์ เช่น Google Drive ช่วยให้ผู้เรียนสามารถเข้าถึงสื่อได้ทุกที่ทุกเวลา อีกทั้งยังมีความคิดเห็นในด้านการพัฒนาเอกสารละสื่อประกอบการสอนที่ผู้สอนจัดทำขึ้นเพื่อเชื่อมโยงดนตรีตะวันตกกับประวัติศาสตร์และวัฒนธรรม เช่น การใช้สื่อเกมเพื่อการเรียนรู้และการจัดกิจกรรมกลุ่มถูกนำมาประยุกต์ใช้เพื่อเพิ่มความน่าสนใจและเสริมสร้างการมีส่วนร่วมของผู้เรียน ผลการศึกษาชี้ให้เห็นถึงความสำคัญของการพัฒนาและปรับปรุงสื่อการสอนอย่างต่อเนื่อง เพื่อยกระดับประสิทธิภาพการเรียนรู้วิชาประวัติศาสตร์ดนตรีตะวันตกให้มีคุณภาพและความเข้าใจที่ลึกซึ้งยิ่งขึ้น ข้อเสนอแนะสำคัญจากการวิจัย ได้แก่ 1) ควรเพิ่มกลุ่มตัวอย่างเพื่อให้ได้ข้อมูลที่สะท้อนบริบทที่หลากหลาย 2) ดำเนินการศึกษาวิจัยเชิงลึกเพิ่มเติม เช่น การสัมภาษณ์เชิงลึกหรือการสนทนากลุ่ม (Focus Group) เพื่อสำรวจประสบการณ์และความคิดเห็นของนักศึกษา 3) วิเคราะห์และพัฒนาสื่อดิจิทัล เช่น แอปพลิเคชัน วิดีโอ และเกม เพื่อเพิ่มความเข้าใจและความสนใจของผู้เรียน 4) ส่งเสริมการพัฒนากิจกรรมสร้างสรรค์ เช่น การจำลองเหตุการณ์ทางดนตรี เพื่อกระตุ้นความคิดสร้างสรรค์และการเชื่อมโยงบริบททางประวัติศาสตร์ดนตรี 5) ศึกษาผลกระทบในระยะยาวเพื่อประเมินผลลัพธ์การเรียนรู้ในด้านการคิดวิเคราะห์ ความคิดสร้างสรรค์ และการประยุกต์ใช้ความรู้ในอนาคต

คำสำคัญ: การจัดการเรียนการสอนดนตรี; ประวัติศาสตร์ดนตรีตะวันตก; มหาวิทยาลัยราชภัฏ; สื่อการสอน

การประชุมวิชาการระดับชาติและนานาชาติบ้านสมเด็จเจ้าพระยา ครั้งที่ 1 (BS2C 2025)
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Study of teaching and learning management patterns and the use of teaching media in the subject of Western music history at the higher education level: A case study of Bangkok Rajabhat University

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Abstract

This research explored the needs and strategies for utilizing teaching media in the Western Music History course at the higher education level in Rajabhat Universities in Bangkok. The goal was to develop effective teaching models to enhance student learning outcomes. A qualitative methodology was employed, involving in-depth interviews with instructors at four Rajabhat Universities in Bangkok. The data focused on teaching practices, instructional media use, and improvement strategies addressing student needs. The findings revealed: 1) Teaching adhered to the standard curriculum framework, emphasizing learning outcomes within the set timeframe. Course content covered music from ancient times to the 20th century, emphasizing links to social and cultural contexts. However, students faced challenges understanding complex content, including technical terminology. 2) Regarding teaching media, universities used online platforms like YouTube and movies to simplify complex concepts, while Google Drive facilitated access to materials. Instructor-designed teaching materials integrated Western music with its historical and cultural contexts. Techniques such as educational games and group activities enhanced student engagement and interest. This study highlights the importance of continuously refining teaching media to improve the quality of learning in Western Music History courses. Recommendations include (1) expanding the sample size to cover diverse contexts; (2) conducting further qualitative research, such as focus groups, to gather students' insights; (3) developing digital media, such as apps, videos, and games, to improve comprehension and interest; (4) promoting creative activities like reenacting historical musical events to foster contextual understanding; and (5) conducting longitudinal studies to assess the impact of learning on critical thinking, creativity, and future knowledge application.

Keywords: Music teaching management; Teaching media; History of Western music; Rajabhat University

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1. บทนำ

การศึกษาด้านดนตรีศึกษาในประเทศไทยมีการพัฒนาและขยายตัวอย่างต่อเนื่องในช่วงหลายปีที่ผ่านมา โดยเฉพาะหลังจากการประกาศใช้หลักสูตรแกนกลางการศึกษาขั้นพื้นฐาน พุทธศักราช 2551 ซึ่งได้ส่งเสริมให้การเรียนการสอนดนตรีเกิดขึ้นในทุกระดับการศึกษา ตั้งแต่ระดับประถมศึกษา มัธยมศึกษา การพัฒนานี้สะท้อนถึงความสำคัญที่เพิ่มขึ้นของการให้โอกาสผู้เรียนในการพัฒนาทักษะทางดนตรีอย่างต่อเนื่อง ซึ่งมีผลโดยตรงต่อการสร้างศักยภาพและความสามารถของผู้เรียนในอนาคต (กระทรวงศึกษาธิการ, 2551: 182-189) สำหรับระดับอุดมศึกษา ในหลายสถาบันมีการเปิดการเรียนการสอนดนตรีเป็นวิชาเอกสำหรับผู้เรียนที่ต้องการเรียนต่อจากระดับมัธยมศึกษา อีกทั้งยังมีการจัดการเรียนการสอนวิชาสังคีตนิยมให้กับผู้เรียนวิชาเอกอื่นๆ ได้เรียน ในหมวดศึกษาทั่วไป (ณรุทธ์ สุทธจิตต์, 2566 : 167) เมื่อมองย้อนกลับไปถึงบทบาทของดนตรีตะวันตกในการศึกษา ดนตรีตะวันตกไม่เพียงแต่เป็นรากฐานของศิลปะการแสดงในหลายวัฒนธรรม แต่ยังมีความสำคัญในแง่การสร้างเสริมองค์ความรู้และการพัฒนาทักษะที่หลากหลาย เช่น ผลงานของ บีโทเฟน (Beethoven) หรือ โมสาร์ท (Mozart) ได้ถูกนำมาประยุกต์ในหลักสูตรการเรียนการสอนเพื่อเสริมสร้างทักษะการคิดเชิงวิเคราะห์ทางดนตรี บทเพลงเหล่านี้ช่วยให้นักเรียนเข้าใจถึงความเชื่อมโยงระหว่างดนตรี วัฒนธรรม และสังคมในบริบทของโลก ช่วยให้ผู้เรียนตระหนักถึงความสำคัญของการแลกเปลี่ยนทางวัฒนธรรม เช่น การเปรียบเทียบดนตรีตะวันตกกับดนตรีไทยหรือดนตรีจากภูมิภาคอื่น ๆ อีกทั้งยังช่วยสร้างแรงบันดาลใจในการสร้างสรรค์ผลงานดนตรีร่วมสมัย ผู้เรียนสามารถเข้าใจความเชื่อมโยงระหว่างดนตรี วัฒนธรรม และสังคม พร้อมพัฒนานวัตกรรมดนตรีใหม่ที่ตอบโจทย์ยุคดิจิทัล ทั้งยังช่วยอนุรักษ์และต่อยอดมรดกทางดนตรีให้ยั่งยืนในบริบทที่เปลี่ยนแปลงของโลก

และปัจจุบันสังคมได้ก้าวเข้าสู่ยุคที่เทคโนโลยีมีบทบาทสำคัญในชีวิตประจำวัน การศึกษาในศตวรรษที่ 21 จึงต้องมีการปรับตัวเพื่อให้สอดคล้องกับการเปลี่ยนแปลงเหล่านี้ ครูผู้สอนไม่เพียงต้องมีความรู้เกี่ยวกับเนื้อหาวิชาที่ตนสอน แต่ยังต้องสามารถประยุกต์ใช้เทคโนโลยีและสื่อการเรียนรู้สมัยใหม่ในการออกแบบกระบวนการสอนเพื่อให้เหมาะสมกับความต้องการของผู้เรียน แนวโน้มเหล่านี้สะท้อนให้เห็นว่าเทคโนโลยีไม่ได้เป็นเพียงเครื่องมือเสริมในการเรียนการสอน แต่ได้กลายมาเป็นส่วนหนึ่งของโครงสร้างพื้นฐานที่สำคัญ ครูและผู้ออกแบบการสอนต้องคำนึงถึงการนำเทคโนโลยีมาใช้ในทุกขั้นตอนอย่างเหมาะสม และสร้างการเรียนรู้ที่เน้นผู้เรียนเป็นศูนย์กลาง เพื่อให้การศึกษาไม่เพียงบรรลุวัตถุประสงค์ในเชิงวิชาการเท่านั้น แต่ยังเตรียมพร้อมผู้เรียนให้สามารถนำความรู้ไปปรับใช้ได้อย่างมีประสิทธิภาพในสังคมที่เปลี่ยนแปลงอย่างรวดเร็ว (วิวัฒน์ มีสุวรรณ, 2565: 41-42) แนวทางการพัฒนาดนตรีศึกษาในประเทศไทยมีความก้าวหน้าไปอย่างมาก มีการผลักดันให้การศึกษาในสาขานี้เป็นที่แพร่หลายและสามารถพัฒนาต่อยอดในระดับมืออาชีพได้อย่างต่อเนื่อง ซึ่งแนวทางนี้นับว่าเป็นการเตรียมพร้อมเข้าสู่ศตวรรษที่ 21 ที่มีการเปลี่ยนแปลงและการเติบโตทางด้านศิลปะและดนตรีในระดับโลก การปรับตัวต่อเทคโนโลยีในด้านการศึกษาไม่ควรถูกมองว่าเป็นเพียงการนำอุปกรณ์ทันสมัยมาสอน แต่ควรเป็นการปรับแนวคิดและวิธีการสอนเพื่อให้เหมาะสมกับการพัฒนาและความต้องการของผู้เรียนในยุคใหม่ ที่ต้องบูรณาการองค์ความรู้ในหลากหลายมิติ ซึ่งช่วยเตรียมความพร้อมของผู้เรียนให้สามารถปรับตัวกับความเปลี่ยนแปลงในศตวรรษที่ 21 ได้อย่างมีประสิทธิภาพ

ในปัจจุบันการศึกษาไม่ได้จำกัดอยู่เพียงการบรรยายหรือการอ่านหนังสือเรียนเท่านั้นแต่ยังมีการนำสื่อการเรียนรู้รูปแบบใหม่ๆ เข้ามาใช้เพื่อเพิ่มประสิทธิภาพในการเรียนการสอน หนึ่งในวิธีการที่ได้รับความสนใจมากขึ้นคือการใช้ สื่อที่น่าสนใจในการสอน ซึ่งสามารถช่วยสร้างบรรยากาศการเรียนรู้ที่น่าสนใจและกระตุ้นให้ผู้เรียนมีส่วนร่วมมากขึ้น โดยเฉพาะในการสอนวิชาที่มีเนื้อหาซับซ้อนและกว้างขวาง เช่น วิชาประวัติศาสตร์ดนตรีตะวันตก ซึ่งเป็นวิชาที่ครอบคลุมพัฒนาการทางดนตรีตั้งแต่ยุคกลางจนถึงปัจจุบัน สื่อช่วยทำให้การเรียนรู้เป็นเรื่องที่น่าสนุกและเข้าใจได้ง่ายขึ้น ซึ่งเป็นเนื้อหาที่มีความซับซ้อนเป็นอย่างมาก จึงสามารถช่วยทำให้ผู้เรียนเข้าใจเนื้อหาได้ง่ายขึ้น เนื่องจากสามารถจำลองสถานการณ์และเหตุการณ์ทางประวัติศาสตร์ที่สำคัญออกมาให้เห็นภาพได้ชัดเจน ซึ่งช่วยส่งเสริมการจดจำและความเข้าใจในเนื้อหา

การศึกษาวิธีสอนประวัติศาสตร์ดนตรีในมหาวิทยาลัยราชภัฏ โดยเฉพาะในเขตกรุงเทพฯ มีความสำคัญเป็นอย่างยิ่ง เนื่องจากมหาวิทยาลัยราชภัฏมีบทบาทสำคัญในการพัฒนาท้องถิ่นและเน้นการให้โอกาสทางการศึกษาแก่เยาวชนที่อาจมีข้อจำกัดด้านทรัพยากรหรือการเข้าถึงการศึกษาในระดับสูง การสอนในมหาวิทยาลัยราชภัฏจึงต้องปรับให้สอดคล้องกับข้อจำกัดและความหลากหลายของผู้เรียน โดยเน้นการใช้เทคนิคที่เข้าถึงง่าย กระตุ้นความสนใจ และสร้างการมีส่วนร่วมในชั้นเรียน เพื่อให้ผู้เรียนสามารถเข้าใจและเชื่อมโยงประวัติศาสตร์ดนตรีกับวัฒนธรรมที่หลากหลายและเห็นคุณค่าสามารถนำไปปรับใช้ในชีวิตได้มากขึ้น

ด้วยเหตุผลเหล่านี้ การศึกษารูปแบบการสอนวิชาประวัติศาสตร์ดนตรีในมหาวิทยาลัยราชภัฏ ในเขตกรุงเทพฯ จึงเป็นการศึกษาเพื่อค้นหาว่าแต่ละสถาบันมีวิธีการปรับตัวและแนวทางการสอนอย่างไรเพื่อทำให้วิชานี้เข้าถึงง่ายและมีความน่าสนใจ

2. วัตถุประสงค์ของการวิจัย

เพื่อศึกษารูปแบบการจัดการเรียนการสอนและการใช้สื่อประกอบการสอนในรายวิชาประวัติศาสตร์ดนตรีตะวันตก ระดับอุดมศึกษา ในกลุ่มมหาวิทยาลัยราชภัฏเขตกรุงเทพมหานครฯ

3. ประโยชน์ที่คาดว่าจะได้รับ

3.1) ได้ข้อมูลเชิงลึกเกี่ยวกับรูปแบบการจัดการเรียนการสอนและการใช้สื่อประกอบการสอนในวิชาประวัติศาสตร์ดนตรีตะวันตก ระดับอุดมศึกษา

3.2) เข้าใจถึงความต้องการและข้อจำกัดในการใช้สื่อการสอนของอาจารย์ผู้สอนในมหาวิทยาลัยราชภัฏ

3.3) เสนอแนวทางในการพัฒนาการสอนและการใช้สื่อการสอนให้เหมาะสมและมีประสิทธิภาพยิ่งขึ้น

3.4) สนับสนุนให้สถาบันการศึกษาสามารถปรับปรุงการสอนให้สอดคล้องกับบริบทและความต้องการของผู้เรียน

4. ขอบเขตการวิจัย

4.1 กลุ่มผู้ให้ข้อมูล

ประชากร คือ อาจารย์ที่สอนวิชาประวัติศาสตร์ดนตรีตะวันตก มหาวิทยาลัยราชภัฏในเขตกรุงเทพมหานคร

4.1.1) มหาวิทยาลัยราชภัฏบ้านสมเด็จเจ้าพระยา -รองศาสตราจารย์ ดร.สรีวันท์ วาทะวัฒนะ

4.1.2) มหาวิทยาลัยราชภัฏสวนสุนันทา -อาจารย์ ปฐมวัส ธรรมชาติ

4.1.3) มหาวิทยาลัยราชภัฏจันทร์เกษม -ดร.ปองภพ สุกิตติวงศ์

4.1.4) มหาวิทยาลัยราชภัฏพระนคร -ผู้ช่วยศาสตราจารย์ ดร.ภัสชา น้อยสะอาด

กลุ่มตัวอย่าง คือ อาจารย์มหาวิทยาลัยที่สอนวิชาประวัติศาสตร์ดนตรีตะวันตก มหาวิทยาลัยราชภัฏในเขตกรุงเทพมหานครจำนวน 4 แห่ง รวม 4 ท่าน

4.2 ขอบเขตด้านเนื้อหา

4.1.1) ด้านเนื้อหาการสัมภาษณ์

4.1.2) ด้านความต้องการด้านการจัดการเรียนการสอนรายวิชาประวัติศาสตร์ดนตรีตะวันตก

4.1.3) ด้านสื่อการสอนและทรัพยากรการสอนรายวิชาประวัติศาสตร์ดนตรีตะวันตก

5. วิธีดำเนินการวิจัย

5.1 ประชากรและกลุ่มผู้ให้ข้อมูล

ประชากรในการวิจัยนี้ คือ อาจารย์ผู้สอนวิชาประวัติศาสตร์ดนตรีตะวันตกในมหาวิทยาลัยราชภัฏในเขต กรุงเทพมหานคร ได้แก่:

1) มหาวิทยาลัยราชภัฏบ้านสมเด็จเจ้าพระยา

2) มหาวิทยาลัยราชภัฏสวนสุนันทา

3) มหาวิทยาลัยราชภัฏจันทรเกษม

4) มหาวิทยาลัยราชภัฏพระนคร

กลุ่มตัวอย่าง คือ อาจารย์จำนวน 4 ท่านที่ได้รับการคัดเลือกแบบเจาะจง (purposive sampling) เนื่องจากมี ความเชี่ยวชาญและประสบการณ์ในการสอนวิชาประวัติศาสตร์ดนตรีตะวันตกมากกว่า 10 ปี โดยประกอบด้วย:

1) รองศาสตราจารย์ ดร.สรีวันท์ วาทะวัฒนะ – มหาวิทยาลัยราชภัฏบ้านสมเด็จเจ้าพระยา

2) อาจารย์ปฐมวัส ธรรมชาติ – มหาวิทยาลัยราชภัฏสวนสุนันทา

3) ดร.ปองภพ สุกิตติวงศ์ – มหาวิทยาลัยราชภัฏจันทรเกษม

4) ผู้ช่วยศาสตราจารย์ ดร.ภัสชา น้อยสะอาด – มหาวิทยาลัยราชภัฏพระนคร

5.2 เครื่องมือที่ใช้ในการวิจัย

เครื่องมือที่ใช้ในการวิจัยคือ แบบสัมภาษณ์ จำนวน 1 ฉบับ ประกอบไปด้วยประเด็นต่าง ๆ ดังนี้

5.1.1) ส่วนที่ 1 ข้อคำถามด้านข้อมูลทั่วไป เช่น สังกัด และมหาวิทยาลัย รายวิชาประวัติศาสตร์ดนตรี ตะวันตกที่ท่านสอน อยู่ภายใต้หลักสูตรใด ฯลฯ

5.1.2) ส่วนที่ 2 ข้อคำถามที่เกี่ยวข้องกับงานวิจัย ด้านความต้องการด้านการจัดการเรียนการสอนรายวิชา ประวัติศาสตร์ดนตรีตะวันตก และด้านสื่อการสอนและทรัพยากรการสอนรายวิชาประวัติศาสตร์ดนตรีตะวันตก

การสร้างเครื่องมือวิจัยและการหาคุณภาพของเครื่องมือวิจัย

1) ผู้วิจัยทำการศึกษาข้อมูลจากเอกสาร ตำรา และงานวิจัยที่เกี่ยวข้อง เช่น วิธีการสอนวิชา ประวัติศาสตร์ดนตรี การพัฒนาสื่อการสอน

2) ผู้วิจัยนำองค์ความรู้ที่ได้รับจากการศึกษา ไปออกแบบข้อคำถามในแบบสัมภาษณ์

3) ดำเนินการจัดกลุ่มส่วนต่าง ๆ ของแบบสัมภาษณ์

4) นำแบบสัมภาษณ์ไปหาประสิทธิภาพของเครื่องมือวิจัยโดยผู้เชี่ยวชาญ (IOC : Index of item objective congruence) โดยจะต้องได้รับค่าเฉลี่ยประสิทธิภาพไม่น้อยกว่า 0.5 ขึ้นไป จึงจะถือว่าเครื่องมือมีคุณภาพ

การเก็บรวบรวมข้อมูล

6) ผู้วิจัยทำการนัดหมายกลุ่มตัวอย่าง และส่งแบบสัมภาษณ์

7) นำข้อมูลที่ได้จากแบบสัมภาษณ์มาวิเคราะห์ผล และเรียบเรียงแบบรายงานผลในรูปแบบ บรรยายและพรรณนา

8) นำผลข้อมูลที่ได้จากการรายงานผลนำมาสรุปผล อภิปรายผล และข้อเสนอแนะ

6. ผลการวิจัย

    ผู้วิจัยได้วิเคราะห์ข้อมูลเชิงคุณภาพจากการสัมภาษณ์อาจารย์ผู้สอนวิชาประวัติศาสตร์ดนตรีตะวันตกใน มหาวิทยาลัยราชภัฏ 4 แห่งในกรุงเทพมหานคร โดยใช้วิธีวิเคราะห์เนื้อหา (Content Analysis) เพื่อศึกษาการจัดการเรียน การสอนและการใช้สื่อการสอนในรายวิชาดังกล่าว โดยกระบวนการวิเคราะห์แบ่งเป็น 4 ขั้นตอนดังนี้: 1) ถอดความข้อมูล แปลงคำตอบจากการสัมภาษณ์เป็นข้อความที่ชัดเจนและครอบคลุมข้อมูลสำคัญ 2) เข้ารหัสข้อมูล กำหนดรหัสให้ข้อมูลโดยอิง จากแนวคิดหรือหัวข้อ เช่น แนวทางการสอน เทคนิคการใช้สื่อ และทรัพยากรที่จำเป็น 3) จัดกลุ่มรหัส จัดหมวดหมู่ข้อมูล เช่น ความต้องการด้านการสอน ปัญหาในการใช้สื่อ และแนวทางการพัฒนาการสอน 4) ตีความและสรุปผล วิเคราะห์ความสัมพันธ์ ของข้อมูลเพื่อค้นหาข้อสรุปที่ตอบโจทย์วัตถุประสงค์ของการวิจัย

    ผลการวิเคราะห์ข้อมูลและนำเสนอในรูปแบบความเรียงและพรรณนา โดยแบ่งออกเป็นสองประเด็นหลัก ดังนี้:

        1) ด้านความต้องการการจัดการเรียนการสอนรายวิชาประวัติศาสตร์ดนตรีตะวันตก

        2) ด้านสื่อการสอนและทรัพยากรการสอนรายวิชาประวัติศาสตร์ดนตรีตะวันตก

ส่วนที่ 1 ด้านความต้องการการจัดการเรียนการสอนรายวิชาประวัติศาสตร์ดนตรีตะวันตก

  1. การวางแผนการสอนในแต่ละบทเรียน และการกำหนดเกณฑ์เนื้อหาในรายวิชาประวัติศาสตร์ดนตรีตะวันตก

    จากการสัมภาษณ์กลุ่มตัวอย่างพบว่า มหาวิทยาลัยราชภัฏทั้ง 4 แห่ง ได้แก่ มหาวิทยาลัย เอ, บี, ซี และดี มีแนวทางการจัดการเรียนการสอนวิชาประวัติศาสตร์ดนตรีตะวันตกที่ คล้ายคลึงกัน โดยเน้นการวางแผนให้สอดคล้องกับเกณฑ์มาตรฐานของหลักสูตร รวมถึงการกำหนดเนื้อหาที่ชัดเจน เพื่อให้ผู้เรียนบรรลุผลสัมฤทธิ์ทางวิชาการ อีกทั้งยังมีการกำหนดเกณฑ์การ ประเมินผล เช่น ผู้เรียนต้องได้คะแนนไม่น้อยกว่า 50 คะแนนจึงจะผ่านรายวิชา ซึ่งเป็นการรักษามาตรฐานและกระตุ้นให้ผู้เรียนมีความพยายามในการ เรียนรู้ในระดับหนึ่ง นอกจากนี้ ในการถ่ายทอดเนื้อหานั้น ผู้สอนเน้นการคัดเลือกและนำเสนอเฉพาะประเด็นสำคัญ โดย คำนึงถึงพื้นฐานและความสนใจของผู้เรียนในแต่ละกลุ่ม เพื่อส่งเสริมให้การเรียนรู้เกิดขึ้นอย่างมีประสิทธิภาพ อย่างไรก็ตาม มหาวิทยาลัย ซี ให้ความเห็นกับความสำคัญกับการจัดสรรเนื้อหา เนื่องจากข้อจำกัดด้านชั่วโมงเรียนในแต่ละภาคการศึกษา ส่งผลให้การวางแผนการสอนต้องพิถีพิถัน โดยการจัดลำดับความสำคัญของเนื้อหาอย่างรอบคอบ เพื่อให้แน่ใจว่าผู้เรียนได้รับ สาระสำคัญครบถ้วนภายในเวลาที่จำกัด สำหรับรายวิชาประวัติศาสตร์ดนตรีตะวันตกนั้น มีเนื้อหาที่ครอบคลุมหลายยุคสมัย ซึ่งในแต่ละยุคมีรายละเอียดที่ต้องศึกษา เช่น การวิวัฒนาการทางดนตรี แนวคิด ทฤษฎี อิทธิพลทางสังคมและวัฒนธรรม รวมถึงบุคคลสำคัญที่มีบทบาท ด้วยเหตุนี้การจัดการกับปริมาณเนื้อหาที่มากและหลากหลายนี้ถือเป็นความท้าทายที่ผู้สอน จำเป็นต้องรักษาสมดุลระหว่างการให้ข้อมูลเชิงลึกและการคำนึงถึงเวลาที่จำกัด ส่งผลให้บางครั้งจำเป็นต้องลดทอน รายละเอียดบางส่วน แต่ยังคงเน้นประเด็นสำคัญที่ช่วยให้ผู้เรียนเห็นภาพรวมของเนื้อหาได้อย่างชัดเจน ดังนั้น การออกแบบ การสอนจึงใช้วิธีการที่สร้างสรรค์ ที่กระตุ้นความสนใจ เพื่อให้ผู้เรียนสามารถเชื่อมโยงเนื้อหากับภาพรวมของประวัติศาสตร์ ดนตรีได้อย่างมีประสิทธิภาพ

  2. การตั้งเป้าหมายการเรียนรู้สำหรับผู้เรียน

    เนื่องจากข้อจำกัดด้านระยะเวลาและความลึกซึ้งของเนื้อหาในบางแง่มุมของรายวิชาประวัติศาสตร์ดนตรีตะวันตก คณาจารย์จึงต้องคัดสรรประเด็นที่สำคัญและเป็นจุดเด่นเพื่อนำมาถ่ายทอดแก่ผู้เรียน เพื่อให้เกิดประโยชน์สูงสุดและเสริมสร้าง ความเข้าใจเชิงลึกในสาระสำคัญของวิชา จากการสัมภาษณ์กลุ่มตัวอย่างพบว่า มหาวิทยาลัยราชภัฏทั้ง 4 แห่ง มีการ ตั้งเป้าหมายการเรียนรู้ที่สอดคล้องกัน แต่แตกต่างกันในบางด้านเพื่อให้สอดรับกับลักษณะและความต้องการของผู้เรียน มหาวิทยาลัย เอ และบี ให้ข้อมูลที่คล้ายกันว่า การตั้งเป้าหมายให้ผู้เรียนสามารถประเมินความรู้และความเข้าใจของตนเอง หลังจากจบเนื้อหา โดยมีการเก็บคะแนนประเมินผล ซึ่งผู้เรียนต้องสามารถตอบคำถามและวิเคราะห์เนื้อหาได้ในระดับไม่น้อย กว่า 50% เพื่อแสดงถึงความเข้าใจที่เพียงพอในวิชา ซึ่งการประเมินนี้ช่วยให้ผู้สอนเห็นถึงการรับรู้และความสามารถในการ

ประยุกต์ใช้ความรู้ของผู้เรียน ในส่วนของมหาวิทยาลัย ซี ได้กำหนดกฎเกณฑ์เฉพาะในการเรียนการสอน โดยระบุว่าผู้เรียน
จะต้องสอบผ่านในหัวข้อที่ 1 (ยุกโบราณ - ยุคบาโรก) จึงจะมีสิทธิ์เรียนต่อในหัวข้อที่ 2 (ยุคคลาสสิค – ปัจจุบัน) อีกทั้งยังมี
การแบ่งการสอบย่อยในแต่ละยุคเพื่อให้ผู้เรียนได้ทบทวนเนื้อหาอย่างสม่ำเสมอ นโยบายนี้มีวัตถุประสงค์เพื่อให้เกิดความเป็น
ธรรมแก่ผู้เรียนที่ตั้งใจและพยายามศึกษา โดยช่วยคัดกรองผู้เรียนให้พร้อมต่อการเรียนรู้เนื้อหาที่ซับซ้อนยิ่งขึ้น สำหรับ
มหาวิทยาลัย ดี แสดงให้เห็นความแตกต่างอย่างชัดเจนในการตั้งเป้าหมายการเรียนรู้ด้วยข้อจำกัดของเวลาที่มีจำกัด และ
เนื้อหาวิชาที่ครอบคลุมในหลายด้าน ทำให้การสอนในรายวิชาต้องเน้นเป้าหมายที่สำคัญที่สุด คือการให้ผู้เรียนสามารถ
เชื่อมโยงเนื้อหาในวิชากับประสบการณ์ใกล้ตัวที่พวกเขาพบเจอได้ หลักการสอนนี้จึงมุ่งเน้นไปที่การประยุกต์ใช้ความรู้ โดยไม่
เพียงแค่เข้าใจในเนื้อหาเชิงทฤษฎีเท่านั้น แต่ต้องสามารถเชื่อมโยงแนวคิดและหลักการเข้ากับสถานการณ์ที่พบและนำสิ่งที่
เรียนรู้ในรายวิชามาปรับใช้ในชีวิตประจำวันได้จริง

3. **เนื้อหารายวิชาประวัติศาสตร์ดนตรีตะวันตกในหลักสูตร**

จากการสัมภาษณ์กลุ่มตัวอย่างพบว่า มหาวิทยาลัยราชภัฏทั้ง 4 แห่ง ได้แก่ มหาวิทยาลัย เอ, บี, ซี และ ดี มี
แนวทางการจัดการเรียนการสอนในรายวิชาประวัติศาสตร์ดนตรีตะวันตกที่มีความสอดคล้องกัน โดยเนื้อหาวิชาครอบคลุมองค์
ความรู้ที่กว้างขวางและหลากหลาย ตั้งแต่ดนตรียุคกรีกโบราณซึ่งเป็นจุดเริ่มต้นของดนตรีตะวันตก ไปจนถึงดนตรียุคศตวรรษที่
20 ซึ่งมีการพัฒนาและเปลี่ยนแปลงอย่างหลากหลายในเชิงแนวคิดและรูปแบบ ทั้งนี้ รายวิชาดังกล่าวยังให้ความสำคัญกับ
การศึกษาคำศัพท์เฉพาะทางดนตรีหรือศัพท์สังคีตที่จำเป็นสำหรับการวิเคราะห์บทเพลงในแต่ละยุค อีกทั้งยังเชื่อมโยงเนื้อหา
กับบริบททางสังคมที่มีผลต่อการสร้างสรรค์ดนตรีในยุคต่าง ๆ การเรียนรู้ในมิตินี้ช่วยให้ผู้เรียนสามารถเข้าใจพัฒนาการของ
ดนตรีผ่านองค์ประกอบที่เป็นเอกลักษณ์ของแต่ละยุค รวมถึงศึกษาบุคคลสำคัญที่มีบทบาทในการขับเคลื่อนและพัฒนาดนตรี
อาทิ คีตกวี นักประพันธ์ และนักดนตรีที่ส่งอิทธิพลและแรงบันดาลใจสู่ศิลปินในยุคนอกจากนี้ หลักสูตรยังครอบคลุมถึงแนว
ดนตรีที่เป็นรากฐานสำคัญของดนตรีสมัยใหม่ เช่น ป็อป ร็อค แจ๊ส และบลูส์ ซึ่งมีบทบาทสำคัญในการสร้างสรรค์และหล่อ
หลอมวัฒนธรรมดนตรีในระดับสากล การเรียนรู้แนวดนตรีเหล่านี้จึงไม่เพียงแต่ทำให้ผู้เรียนเข้าใจวิวัฒนาการของดนตรี
ตะวันตกเท่านั้น แต่ยังช่วยให้เห็นถึงการผสมผสานทางวัฒนธรรมที่สะท้อนผ่านดนตรีในแต่ละยุค

4. **เนื้อหาในรายวิชาที่ผู้เรียนยังไม่มีความเข้าใจและเกิดความสับสน**

จากการสัมภาษณ์กลุ่มตัวอย่างพบว่า มหาวิทยาลัยราชภัฏทั้ง 4 แห่ง ได้แก่ มหาวิทยาลัย เอ, บี, ซี และ ดี มีความ
สอดคล้องกันในแง่ของปัญหาที่ผู้เรียนพบในการเข้าใจเนื้อหา โดยเนื้อหาที่เกี่ยวข้องกับบริบททางสังคมในยุคโบราณมักเป็น
สาเหตุหลักที่ทำให้ผู้เรียนเกิดความสับสนและไม่เข้าใจอย่างชัดเจน มหาวิทยาลัย เอ บี และ ซี ชี้ว่า เมื่อเนื้อหาย้อนกลับไปยัง
ยุคที่มีความเก่าแก่ ผู้เรียนมักประสบปัญหาในการจินตนาการภาพรวมของสังคมและวิถีชีวิตในยุคนั้น ซึ่งทำให้การเชื่อมโยง
ความรู้กับภาพที่เป็นรูปธรรมเป็นไปได้ยาก ส่งผลให้การเรียนรู้เกิดความไม่ต่อเนื่องและความเข้าใจไม่ลึกซึ้ง ในส่วนของ
มหาวิทยาลัย ดี ได้เน้นย้ำถึงความท้าทายสำคัญคือการเข้าถึงบริบททางสังคมและวัฒนธรรมที่ซับซ้อนของยุคเก่า ผู้เรียนพบว่า
การจินตนาการภาพและการเชื่อมโยงข้อมูลกับเนื้อหาที่เรียนรู้ทำได้ยาก เนื้อหาที่เกี่ยวข้องกับศัพท์สังคีตซึ่งมีความซับซ้อนและ
ใช้ภาษาที่ยากต่อการเข้าใจ ยังเป็นอุปสรรคที่ทำให้ผู้เรียนต้องใช้ความพยายามมากขึ้นในการจดจำและทำความ นอกจากนี้
การศึกษาประวัติและความสำคัญของบุคคลในยุคก่อนคลาสสิกยังเป็นอีกปัจจัยที่เพิ่มความซับซ้อนในการเรียนรู้ เนื่องจาก
นักศึกษามักไม่คุ้นเคยกับบุคคลเหล่านี้ จึงยากต่อการจดจำและเชื่อมโยงข้อมูลกับเหตุการณ์ในยุคนั้น ปัญหาเหล่านี้สะท้อนถึง
ความจำเป็นในการพัฒนาสื่อการเรียนรู้ที่สามารถช่วยให้ผู้เรียนเข้าถึงข้อมูลและสร้างจินตนาการภาพที่ชัดเจนยิ่งขึ้น

การประชุมวิชาการระดับชาติและนานาชาติบ้านสมเด็จเจ้าพระยา ครั้งที่ 1 (BS2C 2025)
The 1st Bansomdejchaopraya National and International Conference (BS2C 2025)

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5. **ปัญหาและอุปสรรคด้านการจัดการเรียนการสอนรายวิชาประวัติศาสตร์ดนตรีตะวันตก**

จากการสัมภาษณ์พบว่า มหาวิทยาลัยทั้ง 4 แห่ง ได้แก่ มหาวิทยาลัย เอ, บี, ซี และ ดี ต่างประสบปัญหาคล้ายกันใน
การสอนวิชาประวัติศาสตร์ดนตรีตะวันตก ซึ่งส่งผลต่อประสิทธิภาพการเรียนรู้ของนักศึกษา โดยมหาวิทยาลัย เอ, บี และ ซี
รายงานว่าผู้เรียนส่วนใหญ่พบว่าการเข้าใจเนื้อหานั้นยาก โดยเฉพาะนักศึกษาที่ไม่มีพื้นฐานดนตรีคลาสสิก ทำให้มองว่าเนื้อหา
ประวัติศาสตร์ดนตรีนั้นไกลตัวและไม่เกี่ยวข้องกับชีวิตประจำวัน จึงขาดแรงจูงใจในการเรียน ส่งผลให้ผลการเรียนต่ำกว่า
เกณฑ์

ในด้านสื่อการสอน มหาวิทยาลัยเหล่านี้พบปัญหาสื่อการสอนที่มีอยู่ไม่เพียงพอและไม่ดึงดูดความสนใจ สื่อบาง
ประเภทล้าสมัยหรือไม่ชัดเจน ทำให้ผู้เรียนเชื่อมโยงข้อมูลได้ยาก นอกจากนี้ แหล่งข้อมูลส่วนใหญ่ยังเป็นภาษาอังกฤษ ซึ่งทำ
ให้นักศึกษาที่มีพื้นฐานภาษาอังกฤษไม่เพียงพอ ประสบปัญหาในการเข้าใจเนื้อหาที่ซับซ้อนและจับประเด็นสำคัญได้ยาก อีก
ปัญหาคือการขาดความเข้าใจในบริบทสังคมของแต่ละยุค ซึ่งเป็นสิ่งจำเป็นในการศึกษาประวัติศาสตร์ดนตรี ทำให้ผู้เรียนรู้สึก
ว่าไม่สามารถนำความรู้นี้ไปปรับใช้ได้ และขาดแรงจูงใจในการเรียน สำหรับมหาวิทยาลัย ดี ชี้ให้เห็นปัญหาที่แตกต่างออกไป
โดยนักศึกษาบางคนต้องทำงานควบคู่กับการเรียน ทำให้เวลาที่ใช้ในการศึกษาและเข้าใจเนื้อหาลดลง แม้ว่าจะตั้งใจศึกษาแต่
ปัญหาการจัดสรรเวลาทำให้ผลการเรียนได้รับผลกระทบจึงต้องการวิธีการสนับสนุนที่เหมาะสม

6. **เทคนิคและวิธีการกระตุ้นความสนใจของผู้เรียน**

จากการสัมภาษณ์กลุ่มตัวอย่าง พบว่ามหาวิทยาลัยราชภัฏทั้ง 4 แห่ง ได้แก่ มหาวิทยาลัย เอ, บี, ซี และ ดี มีแนว
ทางการกระตุ้นความสนใจของผู้เรียนที่มีความคล้ายคลึงกัน มหาวิทยาลัย เอ อธิบายว่า หนึ่งในวิธีการที่มีประสิทธิภาพคือการ
มอบหมายงานกลุ่ม โดยแต่ละกลุ่มต้องมีส่วนร่วมในการทำงาน เนื่องจากเนื้อหาที่ได้รับจะต้องถูกรวมเป็นเนื้อหาหลักของวิชา
การขาดเนื้อหาจากกลุ่มใดกลุ่มหนึ่งจะทำให้ภาพรวมไม่สมบูรณ์ วิธีนี้ทำให้ผู้เรียนรู้สึกว่าตนเองมีบทบาทสำคัญและกระตุ้นให้มี
ความรับผิดชอบต่อเนื้อหา ส่งผลให้เกิดการมีส่วนร่วมอย่างจริงจังในการเรียนรู้ ในขณะที่ มหาวิทยาลัย บี ใช้เทคนิคการ
ปรับเปลี่ยนหัวข้อการสนทนาเมื่อผู้สอนสังเกตเห็นความเบื่อหน่ายหรือความสนใจที่ลดลงของผู้เรียน วิธีนี้ช่วยให้การสอน
สอดคล้องกับพฤติกรรมของผู้เรียนในยุคปัจจุบันที่คุ้นเคยกับการเสพสื่อออนไลน์และข้อมูลที่เปลี่ยนแปลงอย่างรวดเร็ว การ
เปลี่ยนหัวข้อสนทนาอย่างทันทีทำให้ผู้เรียนรู้สึกว่าการเรียนมีความสดใหม่และเพิ่มความสนใจ ก่อนที่จะเชื่อมโยงกลับสู่เนื้อหา
หลักอย่างเป็นธรรมชาติ วิธีนี้ช่วยกระตุ้นให้ผู้เรียนมีความสนใจและติดตามการเรียนรู้ต่อไป มหาวิทยาลัย ซี และ ดี ใช้แนวทาง
การดึงดูดความสนใจผ่านการใช้สื่อการสอนที่หลากหลาย เช่น ภาพยนตร์ วิดีโอ และเพลง การนำสื่อเหล่านี้มาใช้ช่วยให้ผู้เรียน
เชื่อมโยงเนื้อหากับภาพและเสียงได้ชัดเจนมากขึ้น เพิ่มความสนุกสนานและน่าสนใจให้กับการเรียนรู้ สร้างบรรยากาศที่กระตุ้น
ความรู้สึกและแรงจูงใจในการเรียน

7. **วิธีหรือเทคนิคใดในการประเมินผลการเรียนรู้ของผู้เรียน**

จากการสัมภาษณ์พบว่า มหาวิทยาลัยราชภัฏทั้ง 4 แห่ง ได้แก่ มหาวิทยาลัย เอ, บี, ซี และ ดี มีแนวทางการ
ประเมินผลการเรียนรู้ของผู้เรียนที่คล้ายคลึงกัน โดยเน้นการตั้งเกณฑ์การประเมินที่ครอบคลุมหลายด้าน เพื่อสะท้อน
ความสามารถที่แท้จริงของผู้เรียน ไม่จำกัดเพียงการสอบปลายภาคหรือการวัดความรู้จากเนื้อหาเพียงอย่างเดียว แต่ยัง
คำนึงถึงกระบวนการเรียนรู้และความก้าวหน้าของผู้เรียน เกณฑ์การประเมินประกอบด้วยการสอบก่อนเรียน การสอบหลัง
เรียน การสอบย่อยระหว่างการเรียน รวมถึงการประเมินจากการทำกิจกรรมในชั้นเรียน นอกจากนี้ การมีจิตพิสัยที่ดี เช่น
ความสม่ำเสมอในการเข้าเรียน การมีส่วนร่วมในชั้นเรียน และความรับผิดชอบต่อการเรียนรู้ ก็เป็นองค์ประกอบสำคัญในการ
ประเมินผล การประเมินผลในลักษณะนี้ช่วยสะท้อนพฤติกรรมการเรียนรู้และทัศนคติของผู้เรียน เช่น การทำงานกลุ่ม ความ

รับผิดชอบในงานที่ได้รับมอบหมาย และการทำงานร่วมกับเพื่อนร่วมชั้น การมีระบบการประเมินที่ครอบคลุมหลายมิติช่วยให้เห็นภาพรวมของพัฒนาการทางการเรียนรู้ของผู้เรียนได้อย่างชัดเจนและลึกซึ้งมาก

ส่วนที่ 2 ด้านสื่อการสอนและทรัพยากรการสอนรายวิชาประวัติศาสตร์ดนตรีตะวันตก

1. **การเลือกใช้สื่อการสอนหรือทรัพยากรในการจัดการเรียนการสอนรายวิชาประวัติศาสตร์ดนตรีตะวันตก**

จากการสัมภาษณ์กลุ่มตัวอย่าง พบว่ามหาวิทยาลัยราชภัฏทั้ง 4 แห่ง ได้แก่ มหาวิทยาลัย เอ, บี, ซี และ ดี มีแนวทางการเลือกใช้สื่อการสอนและทรัพยากรที่ทันสมัยและเข้าถึงได้ง่าย โดยเน้นการใช้ สื่อออนไลน์ เช่น วิดีโอจาก ยูทูป (YouTube) ซึ่งช่วยให้ผู้เรียนเข้าใจเนื้อหาซับซ้อนผ่านภาพและเสียง รวมถึงการใช้ภาพยนตร์ที่เกี่ยวข้องกับประวัติศาสตร์ดนตรีตะวันตกเพื่อเสริมความรู้เชิงลึกและสร้างบรรยากาศที่น่าสนใจ นอกจากนี้ มหาวิทยาลัยยังเลือกใช้ กูเกิลไดรฟ์ (Google Drive) เป็นแหล่งเก็บเอกสารประกอบการสอน เช่น บทความและเนื้อหาที่ผู้เรียนสามารถเข้าถึงได้ทุกที่ทุกเวลา เพื่อเพิ่มความสะดวกและต่อยอดการเรียนรู้ มหาวิทยาลัย เอ ยังเสริมด้วย แบบฝึกหัดอิเล็กทรอนิกส์ (E-exercises) และระบบอีเลินนิ่ง (E-Learning) ที่รวบรวมเอกสารและแบบฝึกหัดให้ผู้เรียนทบทวนได้อย่างต่อเนื่องและอิสระ ทำให้กระบวนการเรียนรู้มีประสิทธิภาพมากขึ้น

2. **ความสำคัญของสื่อการสอนหรือทรัพยากรใช้การสอน ในรายวิชาประวัติดนตรีตะวันตก**

มหาวิทยาลัยทั้ง 4 แห่ง ให้ความสำคัญกับการใช้สื่อและทรัพยากรที่หลากหลายเพื่อส่งเสริมประสิทธิภาพการเรียนรู้ โดยเน้นว่าการบรรยายแบบดั้งเดิมเพียงอย่างเดียวอาจทำให้นักศึกษาเบื่อหน่ายและรู้สึกว่าเนื้อหาซับซ้อนหรือไกลตัว การใช้สื่อที่เหมาะสม เช่น ภาพประกอบ วิดีโอ สไลด์การนำเสนอ หรือภาพยนตร์เฉพาะทาง จึงช่วยให้เนื้อหาที่ซับซ้อนกลายเป็นเรื่องที่เข้าใจได้ง่ายและมีความน่าสนใจ สื่อการสอนเหล่านี้ยังช่วยกระตุ้นความคิดสร้างสรรค์ การตั้งคำถาม และการมีส่วนร่วมในชั้นเรียน โดยเฉพาะการใช้สื่อภาพและเสียงที่ช่วยสร้างการเรียนรู้ที่ชัดเจนและลึกซึ้งมากขึ้น ทำให้นักศึกษาสามารถเชื่อมโยงความรู้ทางประวัติศาสตร์ดนตรีกับเหตุการณ์สำคัญได้อย่างมีประสิทธิภาพ

3. **การเลือกตำราเรียนในการสอนวิชาประวัติศาสตร์ดนตรีตะวันตก**

จากการสัมภาษณ์กลุ่มตัวอย่างผู้ให้ข้อมูล พบว่า มหาวิทยาลัยทั้ง 4 แห่ง ในการเลือกตำราเรียนในการสอนวิชาประวัติศาสตร์ดนตรีตะวันตก ในรูปแบบที่คล้ายคลึง มหาวิทยาลัย เอ, บี, ซี และดี ในการสอนวิชาประวัติศาสตร์ดนตรีตะวันตก ในการเลือกใช้เอกสารประกอบการเรียนที่ผู้สอนจัดทำขึ้นเอง แทนการใช้ตำราเรียนเพียงเล่มเดียว เอกสารเหล่านี้ถูกพัฒนาจากแหล่งข้อมูลที่เชื่อถือได้ทั้งในประเทศและต่างประเทศ โดยเน้นความเหมาะสมกับบริบทการเรียนรู้ในแต่ละปีการศึกษา การจัดทำเอกสารเหล่านี้ไม่เพียงช่วยถ่ายทอดเนื้อหาที่สำคัญและทันสมัย แต่ยังช่วยให้ผู้สอนสามารถปรับปรุงเนื้อหาให้เหมาะสมกับพื้นฐานของผู้เรียนในแต่ละปี การใช้เอกสารประกอบการเรียนที่หลากหลายยังช่วยให้ผู้เรียนมีมุมมองที่กว้างขึ้น และสามารถเชื่อมโยงดนตรีตะวันตกกับประวัติศาสตร์ วัฒนธรรม และพัฒนาการในยุคสมัยต่าง ๆ ได้อย่างลึกซึ้ง

4. **การเข้าถึงตำราเรียนและสื่อการเรียนการสอนของผู้เรียน**

มหาวิทยาลัย เอ, บี, ซี และ ดี ให้ความสำคัญกับการใช้ สื่อดิจิทัล ที่ช่วยให้นักศึกษาสามารถเข้าถึงข้อมูลได้อย่างรวดเร็วและสะดวก เช่น การใช้ กูเกิลไดรฟ์ (Google Drive) ในการเผยแพร่เอกสารประกอบการเรียน หรือกลุ่มในโซเชียลมีเดียเพื่อกระจายเนื้อหา ผู้เรียนสามารถดาวน์โหลดเอกสารผ่านอุปกรณ์ต่าง ๆ เช่น คอมพิวเตอร์ แท็บเล็ต และสมาร์ทโฟน ทำให้การศึกษาเป็นไปได้ทุกที่ทุกเวลา การเข้าถึงสื่อดิจิทัลนี้ช่วยให้ผู้เรียนสามารถทบทวนบทเรียนได้อย่างต่อเนื่องและสอดคล้องกับวิถีชีวิตในยุคดิจิทัล โดยลดความจำเป็นในการพกพาตำราและช่วยให้นักศึกษาสามารถเรียนรู้ด้วยตนเองได้อย่างมีประสิทธิภาพ

5. **การพัฒนาการสอนวิชาประวัติศาสตร์ดนตรีตะวันตก**

มหาวิทยาลัยทั้ง 4 แห่งมีข้อเสนอแนะที่คล้ายคลึงกันในการพัฒนาการสอนวิชาประวัติศาสตร์ดนตรีตะวันตก เช่น

1. **การพัฒนาสื่อการเรียนที่เข้าถึงง่ายและสะดวก** ปัจจุบันผู้เรียนมีความต้องการให้สื่อการเรียนรู้สามารถเข้าถึงได้อย่างรวดเร็วและง่ายดาย ไม่ว่าจะอยู่ที่ไหนก็ตาม การพัฒนาสื่อการเรียนให้สามารถใช้งานได้ทุกที่ทุกเวลา เช่น การสร้างแพลตฟอร์มออนไลน์ หรือแอปพลิเคชันสำหรับสื่อการเรียนรู้วิชาประวัติศาสตร์ดนตรีโดยเฉพาะ จะช่วยให้ผู้เรียนสามารถศึกษาและทบทวนเนื้อหานอกห้องเรียนได้อย่างสะดวกและต่อเนื่อง อีกทั้งยังส่งเสริมให้เกิดการเรียนรู้ด้วยตนเองตามความสะดวกของผู้เรียน

2. **สนับสนุนการผลิตสื่อที่น่าสนใจและมีคุณภาพ** การพัฒนาสื่อการเรียนที่มีเนื้อหาสนุกสนาน มีคุณภาพ และสามารถดึงดูดความสนใจของผู้เรียนเป็นสิ่งที่ควรได้รับการสนับสนุน สื่อที่น่าสนใจไม่เพียงช่วยให้ผู้เรียนเกิดความรู้สึกใหม่ ๆ และหลงใหลในการเรียนรู้ แต่ยังทำให้เนื้อหาที่ซับซ้อนเข้าใจได้ง่ายขึ้น ไม่ว่าจะเป็นสื่อภาพ เสียง หรือวิดีโอ การผลิตสื่อที่สร้างสรรค์และมีคุณภาพจึงเป็นหัวใจสำคัญในการพัฒนาการเรียนการสอนวิชานี้

3. **การใช้สื่อเกมเพื่อกระตุ้นการเรียนรู้** สื่อเกมเป็นอีกทางเลือกหนึ่งที่น่าสนใจในการดึงดูดความสนใจของผู้เรียน โดยเฉพาะการใช้บอร์ดเกมหรือเกมออนไลน์ที่มีเนื้อหาสอดคล้องกับประวัติศาสตร์ดนตรี เกมเหล่านี้สามารถกระตุ้นให้ผู้เรียนเกิดการแข่งขันและความสนุก ทำให้ผู้เรียนจดจำเนื้อหาได้ดีขึ้นผ่านประสบการณ์ตรงจากการเล่นเกม การเรียนรู้ด้วยเกมยังสามารถทำให้บรรยากาศการเรียนการสอนผ่อนคลายและน่าสนุกมากยิ่งขึ้น

4. **การพัฒนาความคิดสร้างสรรค์ผ่านกิจกรรมเสริม** นอกเหนือจากสื่อการเรียนแบบออนไลน์หรือเกมแล้ว การจัดกิจกรรมเสริม เช่น การจำลองการแสดงดนตรีแบบยุคต่าง ๆ หรือการวิเคราะห์บทเพลงสำคัญในประวัติศาสตร์ สามารถช่วยกระตุ้นความคิดสร้างสรรค์และความเข้าใจในบริบทของดนตรีได้อย่างดี การสร้างสถานการณ์ที่ทำให้ผู้เรียนได้สัมผัสกับบรรยากาศของยุคต่าง ๆ จะช่วยให้ผู้เรียนเข้าใจประวัติศาสตร์ดนตรีตะวันตกได้ลึกซึ้งขึ้นและจดจำเนื้อหาได้ยาวนาน การพัฒนาการสอนวิชาประวัติศาสตร์ดนตรีที่มีสื่อการเรียนรู้ที่เข้าถึงง่ายและสื่อที่น่าสนใจ พร้อมกับกิจกรรมและเกมที่เสริมความสนุก จะช่วยกระตุ้นให้ผู้เรียนสนใจในการเรียนรู้และเพิ่มประสิทธิภาพในการจดจำเนื้อหาได้ดียิ่งขึ้น

7. อภิปรายผลการวิจัย

ผลการวิจัยนี้สะท้อนให้เห็นถึงการจัดการเรียนการสอนรายวิชาประวัติศาสตร์ดนตรีตะวันตกในมหาวิทยาลัยราชภัฏทั้ง 4 แห่งในเขตกรุงเทพมหานครฯ โดยให้ความสำคัญกับการวางแผนการสอน การใช้สื่อที่หลากหลาย การประเมินผลหลายมิติ และการส่งเสริมความคิดสร้างสรรค์ในกระบวนการเรียนรู้ สรุปผลได้ ดังตารางต่อไปนี้:

ตารางที่ 1 สรุปผลการวิจัยด้านความต้องการการจัดการเรียนการสอนและสื่อการเรียนรู้ในรายวิชาประวัติศาสตร์ดนตรีตะวันตก

หัวข้อการศึกษา	สรุปผลการวิจัย
1. ด้านความต้องการการจัดการเรียนการสอนรายวิชาประวัติศาสตร์ดนตรีตะวันตก	
1) การวางแผนการสอนใน เกณฑ์เนื้อหา	กำหนดเนื้อหาให้สอดคล้องกับเกณฑ์มาตรฐานหลักสูตร •**มหาวิทยาลัย เอ และ บี:** เน้นการถ่ายทอดเนื้อหาหลักและการประเมินผลเพื่อให้ผู้เรียนบรรลุผลสัมฤทธิ์ทางการศึกษา โดยเกณฑ์การประเมินเน้นให้ผู้เรียนได้คะแนนไม่น้อยกว่า 50% • **มหาวิทยาลัย ซี:** เผชิญข้อจำกัดด้านชั่วโมงเรียน ทำให้ต้องจัดลำดับความสำคัญของเนื้อหาและลดรายละเอียดบางส่วน เน้นประเด็นสำคัญเพื่อให้ผู้เรียนเห็นภาพรวมได้ชัดเจน • **มหาวิทยาลัย ดี:** ให้ความสำคัญกับการออกแบบการสอนที่ช่วยให้ผู้เรียนเข้าใจภาพรวมของประวัติศาสตร์ดนตรี

หัวข้อการศึกษา	สรุปผลการวิจัย
	และเชื่อมโยงเนื้อหากับชีวิตจริง
2) การตั้งเป้าหมายการเรียนรู้	• **มหาวิทยาลัย เอ และ บี**: เน้นการถ่ายทอดเนื้อหาหลักและการประเมินผลเพื่อให้ผู้เรียนบรรลุผลสัมฤทธิ์ทางการศึกษา โดยเกณฑ์การประเมินเน้นให้ผู้เรียนได้คะแนนไม่น้อยกว่า 50% • **มหาวิทยาลัย ซี**: เผชิญข้อจำกัดด้านชั่วโมงเรียน ทำให้ต้องจัดลำดับความสำคัญของเนื้อหาและลดรายละเอียดบางส่วน เน้นประเด็นสำคัญเพื่อให้ผู้เรียนเห็นภาพรวมได้ชัดเจน • **มหาวิทยาลัย ดี**: ให้ความสำคัญกับการออกแบบการสอนที่ช่วยให้ผู้เรียนเข้าใจภาพรวมของประวัติศาสตร์ดนตรี และเชื่อมโยงเนื้อหากับชีวิตจริง
3) เนื้อหารายวิชา	เนื้อหาในวิชาประวัติศาสตร์ดนตรีตะวันตกของทุกมหาวิทยาลัยครอบคลุมตั้งแต่ยุคดนตรียุคกรีกโบราณจนถึงยุคสมัยใหม่ • **มหาวิทยาลัย เอ และ บี**: เน้นการศึกษาคำศัพท์เฉพาะทางดนตรีและการวิเคราะห์บทเพลงในแต่ละยุค • **มหาวิทยาลัย ซี และ ดี**: ให้ความสำคัญกับการเชื่อมโยงเนื้อหากับบริบททางสังคม เพื่อสร้างความเข้าใจพัฒนาการดนตรีในแต่ละยุค
4) เนื้อหาที่ผู้เรียนมักสับสน	• **มหาวิทยาลัย เอ บี และ ซี**: ผู้เรียนสับสนกับบริบทสังคมยุคโบราณ และจินตนาการภาพไม่ชัดเจน ทำให้การเรียนรู้ขาดความลึกซึ้ง • **มหาวิทยาลัย ดี**: ผู้เรียนประสบปัญหากับคำศัพท์เฉพาะทางและบุคคลสำคัญในยุคก่อนคลาสสิกที่ไม่คุ้นเคย ทำให้การจดจำและเชื่อมโยงข้อมูลเป็นไปได้ยาก
5) ปัญหาการจัดการเรียนการสอน	• **มหาวิทยาลัย เอ บี และ ซี**: ปัญหาหลักคือผู้เรียนไม่มีพื้นฐานดนตรีคลาสสิกและขาดแรงจูงใจ สื่อการสอนบางส่วนล้าสมัยและใช้ภาษาอังกฤษซึ่งยากต่อการเข้าใจ • **มหาวิทยาลัย ดี**: ผู้เรียนบางคนต้องทำงานควบคู่กับการเรียน ทำให้มีเวลาศึกษาน้อยลงและส่งผลต่อผลการเรียน
6) เทคนิคกระตุ้นความสนใจ	• **มหาวิทยาลัย เอ**: ใช้งานกลุ่มเพื่อเพิ่มความรับผิดชอบและการมีส่วนร่วมของผู้เรียน • **มหาวิทยาลัย บี**: ปรับหัวข้อการสอนตามความสนใจของผู้เรียน โดยเปลี่ยนหัวข้อทันทีเมื่อสังเกตเห็นความเบื่อหน่าย • **มหาวิทยาลัย ซี และ ดี**: ใช้สื่อหลากหลาย เช่น วิดีโอ เพลง หรือภาพยนตร์ เพื่อสร้างความสนใจและกระตุ้นการเรียนรู้
7) การประเมินผลการเรียนรู้	• **มหาวิทยาลัย เอ และ บี**: ใช้การสอบก่อน-หลังเรียน และประเมินจากการมีส่วนร่วมในชั้นเรียน • **มหาวิทยาลัย ซี**: ใช้การสอบย่อยในแต่ละยุคเพื่อทบทวนความรู้ • **มหาวิทยาลัย ดี**: เน้นประเมินความเข้าใจผ่านการวิเคราะห์และเชื่อมโยงเนื้อหากับสถานการณ์จริง
2. ด้านสื่อการสอนและทรัพยากรการสอนรายวิชาประวัติศาสตร์ดนตรีตะวันตก	
1) การเลือกใช้สื่อการสอน	• **มหาวิทยาลัย เอ และ บี**: ใช้สื่อออนไลน์ เช่น YouTube และ Google Drive เพื่อเผยแพร่เอกสาร และเสริมด้วยระบบ E-Learning • **มหาวิทยาลัย ซี และ ดี**: ใช้สื่อวิดีโอ ภาพยนตร์ และเพลง เพื่อช่วยให้ผู้เรียนเข้าใจเนื้อหาที่ซับซ้อน
2) ความสำคัญของสื่อการสอน	• **มหาวิทยาลัย เอ บี และ ซี**: สื่อภาพและเสียงช่วยลดความซับซ้อนของเนื้อหาและสร้างความน่าสนใจ • **มหาวิทยาลัย ดี**: เน้นให้สื่อช่วยกระตุ้นความคิดสร้างสรรค์และการตั้งคำถาม
3) การเลือกตำราเรียน	ใช้เอกสารประกอบการเรียนที่ผู้สอนจัดทำขึ้นเอง , อ้างอิงจากตำราที่น่าเชื่อถือในและต่างประเทศ , เน้นความเหมาะสมกับพื้นฐานผู้เรียนและการปรับปรุงเนื้อหาให้ทันสมัย
4) การเข้าถึงตำรา	ใช้สื่อดิจิทัล เช่น กูเกิลไดรฟ์และกลุ่มโซเชียลมีเดีย , ผู้เรียนดาวน์โหลดเอกสารได้สะดวก ,

หัวข้อการศึกษา	สรุปผลการวิจัย
เรียน	ลดความจำเป็นในการพกพาตำรา
5) การพัฒนาการสอน	• **มหาวิทยาลัย เอ และ บี**: แนะนำให้พัฒนาสื่อดิจิทัลและเกมเพื่อเพิ่มความน่าสนใจ • **มหาวิทยาลัย ซี**: สนับสนุนกิจกรรมเสริม เช่น การจำลองดนตรียุคต่าง ๆ เพื่อสร้างประสบการณ์ตรง • **มหาวิทยาลัย ดี**: เสนอให้ใช้แพลตฟอร์มออนไลน์ที่ทันสมัยเพื่อการเรียนรู้แบบยืดหยุ่น

ผู้วิจัยเห็นว่า วิธีการนี้ไม่เพียงส่งเสริมการเรียนรู้ที่มีคุณภาพ แต่ยังสร้างความมั่นใจให้กับนักศึกษาว่าพวกเขาสามารถบรรลุเป้าหมายทางวิชาการได้อย่างมีทิศทาง การออกแบบแผนการสอนเช่นนี้สอดคล้องกับข้อเสนอของ เฉลิม มลิลา นิติเขตต์ปรีชา (2559) ที่เน้นความสำคัญของการจัดกิจกรรมการเรียนรู้และการประเมินผลที่ครอบคลุม เพื่อให้ผู้เรียนสามารถเชื่อมโยงเนื้อหาเข้ากับประสบการณ์ในชีวิตจริง จากการวิเคราะห์ข้อมูลผู้วิจัยได้รวบรวมประเด็นที่สำคัญไว้ดังนี้ :

7.1 การวางแผนการสอนที่เน้นเป้าหมายชัดเจนและส่งเสริมการมีส่วนร่วม

ในมหาวิทยาลัยที่เข้าร่วมการวิจัย ผู้สอนวางแผนการสอนที่มีเกณฑ์มาตรฐานตามหลักสูตร เนื้อหาวิชาประวัติศาสตร์ดนตรีตะวันตกครอบคลุมหลายยุคสมัยทำให้ต้องเลือกเนื้อหาที่สำคัญ นักศึกษาจะได้รับการทดสอบความเข้าใจอยู่ตลอดทั้งภาคเรียน ซึ่งเป็นวิธีที่กระตุ้นให้ทบทวนเนื้อหาอยู่เสมอ วิธีการนี้ช่วยให้การเรียนมีทิศทางชัดเจนและยังรักษาคุณภาพการเรียนการสอน มีเป้าหมายที่ชัดเจนในการเรียนรู้ ตรงกับแผนการสอนวิชาประวัติศาสตร์ของ เฉลิม มลิลา นิติเขตต์ปรีชา (2559 : 243-246) กล่าวว่า แผนการสอนมีความสำคัญในการจัดการเรียนรู้ให้เป็นระบบและมีประสิทธิภาพ ผู้สอนต้องเตรียมแผนล่วงหน้าที่ครอบคลุมทั้งกิจกรรม วิธีการสอน และการประเมินผล เพื่อให้สอดคล้องกับความต้องการของผู้เรียน และสามารถปรับแก้ได้ตามสถานการณ์ ซึ่งหากผู้สอนสามารถปรับให้การเรียนรู้มีความน่าสนใจและมีส่วนร่วมของผู้เรียน การสอนจะมีประสิทธิภาพมากขึ้น

7.2 การนำสื่อที่หลากหลายมาใช้เพื่อเพิ่มความน่าสนใจ

วราพร บุญมี (2564 : 378) กล่าวว่า สื่อการสอน คือ เครื่องมือที่ทำหน้าที่เป็นตัวกลางในการส่งเสริมการเรียนรู้ระหว่างผู้สอนและผู้เรียน โดยสื่อการสอนอาจมาในหลากหลายรูปแบบ เช่น วัสดุ อุปกรณ์ วิธีการ หรือแหล่งเรียนรู้ต่าง ๆ ที่มีส่วนช่วยในการถ่ายทอดความรู้และประสบการณ์ให้แก่ผู้เรียน ส่งผลให้เกิดการเปลี่ยนแปลงในพฤติกรรมตามเป้าหมายที่ตั้งไว้ ผู้เรียนจึงสามารถสร้างองค์ความรู้ด้วยตนเองและบรรลุวัตถุประสงค์ของการเรียนการสอน ดังนั้นสื่อการสอนเป็นอีกหนึ่งปัจจัยที่สำคัญ ผู้สอนในมหาวิทยาลัยใช้สื่อที่หลากหลาย เช่น วิดีโอจาก YouTube ภาพยนตร์ และกิจกรรมที่จำลองบรรยากาศของยุคต่าง ๆ เพื่อให้เนื้อหาที่ซับซ้อนกลายเป็นสิ่งที่จับต้องได้มากขึ้น ทำให้การเรียนรู้เกิดความเข้าใจและสนุกสนาน นอกจากนี้การใช้เอกสารดิจิทัล เช่น Google Drive ช่วยให้นักศึกษาสามารถเข้าถึงข้อมูลได้ง่าย ช่วยให้เกิดการเรียนรู้อย่างต่อเนื่องทั้งในและนอกห้องเรียน

7.3 การประเมินผลที่ครอบคลุมหลายมิติ

มหาวิทยาลัยต่าง ๆ ได้ออกแบบการประเมินผลการเรียนรู้ของนักศึกษาโดยใช้เกณฑ์ที่หลากหลาย ทั้งการสอบย่อย การสอบก่อนและหลังเรียน การทำกิจกรรมในชั้นเรียน ไปจนถึงการประเมินจากการเข้าชั้นเรียนและการมีส่วนร่วม วิธีการนี้ทำให้ผู้สอนได้เห็นภาพรวมของพัฒนาการของนักศึกษาในมิติที่หลากหลาย เป็นการประเมินผลที่ครอบคลุมทั้งด้านวิชาการและพฤติกรรมซึ่งช่วยส่งเสริมให้เกิดการเรียนรู้ที่สมดุล สอดคล้องกับทฤษฎีการเรียนรู้โดยการมีส่วนร่วม (Experiential Learning Theory) ของ David Kolb ซึ่งเน้นให้ผู้เรียนมีปฏิสัมพันธ์กับประสบการณ์การเรียนรู้ และทฤษฎีพัฒนาการองค์รวม

(Holistic Development) ที่สนับสนุนการพัฒนานักศึกษาในทุกด้าน ทั้งด้านความรู้ ทักษะ และทัศนคติ การประเมินผลแบบ
นี้จึงทำให้ผู้สอนได้รับรู้ถึงพัฒนาการในแง่มุมที่ลึกซึ้งกว่า และสามารถปรับปรุงการสอนให้เหมาะสมกับความต้องการของ
นักศึกษาในแต่ละคนได้มากขึ้น การประเมินแบบครอบคลุมนี้สร้างแรงกระตุ้นให้นักศึกษาเรียนรู้จากกิจกรรมที่หลากหลาย
โดยที่นักศึกษาสามารถพัฒนาทักษะการเรียนรู้ การมีส่วนร่วมในชั้นเรียน และการจัดการเวลา ซึ่งล้วนเป็นทักษะที่สำคัญต่อ
ความสำเร็จในการศึกษาและอาชีพในอนาคต

7.4 การพัฒนาสื่อที่เข้าถึงง่ายและน่าสนใจเพื่อตอบสนองนักศึกษา

แผนปฏิบัติการดิจิทัลเพื่อการศึกษา กระทรวงศึกษาธิการ พ.ศ. 2563 - 2565 ตระหนักถึงความสำคัญของการใช้
เทคโนโลยีดิจิทัลในการศึกษา เพื่อให้ทันกับเทคโนโลยีและสังคมที่เปลี่ยนแปลง โดยมีจุดมุ่งหมายเพื่อเพิ่มประสิทธิภาพและ
แก้ปัญหาด้านการศึกษา ดังนี้ :

7.4.1) ระดับผู้เรียน ช่วยให้ผู้เรียนเรียนรู้ได้รวดเร็วขึ้น บรรยากาศการเรียนรู้สนุกสนานขึ้น สามารถเข้าถึงบทเรียนได้
หลากหลายทุกที่ ทุกเวลา ทุกอุปกรณ์ ลดความเหลื่อมล้ำทางการศึกษา

7.4.2) ระดับครู/อาจารย์ เพิ่มความหลากหลายในการจัดกิจกรรมการเรียน สร้างสื่อที่น่าสนใจ ทำให้การสอนสะดวก
ขึ้น และช่วยให้ครูมีเวลาเตรียมการสอนได้อย่างเต็มที่ จากการสัมภาษณ์พบว่าการใช้สื่อการเรียนรู้ที่เข้าถึงง่าย เช่น แอปพลิเค
ชันหรือแพลตฟอร์มออนไลน์เฉพาะสำหรับวิชาดนตรีตะวันตก ช่วยเพิ่มความสะดวกในการเข้าถึงเนื้อหาสำหรับนักศึกษา ทำให้
สามารถศึกษาและทบทวนเนื้อหานอกห้องเรียนได้อย่างต่อเนื่อง การสร้างสื่อที่มีคุณภาพและสนุกสนานยังช่วยดึงดูดความ
สนใจของนักศึกษาได้อย่างมาก สื่อเหล่านี้ทำให้เนื้อหาที่ยากและซับซ้อนกลายเป็นเรื่องที่เข้าใจได้ง่ายขึ้น เช่น สื่อเกมเพื่อการ
เรียนรู้หรือแบบฝึกหัดที่เชื่อมโยงเนื้อหาทางประวัติศาสตร์กับการประยุกต์ใช้ในปัจจุบัน

7.5 การส่งเสริมความคิดสร้างสรรค์และการเชื่อมโยงเนื้อหากับชีวิตจริง

จันทรา ด่านคงรักษ์ (2561 : 17-19) ได้ให้แนวทางการส่งเสริมความคิดสร้างสรรค์ ดังนี้ :

7.5.1) ส่งเสริมการคิดเชิงบวกและการคิดแบบเปิดกว้าง: กระตุ้นให้ผู้เรียนคิดในมุมมองที่กว้างและพัฒนาความมั่นใจ
ในความคิดของตนเอง

7.5.2) สร้างบรรยากาศที่สนับสนุน: จัดสภาพแวดล้อมที่ผู้เรียนรู้สึกสบายใจที่จะนำเสนอแนวคิดใหม่ ๆ โดยไม่ต้อง
กลัวการถูกตัดสินหรือล้มเหลว

7.5.3) กระตุ้นความอยากรู้และการตั้งคำถาม: ใช้คำถามเพื่อกระตุ้นความสนใจ เพื่อให้เกิดการสำรวจและคิดเชิง
สร้างสรรค์

7.5.4) ใช้กิจกรรมแบบปลายเปิด: ให้ผู้เรียนได้มีส่วนร่วมในกิจกรรมที่ไม่มีคำตอบที่กำหนดไว้ล่วงหน้า เพื่อให้พวก
เขาได้สำรวจและสร้างสรรค์ได้อย่างอิสระ

7.5.5) นำความคิดไปประยุกต์ใช้ในชีวิตจริง: เปิดโอกาสให้ผู้เรียนทดลองกับแนวคิดต่าง ๆ ในสถานการณ์จริงหรือ
กิจกรรมเชิงปฏิบัติเพื่อเสริมสร้างความเข้าใจและความคิดสร้างสรรค์

แนวทางเหล่านี้จะส่งเสริมความคิดสร้างสรรค์ ชี้แนะแนวทางและอิสระในการสำรวจ เพิ่มความรู้ในด้าน
ประวัติศาสตร์ดนตรี ส่งเสริมให้นักศึกษาพัฒนาความคิดสร้างสรรค์ เช่น กิจกรรมเสริมที่เกี่ยวข้องกับการวิเคราะห์บทเพลง
สำคัญในแต่ละยุค การจำลองเหตุการณ์ หรือแม้กระทั่งการสร้างดนตรีที่เชื่อมโยงกับแนวเพลงในอดีต กิจกรรมเหล่านี้ทำให้
นักศึกษาได้สัมผัสและเข้าใจบรรยากาศทางดนตรีในอดีตอย่างลึกซึ้ง ส่งผลให้เกิดความคิดสร้างสรรค์ใหม่ ๆ และช่วยให้การ
เรียนรู้เป็นสิ่งที่น่าจดจำ

7.6 การพัฒนาการเรียนการสอนในอนาคต

จากวิสัยทัศน์ของกระทรวงศึกษาธิการที่มุ่งเน้นการพัฒนาผู้เรียนให้มีศักยภาพตามความถนัด มีทักษะที่สอดคล้องกับความต้องการในโลกยุคใหม่ และสามารถปรับตัวได้ในชีวิตประจำวัน (กระทรวงศึกษาธิการ, มปป.) การพัฒนาการเรียนการสอนวิชาประวัติศาสตร์ดนตรีตะวันตกสามารถดำเนินการได้ดังนี้:

7.6.1) การเพิ่มสื่อดิจิทัลและออนไลน์ การนำเทคโนโลยีมาใช้ในการเรียนการสอน เช่น การพัฒนาแอปพลิเคชันหรือสื่อดิจิทัลที่เข้าถึงได้ทุกที่ทุกเวลา เป็นการส่งเสริมให้ผู้เรียนสามารถเรียนรู้ได้อย่างอิสระและต่อเนื่อง ซึ่งสอดคล้องกับเป้าหมายการสร้างการเรียนรู้ตลอดชีวิต

7.6.2) การพัฒนาสื่อที่น่าสนใจและสร้างความท้าทาย การใช้เกมหรือกิจกรรมที่มีความสนุกสนานช่วยกระตุ้นความสนใจของผู้เรียนและทำให้เกิดความเข้าใจในเนื้อหาอย่างลึกซึ้งและยั่งยืน ตรงกับเป้าหมายของกระทรวงศึกษาธิการที่มุ่งเน้นการจัดการศึกษาให้สร้างความสุขและการมีส่วนร่วมของผู้เรียน

7.6.3)การสนับสนุนกิจกรรมเสริมความคิดสร้างสรรค์ การจัดกิจกรรมเสริม เช่น เวิร์กช็อปจำลองเหตุการณ์ในอดีตหรือการวิเคราะห์แนวดนตรีในยุคต่าง ๆ จะช่วยให้ผู้เรียนเข้าใจบริบททางสังคมและวัฒนธรรมที่เกี่ยวข้องได้อย่างลึกซึ้ง พร้อมทั้งพัฒนาทักษะการคิดเชิงวิเคราะห์และสร้างสรรค์

7.7 การปรับใช้ผลการวิจัยเพื่อพัฒนาการเรียนการสอนในบริบทต่างๆ

จากการวิจัยเกี่ยวกับการจัดการเรียนการสอนและการใช้สื่อประกอบการสอนในรายวิชาประวัติศาสตร์ดนตรีตะวันตก ผู้วิจัยพิจารณาว่าผลการวิจัยนี้สามารถนำไปปรับใช้ในบริบทอื่นเพื่อส่งเสริมการเรียนรู้และพัฒนาสื่อการสอนในหลากหลายด้าน เช่น:

7.7.1) การส่งเสริมการเรียนรู้วิชาประวัติศาสตร์และวัฒนธรรม ผู้วิจัยเห็นว่า แนวทางการใช้สื่อดิจิทัล เช่น วิดีโอและภาพยนตร์ ช่วยลดความซับซ้อนของเนื้อหาและสร้างการเรียนรู้ที่น่าสนใจ สามารถนำไปประยุกต์ใช้ในวิชาอื่นที่มีเนื้อหาทางประวัติศาสตร์หรือวัฒนธรรม เช่น ประวัติศาสตร์ศิลปะ หรือวรรณคดีไทย เพื่อช่วยให้ผู้เรียนสามารถเข้าใจบริบทเชิงลึกและเชื่อมโยงเนื้อหากับเหตุการณ์ในอดีตได้อย่างมีประสิทธิภาพ

7.7.2) การประยุกต์การเรียนรู้แบบผสมผสาน (Blended Learning) ผู้วิจัยตระหนักถึงความสำคัญของการเรียนรู้ที่ยืดหยุ่น จึงเห็นว่าการใช้แพลตฟอร์มออนไลน์ เช่น Google Drive และระบบ E-Learning ที่นำเสนอในงานวิจัยนี้ สามารถประยุกต์ใช้กับวิชาอื่น ๆ เพื่อเพิ่มการเข้าถึงเนื้อหาได้ทุกที่ทุกเวลา ตอบโจทย์ผู้เรียนที่ต้องการศึกษาเพิ่มเติมด้วยตนเอง

7.7.3) การพัฒนากระบวนการเรียนรู้ผ่านเกม (Game-Based Learning) จากการใช้สื่อเกมในการเรียนวิชาประวัติศาสตร์ดนตรี ผู้วิจัยเล็งเห็นว่าแนวทางนี้สามารถนำไปปรับใช้ในวิชาอื่นที่มีความซับซ้อน เพื่อกระตุ้นความสนใจ

7.7.4) การพัฒนาสื่อการเรียนรู้ในพื้นที่ที่มีข้อจำกัดด้านทรัพยากร ผู้วิจัยมองว่า สื่อดิจิทัลที่เข้าใจง่ายและใช้งานได้สะดวก เช่น เอกสารประกอบการสอนแบบดิจิทัล หรือเกมที่ไม่จำเป็นต้องใช้อินเทอร์เน็ต เป็นทางเลือกสำคัญที่สามารถนำไปใช้ในพื้นที่ชนบทหรือกลุ่มผู้เรียนที่ขาดแคลนทรัพยากร เพื่อสร้างความเท่าเทียมในการเข้าถึงการเรียนรู้

7.7.5) การปรับใช้ในกลุ่มผู้เรียนที่หลากหลาย ผู้วิจัยเสนอว่า เทคนิคการใช้สื่อที่หลากหลาย เช่น สื่อภาพ เสียง และกิจกรรมกลุ่ม สามารถช่วยตอบสนองความต้องการของกลุ่มผู้เรียนที่มีความแตกต่างกันในพื้นฐานความรู้และความสนใจ เช่น นักเรียนที่ไม่มีพื้นฐานทางดนตรีหรือกลุ่มผู้เรียนที่มีข้อจำกัดด้านภาษา

การศึกษาเรื่องการจัดการเรียนการสอนและการใช้สื่อการสอนวิชาประวัติศาสตร์ดนตรีตะวันตกในระดับอุดมศึกษานี้ ผู้วิจัยเห็นว่ามีความเหมาะสมและสอดคล้องกับแนวคิดการเรียนรู้ในยุคปัจจุบัน การวางแผนการสอนที่มีเป้าหมาย การใช้สื่อที่หลากหลาย การประเมินหลายมิติ และการส่งเสริมความคิดสร้างสรรค์เป็นวิธีการที่ช่วยให้นักศึกษาเรียนรู้ได้อย่างมี

ประสิทธิภาพและพัฒนาตนเองในหลายด้าน ทั้งด้านความรู้ ทักษะ และทัศนคติ ซึ่งผู้วิจัยเห็นว่าควรมีการสนับสนุนและพัฒนา ต่อไปเพื่อให้การเรียนการสอนในวิชานี้เกิดประโยชน์สูงสุดต่อนักศึกษา

8. ข้อเสนอแนะ

8.1) ขยายกลุ่มตัวอย่างเพื่อความครอบคลุม ควรเพิ่มกลุ่มตัวอย่างจากมหาวิทยาลัยประเภทอื่น ๆ เพื่อให้ได้ข้อมูลที่ สะท้อนถึงแนวทางการจัดการเรียนการสอนวิชาประวัติศาสตร์ดนตรีตะวันตกในบริบทที่หลากหลายมากขึ้น

8.2) การวิจัยเชิงลึกเพื่อความเข้าใจรอบด้าน ควรดำเนินการศึกษาวิจัยเชิงคุณภาพเพิ่มเติม เช่น การสัมภาษณ์เชิงลึก หรือการจัดกลุ่มสนทนา (Focus Group) กับนักศึกษา เพื่อสำรวจความคิดเห็นและประสบการณ์เกี่ยวกับการเรียนการสอน วิชานี้ ข้อมูลดังกล่าวสามารถนำไปพัฒนาแผนการสอนและสื่อการเรียนรู้ให้ตรงกับความต้องการของนักศึกษาได้อย่างมี ประสิทธิภาพ

8.3) การศึกษาผลกระทบของเทคโนโลยีและสื่อดิจิทัล ควรศึกษาประสิทธิภาพของสื่อเทคโนโลยี เช่น แอปพลิเคชัน วิดีโอ และเกมการศึกษา ในการช่วยนักศึกษาเข้าใจเนื้อหาและรักษาความสนใจในระยะยาว การวิเคราะห์นี้จะช่วยระบุสื่อที่ เหมาะสมที่สุดสำหรับการสอนในยุคดิจิทัล

8.4) พัฒนากิจกรรมเสริมความคิดสร้างสรรค์ ควรออกแบบกิจกรรมที่เชื่อมโยงกับเนื้อหาประวัติศาสตร์ดนตรี เช่น การจำลองเหตุการณ์ดนตรียุคต่าง ๆ กิจกรรมเหล่านี้จะช่วยกระตุ้นความคิดสร้างสรรค์และความเข้าใจบริบททางสังคมและ วัฒนธรรมในแต่ละยุค

8.5) การวิจัยระยะยาวเพื่อประเมินผลลัพธ์การเรียนรู้ ควรดำเนินการวิจัยในระยะยาวเพื่อประเมินผลลัพธ์ของการ เรียนการสอนในแง่ของการพัฒนาทักษะการคิดวิเคราะห์ ความคิดสร้างสรรค์ และการประยุกต์ใช้ความรู้ การศึกษาเชิงลึกนี้จะ ช่วยให้สามารถปรับปรุงแผนการสอนให้สอดคล้องกับการเปลี่ยนแปลงในอนาคตได้อย่างต่อเนื่อง

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การศึกษารูปแบบการบรรเลงโหวดของครูธีรชีพ ไกรธีรางกูร

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บทคัดย่อ

บทความวิจัยนี้มีวัตถุประสงค์เพื่อศึกษารูปแบบการบรรเลงโหวดของครูธีรชีพ ไกรธีรางกูร โดยใช้วิธีการวิจัยเชิง
คุณภาพเก็บรวมรวมข้อมูลโดยการสัมภาษณ์เชิงลึก ผู้ให้ข้อมูลคือครูธีรชีพ ไกรธีรางกูร นักดนตรีพื้นบ้านอีสานผู้เป็นเจ้าของ
เสียงโหวดในบทเพลงลูกทุ่งอีสานมากมาย

ผลวิจัยพบว่ารูปแบบการบรรเลงโหวดของครูธีรชีพ ไกรธีรางกูร สามารถแบ่งแนวทางการศึกษารูปแบบการบรรเลง
โหวดออกได้เป็น 2 ส่วน ได้แก่ 1) รูปแบบฝึกพื้นฐาน ประกอบด้วย การจับโหวด ลักษณะท่าทางการบรรเลงโหวด การวางรูป
ปาก หลักการใช้ลม และการแบ่งลมหายใจ 2) รูปแบบเสริมกลวิธีการบรรเลงประกอบด้วยกลวิธีดังนี้ การเป่าตัดลม การเป่า
สะบัดเสียง การเป่าอ้อนเสียงหรือการเป่าเอื้อนเสียง จากแนวทางการศึกษารูปแบบการบรรเลงโหวดของครูธีรชีพ ไกรธีรางกูร
สามารถนำไปใช้เป็นต้นแบบในการจัดการเรียนการสอนในระบบ การศึกษาถึงรูปแบบวิธีการบรรเลงการฝึกหัดการลำดับ
เนื้อหาในการสอนโหวดจากง่ายไปยาก รวมไปถึงการพัฒนาต่อยอดจากทักษะพื้นฐานเดิมที่มีอยู่อีกทั้งยังเป็นแนวทางให้แก่
บุคคลทั่วไปที่สนใจฝึกหัดเล่นโหวด

คำสำคัญ: กลวิธีการบรรเลง; ดนตรีพื้นบ้านอีสาน; โหวด

การประชุมวิชาการระดับชาติและนานาชาติบ้านสมเด็จเจ้าพระยา ครั้งที่ 1 (BS2C 2025)
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The study of the performance style of the Vot by Khru Teeracheep Kriteerangkula

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Abstract

This research article aims to study the performance style of the Vot by Khru Teeracheep Kriteerangkula, using a qualitative research method. Data was collected through interviews with Khru Teeracheep Kriteerangkula, a renowned musician from the Isan region who is known for his mastery of the Vot and his contribution to many Luk Thung Thai folk music songs.

The research findings reveal that Khru Teeracheep Kriteerangkula's performance style can be categorized into two main areas. 1) Basic Training Style: This includes the following elements, proper grip and handling of the Vot, posture and body position while playing the Vot, lip placement, breathing techniques and control of airflow and breathing patterns and how to manage breath during performance 2) Advanced Performance Techniques: This category includes various techniques such as cutting the airflow, shaking the sound, soft blowing. From the study of Khru Teeracheep Kriteerangkula's performance style, these findings can serve as a model for teaching and learning how to play the Vot. The methodology outlined in this study provides a systematic approach to teaching the instrument, including how to structure lessons from easy to difficult levels. It also emphasizes the development of advanced skills from basic techniques. Moreover, this research offers valuable insights for individuals who are interested in learning to play the Vot, providing guidance for both formal educational settings and self-study practices.

Keywords: Technique Of Performance; Performance; Vot

การประชุมวิชาการระดับชาติและนานาชาติบ้านสมเด็จเจ้าพระยา ครั้งที่ 1 (BS2C 2025)
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1. บทนำ

โหวดดั้งเดิมเป็นของเด็กเล่นของเด็กภาคอีสานที่นิยมเล่นกันในกลุ่มเด็กผู้ชายสมัยก่อน เพราะของเล่นในสมัยก่อนนั้น หายากไม่เหมือนกับในปัจจุบัน อีกทั้งโหวดยังถูกนำมาใช้เป็นการละเล่นหรือการแข่งขันกัน โดยการโยนโหวดขึ้นบนท้องฟ้า เพื่อให้เกิดเสียง ลักษณะของการโยนโหวดนั้นทางภาคอีสานจะเรียกว่า แงวโหวด (แกว่งโหวด) เป็นการละเล่นกันของคนภาค อีสานในสมัยก่อน และยังเป็นการแสดงความรู้ความสามารถของผู้ประดิษฐ์โหวดที่สามารถทำให้โหวดเกิดเสียงขึ้นได้ นอกจากนี้ เชิดศักดิ์ ฉายถวิล, (2549 : 69) ยังได้กล่าวถึงโหวดอีกว่าโหวดยังถูกนำมาใช้อยู่ในรูปแบบของการแข่งขันในอดีต เพื่อให้เกิดความตื่นเต้นและยังเป็นการแสดงศักยภาพของผู้ที่เป็นเจ้าของโหวดว่ามีความสามารถในการประดิษฐ์โหวด และมี ความสามารถในการแกว่งโหวด หรือ "แงวโหวด" ได้ดีเพียงใด การเล่นโหวดของเด็กอีสานนิยมเล่นกันตามท้องทุ่งนาที่มีพื้นที่ กว้าง เนื่องจากเป็นพื้นที่ที่เหมาะแก่การแงวโหวดให้ไปได้ไกลที่สุด ทั้งนี้การแงวโหวด (แกว่งโหวด) ยังเชื่อมโยงถึงความเชื่อของ คนอีสานกล่าวคือโหวดเป็นเหมือนเสียงสัญญาณบอกพระยาแถนให้หยุดในการประทานฝนลงมา เพราะตอนนี้ดินน้ำอุดม สมบูรณ์แล้ว

นอกจากโหวดที่ใช้ในการแกว่งแล้วยังมีการนำโหวดไปเป่าเล่นเพื่อความเพลิดเพลินหรือใช้โหวดในการจีบสาว โดย อดีตโหวดที่ใช้เป่ามีเพียงไม่กี่เสียงไม่สามารถที่จะเป่าเป็นบทเพลงได้ นายทรงศักดิ์ ประทุมสินธุ์ ชาวอำเภอหนองพอก ได้ พัฒนาระดับเสียงของโหวด ให้ครบ 7-8 เสียง เพื่อให้สามารถนำมาผสมกับเครื่องดนตรีพื้นบ้าน คือ การตัดไม้กู่แคนให้ได้ ขนาดที่แตกต่างกัน ทั้งในด้านขนาดและความยาวนำมาติดกับแกนไม้ไผ่ให้ครบ 7-8 ลูก ปรับ เสียงให้เข้ากับดนตรีพื้นบ้าน โดย การติดชันโรงให้ได้สัดส่วนแล้วนำมาเป่าแทนการแกว่งหรือการสะแนและได้จัดตั้งวงดนตรีโหวดขึ้นเป็นครั้งแรก เมื่อประมาณ พ.ศ. 2511 โดยได้รับการสนับสนุน จากผู้ว่าราชการจังหวัดร้อยเอ็ด (นายประมูล จันทรจำนงค์) ในขณะนั้น ได้นำเครื่องดนตรี โหวดเป็นเครื่องหลักประกอบวงดนตรีกับเครื่องดนตรีพื้นบ้านอื่น ๆ เช่น พิณ และแคน (สุภัทรชัย กระสินหอม, 2550 : 27)

การบรรเลงโหวดนิยมกันมากขึ้นในแถบภาคอีสานเกิดนักดนตรีพื้นบ้านอีสานมากมาย หนึ่งในนั้นคือครูธีรชีพ ไกรธี รางกูร ที่มีผลงานด้านการบันทึกเสียงในเพลงลูกทุ่งอีสานให้กับศิลปินมากมาย เช่น ต่าย อรทัย ไมค์ ภิรมย์พร ไผ่ พงศธร เต๋า ภูศิลป์ อาม ชุติมา อีกทั้งครูได้รับเกียรติเชิญไปเป็นกรรมการตัดสินในเวทีการประกวดแข่งขันดนตรีไทยโสตศิลป์ สืบสานดนตรี ไทย และปัจจุบันครูได้รับรางวัล วิศิษฏศิลปิน 69 ร่วมแสดงดนตรีต่อหน้าพระพักตร์สมเด็จพระกนิษฐาธิราชเจ้า กรมสมเด็จ พระเทพรัตนราชสุดา ฯ สยามบรมราชกุมารี ทรงเจริญพระชนมายุครบ ๕ รอบ จากประสบการณ์ผลงานรางวัลที่ผ่านมาทำให้ ครูธีรชีพ ไกรธีรางกูร นับเป็นนักดนตรีพื้นบ้านอีสานที่มากความสามารถและได้รับการยอมรับในวงการดนตรีพื้นบ้านอีสาน

จากการศึกษาเอกสารและงานวิจัยที่เกี่ยวข้องการศึกษารูปแบบการบรรเลงโหวด วิธีการปฏิบัติโหวด พบว่า มี การศึกษาเรื่อง การประยุกต์ใช้พิณและโหวดของนายมงคล อุทกเพื่อการบรรเลงร่วมกับเครื่องดนตรีสากล การพัฒนาทักษะ การเป่าโหวดตามแนวทางการจัดการเรียนรู้ของแฮร์โรว์ของนักเรียนชั้นประถมศึกษาปีที่ 5 เทคนิคการบรรเลงเดี่ยวโหวดและ การถ่ายทอด และการพัฒนาทักษะปฏิบัติเครื่องดนตรีโหวดตามแนวคิดของครูภูมิปัญญาไทยประกอบชุดฝึก พบว่างานวิจัยที่ ได้กล่าวถึงนี้มีเนื้อหารูปแบบการบรรเลงโหวดที่เหมือนและแตกต่างกัน เช่น ขั้นตอนการฝึกการบรรเลง ชื่อเรียกกลวิธี เนื่องจากงานวิจัยมีการศึกษากับบุคคลผู้ให้ความรู้ที่แตกต่างกัน และยังไม่ได้มีผู้ศึกษารูปแบบการบรรเลงกับครูธีรชีพ ไกรธีรางกูร

ด้วยเหตุผลที่กล่าวมาข้างต้นบทความวิจัยนี้มีวัตถุประสงค์เพื่อรวบรวมองค์ความรู้วิเคราะห์และสังเคราะห์นำเสนอ รูปแบบการบรรเลงโหวดจากครูธีรชีพ ไกรธีรางกูร เพื่อเพิ่มพูนความรู้ทางวัฒนธรรมดนตรีพื้นบ้านอีสานและยังเป็นการ ส่งเสริมการเรียนรู้ดนตรีพื้นบ้านอีสาน ส่งเสริมความภาคภูมิใจในภูมิปัญญาท้องถิ่นตลอดจนการฝึกฝนอนุรักษ์การบรรเลง โหวดจากรุ่นสู่รุ่น ทั้งนี้ยังเป็นประโยชน์ต่อระบบการศึกษาในด้านการจัดการเรียนการสอนเนื้อหาสาระของโหวดอีกด้วย

2. วัตถุประสงค์ของการวิจัย

    เพื่อศึกษารูปแบบการบรรเลงโหวดของครูธีรชีพ ไกรธีรางกูร

3. ขอบเขตการวิจัย

    การศึกษารูปแบบการบรรเลงโหวดของครูธีรชีพ ไกรธีรางกูร ผู้วิจัยศึกษารูปแบบการบรรเลงโหวดของครูธีรชีพ ไกรธีรางกูร โดยศึกษาตั้งแต่การเริ่มฝึกหัดบรรเลง ได้แก่ วิธีการจับโหวด ลักษณะท่าทางในการบรรเลงโหวด การวางรูปปากในการเป่าโหวด หลักการใช้ลมในการเป่าโหวดเบื้องต้น วิธีการแบ่งลมหายใจในการเป่าโหวด และกลวิธีในการเป่าที่เกี่ยวข้องกับการบรรเลงโหวด

4. ประโยชน์ที่คาดว่าจะได้รับจากการวิจัย

    4.1 ทราบถึงรูปแบบการบรรเลงโหวดตามแนวทางครูธีรชีพ ไกรธีรางกูร

    4.2 เพื่อเป็นแนวทางสำหรับผู้ที่สนใจฝึกหัดบรรเลงโหวด ทบทวน และเพิ่มพูนทักษะการบรรเลงโหวด

    4.3 เพื่อเป็นองค์ความรู้และเปรียบเทียบแนวทางการบรรเลงโหวดของครูท่านอื่น

5. นิยามศัพท์เฉพาะ

    โหวด หมายถึง เครื่องดนตรีพื้นบ้านอีสานประเภทเป่า ที่พัฒนามาจากของเล่นเด็กอีสานจนกลายมาเป็นเครื่องดนตรีที่สามารถบรรเลงได้จริง มีส่วนประกอบได้แก่ แกนโหวด ลูกโหวด และขี้สูด ทำจากไม้ไผ่เฮี้ยโดยการนำลูกโหวดตัดเรียงลำดับจากโน้ตเสียงต่ำไปเสียงสูงมาติดเข้ากับแกนโหวดโดยใช้ขี้สูดเป็นตัวยึดลูกโหวดกับแกน เข้าด้วยกันประมาณ 11-13 ลูก และใช้ขี้สูดอุดเข้าไปในลูกโหวดเพื่อเป็นการตั้งเสียงโหวด

    รูปแบบการบรรเลงโหวดตามแนวทางของครูธีรชีพ ไกรธีรางกูร หมายถึง ทักษะทั้งหมดของการบรรเลงโหวดเริ่มตั้งแต่รูปแบบฝึกขั้นพื้นฐานจนไปถึงรูปแบบเสริมกลวิธีการบรรเลง

    เสริมกลวิธี หมายถึง ลูกเล่นหรือการตกแต่งเสียงโหวดให้เกิดสีสันของเสียงใหม่ที่แตกต่างจากการเป่าแบบธรรมดา ทำให้เสียงของโหวดมีความไพเราะน่าสนใจมากยิ่งขึ้นในการบรรเลง

    ดนตรีพื้นบ้านอีสาน หมายถึง ภูมิปัญญาของท้องถิ่นคนอีสานที่สร้างสรรค์ท่วงทำนองที่เป็นเอกลักษณ์ผ่านเครื่องดนตรีพื้นบ้านอีสาน มีการพัฒนาสร้างสรรค์ตามแต่ละสมัยและถ่ายทอดจากรุ่นสู่รุ่นจนถึงในปัจจุบัน

6. วิธีดำเนินการวิจัย

    6.1 ผู้ให้ข้อมูล

    ผู้ให้ข้อมูลคือ ครูธีรชีพ ไกรธีรางกูร ผู้อำนวยการสถานศึกษา โรงเรียนวัดมะเดื่อ องค์การบริหารส่วนจังหวัดนนทบุรี โดยใช้เกณฑ์การเลือกแบบเฉพาะเจาะจง ดังนี้

        6.1.1 ประสบการณ์ด้านการปฏิบัติโหวดมากว่า 20 ปี

        6.1.2 มีผลงานด้านการบันทึกเสียงโหวด เช่น สาวเลยยังรอ เต่างอย อ้อมกอดเขมราฐ

        6.1.3 เป็นที่ยอมรับในวงการดนตรีพื้นบ้านอีสานได้รับรางวัลเชิดชูเกียรติทางด้านดนตรี ได้แก่ วิศิษฏศิลปิน 69

        6.1.4 มีผลงานส่งลูกศิษย์เข้าประกวดแข่งขัน เช่น เวทีการประกวดดนตรีพื้นบ้านวงโปงลางชิงถ้วยพระราชทานฯ ได้รับรางวัลการบรรเลงเดี่ยวโหวดยอดเยี่ยม

6.2 เครื่องมือที่ใช้ในการวิจัย

เครื่องมือที่ใช้ในการวิจัยคือ แบบสัมภาษณ์จำนวน 1 ฉบับ สำหรับใช้ในการสัมภาษณ์กลุ่มตัวอย่างของผู้ให้ข้อมูล จำนวน 1 คน ประกอบไปด้วยประเด็นต่าง ๆ ดังนี้

6.2.1 ส่วนที่ 1 ข้อคำถามด้านข้อมูลทั่วไป เช่น ชื่อ-สกุล อาชีพ ผลงาน ฯลฯ

6.2.2 ส่วนที่ 2 ข้อคำถามที่เกี่ยวข้องกับงานวิจัย เช่น วิธีการจับโหวด ลักษณะท่าทางในการบรรเลงโหวด การวางรูปปากในการเป่าโหวด หลักการใช้ลมในการเป่าโหวดเบื้องต้น วิธีการแบ่งลมหายใจในการเป่าโหวด และกลวิธีในการเป่าโหวด

6.3 การสร้างเครื่องมือวิจัยและการหาคุณภาพของเครื่องมือวิจัย

6.3.1 ศึกษาเอกสารและงานวิจัยที่เกี่ยวข้องกับโหวด

6.3.2 สร้างแบบกำหนดประเด็น ในการสร้างเครื่องมือ

6.3.3 สร้างแบบสัมภาษณ์ ตามแบบกำหนดประเด็นที่ตั้งไว้

6.3.4 นำเครื่องมือฉบับร่างส่งอาจารย์ที่ปรึกษาตรวจสอบให้คำแนะนำและแก้ไข

6.3.5 ปรับปรุงเครื่องมือการวิจัย ตามคำแนะนำของอาจารย์ที่ปรึกษา

6.3.6 นำเครื่องมือที่ผู้วิจัยสร้างขึ้นให้ผู้เชี่ยวชาญ 3 ท่าน พิจารณา เพื่อตรวจสอบความเที่ยงตรงของเนื้อหา (IOC : Index of Item Objective Congruence)

6.4 การเก็บรวบรวมข้อมูล

6.4.1 ผู้วิจัยทำการนัดหมายผู้ให้ข้อมูล พร้อมทั้งดำเนินการสัมภาษณ์แบบออนไลน์ผ่านโปรแกรม Zoom

6.4.2 สังเกตการบรรเลงการใช้ลมรวมทั้งกลวิธีในการเป่า เพื่อรวบรวมข้อมูลที่ได้จากการสัมภาษณ์

6.4.3 นำข้อมูลที่ได้จากการสัมภาษณ์มาวิเคราะห์ผล และเรียบเรียงแบบรายงานผลในรูปแบบบรรยายและพรรณนา

6.4.4 สรุปผลและอภิปรายผลตามวัตถุประสงค์ของการวิจัย พร้อมข้อเสนอแนะ ในประเด็นสำคัญ

7. ผลการวิจัย

ภาพที่ 1 ครูธีรชีพ ไกรธีรางกูร
ที่มา : ธีรชีพ ไกรธีรางกูร

การประชุมวิชาการระดับชาติและนานาชาติบ้านสมเด็จเจ้าพระยา ครั้งที่ 1 (BS2C 2025)
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รูปแบบการบรรเลงโหวดของครูธีรชีพ ไกรธีรางกูร

แบ่งออกเป็น 2 ส่วน คือ 1) รูปแบบฝึกพื้นฐาน 2) รูปแบบเสริมกลวิธีการบรรเลง โดยจะอธิบายดังต่อไปนี้

1. รูปแบบฝึกพื้นฐาน เป็นทักษะเบื้องต้นการฝึกในการบรรเลงโหวด ได้แก่ วิธีการจับโหวด ลักษณะท่าทางในการบรรเลงโหวด การวางรูปปากในการเป่าโหวด หลักการใช้ลมในการเป่าโหวดเบื้องต้น และวิธีการแบ่งลมหายใจในการเป่าโหวด ซึ่งจะอธิบายดังต่อไปนี้

วิธีการจับโหวด

ลักษณะการจับโหวดจับที่ส่วนหางของโหวด ใช้นิ้วชี้ นิ้วกลาง นิ้วนาง นิ้วก้อย นิ้วหัวแม่มือจับประคองโหวดให้แน่น พอประมาณ ทั้งนี้ครูธีรชีพ ไกรธีรางกูร ได้กล่าวไว้อีกว่าลักษณะการจับโหวดไม่ได้มีกฎเกณฑ์ข้อบังคับผู้บรรเลงจะจับอย่างไรก็ได้ แต่ ข้อสังเกตคือเมื่อจับโหวดแล้วต้องสามารถหมุนโหวดในการเป่าได้ตั้งแต่ลูกแรกถึงลูกสุดท้ายของโหวด เพื่อสามารถเปลี่ยนระดับเสียง ในขณะบรรเลงได้อย่างคล่องแคล่วไม่ขัดต่อการเคลื่อนไหวของข้อมือ
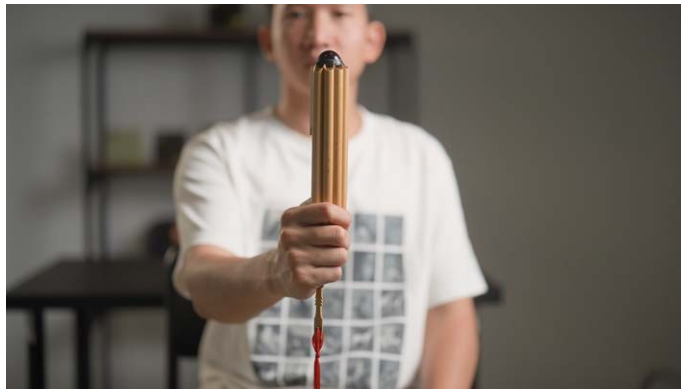
ภาพที่ 2 วิธีการจับโหวด

ที่มา : คำรณ วรรณ์ดิษฐ

ลักษณะท่าทางในการบรรเลงโหวด

วางโหวดบนริมฝีปากล่างในระดับ ไม่สูงไม่ต่ำกว่าริมฝีปากล่างจนเกินไป ผู้บรรเลงสามารถปรับระดับ องศาของโหวดเพื่อหาตำแหน่งที่เป่าลมออกมาแล้วเกิดเสียงโหวดที่ดีที่สุด โดยประคองโหวดให้อยู่ในระดับ องศาเดิมตลอดทั้งเพลง

ภาพที่ 3 ลักษณะท่าทางในการบรรเลงโหวด	**ภาพที่ 4** ลักษณะท่าทางในการบรรเลงโหวด	**ภาพที่ 5** ลักษณะท่าทางในการบรรเลงโหวด
ที่มา: คำรณ วรรณ์ดิษฐ	ที่มา: คำรณ วรรณ์ดิษฐ	ที่มา: คำรณ วรรณ์ดิษฐ

การวางรูปปากในการเป่าโหวด

ทำรูปปากในลักษณะเหมือนการผิวปาก เพื่อให้ลมที่ออกมาเป็นรูเล็กที่สุด บังคับลมที่เป่าให้เข้าลูกโหวด โดยควบคุมลมไม่ให้กระจายไปโดนลูกโหวดในเสียงที่ไม่ต้องการ ซึ่งถ้าเป่าในลักษณะนี้จะทำให้เสียงโหวดออกมามีคุณภาพ

ภาพที่ 5 การวางรูปปากในการเป่าโหวด

ที่มา: คำรณ วรรณ์ดิษฐ

หลักการใช้ลมในการเป่าโหวดเบื้องต้น

การเป่าลมยาว โดยการค่อย ๆ ระบายลมออกให้ยาวที่สุดเท่าที่จะทำได้ ในขณะที่เป่าลมก็จะต้องประคองลมให้สม่ำเสมอไม่เบาและไม่แรงจนเกินไป เพื่อเสียงโหวดจะมีความดังเบาที่สม่ำเสมอและไม่เกิดการสะดุดของเสียงโหวด

วิธีการแบ่งลมหายใจในการเป่าโหวด

การแบ่งลมหายใจนั้น ควรฝึกแบ่งลมหายใจให้ได้ใน 1 วรรคเพลง โดยเริ่มฝึกจากบทเพลงลายลำโปงลาง

ลาย ลำโปงลาง

				♥			
- - - -	- - - ม	- ซ - ล	- ซ - ล	- - - -	- - - ร	- ด - ล	- ซ - ล
♥				♥			
- - - -	- - - ด	- ร - ม	- ร - ม	- - - -	- - - ล	- ซ - ม	- ร - ม
♥				♥			
- - - -	- - - ม	- ซ - ล	- ซ - ล	- - -	- - - ร	- ด - ล	- ซ - ล
♥				♥			
- - - -	- - - ซ	- ม - ล	- ซ - ม	- - - -	- - - ด	- ร - ซ	- ร - ม
♥				♥			
- - - -	- - - ซ	- ม - ล	- ซ - ม	- - - -	- - - ด	- ร - ซ	- ร - ม
♥				♥			
- - - -	- ม - ร	- ด - ล	- ซ - ล	- - - -	- ม - ร	- ด - ล	- ซ - ล

หมายเหตุ ♥ หมายถึง หยุดหายใจ

2. รูปแบบเสริมกลวิธีการบรรเลง เป็นการเป่าโหวดที่ตกแต่งด้วยกลวิธีพิเศษ เพื่อเพิ่มสีสันและมิติของเสียงอันทำให้เกิดอารมณ์เพลง และความไพเราะอรรถรสของลายโหวด ได้แก่ การเป่าตัดลม การเป่าสะบัดเสียง การเป่าอ้อนเสียงหรือเอื้อนเสียง ซึ่งจะอธิบายดังต่อไปนี้

การเป่าตัดลม

เป็นการเป่าทำให้ลมที่เป่าออกมาหยุดกะทันหัน โดยการใช้ลิ้นมาอุดที่ริมฝีปาก ทำให้เกิดเสียงสั้น ๆ กลวิธีนี้จะทำให้เสียงมีความคมชัด ข้อสังเกตการใช้กลวิธีนี้จะใช้ก็ต่อเมื่อเป็นการเป่าข้ามเสียง ดังตัวอย่าง

กลวิธี	-^-^	-^-^	^^^^		^^^^		^^^^	
ทำนอง	-ดำ-ซ	-ดำ-ล	ดำซดำล	ซมซล	ดำซดำล	ซมซล	ดำซดำล	ซมรม

หมายเหตุ ^ หมายถึง กลวิธีการเป่าตัดลม

การเป่าสะบัดเสียง

เป็นการเป่าลมออกไปครั้งเดียว ใช้มือหมุนสะบัด สะบัดให้โดนลูกโหวด 2 ลูก โดยมีความเร็วพอประมาณ ซึ่งมีอยู่ 2 ลักษณะ ดังนี้

1. การสะบัด 2 เสียง

กลวิธี	~		~		~		~	
ทำนอง	---ซ̃ล	-ซมล	---ซ̃ล	-ซมล	---ซ̃ล	-ซมล	-ซ̃ล-ซ	-มรม

2. การสะบัดสลับเสียง

กลวิธี				~				~
ทำนอง	-ล-ด	รมรม	ซมรม	ซลซลᵈ				---ดำ̃

หมายเหตุ ~ หมายถึง กลวิธีการเป่าสะบัดเสียง

การเป่าอ้อนเสียงหรือเอื้อนเสียง

เป็นการทำให้เสียงมีความหนัก-เบา หรือสั่นเสียง โดยมีวิธีปฏิบัติ 2 ลักษณะดังนี้   1) การใช้มือเขย่าโหวดไปมา 2) การบังคับลมให้เป่าออกมาเป็นคลื่น ในการใช้กลวิธีจะใช้โน้ตที่มีลักษณะเสียงยาว เพื่อให้เกิดความไพเราะ และเกิดอารมณ์ของเพลง ดังตัวอย่าง

กลวิธี			≈					≈
ทำนอง	----	---มฺ	-ซฺ-ลฺ	-ซฺ-ลฺ	----	---รฺ	-ด-ล	-ซฺ-ล

หมายเหตุ ≈ หมายถึง การเป่าอ้อนเสียง

รูปแบบการบรรเลงโหวดเริ่มจากการฝึกพื้นฐานถือเป็นทักษะเบื้องต้นในการบรรเลงโหวด เพื่อพัฒนาต่อยอดไปยังเสริมกลวิธีการบรรเลง ซึ่งครูธีรชีพ ไกรธีรางกูร ได้แบ่งรูปแบบแนวทางการบรรเลงโหวดโดยสามารถแบ่งออกได้ 2 ส่วนได้แก่ รูปแบบฝึกพื้นฐาน ประกอบด้วย วิธีการจับโหวด ลักษณะท่าทางในการบรรเลงโหวด การวางรูปปากในการเป่าโหวด หลักการใช้ลมในการเป่าโหวดเบื้องต้น และวิธีการแบ่งลมหายใจในการเป่าโหวด และรูปแบบเสริมกลวิธีการบรรเลง กลวิธีในการเป่าโหวด เช่น การเป่าตัดลม การเป่าสะบัดเสียง และการเป่าอ้อนเสียงหรือเอื้อนเสียง

8. อภิปรายผลการวิจัย

จากการศึกษารูปแบบการบรรเลงโหวดของครูธีรชีพ ไกรธีรางกูร ผู้วิจัยได้ศึกษาทบทวนจากเอกสาร ตำรา วิทยานิพนธ์ และใช้วิธีการสัมภาษณ์ ในการเก็บรวบรวมข้อมูล ซึ่งผลการวิจัยพบว่ารูปแบบการบรรเลงโหวดสามารถแบ่งออกเป็นประเด็นได้ดังนี้

8.1 รูปแบบฝึกพื้นฐาน พบว่ามีการลำดับเนื้อหาการสอนโหวดจากรูปแบบฝึกพื้นฐานง่ายไปยากโดยเรียงลำดับดังนี้ 1) วิธีการจับโหวด 2) ลักษณะท่าทางในการบรรเลงโหวด 3) การวางรูปปากในการเป่าโหวด 4) หลักการใช้ลมในการเป่าโหวดเบื้องต้น 5) วิธีการแบ่งลมหายใจในการเป่าโหวด ซึ่งผลการศึกษารูปแบบฝึกพื้นฐานการบรรเลงโหวดของครูธีรชีพ ไกรธีรางกูร นี้มีความสอดคล้องกับการศึกษาของ กิตติ ศรีลาศักดิ์ (2565) ซึ่งศึกษาเรื่อง การพัฒนาทักษะการเป่าโหวดตามแนวทางการจัดการเรียนรู้ของแฮร์โรว์ของนักเรียนชั้นประถมศึกษาปีที่ 5 และวิทยา เอื้อการ (2562) ซึ่งศึกษาเรื่อง การพัฒนาทักษะปฏิบัติเครื่องดนตรีโหวดตามแนวคิดของครูภูมิปัญญาไทยประกอบชุดฝึก โดยพบว่ามีวิธีการสอนและฝึกบรรเลงโหวดเรียงลำดับเนื้อหาสาระการเรียนรู้จากง่ายไปยากเหมือนกัน แต่สิ่งที่แตกต่างกันคือรายละเอียดวิธีขั้นตอนการปฏิบัติโหวดที่มีรายละเอียดปลีกย่อย เนื่องจากงานวิจัยมีการศึกษาบุคคลผู้ให้ข้อมูลที่ต่างกัน

8.2 รูปแบบเสริมกลวิธีการบรรเลง ประกอบไปด้วย 1) การเป่าตัดลม 2) การเป่าสะบัดเสียง 3) การเป่าอ้อนเสียงหรือเอื้อนเสียง ซึ่งผลการศึกษารูปแบบการบรรเลงโหวดของครูธีรชีพ ไกรธีรางกูร นี้มีความสอดคล้องกับการศึกษาของการศึกษาของ กาญจนา วัฒนะพิพัฒน์ (2552) ซึ่งศึกษาเรื่อง การประยุกต์ใช้พิณและโหวดของนายมงคล อุทกเพื่อการบรรเลงร่วมกับเครื่องดนตรีสากล โดยพบว่ามีการใช้ชื่อเรียกกลวิธีและลักษณะของการบรรเลง เหมือนกันทั้ง 3 กลวิธี และสอดคล้องกับ บุลากร สมใส (2557) ซึ่งศึกษาเรื่อง เทคนิคการบรรเลงเดี่ยวโหวดและการถ่ายทอด โดยใช้ชื่อเรียกกลวิธีและลักษณะของการบรรเลง เหมือนกันทั้ง 3 กลวิธี นอกจากนี้งานวิจัยดังกล่าวได้มีกลวิธีที่แตกต่างกล่าวคือ มีกลวิธีมากกว่า 9 กลวิธีที่กล่าวมาข้างต้น ได้แก่ 1) เทคนิคกักลม 2) เทคนิคเป่าสะบัด 3) เทคนิคเป่าควบเสียง 4) เทคนิคเป่าม้วนเสียง 5) เทคนิคเป่าเอื้อนเสียง 6) เทคนิคเป่าสะอื้นเสียง 7) เทคนิคเป่าตอดเสียง 8) เทคนิคเป่าหลบเสียงและ 9) เทคนิคบรรเลงโหวด 2 มือ ผลการศึกษาที่มีความแตกต่างดังกล่าว เนื่องจากการศึกษาของบุลากร สมใส ได้ศึกษาจากศิลปินจำนวนหลายท่าน จึงทำให้การเรียกชื่อและการบรรเลงของกลวิธีมีความแตกต่างกัน

9. บทสรุป

จากการศึกษารูปแบบการบรรเลงโหวดของครูธีรชีพ ไกรธีรางกูร สามารถจัดลำเนื้อหาสาระของโหวดได้ 2 ส่วน คือ 1) รูปแบบฝึกพื้นฐาน ประกอบด้วย การจับโหวด ลักษณะท่าทางการบรรเลงโหวด การวางรูปปาก หลักการใช้ลม การแบ่งลมหายใจ 2) รูปแบบเสริมกลวิธีการบรรเลง เช่น การเป่าตัดลม การเป่าสะบัดเสียง การเป่าอ้อนเสียง จากรูปแบบการบรรเลงโหวดที่กล่าวมานี้สามารถนำไปใช้เป็นแนวทางหรือตัวอย่างการจัดสาระการเรียนรู้ของโหวด โดยมีการเรียงลำดับเนื้อหารูปแบบการฝึกบรรเลงโหวดจากง่ายไปหายากเป็นลำดับ เพื่อเป็นประโยชน์ต่อการเรียนการสอนในระบบการศึกษาและเป็นประโยชน์ให้กับบุคคลที่สนใจฝึกหัดเล่นโหวด

10. ข้อเสนอแนะในการวิจัยครั้งต่อไป

10.1 ในการศึกษาวิจัยครั้งนี้เป็นการรวบรวมองค์ความรู้ของครูธีรชีพ ไกรธีรางกูร โดยใช้วิธีการวิจัยเชิงคุณภาพโดยการเก็บรวบรวบข้อมูลสัมภาษณ์ ควรนำไปต่อยอดเป็นการสร้างชุดฝึก ชุดการสอน คู่มือ ในรูปแบบวิจัยเชิงทดลองและเก็บข้อมูลการหาประสิทธิภาพของนวัตกรรมต่อไป

10.2 ควรมีการศึกษาเปรียบเทียบรูปแบบการบรรเลงโหวดของครูท่านอื่นว่ามีรูปแบบการบรรเลง การฝึก เหมือนหรือแตกต่างกัน

10.3 จากการศึกษารูปแบบการบรรเลงโหวดของครูธีรชีพ ไกรธีรางกูร นอกจะมีความเชี่ยวชาญด้านโหวดแล้วท่านยังมีความเชี่ยวชาญเครื่องดนตรีอีสานทุกประเภท หากมีผู้สนใจที่จะศึกษาถอดองค์ความรู้ของครูในเครื่องดนตรีอีสานอื่น จะเป็นประโยชน์ต่อการศึกษาทางดนตรีพื้นบ้านอีสานเช่นกัน

10.4. จากการศึกษาพบว่าการบรรเลงโหวด ถูกปรากฏอยู่ในบทเพลงลูกทุ่งอีสาน ดนตรีประกอบภาพยนตร์ ดนตรีประกอบละคร ดังนั้นหากมีผู้สนใจศึกษาในประเด็นดังกล่าวสามารถศึกษาเพิ่มเติมเพื่อเป็นประโยชน์ต่อการศึกษาทางดนตรีพื้นบ้านอีสาน

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(143-TH-EDU)

การศึกษาการแก้ไขปัญหาการใช้มือขวาสำหรับการปฏิบัติทักษะเครื่องดนตรีกีตาร์คลาสสิกของ อาจารย์ปฐมวัส ธรรมชาติ

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บทคัดย่อ

บทความวิจัยนี้มุ่งเน้นศึกษาปัญหาและการแก้ไขปัญหาการใช้มือขวาในการบรรเลงเครื่องดนตรีกีตาร์คลาสสิก โดยใช้ระเบียบวิธีวิจัยเชิงคุณภาพ แบบสัมภาษณ์เชิงลึกโดยสัมภาษณ์อาจารย์ปฐมวัส ธรรมชาติ อาจารย์ประจำคณะศิลปกรรมศาสตร์ มหาวิทยาลัยราชภัฏสวนสุนันทา

จากการศึกษาพบว่า ผู้เรียนมักมีปัญหาการใช้กล้ามเนื้อและการวางมือที่ไม่ถูกต้อง ส่งผลให้คุณภาพเสียงลดลง อาจารย์ปฐมวัส ธรรมชาติใช้วิธีการแก้ไขปัญหาการใช้มือขวาโดยใช้บทฝึก 120 Right-Hand Studies for Guitar ของ Mauro Giuliani และบทเพลง Romance de Amour ในการแก้ไขปัญหาดังกล่าว และจากการสอบถามพบว่ายังมีปัญหาอื่นๆ ได้แก่ การเลือกใช้ข้อต่างๆ ได้แก่ ข้อนิ้ว ข้อมือ และ ข้อศอก การใช้เล็บมือขวา อาการบาดเจ็บที่กล้ามเนื้อและเส้นเอ็น และเหตุปัจจัยอื่น ๆ เฉพาะรายบุคคล อาจารย์จะพิจารณาปัญหาและแก้ไขปัญหาของผู้เรียนแต่ละบุคคลไม่เหมือนกัน การสอนของ อาจารย์ปฐมวัส ธรรมชาติจะปรับตัวตามลักษณะสรีระร่างกายและความถนัดเฉพาะบุคคลของผู้เรียนเพื่อพัฒนาการใช้มือขวาให้มีประสิทธิภาพสูงสุด

คำสำคัญ: การใช้มือขวา; กีตาร์คลาสสิก; ปฏิบัติทักษะเครื่องดนตรี

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Study of the problem-solving of right-handedness for the practice of classical guitar skills of Instructor Pathomwat Thammachat

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Abstract

This research article focuses on studying the problems and solutions of right-handedness in classical guitar playing, using qualitative research methods by conducting in-depth interviews with Instructor Pathomwat Thammachat.

From the study, it was found that students often have problems with muscle use and incorrect hand placement, which results in a decrease in sound quality. Instructor Pathomwat Thammachat solves the problem by using the right hand by using the exercise 120 Right-Hand Studies for Guitar by Mauro Giuliani and the song Romance de Amour to solve this problem. In addition, there are other problems such as using of the kunckle, the wrist, the elbow, the right fingernails, may also cause muscle and tendon injuries, Instructor will consider all these problems and solve them for each student accordingly.

Keywords: Musical Instrument Practice; Right Hand Use; Classical Guitar

1. บทนำ

การใช้มือขวาในกีตาร์คลาสสิกมีจุดเริ่มต้นมาตั้งแต่สมัยฟื้นฟูศิลปะวิทยาการ (Renaissance) และพัฒนาจนกระทั่งถึง ศตวรรษที่ 20 (Contemporary) อย่างต่อเนื่องโดยนักกีตาร์คลาสสิกระดับโลกจากทางตะวันตก ที่มีชื่อเสียงในแวดวงการ กีตาร์คลาสสิก เช่น Fernando Sor, Mauro Giuliani ซึ่งมีบทบาทสำคัญในการพัฒนาเทคนิคมือขวาผ่านบทประพันธ์และ ตำราในเวลาต่อมา เช่น เทคนิค Rest Stroke, Free Stroke Tremolo, Arpeggio, Rasgueado, Sul Ponticello และ Sul Pizzicato เทคนิคเหล่านี้ช่วยเพิ่มสีสันและความลึกซึ้งในบทเพลง การทำความเข้าใจพัฒนาการทางประวัติศาสตร์ของเทคนิค เหล่านี้เป็นพื้นฐานสำคัญในการสร้างแนวทางการพัฒนามือขวาให้แก่ผู้เล่นกีตาร์ในยุคปัจจุบัน (วิทยา วอสเบียน, 2531) เทคนิคมือขวาของกีตาร์คลาสสิกมีความซับซ้อนและซึ่งต้องการการพัฒนาทักษะที่ถูกต้อง โดยการเรียนรู้พื้นฐานเป็นสิ่งสำคัญ ปัญหาที่พบมากเกี่ยวกับมือขวา เช่น การเลือกใช้นิ้วในการดีด การเลือกใช้ข้อต่าง ๆ เช่น ข้อนิ้ว ข้อศอก ข้อหัวไหล่ เล็บมือขวา และอาการบาดเจ็บที่กล้ามเนื้อและเส้นเอ็น อีกทั้งยังมีเหตุปัจจัยอื่นที่มีการส่งผลต่อมือขวา เช่น แรงตึงของสายกีตาร์ ท่านั่ง เก้าอี้ วัสดุยกเท้า และสภาพอากาศ การฝึกบรรเลงกีตาร์ให้มีประสิทธิภาพต้องอาศัยพัฒนาทักษะทางเทคนิค และการเรียนรู้ ของกล้ามเนื้อ วรรณกรรมหลายแหล่งให้ความสำคัญกับการจัดระเบียบการฝึก และการใช้เทคนิคที่ถูกต้อง และการแก้ไข ปัญหาเฉพาะจุด อย่างมือขวา (Bosi 2018 , Can[1] and Yilmaz[2] 2019)

ในการเรียนกีตาร์คลาสสิกในระดับอุดมศึกษาจำเป็นต้องใช้ทักษะมือขวาอย่างมากในการบรรเลงและการสอบประเมิน บทเพลง สอดคล้องกับงานวิจัยของณัฐวัฒน์ โฆษิตดิษยนันท์ (2561) ที่ระบุว่าการประเมินองค์ความรู้ทางดนตรีของผู้เรียน แบ่งเป็น 5 ส่วน ได้แก่ ความถูกต้องของโน้ต, คุณภาพเสียง, จังหวะ, เทคนิคการบรรเลง และการถ่ายทอดอารมณ์ ซึ่งมือขวามี บทบาทสำคัญในการควบคุมการดีด เน้นเสียง และหยุดเสียง ในขณะที่ นลิน พ่วงความสุข (2556) กล่าวว่า การนิ้วมือขวามี ความอิสระนั้นจะช่วยทำให้ผู้เล่นกีตาร์คลาสสิกสามารถควบคุมทุกมิติของเสียงได้อย่างสมบูรณ์ นอกจากนี้ยังช่วยให้การ แสดงออกทางดนตรีเป็นไปอย่างราบรื่นและเต็มไปด้วยอารมณ์ดนตรี การตีความบทเพลง ฉะนั้นมือขวาจึงเป็นองค์ประกอบที่ สำคัญ ในการพัฒนาองค์ความรู้ทางดนตรีใน 5 ส่วนนี้

ปัญหาด้านมือขวาในการบรรเลงกีตาร์คลาสสิก จะส่งผลโดยตรงต่อคุณภาพและความราบรื่นของการบรรเลงบทเพลง หากมือขวาไม่สามารถควบคุมจังหวะและน้ำหนักการดีดได้อย่างแม่นยำ เสียงที่เกิดขึ้นจะขาดความชัดเจนและไม่สมดุล ความเร็วในการเล่นจะถูกจำกัด ทำให้ไม่สามารถบรรเลงบันไดเสียงหรือคอร์ดที่ซับซ้อนได้อย่างราบรื่น นอกจากนี้ ไม่สามารถ เน้นเสียงแนวหลักหรือหยุดเสียงได้อย่างถูกต้องจะทำให้เพลงขาดมิติและขาดความลึกซึ้ง การควบคุมน้ำหนักเสียงที่ไม่ดีจะทำ ให้การสื่อสารอารมณ์ดนตรีขาดความชัดเจน จากผลวิจัยที่เป็นประเภทการแสดงเดี่ยว ของกีตาร์คลาสสิกของระดับ มหาบัณฑิต จะพบถึงปัญหา ของการบรรเลงในบทเพลงนั้น เกิดจากมือขวาเป็นส่วนใหญ่ (วัชรินทร์ สุขทรัพย์ศรี 2563) ฉะนั้นทักษะมือขวา เป็นสิ่งที่ควรเรียนรู้และศึกษาอย่างจริงจัง เพื่อในอนาคตจะสามารถพัฒนาทักษะมือขวาในการบรรเลงได้ อย่างชำนาญ ซึ่งผู้บรรเลงกีตาร์คลาสสิกต่างทราบถึงปัญหานี้กันดี

อาจารย์ปฐมวัส ธรรมชาติ เป็นผู้เชี่ยวชาญทางด้านการเล่นกีตาร์คลาสสิกซึ่งเป็นผู้สำเร็จการศึกษาในระดับปริญญาโท ด้านดนตรีจาก Indiana State University ประเทศสหรัฐอเมริกา เกี่ยวกับทางการแสดงกีตาร์คลาสสิก ปัจจุบันอาจารย์ ปฐมวัส ธรรมชาติ เป็นผู้สอนอยู่ในระดับอุดมศึกษา ในรายวิชาทักษะดนตรีตะวันตก กีตาร์คลาสสิก คณะศิลปกรรมศาสตร์ สาขาดนตรี มหาวิทยาลัยราชภัฏสวนสุนันทา อีกทั้งอาจารย์ยังมีผลงานเกี่ยวกับการใช้มือขวาในปฏิบัติทักษะกีตาร์คลาสสิก (THAMMACHARD, P. ม.ป.ป.)

จากที่ได้กล่าวมาข้างต้นผู้วิจัยจึงมองเห็นความสำคัญและมีความสนใจที่จะทำวิจัยเรื่อง การศึกษาการแก้ไขปัญหาเรื่อง การใช้มือขวาสำหรับการปฏิบัติทักษะเครื่องดนตรีกีตาร์คลาสสิก ของอาจารย์ปฐมวัส ธรรมชาติ   ผู้วิจัยใช้วิธีการดำเนินการ

วิจัยโดยการสัมภาษณ์ เชิงลึกเพื่อหาแนวทางการแก้ไขปัญหา เพื่อสร้างความเข้าใจเพิ่มเติมในการใช้มือขวา อีกทั้งยังเป็น
ประโยชน์สำหรับผู้เรียนที่ประสบปัญหาการใช้มือขวาสำหรับการปฏิบัติทักษะเครื่องดนตรีกีตาร์คลาสสิก

2. วัตถุประสงค์การวิจัย

       1. เพื่อศึกษาปัญหาการใช้มือขวาสำหรับการปฏิบัติทักษะเครื่องดนตรีกีตาร์คลาสสิก

       2. เพื่อศึกษาแนวทางการแก้ไขปัญหาการใช้มือขวาสำหรับการปฏิบัติทักษะเครื่องดนตรีกีตาร์คลาสสิก

3. ขอบเขตของการวิจัย

       1. ขอบเขตผู้ให้ข้อมูล

       ผู้ให้ข้อมูลคือ อาจารย์ปฐมวัส ธรรมชาติ ผู้สอนรายวิชาทักษะดนตรีตะวันตก กีตาร์คลาสสิก คณะศิลปกรรมศาสตร์
สาขาดนตรี มหาวิทยาลัยราชภัฏสวนสุนันทา โดยมีเกณฑ์การคัดเลือกแบบเฉพาะเจาะจง

       เนื่องจากอาจารย์เป็นผู้มีความรู้ความสามารถเฉพาะด้านในเรื่องการปฏิบัติกีตาร์คลาสสิก เป็นผู้สอนกีตาร์คลาสสิก
ในระดับอุดมศึกษา มหาวิทยาลัยราชภัฏสวนสุนันทา เป็นผู้สำเร็จการศึกษาในระดับปริญญาโทด้านการแสดงดนตรีจาก
สหรัฐอเมริกา Indiana State University เป็นผู้มีประสบการณ์ประกวดการแข่งขันกีตาร์คลาสสิกทั้งในประเทศและนอก
ประเทศ และเป็นผู้มีประสบการณ์ตัดสินการแข่งขันกีตาร์คลาสสิก

       2. ขอบเขตด้านเนื้อหา

       เนื้อหาสาระของปัญหาเรื่องมือขวา ได้แก่

       - เทคนิคการเลือกใช้ข้อต่างๆ เช่น ข้อนิ้ว ข้อศอก ข้อหัวไหล่

       - เทคนิคการใช้เล็บมือขวา

       - อาการบาดเจ็บที่กล้ามเนื้อและเส้นเอ็น

       - เหตุปัจจัยอื่น ๆ ที่เกี่ยวข้อง เช่น ท่าทาง การวางกีตาร์ เก้าอี้ วัสดุอุปกรณ์ยกเท้า และสภาพอากาศ

       - เทคนิคการในการดีด

       - เทคนิคการใช้มือขวาในการเล่นกีตาร์คลาสสิก

4. ประโยชน์ที่คาดได้รับจากการวิจัย

       1. เพื่อให้ทราบถึงปัญหาเรื่องการใช้มือขวาสำหรับการปฏิบัติทักษะเครื่องดนตรีกีตาร์คลาสสิก

       2. เพื่อให้เป็นประโยชน์สำหรับผู้เรียนที่ประสบปัญหาการใช้มือขวาสำหรับการปฏิบัติทักษะเครื่องดนตรีกีตาร์
คลาสสิก

5. นิยามศัพท์เฉพาะ

       1. การแก้ไขปัญหาการใช้มือขวา หมายถึง การวิเคราะห์หาสาเหตุองค์ประกอบโดยรวมของการปฏิบัติการใช้งานใน
มือข้างที่ทำหน้าที่ในการดีดสายกีตาร์คลาสสิก และหาแนวทางแก้ไข เพื่อนำไปปฏิบัติ

       2. ปฏิบัติทักษะเครื่องดนตรีกีตาร์คลาสสิก หมายถึง ความสามารถในการกระทำหรือการปฏิบัติเครื่องดนตรีกีตาร์
คลาสสิก

       3. การแก้ไขปัญหา หมายถึง การวิเคราะห์หาสาเหตุ หาแนวทางแก้ไข และนำไปปฏิบัติ

       4. Planting หมายถึง การเตรียมนิ้วให้พร้อมสำหรับการดีดเสียงถัดไป

       5. p i m a หมายถึงการกำหนดสัญลักษณ์ของนิ้วมือขวาคือ P (Pulgar) = นิ้วโป้ง (Indice) = นิ้วชี้ M (Medio) =
นิ้วกลาง และ A (Anular) = นิ้วนาง

6. วิธีดำเนินการวิจัย

เครื่องมือการวิจัย

เครื่องมือที่ใช้ในการเก็บรวบรวมข้อมูล ได้แก่

แบบสัมภาษณ์แบบกึ่งโครงสร้าง โดยประกอบไปด้วย 4 ประเด็น และ ผู้วิจัยนำแบบสัมภาษณ์ที่สร้างขึ้นให้ผู้ ผู้เชี่ยวชาญ3 ท่านพิจารณาตรวจสอบความเที่ยงตรงของ เนื้อหา (IOC: Index of Objective Congrueuec) โดยมีค่าเฉลี่ย การประเมิน ไม่ต่ำกว่า 0.5

การรวบรวมข้อมูล

ทำการเก็บข้อมูลเชิงคุณภาพ โดยใช้กระบวนการคัดเลือกผู้ให้ข้อมูลแบบเฉพาะเจาะจง (Purposive Sampling) โดยการสัมภาษณ์อาจารย์ปฐมวัส ธรรมชาติ ซึ่งเป็นผู้ที่ให้ข้อมูลเกี่ยวกับปัญหาเรื่องการใช้มือขวาสำหรับการปฏิบัติทักษะ เครื่องดนตรีกีตาร์คลาสสิกและแนวทางการแก้ไขปัญหา ผู้วิจัยใช้วิธีจุดประสงค์การสัมภาษณ์และสังเกต

การวิเคราะห์ข้อมูล

การวิเคราะห์ข้อมูลครั้งนี้ วิเคราะห์ข้อมูลตามความมุ่งหมายของการวิจัย ด้วยวิธีการพรรณนาวิเคราะห์ (Descriptive Analysis) โดยเน้นที่ความถูกต้องรัดกุมชัดเจน มีความต่อเนื่องและความเชื่อมโยงของประเด็นปัญหาต่างๆ

7. ผลการวิจัย

การศึกษาการแก้ไขปัญหาการใช้มือขวาสำหรับการปฏิบัติทักษะเครื่องดนตรีกีตาร์คลาสสิกของอาจารย์ปฐมวัส ธรรมชาติ ในการวิจัยครั้งนี้ผู้วิจัยได้ดำเนินการวิเคราะห์ ตามวัตถุประสงค์ของการวิจัย โดยได้ผลสรุปดังนี้

ภาพที่ 1 บรรยายกาศการสัมภาษณ์
ที่มา: ผู้เขียน

ปัญหาและอุปสรรคการใช้มือขวาในการปฏิบัติทักษะกีตาร์คลาสสิก

อาจารย์ปฐมวัส ธรรมชาติได้กล่าวว่า

("...ปัญหาหลักๆเลย คือผู้เรียนใช้มัดกล้ามเนื้อที่ไม่ถูกต้อง และปัญหาในการวางมือ คุณภาพเสียงที่ได้ออกมาจะไม่ ค่อยเหมาะสม กับสไตล์การเล่นแบบคลาสสิก โดยหน่วยวัดความถูกต้องของอาจารย์ คือ ดีดแล้วคุณภาพเสียงออกมาเต็ม ในขณะดีดรู้สึกสบาย ปัญหาที่พบจากผู้เรียนส่วนใหญ่ไม่ค่อยวางมือในลักษณะที่พร้อมเตรียมบรรเลง แต่จะเป็นวางมือแบบ ตามอิสระของตน หรือยืดนิ้วที่มากเกินไป ทำให้เวลาผู้เรียนออกแรงในการดีด จะออกจากแรงข้อนิ้วที่เล็ก ส่งผลกระทบให้ คุณภาพเสียงที่ออกมา ไม่เต็ม และการใช้ข้อนิ้วที่เล็กจะทำให้เกิดเป็นลักษณะเหมือนการงัด ทำให้เสียงที่ได้สายจะตีกับเฟร็ต

ทำให้เสียงที่ได้นั้นออกมาไม่เพราะ การใช้ข้อหรือมัดกล้ามเนื้อที่ใหญ่กว่าจะช่วยให้เสียงที่เต็มและหลีกเลี่ยงเสียงที่เป็นใน
ลักษณะSlapได้ สรุปคือการวางมือที่ไม่ถูกต้อง ใช้ข้อนิ้วที่เล็กในการดีด ทำให้เกิดเสียงตีเฟร็ต และเกี่ยวเนื่องปัญหาต่อไปคือ
การดีดที่มีเสียงเบา เพราะต้องการเลี่ยงเสียงที่กระทบกับเฟร็ต จึงต้องดีดให้เบาลง ปัญหานี้จะแก้ได้ถ้า วางมือให้ถูกต้อง กับ
การข้อนิ้วที่ใหญ่กว่าในการดีด...")

จากการถามปัญหาการใช้มือขวา (ปฐมวัส ธรรมชาติ, สัมภาษณ์, 28 ตุลาคม 2567) ปัญหาที่มักพบบ่อยจากผู้เรียน
ในระดับอุดมศึกษา อาจารย์ปฐมวัส ธรรมชาติ ชี้ให้เห็นถึงปัญหาหลักที่ผู้เรียนมักเผชิญ ได้แก่ การใช้มัดกล้ามเนื้อที่ไม่
เหมาะสมและการวางมือที่ไม่ถูกต้อง ปัญหานี้ส่งผลให้คุณภาพเสียงไม่ตรงกับสไตล์การเล่นกีตาร์คลาสสิก การดีดที่ดีต้องมีเสียง
ที่เต็มและรู้สึกสบายขณะดีด ซึ่งเป็นหน่วยมาตรวัดที่อาจารย์ใช้ในการประเมินความถูกต้องของการดีด โดยปัญหาที่พบ
โดยทั่วไปคือ ผู้เรียนมักวางมือในลักษณะอิสระเกินไป หรือขยายข้อนิ้วมากเกิน ทำให้เกิดการดีดที่ใช้แรงจากข้อนิ้วเล็ก ๆ ซึ่งไม่
แข็งแรงพอ ส่งผลให้เสียงที่ได้ออกมาไม่เต็มและมักมีเสียงตีกระทบเฟร็ต

นอกจากนี้ ผู้เรียนมีการใช้นิ้วมือขวาที่เป็นลักษณะการงัดสาย ทำให้เสียงที่ได้มีลักษณะไม่เป็นไปตามที่ต้องการ และ
เสียงอาจจะเบา เพราะผู้เรียนพยายามดีดให้เบาเพื่อเลี่ยงเสียงกระทบเฟร็ต ซึ่งจะไปขัดกับการบรรเลงที่ควรมีเสียงที่ลื่นไหล
และไพเราะ การดีดในกีตาร์คลาสสิกนั้นต้องการการใช้ข้อนิ้วและกล้ามเนื้อที่เหมาะสม โดยควรใช้มัดกล้ามเนื้อที่ใหญ่กว่า เช่น
การใช้ข้อต่อใหญ่แทนข้อนิ้วเล็ก ซึ่งจะทำให้ได้เสียงที่เต็มและนุ่มนวล อีกทั้งยังลดความเสี่ยงในการเกิดเสียงการกระทบเฟร็ต
การใช้มัดกล้ามเนื้อที่ใหญ่และแข็งแรงจะช่วยให้ผู้เรียนสามารถดีดได้เสียงที่ชัดเจนและคุณภาพเสียงดีขึ้น

ภาพที่ 2 การดีดในลักษณะการงัด
ที่มา: ผู้เขียน

("...ในการแก้ไขอาจารย์จะชี้แนะแนวทางการดีดที่ถูกต้องให้เบื้องต้น แต่อย่างไรก็ตาม แต่ละบุคคลจะมีลักษณะ
เฉพาะตัวที่ไม่เหมือนกัน เช่นบางกรณีคนที่มีนิ้วยาวหรือนิ้วสั้น อาจต้องปรับในบางมุมในการดีด ...")

ในส่วนนี้อาจารย์ปฐมวัส ธรรมชาติจะกล่าวถึงวิธีการแก้ไขปัญหาการใช้มือขวาในการเล่นกีตาร์คลาสสิก ซึ่งอาจารย์
จะให้คำแนะนำกับผู้เรียนเบื้องต้นเกี่ยวกับเทคนิคการดีดที่ถูกต้อง แต่การฝึกฝนนี้ไม่สามารถกำหนดได้ตายตัว เนื่องจาก
ลักษณะทางกายภาพของผู้เรียนแต่ละคนมีความแตกต่างกัน ตัวอย่างเช่น คนที่มีนิ้วมือยาวหรือนิ้วสั้น อาจต้องปรับมุมและ
วิธีการดีดให้เหมาะสมกับตัวเอง ซึ่งจะช่วยให้สามารถเล่นได้ถนัดและมีประสิทธิภาพมากขึ้น การปรับเทคนิคเฉพาะตัวจึงเป็น
สิ่งสำคัญ เพราะลักษณะนิ้วของแต่ละบุคคลมีผลต่อการควบคุมสายและการดีด การฝึกฝนทักษะนี้จึงต้องยืดหยุ่นและปรับให้
เหมาะสมกับโครงสร้างของนิ้วมือ ในแต่ละรายบุคคล

การประชุมวิชาการระดับชาติและนานาชาติบ้านสมเด็จเจ้าพระยา ครั้งที่ 1 (BS2C 2025)
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ปัญหาทางกายภาพ

การเลือกใช้ข้อต่างๆสำหรับการปฏิบัติทักษะกีตาร์คลาสสิก

อาจารย์ปฐมวัส ธรรมชาติได้กล่าวว่า

("...ในส่วนตัวสำหรับอาจารย์การใช้ข้อสำหรับการบรรเลงไม่น่ามีปัญหา ถ้าผู้เรียนบอกว่าแบบนี้ใช้ได้และดีมันเหมาะ
สำหรับเขา ก็ไม่ติดอะไร แต่ในการสอนบางจุดในอาจารย์จะบอกผู้เรียนให้ฟังว่า การใช้แบบนี้ไปสักพักอาจเจ็บได้ แต่ตัวผู้เรียน
จะใช้แบบเดิมก็ได้ แล้วแต่ตัวผู้เรียนเอง อาจารย์จะแค่แนะนำให้ผู้เรียนวางมือแบบนี้ว่าถนัดรึป่าว อาจลองวางแบบนี้ดูเผื่อจะ
ถนัดกว่า อาจารย์จะให้ผู้เรียนวิเคราะห์ด้วยตนเอง ว่าจะเลือกใช้แบบไหน โดยอาจารย์จะคอยทดสอบเสียงให้ ว่าแบบนี้ใช้ได้
ไหม เสียงที่ออกมาดีรึป่าว...")

จากที่กล่าวมาในการใช้ข้อแบบไม่เป็นไปตามธรรมชาติของร่างกาย ถ้าผู้บรรเลงสามารถให้คุณภาพของเสียงอย่างที่
บทเพลงนั้นควรจะเป็นได้จะไม่มีผลในส่วนของเกณการให้คะแนนต่อโดยรวมของบทเพลงที่บรรเลง แต่ในทางกายภาพอาจเกิด
ปัญหาหลายๆอย่างตามมา เช่น อาการเจ็บปวดที่กล้ามเนื้อและเส้นเอ็น และ ความเร็วของการบรรเลง อาจารย์ปฐมวัส
ธรรมชาติให้ความสำคัญกับการเลือกใช้ข้อต่อและการจัดวางมือในการเล่นกีตาร์คลาสสิก โดยวิธีการสอนของอาจารย์มุ่งเน้นไป
ที่การให้ผู้เรียนพิจารณาและวิเคราะห์ตนเอง เพื่อหาวิธีที่เหมาะสมและสอดคล้องกับสรีระหรือความถนัดของตนเอง ซึ่ง
อาจารย์ปฐมวัส ธรรมชาติมีหลักการดังนี้

การเคารพในความถนัดและสรีระของผู้เรียน อาจารย์เน้นว่าถ้าผู้เรียนรู้สึกว่าวิธีการใช้ข้อต่อหรือการจัดวางมือแบบ
หนึ่งเหมาะสมและสบายสำหรับตนเอง อาจารย์จะยอมรับและไม่จำเป็นต้องเปลี่ยนแปลง ซึ่งเป็นการเปิดโอกาสให้ผู้เรียนได้
พัฒนาในแบบของตนเอง

การแนะนำให้ผู้เรียนระวังอาการบาดเจ็บ อาจารย์มีความเข้าใจในด้านการใช้งานข้อต่อและการจัดวางมือในระยะ
ยาว โดยจะแจ้งเตือนให้ผู้เรียนทราบถึงผลที่อาจเกิดขึ้น เช่น ความเสี่ยงที่จะบาดเจ็บหากใช้ท่าทางที่อาจไม่เหมาะสมในระยะ
ยาว ทั้งนี้ หากผู้เรียนยังคงเลือกใช้อิริยาบถเดิม อาจารย์ก็จะเคารพในการตัดสินใจนั้น

การทดลองและวิเคราะห์ด้วยตนเอง อาจารย์ให้ผู้เรียนลองจัดวางมือและใช้ข้อต่อในหลายรูปแบบเพื่อเปรียบเทียบ
โดยให้ผู้เรียนพิจารณาว่าการจัดวางแบบใดที่รู้สึกถนัดและเหมาะสมกับตนเองที่สุด การให้ผู้เรียนวิเคราะห์เองเป็นวิธีการที่ช่วย
พัฒนาทักษะและความเข้าใจในด้านการบรรเลงอย่างลึกซึ้ง

การทดสอบเสียง อาจารย์จะคอยช่วยฟังเสียงที่เกิดขึ้นจากการใช้ข้อต่อและการจัดวางมือแต่ละรูปแบบ เพื่อให้
ผู้เรียนสามารถเข้าใจถึงผลของการจัดวางมือที่มีต่อคุณภาพเสียง การทดสอบเสียงนี้เป็นส่วนหนึ่งในการพิจารณาว่าเทคนิคใดที่
ให้ผลลัพธ์ดีที่สุดในการบรรเลง โดยรวมแล้ว วิธีการสอนของอาจารย์เน้นการสนับสนุนให้ผู้เรียนได้ทดลองและพิจารณาด้วย
ตนเอง เพื่อหาวิธีที่เหมาะสมและพัฒนาความเข้าใจด้านการใช้ข้อต่อในแบบที่สอดคล้องกับร่างกายตนเอง

การใช้เล็บมือขวา

ในส่วนของเล็บมือขวาอาจารย์ปฐมวัส ธรรมชาติ กล่าวว่า

("...เรื่องเล็บ อาจารย์จะถามผู้เรียนก่อนว่าอยากได้เสียงแบบไหน ผู้เรียนคิดว่าเล็บควรจะต้องเป็นยังไง และทดลอง
โดยชี้แนะจากหนังสือ Pumping Nylon และ The Christopher Parkening Guitar Method...")

เบื้องต้นอาจารย์ปฐมวัส ธรรมชาติ แนะแนวทางให้กับผู้เรียนดังนี้ ขั้นที่1 ให้ตั้งเสียงที่อยากจะได้ก่อนโดยจะมี
อาจารย์ชี้แนะให้ผู้เรียนเบื้องต้น แล้วขั้นที่2 อาจารย์จะให้ผู้เรียนทดลองตะไบเล็บ ตามรูปทรงเล็บ โดยอ้างอิงจากหนังสือ 1.
Pumping Nylon ของ Scott Tennant 2. The Christopher Parkening Guitar Method - Volume 1 : Guitar
Technique ของ Christopher Parkening โดยเนื้อหาเกี่ยวกับการทำเล็บเพื่อเล่นกีตาร์คลาสสิก และให้ผู้เรียนได้ทดลองทำ

เล็บด้วยตนเอง แต่หลักๆอาจารย์ปฐมวัส ธรรมชาติจะแนะนำให้ผู้เรียนทำเล็บที่เป็นในลักษณะที่นิยมไว้สำหรับการเล่นกีตาร์คลาสสิก จะเป็นในลักษณะที่เป็นรูปแบบ Ramp
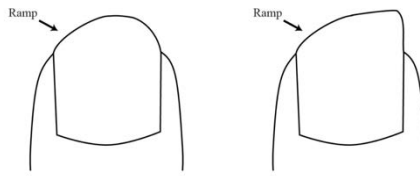
ภาพที่ 3 ตัวอย่างทรงเล็บรูปแบบ Ramp

ที่มา: https://brentrobitaille.com/2021/02/22/how-to-play-classical-guitar-lesson-two/

("...ส่วนเรื่องของความสั้นความยาว ส่วนนี้ขึ้นอยู่กับโทนเสียงที่อยากจะได้ แต่ทั้งหมดทั้งมวลขึ้นอยู่กับปัจจัยอื่นด้วย เช่น คนแรกมีเทคนิคการดีดดี เล็บจะเป็นอีกแบบนึง อีกคนเทคนิคการดีดไม่ดี เล็บจะเป็นอีกแบบนึง แล้วแต่เหตุปัจจัย ทรงเล็บ ความแข็งแรงของเล็บ ของผู้เรียนนั้น มีความแตกต่างกัน ต้องปรับให้เป็นไปตามลักษณะเล็บของแต่ละบุคคล เล็บอ่อนเล็บแข็ง ก็ส่งผลกระทบต่อเสียงด้วยเช่นกัน เล็บการไว้เล็บให้สั้นลงก็ช่วยลดความเสี่ยงได้เช่นกัน เพื่อนนักกีตาร์คลาสสิกในวงการ ไว้เล็บยาวไม่ได้ เนื่องจากไว้ยาวแล้ว เกิดรอยบาก แตกหักง่าย ขึ้นอยู่กับธรรมชาติทางร่างกายของคนนั้นด้วย ถ้าเกี่ยวกับการบำรุงรักษาเล็บ ส่วนตัวอาจารย์จะบอกให้ผู้เรียน ให้เล็บถูกใช้งานน้อยที่สุดหรือลดความเสี่ยงในการใช้เล็บมากที่สุด เช่นการติดเทปกาว ติดปลอกเล็บ หรือน้ำยาทาเล็บสำหรับกีตาร์ เพื่อทำให้หน้าเล็บแข็งแรงขึ้น ...")

ในส่วนปัญหาอื่นเช่นความแข็งแรงของเล็บ ความยาวในการไว้เล็บ ในส่วนนี้ อาจารย์ปฐมวัส ธรรมชาติ ไม่ได้มีสูตรในการแก้ปัญหาที่ตายตัว ต้องดูที่รูปลักษณะของเล็บก่อน แต่มีการแนะนำให้กับผู้เรียนแต่ละบุคคลแตกต่างกันไป เช่น ผู้เรียนที่มีเล็บความแข็งแรงข้างค่อนอ่อน จะมีการแนะให้ผู้เรียนนำเทปมาพันบริเวณเล็บ เพื่อป้องกันการแตกหัก หรือ ลดพฤติกรรมอื่นๆที่ส่งผลต่อการแตกหัก เรื่องของความยาวในการไว้เล็บขึ้นอยู่กับความแข็งอ่อนของเล็บเช่นกัน ถ้าผู้เรียนมีเล็บที่แข็ง เล็บที่มีความยาวมากอาจจะไม่ส่งผลต่อการแตกหักมาก แต่อาจส่งผลให้บรรเลงลำบากและคุณภาพเสียง ในผู้เรียนมีเล็บที่อ่อน อาจต้องไว้เล็บที่มีความยาวที่เหมาะสม จะสามารถช่วยลดต่อการแตกหักของเล็บได้

ในส่วนปัญหาอื่นเช่นความแข็งแรงของเล็บ ความยาวในการไว้เล็บ เรื่องของการดูแลและปรับแต่งเล็บเพื่อการเล่นกีตาร์คลาสสิก โดยเฉพาะอย่างยิ่งสำหรับการควบคุมโทนเสียงและการป้องกันเล็บจากความเสียหาย ผู้วิจัยจะสรุปหัวข้อนี้ในประเด็นหลัก ๆที่อธิบายอาจารย์ปฐมวัส ธรรมชาติไว้ดังนี้

ผลกระทบของความยาวและรูปทรงของเล็บต่อโทนเสียง ความยาวและรูปทรงของเล็บมีผลโดยตรงต่อเสียงที่ได้เมื่อดีดกีตาร์ ผู้เล่นที่มีเทคนิคดีมักจะปรับแต่งเล็บให้เหมาะสมกับลักษณะการดีด เพื่อให้เสียงออกมาสมบูรณ์และควบคุมได้ดี ขณะที่ผู้เล่นที่ยังฝึกฝนทักษะการดีดอาจต้องปรับรูปทรงและความยาวของเล็บแตกต่างกันไปตามความถนัดและความแข็งแรงของเล็บของตนเอง

การปรับแต่งเล็บให้เหมาะสมกับความแข็งแรงของเล็บแต่ละบุคคล ความแข็งหรืออ่อนของเล็บจะส่งผลต่อเสียงที่เกิดขึ้นด้วย หากเล็บแข็งจะสร้างเสียงที่แตกต่างจากเล็บที่อ่อนกว่า ดังนั้น การปรับทรงและความยาวเล็บให้เหมาะสมกับลักษณะของเล็บในแต่ละบุคคลจึงสำคัญมาก เพื่อให้สามารถควบคุมโทนเสียงและคุณภาพเสียงได้อย่างมีประสิทธิภาพ

ข้อจำกัดในการไว้เล็บยาวและการดูแลรักษาเล็บ เล็บที่ยาวเกินไปอาจเกิดรอยบากหรือแตกหักได้ง่าย โดยเฉพาะในนักกีตาร์คลาสสิก การเล่นกีตาร์ด้วยเล็บที่แข็งแรงแต่ไม่ยาวเกินไปจึงเป็นสิ่งที่นักกีตาร์ส่วนใหญ่พยายามปฏิบัติ เนื่องจากเป็นการลดโอกาสที่จะเกิดปัญหากับเล็บ ซึ่งอาจกระทบต่อการฝึกซ้อมและการแสดงได้ การบำรุงรักษาเล็บ อาจารย์แนะนำให้

การประชุมวิชาการระดับชาติและนานาชาติบ้านสมเด็จเจ้าพระยา ครั้งที่ 1 (BS2C 2025)
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ผู้เรียนหาวิธีดูแลเล็บและลดการใช้งานเล็บโดยตรงให้น้อยที่สุด เพื่อให้เล็บไม่เสื่อมสภาพหรือเกิดการแตกหัก เช่น การติดเทป กาว ติดปลอกเล็บ หรือน้ำยาทาเล็บที่ช่วยเสริมความแข็งแรงของหน้าเล็บ ซึ่งจะช่วยให้เล็บทนทานมากขึ้นต่อการดีดกีตาร์และ ลดความเสี่ยงในการเกิดความเสียหาย จากการข้างต้นนี้ แสดงให้เห็นถึงความสำคัญของการปรับแต่งเล็บและการบำรุงรักษา เล็บเพื่อให้สามารถเล่นกีตาร์คลาสสิกได้อย่างราบรื่น นักกีตาร์คลาสสิกจึงควรให้ความสำคัญในการดูแลเล็บพอ ๆ กับการ ฝึกฝนทักษะการเล่น เพราะเล็บที่แข็งแรงและถูกปรับแต่งมาอย่างดีจะส่งผลให้เสียงมีคุณภาพและลดความเสี่ยงในการบาดเจ็บ หรือเสียหายจากการเล่น

การบาดเจ็บที่กล้ามเนื้อและเส้นเอ็น

("...แน่นอนว่าการอาการนี้เกิดจากการซ้อมเยอะ หรือไม่ก็ซ้อมผิดวิธี ส่วนตัวอาจารย์ มือนี้คือพักเลย พักผ่อน ใช้ งานกล้ามเนื้อให้น้อยที่สุด จะพักจนกว่าจะหาย...")

ในส่วนนี้ การซ้อมนาน ๆ หรือการซ้อมในท่าทางที่ไม่เป็นธรรมชาติ จะเกิดการบาดเจ็บได้ อาจารย์ปฐมวัส ธรรมชาติ ได้ชี้แนะในส่วนของวิธีการดูแลและฟื้นฟูเมื่อเกิดการบาดเจ็บกล้ามเนื้อจากการซ้อมหรือการใช้งานกล้ามเนื้อหนักเกินไปและได้ ชี้แนะเกี่ยวกับการรักษาและได้เสริมเรื่องของการซ้อมในระหว่างที่กำลังบาดเจ็บอยู่โดยผู้วิจัยได้สรุปลำดับขั้นตอนดังนี้ พักผ่อน และลดการใช้งาน เมื่อเกิดการบาดเจ็บของกล้ามเนื้อและเส้นเอ็น สิ่งแรกที่ควรทำคือลดการใช้งานกล้ามเนื้อที่บาดเจ็บให้มาก ที่สุด แม้ว่าการซ้อมจะมีความสำคัญ แต่ควรคำนึงถึงการรักษาสุขภาพและฟื้นฟูสภาพร่างกายก่อน เพื่อไม่ให้การบาดเจ็บนั้น เรื้อรังหรือรุนแรงขึ้น การปรับเปลี่ยนรูปแบบการซ้อม ในกรณีที่ยังต้องการซ้อมแต่ไม่สามารถใช้กล้ามเนื้อที่บาดเจ็บได้ ให้ลอง ปรับการซ้อม โดย: ถ้าเจ็บแค่ข้างเดียว สามารถใช้มือข้างที่ไม่เจ็บฝึกซ้อมเพื่อไม่ให้เกิดการลืมเทคนิคการเล่น หากบาดเจ็บทั้ง สองข้าง อาจใช้วิธีซ้อมโดยไม่ใช้เครื่องดนตรีกีตาร์คลาสสิก แต่ใช้การมโนภาพถึงการเล่นและเสียงในหัวของบทเพลง เพื่อให้ ร่างกายยังคุ้นเคยกับเพลงและเทคนิคการเล่น การพักและฟื้นฟูอย่างเหมาะสม ขณะบาดเจ็บ ควรให้มือพักอย่างเต็มที่ เพื่อให้ ร่างกายได้ซ่อมแซมตัวเอง หลังจากอาการบาดเจ็บเริ่มทุเลาลง ค่อยๆ กลับมาขยับกล้ามเนื้อบ้างอย่างค่อยเป็นค่อยไป เช่น การ ยืดเหยียดกล้ามเนื้อ เพื่อทดสอบความพร้อมในการกลับมาใช้งานตามปกติ การซ้อมอย่างค่อยเป็นค่อยไปเมื่ออาการดีขึ้น เมื่อ พร้อมที่จะกลับมาเล่นหรือซ้อมอีกครั้ง ควรเริ่มจากความเร็วที่ช้าเพื่อให้ร่างกายสามารถควบคุมการเคลื่อนไหวได้ โดยค่อยๆ เพิ่มความเร็วขึ้นตามสภาพร่างกาย เพื่อป้องกันการบาดเจ็บซ้ำซ้อน การระมัดระวังการซ้อม อาการบาดเจ็บมักเกิดจากการ ซ้อมที่หนักเกินไปหรือซ้อมผิดวิธี ซึ่งสามารถป้องกันได้ด้วยการให้เวลากล้ามเนื้อและเส้นเอ็นพักผ่อนอย่างเพียงพอ ไม่ควรใช้ งานต่อเนื่องนานเกินไป ควรเว้นช่วงพักระหว่างการซ้อมเพื่อลดโอกาสการบาดเจ็บ การอภิปรายนี้เน้นย้ำถึงความสำคัญของการ ดูแลและฟื้นฟูกล้ามเนื้อที่บาดเจ็บให้ถูกวิธีเพื่อป้องกันปัญหาเรื้อรัง การปฏิบัติตามขั้นตอนเหล่านี้จะช่วยให้สามารถกลับมาใช้ งานกล้ามเนื้อได้อย่างปลอดภัย โดยไม่เสี่ยงต่อการบาดเจ็บที่รุนแรงกว่าเดิม

องค์ประกอบอื่นที่เกี่ยวข้องกับกายภาพมือขวา

("...ไม่ว่า สายกีตาร์ กีตาร์ที่เราใช้ ท่าทางท่านั่ง การวางมือ การวางตำแหน่งกีตาร์คลาสสิก เก้าอี้ที่นั่ง วัสดุอุปกรณ์ ยกเท้า สภาพอากาศ ห้องที่บรรเลง ความชื้นในอากาศ ส่งผลต่อเสียงและการเล่นมือขวาของเราทั้งหมด...")

จากที่อาจารย์ปฐมวัส ธรรมชาติ ได้กล่าวมา จะเป็นเหตุปัจจัยที่เกิดจากภายนอกส่วนใหญ่ ผู้วิจัยได้สรุปในส่วนที่ เป็นประเด็นสำคัญที่เกี่ยวข้องกับผลกระทบในการเล่นมือขวา มีดังนี้

ผลของสายกีตาร์ต่อมือขวา

สายกีตาร์เป็นปัจจัยสำคัญที่ส่งผลต่อการดีดและการควบคุมเสียงของมือขวา วัสดุที่ใช้ทำสาย ความตึงของสาย และ คุณสมบัติเฉพาะของสายแต่ละชนิดส่งผลโดยตรงต่อสัมผัสและเสียงที่ได้

การประชุมวิชาการระดับชาติและนานาชาติบ้านสมเด็จเจ้าพระยา ครั้งที่ 1 (BS2C 2025)
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วัสดุที่ใช้ทำสายไนลอน มีอิทธิพลต่อเสียงและความรู้สึกในการดีดของมือขวา โดยสายที่ตึงมากขึ้นจะส่งผลให้การดีดมีความเด้งและเสียงกระชับ แต่ก็อาจทำให้มือขวาต้องออกแรงเพิ่มขึ้นเช่นกัน สายที่ตึงมากจะมีแรงต้านที่สูงกว่า ส่งผลให้มือขวาต้องใช้พลังงานมากขึ้นในการดีด

นอกจากนี้ ความตึงของสายยังช่วยชดเชยข้อด้อยบางประการของเล็บของผู้เล่น หากเล็บอ่อนเกินไป สายที่แข็งแรงสามารถช่วยให้เสียงออกมาคมชัดขึ้น แต่ก็อาจทำให้เสียงขาดความนุ่มนวล ดังนั้น นักกีตาร์คลาสสิกจำเป็นต้องปรับแต่งสายให้เหมาะสมกับลักษณะการเล่นและสไตล์เสียงที่ต้องการเพื่อให้มือขวาสามารถทำงานได้อย่างเต็มประสิทธิภาพ

ผลกระทบของสภาพอากาศและอุณหภูมิ

อุณหภูมิและสภาพอากาศมีผลโดยตรงต่อการเคลื่อนไหวและความยืดหยุ่นของกล้ามเนื้อมือขวา โดยเฉพาะในสภาพอากาศหนาวเย็น กล้ามเนื้อจะตึงตัวและการเคลื่อนไหวของนิ้วมือจะช้าลง

ความเย็นทำให้ร่างกายใช้พลังงานมากขึ้นและทำให้การควบคุมการดีดสายทำได้ยากขึ้น เมื่อต้องเล่นในสภาพแวดล้อมที่หนาวเย็น จะหาอุปกรณ์เพื่อเพิ่มความอบอุ่นให้มือ เช่น การแช่มือในน้ำอุ่น การใช้ถุงร้อน การรักษาอุณหภูมิของมือให้เหมาะสมช่วยให้มือขวาทำงานได้คล่องตัว ลดการตึงของกล้ามเนื้อ และทำให้ควบคุมเสียงที่ออกมาได้ดียิ่งขึ้น

ท่าทางการนั่งและการจัดวางตำแหน่งกีตาร์คลาสสิก

ท่านั่งและตำแหน่งการวางกีตาร์มีความสำคัญในการช่วยให้มือขวาสามารถเคลื่อนไหวได้อย่างอิสระและมีประสิทธิภาพสูงสุด นักกีตาร์คลาสสิกจำเป็นต้องเลือกท่านั่งที่ทำให้สามารถจัดวางกีตาร์ในตำแหน่งที่ถูกต้อง เพื่อให้สามารถเข้าถึงทั้งมือซ้ายและมือขวาได้ง่าย

การวางกีตาร์ที่ดีควรให้ตัวกีตาร์อยู่ในตำแหน่งกึ่งกลางระหว่างหัวเข่าและหน้าท้อง โดยการวางตัวกีตาร์ให้พอดีจะช่วยให้เสียงที่ออกมามีความเต็มและกระจายไปในทิศทางที่เหมาะสม หากวางกีตาร์ให้หน้ากีตาร์เอียงลง อาจทำให้เสียงที่ออกมาเบาและไม่เต็ม และส่งผลให้มือขวาต้องเปลี่ยนปรับมุมมองศาในการดีดตามไปด้วย หากตัวกีตาร์วางเอียงไปทางใดทางหนึ่ง มือขวาอาจต้องเปลี่ยนตำแหน่งการดีดเพื่อให้เข้าถึงสายได้ง่ายขึ้น การวางกีตาร์อย่างเหมาะสมจึงช่วยให้มือขวาสามารถดีดได้อย่างแม่นยำและสบายขึ้น

ผลกระทบจากลักษณะร่างกายเฉพาะบุคคล

เรื่องของท่าทางท่านั่ง การวางมือ เก้าอี้ที่นั่ง วัสดุอุปกรณ์ยกเท้า เป็นเรื่องที่เกี่ยวข้องกับความแตกต่างของสรีระแต่บุคคลด้วย เช่น ความสูงของตัวบุคคล ระยะความยาวของแขน และขนาดของมือ ส่งผลให้การวางตำแหน่งของมือขวาอาจต้องปรับเปลี่ยนตามไปด้วย บุคคลที่มีแขนยาวหรือขาสั้นอาจต้องปรับท่านั่งและตำแหน่งกีตาร์ให้สอดคล้องกับสรีระของตน เพื่อให้สามารถควบคุมการดีดได้ง่ายขึ้นและลดความเมื่อยล้าหรือการเกร็งของมือขวาระหว่างการเล่น

การปรับท่านั่งและตำแหน่งกีตาร์หรือ ความสูงของเก้าอี้ เก้าอี้สูงมีผล โครงสร้างโดยรวมของร่างกายถูกเปลี่ยน หลังตึงขึ้น การนั่งครึ่งเก้าอี้ นั่งเต็มเก้าอี้ ต้องมีการปรับให้เหมาะสมกับสรีระของแต่ละคนช่วยให้การเล่นมีความมั่นคงและลดโอกาสเกิดการบาดเจ็บ ช่วยให้มือขวาควบคุมการดีดสายและโทนเสียงได้อย่างมีประสิทธิภาพ นอกจากนี้ในส่วนนี้ยังส่งผลต่อความรู้สึกของคนดูอีกด้วย

จากที่กล่าวมาทั้งหมด แสดงให้เห็นว่า การเล่นกีตาร์คลาสสิกโดยเฉพาะการควบคุมมือขวานั้น ต้องการความเข้าใจและการปรับเปลี่ยนตามสภาวะแวดล้อมและคุณสมบัติของอุปกรณ์ รวมถึงลักษณะทางร่างกายของผู้เล่นเอง การคำนึงถึงปัจจัยเหล่านี้จะช่วยให้สามารถเล่นกีตาร์ได้อย่างเต็มที่ มีความคล่องตัว และได้คุณภาพเสียงที่ดีเยี่ยม

บทเพลงที่ใช้ในการแก้ปัญหามือขวาปฏิบัติทักษะกีตาร์คลาสสิก

(*"...ในการจะแก้ปัญหามือขวากับผู้เรียนระดับต้น ในเบื้องต้นอาจารย์จะเลือกใช้บทฝึก 120 right-hand studies for guitar ของ Mauro Giuliani เป็นหลัก เพราะแบบฝึกนี้มือซ้ายค่อนข้างง่าย ห้องแรกเป็นคอร์ด C ห้องสองเป็น G7 แต่มือ ขวาสามารถเป็นไปได้ 120 แบบ ถ้าเป็นตัวบทเพลงจะใช้บทเพลง Romance D'Amour..."*)

ภาพที่ 5 แบบฝึกมือขวา120 right-hand studies for guitar ของ Mauro Giuliani

ที่มา: THAMMACHARD, P. (2022) อ้างถึงใน Giuliani, M. Studio per la chitarra : opera 1a. Artaria, 1812

ภาพที่ 6 บทเพลง Romance D'Amour

ที่มา: https://musescore.com/user/13318046/scores/2943106

ในการเลือกบทเพลงกีตาร์คลาสสิกที่ใช้ในการแก้ปัญหามือขวา โดยเฉพาะกับผู้เรียนระดับต้น อาจารย์มักจะเจอ ผู้เรียนที่ประสบปัญหาที่เกี่ยวข้องกับการใช้มือขวาในการดีดสาย เช่น การควบคุมจังหวะ การสร้างเสียงที่ชัดเจน และการ พัฒนาความคล่องแคล่วในการเคลื่อนไหวของนิ้วมือขวา เพื่อแก้ไขปัญหาเหล่านี้ อาจารย์เลือกใช้บทฝึกและบทเพลงที่ เหมาะสมเพื่อเสริมสร้างทักษะและความมั่นใจให้กับผู้เรียนได้อย่างมีประสิทธิภาพ

บทฝึก "120 Right-Hand Studies for Guitar" ของ Mauro Giuliani ความสำคัญของบทฝึกนี้ บทฝึก "120 Right-Hand Studies for Guitar" โดย Mauro Giuliani เป็นหนึ่งในบทฝึกที่ได้รับการยอมรับอย่างกว้างขวางในวงการกีตาร์ คลาสสิก เนื่องจากบทฝึกนี้เน้นการพัฒนาทักษะมือขวาในหลากหลายรูปแบบ ไม่ว่าจะเป็นการดีดสายในลักษณะต่างๆ การ ควบคุมจังหวะ และการสร้างเสียงที่มีคุณภาพ การเลือกบทฝึกสำหรับผู้เรียนระดับต้น สำหรับผู้เรียนระดับต้นที่ยังมี

ความคุ้นเคยกับการเล่นกีตาร์คลาสสิกไม่มาก บทฝึกนี้เป็นทางเลือกที่ดีเพราะมีความหลากหลายและสามารถปรับให้เหมาะสม กับความสามารถของผู้เรียนได้ โดยเฉพาะห้องแรกที่มุ่งเน้นการเล่นคอร์ด C และห้องสองที่เน้นการเล่นคอร์ด G7 ซึ่งเป็นคอร์ด พื้นฐานที่สำคัญในการเล่นกีตาร์คลาสสิก ประโยชน์ที่ได้จากการฝึกบทนี้ คือการพัฒนาความแม่นยำในการดีดสาย บทฝึกนี้ช่วย ให้ผู้เรียนสามารถพัฒนาความแม่นยำในการดีดสายแต่ละสายได้อย่างเป็นระบบ โดยการฝึกซ้อมอย่างต่อเนื่องจะช่วยให้มือขวา สามารถควบคุมการดีดสายได้ดีขึ้น และการฝึกในบทนี้ช่วยให้ผู้เรียนสามารถสร้างจังหวะที่มั่นคงและสม่ำเสมอ ซึ่งเป็นพื้นฐาน สำคัญในการเล่นกีตาร์คลาสสิก การฝึกซ้อมเป็นประจำช่วยให้กล้ามเนื้อมือขวามีความแข็งแรงและคล่องแคล่วมากขึ้น ซึ่งช่วย ลดความเมื่อยล้าและป้องกันการบาดเจ็บจากการเล่นกีตาร์

บทเพลง "Romance D'Amour" ความสำคัญของบทเพลงนี้ "Romance D'Amour" เป็นบทเพลงที่ได้รับความนิยม อย่างแพร่หลายในการเรียนกีตาร์คลาสสิก เนื่องจากมีความเรียบง่ายและมีความงดงามในท่วงทำนอง และเหมาะสำหรับ ผู้เรียนระดับต้นที่ต้องการฝึกการใช้มือขวาในการสร้างเสียงที่ละมุนและไพเราะ การเลือกใช้บทเพลงนี้เพื่อแก้ปัญหามือขวา บท เพลง "Romance D'Amour" ถูกเลือกใช้เพราะมีโครงสร้างที่ไม่ซับซ้อน แต่ยังคงท้าทายในการใช้เทคนิคมือขวา เช่น การดีด สายแบบ Rest Stroke และ Free Stroke ซึ่งเป็นเทคนิคที่ผู้เรียนควรฝึกฝนเพื่อสร้างเสียงที่หลากหลายและมีคุณภาพ ประโยชน์ที่ได้จากการเล่นบทเพลงนี้

การใช้บทฝึก "120 Right-Hand Studies for Guitar" ของ Mauro Giuliani กับบทเพลง "Romance D'Amour" เป็นวิธีในการแก้ไขปัญหาที่เกี่ยวข้องกับมือขวาของอาจารย์ปฐมวัส ธรรมชาติ สำหรับผู้เรียนกีตาร์คลาสสิกระดับต้น

เทคนิคมือขวาในการปฏิบัติทักษะกีตาร์คลาสสิก

ในการสอนเทคนิคมือขวาสำหรับกีตาร์คลาสสิก อาจารย์ปฐมวัส ธรรมชาติ มักจะมีขั้นตอนที่ชัดเจนในการพัฒนา ทักษะมือขวาของผู้เรียนในแต่ละเทคนิค ที่เป็นเทคนิคพื้นฐานของกีตาร์คลาสสิก โดยเน้นการเข้าใจและฝึกฝนวิธีดีดที่เหมาะสม ซึ่งแบ่งเป็นลำดับขั้นตอนและอย่างละเอียด ดังนี้

การดีดพักสาย (Rest Stroke) และการดีดผ่านสาย (Free Stroke)

Rest Stroke อาจารย์ปฐมวัส ธรรมชาติ แนะนำให้ผู้เรียนฝึกการดีดโดยพักนิ้วบนสายถัดไปหลังจากดีดสายที่ ต้องการแล้ว ซึ่งเทคนิคนี้ช่วยให้เสียงที่ได้มีความเน้นและชัดเจน มักใช้ในการบรรเลงท่วงทำนอง (melody) เพื่อให้เสียงเด่นชัด ขึ้น และเป็นเสียงหลักที่ฟังชัดเจนในเพลง

Free Stroke เป็นการดีดผ่านสายที่ไม่พักนิ้วบนสายถัดไป โดยใช้ในกรณีเล่นคอร์ดหรือ Accompaniment เพื่อ สร้างเสียงที่ราบรื่นและไหลลื่น เทคนิคนี้เหมาะกับการสร้างจังหวะและท่วงทำนองที่นุ่มนวล อาจารย์ปฐมวัส ธรรมชาติ จะ อธิบายให้ผู้เรียนเข้าใจถึงความแตกต่างในหน้าที่ของการดีดทั้งสองแบบ และผลของเสียงที่แตกต่างกัน

รวมถึงแนะนำว่าการผสมผสาน Rest Stroke และ Free Stroke จะช่วยสร้างความน่าสนใจในเพลง และช่วยสร้าง สไตล์ที่เป็นเอกลักษณ์ให้กับผู้เล่น

การใช้กล้ามเนื้อมือขวา หลักในการสอนของผู้สอนคือให้ใช้กล้ามเนื้อมัดใหญ่และข้อต่อขนาดใหญ่ก่อนเสมอ เช่น ข้อมือและข้อศอก ก่อนที่จะใช้กล้ามเนื้อมัดเล็กและข้อต่อที่เล็กกว่า เช่น นิ้วมือ เพื่อช่วยลดการเกร็งและความล้าของมือ รวมถึงเพิ่มความแม่นยำในการดีด อาจารย์ปฐมวัส ธรรมชาติ จะพิจารณาความเหมาะสมและข้อจำกัดของแต่ละคนในการใช้ กล้ามเนื้อเหล่านี้ เพื่อให้ผู้เรียนสามารถปรับเทคนิคให้เหมาะกับตนเองได้ และใช้กล้ามเนื้ออย่างมีประสิทธิภาพที่สุด

การฝึก Arpeggio และ Planting ในการสอน Arpeggio หรือการดีดทีละสายอย่างต่อเนื่อง อาจารย์ปฐมวัส ธรรมชาติ เลือกใช้บทฝึกของ Giuliani เช่นกัน ซึ่งเป็นแบบฝึกที่ได้รับความนิยมและสร้างพื้นฐานที่ดีให้กับผู้เรียน ถ้าเล่นบทฝึก นี้ได้ 10 แบบ จะสามารถเข้าใจเรื่องการ Planting มือขวาไปในตัวได้ด้วย

การประชุมวิชาการระดับชาติและนานาชาติบ้านสมเด็จเจ้าพระยา ครั้งที่ 1 (BS2C 2025)
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อาจารย์ปฐมวัส ธรรมชาติ ให้ผู้เรียนฝึกแบบฝึก Arpeggio โดยเน้นการใช้เทคนิคการ Planting มือขวา (การวางนิ้ว มือขวาลงบนสายที่ต้องการเล่นล่วงหน้า) เพื่อช่วยสร้างความมั่นคงและความแม่นยำในการดีด การฝึก Planting ช่วยให้ผู้เรียน เข้าใจถึงการควบคุมและเตรียมพร้อมในการดีดแต่ละโน้ตได้ดีขึ้น ซึ่งเป็นทักษะสำคัญใน Arpeggio

การสอนเทคนิค Tremolo ขั้นตอนแรกคือการอธิบายแนวคิดเบื้องต้นเกี่ยวกับ Tremolo ให้ผู้เรียนเข้าใจว่าเป็นการ เล่นเสียงเดิมซ้ำ ๆ เพื่อสร้างเสียงให้คล้ายกับเสียงร้องหรือเสียงเครื่องดนตรีที่ยืดยาวต่อเนื่อง

อาจารย์ปฐมวัส ธรรมชาติ จะสอนเทคนิคการดีด Tremolo รูปแบบ p-a-m-i (นิ้วโป้ง-นิ้วนาง-นิ้วกลาง-นิ้วชี้) ซึ่ง เป็นรูปแบบที่ได้รับความนิยม โดยรูปแบบนี้เป็นที่รู้จักจากนักกีตาร์คลาสสิก Francisco Tárrega (ฟรานซิสโก ทาเรก้า) ชาว สเปนผู้มีชื่อเสียงในการพัฒนาเทคนิคนี้ โดยจะให้ผู้เรียนเริ่มฝึกดีดจากสายเปล่าก่อน และขั้นต่อไปในส่วนของการเลือกบท เพลง อาจารย์ปฐมวัส ธรรมชาติ จะมีให้เลือก 2 กรณี 1. ให้ผู้เรียนเลือกบทเพลงเอง แต่ต้องอยู่ในขอบเขตความสามารถตัว ผู้เรียน 2. อาจารย์ปฐมวัส ธรรมชาติ เลือกบทเพลงให้ กรณีเลือกให้ จะใช้บทเพลง Romance D'Amour เช่นกัน แต่จะเป็น ฉบับการเล่น Tremolo
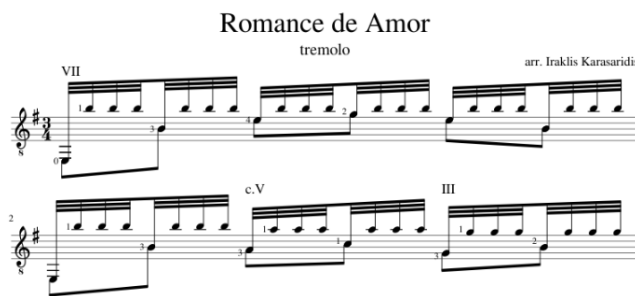
ภาพที่ 7 บทเพลง Romance D'Amour ฉบับการเล่น Tremolo

ที่มา: https://musescore.com/user/17252656/scores/3685696

อาจารย์ปฐมวัส ธรรมชาติ จะแนะนำให้ผู้เรียนฝึกเล่นจากจังหวะช้าไปสู่จังหวะที่เร็วขึ้นตามลำดับ เพื่อให้เกิดความ แม่นยำและสม่ำเสมอ เมื่อผู้เรียนมีความชำนาญในจังหวะช้าแล้วจึงค่อย ๆ เร่งความเร็วขึ้นจนสามารถเล่น Tremolo ได้อย่าง ไหลลื่น

การเล่นในมือขวาด้วยความเร็ว

("...อาจารย์จะให้ผู้เรียนเลือกอยู่ 2 วิธี และวิธีที่ 2 อาจารย์มองว่าอาจจะตอบสนองต่อผู้เรียนในยุคนี้ที่มีความใจ ร้อน อยากเป็นให้ไว โดย วิธีที่ 2 นี้อาจารย์ให้ผู้เรียนวิเคราะห์ข้อผิดพลาดด้วยตนเอง เพราะอันนี้ยอมรับตามความจริงว่า ผู้เรียนบางคน ไม่ยอมที่จะเล่นช้าจริงๆ...")

ผู้เรียนของอาจารย์ปฐมวัส ธรรมชาติ ที่สอนส่วนใหญ่ มักมีความใจร้อน อยากเล่นเป็นให้ไว โดยอาจารย์ปฐมวัส ธรรมชาติการแนะให้ผู้เรียนอยู่ 2 วิธี คือ 1.ฝึกซ้อมเริ่มจากช้ามากๆ แต่ไปแบบอย่างถูกต้อง 2.ฝึกซ้อมเริ่มจากเร็วๆจนผู้เรียน พบข้อผิดพลาดด้วยตนเอง แล้วทำการแก้ปัญหาในทีละจุดให้อย่างช้าๆ วิธีที่ 2 นี้ อาจทำให้ผู้เรียนรู้สึกว่าวิธีนี้ทันใจมากกว่า แต่ท้ายสุดต้องกลับไปสู่วิธีที่ถูกต้อง คือ วิธีที่ 1 ฝึกซ้อมเริ่มจากช้าๆอย่างเดิม

โดยสรุปขั้นตอนการสอนเทคนิคการปฏิบัติทักษะการใช้มือขวา

1. แนะนำแนวคิดและหน้าที่ของแต่ละเทคนิค ให้ผู้เรียนเข้าใจพื้นฐานและเป้าหมายของเทคนิค

2. ฝึกฝนกับบทฝึกเฉพาะทาง ใช้บทฝึกที่ออกแบบมาสำหรับเทคนิคโดยเฉพาะ

3. เน้นการใช้กล้ามเนื้อมัดใหญ่ก่อนมัดเล็ก การใช้กล้ามเนื้อมัดใหญ่เป็นหลักในการเล่น ช่วยให้เล่นได้อย่างมั่นคง และลดความเหนื่อยล้าของมือ

4. ฝึกจากจังหวะช้าไปเร็ว ในเทคนิคที่ต้องการความเร็ว เช่น Tremolo การฝึกเริ่มจากช้าไปเร็วช่วยให้เกิดความ แม่นยำและความคงที่ของจังหวะ อาจารย์ปฐมวัส ธรรมชาติ สามารถช่วยให้ผู้เรียนแก้ปัญหาทักษะมือขวาให้สามารถควบคุม เสียงได้อย่างมีคุณภาพและสร้างสไตล์การเล่นที่เป็นเอกลักษณ์ของตนด้วยขั้นตอนเหล่านี้

8. สรุปและอภิปรายผล

จากการศึกษาการแก้ไขปัญหาการใช้มือขวาสำหรับการปฏิบัติทักษะเครื่องดนตรีกีตาร์คลาสสิกของอาจารย์ปฐมวัส ธรรมชาติ ผู้วิจัยได้เห็น ประเด็นที่น่าสนใจจากผลการวิจัย โดยสรุปออกมาเป็นประเด็นอภิปรายผลได้ดังนี้

1. ประเด็นปัญหาหลักที่พบในการใช้มือขวา จากการสัมภาษณ์อาจารย์ปฐมวัส ธรรมชาติ พบว่าปัญหาหลักของ ผู้เรียนคือการใช้มัดกล้ามเนื้อและการวางมือที่ไม่ถูกต้อง ซึ่งส่งผลให้คุณภาพเสียงลดลง เกิดเสียงกระทบเฟร็ต รวมถึงเสียงไม่ เต็มกำลัง ซึ่งประเด็นนี้ สามารถเกี่ยวโยง ถึงปัญหา ได้ถึง 2 เรื่อง เรื่องแรกคือ อาการบาดเจ็บและเส้นเอ็น มีความสอดคล้อง กับ Bosi, B. (2018) ที่ได้กล่าวไว้ว่าเกี่ยวกับอาการบาดเจ็บมือขวาหลายคนได้รับบาดเจ็บจากการใช้เทคนิคและใช้มัด กล้ามเนื้อที่ไม่เหมาะสม ซึ่งอาจนำไปสู่การบาดเจ็บ โดยเฉพาะในบริเวณข้อมือและนิ้วมือ สาเหตุเกิดจากเทคนิคมือขวาที่ ผิดพลาด และ เรื่องที่ 2 คือ เรื่องคุณภาพของเสียง ซึ่งมีความสอดคล้องกับ วรเทพ รัตนอัมพวัลย์ (2561) ได้กล่าวไว้ถึงการ วางมือที่ถูกต้องเป็นองค์ประกอบในการช่วยในสร้างเสียงที่ไพเราะได้ ดังนั้นการวางมือที่ไม่ถูกต้อง ทำให้ส่งผลต่อคุณภาพของ เสียงโดยตรง วิธีแก้ไขที่อาจารย์แนะนำให้กับผู้เรียนในประเด็นนี้ คือการฝึกทักษะการดีดโดยใช้ข้อและกล้ามเนื้อที่เหมาะสม การจัดวางมือให้สอดคล้องกับสรีระและการใช้นิ้วอย่างถูกต้อง เพื่อลดปัญหาเสียงกระทบและเพิ่มความชัดเจนของเสียง คือ การใช้มัดกล้ามเนื้อและการวางมือที่ไม่ถูกต้อง

2. ประเด็นปัญหาทางกายภาพ มีอยู่ 3 ด้าน ด้านที่ 1 คือเรื่องของการใช้ข้อต่อ อาจารย์แนะนำให้จะผู้เรียนพิจารณา การเลือกใช้ข้อและการจัดวางมือ ในการเล่นกีตาร์คลาสสิก โดยให้คำนึงถึงความสบาย ความเหมาะสมกับสรีระ และคุณภาพ เสียงที่ได้ อาจารย์ให้ความสำคัญกับการสนับสนุนผู้เรียนให้ทดลอง วิเคราะห์ และตัดสินใจด้วยตนเอง โดยมีการแนะนำอย่าง รอบคอบเพื่อป้องกันการบาดเจ็บในระยะยาว ด้านที่ 2 คือเรื่องของเล็บมือขวา การปรับรูปทรงและความยาวของเล็บขวามี บทบาทสำคัญในการควบคุมคุณภาพเสียง อาจารย์แนะนำให้ผู้เรียน โดยการการตกแต่งเล็บเป็นรูปแบบ Ramp เพื่อให้ได้ คุณภาพเสียงที่ดีและมีความคล่องตัวในการดีด รวมถึงการบำรุงรักษาเล็บเพื่อความแข็งแรงและยืดอายุการใช้งานของเล็บที่ ต้องสัมผัสกับสายกีตาร์บ่อยๆ จะมีการแนะให้ผู้เรียนนำเทปมาพันบริเวณเล็บ เพื่อป้องกันการแตกหัก หรือ ลดพฤติกรรมอื่นๆ ที่ส่งผลต่อการแตกหัก ซึ่งมีความสอดคล้องกับ Can[1] and Yilmaz[2] (2019) ได้กล่าวไว้ว่าปัญหาที่พบบ่อยในผู้เรียน คือเล็บหัก หรือเล็บที่อ่อน สาเหตุปัญหาเล็บมือขวาฉีกหรือหัก ระบุว่าคือ กิจกรรมประจำวันทำให้เล็บผิดรูปและทำให้รูปร่างเปลี่ยนไป แต่ในวิธีแก้ปัญหา จะแตกต่างออกไป นั้นคือการใช้ผลิตภัณฑ์บำรุงเล็บ การรักษาโดยใช้โภชนาการมาช่วย โดย ยกตัวอย่างเช่น เพิ่มแคลเซียมและสังกะสี หรือใช้เล็บเทียมในกรณีเร่งด่วน ในส่วนการให้คำแนะนำนั้นมีความสอดคล้องกัน คือควรมีการ ทดลองปรับรูปทรงและความยาวของเล็บให้เหมาะกับสรีระและสไตล์การเล่นของแต่ละบุคคล ด้านที่ 3 คือเรื่องของการ บาดเจ็บที่กล้ามเนื้อและเส้นเอ็น นั้นเกิดจาก ความเจ็บปวดจากการใช้มือขวาในการฝึกซ้อม ในส่วนนี้ (Bosi, B. 2018) ได้ให้ ความเห็นไว้ตรงกัน อาจารย์ได้ให้คำแนะนำเกี่ยวกับการพักและการดูแลกล้ามเนื้อเมื่อเกิดการบาดเจ็บ เพื่อป้องกันไม่ให้ปัญหา นั้นลุกลามและเป็นอุปสรรคต่อการฝึกฝน โดยแนะนำให้ลดการใช้งานมือขวาชั่วคราวหากมีการบาดเจ็บ และค่อยๆ เพิ่มการ ฝึกซ้อมอย่างค่อยเป็นค่อยไปเมื่ออาการดีขึ้น

3. เพลงที่ใช้สำหรับในการแก้ไขปัญหามือขวา อาจารย์ใช้บทเพลง "Romance de Amour" ความสำคัญของบท
เพลงนี้ เป็นบทเพลงที่ได้รับความนิยมอย่างแพร่หลายในการเรียนกีตาร์คลาสสิก ซึ่งสอดคล้องกับ ดวงกมล ชัยวาสี และคณะ
(2561) ได้กล่าวไว้ว่าเพลง Romance de amor เป็นเพลงพื้นฐานที่นักดนตรีกีตาร์คลาสสิกทุกคนจะต้องได้เคยเรียนใน
ช่วงแรกของการฝึกฝน เป็นประโยชน์ในแง่ที่จะช่วยผู้ที่สนใจนำไปพัฒนาเทคนิคการสอน เนื่องจากเพลงมีความเรียบง่ายและมี
ความงดงามในท่วงทำนอง และเหมาะสำหรับผู้เรียนระดับต้นที่ต้องการฝึกการใช้มือขวาในการสร้างเสียงที่ละมุนและไพเราะ
การเลือกใช้บทเพลงนี้เพื่อแก้ปัญหามือขวา และอาจารย์ใช้อีก 1 บทฝึก คือ 120 Right-Hand Studies for Guitar ของ
Mauro Giuliani ซึ่งสอดคล้องกับ THAMMACHARD, P. (2022). ที่กล่าวถึงความสำคัญของบทฝึกนี้ และกล่าวว่าในการเล่น
มือขวาบนกีตาร์ที่เป็นทักษะที่สำคัญต่อการพัฒนาการเล่นกีตาร์ในอนาคต ในส่วนการฝึกมือขวาให้ความเร็วนั้น อาจารย์จะ
สอน ให้เริ่มจังหวะจากช้าไปเร็วเป็นหลัก

4. ประเด็นในการแก้ปัญหามือขวาโดยรวม อาจารย์ใช้วิธีการสอนที่ปรับเปลี่ยนตามลักษณะเฉพาะของผู้เรียน จะ
พิจารณาปัญหาและแก้ไขของผู้เรียนแต่ล่ะบุคคลไม่เหมือนกัน เนื่องจากสภาพร่างกายหรือจิตใจ ของผู้เรียนมีข้อที่แตกต่างกัน
ไป ในสรีระและความถนัดเฉพาะตัวของผู้เรียน พร้อมให้คำแนะนำที่ยืดหยุ่น ให้แก่ผู้เรียน ซึ่งสอดคล้องกับ นัติเทพ การิเทพ[1]
และ ปิยพันธ์ แสนทวีสุข[2] (2561) ตามที่อาจารย์เกียรติ เอกศิลป์ กล่าวไว้ว่า ไม่ว่าจะเป็นการตะไบเล็บหรือเทคนิคในการดีด
เป็นกระบวนการที่ต้องอาศัยประสบการณ์และการทดลองจนกว่าจะพบตำแหน่งที่พอดีและเหมาะสมกับตัวของผู้เรียน

สรุปโดยรวม ในประเด็นทั้งหมด หรือที่นอกเหนือจากนี้ ที่เป็นปัจจัยภายนอกอื่น ๆ เช่น สายกีตาร์ กีตาร์ที่เราใช้
ท่าทางท่านั่ง การวางมือ การวางตำแหน่งกีตาร์คลาสสิก เก้าอี้ที่นั่ง วัสดุอุปกรณ์ยกเท้า สภาพอากาศ ห้องที่บรรเลง ความชื้น
ในอากาศ ทุกอย่างเกี่ยวเนื่องกันกับปัญหาของการใช้มือขวาทั้งหมด

9. ข้อเสนอแนะจากการวิจัย

1. ควรศึกษาวิจัยเกี่ยวกับการใช้มือขวาสำหรับเครื่องดนตรีกีตาร์คลาสสิก ในแนวเพลงสไตล์อื่นๆ โดยวิเคราะห์หา
ความเหมือน หรือ ความแตกต่าง รูปแบบในการใช้มือขวา

2. ควรศึกษาและบันทึกท่าทางการใช้มือขวา จากศิลปินผู้ที่มีองค์ความรู้ ในทางด้านการแสดงกีตาร์คลาสสิก โดยมี
ผลงานการแสดงเป็นที่ยอมรับในระดับนานาชาติ

3.ควรศึกษาในปัจจัยอื่น ๆ ที่เกี่ยวข้องกับการใช้มือขวา เพื่อหาแนวทางในการปฏิบัติที่เหมาะสมต่อไป

10. เอกสารอ้างอิง

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ผลสัมฤทธิ์ทางการเรียนวิทยาศาสตร์ โดยการจัดการเรียนรู้แบบร่วมมือด้วยเทคนิค STAD เรื่อง โลกและการเปลี่ยนแปลงของนักเรียนชั้นมัธยมศึกษาปีที่ 2 โรงเรียนสวนอนันต์

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บทคัดย่อ

    การวิจัยนี้มีวัตถุประสงค์เพื่อศึกษาผลสัมฤทธิ์ทางการเรียนวิทยาศาสตร์ โดยการจัดการเรียนรู้แบบร่วมมือด้วยเทคนิค STAD เรื่อง โลกและการเปลี่ยนแปลงของนักเรียนชั้นมัธยมศึกษาปีที่ 2 โรงเรียนสวนอนันต์ กลุ่มตัวอย่าง ได้แก่ นักเรียนชั้นมัธยมศึกษาปีที่ 2 โรงเรียนสวนอนันต์ จำนวน 11 คน ที่กำลังศึกษาอยู่ในภาคเรียนที่ 2 ปีการศึกษา 2567 ได้มาจากการเลือกด้วยวิธีเฉพาะเจาะจง (Purposive Sampling) เครื่องมือที่ใช้ในการเก็บรวบรวมข้อมูล ประกอบด้วย แบบทดสอบวัดความรู้ความเข้าใจ มีความยากง่ายอยู่ระหว่าง 0.20-0.80 มีค่าอำนาจจำแนกมากกว่า 0.20 มีค่าความเชื่อมั่น เท่ากับ .84 วิเคราะห์ข้อมูลโดยใช้สถิติค่าเฉลี่ย ส่วนเบี่ยงเบนมาตรฐาน และใช้การทดสอบค่าที (t-test for Dependent)

    ผลการวิจัย พบว่า

    ผลสัมฤทธิ์ทางการเรียนวิทยาศาสตร์ โดยการจัดการเรียนรู้แบบร่วมมือด้วยเทคนิค STAD เรื่อง โลกและการเปลี่ยนแปลงของนักเรียนชั้นมัธยมศึกษาปีที่ 2 โรงเรียนสวนอนันต์ มีผลสัมฤทธิ์ทางการเรียนหลังเรียนสูงกว่าก่อนเรียนอย่างมีนัยสำคัญทางสถิติที่ระดับ .05

คำสำคัญ: การเรียนรู้แบบร่วมมือ; เทคนิค STAD; โรงเรียนสวนอนันต์; โลกและการเปลี่ยนแปลง; วิทยาศาสตร์

Achievement in science by cooperative learning with STAD technique on the topic of the world and changes of Mathayom 2 students at Suan Anan School

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Abstract

This research aimed to study the learning achievement in science by cooperative learning with STAD technique on the topic of the world and changes of Mathayom 2 students at Suan Anan School. The sample group consisted of 11 Mathayom 2 students at Suan Anan School who were studying in the second semester of the academic year 2024, selected by purposive sampling. The tools used for data collection consisted of a knowledge and understanding test with a difficulty level between 0.20-0.80, a discrimination power greater than 0.20, and a reliability value of .84. Data were analyzed using statistics of mean, standard deviation, and t-test for Dependent.

The results of the research found that:

The learning achievement in science by cooperative learning with STAD technique on the topic of the world and changes of Mathayom 2 students at Suan Anan School. The academic achievement after studying was significantly higher than before studying at a statistical level of .05.

Keywords: Science; Collaborative learning; STAD technique; World and change; Suan Anan School

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1. บทนำ

การเรียนการสอนในศตวรรษที่ 21 ไม่ได้มุ่งเน้นเพียงการส่งเสริมความรู้ความเข้าใจในเนื้อหาเท่านั้น แต่ยังมุ่งเน้นไป
ที่การพัฒนาทักษะกระบวนการคิด การทำงานร่วมกัน และความสามารถในการประยุกต์ใช้ความรู้ในบริบทต่าง ๆ การจัดการ
เรียนรู้แบบร่วมมือ (Cooperative Learning) ถือเป็นแนวทางสำคัญที่ช่วยเสริมสร้างความร่วมมือและความคิดสร้างสรรค์ของ
ผู้เรียน ผ่านการทำงานกลุ่มที่มีเป้าหมายร่วมกัน อีกทั้งยังช่วยส่งเสริมทักษะการสื่อสาร การแก้ไขปัญหา และการตัดสินใจ

ในวิชาวิทยาศาสตร์ เนื้อหาเรื่อง "โลกและการเปลี่ยนแปลง" เป็นหัวข้อที่มีความสำคัญต่อการสร้างความเข้าใจ
เกี่ยวกับระบบโลก เช่น การเปลี่ยนแปลงทางธรณีวิทยา การหมุนเวียนของน้ำในธรรมชาติ และผลกระทบที่เกิดขึ้นจากการ
เปลี่ยนแปลงสภาพแวดล้อม การเข้าใจเรื่องเหล่านี้ไม่ได้เป็นเพียงการเพิ่มพูนความรู้ แต่ยังช่วยให้นักเรียนตระหนักถึงบทบาท
และความสัมพันธ์ระหว่างธรรมชาติกับมนุษย์ รวมถึงสามารถประยุกต์ใช้ความรู้นี้ในการแก้ไขปัญหาสิ่งแวดล้อม อย่างไรก็ตาม
การเรียนการสอนในรูปแบบเดิมที่เน้นการบรรยายและการจดจำอาจทำให้ผู้เรียนขาดโอกาสในการมีส่วนร่วมอย่างแท้จริงและ
ขาดการพัฒนาทักษะที่จำเป็นสำหรับการทำงานในยุคปัจจุบัน เทคนิค STAD (Student Teams Achievement Divisions)
ซึ่งเป็นหนึ่งในรูปแบบของการจัดการเรียนรู้แบบร่วมมือ ได้รับการยอมรับว่ามีประสิทธิภาพในการพัฒนาทั้งผลสัมฤทธิ์ทางการ
เรียนและทักษะทางสังคมของผู้เรียน เทคนิคนี้เน้นการแบ่งนักเรียนเป็นทีมเล็ก ๆ ที่มีการทำงานร่วมกัน เพื่อช่วยเหลือกัน
เรียนรู้และแก้ไขปัญหา

งานวิจัยนี้มุ่งเน้นการประเมินผลสัมฤทธิ์ทางการเรียนวิทยาศาสตร์ของนักเรียนชั้นมัธยมศึกษาปีที่ 2 ในหัวข้อ "โลก
และการเปลี่ยนแปลง" โดยการใช้เทคนิค STAD ในการจัดการเรียนรู้แบบร่วมมือ การศึกษาเน้นไปที่การสร้างประสบการณ์
การเรียนรู้ที่ผู้เรียนมีบทบาทสำคัญ ทั้งในแง่การเรียนรู้จากเพื่อนและการทำงานร่วมกันเพื่อบรรลุเป้าหมายร่วมกัน
ผลการวิจัยนี้คาดว่าจะชี้ให้เห็นถึงประสิทธิภาพของเทคนิค STAD ในการพัฒนาผลสัมฤทธิ์ทางการเรียน พร้อมทั้งเสนอ
แนวทางที่สามารถนำไปปรับใช้ในการจัดการเรียนรู้ในบริบทอื่น ๆ เพื่อส่งเสริมการเรียนรู้ที่มีคุณภาพและความยั่งยืน

2. วัตถุประสงค์ของการวิจัย

เพื่อศึกษาผลสัมฤทธิ์ทางการเรียนวิทยาศาสตร์ โดยการจัดการเรียนรู้แบบร่วมมือด้วยเทคนิค STAD เรื่อง โลกและ
การเปลี่ยนแปลงของนักเรียนชั้นมัธยมศึกษาปีที่ 2 โรงเรียนสวนอนันต์

3. สมมติฐานการวิจัย

ผลสัมฤทธิ์ทางการเรียนวิทยาศาสตร์ โดยการจัดการเรียนรู้แบบร่วมมือด้วยเทคนิค STAD เรื่อง โลกและการ
เปลี่ยนแปลงของนักเรียนชั้นมัธยมศึกษาปีที่ 2 โรงเรียนสวนอนันต์ หลังเรียนสูงกว่าก่อนเรียน

4. วิธีดำเนินการวิจัย

การวิจัยครั้งนี้เป็นการวิจัยเชิงทดลองเบื้องต้น (Pre-Experimental design) ใช้แบบแผนการวิจัยแบบกลุ่มเดียว
สอบก่อนสอบหลัง (One group pretest-posttest design) โดยมีรายละเอียดวิธีดำเนินการวิจัยดังต่อไปนี้

ประชากรและกลุ่มตัวอย่าง

ประชากร ได้แก่ นักเรียนชั้นมัธยมศึกษาปีที่ 2 โรงเรียนสวนอนันต์ กรุงเทพมหานคร ภาคเรียนที่ 2 ปีการศึกษา
2567 จำนวนรวมนักเรียน 11 คน

กลุ่มตัวอย่าง ได้แก่ นักเรียนชั้นมัธยมศึกษาปีที่ 2 โรงเรียนสวนอนันต์ กรุงเทพมหานคร ภาคเรียนที่ 2 ปีการศึกษา
2567 ด้วยวิธีการเลือกแบบเฉพาะเจาะจง (Purposive Sampling) จำนวน 11 คน

เครื่องมือที่ใช้ในการวิจัย

เครื่องมือที่ใช้ในการเก็บรวบรวมข้อมูล ประกอบด้วย แบบทดสอบวัดความรู้ความเข้าใจ มีความยากง่ายอยู่ระหว่าง 0.20-0.80 มีค่าอำนาจจำแนกมากกว่า 0.20 มีค่าความเชื่อมั่น เท่ากับ .84

เครื่องมือที่ใช้ในการวิจัยครั้งนี้ ประกอบด้วย

1) แผนการจัดการเรียนรู้วิชาวิทยาศาสตร์ เรื่อง การเรียนวิทยาศาสตร์ โดยการจัดการเรียนรู้แบบร่วมมือด้วยเทคนิค STAD เรื่อง โลกและการเปลี่ยนแปลงของนักเรียนชั้นมัธยมศึกษาปีที่ 2 โรงเรียนสวนอนันต์

2) แบบทดสอบวัดผลสัมฤทธิ์ทางการเรียนวิทยาศาสตร์วิชาวิทยาศาสตร์ เรื่อง การเรียนวิทยาศาสตร์ โดยการจัดการเรียนรู้แบบร่วมมือด้วยเทคนิค STAD เรื่อง โลกและการเปลี่ยนแปลงของนักเรียนชั้นมัธยมศึกษาปีที่ 2 โรงเรียนสวนอนันต์

ขั้นตอนการสร้างเครื่องมือ

1) ศึกษาหลักสูตรแกนกลางการศึกษาขั้นพื้นฐาน พุทธศักราช 2551

2) วิเคราะห์คำอธิบายรายวิชา สาระการเรียนรู้และหน่วยการเรียนรู้

3) วิเคราะห์ตัวชี้วัด เพื่อนำมาเขียนเป็นจุดประสงค์การเรียนรู้โดยให้ควบคุมพฤติกรรมด้านความรู้ ทักษะกระบวนการ เจตคติ

4) วิเคราะห์สาระการเรียนรู้โดยเลือกเนื้อหาสาระการเรียนรู้ให้สอดคล้องกับผู้เรียน ชุมชนและท้องถิ่น

5) วิเคราะห์การประเมินผลโดยการเลือกสื่อและแหล่งการเรียนรู้ทั้งในและนอกห้องเรียน ให้เหมาะสมและสอดคล้องกับกระบวนการเรียนรู้

6) ขั้นออกแบบและจัดทำแผนการจัดการเรียนรู้ ซึ่งมีองค์ประกอบดังนี้

- เวลาเรียน
- สาระสำคัญ
- จุดประสงค์การเรียนรู้
- สาระการเรียนรู้
- กิจกรรมการเรียนรู้
- สื่อการเรียนรู้
- การวัดผลประเมินผล
- บันทึกผลหลังการสอน

การเก็บรวบรวมข้อมูล

ในการวิจัยครั้งนี้ ผู้วิจัยทำการทดลองและเก็บรวบรวมข้อมูลกลุ่มตัวอย่าง ในภาคเรียนที่ 2 ปีการศึกษา 2567 โดยดำเนินการเก็บรวบรวมข้อมูล ดังนี้

1) ผู้วิจัยวิเคราะห์ปัญหาการจัดการเรียนรู้วิชาวิทยาศาสตร์ เรื่อง การเรียนวิทยาศาสตร์ โดยการจัดการเรียนรู้แบบร่วมมือด้วยเทคนิค STAD เรื่อง โลกและการเปลี่ยนแปลงของนักเรียนชั้นมัธยมศึกษาปีที่ 2 โรงเรียนสวนอนันต์ จากการสอบถามครูและสัมภาษณ์ นักเรียนที่เคยเรียนเรื่องนี้มาแล้ว รวมทั้งศึกษาสภาพสังคมของชุมชนของนักเรียน

2) ปฐมนิเทศชี้แจงวัตถุประสงค์ของการวิจัยให้นักเรียนกลุ่มตัวอย่างทราบ และอธิบายถึงบทบาทหน้าที่ของนักเรียนและผู้วิจัย

3) ผู้วิจัยทำการทดสอบก่อนการทดลอง (Pretest) โดยให้นักเรียนได้ทำแบบทดสอบวัดผลสัมฤทธิ์ทางการเรียนวิชาวิทยาศาสตร์ เรื่อง การเรียนวิทยาศาสตร์ โดยการจัดการเรียนรู้แบบร่วมมือด้วยเทคนิค STAD เรื่อง โลกและการ

เปลี่ยนแปลงของนักเรียนชั้นมัธยมศึกษาปีที่ 2 โรงเรียนสวนอนันต์ ฉบับจริงที่ผู้วิจัยสร้างขึ้น จำนวน 10 ข้อ โดยมีระยะเวลา
ทำแบบทดสอบ 30 นาที

4) ดำเนินการจัดการวิชาวิทยาศาสตร์ เรื่อง การเรียนวิทยาศาสตร์ โดยการจัดการเรียนรู้แบบร่วมมือด้วย
เทคนิค STAD เรื่อง โลกและการเปลี่ยนแปลงของนักเรียนชั้นมัธยมศึกษาปีที่ 2 โรงเรียนสวนอนันต์

5) เมื่อสิ้นสุดการจัดการเรียนรู้ตามแผนที่วางไว้ จึงทำการทดสอบวัดหลังการทดลอง (Post-test) โดยนำ
แบบทดสอบวัดผลสัมฤทธิ์ทางการเรียนวิชาวิทยาศาสตร์ เรื่อง การเรียนวิทยาศาสตร์ โดยการจัดการเรียนรู้แบบร่วมมือด้วย
เทคนิค STAD เรื่อง โลกและการเปลี่ยนแปลงของนักเรียนชั้นมัธยมศึกษาปีที่ 2 โรงเรียนสวนอนันต์ ฉบับเดิม ที่ใช้ทำการ
ทดสอบก่อนการทดลอง มาให้นักเรียนทดสอบอีกครั้ง มีระยะเวลาในการทำแบบทดสอบ 20 นาที

6) ผู้วิจัยนำข้อมูลที่ได้จากคะแนนผลการเรียนระหว่างเรียน และคะแนนจากการทำแบบทดสอบวัดผล
สัมฤทธิ์ทางการเรียนวิชาวิทยาศาสตร์ เรื่อง การเรียนวิทยาศาสตร์ โดยการจัดการเรียนรู้แบบร่วมมือด้วยเทคนิค STAD เรื่อง
โลกและการเปลี่ยนแปลงของนักเรียนชั้นมัธยมศึกษาปีที่ 2 โรงเรียนสวนอนันต์ วิเคราะห์ด้วยวิธีการทางสถิติ โดยใช้โปรแกรม
คอมพิวเตอร์ และเก็บรวบรวมข้อมูลเชิงคุณภาพ ประมวลผลและเรียบเรียงนำเสนอในรูปความเรียง

การวิเคราะห์ข้อมูล

ในการวิเคราะห์ข้อมูลเกี่ยวกับผลสัมฤทธิ์ทางการเรียนวิชาวิทยาศาสตร์ เรื่อง การเรียนวิทยาศาสตร์ โดยการ
จัดการเรียนรู้แบบร่วมมือด้วยเทคนิค STAD เรื่อง โลกและการเปลี่ยนแปลงของนักเรียนชั้นมัธยมศึกษาปีที่ 2 โรงเรียนสวน
อนันต์ ผู้วิจัยดำเนินการโดยใช้โปรแกรมสำเร็จรูปทางสถิติ ตามขั้นตอนดังนี้

1) วิเคราะห์ผลสัมฤทธิ์ทางการเรียนวิชาวิทยาศาสตร์ เรื่อง การเรียนวิทยาศาสตร์ โดยการจัดการเรียนรู้แบบ
ร่วมมือด้วยเทคนิค STAD เรื่อง โลกและการเปลี่ยนแปลงของนักเรียนชั้นมัธยมศึกษาปีที่ 2 โรงเรียนสวนอนันต์

2) เปรียบเทียบคะแนนผลสัมฤทธิ์ทางการเรียนวิชาวิทยาศาสตร์ เรื่อง การเรียนวิทยาศาสตร์ โดยการจัดการ
เรียนรู้แบบร่วมมือด้วยเทคนิค STAD เรื่อง โลกและการเปลี่ยนแปลงของนักเรียนชั้นมัธยมศึกษาปีที่ 2 โรงเรียนสวนอนันต์
ระหว่างก่อนและหลังการจัดการเรียนรู้ โดยใช้สถิติการทดสอบที ชนิดกลุ่มตัวอย่างไม่เป็นอิสระต่อกัน (t-test for
Dependent)

สถิติที่ใช้ในการวิจัย

วิเคราะห์ข้อมูลโดยใช้สถิติค่าเฉลี่ย ($\overline{X}$) ส่วนเบี่ยงเบนมาตรฐาน (S.D.) และใช้การทดสอบค่าที (t-test for
Dependent)

5. ผลการวิจัย

ผลการเปรียบเทียบคะแนนผลสัมฤทธิ์ทางการเรียนวิชาวิทยาศาสตร์ เรื่อง วงจรไฟฟ้าอย่างง่ายผ่านการเรียนรู้แบบสืบ
เสาะหาความรู้ 5E โดยใช้เกมเป็นฐาน ปรากฏผลดังตารางที่ 1

ตารางที่ 1 ผลการเปรียบเทียบคะแนนผลสัมฤทธิ์ทางการเรียนวิชาวิทยาศาสตร์ เรื่อง การเรียนวิทยาศาสตร์ โดยการจัดการ
เรียนรู้แบบร่วมมือด้วยเทคนิค STAD เรื่อง โลกและการเปลี่ยนแปลงของนักเรียนชั้นมัธยมศึกษาปีที่ 2 โรงเรียน
สวนอนันต์

กลุ่ม ตัวอย่าง	n	คะแนน เต็ม	ก่อนเรียน		หลังเรียน		t	df	sig
			$\overline{X}$	S.D.	$\overline{X}$	S.D.			
ผู้เรียน	11	20	7.41	1.65	18.45	0.75	-26.24	10	.000

*ค่านัยสำคัญทางสถิติที่ระดับ .05

การประชุมวิชาการระดับชาติและนานาชาติบ้านสมเด็จเจ้าพระยา ครั้งที่ 1 (BS2C 2025)
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จากตารางที่ 1 ผลการเปรียบเทียบคะแนนผลสัมฤทธิ์ทางการเรียนก่อนเรียน และหลังเรียนวิชาวิทยาศาสตร์ เรื่อง การเรียนวิทยาศาสตร์ โดยการจัดการเรียนรู้แบบร่วมมือด้วยเทคนิค STAD เรื่อง โลกและการเปลี่ยนแปลงของนักเรียนชั้นมัธยมศึกษาปีที่ 2 โรงเรียนสวนอนันต์ พบว่า คะแนนทดสอบหลังเรียนสูงกว่าคะแนนการทดสอบก่อนเรียน อย่างมีนัยสำคัญทางสถิติที่ระดับ .05 จึงกล่าวได้ว่า คะแนนก่อนเรียน และหลังเรียน มีความแตกต่างกันจริง โดยคะแนนหลังเรียนมีค่าสูงกว่าก่อนเรียน และแสดงว่านักเรียนมีการพัฒนาผลการเรียนสูงขึ้น หลังจากการใช้ชุดกิจกรรมการเรียนรู้วิชาวิทยาศาสตร์ เรื่อง การเรียนวิทยาศาสตร์ โดยการจัดการเรียนรู้แบบร่วมมือด้วยเทคนิค STAD เรื่อง โลกและการเปลี่ยนแปลงของนักเรียนชั้นมัธยมศึกษาปีที่ 2 โรงเรียนสวนอนันต์

6. สรุปและอภิปรายผล

การศึกษาวิจัยครั้งนี้เป็นการวิจัย เรื่อง การเรียนวิทยาศาสตร์ โดยการจัดการเรียนรู้แบบร่วมมือด้วยเทคนิค STAD เรื่อง โลกและการเปลี่ยนแปลงของนักเรียนชั้นมัธยมศึกษาปีที่ 2 โรงเรียนสวนอนันต์ สามารถนำมาอภิปรายผลได้ดังนี้ การศึกษาครั้งนี้มีวัตถุประสงค์เพื่อประเมินผลสัมฤทธิ์ทางการเรียนวิทยาศาสตร์เรื่อง "โลกและการเปลี่ยนแปลง" ของนักเรียนชั้นมัธยมศึกษาปีที่ 2 โดยใช้การจัดการเรียนรู้แบบร่วมมือด้วยเทคนิค STAD ผลการวิจัยพบว่านักเรียนมีผลสัมฤทธิ์ทางการเรียนหลังการเรียนสูงกว่าก่อนการเรียนอย่างมีนัยสำคัญทางสถิติ ซึ่งสะท้อนให้เห็นว่าการใช้เทคนิค STAD มีประสิทธิภาพในการเสริมสร้างความเข้าใจและพัฒนาทักษะของผู้เรียน การวิเคราะห์ผลการวิจัยชี้ให้เห็นว่ากระบวนการเรียนรู้แบบร่วมมือที่ใช้เทคนิค STAD ช่วยให้นักเรียนมีส่วนร่วมในกระบวนการเรียนรู้มากขึ้น การทำงานร่วมกันในกลุ่มเปิดโอกาสให้นักเรียนแลกเปลี่ยนความรู้และความคิดเห็น อีกทั้งยังส่งเสริมการช่วยเหลือกันในทีมเพื่อแก้ไขปัญหาและบรรลุเป้าหมายร่วมกัน กระบวนการนี้ช่วยสร้างความมั่นใจให้แก่นักเรียน และกระตุ้นให้พวกเขามีความกระตือรือร้นในการเรียนรู้

ในหัวข้อ "โลกและการเปลี่ยนแปลง" การที่นักเรียนได้ศึกษาผ่านการทำงานกลุ่มช่วยให้พวกเขาสามารถเชื่อมโยงความรู้เชิงทฤษฎีกับปรากฏการณ์ในชีวิตจริง เช่น การวิเคราะห์การเปลี่ยนแปลงของสภาพแวดล้อม การสำรวจผลกระทบของการเปลี่ยนแปลงทางธรณีวิทยา และการนำเสนอแนวทางการแก้ไขปัญหาสิ่งแวดล้อมในชุมชน นอกจากนี้ การทำงานกลุ่มยังช่วยพัฒนาทักษะการสื่อสาร การแก้ไขปัญหา และการตัดสินใจ ซึ่งเป็นทักษะที่จำเป็นสำหรับการดำรงชีวิตในยุคปัจจุบัน อย่างไรก็ตาม งานวิจัยนี้มีข้อจำกัดบางประการ เช่น ขนาดของกลุ่มตัวอย่างที่ค่อนข้างเล็กและการเลือกกลุ่มตัวอย่างแบบเฉพาะเจาะจง อาจส่งผลต่อความสามารถในการนำผลการวิจัยไปใช้ในบริบทที่กว้างขึ้น นอกจากนี้ เทคนิค STAD อาจต้องการเวลาและการวางแผนที่รอบคอบในการจัดการเรียนรู้ ซึ่งอาจเป็นความท้าทายสำหรับครูผู้สอนที่มีข้อจำกัดด้านทรัพยากร

ข้อเสนอแนะสำหรับการวิจัยในอนาคตคือการขยายกลุ่มตัวอย่างให้หลากหลายยิ่งขึ้น รวมถึงการศึกษาผลกระทบในด้านอื่น ๆ เช่น ความเปลี่ยนแปลงทางทัศนคติ ความสนใจ หรือความสามารถในการทำงานเป็นทีม เพื่อให้ได้ภาพรวมที่สมบูรณ์ยิ่งขึ้น นอกจากนี้ การพัฒนาสื่อและเครื่องมือที่สนับสนุนการใช้เทคนิค STAD จะช่วยเพิ่มประสิทธิภาพและลดข้อจำกัดในการจัดการเรียนรู้

โดยสรุป การจัดการเรียนรู้แบบร่วมมือด้วยเทคนิค STAD เป็นแนวทางที่มีศักยภาพในการพัฒนาผลสัมฤทธิ์ทางการเรียนและทักษะการทำงานร่วมกันของผู้เรียน งานวิจัยนี้แสดงให้เห็นว่าการจัดการเรียนรู้ที่เน้นการมีส่วนร่วมและการทำงานเป็นทีมสามารถช่วยสร้างแรงจูงใจและความสนุกสนานในการเรียนรู้ พร้อมทั้งเสริมสร้างความรู้ที่ยั่งยืนในระยะยาว

7. ข้อเสนอแนะ

ข้อเสนอแนะในการนำผลวิจัยไปใช้

1. ก่อนการจัดการเรียนรู้การเรียนวิทยาศาสตร์ โดยการจัดการเรียนรู้แบบร่วมมือด้วยเทคนิค STAD เรื่อง โลกและการเปลี่ยนแปลงของนักเรียนชั้นมัธยมศึกษาปีที่ 2 โรงเรียนสวนอนันต์ครูผู้สอนควรมีความรู้ความเข้าใจในการจัดการเรียนรู้

ตามแนวคิดสะเต็มศึกษาได้เป็นอย่างดี ครูผู้สอนควรเตรียมตัวและทำหน้าที่ตนเองให้พร้อมต่อการจัดการเรียนรู้ เช่น การวางแผนการจัดการเรียนรู้อย่างรอบคอบและมีประสิทธิภาพ การดำเนินการจัดการเรียนรู้ตามขั้นตอนที่วางแผนไว้เพื่อให้การจัดการเรียนรู้เป็นไปอย่างมีประสิทธิภาพ

2. ก่อนการจัดการเรียนรู้ ครูผู้สอนควรชี้แจงทำความเข้าใจให้นักเรียนเข้าใจรูปแบบการจัดการเรียนรู้ให้ชัดเจนเพื่อให้นักเรียนเข้าใจในบทบาทหน้าที่ของตนเอง โดยให้นักเรียนมีอิสระในด้านการคิด โดยครูผู้สอนมีหน้าที่คอยชี้แนะให้คำปรึกษาอย่างใกล้ชิด

3. ครูผู้สอนควรศึกษาการจัดการเรียนรู้การเรียนวิทยาศาสตร์ โดยการจัดการเรียนรู้แบบร่วมมือด้วยเทคนิค STAD เรื่อง โลกและการเปลี่ยนแปลงของนักเรียนชั้นมัธยมศึกษาปีที่ 2 โรงเรียนสวนอนันต์ให้เข้าใจอย่างลึกซึ้งเพื่อการจัดการเรียนรู้ที่มีประสิทธิภาพและเกิดประโยชน์ต่อผู้นักเรียนมากที่สุด

4. การจัดการเรียนรู้การเรียนวิทยาศาสตร์ โดยการจัดการเรียนรู้แบบร่วมมือด้วยเทคนิค STAD เรื่อง โลกและการเปลี่ยนแปลงของนักเรียนชั้นมัธยมศึกษาปีที่ 2 โรงเรียนสวนอนันต์มีข้อจำกัดเรื่องเวลา ครูผู้สอนควรยืดหยุ่นเรื่องระยะเวลาที่ใช้ในการดำเนินกิจกรรมในแต่ละขั้นตอนของการจัดการเรียนรู้ตามความเหมาะสม

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(145-TH-EDU)

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วิทยาลัยการดนตรี มหาวิทยาลัยราชภัฏบ้านสมเด็จเจ้าพระยา
กรณีศึกษาผู้ช่วยศาสตราจารย์ ดร.วงศ์วสันต์ วสันตสุรีย์

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บทคัดย่อ

บทความวิจัยนี้มีวัตถุประสงค์เพื่อศึกษาแนวทางการสอนพื้นฐานระนาดทุ้มสำหรับนักศึกษาชั้นปีที่ 1 วิทยาลัยการดนตรี มหาวิทยาลัยราชภัฏบ้านสมเด็จเจ้าพระยา โดยใช้วิธีการสัมภาษณ์ ผู้ช่วยศาสตราจารย์ ดร.วงศ์วสันต์ วสันตสุรีย์ ซึ่งเป็นผู้เชี่ยวชาญในการบรรเลง และการสอนระนาดทุ้มที่ได้รับการยอมรับ ผลการวิจัยพบว่า 1) ด้านการสำรวจความพร้อมของผู้เรียน ใช้วิธีการสังเกตเพื่อประเมินพื้นฐานความรู้ของผู้เรียนผ่านโครงการปรับพื้นฐานก่อนเปิดภาคเรียน 2) ด้านการปรับพื้นฐานผู้เรียน ได้แก่ การจับไม้ ท่านั่ง และการฝึกฝนด้วยแบบฝึกหัดพื้นฐาน โดยอาจารย์แนะนำให้ผู้เรียนฝึกฝนอย่างสม่ำเสมอ 3) ด้านเพลงที่ใช้สำหรับการสอนพื้นฐาน คือ เพลงสาธุการ เพื่อเสริมสร้างความเข้าใจในวิธีการตีระนาดทุ้ม 4) ด้านการสร้างแรงบันดาลใจ ให้ความสำคัญกับการให้กำลังใจผู้เรียนถือเป็นสิ่งสำคัญของการเรียนการสอน 5) ด้านการประเมินผลผู้เรียนแบ่งเป็น 2 แบบ คือ การประเมินผู้เรียนตามสภาพจริง และการประเมินทักษะดนตรี

คำสำคัญ: ปฏิบัติระนาดทุ้ม; แนวทางการสอนดนตรี; ระดับอุดมศึกษา

การประชุมวิชาการระดับชาติและนานาชาติบ้านสมเด็จเจ้าพระยา ครั้งที่ 1 (BS2C 2025)
The 1st Bansomdejchaopraya National and International Conference (BS2C 2025)

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Basic Instructional Approaches for Ranad Thum for First-Year Students of College of Music, Bansomdejchaopraya Rajabhat University: A Case Study of Assistant Professor Dr. Wongwasan Wasantasuri

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Abstract

This research article aims to study the basic teaching methods of the Ranat Thum for first-year students at the College of Music, Bansomdejchaopraya Rajabhat University. The study was conducted by interviewing Assistant Professor Dr. Wongsawas Wasonsuree, an expert in Ranat Thum performance and teaching. The research findings are as follows: 1) In terms of assessing students' readiness, observation methods were used to evaluate students' foundational knowledge through a pre-term preparation program. 2) For basic skill adjustments, these included mallet handling, sitting posture, and practicing with basic exercises, with the instructor advising students to practice consistently. 3) In terms of basic teaching repertoire, the song Satukan was used to enhance students' understanding of Ranat Thum techniques. 4) For motivation, encouragement was emphasized as a key aspect of teaching and learning. 5) Student assessment was divided into two types: authentic assessment and musical skills assessment.

Keywords: Ranad Thum; music teaching approaches; higher education

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1. บทนำ

ดนตรีไทยเป็นดนตรีประจำชาติไทยที่อยู่คู่กับคนไทยมาอย่างยาวนาน ถือเป็นเอกลักษณ์อย่างหนึ่งของไทย ซึ่งแสดง
ถึงภูมิปัญญาที่มีการพัฒนามาอย่างยาวนานของคนไทยที่แสดงให้เห็นว่าชาติไทยนั้นมีความเจริญรุ่งเรืองมาตั้งแต่โบราณ ใน
ฐานะเยาวชนรุ่นหลังก็ควรที่จะศึกษาสืบทอดดนตรีไทยและให้ความสำคัญกับดนตรีไทย โดยผู้ที่จะเรียนดนตรีไทยนั้นจะต้องมี
การศึกษาเล่าเรียนอย่างเป็นขั้นตอน หากเราเรียนดนตรีไทยให้ถึงจุดของวิชาการ จะพบว่าดนตรีไทยก็เปรียบเหมือนกระจกที่
สะท้อนให้เห็นถึงสภาพของสังคมไทย ค่านิยม พฤติกรรม รวมทั้งจารีตประเพณีอันเป็นส่วนหนึ่งของสังคมไทยในอดีตเป็นอย่าง
ดี (สงัด ภูเขาทอง, 2532 : 20)

สำหรับการถ่ายทอดดนตรีไทยมีองค์ประกอบที่สำคัญได้แก่ ครู ศิษย์ หลักการ และวิธีการสอนเพลง หรือเนื้อหา
สาระที่สอน และการปลูกฝังคุณธรรมจริยธรรมแก่ ศิษย์ ซึ่งการถ่ายทอดดนตรีไทยนิยมใช้หลัก 3 ประการ ได้แก่ การทำตาม
คำสั่งครู การท่องจำ และยึดมั่นในจารีตประเพณี มีลักษณะการถ่ายทอดแบบมุขปาฐะ ซึ่งครูกับศิษย์ในสมัยก่อนจะมี
ความสัมพันธ์ และความผูกพันกันมาก ดุจบิดา มารดา ที่ถ่ายทอดความรู้ให้ด้วยความจริงใจทั้งความรู้ทักษะทางดนตรี และ
คุณธรรม จริยธรรมและความเป็นนักดนตรีที่ดี โดยหลักการสอนดนตรีควรเริ่มเมื่อผู้เรียนพอใจและมีใจรัก เครื่องดนตรีต้องมี
คุณภาพ เหมาะกับความถนัด และสภาพร่างกายของผู้เรียน ควรปลูกฝังการรักษาเครื่องดนตรีและเคารพไหว้ครูอาจารย์ ต้อง
สอนให้เป็นลำดับขั้นตอนตั้งแต่การนั่งตามแบบแผน การจับและการใช้เครื่องดนตรี โดยเริ่มตั้งแต่เป็นเสียงจนกระทั่งเป็นเพลง
ตั้งแต่ง่ายไปหายาก (อุทัย ศาสตรา, 2553 : 16)

ดนตรีไทยนั้นมีหลากหลายประเภทเครื่องดนตรีไทยส่วนใหญ่นิยมทำจากไม้และโลหะ โดยมีการออกแบบโดยภูมิ
ปัญญาของคนไทย จำแนกออกเป็น 4 ประเภท ได้แก่ เครื่องดีด เครื่องสี เครื่องตี และเครื่องเป่า โดยเครื่องดีด ได้แก่ จะเข้
ะกระจับปี่ เครื่องสี ได้แก่ ซอด้วง ซออู้ ซอสามสาย เครื่องตี ได้แก่ ระนาดเอก ระนาดทุ้ม ฆ้องวง เป็นต้น เครื่องเป่า ได้แก่
ขลุ่ย ปี่

สำหรับระนาดทุ้มเป็นเครื่องดนตรีที่สร้างเลียนแบบระนาดเอก ประดิษฐ์ขึ้นในสมัยรัชกาลที่ 3 แห่งกรุงรัตนโกสินทร์
ส่วนประกอบคล้ายระนาดเอก แต่ตัวรางมีขนาดยาวกว่า รูปร่างคล้ายหีบไม้มีเท้าอยู่ทั้งสี่ มุม ลูกระนาดทุ้มมีขนาดกว้าง และ
ยาวกว่าลูกระนาดเอก มีทั้งหมด 17 ลูก (อัศนีย์ เปลี่ยนศรี, 2555 : 27-28) ระนาดทุ้มมีหน้าที่ดำเนินทำนองหยอกล้อ ยั่วเย้า
ไปกับพวกดำเนินทำนองด้วยกัน สนับสนุนให้เกิดความสนุกสนานกระตุ้นเตือนให้ครึกครื้นรื่นเริง เทียบได้กับตัวตลกของละคร
การดำเนินทำนองจึงมีทั้งล่วงหน้า ลักจังหวะและขัดจังหวะต่าง ๆ ที่ล้อขัดระนาดเอกและเครื่องดำเนินทำนองอื่น ๆ ก่อให้เกิด
ความสะเทือนอารมณ์ทำให้ผู้ฟังและผู้ที่บรรเลงด้วย แม้ระนาดทุ้มจะมีหน้าที่หยอกล้อยั่วเย้าให้เกิดอารมณ์ครึกครื้น ก็ต้อง
หยอกล้อให้เหมาะสมกับลักษณะของเพลง ถ้าเป็นทางพื้นก็ควรจะหยอกล้อยั่วเย้าแทรกแซงให้กลมกลืนกับทำนองเพลง หาก
เป็นเพลงประเภทลูกล้อลูกขัดระนาดทุ้มก็ย่อมจะมีทางหยอกล้อยั่วเย้าได้เต็มที่ แต่ต้องระวังอย่าให้ฉีกทางออกไปห่างไกลจาก
เนื้อเพลงมากนัก คนระนาดทุ้มจะต้องรู้ใจและรู้วิธีดำเนินทำนองของคนระนาดเอกแต่ละคนด้วยเพื่อจะได้หยอกล้อให้กลมกลืน
กันจะทำให้การบรรเลงเป็นไปอย่างไพเราะน่าฟัง (บุษกร สำโรงทอง, 2539 : 22) ซึ่งผู้ที่จะบรรเลงระนาดทุ้มให้ไพเราะน่าฟัง
นั้นจึงจำเป็นจะต้องมีความรู้พื้นฐานเกี่ยวกับการบรรเลงระนาดทุ้มที่ดีเริ่มตั้งแต่ท่าทางในการบรรเลง การจับไม้ และการฝึก
พื้นฐาน เป็นต้น ดังนั้นการวางพื้นฐานการบรรเลงระนาดทุ้มให้กับผู้เรียนควรที่จะมีแนวคิดการสอนที่ชัดเจนและเหมาะสม
เพื่อเป็นการเสริมสร้างพื้นฐานที่ดีให้กับผู้เรียน

สำหรับผู้ช่วยศาสตราจารย์ ดร.วงศ์วสันต์ วสันตสุรีย์ เป็นผู้ที่มีความเชี่ยวชาญในการบรรเลงระนาดทุ้ม และการสอน
ระนาดทุ้ม ซึ่งได้รับการถ่ายทอดระนาดทุ้มจากบรมครูที่เชี่ยวชาญทางด้านระนาดทุ้ม เช่น ครูชาตรี อบนวล ครูเอกสิทธิ์ การ
คุณี ครูอุทัย แก้วละเอียด โดยผู้ช่วยศาสตราจารย์ดร.วงศ์วสันต์ วสันตสุรีย์ ได้รับการถ่ายทอดทั้งพื้นฐาน กลวิธีต่าง ๆ ในการ
บรรเลงระนาดทุ้ม รวมทั้งการปรับเพื่อการเดี่ยว และปรับวง จึงทำให้ผู้ช่วยศาสตราจารย์ ดร.วงศ์วสันต์ วสันตสุรีย์ เป็นผู้ที่มี

ความรู้ความสามารถในการบรรเลง และการสอนระนาดทุ้ม ได้สร้างสรรค์ผลงานวิชาการมากมาย เช่น การประพันธ์เดี่ยว ระนาดทุ้มเพลงเทพบรรทม เพลงภิรมย์สุรางค์ เพลงพิรุณสร่างฟ้า เพลงกัลยาเยี่ยมห้อง เพลงม้าย่อง เป็นต้น อีกทั้งยังมีงาน ด้านสร้างสรรค์ เช่น การเดินทางของท่านเฉกอะหมัด ซึ่งเป็นผลงานการสร้างสรรค์ดนตรีไทยที่มีกลิ่นอายของสำเนียงเปอร์เซีย (วงศ์สันต์ วสันตสุรีย์, สัมภาษณ์, 18 ตุลาคม 2567)

ทั้งนี้จากการสำรวจเบื้องต้นผู้วิจัยพบว่า นักศึกษาชั้นปีที่ 1 วิทยาลัยการดนตรี มหาวิทยาลัยราชภัฏบ้านสมเด็จ เจ้าพระยา มีพื้นฐานการตีระนาดทุ้มที่แตกต่างกันก่อนที่จะเข้ามาศึกษาในระดับอุดมศึกษา

การสอนพื้นฐานระนาดทุ้มจึงมีความสำคัญ เพื่อให้ผู้เรียนมีพื้นฐานให้อยู่ในมาตรฐานที่ใกล้เคียงกันมากที่สุด จากการทบทวนเอกสารและงานวิจัยที่เกี่ยวข้อง และการปฏิบัติระนาดทุ้มพบว่างานวิจัยส่วนใหญ่มุ่งศึกษาและถ่ายทอดให้ ผู้เรียนในระดับการศึกษาขั้นพื้นฐาน ได้แก่ ครองไทย อยู่ดี (2564) ได้ศึกษาเรื่อง การถ่ายทอดเดี่ยวระนาดทุ้มเพลงอาหนู สาม ชั้น กรณีศึกษา ครูปราศรัย อยู่ดี ได้ประพันธ์ทางเดี่ยวระนาดทุ้มเพลงอาหนู สามชั้น เพื่อใช้ในการแข่งขันศิลปหัตถกรรม นักเรียน มีขั้นตอนการถ่ายทอดแบบมุขปาฐะ ซึ่งครูจะเป็นผู้ฝึกซ้อมให้ลูกศิษย์จนสามารถบรรเลงจบเพลงได้อย่างสมบูรณ์ ในขณะที่ ชยพร ไชยสิทธิ์ มนัส วัฒนไชยยศ และบรรจง ชลวิโรจน์ (2560) ศึกษาเรื่องการพัฒนาชุดฝึกทักษะทางระนาดทุ้ม เพลงสาธุการของนักเรียนชั้นมัธยมศึกษาปีที่ 4 สาขาวิชาชีพเฉพาะปี่พาทย์ วิทยาลัยนาฏศิลปนครศรีธรรมราช สถาบันบัณฑิต พัฒนศิลป ซึ่งสามารถนำชุดฝึกนี้ไปใช้ประกอบการเรียนการสอน และฝึกปฏิบัติระนาดทุ้มเพลงสาธุการได้จริง ทั้งนี้ผู้วิจัยยังไม่ พบงานวิจัยเกี่ยวข้องกับแนวการสอนพื้นฐานสำหรับนักศึกษาที่ปฏิบัติระนาดทุ้มระดับอุดมศึกษาผู้วิจัยจึงมีความสนใจที่จะ ศึกษาแนวทางทางการสอนพื้นฐานระนาดทุ้มสำหรับนักศึกษาชั้นปีที่ 1 วิทยาลัยการดนตรี มหาวิทยาลัยราชภัฏบ้านสมเด็จ เจ้าพระยา กรณีศึกษาผู้ช่วยศาสตราจารย์ ดร.วงศ์สันต์ วสันตสุรีย์ เพื่อเป็นแนวทางให้กับผู้สอนระนาดทุ้มในระดับอุดมศึกษา นำไปประยุกต์ใช้ในการเรียนการสอนต่อไป

2. วัตถุประสงค์ของการวิจัย

เพื่อศึกษาแนวทางการสอนพื้นฐานระนาดทุ้มสำหรับนักศึกษาชั้นปีที่ 1 วิทยาลัยการดนตรี มหาวิทยาลัยราชภัฏบ้าน สมเด็จเจ้าพระยา กรณีศึกษาผู้ช่วยศาสตราจารย์ ดร.วงศ์สันต์ วสันตสุรีย์

3. ขอบเขตของการวิจัย

1. ขอบเขตผู้ให้ข้อมูล

ผู้ให้ข้อมูลคือ ผู้ช่วยศาสตราจารย์ ดร.วงศ์สันต์ วสันตสุรีย์ อาจารย์ประจำภาควิชาดนตรีไทย วิทยาลัยการดนตรี มหาวิทยาลัยราชภัฏบ้านสมเด็จเจ้าพระยา โดยมีเกณฑ์การคัดเลือกดังนี้

1) เป็นผู้สอนปฏิบัติระนาดทุ้มในระดับอุดมศึกษา มหาวิทยาลัยราชภัฏบ้านสมเด็จเจ้าพระยา

2) เป็นผู้มีความเชี่ยวชาญในการปฏิบัติระนาดทุ้ม

3) เป็นผู้มีประสบการณ์การสอนระนาดทุ้มในระดับอุดมศึกษา

2. ขอบเขตเนื้อหา

ในการศึกษาการสอนพื้นฐานระนาดทุ้มประกอบด้วย 5 ด้าน ดังนี้

1) ด้านการสำรวจความพร้อมของผู้เรียน

2) ด้านการปรับพื้นฐานผู้เรียน

3) ด้านเพลงที่ใช้สำหรับการสอนพื้นฐาน

4) ด้านการสร้างแรงบันดาลใจ และให้กำลังใจผู้เรียน

5) ด้านการประเมินผลผู้เรียน

การประชุมวิชาการระดับชาติและนานาชาติบ้านสมเด็จเจ้าพระยา ครั้งที่ 1 (BS2C 2025)
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3. ขอบเขตสถานที่

ภาควิชาดนตรีไทย วิทยาลัยการดนตรี มหาวิทยาลัยราชภัฏบ้านสมเด็จเจ้าพระยา

4. ประโยชน์ที่คาดว่าจะได้รับ

1. ทราบถึงแนวทางการสอนพื้นฐานระนาดทุ้มสำหรับนักศึกษาชั้นปีที่ 1 วิทยาลัยการดนตรี มหาวิทยาลัยราชภัฏบ้านสมเด็จเจ้าพระยา กรณีศึกษาผู้ช่วยศาสตราจารย์ ดร.วงศ์วสันต์ วสันตสุรีย์

2. เพื่อเป็นแนวทางให้กับผู้สอนระนาดทุ้มนำไปประยุกต์ใช้ในการเรียนการสอนสำหรับผู้เรียนระดับอุดมศึกษา

5. นิยามศัพท์เฉพาะ

แนวทางการสอนพื้นฐานระนาดทุ้ม หมายถึง แนวทางสอนสำหรับนักศึกษาชั้นปีที่ 1 ที่มีพื้นฐานแตกต่างกัน จึงมีเนื้อหาตั้งแต่การปรับพื้นฐานเพื่อให้ผู้เรียนมีพื้นฐานที่ใกล้เคียงกัน และปูพื้นฐานเพื่อวางรากฐานให้แข็งแรงเพื่อให้ผู้เรียนเรียนรู้บทเพลงหรือทำนองที่ซับซ้อนได้ง่ายและเร็วขึ้น โดยมีเนื้อหาการสอนได้แก่ 1) การสำรวจความพร้อมของผู้เรียน 2) การปรับพื้นฐานผู้เรียน 3) เพลงที่ใช้สำหรับการสอนพื้นฐาน 4) การสร้างแรงบันดาลใจสำหรับผู้เรียน 5) การประเมินผลผู้เรียน

6. วิธีการดำเนินการวิจัย

เครื่องมือการวิจัย

เครื่องมือที่ใช้ในการเก็บรวบรวมข้อมูล ได้แก่ แบบสัมภาษณ์แบบกึ่งโครงสร้าง โดยประกอบไปด้วย 5 ประเด็น ได้แก่

1) การสำรวจความพร้อมของผู้เรียน

2) การปรับพื้นฐานผู้เรียน

3) เพลงที่ใช้สำหรับการสอนพื้นฐาน

4) การสร้างแรงบันดาลใจสำหรับผู้เรียน

5) การประเมินผลผู้เรียน

ผู้วิจัยนำแบบสัมภาษณ์ที่สร้างขึ้นให้ผู้เชี่ยวชาญ 3 ท่านพิจารณาตรวจสอบความเที่ยงตรงของเนื้อหา (IOC: Index of Objective Congruence) โดยคัดเลือกหัวข้อคำถามที่มีค่าเฉลี่ยการประเมินไม่ต่ำกว่า 0.5

การเก็บรวบรวมข้อมูล

ทำการเก็บข้อมูลเชิงคุณภาพ โดยใช้กระบวนการคัดเลือกผู้ให้ข้อมูลแบบจำเพาะเจาะจง (Purposive Sampling) โดยการสัมภาษณ์จากผู้ช่วยศาสตราจารย์ ดร.วงศ์วสันต์ วสันตสุรีย์ เป็นผู้ที่ให้ข้อมูลหลักเกี่ยวกับแนวทางการสอนพื้นฐานระนาดทุ้มสำหรับนักศึกษาชั้นปีที่ 1 วิทยาลัยการดนตรี มหาวิทยาลัยราชภัฏบ้านสมเด็จเจ้าพระยา โดยมีเกณฑ์การคัดเลือกตามที่ระบุในขอบเขตการวิจัย มีวิธีการเก็บรวบรวมข้อมูล ดังนี้

1. ผู้วิจัยทำการนัดหมายอาจารย์ผู้ให้ข้อมูล

2. สัมภาษณ์อาจารย์ผู้ให้ข้อมูล

3. นำข้อมูลที่ได้จากการสัมภาษณ์มาวิเคราะห์ผล และเรียบเรียงแบบรายงานผลในรูปแบบบรรยายและพรรณนา

4. นำผลข้อมูลที่ได้จากการรายงานผลนำมาสรุปผล อภิปรายผลและข้อเสนอแนะ

การวิเคราะห์ข้อมูล

การวิเคราะห์ข้อมูลครั้งนี้ วิเคราะห์ และเรียบเรียงรายงานผลข้อมูลตามความมุ่งหมายของการวิจัยรูปแบบบรรยาย และพรรณนา โดยเน้นความรัดกุมชัดเจน มีความต่อเนื่องกัน

7. ผลการวิจัย

ด้านการสำรวจความพร้อมของผู้เรียน

("...ครูจะดูจากโครงการพี่สอนน้องว่าเด็กมีพื้นฐานมากน้อยเพียงใด เมื่อถึงเวลาเปิดเทอมหากเด็กมีพื้นฐานถอยลง จะต้องมีการปรับพื้นฐานก่อนต่อเพลง ถ้าพื้นฐานไม่ถอยลงแสดงว่าเด็กพร้อมแล้ว...")

ที่กล่าวมาข้างต้นอาจารย์จะใช้วิธีสังเกตพื้นฐานผู้เรียนจากโครงการพี่สอนน้องเปรียบเสมือนการเตรียมตัวที่จะเปิด ภาคเรียนอย่างจริงจัง หลังจากนั้นจะสังเกตในช่วงเปิดภาคเรียนซึ่งจะมีการทบทวนเพลงพระอาทิตย์ชิงดวง 2 ชั้น โดยสังเกต ว่าหากผู้เรียนมีพื้นฐานเท่าเดิม หรือดีขึ้นแสดงว่าผู้เรียนพร้อมสำหรับการเรียนรู้ หากผู้เรียนมีพื้นฐานที่ถดถอยลงไปอาจารย์ จะต้องมาปรับพื้นฐานผู้เรียนเพิ่มเติม ก่อนที่จะต่อเพลง (วงศ์วสันต์ วสันตสุรีย์, สัมภาษณ์, 18 ตุลาคม 2567)

ด้านการปรับพื้นฐานผู้เรียน

"...ครูจะใช้เพลงพระอาทิตย์ชิงดวง 2 ชั้นเป็นหลักในการปรับพื้นฐาน โดยให้ความสำคัญกับการจับไม้ตั้งแต่นิ้วกลาง นาง ก้อย ซึ่งมีกำลังส่งมาก ๆ ในการตีระนาดทุ้ม ท่านั่งหลังตรง สง่า เน้นความธรรมชาติสบาย น้ำหนักมือสองข้างต้องเท่ากัน ทั้งซ้าย ขวาตีให้เต็มเสียง และคอยปรับเรื่องรสมือในการตี...")

อาจารย์จะใช้วิธีการที่กล่าวมาในการปรับพื้นฐานให้ผู้เรียนมีพื้นฐานให้อยู่ในมาตรฐานที่ใกล้เคียงกันมากที่สุด เพื่อจะ ทำให้ผู้เรียนนั้นมีความพร้อมต่อการเรียนรู้ในระดับที่สูงขึ้นต่อไป โดยวิธีการฝึกพื้นฐานระนาดทุ้มสำหรับนักศึกษาชั้นปีที่ 1 มี ดังนี้

1. การจับไม้ระนาดทุ้ม

ใช้วิธีการจับแบบปากกา ซึ่งอาจารย์ให้ความสำคัญกับการจับไม้เป็นอย่างมาก เพราะหากจับไม้ถูกวิธีขณะเวลาที่ฝึก นั้นก็ทำให้มีกำลังในการตีที่สมบูรณ์แบบ

ภาพที่ 1 การจับไม้ระนาดทุ้ม

การประชุมวิชาการระดับชาติและนานาชาติบ้านสมเด็จเจ้าพระยา ครั้งที่ 1 (BS2C 2025)
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ที่มา : สุภัทรชัย สืบสกุล

2. ท่านั่ง

ผู้เรียนต้องนั่งขัดสมาธิ หลังตรงสง่า และเน้นความธรรมชาติสบาย อยู่ระหว่างกลางระนาดทุ้ม

ภาพที่ 2 ท่านั่ง

ที่มา : สุภัทรชัย สืบสกุล

3. การฝึกพื้นฐาน อาจารย์จะดึงมาจากกลวิธีของการตีระนาดทุ้มมามาถอดเป็นแบบฝึก โดยเรียงจากง่ายไปหายาก ดังนี้

3.1) ตีฉาก เป็นการตีสองมือพร้อม ๆ กัน โดยลงน้ำหนักมือเท่ากันเป็นคู่ 8

- - - ร	- - - ม	- - - ฟ	- - - ซ	- - - ล	- - - ท	- - - ดํ	- - - รํ
- - - รฺ	- - - มฺ	- - - ฟฺ	- - - ซฺ	- - - ลฺ	- - - ทฺ	- - - ด	- - - ร

ภาพที่ 3 แบบฝึก

ที่มา : สุภัทรชัย สืบสกุล

3.2) การตีแบ่งมือไล่เสียงขึ้น - ลง 3 เสียง

ไล่เสียงขึ้น รูปแบบการแบ่งมือ คือ ซ้าย ขวา ขวา

- - ม ฟ	- - ฟ ซ	- - ซ ล	- - ล ท	- - ท ด	- - ดํ รํ	- - รํ มํ	- - มํ ฟํ
- ร - -	- ม - -	- ฟ - -	- ซ - -	- ล - -	- ท - -	- ดํ - -	- รํ - -

ไล่เสียงลง รูปแบบการแบ่งมือ คือ ขวา ซ้าย ซ้าย

- ฟํ - -	- มํ - -	- รํ - -	- ดํ - -	- ท - -	- ล - -	- ซ - -	- ฟ - -
- - มํ รํ	- - รํ ดํ	- - ดํ ท	- - ท ล	- - ล ซ	- - ซ ฟ	- - ฟ ม	- - ม ร

ภาพที่ 4 แบบฝึก

ที่มา : สุภัทรชัย สืบสกุล

3.4) การตีแบ่งมือไล่เสียงขึ้น - ลง 4 เสียง

ไล่เสียงขึ้น รูปแบบการแบ่งมือ คือ ซ้าย ซ้าย ขวา ขวา

ดร - -	ร ม - -	ม ฟ - -	ฟ ซ - -	ซ ล - -	ล ท - -	ทดํ - -	ดํ รํ - -
- - ม ฟ	- - ฟ ซ	- - ซ ล	- - ล ท	- - ท ดํ	- - ดํ รํ	- - รํ มํ	- - มํ ฟํ

ไล่เสียงลง รูปแบบการแบ่งมือ คือ ขวา ขวา ซ้าย ซ้าย

ฟํมํ - -	มํรํ - -	รํดํ - -	ดํท - -	ทล - -	ลซ - -	ซฟ - -	ฟม - -
- - รํดํ	- - ดํท	- -ทล	- - ลซ	- - ซฟ	- - ฟม	- - มร	- - รด

รูปภาพที่ 5 แบบฝึก

ที่มา : สุภัทรชัย สืบสกุล

3.5) การตีดูด คือ การตีกดมือซ้าย และเปิดมือขวา

(ตัวโน้ตที่ขีดเส้นใต้ จะใช้มือซ้ายในการตามกดเสียง)

- - - -	ม ฟ ซ ล	- - - -	ฟ ซ ล ท	- - - -	ซ ล ท ดํ	- - - -	ล ท ดํ รํ
- - - ร	- - - -	- - - ม	- - - -	- - - ฟ	- - - -	- - - ซ	- - - -

รูปภาพที่ 6 แบบฝึก

ที่มา : สุภัทรชัย สืบสกุล

3.6) การตีถ่าง คือ การตีเริ่มต้นด้วยมือซ้ายก่อน และตามด้วยมือขวาเป็นคู่ 8 จากนั้นให้แยกมือซ้าย
ออกไปตีเกินคู่แปด มือขวาตีเสียงเดิม และกลับมาจบที่มือซ้ายเสียงเดิม

- - - ซ	- ซ - -	- - - ล	- ล - -	- - - ท	- ท - -	- - - ดํ	- ดํ - -
- - ซฺ -	- รฺ - ซ	- - ลฺ -	- มฺ – ลฺ	- - ทฺ -	- ฟฺ - ทฺ	- - ด -	- ซฺ - ด

รูปภาพที่ 7 แบบฝึก

ที่มา : ผู้เขียน

อาจารย์แนะนำให้ผู้เรียนฝึกพื้นฐานระนาดทุ้มอย่างสม่ำเสมอจนคล่อง เพื่อให้เกิดความเข้าใจ และมีพื้นฐานที่ดีของ
การตีระนาดทุ้มมากยิ่งขึ้น (วงศ์วสันต์ วสันตสุรีย์, สัมภาษณ์, 18 ตุลาคม 2567)

ด้านเพลงที่ใช้สำหรับการสอนพื้นฐาน

เมื่อผู้เรียนมีทักษะพื้นฐานที่ดีแล้วอาจารย์จึงจะเริ่มต่อเพลงที่เหมาะสมสำหรับพื้นฐานระนาดทุ้มให้ เพื่อให้ผู้เรียนไม่
ฝึกซ้ำซากจนเกินไป และอาจเกิดความเบื่อหน่ายได้ โดยเพลงที่เหมาะสมกับการฝึกพื้นฐานนั้นคือ เพลงสาธุการ

(*"...เพลงสาธุการเป็นการรวบรวมนำแบบฝึกที่กล่าวมาเข้ามาอยู่ในเพลง โดยครูจะผูกกลอนขึ้นมาเองเพื่อที่จะให้
เหมาะสมกับความสามารถของเด็ก หรืออาจจะเริ่มต้นด้วยทางที่และไล่ระดับความยากขึ้นไปตามทักษะที่เพิ่มขึ้นของเด็ก..."*)

อาจารย์ผูกกลอนระนาดทุ้มขึ้นมาเองเพื่อให้เหมาะสมกับความสามารถของผู้เรียน หรืออาจจะเริ่มต้นด้วยทางที่ง่าย
และวรรคต่อ ๆ ไปจะค่อย ๆ เพิ่มความยากขึ้น หากต่อทางระนาดทุ้มจนเกินความสามารถของผู้เรียน ผู้เรียนจะเกิดความ
ท้อแท้ และขาดกำลังใจในงานเรียนรู้ อาจจะทำให้ผู้เรียนอาจจะเกิดความไม่ชอบและไม่อยากเรียน

ในส่วนของการเรียนการสอนนั้นอาจารย์จะกลับมาทบทวนสิ่งที่ได้สอนไปแล้วเสมอ เพื่อเชื่อมโยงระหว่างความรู้เดิม และความรู้ใหม่ที่ผู้เรียนกำลังจะได้รับ ก่อนจบชั่วโมงเรียนอาจารย์จะทบทวนโดยการให้ผู้เรียนปฏิบัติตั้งแต่วรรคแรกจนถึง วรรคสุดท้าย เพื่อเป็นการสรุปการเรียนรู้และความรู้ที่ได้รับ เพื่อนำความรู้ไปประยุกต์ให้กับสถานการณ์อื่น ๆ รวมถึงมีการ รวบรวมข้อมูล โดยการบันทึกคลิปเสียง และการบันทึกวิดีโอ เพื่อให้ผู้เรียนจะได้กลับไปทบทวนความรู้ด้วยตนเอง อาจารย์ยัง เปิดโอกาสให้ผู้เรียนนำความรู้ที่ได้เรียนไปใช้ในสถานการณ์จริง เพื่อฝึกประสบการณ์ในการบรรเลง ผู้เรียนจะได้รู้ ความสามารถของตัวเอง หากผู้เรียนยังทำได้ไม่ดีพอผู้เรียนจะได้นำประสบการณ์ที่ได้รับจากการบรรเลงมาปรับแก้ไข และ พัฒนาทักษะของผู้เรียนให้ดียิ่งขึ้นไป (วงศ์วสันต์ วสันตสุรีย์, สัมภาษณ์, 18 ตุลาคม 2567)

ด้านการสร้างแรงบันดาลใจ และให้กำลังใจผู้เรียน

("...สิ่งที่ดีที่สุดของการเป็นครูอีกอย่างหนึ่ง คือ ต้องเป็นศิลปินที่ดีให้เด็กดู ต้องตีให้เด็กดู เด็ก ๆ อาจจะมองเราเป็น ต้นแบบในการเล่นดนตรี เมื่อเด็กเห็นครูตีก็อยากจะตีให้ได้แบบครูบ้าง ถือว่าเป็นการสร้างกำลังใจให้เด็กมีแรงผลักดันในการ พัฒนาตัวเอง...")

อาจารย์จะไม่เสริมแรงลบจะเสริมแรงบวกอย่างเดียว ใช้ตรรกะและเหตุผลในการสอนเพราะผู้เรียน ยุคใหม่จะมี คำถามตลอดเวลา หากผู้เรียนไม่ถูกใจความสนใจในการเรียนจะลดน้อยลง จึงเน้นการพูดให้คิดมากกว่า รวมถึงสร้างความ เชื่อมั่นให้กับผู้เรียน คอยให้กำลังใจผู้เรียนอยู่สม่ำเสมอ และเมื่อผู้เรียนทำได้ดีอาจารย์จะให้คำชื่นชม หากทำผิดพลาดอาจารย์ จะพูดให้ผู้เรียนคิดพิจารณาตัวเอง และปรับปรุงแก้ไขเพื่อพัฒนาตัวเองให้ดีขึ้น (วงศ์วสันต์ วสันตสุรีย์, สัมภาษณ์, 18 ตุลาคม 2567)

ด้านการประเมินผลผู้เรียน

การประเมินผลแบ่งเป็น 2 แบบ คือ

1.การประเมินตามสภาพจริง ได้แก่ ประเมินภายในชั่วโมงเรียน เพื่อสังเกตว่าผู้เรียนจำบทเรียนที่ได้เรียนรู้ได้หรือไม่ รวมถึงอาจารย์จะสังเกตผู้เรียนในทุกครั้งที่เข้าเรียนว่ามีพัฒนาการไปในทิศทางใด

2. การประเมินทักษะดนตรี คือ การประเมินแบบให้ผลคะแนน แบ่งเป็น

  2.1 คะแนนความแม่นยำในทำนองหลัก

  2.2 คะแนนทักษะระนาดทุ้ม

  2.3 คะแนนจากการปฏิบัติรวมวง

  2.4 คะแนนความตั้งใจ และพัฒนาการที่ดีรายบุคคล

ในการประเมินผู้เรียนอาจารย์จะแจ้งผลให้ผู้เรียนทราบ รวมถึงยังให้คำแนะนำต่าง ๆ เพื่อให้ผู้เรียนได้นำไปปรับปรุง และพัฒนาตัวเอง หากผู้เรียนทำได้ดีอาจารย์จะชื่นชม เพื่อเป็นกำลังใจในการเรียน หากมีข้อบกพร่องอาจารย์จะชี้แจงและให้ ปรับปรุงแก้ไข เพื่อให้เกิดการพัฒนาการที่ดียิ่งขึ้น (วงศ์วสันต์ วสันตสุรีย์, สัมภาษณ์, 18 ตุลาคม 2567).

8. อภิปรายผลการวิจัย

จากการศึกษาแนวทางการสอนพื้นฐานระนาดทุ้มสำหรับนักศึกษาชั้นปีที่ 1 วิทยาลัยการดนตรี มหาวิทยาลัยราชภัฏบ้านสมเด็จเจ้าพระยา กรณีศึกษาผู้ช่วยศาสตราจารย์ ดร.วงศ์วสันต์ วสันตสุรีย์ ผู้วิจัยได้เห็นประเด็นที่ น่าสนใจจากผลการวิจัย โดยสรุปออกมาเป็นประเด็นอภิปรายผลได้ดังนี้

1. ด้านการสำรวจความพร้อมของผู้เรียน อาจารย์ใช้โครงการพี่สอนน้องเป็นการปรับพื้นฐานก่อนเปิดภาคเรียน จากนั้นในช่วงเปิดภาคเรียนจะสังเกตผู้เรียนระหว่างทบทวนเพลงพระอาทิตย์ชิงดวง 2 ชั้น หากผู้เรียนมีพื้นฐานเท่าเดิมหรือดี

ขึ้น แสดงว่าพร้อมสำหรับการเรียนรู้ต่อไป แต่หากพื้นฐานถดถอย อาจารย์จะปรับพื้นฐานเพิ่มเติมก่อนสอนเพลงต่อ ซึ่งมีความ สอดคล้องกับ ฐิยาพร กันตาธนวัฒน์ (2564) ที่กล่าวว่า เมื่อบุคคลมีความพร้อมของร่างกายที่จะเรียนหรือกระทำสิ่งใด ย่อมจะ เกิดความพึงพอใจ การสำรวจความพร้อมของผู้เรียนนั้นจึงมีความสำคัญ เพื่อเป็นการช่วยสร้างความพร้อมทางการเรียนให้แก่ ผู้เรียนว่ายังขาดสิ่งใดไป อีกทั้งยังถือว่าเป็นการตรวจสอบความรู้เดิม

2. ด้านการปรับพื้นฐานนักศึกษาชั้นปีที่ 1 อาจารย์เริ่มปรับตั้งแต่การจับไม้ โดยให้ความสำคัญกับการจับไม้ตั้งแต่ นิ้วกลาง นาง ก้อย ซึ่งกำลังส่งมาก ๆ ในการตีระนาดทุ้ม ท่านั่งนั่งหลังตรง สง่า เน้นความธรรมชาติสบาย และการใช้แบบฝึก ทักษะ อาจารย์ให้ผู้เรียนฝึกพื้นฐานระนาดทุ้มซ้ำไปซ้ำมาอย่างสม่ำเสมอจนคล่อง เพื่อให้เกิดความเข้าใจ และมีพื้นฐานที่ดีของ การตีระนาดทุ้มมากยิ่งขึ้น ซึ่งมีความสอดคล้องกับอัชรา เอิบสุขสิริ (2559) กล่าวไว้ว่า การกระทำซ้ำ ๆ จะช่วยให้เกิดการ เรียนรู้ที่มั่นคงถาวร ส่วนการกระทำที่ไม่เกิดขึ้นอย่างต่อเนื่องจะทำให้ไม่เกิดการเรียนรู้ที่ถาวร ซึ่งการฝึกทักษะนั้นจำเป็นที่ จะต้องให้ผู้เรียนฝึกอย่างซ้ำไปซ้ำมาอย่างสม่ำเสมอ จะช่วยให้ผู้เรียนผู้ความรู้และเข้าใจเรื่องนั้น

3. ด้านเพลงที่ใช้สำหรับการสอนพื้นฐาน อาจารย์ใช้เพลงสาธุการ ซึ่งเป็นเพลงที่รวบรวมแบบฝึก ที่ใช้ในการปรับพื้นฐานเข้ามาอยู่ในเพลง ซึ่งอาจารย์ออกแบบการสอนระนาดทุ้มให้เหมาะกับความสามารถของผู้เรียน โดยเริ่ม จากทางง่ายและค่อย ๆ เพิ่มความยากขึ้น รวมถึงทบทวนบทเรียนเสมอเพื่อเชื่อมโยงความรู้เดิมกับความรู้ใหม่ให้สอดคล้องกัน ก่อนจบชั่วโมงจะให้ผู้เรียนปฏิบัติเพื่อสรุปความรู้ พร้อมอัดคลิปเสียงและวิดีโอเพื่อให้ผู้เรียนทบทวนด้วยตนเอง นอกจากนี้ ยัง ส่งเสริมให้ผู้เรียนได้บรรเลงในสถานการณ์จริง เพื่อฝึกประสบการณ์และพัฒนาทักษะในการบรรเลง ซึ่งมีความสอดคล้องกับ ทิศนา แขมมณี (2546) ที่กล่าวถึงหลักการสอนของแฮร์บาร์ตว่า การเชื่อมโยงความรู้ใหม่ กับความรู้เดิมเป็นการให้ผู้เรียนได้ ฝึกเปรียบเทียบความแตกต่าง และความคล้ายคลึงกันระหว่างความรู้ใหม่และความรู้เดิม เพื่อให้เกิดความเข้าใจในบทเรียน อีกทั้งยังมีการสรุปความรู้เพื่อช่วยให้ผู้เรียนเข้าใจสิ่งที่ได้เรียนไปมากยิ่งขึ้น และให้ผู้เรียนนำความรู้ที่ได้รับไปใช้ในสถานการณ์ จริง เพื่อให้ผู้เรียนเกิดประสบการณ์ และหากมีความผิดพลาดผู้เรียนก็จะเรียนรู้ในการแก้ไขปัญหาในสถานการณ์ใหม่ ๆ ที่ไม่ใช่ ในห้องเรียน

4. ด้านการสร้างแรงบันดาลใจ และให้กำลังใจผู้เรียนโดยมุ่งเน้นการเป็นแบบอย่างที่ดีในการเล่นดนตรี สร้างแรง บันดาลใจให้ผู้เรียนพัฒนา โดยใช้การเสริมแรงบวกและการสอนด้วยตรรกะและเหตุผล เพื่อกระตุ้นการคิดและสร้างความ มั่นใจให้ผู้เรียน หากผู้เรียนทำได้ดีจะได้รับคำชม ส่วนเมื่อเกิดข้อผิดพลาดจะให้ผู้เรียนคิดและพิจารณาตนเอง เพื่อให้สามารถ ปรับปรุงและพัฒนาตนเองต่อไป ซึ่งมีความสอดคล้องกับ ศศิธร เวียงวะลัย (2556) ได้กล่าวว่า การสร้างแรงจูงใจนับว่าสำคัญ มาก เพราะจะทำให้ผู้เรียนเกิดความพอใจ รางวัลจึงเป็นสิ่งควบคุม พฤติกรรมของผู้เรียน ครูจะต้องให้ผู้เรียนรู้ผลการกระทำ หรือผลการเรียน เพราะการรู้ผลจะทำให้ผู้เรียนทราบว่าการกระทำนั้นถูกต้องหรือไม่ถูกต้อง ถ้าการกระทำนั้นผิด หรือไม่เป็นที่ พอใจเขาก็จะได้รับการแก้ไขปรับปรุงให้ถูกต้อง

5. ด้านการประเมินผลผู้เรียน แบ่งเป็น 2 แบบ ได้แก่ การประเมินตามสภาพจริง โดยประเมินภายในชั่วโมงเรียน และสังเกตพัฒนาการของผู้เรียนทุกครั้งที่เข้าเรียน ซึ่งมีความสอดคล้องกับ ชัยวัฒน์ สุทธิรัตน์ (2554) กล่าวไว้ว่า การประเมิน ตามสภาพจริงเป็นความสามารถในการแก้ปัญหาและการแสดงออกที่เกิดจากการปฏิบัติ ในสภาพจริงอยู่บนพื้นฐานของ เหตุการณ์จริงในชีวิตจริง เน้นพัฒนาการที่ปรากฏให้เห็นทั้งในและ นอกห้องเรียน รวมทั้งเป็นการประเมินที่มีลักษณะแบบไม่ เป็นทางการ และการประเมินทักษะดนตรี แบ่งเป็นคะแนนความแม่นยำในทำนอง ทักษะระนาดทุ้ม การปฏิบัติรวมวง และ ความตั้งใจพร้อมพัฒนาการของแต่ละคน อาจารย์จะแจ้งผลประเมินพร้อมให้คำแนะนำเพื่อการพัฒนา หากผู้เรียนทำได้ดีจะได้ รับคำชม เพื่อสร้างกำลังใจ แต่หากมีข้อบกพร่องจะชี้แจงและแนะนำเพื่อให้ปรับปรุงต่อไป ซึ่งมีความสอดคล้องกับ Brophy (2019) ที่กล่าวว่า ในการวัดและประเมินผลทักษะทางดนตรีในระดับอุดมศึกษา นับว่ามีความสำคัญอย่างยิ่งต่อ กระบวนการเรียนรู้รายวิชาดนตรี เนื่องจากเป็นระดับการเรียนการสอนที่มุ่งเน้นให้ ผู้เรียนสามารถต่อยอดจากความรู้ในการ

การประชุมวิชาการระดับชาติและนานาชาติบ้านสมเด็จเจ้าพระยา ครั้งที่ 1 (BS2C 2025)
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เรียนการสอนเพื่อนำไปประกอบเป็นวิชาชีพได้ รวมทั้งเน้นการปฏิบัติเพื่อให้เกิด ทักษะทางด้านดนตรีขั้นพื้นฐานไปสู่ขั้นสูงได้ และยังเป็นการสะท้อนผลจากการเรียนการสอนไปสู่ทั้งตัวผู้สอนและผู้เรียน เพื่อให้เกิดการพัฒนาทั้งในแง่ ของการเรียนการสอนและการฝึกซ้อมเพื่อบรรลุวัตถุประสงค์ของการเรียนรู้

9. บทสรุป

แนวทางการสอนพื้นฐานระนาดทุ้มสำหรับนักศึกษาชั้นปีที่ 1 ของผู้ช่วยศาสตราจารย์ ดร.วงศ์วสันต์ วสันตสุรีย์ มุ่งเน้นไปที่การสำรวจความพร้อมของผู้เรียนในขั้นต้น โดยใช้การสังเกตพื้นฐานที่ผู้เรียนมี ว่าคงเดิม ดีขึ้น หรือถดถอยลง เพื่อเป็นการประเมินว่าผู้เรียนพร้อมสำหรับการเรียนรู้หรือไม่ หากพบว่าผู้เรียนมีพื้นฐานที่อ่อนลง อาจารย์จะทำการปรับพื้นฐาน ผ่านการฝึกฝนใน 3 ด้านหลัก ได้แก่ 1) การจับไม้ สอนทักษะการจับไม้ระนาดทุ้มที่ถูกต้อง 2) ท่านั่ง ปรับท่านั่งให้เหมาะสม สำหรับการตีระนาดทุ้ม 3) แบบฝึกพื้นฐาน มุ่งให้ผู้เรียนฝึกฝนอย่างสม่ำเสมอจนคล่องแคล่ว เพลงพื้นฐานที่เลือกใช้ในการฝึก คือเพลง "สาธุการ" เนื่องจากเป็นเพลงที่รวบรวมเทคนิคพื้นฐานต่าง ๆ ที่จำเป็นต่อการฝึกฝนระนาดทุ้ม โดยอาจารย์จะผูก กลอนระนาดขึ้นมาเองให้เหมาะสมกับระดับความสามารถของผู้เรียน โดยเริ่มจากทางง่าย และค่อย ๆ เพิ่มความยากขึ้นเพื่อ พัฒนาไปตามระดับของนักศึกษา ทั้งนี้ อาจารย์หลีกเลี่ยงการให้ทางที่ยากเกินไปเพื่อป้องกันไม่ให้ผู้เรียนท้อแท้และหมด กำลังใจ ในการสอนอาจารย์เน้นการสร้างแรงบันดาลใจและกำลังใจแก่ผู้เรียน โดยใช้วิธีเสริมแรงทางบวก หากผู้เรียนทำผิด อาจารย์จะใช้การสอนโดยตรรกะและเหตุผล เนื่องจากผู้เรียนยุคใหม่มักมีคำถามและต้องการเหตุผลในทุกคำตอบ อาจารย์จึง ให้คำอธิบายที่ชัดเจนมากกว่าการตำหนิ นอกจากนี้ ยังสร้างความเชื่อมั่นให้กับผู้เรียนและคอยให้กำลังใจอยู่เสมอ และการ ประเมินผลแบ่งออกเป็น 2 ประเภท คือ 1) การประเมินตามสภาพจริง โดยการสังเกตพัฒนาการของผู้เรียนภายในชั่วโมงเรียน 2) การประเมินทักษะทางดนตรี อีกทั้งอาจารย์ยังให้คำแนะนำเพื่อช่วยให้ผู้เรียนสามารถนำไปปรับปรุงและพัฒนาตัวเองในการ เล่นระนาดทุ้มต่อไปในอนาคต

10. ข้อเสนอแนะในการวิจัยครั้งต่อไป

ควรมีงานวิจัยที่เกี่ยวข้องกับแนวทางการสอนพื้นฐานของนักศึกษาชั้นปีที่ 1 ของเครื่องดนตรีไทยชนิดอื่น ๆ เช่น ระนาดเอก ฆ้องวงใหญ่ ปี่ใน ตะโพนไทย เป็นต้น เพื่อสะท้อนให้เห็นถึงความสำคัญของพื้นฐานการเล่นดนตรีไทย พื้นฐานที่ดี เปรียบเสมือนการปูรากฐานที่มั่นคงในการเรียนรู้สิ่งใหม่ ๆ ในการเล่นดนตรีไทย หากผู้เรียนมีพื้นฐานที่ดีพวกเขาจะสามารถ เรียนรู้บทเพลงหรือทำนองที่ซับซ้อนได้ง่ายและเร็วขึ้น นอกจากนี้ยังช่วยให้ผู้เรียนมีความมั่นใจและสนุกกับการเรียนรู้มากขึ้น

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การพัฒนาวงปี่พาทย์มอญในรูปแบบเวทีลอยฟ้าของคณะสนั่น แก้วบูชา

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บทคัดย่อ

บทความวิจัยนี้มีวัตถุประสงค์เพื่อศึกษาการพัฒนาวงปี่พาทย์มอญในรูปแบบเวทีลอยฟ้าของคณะสนั่น แก้วบูชา โดยใช้ระเบียบวิธีวิจัยเชิงคุณภาพ โดยการเก็บข้อมูลด้วยการสัมภาษณ์เชิงลึก ผลวิจัยพบว่า วงปี่พาทย์มอญ คณะสนั่น แก้วบูชา เป็นวงปี่พาทย์ที่มีการสืบทอดจากบรรพบุรุษมาอย่างช้านานจากรุ่นสู่รุ่น และมีชื่อเสียงในจังหวัดนครปฐม เป็นอย่างมาก ครูสนั่น แก้วบูชา เป็นบุคคลคนแรกที่ริเริ่มพัฒนาเวทีปี่พาทย์มอญ โดยการนำรูปแบบเวทีลอยฟ้ามาปรับใช้ใน การบรรเลงวงปี่พาทย์มอญ เพื่อยกระดับการบรรเลงให้มีความโดดเด่นให้เข้ากับยุคสมัยมากยิ่งขึ้น เป็นการประดิษฐ์คิดค้น เพื่อประยุกต์ วงปี่พาทย์มอญให้มีความเหมาะสมกับสังคมในปัจจุบัน และตอบสนองความต้องการของผู้จ้างงานที่ต้องการ ความโดดเด่น ความเป็นเอกลักษณ์ และความแตกต่าง ซึ่งการประยุกต์เหล่านี้ล้วนแล้วแต่ส่งผลให้วงปี่พาทย์มอญ คณะสนั่น แก้วบูชา สามารถดำรงอยู่ได้ในสังคมปัจจุบัน นำไปสู่การสร้างสรรค์อนุรักษ์ส่งเสริมวัฒนธรรมในสังคมไทย

คำสำคัญ: คณะสนั่น แก้วบูชา; วงปี่พาทย์มอญ; วงปี่พาทย์มอญรูปแบบเวทีลอยฟ้า

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The development of the Mon Piphat ensemble in the form of an elevated stage by the Sanan Kaewbucha group.

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Abstract

This research piece aims to analyse the growth of the Piphat Mon ensemble in the Sanan Kaewbucha group's elevated stage format utilising qualitative research methods, using data collected through in-depth interviews. The search showed that the Piphat Mon ensemble of the Sanan Kaewbucha group has been passed down through generations and is well-known in Nakhon Pathom Province. Teacher Sanan Kaewbucha was the first to create the Piphat Mon stage, using the elevated stage concept for performances to highlight the music and make it more modern. This invention intended to modernise the Piphat Mon ensemble and fulfil the needs of employers who value originality, distinction, and personality. These changes have kept the Sanan Kaewbucha Piphat Mon ensemble relevant in today's society, helping maintain and promote Thai culture.

Keywords: Phiphat Mon, Mon Piphat Ensemble with elevated stage Format, Sanan Kaewbucha

1. บทนำ

      ดนตรีเป็นสิ่งที่มนุษย์สร้างขึ้นเพื่อตอบสนองความต้องการทางด้านจิตใจ เป็นสิ่งที่ให้ความสุข บทบาทของดนตรี จึงมีความสำคัญกับมนุษย์ตั้งแต่เกิดจนตาย ดนตรีถือว่ามีความสำคัญกับการดำรงชีวิตของมนุษย์ การดำรงชีวิตของคนไทยใน อดีตนั้น ดนตรีถือเป็นส่วนประกอบในทุก ๆ วัฒนธรรมประเพณีส่งผลให้มีการสืบทอดและปฏิบัติกันเรื่อยมา ดนตรีมีบทบาท สำคัญในวัฒนธรรมไทย โดยสะท้อนถึงความเชื่อ ศิลปะและวิถีชีวิตของคนในสังคมแต่ละยุคสมัยมีความเชื่อมโยงกับประเพณี และพิธีกรรมต่าง ๆ เช่น การบรรเลงเพลงในงานบวชหรืองานศพ ซึ่งมีความหมายและความสำคัญทางจิตใจ (ชัชวาลย์ แก้วบูชา, 2557 : น.1)

      ปัจจุบันดนตรีไทยมีการพัฒนาและเปลี่ยนแปลงไปตามค่านิยมของผู้คนในสังคม เพื่อให้ทันยุคทันสมัยและสอดคล้อง กับบริบทสังคมในปัจจุบัน ทั้งในเรื่องของการอนุรักษ์และการสร้างสรรค์งานใหม่ ๆ ที่ผสมผสานกับแนวดนตรีสมัยใหม่ ที่ ตอบสนองต่อความเปลี่ยนแปลงของสังคมและยุคสมัย ดนตรีไทยจากอดีตสู่ปัจจุบันจึงมีการพัฒนาขึ้นอย่างเรื่อย ๆ เพื่อยังคง สามารถอยู่ร่วมกับสังคมในปัจจุบันที่มีการเปลี่ยนแปลงอย่างต่อเนื่องได้และยังเป็นการอนุรักษ์มรดกทางวัฒนธรรมเพื่อไม่ให้ สูญหายอีกด้วย (จักกฤษณ์ วัฒนากูล, 2564 : น.1)

      การพัฒนาวงปี่พาทยมอญในปัจจุบันมีการเจริญเติบโตอย่างมาก โดยการขยายรูปแบบการจัดวงให้มีความสง่างาม ความสวยงามและความยิ่งใหญ่ เป็นการจัดวงปี่พาทย์มอญแบบพิเศษที่เปลี่ยนแปลงไปจากรูปแบบเดิม บ้างอาจจะมีฆ้องมอญ 10 ถึง 20 โค้ง มีการใช้รูปแบบเวทีที่หลากหลาย แตกต่างกันไปและยังมีการประดับไฟเพื่อความสวยงามและความโดดเด่น ของวงปี่พาทยมอญ มีการนำระบบ แสง สี เสียง เข้ามาใช้ในวงปี่พาทย์มอญ เพื่อให้เกิดความน่าสนใจและมีความสมบูรณ์ ในการบรรเลงมากยิ่งขึ้น

      วงปี่พาทย์มอญคณะสนั่น แก้วบูชา เริ่มก่อตั้งวงเมื่อปี พ.ศ. 2506 โดยการสืบทอดวงปี่พาทย์มอญจาก นายจำนอง แก้วบูชา ซึ่งเป็นบิดาจากนั้นครูสนั่น แก้วบูชา ได้พัฒนาวงปี่พาทย์มอญมาอย่างต่อเนื่องจนปัจจุบัน มีฆ้องมอญถึง 30 โค้ง และ มีการพัฒนาองค์ประกอบส่วนต่าง ๆ ของวงให้มีความทันยุคทันสมัยอยู่ตลอดเวลา ไม่ว่าจะเป็น เวที แสง สี เสียง เป็นต้น และ สิ่งที่ทำให้วงปี่พาทย์มอญคณะสนั่น แก้วบูชา มีชื่อเสียงและเป็นรู้จักมากยิ่งขึ้นคือ การพัฒนาเวทีปี่พาทย์รูปแบบเวทีลอยฟ้า เริ่มต้นจากเวที 2 ชั้น จนถึง 5 ชั้น ซึ่งสามารถตั้งฆ้องมอญที่ใช้ในการบรรเลงได้ถึง 20 โค้ง ซึ่งถือได้ว่าครูสนั่น แก้วบูชา เป็นบุคคลแรก ๆ ในวงการปี่พาทย์ที่คิดค้นพัฒนารูปแบบเวทีให้มีความอลังการและยิ่งใหญ่มากยิ่งขึ้น (เสนาะ แก้วบูชา ,สัมภาษณ์, 1 ตุลาคม 2567)

      การพัฒนาวงปี่พาทย์มอญในรูปแบบเวทีลอยฟ้าของคณะสนั่น แก้วบูชา เป็นการพัฒนาและสร้างสรรค์ โดยมีลักษณะเด่นดังนี้ แนวคิดและการออกแบบการสร้างสรรค์เวทีลอยฟ้าที่ถูกออกแบบให้มีความสวยงามและ เข้ากับบรรยากาศของงานและการบรรเลง ทำให้ผู้ชมสามารถเห็นการบรรเลงได้อย่างชัดเจน รวมถึงสร้างความหน้าตื่นตาตื่น ใจให้กับผู้รับชม รูปแบบเวทีลอยฟ้าช่วยให้การบรรเลงเข้าถึงผู้ชมได้มากขึ้น โดยเฉพาะในงานที่มีการบรรเลงกลางแจ้ง ที่มีผู้คนจำนวนมาก การนำเสนอในรูปแบบนี้ ไม่เพียงแต่รักษาเอกลักษณ์ของวงดนตรี แต่ยังช่วยเผยแพร่และส่งเสริม วัฒนธรรมให้มีความกว้างขวางยิ่งขึ้น ในขณะที่ จักกฤษณ์ วัฒนากูล (2564) ศึกษาเรื่องพัฒนาการและบทบาทของ วงปี่พาทย์มอญในอำเภอเมือง จังหวัดสุพรรณบุรี การพัฒนาอีกหนึ่งรูปแบบคือ านรูปลักษณ์ ต าง ๆ ของวงป พาทย มอญซึ่ง ถือว าเป นอีกหนึ่งจุดที่สามารถดึงดูดความสนใจต อผู ว จ างให มีต อคณะป พาทย แต ละคณะ โดยมีการใช เทคโนโลยีรวมทั้ง าน ต าง ๆ เข ามามีส วนร วมในการพัฒนา ทั้งนี้ ผู้วิจัยยังไม่พบงานวิจัยที่เกี่ยวข้องกับการพัฒนาวงปี่พาทย์มอญในรูปแบบ เวทีลอยฟ้า คณะสนั่น แก้วบูชา มักจะร่วมมือกับหน่วยงานหรือองค์กรต่าง ๆ เพื่อสร้างสรรค์การแสดงที่มีคุณภาพและดึงดูดผู้ชมด้วยแนวทางเหล่านี้ การ

พัฒนาวงปี่พาทย์มอญในรูปแบบเวทีลอยฟ้าของคณะสนั่น แก้วบูชา จึงเป็นการสร้างสรรค์ ที่นำไปสู่การ
อนุรักษ์และส่งเสริมวัฒนธรรมในสังคมไทยอย่างยั่งยืน

2. วัตถุประสงค์ของการวิจัย

เพื่อศึกษาการพัฒนาวงปี่พาทย์มอญในรูปแบบเวทีลอยฟ้าของคณะสนั่น แก้วบูชา

3. ขอบเขตการวิจัย

1. ขอบเขตผู้ให้ข้อมูล

- นายเสนาะ แก้วบูชา

- นายประสาร เอี่ยมจร

- นายชัชวาล แก้วบูชา

2. ขอบเขตข้อมูล

- ประวัติวงปี่พาทย์คณะสนั่น แก้วบูชา

- ประวัติครูสนั่น แก้วบูชา

- การสืบทอดและการดำรงอยู่ของวงปี่พาทย์คณะสนั่น แก้วบูชา

- การพัฒนาวงปี่พาทย์มอญรูปแบบเวทีลอยฟ้าของคณะสนั่น แก้วบูชา

(1) วงปี่พาทย์มอญรูปแบบเวทีลอยฟ้ายุคเริ่มต้น

(2) วงปี่พาทย์มอญรูปแบบเวทีลอยฟ้ายุคกลาง

(3) วงปี่พาทย์มอญรูปแบบเวทีลอยฟ้ายุคปัจจุบัน

4. ประโยชน์ที่คาดว่าจะได้รับจากการวิจัย

1. ทราบถึงประวัติความเป็นมาของวงปี่พาทย์คณะสนั่น แก้วบูชา

2. ทราบถึงกระบวนการสืบทอดของวงปี่พาทย์คณะสนั่น แก้วบูชา

3. ทราบถึงแนวคิดในการพัฒนาวงปี่พาทย์มอญรูปแบบเวทีลอยของคณะสนั่น แก้วบูชา

5. นิยามศัพท์เฉพาะ

วงปี่พาทย์คณะสนั่น แก้วบูชา หมายถึง วงปี่พาทย์ของครูสนั่น แก้วบูชา ศิลปินดีเด่นประจำจังหวัดนครปฐม

การสืบทอด หมายถึง การถ่ายทอดความรู้ทางด้านดนตรีไทยของวงปี่พาทย์คณะสนั่น แก้วบูชา จากรุ่นสู่รุ่น

เวทีปี่พาทย์ลอยฟ้า หมายถึง เวทีตั้งวงปี่พาทย์มอญที่ถูกประยุกต์ขึ้นใหม่ให้มีความยิ่งใหญ่อลังการโดยครูสนั่น
แก้วบูชา เป็นผู้ริเริ่มจัดสร้าง

6. วิธีดำเนินการวิจัย

เครื่องมือการวิจัย

เครื่องมือที่ใช้ในการเก็บรวบรวมข้อมูล ได้แก่ แบบสัมภาษณ์แบบกึ่งโครงสร้าง และผู้วิจัยนำแบบสัมภาษณ์ที่
สร้างขึ้นให้ผู้เชี่ยวชาญพิจารณาตรวจสอบความเที่ยงตรงของเนื้อหา (IOC: Index of Objective Congrueuec) 3 ท่าน
โดยมีค่าความเที่ยงตรงในทุกข้อของแบบสัมภาษณ์ ไม่ต่ำกว่า 0.5 โดยประกอบไปด้วย 5 ประเด็น ดังนี้

(1) ข้อมูลส่วนตัว

(2) ประวัติความเป็นมาของวงปี่พาทย์คณะสนั่น แก้วบูชา

(3) การสืบทอดวงปี่พาทย์คณะสนั่น แก้วบูชา

(4) การถ่ายทอดบทเพลงของวงปี่พาทย์ของวงปี่พาทย์คณะสนั่น แก้วบูชา

(5) การวิวัฒนาการของวงปี่พาทย์คณะสนั่น แก้วบูชา

การเก็บรวบรวมข้อมูล ทำการเก็บข้อมูลเชิงคุณภาพ โดยใช้กระบวนการคัดเลือกผู้ให้ข้อมูลแบบจำเพาะเจาะจง (Purposive Sampling)

- วิเคราะห์เอกสารการบันทึกภาพเพื่อนำมาเป็นประเด็นในการสัมภาษณ์

- สัมภาษณ์จากนายเสนาะ แก้วบูชา ผู้ที่ให้ข้อมูลหลักเกี่ยวกับประวัติความเป็นมาของวงปี่พาทย์มอญ คณะสนั่น แก้วบูชา

- สัมภาษณ์จากนายประสาร เอี่ยมจร ผู้ที่ให้ข้อมูลหลักเกี่ยวกับการสืบทอดและการถ่ายทอดความรู้ ของวงปี่พาทย์มอญคณะสนั่น แก้วบูชา

- สัมภาษณ์นายชัชวาลย์ แก้วบูชา ผู้ให้ข้อมูลด้านการพัฒนาวงปี่พาทย์มอญรูปแบบเวทีลอยฟ้าของ คณะสนั่น แก้วบูชา

การวิเคราะห์ข้อมูล การวิเคราะห์ข้อมูลครั้งนี้ วิเคราะห์ข้อมูลตามความมุ่งหมายของการวิจัย ด้วยวิธีการวิเคราะห์ เนื้อหา (Content Analysis) โดยเน้นที่ความถูกต้องรัดกุมชัดเจน มีความต่อเนื่องเชื่อมโยงและตอบวัตถุประสงค์

7. ผลการวิจัย

ภาพที่ 1 วงปี่พาทย์มอญคณะสนั่น แก้วบูชา

ที่มา: ธนิต ฉิมงามขำ

วงปี่พาทย์มอญคณะสนั่น แก้วบูชา ตั้งอยู่บ้านเลขที่ 28/3 หมู่ที่ 3 ตำบลวัดละมุด อำเภอนครชัยศรี จังหวัดนครปฐม ได้ก่อตั้งขึ้นเมื่อปี พ.ศ. 2506 โดยเริ่มจากนายจำนอง แก้วบูชา(บิดา) ได้แบ่งเครื่องดนตรีให้กับลูก ๆ เพื่อนำไปประกอบอาชีพก่อตั้งวงปี่พาทย์มอญเป็นของตนเอง โดยเริ่มต้นจากวงปี่พาทย์มอญเครื่องคู่

นายสนั่น แก้วบูชา ก็เริ่มรับงานมาตลอดเวลา จนกระทั่งปี พ.ศ. 2515 ก็มีฆ้องมอญเพิ่มขึ้นเรื่อย ๆ จนปัจจุบันมีถึง 30 โค้ง และได้มีการพัฒนาวงอย่างต่อเนื่อง ไม่ว่าจะเป็นด้านการบรรเลง รูปแบบของวงในส่วนต่าง ๆ และที่ทำให้วงปี่พาทย์มอญ คณะสนั่น แก้วบูชา มีชื่อเสียงเป็นอย่างมากคือการสร้างสรรค์ผลงานทางด้านเวที การบรรเลงวงปี่พาทย์มอญในรูปแบบ เวทีลอยฟ้า เพื่อเพิ่มความอลังการและความสง่างามให้กับวงปี่พาทย์มอญของตนเองจึงทำให้วงมีชื่อเสียงและเป็นที่ยอมรับ ในวงการดนตรีไทย จนทำให้ในปี พ.ศ. 2545 ครูสนั่น แก้วบูชา ได้รับรางวัลศิลปินดีเด่น (สาขาดนตรีไทย) ประจำจังหวัดนครปฐม (เสนาะ แก้วบูชา, สัมภาษณ์, 1 ตุลาคม 2567)

ครูสนั่น แก้วบูชา เกิดเมื่อวันที่ 22 ธันวาคม พ.ศ. 2477 และถึงแก่กรรม เมื่อวันที่ 27 เมษายน พ.ศ. 2567 สิริอายุ 90 ปี จบการศึกษาชั้นประถมศึกษาปีที่ 4 จากโรงเรียนวัดใหม่สุคนธาราม ตำบลวัดละมุด อำเภอนครชัยศรี จังหวัดนครปฐม เริ่มเรียนดนตรีไทยจากบิดา คือ คุณพ่อนอง แก้วบูชา ได้รับตำแหน่งเป็นมือระนาดเอก ประจำวง ต่อมาบิดา ได้ส่งให้ไปเรียนกับครูทองดี เดชชาวนา ที่บ้านโพรงมะเดื่อ จนเรียนจบกระบวนเพลงเพลงโหมโรงเย็น จากนั้นได้ต่อเพลงเกร็ด เพลงสองชั้น จนสามารถบรรเลงประกอบการแสดงลิเกได้ และเป็นที่ยอมรับในหมู่นักดนตรีในยุคนั้นว่า นายสนั่น แก้วบูชา คือ คนระนาดฝีมือดีและเชี่ยวชาญในการบรรเลงรับร้องลิเก ต่อจากนั้นจึงไปได้เรียนเพลงหน้าพาทย์ต่าง ๆ จากครูสมพร ยิ้มสนิท ได้รับมอบเป็นผู้อ่านโองการไหว้ครูดนตรีไทยจากพี่ชายคือครูจำนงค์ แก้วบูชา เมื่อปี พ.ศ. 2500 สมรสกับนางเหมือน เที่ยงธรรม มีบุตรธิดาจำนวน 8 คน ในปี พ.ศ. 2506 ครูสนั่นจึงได้แยกวงจากบิดาและพี่ชาย มาก่อตั้งวงเป็นของตนเอง โดยใช้ชื่อตนเองเป็นชื่อวง ตอนแรกเริ่มมีเครื่องดนตรีอยู่ไม่มากมีเพียงวงปี่พาทย์เครื่องคู่ เพียงเท่านั้น จนปี พ.ศ. 2510 ก็ได้พัฒนาวงและสร้างเครื่องดนตรีเพิ่มขึ้นอีก รวมถึงยังสร้างแตรวงประยุกต์เพิ่มขึ้นอีกด้วย (เสนาะ แก้วบูชา, สัมภาษณ์, 1 ตุลาคม 2567)

การสืบทอดและการดำรงอยู่ของวงปี่พาทย์มอญคณะสนั่น แก้วบูชา

การสืบทอดเพื่อการดำรงอยู่นั้นสิ่งที่สำคัญที่สุด สำหรับการสืบทอดคือการที่มีบุคคลในครอบครัวให้ความสำคัญเห็น ถึงคุณค่าในความรู้ที่บรรพบุรุษได้เป็นผู้สร้างและถ่ายทอดไว้ให้ วงปี่พาทย์มอญคณะสนั่น แก้วบูชา เป็นสายตระกูลนักดนตรี

การประชุมวิชาการระดับชาติและนานาชาติบ้านสมเด็จเจ้าพระยา ครั้งที่ 1 (BS2C 2025)
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ที่มีเชื้อสายสืบทอดกันมาอย่างยาวนานตั้งแต่สมัยรัชกาลที่ 3 จนถึงปัจจุบัน ผู้ก่อตั้ง วงดนตรีแก้วบูชา ในช่วงแรก คือ นายแก้ว ต่อมาจึงได้มีการถ่ายทอดความรู้ด้านดนตรีมาที่นายรอด แก้วบูชา และส่งต่อความรู้ด้านดนตรีให้กับนายจำนอง แก้วบูชา ซึ่งต่อมาก็ได้ส่งต่อความรู้ด้านดนตรีมาที่บุตรชาย คือ นายจำนงค์ แก้วบูชา และ นายสนั่น แก้วบูชา เป็นผู้ดูแล และสืบทอด ต่อกันมาจนถึงปัจจุบัน จึงส่งผลให้เป็นวงดนตรีไทยที่มีลูกศิษย์มากมาย เป็นศูนย์รวมของนักดนตรีในลุ่มแม่น้ำนครชัยศรี ที่ร่วมกันสืบทอดให้วงดนตรีสามารถดำรงอยู่ในสังคมได้อย่างยาวนาน และเป็นที่รู้จักของผู้คนในภาคกลางและภูมิภาคต่าง ๆ

ภาพที่ 4 ครูสนั่น แก้วบูชา

ที่มา: ธนิต ฉิมงามขำ

(ครูสนั่น แก้วบูชา ประกอบพิธีจับมือครอบเพลงสาธุการ)

วิธีการถ่ายทอดและการสอนดนตรีไทยให้กับลูกหลานและเด็ก ๆ ในชุมชนของ ครูสนั่น แก้วบูชา จะเริ่มจากการครอบครูจับมือเพลงสาธุการ ให้ผู้เรียนทุก ๆ คน เพื่อเป็นการฝากตัวเป็นศิษย์ แล้วจึงจะทำการถ่ายทอด เป็นลำดับขั้นต่อไป การประกอบพิธีไหว้ครูนั้นเป็นหนึ่งในวัฒนธรรม ที่มีการสืบทอดต่อกันมาอย่างช้านาน เนื่องด้วย เป็นการแสดงความกตัญญูของศิษย์ต่อครู และเตือนสติในปฏิบัติตนให้เหมาะสมกับการที่เป็น "ศิษย์มีครู" โดยมีขั้นตอน คือ การฝากตัวเป็นศิษย์ การครอบครู และการไหว้ครู โดยการไหว้ครูครอบครูนั้น จะใช้เครื่องดนตรีที่ใช้ในการครอบครู คือ ฆ้องวงใหญ่ และตะโพน (สุวรรณา วังโสภณ, 2547)

(*"...นอกจากลูกหลานหัดปี่พาทย์แล้ว ก็มีคนในชุมชนส่วนใหญ่ที่ให้ความสนใจส่งลูกหลานมาเรียนเพื่อเป็นวิชา ความรู้ติดตัว ส่วนมากก็หัดกันตั้งแต่ชั้นประถมศึกษา เด็ก ๆ ก็มีความสามารถพิเศษติดตัวนำไปสอบเข้าเรียนบ้าง ยึดเป็นอาชีพ เลี้ยงตัวบ้าง ที่บ้านจะเน้นต่อเพลงที่นิยมใช้ในการออกงานสะส่วนใหญ่ เช่น เพลงประจำวัด เพลงยกศพ เพลงนางหงส์..."*)

การถ่ายทอดของครูสนั่น จะใช้วิธีการสอนแบบวิธีการสาธิต คือ การที่ครูผู้สอนปฏิบัติให้ดูเป็นตัวอย่าง แล้วให้ผู้เรียนปฏิบัติตาม เพื่อให้ผู้เรียนเกิดการจดจำแนวทางการปฏิบัติต่าง ๆ และปฏิบัติตามผู้สอน ผู้เรียนจะเรียนรู้ ได้จากการสังเกตการจำเสียง การจดจำทำนองเพลง และปฏิบัติซ้ำ ๆ จนเกิดความชำนาญ เมื่อผู้เรียนสามารถปฏิบัติ

เครื่องดนตรีได้อย่างคล่องแคล่วแล้ว ครูสนั่นจึงจะพาไปหาประสบการณ์จากการออกงานบรรเลงในโอกาสต่าง ๆ ทำให้เกิดการสร้างงานภายในครอบครัวและชุมชน สามารถเลี้ยงตนเองและครอบครัวได้

ภาพที่ 5 โน้ตเพลงเรื่องนางหงส์ทางฆ้องวงใหญ่

ที่มา: ธนิต ฉิมงามขำ (ตัวอย่างทำนองหลักมือฆ้องวงใหญ่เพลงเรื่องนางหงส์ เพลงที่ 2 ท่อนที่ 1)

เพลงเรื่องนางหงส์หรือเพลงชุดนางหงส์ประกอบด้วยเพลง 5 เพลง ดังนี้ เพลงนางหงส์ (หรือเพลงพราหมณ์เก็บหัวแหวน) เพลงสาวสอดแหวน เพลงแสนสุดสวาท เพลงแมลงปอทอง เพลงแมลงวันทอง ซึ่งใช้บรรเลงในวงปี่พาทย์นางหงส์ ซึ่งประกอบได้ ปี่ชวา ระนาดเอก ระนาดทุ้ม ฆ้องวงใหญ่ ฆ้องวงเล็ก กลองมลายู ซึ่งเป็นการผสมวงระหว่างวงปี่พาทย์ไม้แข็งกับวงบัวลอย ซึ่งนิยมใช้บรรเลงประโคมศพในงานอวมงคล ในปัจจุบันนี้มีการนิยมนำเพลงเรื่องนางหงส์มาใช้บรรเลงในวงปี่พาทย์มอญเป็นอย่างมาก ซึ่งทำนองหลักมือฆ้องมอญเพลงเรื่องนางหงส์นี้ เป็นทางที่ครูสนั่น แก้วบูชา มักจะนำมาถ่ายทอดให้กับลูกศิษย์ รุ่นสู่รุ่น และสิ่งที่เป็นเอกลักษณ์ของทำนองหลักทางนี้คือ ในส่วนของเพลงที่ 2 ท่อนที่ 1 และเพลงที่ 3 ท่อนที่ 1 พบสำนวนเฉพาะที่เป็นเอกลักษณ์ในการบรรเลงฆ้องมอญของวงปี่พาทย์มอญคณะสนั่น แก้วบูชา

ภาพที่ 6 โน้ตเพลงเรื่องนางหงส์ทางฆ้องวงใหญ่

ที่มา: ธนิต ฉิมงามขำ (ตัวอย่างทำนองหลักมือฆ้องมอญวงใหญ่เพลงเรื่องนางหงส์ เพลงที่ 2 ท่อนที่ 1)

การถ่ายทอดความรู้ให้เด็ก ๆ ของวงปี่พาทย์คณะสนั่น แก้วบูชา เป็นความรู้ที่ได้รับการถ่ายทอดมาจากบรรพบุรุษ และเพื่อปลูกฝังให้ลูกหลานรักในเสียงดนตรีร่วมช่วยสืบทอดวัฒนธรรมทางด้านดนตรี และตระหนักถึงการรักษาวัฒนธรรม ทางด้านดนตรีให้อยู่คู่กับชุมชนต่อไป นำไปสู่การสร้างอาชีพ ทำให้เกิดการสร้างงานภายในชุมชน สามารถเลี้ยงตนเอง และ ครอบครัวได้ อีกทั้งครูสนั่นไม่เพียงแต่สอนเรื่องดนตรีเท่านั้นแต่ยังสอนแทรก คุณธรรม จริยธรรม ระเบียบวินัยของความเป็น นักดนตรีที่ดีนั้นควรเป็นอย่างไรอีกด้วย ถึงแม้ว่าปัจจุบันนี้ ครูสนั่น แก้วบูชา จะถึงแก่กรรมไปแล้วก็ตามแต่วงปี่พาทย์มอญ คณะสนั่น แก้วบูชา ก็ยังสามารถดำรงอยู่ได้ด้วยการที่ลูกหลานทุกคน ร่วมกันสืบสานพัฒนาให้วงปี่พาทย์ยังสามารถคงอยู่ ต่อไปอย่างยั่งยืน (ประสาร เอี่ยมจร, สัมภาษณ์, 1 ตุลาคม 2567)

การพัฒนาวงปี่พาทย์มอญรูปแบบเวทีลอยฟ้า

ภาพที่ 7 วงปี่พาทย์มอญรูปแบบเวทีลอยฟ้ายุคเริ่มต้น
ที่มา: ธนิต ฉิมงามขำ

การพัฒนาวงปี่พาทย์มอญรูปแบบเวทีลอยฟ้าของคณะสนั่น แก้วบูชา สามารถแบ่งได้เป็น 3 ยุค ด้วยกัน โดยในยุคเริ่มต้นนั้น ครูสนั่น แก้วบูชา ได้มีแนวคิดคิดริเริ่มเปลี่ยนแปลงรูปแบบการจัดทำวงปี่พาทย์มอญแบบเดิม ที่ใช้รูปแบบ การจัดวงแบบปูเสื่อกับพื้น มาเป็นการจัดทำวงปี่พาทย์มอญในรูปแบบเวทีลอย ซึ่งแนวคิดที่นำมาเปลี่ยนแปลงสร้างสรรค์ การจัดทำนั้น มาจากการที่ครูสนั่นได้เดินเที่ยวงานวัด และได้พบกับเวทีร้านปาลูกโป่งที่มีลักษณะหลังคาในตัวจึงเกิดความคิด สร้างสรรค์ที่จะออกแบบเวทีปี่พาทย์มอญแบบใหม่ ครูสนั่น แก้วบูชา ได้นำแนวคิดในการนำรูปแบบของเวทีร้านปาลูกโป่ง มาดัดแปลงให้สอดคล้องกับรูปแบบเวทีลอยที่ครูสนั่น แก้วบูชา คิดค้นขึ้นใหม่ประมาณปี พ.ศ. 2530 โดยโครงสร้างของเวทีนั้น มีลักษณะคล้ายเวทีที่ใช้แสดงลิเก ด้านหน้าเวทีมีขนาดกว้างกว่าด้านหลังเวที มีขนาด 3 ชั้น สามารถตั้งฆ้องมอญที่ใช้ใน การบรรเลงได้ 9 -10 โค้ง การประยุกต์วงปี่พาทย์มอญรูปแบบเวทีลอยฟ้าของคณะสนั่น แก้วบูชาทั้งรูปแบบเวทีลอยฟ้า การตกแต่ง ฆ้องมอญในรูปแบบของการประดับไฟ พู่ และธงชาติ ล้วนแล้วแต่เป็นการประดิษฐ์คิดค้นเพื่อประยุกต์วงดนตรี ให้สอดคล้องกับสังคมปัจจุบัน เพื่อตอบสนองความต้องการของผู้จ้างงานที่ต้องการความโดดเด่นความเป็นเอกลักษณ์

การประชุมวิชาการระดับชาติและนานาชาติบ้านสมเด็จเจ้าพระยา ครั้งที่ 1 (BS2C 2025)
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และความแตกต่างของวงดนตรีซึ่งการประยุกต์เหล่านี้ ล้วนแล้วแต่ส่งผลให้วงปี่พาทย์มอญคณะสนั่น แก้วบูชา สามารถดำรง
อยู่ได้ในสังคมตั้งแต่อดีตจนถึงปัจจุบัน

ภาพที่ 8 วงปี่พาทย์มอญรูปแบบเวทีลอยฟ้ายุคกลาง
ที่มา: ธนิต ฉิมงามขำ

เวทีปี่พาทย์มอญรูปแบบเวทีลอยฟ้าในยุคกลาง ยังคงรักษารูปแบบโครงสร้างของเวทียุคเริ่มต้น แต่ก็ได้มีการพัฒนา
เพิ่มเติมเรื่องของการเพิ่มชั้นของเวทีให้สูงขึ้นเป็น 4 ชั้น เนื่องจากเวทีเดิมนั้นมีเพียง 3 ชั้น สามารถตั้งฆ้องมอญได้เพียง
9 -10 โค้ง แต่เวทีในยุคกลางนี้สามารถตั้งฆ้องมอญที่ใช้ในการบรรเลงได้ถึง 15 โค้ง และเปิงมางคอก 2 คอก เพื่อตอบรับความ
ต้องการของการจ้างงานจากเจ้าภาพผู้หางานที่ต้องการเครื่องดนตรีที่มากขึ้น ต้องการรูปแบบเวทีที่ใหญ่ขึ้น และมีความ
อลังการ ที่มีเอกลักษณ์โดดเด่นเฉพาะตัว และยังเพิ่มเรื่องของการประดับไฟให้สวยงาม ประดับตกแต่งองค์ประกอบต่าง ๆ
หน้าเวที เช่น ป้ายไฟ ป้ายวง กระถางต้นไม้ น้ำพุ ตุ๊กตาต่าง ๆ และมีการติดตั้งระบบ แสง เสียง ที่ทันสมัย เพื่อเพิ่ม
ความสมบูรณ์ในการบรรเลงให้ออกมาได้อย่างลงตัว

จากที่กล่าวมาเบื้องต้น จะเห็นได้ว่าครูสนั่น แก้วบูชา เป็นผู้ที่มีแนวคิด ในการพัฒนาวงดนตรีไทยของตนเอง
อยู่ตลอดเวลา ยิ่งพัฒนาให้วงใหญ่เท่าไร ยิ่งต้องกำลังคนและใช้ผู้บรรเลงเป็นจำนวนมาก แต่ครูสนั่น ไม่เคยกังวลเรื่องนี้เลย
ด้วยเหตุที่มีลูกหลานและลูกศิษย์ลูกหาในวงมากมาย จึงทำให้วงปี่พาทย์ของครูสนั่น มีงานรองรับและดำรงอยู่คู่กับสังคม
ได้อย่างยาวนาน

การประชุมวิชาการระดับชาติและนานาชาติบ้านสมเด็จเจ้าพระยา ครั้งที่ 1 (BS2C 2025)
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ภาพที่ 9 วงปี่พาทย์มอญรูปแบบเวทีลอยฟ้ายุคปัจจุบัน

ที่มา: ธนิต ฉิมงามขำ

("....ในอนาคตวงจะต้องมีการพัฒนาขึ้นไปอีกเรื่อย ๆ ตามยุคตามสมัย ที่บ้านก็มีการปรับพัฒนามาตลอด ๆ ไม่ว่าจะเป็น
การพัฒนารูปแบบวงดนตรีไทย พัฒนาการบรรเลง พัฒนาฝีมือ เพื่อให้เกิดความสมบูรณ์ของงานในทุก ๆ งาน...")

วงปี่พาทย์มอญรูปแบบเวทีลอยฟ้าในยุคปัจจุบันนี้เป็นแนวคิดที่ใช้การผสมผสานระหว่างเวทีคอนเสิร์ต
ดนตรีสากล และเวทีลอยฟ้าปี่พาทย์มอญรูปแบบดั้งเดิม ถือว่าเป็นการอนุรักษ์และสร้างสรรค์ผลงานอย่างลงตัว
โดยจุดเริ่มต้นมาจากหลานชายของครูสนั่น แก้วบูชา คือ นายชัชวาลย์ แก้วบูชา ซึ่งบ้านของครูสนั่น
นอกจากจะรับงานทางด้านดนตรีไทยแล้ว ยังมีการรับงานทางด้านดนตรีสากลอีกด้วย ซึ่งจุดเริ่มต้นนี้จึงทำให้
นายชัชวาลย์ แก้วบูชา ผู้เป็นหลานชายของครูสนั่น มีความคิดที่จะนำเวทีคอนเสิร์ตมาประยุกต์กับเวทีปี่พาทย์มอญลอยฟ้า
ของเดิม ให้มีความยิ่งใหญ่อลังการมากยิ่งขึ้น และสามารถตั้งฆ้องมอญที่ใช้บรรเลงได้ถึง 25 โค้ง มีการนำระบบแสง สี เสียง
และเทคโนโลยีที่ทันสมัยเข้ามาปรับใช้ในการแสดง ช่วยให้การแสดงมีความน่าสนใจมากยิ่งขึ้น ถือว่าเป็นจุดเปลี่ยนครั้งยิ่งใหญ่
ของวงการปี่พาทย์มอญ ในการสร้างสรรค์ผลงานนี้ทำให้วงปี่พาทย์มอญคณะสนั่น แก้วบูชา มีงานการแสดงอย่างไม่ขาดสาย
ไม่ว่าจะเป็นในรูปแบบเวทีขนาดใดก็ตาม รวมถึงมีการใช้สื่อออนไลน์ในการโปรโมททำให้เข้าถึงผู้ชมในวงกว้าง โดยรวมแล้ว
การพัฒนาเวทีปี่พาทย์มอญรูปแบบเวทีลอยฟ้าจึงเป็นการสร้างสรรค์ศิลปะวัฒนธรรมที่มีความทันสมัย แต่ยังคงรักษาความเป็น
ไทยไว้ได้อย่างดี (ชัชวาลย์ แก้วบูชา, สัมภาษณ์, 1 ตุลาคม 2567)

8. อภิปรายผลการวิจัย

จากการศึกษาการพัฒนาวงปี่พาทย์มอญรูปแบบเวทีลอยฟ้าของคณะสนั่น แก้วบูชา ทำให้ผู้วิจัยได้เห็น ถึงกระบวนการพัฒนาวงปี่พาทย์มอญในรูปแบบเวทีลอยฟ้าของคณะสนั่น แก้วบูชา โดยนำเสนอออกมาเป็นประเด็นอภิปราย ได้ดังนี้

1. การพัฒนาวงปี่พาทย์มอญในรูปแบบเวทีลอยฟ้าของคณะสนั่น แก้วบูชา ได้ประดิษฐ์คิดค้น ดัดแปลง รูปแบบ ของ วงดนตรีมาโดยตลอดเพื่อความเป็นเอกลักษณ์ของวง และสอดคล้องกับยุคสมัย วงปี่พาทย์มอญรูปแบบเวลาทีลอยฟ้าของ คณะสนั่น แก้วบูชา สามารถแบ่งออกได้เป็น 3 ยุค 3 รูปแบบ คือ (1) เวทีลอยฟ้ายุคแรก (2) เวทีลอยฟ้า ยุคกลาง (3) เวที ลอยฟ้ายุคปัจจุบัน ซึ่งมีการพัฒนาสร้างสรรค์และเปลี่ยนแปลงไปตามยุคสมัย สอดคล้องกับ พรรณิกา แซ่ลี้ (2555) ที่ได้ศึกษา เรื่อง วงปี่พาทย์มอญ ในอำเภอบางใหญ่ จังหวัดนนทบุรี ผลวิจัยพบว่า การรับงานวงปี่พาทย์มอญ ในอำเภอบางใหญ่ จังหวัด นนทบุรี ปัจจุบันใช้ประกอบพิธีศพเท่านั้น การจัดวงมีการจัดตามแบบแผนที่ถูกพัฒนาขึ้นแล้วตามยุคสมัย มีการประดับไฟที่วง ฆ้องมอญและเปิงมางคอก

2. การนำเสนอการแสดงดนตรีไทยในรูปแบบใหม่โดยเน้นการสร้างสรรค์และนำเทคโนโลยีมาปรับใช้ ทำให้การ บรรเลงให้มีความน่าสนใจมากยิ่งขึ้น การออกแบบเวทีลอยฟ้าทำให้ผู้ชมสามารถมองเห็นการแสดงได้อย่างชัดเจนจากทุกมุม และเพิ่มความน่าตื่นตาตื่นใจ สอดคล้องกับ จักกฤษณ์ วัฒนากูล (2564) ที่ได้ศึกษาเรื่องพัฒนาการและบทบาทของ วงปี่พาทย์มอญ ในอำเภอเมือง จังหวัดสุพรรณบุรี ผลวิจัยพบว่าการพัฒนาอีกรูปแบบคือด้านรูปลักษณ์ต่าง ๆ ของวงปี่พาทย์ มอญ ซึ่งถือว่าเป็นอีกหนึ่งจุดที่สามารถดึงดูดความสนใจต่อผู้ว่าจ้างให้มีต่อคณะปี่พาทย์แต่ละคณะ

9. บทสรุป

วงปี่พาทย์มอญคณะสนั่น แก้วบูชา เป็นวงปี่พาทย์ที่มีการสืบทอด จากบรรพบุรุษมาอย่างช้านานจาก รุ่นสู่รุ่น และ มีชื่อเสียงในจังหวัดนครปฐมเป็นอย่างมาก ครูสนั่น แก้วบูชา เป็นบุคคลคนแรกที่ริเริ่มพัฒนาเวทีปี่พาทย์มอญ โดยการนำรูปแบบเวทีลอยฟ้ามาปรับใช้ในการแสดงวงปี่พาทย์มอญ เพื่อยกระดับการแสดงให้มีความโดดเด่นเข้ากับยุคสมัย มากยิ่งขึ้น จากอดีตถึงปัจจุบันนี้การพัฒนาวงปี่พาทย์มอญรูปแบบเวทีลอยฟเของคณะสนั่น แก้วบูชา ได้ถูกพัฒนามาถึง 3 ยุคสมัย 3 รูปแบบ เป็นการประดิษฐ์คิดค้นเพื่อประยุกต์วงปี่พาทย์มอญให้สอดคล้องกับสังคมปัจจุบัน และตอบสนอง ความต้องการของผู้จ้างงาน ที่ต้องการความโดดเด่น ความเป็นเอกลักษณ์ และความแตกต่าง เช่น เวทีวงปี่พาทย์มอญรูปแบบ เวทีลอยฟ้า การนำระบบ แสงสี เสียง เข้ามาใช้ในวงปี่พาทย์มอญ และการนำเสนอแนวดนตรีที่มีความเป็นเอกลักษณ์ โดยผสมผสานความดั้งเดิมกับความทันสมัย ทั้งในเรื่องของการบรรเลงและเสียงดนตรี เพื่อสร้างสรรค์ประสบการณ์ที่สมบูรณ์ แบบให้แก่ผู้ชมในยุคปัจจุบัน ซึ่งเป็นผลงานทั้งหมดทำให้ครูสนั่น แก้วบูชา มีชื่อเสียงในวงการปี่พาทย์มอญเป็นอย่างมาก การประยุกต์เหล่านี้ นำไปสู่การสร้างสรรค์อนุรักษ์ส่งเสริมวัฒนธรรม จึงทำให้วงปี่พาทย์มอญคณะสนั่น แก้วบูชา ยังสามารถพัฒนาและปรับตัวให้เข้ากับบริบทปัจจุบันได้อย่างมีประสิทธิภาพ

10. ข้อเสนอแนะในการวิจัยครั้งต่อไป

จากการศึกษาการพัฒนาวงปี่พาทย์มอญในรูปแบบเวทีลอยฟ้าของคณะสนั่น แก้วบูชา พบว่าในการศึกษาครั้งต่อไป ควรศึกษาด้านการพัฒนาวงดนตรีรำวงย้อนยุคของ คณะสนั่น แก้วบูชา และการเปรียบเทียบการพัฒนาวงปี่พาทย์กับวงอื่น ๆ ว่ามีการพัฒนาที่เหมือนหรือแตกต่างกันอย่างไรบ้าง เพื่อจะได้ทราบข้อมูลการพัฒนาวงปี่พาทย์มอญ อย่างครบถ้วนสมบูรณ์

11. เอกสารอ้างอิง

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(175-TH-EDU)

ผลการจัดการเรียนรู้โดยใช้รูปแบบ SSCS เรื่อง ทฤษฎีบทพีทาโกรัส
ของนักเรียนชั้นมัธยมศึกษาปีที่ 2 โรงเรียนวัดประดู่ในทรงธรรม

ถิรดา สิทธิมนต์[1], พงศ์รัศมิ์ เฟื่องฟู[1] และสมภพ แซ่ลี้[1][*]

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บทคัดย่อ

การวิจัยครั้งนี้มีวัตถุประสงค์ คือ เพื่อเปรียบเทียบผลสัมฤทธิ์ทางการเรียนคณิตศาสตร์ เรื่อง ทฤษฎีบทพีทาโกรัส ของนักเรียนชั้นมัธยมศึกษาปีที่ 2 ก่อนเรียนและหลังเรียนโดยใช้รูปแบบ SSCS และเพื่อศึกษาความพึงพอใจของนักเรียนที่มีต่อการจัดการเรียนรู้ เรื่อง ทฤษฎีบทพีทาโกรัส โดยใช้รูปแบบ SSCS กลุ่มตัวอย่างที่ใช้ในการวิจัย คือ นักเรียนชั้นมัธยมศึกษาปีที่ 2 ภาคเรียนที่ 2 ปีการศึกษา 2566 โรงเรียนวัดประดู่ในทรงธรรม จำนวน 23 คน ซึ่งได้มาจากการสุ่มอย่างง่าย เครื่องมือที่ใช้ในการวิจัยประกอบด้วย (1) แผนการจัดการเรียนรู้ เรื่อง ทฤษฎีบทพีทาโกรัส โดยใช้รูปแบบ SSCS จำนวน 8 แผน (2) แบบทดสอบวัดผลสัมฤทธิ์ทางการเรียนวิชาคณิตศาสตร์ เรื่อง ทฤษฎีบทพีทาโกรัส ชนิดเลือกตอบ 4 ตัวเลือก จำนวน 15 ข้อ มีค่าความยากง่าย (p) ตั้งแต่ 0.23 ถึง 0.43 ค่าอำนาจจำแนก (r) ตั้งแต่ 0.20 ถึง 0.40 และค่าความเชื่อมั่นเท่ากับ 0.65 และแบบอัตนัย จำนวน 2 ข้อ มีค่าความยากง่าย (p) ตั้งแต่ 0.24 ถึง 0.37 ค่าอำนาจจำแนก (r) ตั้งแต่ 0.45 ถึง 0.64 และค่าความเชื่อมั่นเท่ากับ 0.94 และ (3) แบบสอบถามความพึงพอใจของนักเรียนที่มีต่อการจัดการเรียนรู้โดยใช้การเรียนรู้รูปแบบ SSCS เรื่อง ทฤษฎีบทพีทาโกรัส เป็นแบบมาตราส่วนประมาณค่า 5 ระดับ จำนวน 15 ข้อ สถิติที่ใช้ในการวิเคราะห์ข้อมูล ได้แก่ ค่าเฉลี่ย ร้อยละ ส่วนเบี่ยงเบนมาตรฐานและทดสอบสมมติฐานโดยใช้ค่าที ผลการวิจัยพบว่า ผลสัมฤทธิ์ทางการเรียนคณิตศาสตร์ เรื่อง ทฤษฎีบทพีทาโกรัส ของนักเรียนชั้นมัธยมศึกษาปีที่ 2 โดยใช้รูปแบบ SSCS สูงกว่าก่อนเรียนอย่างมีนัยสำคัญทางสถิติที่ .05 และความพึงพอใจของนักเรียนชั้นมัธยมศึกษาปีที่ 2 ที่มีต่อการจัดการเรียนรู้ เรื่อง ทฤษฎีบทพีทาโกรัส โดยใช้รูปแบบ SSCS อยู่ในระดับมาก

คำสำคัญ: การจัดการเรียนรู้โดยใช้รูปแบบ SSCS; ความพึงพอใจ; ผลสัมฤทธิ์ทางการเรียน

การประชุมวิชาการระดับชาติและนานาชาติบ้านสมเด็จเจ้าพระยา ครั้งที่ 1 (BS2C 2025)
The 1st Bansomdejchaopraya National and International Conference (BS2C 2025)

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Effect of Using SSCS Learning Management on Pythagorean Theorem of Mathayomsuksa 2 Students of Wat Pradoonaisongtham School

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Abstract

The purposes of this research were to compare the mathematics learning achievement of Mathayomsuksa 2 students before and after learning Pythagorean theorem by using SSCS learning management and to evaluate their satisfaction with this method. The sample consisted of 23 Mathayomsuksa 2 students from Wat Pradoonaisongtham school during the second semester of the 2023 academic year, selected through simple sampling. The research instruments consisted of (1) eight lesson plans on the Pythagorean theorem by utilizing SSCS learning management, (2) a 15-item of multiple choice mathematics test on learning achievement for the Pythagorean theorem, with difficulty levels ranging 0.23 to 0.43, discrimination values from 0.20 to 0.40 and overall reliability of 0.65, as well as 2-item subjective test with difficulty levels ranging from 0.24 to 0.47, discrimination values from 0.45 to 0.64 and overall reliability of 0.94 and (3) a 15-item of satisfaction questionnaire toward mathematics learning by using SSCS learning management on Pythagorean theorem. The data were analyzed by mean, percentage, standard deviation and hypothesis testing with a t-test. The result indicated that the mathematics learning achievement on Pythagorean theorem of Mathayomsuksa 2 students after learning by using SSCS learning management was higher than before at .05 level of significance and student's satisfaction with this learning method was rated at a high level.

Keywords: Learning achievement; Satisfaction; SSCS learning management

การประชุมวิชาการระดับชาติและนานาชาติบ้านสมเด็จเจ้าพระยา ครั้งที่ 1 (BS2C 2025)
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1. บทนำ

1.1 ความเป็นมาและความสำคัญของปัญหา

คณิตศาสตร์มีบทบาทสำคัญยิ่งต่อความสำเร็จในการเรียนรู้ในศตวรรษที่ 21 เนื่องจาก คณิตศาสตร์ช่วยให้มนุษย์มีความคิดริเริ่มสร้างสรรค์ คิดอย่างมีเหตุผล เป็นระบบ มีแบบแผน สามารถ วิเคราะห์ปัญหาหรือสถานการณ์ได้อย่างรอบคอบและถี่ถ้วน ช่วยให้คาดการณ์ วางแผน ตัดสินใจแก้ปัญหาได้อย่างถูกต้องเหมาะสมและสามารถนำไปใช้ในชีวิตจริงได้อย่างมีประสิทธิภาพ นอกจากนี้คณิตศาสตร์ยังเป็นเครื่องมือในการศึกษาด้านวิทยาศาสตร์ เทคโนโลยีและศาสตร์อื่น ๆ อันเป็นรากฐานในการพัฒนาทรัพยากรบุคคลของชาติให้มีคุณภาพและพัฒนาเศรษฐกิจของประเทศ ให้ทัดเทียมกับนานาชาติการศึกษาคณิตศาสตร์จึงจำเป็นต้องมีการพัฒนาอย่างต่อเนื่อง เพื่อให้ทันสมัยและสอดคล้องกับสภาพเศรษฐกิจ สังคม และความรู้ทางวิทยาศาสตร์และเทคโนโลยีที่เจริญก้าวหน้าอย่างรวดเร็วในยุคโลกาภิวัตน์ (กระทรวงศึกษาธิการ, 2560: 1)

ในปัจจุบันการจัดการเรียนการสอนคณิตศาสตร์ของโรงเรียนวัดประดู่ในทรงธรรมยังไม่ประสบความสำเร็จเท่าที่ควร พิจารณาได้จากผลการทดสอบทางการศึกษาระดับชาติขั้นพื้นฐาน (O-NET) ปีการศึกษา 2565 ของนักเรียนชั้นมัธยมศึกษาปีที่ 3 ของโรงเรียนมีคะแนนเฉลี่ยของการสอบโอเน็ต (O-NET) กลุ่มสาระการเรียนรู้คณิตศาสตร์ระดับโรงเรียนเท่ากับ 22.35 เปอร์เซ็นต์ (สถาบันทดสอบการศึกษาแห่งชาติ, 2566) รวมถึงจากการที่ผู้วิจัยได้ไปฝึกประสบการณ์วิชาชีพที่โรงเรียนวัดประดู่ในทรงธรรม และจากการสัมภาษณ์คุณครูผู้สอนในโรงเรียน พบปัญหาว่า นักเรียนส่วนใหญ่มีพื้นฐาน ทักษะกระบวนการแก้ปัญหาต่ำมาก นักเรียนไม่เข้าใจโจทย์ปัญหา นักเรียนไม่มีปฏิสัมพันธ์ระหว่างนักเรียนกันเอง อีกทั้งในการจัดกิจกรรมการสอน ส่วนใหญ่ใช้การสอนแบบเดิม ๆ ไม่มีวิธีการสอนแบบใหม่ ๆ จึงทำให้นักเรียนรู้สึกเบื่อหน่าย

การจัดการเรียนรู้คณิตศาสตร์ด้วยรูปแบบ SSCS เป็นการจัดการเรียนรู้ที่มุ่งเน้นให้นักเรียนได้พัฒนาให้มีความสามารถในการแก้ปัญหาได้อย่างสมบูรณ์และมีประสิทธิภาพ คือ ผู้เรียนต้องผ่านประสบการณ์การแก้ปัญหาและมีทักษะทางความคิดที่มีความจำเป็นสำหรับการแก้ปัญหานั่นคือ ทักษะในการจัดกับระบบข้อมูล การตัดสินใจ การหาทางเลือกของวิธีการในการแก้ปัญหา แล้วทำการทดสอบทางเลือกเหล่านั้น และที่สำคัญ คือ การใช้กระบวนการคิดที่นำไปสู่การแก้ปัญหาตามทฤษฎีการประมวลผลข้อมูล ซึ่งประกอบด้วย การนิยามธรรมชาติของปัญหา การเลือกองค์ประกอบหรือขั้นตอนที่จะใช้ในการแก้ปัญหา การเลือกกลวิธีในการจัดลำดับองค์ประกอบในการแก้ปัญหา การเลือกตัวแทนความคิดเกี่ยวกับข้อมูลของปัญหา การกำหนดแหล่งข้อมูลที่เป็นประโยชน์ในการวางแผนการแก้ปัญหา การตรวจสอบวิธีการแก้ปัญหา ซึ่งเป็นส่วนประกอบในการจัดกิจกรรมการเรียนรู้แบบ SSCS (เบญจพร ตะคอนรัมย์, 2564: 3-4) การจัดการเรียนรู้แบบ SSCS มีขั้นตอนการสอนประกอบด้วย 4 ขั้นตอน ประกอบด้วย ขั้นที่ 1 Search: S หมายถึง การค้นหาข้อมูลที่เกี่ยวข้องกับปัญหา การแยกแยะประเด็นปัญหาโดยใช้การระดมสมอง หาข้อมูลเพิ่มเติมโดยอาจหาได้จากการที่นักเรียนตั้งคำถามกับครูหรือเพื่อนนักเรียนด้วยกัน ขั้นที่ 2 Solve: S หมายถึง ขั้นวางแผนการแก้ไขและหาคำตอบของปัญหาด้วยวิธีการต่าง ๆ ขั้นที่ 3 Create: C หมายถึงการนำข้อมูลวิธีการที่ได้จากขั้นตอนที่ 2 มาจัดหรือวางระบบให้เข้าใจ และสื่อสารได้ง่ายยิ่งขึ้น ขั้นที่ 4 Share: S หมายถึง การแสดงความคิดเห็น แลกเปลี่ยนข้อมูลวิธีการแก้ปัญหาและช่วยกันประเมินผลที่ได้ (ธันยพัฒน์ พันธุ์พำนัก, 2562: 3)

การจัดกิจกรรมการเรียนรู้โดยใช้รูปแบบ SSCS เป็นการจัดการเรียนรู้ที่เน้นพัฒนาผู้เรียนเป็นรายบุคคล เนื่องจากผู้เรียนแต่ละคนมีพื้นฐานความรู้และความสามารถในการแก้ปัญหาที่แตกต่างกัน การจัดการเรียนการสอนจึงต้องให้นักเรียนออกแบบ วางแผนการแก้ปัญหาด้วยกลยุทธ์ต่าง ๆ เพื่อหาคำตอบ นอกจากนี้ยังเป็นการสร้างการมีปฏิสัมพันธ์กับผู้สอนและเพื่อนในชั้นเรียน โดยมีครูผู้สอนเป็นผู้แนะนำและชี้แนะแนวทาง เพื่อให้นักเรียนได้ลงมือปฏิบัติด้วยตัวของนักเรียนเอง ดังเห็นได้จากงานวิจัยรัตติยา วงศ์วุฒิ (2565) ได้ทำการศึกษาการพัฒนาชุดกิจกรรมด้วยวิธีการสอนแบบ SSCS เรื่อง ความรู้เบื้องต้นเกี่ยวกับจำนวนจริง สำหรับนักเรียนชั้นมัธยมศึกษาปีที่ 2 ผลการวิจัย พบว่า ประสิทธิภาพของชุดกิจกรรมด้วยวิธีการสอนแบบ

SSCS เรื่อง ความรู้เบื้องต้นเกี่ยวกับจำนวนจริง มีค่า E_1/E_2 เท่ากับ 85.42/85.07 สูงกว่าเกณฑ์ 80/80 ดัชนีประสิทธิผลของชุดกิจกรรมด้วยวิธีการสอนแบบ SSCS มีค่าเท่ากับ 0.6629 คิดเป็นร้อยละ 66.29 ค่าเฉลี่ยผลสัมฤทธิ์ทางการเรียนหลังเรียนโดยใช้ชุดกิจกรรมด้วยวิธีการสอนแบบ SSCS สูงกว่าก่อนเรียนอย่างมีนัยสำคัญทางสถิติที่ระดับ .01 และนักเรียนมีความพึงพอใจต่อการเรียนหลังเรียนโดยใช้ชุดกิจกรรมด้วยวิธีการสอนแบบ SSCS อยู่ในระดับมากที่สุดทุกรายการ และนวกานต์ วิภาสชีวิน (2564) ได้ทำการศึกษาผลการจัดการเรียนรู้ โดยใช้รูปแบบ SSCS ร่วมกับเทคนิคเพื่อนคู่คิด (Think-Pair-Share) เรื่อง สถิติ ที่มีต่อการพัฒนาความสามารถในการแก้ปัญหาและความสามารถในการทำงานเป็นทีมของนักเรียนชั้นมัธยมศึกษาปีที่ 1 ผลการวิจัยพบว่า (1) นักเรียนชั้นมัธยมศึกษาปีที่ 1 มีความสามารถในการแก้ปัญหา เรื่อง สถิติ หลังได้รับการจัดการเรียนรู้โดยใช้รูปแบบ SSCS ร่วมกับเทคนิคเพื่อนคู่คิดสูงกว่าเกณฑ์ร้อยละ 70 อย่างมีนัยสำคัญทางสถิติ .05 (2) นักเรียนชั้นมัธยมศึกษาปีที่ 1 มีผลสัมฤทธิ์ทางการเรียน เรื่อง สถิติ หลังได้รับการจัดการเรียนรู้โดยใช้รูปแบบ SSCS ร่วมกับเทคนิคเพื่อนคู่คิดสูงกว่าเกณฑ์ร้อยละ 70 อย่างมีนัยสำคัญทางสถิติ 0.05 (3) นักเรียนชั้นมัธยมศึกษาปีที่ 1 หลังได้รับการจัดการเรียนรู้โดยใช้รูปแบบ SSCS ร่วมกับเทคนิคเพื่อนคู่คิด มีความสามารถในการทำงานเป็นทีมโดยรวมอยู่ในระดับมาก (ค่าเฉลี่ยเท่ากับ 3.81 และส่วนเบี่ยงเบนมาตรฐานเท่ากับ 0.97) และ (4) นักเรียนชั้นมัธยมศึกษาปีที่ 1 มีความพึงพอใจโดยรวมต่อการจัดการเรียนรู้โดยใช้รูปแบบ SSCS ร่วมกับเทคนิคเพื่อนคู่คิด อยู่ในระดับมาก (ค่าเฉลี่ยเท่ากับ 3.52 และส่วนเบี่ยงเบนมาตรฐานเท่ากับ 1.08) รวมถึงธัญพัฒน์ พันธุ์พำนัก (2562) ได้ทำการศึกษาการจัดการเรียนรู้ด้วยรูปแบบ SSCS เพื่อส่งเสริมผลสัมฤทธิ์ทางการเรียนและทักษะการแก้ปัญหาทางคณิตศาสตร์ เรื่อง ความน่าจะเป็น ชั้นมัธยมศึกษาปีที่ 3 ผลการวิจัยพบว่า (1) แผนการจัดการเรียนรู้โดยใช้การจัดการเรียนรู้ด้วยรูปแบบ SSCS เรื่อง ความน่าจะเป็น ชั้นมัธยมศึกษาปีที่ 3 มีประสิทธิภาพเท่ากับ 84.11/81.11 ซึ่งสูงกว่าเกณฑ์ 75/75 ที่ตั้งไว้ (2) พัฒนาการผลสัมฤทธิ์ทางการเรียน เรื่อง ความน่าจะเป็น ของนักเรียนชั้นมัธยมศึกษาปีที่ 3 ที่เรียนโดยใช้การจัดการเรียนรู้ด้วยรูปแบบ SSCS มีคะแนนเฉลี่ยจากการทดสอบหลังเรียนเท่ากับ 16.22 คะแนน ซึ่งสูงกว่าเกณฑ์ผ่านเฉลี่ยร้อยละ 50 ของคะแนนที่ถูกหักออกจากการทดสอบก่อนเรียน (3) นักเรียนที่ได้รับการจัดการเรียนรู้ด้วยรูปแบบ SSCS เพื่อส่งเสริมผลสัมฤทธิ์ทางการเรียนและทักษะการแก้ปัญหาทางคณิตศาสตร์ เรื่อง ความน่าจะเป็น ของนักเรียนชั้นมัธยมศึกษาปีที่ 3 มีผลสัมฤทธิ์ทางการเรียนสูงกว่าเกณฑ์ร้อยละ 75 อย่างมีนัยสำคัญทางสถิติที่ระดับ.05 และ (4) นักเรียนที่ได้รับการจัดการเรียนรู้ด้วยรูปแบบ SSCS เพื่อส่งเสริมผลสัมฤทธิ์ทางการเรียนและทักษะการแก้ปัญหาทางคณิตศาสตร์ เรื่อง ความน่าจะเป็น ของนักเรียนชั้นมัธยมศึกษาปีที่ 3 มีทักษะการแก้ปัญหาทางคณิตศาสตร์สูงกว่าเกณฑ์ร้อยละ 70 อย่างมีนัยสำคัญทางสถิติที่ระดับ .05

จากข้อมูลข้างต้น ผู้วิจัยจึงสนใจที่จะนำการจัดการเรียนรู้โดยใช้รูปแบบ SSCS มาพัฒนาผลสัมฤทธิ์ทางการเรียนและทักษะในการแก้ปัญหา เรื่อง ทฤษฎีบทพีทาโกรัส ของนักเรียนชั้นมัธยมศึกษาปีที่ 2 ซึ่งเป็นระดับชั้นที่ผู้วิจัยได้ทำการสอนในระหว่างการฝึกประสบการณ์วิชาชีพ เพื่อส่งเสริมให้นักเรียนมีทักษะกระบวนการแก้ปัญหา และมีผลสัมฤทธิ์ทางการเรียนรู้วิชาคณิตศาสตร์สูงขึ้น

2. วัตถุประสงค์การวิจัย

1. เพื่อเปรียบเทียบผลสัมฤทธิ์ทางการเรียนคณิตศาสตร์ เรื่อง ทฤษฎีบทพีทาโกรัส ของนักเรียนชั้นมัธยมศึกษาปีที่ 2 ก่อนเรียนและหลังเรียนโดยใช้รูปแบบ SSCS

2. เพื่อศึกษาความพึงพอใจของนักเรียนชั้นมัธยมศึกษาปีที่ 2 ที่มีต่อการจัดการเรียนรู้ เรื่อง ทฤษฎีบทพีทาโกรัส โดยใช้รูปแบบ SSCS

3. สมมติฐานการวิจัย

1. ผลสัมฤทธิ์ทางการเรียนคณิตศาสตร์ เรื่อง ทฤษฎีบททพีทาโกรัส ของนักเรียนชั้นมัธยมศึกษาปีที่ 2 หลังเรียนโดยใช้รูปแบบ SSCS สูงกว่าก่อนเรียน

2. ความพึงพอใจของนักเรียนชั้นมัธยมศึกษาปีที่ 2 ที่มีต่อการจัดการเรียนรู้ เรื่อง ทฤษฎีบททพีทาโกรัส โดยใช้รูปแบบ SSCS อยู่ในระดับมากขึ้นไป

4. วิธีการดำเนินการวิจัย

4.1 ประชากรและกลุ่มตัวอย่าง

ประชากรในการวิจัย คือ นักเรียนชั้นมัธยมศึกษาปีที่ 2 ภาคเรียนที่ 2 ปีการศึกษา 2566 โรงเรียนวัดประดู่ในทรงธรรม จำนวน 2 ห้อง รวมทั้งสิ้น 47 คน

กลุ่มตัวอย่างในการวิจัย คือ นักเรียนชั้นมัธยมศึกษาปีที่ 2 ภาคเรียนที่ 2 ปีการศึกษา 2566 โรงเรียนวัดประดู่ในทรงธรรม จำนวน 23 คน ซึ่งได้มาจากการสุ่มอย่างง่าย โดยใช้ห้องเรียนเป็นหน่วยสุ่ม

4.2 ตัวแปรที่ศึกษา

ตัวแปรอิสระ คือ การจัดการเรียนรู้โดยใช้รูปแบบ SSCS

ตัวแปรตาม ได้แก่   1. ผลสัมฤทธิ์ทางการเรียน

2. ความพึงพอใจ

4.3 เนื้อหา

เนื้อหาที่ใช้ในการวิจัยครั้งนี้ คือ เนื้อหาสาระการเรียนรู้คณิตศาสตร์ ระดับชั้นมัธยมศึกษาปีที่ 2 ตามตัวชี้วัดและสาระการเรียนรู้แกนกลาง กลุ่มสาระการเรียนรู้คณิตศาสตร์ (ฉบับปรับปรุง พ.ศ.2560) ตามหลักสูตรแกนกลางการศึกษาขั้นพื้นฐาน พุทธศักราช 2551 เรื่อง ทฤษฎีบททพีทาโกรัส มีเนื้อหาดังนี้

1. สมบัติของรูปสามเหลี่ยมมุมฉาก

2. ทฤษฎีบททพีทาโกรัส

3. ทฤษฎีบททกลับของพีทาโกรัส

4. การนำความรู้เรื่องทฤษฎีบททพีทาโกรัสไปใช้

4.4 ระยะเวลาที่ศึกษา

การวิจัยครั้งนี้ ดำเนินการทดลองกับนักเรียนชั้นมัธยมศึกษาปีที่ 2 ภาคเรียนที่ 2 ปีการศึกษา 2566 โดยทำการทดสอบก่อนเรียน 1 คาบ ดำเนินการสอน 8 คาบ และทดสอบหลังเรียน 1 คาบ รวมทั้งสิ้น 10 คาบ

4.5 ขั้นตอนการสร้างเครื่องมือ

เครื่องมือชิ้นที่ 1 แผนการจัดการเรียนรู้ เรื่อง ทฤษฎีบททพีทาโกรัส ของนักเรียนชั้นมัธยมศึกษาปีที่ 2 โดยใช้รูปแบบ SSCS จำนวน 8 แผน มีขั้นตอนการสร้าง ดังนี้

1. ศึกษาเอกสารที่เกี่ยวข้องกับตัวชี้วัดและสาระการเรียนรู้แกนกลาง กลุ่มสาระการเรียนรู้คณิตศาสตร์ (ฉบับปรับปรุง พ.ศ.2560) ตามหลักสูตรแกนกลางการศึกษาขั้นพื้นฐาน พุทธศักราช 2551

2. ศึกษาคู่มือและหนังสือเรียนรายวิชาพื้นฐาน คณิตศาสตร์พื้นฐาน ชั้นมัธยมศึกษาปีที่ 2 เล่ม 2 ตามมาตรฐานตัวชี้วัดและสาระการเรียนรู้แกนกลาง กลุ่มสาระการเรียนรู้คณิตศาสตร์ (ฉบับปรับปรุง พ.ศ.2560) ตามหลักสูตรแกนกลางการศึกษาขั้นพื้นฐาน พุทธศักราช 2551

3. ศึกษาเอกสารที่เกี่ยวข้องกับการเรียนรู้โดยใช้รูปแบบ SSCS

4. วิเคราะห์สาระการเรียนรู้ มาตรฐานการเรียนรู้ และตัวชี้วัด เรื่อง ทฤษฎีบทพีทาโกรัส ของนักเรียนชั้นมัธยมศึกษา ปีที่ 2

5. จัดทำแผนการจัดการเรียนรู้ เรื่อง ทฤษฎีบทพีทาโกรัส โดยการจัดการเรียนรู้รูปแบบ SSCS ของนักเรียนชั้น มัธยมศึกษาปีที่ 2 จำนวน 8 แผน ใช้เวลา 8 คาบ ประกอบด้วย

สมบัติของรูปสามเหลี่ยมมุมฉาก	1	คาบ
ทฤษฎีบทพีทาโกรัส	4	คาบ
บทกลับของทฤษฎีบทพีทาโกรัส	2	คาบ
การนำความรู้เรื่องทฤษฎีบทพีทาโกรัสไปใช้	1	คาบ

6. นำแผนการจัดการเรียนรู้ที่สร้างขึ้นเสนอต่ออาจารย์ที่ปรึกษา และครูพี่เลี้ยงเพื่อพิจารณาความถูกต้องเหมาะสม ชัดเจน และความเป็นไปได้ในการใช้ และนำมาปรับปรุงแก้ไข

7. นำแผนการจัดการเรียนรู้ที่ได้รับการปรับปรุงแก้ไขจากอาจารย์ที่ปรึกษาและครูพี่เลี้ยงเรียบร้อยแล้วเสนอต่อ ผู้เชี่ยวชาญ จำนวน 3 ท่าน เพื่อตรวจสอบคุณภาพของแผนการจัดการเรียนรู้ โดยใช้แบบประเมินตามวิธีของลิเคิร์ทแบบ มาตราส่วนประมาณค่า 5 ระดับ

8. นำผลการประเมินวิเคราะห์หาค่าเฉลี่ย ซึ่งผลการประเมินคุณภาพของแผนการจัดการเรียนรู้มีค่าเฉลี่ยรวมเท่ากับ 4.53 นั่นคือ แผนการจัดการเรียนรู้มีความเหมาะสมมากที่สุด

9. นำแผนการจัดการเรียนรู้มาปรับปรุงแก้ไขตามคำแนะนำของผู้เชี่ยวชาญ และนำไปใช้จริงกับกลุ่มตัวอย่างต่อไป

เครื่องมือชิ้นที่ 2 แบบทดสอบวัดผลสัมฤทธิ์ทางการเรียนวิชาคณิตศาสตร์ เรื่อง ทฤษฎีบทพีทาโกรัส ชั้นมัธยมศึกษา ปีที่ 2 ชนิดเลือกตอบ 4 ตัวเลือก จำนวน 15 ข้อ และแบบอัตนัย จำนวน 2 ข้อ มีขั้นตอนการสร้าง ดังนี้

1. ศึกษาเอกสารที่เกี่ยวข้องกับตัวชี้วัดและสาระการเรียนรู้แกนกลาง กลุ่มสาระการเรียนรู้คณิตศาสตร์ (ฉบับ ปรับปรุง พ.ศ.2560) ตามหลักสูตรแกนกลางการศึกษาขั้นพื้นฐาน พุทธศักราช 2551

2. วิเคราะห์สาระการเรียนรู้ มาตรฐานการเรียนรู้ และตัวชี้วัด เรื่อง ทฤษฎีบททาโกรัส ของนักเรียนชั้นมัธยมศึกษา ปีที่ 2

3. สร้างแบบทดสอบวัดผลสัมฤทธิ์ทางการเรียนวิชาคณิตศาสตร์ เรื่อง ทฤษฎีบทพีทาโกรัส เป็นข้อสอบแบบปรนัย ชนิดเลือกตอบ 4 ตัวเลือก จำนวน 30 ข้อ และแบบอัตนัย จำนวน 4 ข้อ

4. นำแบบทดสอบวัดผลสัมฤทธิ์ทางการเรียนคณิตศาสตร์ เรื่อง ทฤษฎีบทพีทาโกรัส ที่สร้างขึ้นเสนอต่ออาจารย์ ที่ปรึกษาและครูพี่เลี้ยงเพื่อพิจารณาความถูกต้องเหมาะสมให้สอดคล้องกับเนื้อหาและจุดประสงค์การเรียนรู้ แล้วนำมา ปรับปรุงแก้ไข

5. นำแบบทดสอบวัดผลสัมฤทธิ์ทางการเรียนคณิตศาสตร์ เรื่อง ทฤษฎีบทพีทาโกรัส ที่ปรับปรุงแก้ไขเรียบร้อยแล้ว นำเสนอต่อผู้เชี่ยวชาญ จำนวน 3 ท่าน พิจารณาว่าวัดได้ตรงตามจุดประสงค์การเรียนรู้และครอบคลุมเนื้อหาหรือไม่ โดยให้ ผู้เชี่ยวชาญประเมินความสอดคล้องระหว่างแบบทดสอบกับจุดประสงค์การเรียนรู้ (Index of Item Objective Congruence: IOC) ซึ่งเป็นการตรวจสอบความเที่ยงตรงเชิงเนื้อหาของแบบทดสอบ โดยให้ผู้เชี่ยวชาญพิจารณา ดังนี้

ให้ +1 เมื่อแน่ใจว่าข้อสอบนั้นวัดได้ตรงตามจุดประสงค์การเรียนรู้

ให้ 0 เมื่อไม่แน่ใจว่าข้อสอบนั้นวัดได้ตรงตามจุดประสงค์การเรียนรู้หรือไม่

ให้ -1 เมื่อแน่ใจว่าข้อสอบนั้นวัดได้ไม่ตรงตามจุดประสงค์การเรียนรู้

6. นำแบบทดสอบไปทดลอง (Try out) กับนักเรียนชั้นมัธยมศึกษาปีที่ 3 ที่ได้ผ่านการเรียน เรื่อง ทฤษฎีบท พีทาโกรัสแล้ว เพื่อวิเคราะห์หาค่าความยากง่ายและค่าอำนาจจำแนก

7. คัดเลือกข้อสอบปรนัย 15 ข้อ และอัตนัย 2 ข้อ โดยพิจารณาข้อสอบที่มีค่า IOC 0.50 ขึ้นไป ค่าความยากง่าย (p) ตั้งแต่ 0.20 ถึง 0.80 และค่าอำนาจจำแนก (r) ตั้งแต่ 0.20 ขึ้นไป ซึ่งข้อสอบปรนัยที่คัดเลือกไว้ มีค่า IOC เท่ากับ 1.00 ทุกข้อ ค่าความยากง่าย (p) ตั้งแต่ 0.23 ถึง 0.43 ค่าอำนาจจำแนก (r) ตั้งแต่ 0.20 ถึง 0.40 และข้อสอบอัตนัยที่คัดเลือกไว้มีค่า IOC เท่ากับ 1.00 ทุกข้อ ค่าความยากง่าย (p) ตั้งแต่ 0.24 ถึง 0.37 ค่าอำนาจจำแนก (r) ตั้งแต่ 0.45 ถึง 0.64

8. นำแบบทดสอบวัดผลสัมฤทธิ์ทางการเรียนวิชาคณิตศาสตร์ เรื่อง ทฤษฎีบทพีทาโกรัส มาวิเคราะห์หาค่าความเชื่อมั่นของแบบทดสอบทั้งฉบับ ซึ่งข้อสอบปรนัยมีค่าความเชื่อมั่นเท่ากับ 0.65 และข้อสอบอัตนัย มีค่าความเชื่อมั่นเท่ากับ 0.94

9. จัดพิมพ์แบบทดสอบวัดผลสัมฤทธิ์ทางการเรียนวิชาคณิตศาสตร์ที่ผ่านการหาคุณภาพแล้วเพื่อนำไปใช้เป็นเครื่องมือในการทดลอง

เครื่องมือชิ้นที่ 3 แบบสอบถามความพึงพอใจของนักเรียนชั้นมัธยมศึกษาปีที่ 2 ที่มีต่อการจัดการเรียนรู้โดยใช้การเรียนรู้รูปแบบ SSCS เรื่อง ทฤษฎีบทพีทาโกรัส เป็นแบบมาตราส่วนประมาณค่า 5 ระดับ จำนวน 15 ข้อ มีขั้นตอนการสร้างดังนี้

1. กำหนดเป้าหมายความพึงพอใจที่ต้องการวัด

2. ศึกษาเอกสารที่เกี่ยวข้องกับแบบสอบถามความพึงพอใจและการสร้างแบบสอบถามความพึงพอใจ

3. สร้างแบบสอบถามความพึงพอใจที่มีต่อวิชาคณิตศาสตร์ ซึ่งใช้ข้อคำถามแบบมาตราส่วนประมาณค่า (Rating scale) 5 ระดับตามวิธีของลิเคิร์ท จำนวน 15 ข้อ

4. นำแบบสอบถามวัดความพึงพอใจที่มีต่อวิชาคณิตศาสตร์ที่สร้างขึ้นเสนอต่ออาจารย์ที่ปรึกษาและครูพี่เลี้ยงเพื่อพิจารณาความถูกต้องเหมาะสม ชัดเจนและความเป็นไปได้ในการใช้ แล้วนำมาปรับปรุงแก้ไข

5. นำแบบสอบถามความพึงพอใจที่มีต่อวิชาคณิตศาสตร์ที่ได้รับการปรับปรุงแก้ไขจากอาจารย์ที่ปรึกษาและครูพี่เลี้ยงเรียบร้อยแล้วเสนอต่อผู้เชี่ยวชาญ จำนวน 3 คน เพื่อตรวจสอบคุณภาพของแบบสอบถามวัดความพึงพอใจที่มีต่อการจัดการเรียนรู้โดยใช้รูปแบบ SSCS โดยใช้แบบประเมินตามวิธีของลิเคิร์ทแบบมาตราส่วนประมาณค่า 5 ระดับ

6. นำผลการประเมินมาวิเคราะห์หาค่าเฉลี่ย ซึ่งผลการประเมินแบบสอบถามความพึงพอใจมีค่าเฉลี่ยเท่ากับ 4.96 นั่นคือ แบบสอบถามความพึงพอใจมีความเหมาะสมระดับมากที่สุด

7. นำแบบสอบถามความพึงใจ มาปรับปรุงตามคำแนะนำของผู้เชี่ยวชาญ และจัดพิมพ์แบบสอบถามความพึงพอใจเพื่อนำไปใช้กับกลุ่มตัวอย่าง

4.6 การเก็บรวบรวมข้อมูล

ในการวิจัยครั้งนี้ ผู้วิจัยดำเนินการเก็บรวบรวมข้อมูล ดังนี้

1. ทำการทดสอบก่อนเรียน (Pre-test) ด้วยแบบทดสอบวัดผลสัมฤทธิ์ทางการเรียนวิชาคณิตศาสตร์ เรื่อง ทฤษฎีบทพีทาโกรัส เป็นข้อสอบแบบปรนัยชนิดเลือกตอบ 4 ตัวเลือก จำนวน 15 ข้อ และแบบอัตนัย จำนวน 2 ข้อ โดยใช้เวลาในการทดสอบ 1 คาบและตรวจให้คะแนน

2. ดำเนินการสอนด้วยแผนการจัดการเรียนรู้ เรื่อง ทฤษฎีบทพีทาโกรัส โดยการจัดการเรียนรู้รูปแบบ SSCS ของนักเรียนชั้นมัธยมศึกษาปีที่ 2 จำนวน 8 แผน จนกระทั่งครบทุกแผนการจัดการเรียนรู้

3. ทำการทดสอบหลังเรียน (Post-test) ด้วยแบบทดสอบวัดผลสัมฤทธิ์ทางการเรียนวิชาคณิตศาสตร์ เรื่อง ทฤษฎีบทพีทาโกรัส เป็นข้อสอบแบบปรนัยชนิดเลือกตอบ 4 ตัวเลือก จำนวน 15 ข้อ และแบบอัตนัย จำนวน 2 ข้อ โดยใช้เวลาในการสอบ 1 คาบ และตรวจให้คะแนน

4. สอบถามความพึงพอใจที่มีต่อวิชาคณิตศาสตร์ของนักเรียนชั้นมัธยมศึกษาปีที่ 2 ด้วยแบบสอบถามและนำผลไปวิเคราะห์ข้อมูลต่อไป

4.7 การวิเคราะห์ข้อมูล

ในการวิเคราะห์ข้อมูลข้อมูล ผู้วิจัยได้ดำเนินการวิเคราะห์ ดังนี้

1. วิเคราะห์ค่าสถิติพื้นฐาน ร้อยละ ค่าเฉลี่ย ส่วนเบี่ยงเบนมาตรฐาน ของคะแนนสอบนักเรียนกลุ่มเป้าหมาย ทั้งคะแนนสอบก่อนเรียน หลังเรียน หลังเรียน 2 สัปดาห์ และแบบสอบถามความพึงพอใจ

2. วิเคราะห์เปรียบเทียบผลสัมฤทธิ์ทางการเรียนวิชาคณิตศาสตร์ เรื่อง ทฤษฎีบทพีทาโกรัส โดยการจัดการเรียนรู้รูปแบบ SSCS ของนักเรียนชั้นมัธยมศึกษาปีที่ 2 ระหว่างก่อนเรียนและหลังเรียน โดยใช้ t-test (Dependent sample)

3. วิเคราะห์ความพึงพอใจที่มีต่อวิชาคณิตศาสตร์ของนักเรียนชั้นมัธยมศึกษาปีที่ 2 โดยใช้ค่าสถิติพื้นฐาน ได้แก่ ค่าเฉลี่ย และส่วนเบี่ยงเบนมาตรฐาน

5. ผลการวิจัย

การวิจัย เรื่อง ผลการจัดการเรียนรู้โดยใช้รูปแบบ SSCS เรื่อง ทฤษฎีบทพีทาโกรัส ของนักเรียนชั้นมัธยมศึกษาปีที่ 2 โรงเรียนวัดประดู่ในทรงธรรม ผู้วิจัยได้เสนอผลการวิเคราะห์ข้อมูล ดังนี้

ตอนที่ 1 ผลการเปรียบเทียบผลสัมฤทธิ์ทางการเรียนวิชาคณิตศาสตร์ เรื่อง ทฤษฎีบทพีทาโกรัส ของนักเรียนชั้นมัธยมศึกษาปีที่ 2 ก่อนเรียนและหลังเรียนโดยใช้รูปแบบ SSCS ปรากฏดังตารางที่ 1

ตารางที่ 1 แสดงผลการเปรียบเทียบผลสัมฤทธิ์ทางการเรียนวิชาคณิตศาสตร์ เรื่อง ทฤษฎีบทพีทาโกรัส ของนักเรียนชั้นมัธยมศึกษาปีที่ 2 ก่อนเรียนและหลังเรียนโดยใช้รูปแบบ SSCS

คะแนน	n	คะแนนเต็ม	$\bar{X}$	S.D.	ร้อยละ	df	t
ก่อนเรียน	23	20	3.48	1.68	17.39	22	6.44*
หลังเรียน	23	20	10.37	5.07	51.89		

*t มีนัยสำคัญทางสถิติที่ระดับ .05 ($t_{.05, 22}$ = 1.717)

จากตารางที่ 1 พบว่า ผลสัมฤทธิ์ทางการเรียนวิชาคณิตศาสตร์ เรื่อง ทฤษฎีบทพีทาโกรัส ของนักเรียนชั้นมัธยมศึกษาปีที่ 2 ก่อนเรียนโดยใช้รูปแบบ SSCS มีค่าเฉลี่ยเท่ากับ 3.48 ส่วนเบี่ยงเบนมาตรฐานเท่ากับ 1.68 คิดเป็นร้อยละ 17.39 ของคะแนนเต็ม และหลังเรียน มีค่าเฉลี่ยเท่ากับ 10.37 ส่วนเบี่ยงเบนมาตรฐานเท่ากับ 5.07 คิดเป็นร้อยละ 51.85 ของคะแนนเต็มเมื่อเปรียบเทียบระหว่าง $t_{คำนวณ}$ กับ $t_{วิกฤต}$ พบว่า $t_{คำนวณ}$ มากกว่า $t_{วิกฤต}$ จึงสรุปได้ว่า ผลสัมฤทธิ์ทางการเรียนวิชาคณิตศาสตร์ เรื่อง ทฤษฎีบทพีทาโกรัส ของนักเรียนชั้นมัธยมศึกษาปีที่ 2 หลังเรียนโดยใช้รูปแบบ SSCS สูงกว่าก่อนเรียนอย่างมีนัยสำคัญทางสถิติที่ระดับ .05

ตอนที่ 2 ผลการศึกษาความพึงพอใจของนักเรียนชั้นมัธยมศึกษาปีที่ 2 ที่มีต่อการจัดการเรียนรู้ เรื่อง ทฤษฎีบทพีทาโกรัส โดยใช้รูปแบบ SSCS ปรากฏดังตารางที่ 2

ตารางที่ 2 แสดงผลการศึกษาความพึงพอใจของนักเรียนชั้นมัธยมศึกษาปีที่ 2 ที่มีต่อการจัดการเรียนรู้ เรื่อง ทฤษฎีบท
พีทาโกรัส โดยใช้รูปแบบ SSCS

รายการประเมิน	$\bar{x}$	S.D.	ระดับความพึงพอใจ
ด้านการจัดกิจกรรมการเรียนรู้	**4.55**	**0.54**	**มากที่สุด**
1. กิจกรรมการเรียนรู้มีความเหมาะสมกับเนื้อหาและเวลา	4.65	0.49	มากที่สุด
2. กิจกรรมการเรียนรู้มีความเหมาะสมกับความสามารถของนักเรียน	4.43	0.73	มาก
3. กิจกรรมการเรียนรู้ทำให้บรรยากาศในห้องเรียนน่าเรียนมากยิ่งขึ้น	4.61	0.50	มากที่สุด
4. กิจกรรมการเรียนรู้ทำให้นักเรียนเกิดความสนุกและมีความสุขในการเรียน	4.39	0.58	มาก
5. กิจกรรมการเรียนรู้ทำให้นักเรียนมีกระบวนการคิดและการทำงานที่ดีขึ้น	4.57	0.51	มากที่สุด
6. กิจกรรมการเรียนรู้เป็นไปตามขั้นตอนจากง่ายไปยากทำให้นักเรียนเกิดการเรียนรู้ได้ดี	4.61	0.50	มากที่สุด
7. กิจกรรมการเรียนรู้ส่งเสริมให้นักเรียนเกิดทักษะการเรียนรู้ทางคณิตศาสตร์ได้ดี	4.48	0.51	มาก
8. กิจกรรมการเรียนรู้ทำให้นักเรียนทำงานอย่างรอบคอบและเป็นระเบียบมากขึ้น	4.65	0.49	มากที่สุด
ด้านครูผู้สอน	**4.47**	**0.60**	**มาก**
9. ครูมีความสามารถในการถ่ายทอดความรู้ จัดกิจกรรมการเรียนรู้เป็นขั้นตอนเหมาะสมและเข้าใจง่าย	4.52	0.51	มากที่สุด
10. ครูเปิดโอกาสให้นักเรียนซักถามและแลกเปลี่ยนเรียนรู้ร่วมกันระหว่างการจัดการเรียนรู้	4.61	0.58	มากที่สุด
11. ครูมีความตั้งใจในการสอนและให้คำแนะนำตลอดการจัดกิจกรรมการเรียนรู้	4.35	0.57	มาก
12. ครูให้ความสนใจแก่นักเรียนอย่างทั่วถึงขณะสอน	4.39	0.72	มาก
ด้านประโยชน์ที่ได้รับจากกิจกรรมการเรียนรู้	**4.36**	**0.67**	**มาก**
13. กิจกรรมการเรียนรู้ทำให้นักเรียนมีความเข้าใจในเนื้อหามากยิ่งขึ้น	4.13	0.55	มาก
14. กิจกรรมการเรียนรู้ทำให้นักเรียนมีทักษะในการแก้โจทย์ปัญหาได้ดีขึ้น	4.48	0.73	มาก
15. กิจกรรมการเรียนรู้ทำให้นักเรียนเกิดทักษะการแก้โจทย์ปัญหาเป็นขั้นตอนได้มากขึ้น	4.48	0.73	มาก
ผลการประเมินความพึงพอใจโดยรวม	**4.49**	**0.58**	**มาก**

จากตารางที่ 2 พบว่า ความพึงพอใจของนักเรียนชั้นมัธยมศึกษาปีที่ 2 ที่มีต่อการจัดการเรียนรู้รูปแบบ SSCS เรื่อง
ทฤษฎีบทพีทาโกรัส มีค่าเฉลี่ยโดยรวมเท่ากับ 4.49 ส่วนเบี่ยงเบนมาตรฐานเท่ากับ 0.58 นั่นคือ นักเรียนชั้นมัธยมศึกษาปีที่ 2
มีความพึงพอใจต่อการจัดการเรียนรู้ เรื่อง ทฤษฎีบทพีทาโกรัส โดยใช้รูปแบบ SSCS อยู่ในระดับมาก เมื่อพิจารณาเป็นรายข้อ
พบว่า ข้อที่มีระดับความพึงพอใจมากที่สุด คือ กิจกรรมการเรียนรู้มีความเหมาะสมกับเนื้อหาและเวลาและกิจกรรมการเรียนรู้
ทำให้นักเรียนทำงานอย่างรอบคอบและเป็นระเบียบมากขึ้น รองลงมา คือ กิจกรรมการเรียนรู้ทำให้บรรยากาศในห้องเรียนน่า
เรียนมากยิ่งขึ้น กิจกรรมการเรียนรู้เป็นไปตามขั้นตอนจากง่ายไปยากทำให้นักเรียนเกิดการเรียนรู้ได้ดี และครูเปิดโอกาสให้

นักเรียนซักถามและแลกเปลี่ยนเรียนรู้ร่วมกันระหว่างการจัดการเรียนรู้ และข้อที่มีระดับความพึงพอใจน้อยที่สุด คือ กิจกรรม
การเรียนรู้ทำให้นักเรียนมีความเข้าใจในเนื้อหามากยิ่งขึ้น

6. สรุปผลและอภิปรายผล

6.1 สรุปผลการวิจัย

1. ผลสัมฤทธิ์ทางการเรียนคณิตศาสตร์ เรื่อง ทฤษฎีบทพีทาโกรัส ของนักเรียนชั้นมัธยมศึกษาปีที่ 2 โดยใช้รูปแบบ
SSCS สูงกว่าก่อนเรียนอย่างมีนัยสำคัญทางสถิติที่ .05

2. ความพึงพอใจของนักเรียนชั้นมัธยมศึกษาปีที่ 2 ที่มีต่อการจัดการเรียนรู้ เรื่อง ทฤษฎีบทพีทาโกรัส โดยใช้รูปแบบ
SSCS อยู่ในระดับมาก

6.2 อภิปรายผล

จากการศึกษาวิจัย เรื่อง ผลการจัดการเรียนรู้โดยใช้รูปแบบ SSCS เรื่อง ทฤษฎีบทพีทาโกรัส ของนักเรียนชั้น
มัธยมศึกษาปีที่ 2 โรงเรียนวัดประดูในทรงธรรม ผู้วิจัยสามารถอภิปรายผลได้ ดังนี้

1. ผลสัมฤทธิ์ทางการเรียนวิชาคณิตศาสตร์ เรื่อง ทฤษฎีบทพีทาโกรัส ของนักเรียนชั้นมัธยมศึกษาปีที่ 2 หลังเรียน
โดยใช้โดยใช้รูปแบบ SSCS สูงกว่าก่อนเรียน อย่างมีนัยสำคัญทางสถิติที่ระดับ .05 ซึ่งผลการวิจัยสอดคล้องกับสมมติฐานที่ตั้ง
ไว้ ทั้งนี้ เนื่องจากการจัดการเรียนรู้โดยใช้รูปแบบ SSCS เป็นวิธีการหนึ่งที่ส่งเสริมและฝึกทักษะกระบวนการทางคณิตศาสตร์ที่
หลากหลายเพื่อให้นักเรียนสามารถคิด วิเคราะห์ แก้ปัญหาต่าง ๆ อย่างมีขั้นตอน ทำให้สามารถวิเคราะห์ปัญหาได้ง่ายขึ้น ซึ่ง
สอดคล้องกับงานวิจัยของ รัตติยา วงศ์วุฒิ (2565) ซึ่งได้ศึกษาการพัฒนาชุดกิจกรรมด้วยวิธีการสอนแบบ SSCS เรื่อง ความรู้
เบื้องต้นเกี่ยวกับจำนวนจริง สำหรับนักเรียนชั้นมัธยมศึกษาปีที่ 2 ผลการวิจัย พบว่า มีค่าเฉลี่ยผลสัมฤทธิ์ทางการเรียนหลัง
เรียนโดยใช้ชุดกิจกรรมด้วยวิธีการสอนแบบ SSCS สูงกว่าก่อนเรียนอย่างมีนัยสำคัญทางสถิติที่ระดับ .01 และสอดคล้องกับ
งานวิจัยของ นวกานต์ วิภาสชีวิน (2564) ซึ่งได้ศึกษาผลการจัดการเรียนรู้ โดยใช้รูปแบบ SSCS ร่วมกับเทคนิคเพื่อนคู่คิด
(Think-Pair-Share) เรื่อง สถิติที่มีต่อการพัฒนาความสามารถในการแก้ปัญหาและความสามารถในการทำงานเป็นทีมของ
นักเรียนชั้นมัธยมศึกษาปีที่ 1 ผลการวิจัยพบว่า นักเรียนชั้นมัธยมศึกษาปีที่ 1 มีผลสัมฤทธิ์ทางการเรียนเรื่องสถิติหลังได้รับการ
จัดการเรียนรู้โดยใช้รูปแบบ SSCS ร่วมกับเทคนิคเพื่อนคู่คิด สูงกว่าเกณฑ์ร้อยละ 70 อย่างมีนัยสำคัญทางสถิติ 0.05

2. นักเรียนชั้นมัธยมศึกษาปีที่ 2 มีความพึงพอใจต่อการจัดการเรียนรู้ เรื่อง ทฤษฎีบทพีทาโกรัส ของนักเรียนชั้น
มัธยมศึกษาปีที่ 2 โดยใช้รูปแบบ SSCS อยู่ในระดับ ซึ่งสอดคล้องกับสมมติฐานที่ตั้งไว้ เนื่องจาก การจัดการเรียนรู้โดยใช้
รูปแบบ SSCS เป็นการจัดการเรียนรู้ตามขั้นตอน ส่งเสริมให้นักเรียนคิด วิเคราะห์ ฝึกฝนให้นักเรียนมีทักษะในการแก้โจทย์
ปัญหาเมื่อผิดพลาดสามารถทบทวนได้ว่าผิดในขั้นตอนใด และสามารถแก้ไขและหาคำตอบได้ถูกต้อง ซึ่งสอดคล้องกับงานวิจัย
ของ นวกานต์ วิภาสชีวิน (2564) ซึ่งได้ศึกษาผลการจัดการเรียนรู้โดยใช้รูปแบบ SSCS ร่วมกับเทคนิคเพื่อนคู่คิด (Think-Pair-
Share) เรื่อง สถิติที่มีต่อการพัฒนาความสามารถในการแก้ปัญหาและความสามารถในการทำงานเป็นทีมของนักเรียนชั้น
มัธยมศึกษาปีที่ 1 พบว่า นักเรียนชั้นมัธยมศึกษาปีที่ 1 มีความพึงพอใจโดยรวมต่อการจัดการเรียนรู้โดยใช้รูปแบบ SSCS
ร่วมกับเทคนิคเพื่อนคู่คิด อยู่ในระดับมาก และสอดคล้องกับงานวิจัยของ รัตติยา วงศ์วุฒิ (2565) ได้ศึกษาการพัฒนาชุด
กิจกรรมด้วยวิธีการสอนแบบ SSCS เรื่องความรู้เบื้องต้นเกี่ยวกับจำนวนจริง สำหรับนักเรียนชั้นมัธยมศึกษาปีที่ 2 พบว่า
นักเรียนมีความพึงพอใจต่อการเรียนหลังเรียนโดยใช้ชุดกิจกรรมด้วยวิธีการสอนแบบ SSCS อยู่ในระดับมากที่สุดทุกรายการ

การประชุมวิชาการระดับชาติและนานาชาติบ้านสมเด็จเจ้าพระยา ครั้งที่ 1 (BS2C 2025)
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7. ข้อเสนอแนะ

    7.1 ข้อเสนอแนะทั่วไป

    1. การจัดการเรียนรู้โดยใช้รูปแบบ SSCS มี 4 ขั้นตอน ครูผู้สอนควรจัดสรรเวลาให้เหมาะสมเพื่อให้นักเรียนมีเวลาเพียงพอในการเรียนรู้ครอบคลุมเนื้อหา และขั้นตอนของเทคนิค SSCS

    2. ครูผู้สอนควรบูรณาการกิจกรรมหรือสื่อการสอนร่วมด้วยกับการจัดการเรียนรู้โดยใช้รูปแบบ SSCS เพื่อให้นักเรียนมีส่วนร่วมในการคิดและสามารถดึงดูดความสนใจของนักเรียน

    7.2 ข้อเสนอแนะในการวิจัยครั้งต่อไป

    1. ควรมีการศึกษาผลสัมฤทธิ์ทางการเรียนวิชาคณิตศาสตร์ด้วยการจัดการเรียนรู้โดยใช้รูปแบบ SSCS ในเนื้อหาและระดับชั้นอื่น ๆ

    2. ควรมีการศึกษาผลการเรียนรู้โดยใช้ใช้รูปแบบ SSCS บูรณาการกับเทคนิคการสอนวิธีอื่น ๆ เช่น การเรียนรู้แบบร่วมมือ การเรียนรู้โดยการใช้เกม การใช้สื่อประสม เป็นต้น

8. กิตติกรรมประกาศ

    ครุนิพนธ์ฉบับนี้สำเร็จได้อย่างสมบูรณ์ ด้วยความอนุเคราะห์จากอาจารย์ ดร.สมภพ แซ่ลี้ อาจารย์ที่ปรึกษาครุนิพนธ์ และคณาจารย์สาขาคณิตศาสตร์ คณะครุศาสตร์ มหาวิทยาลัยราชภัฏบ้านสมเด็จเจ้าพระยา และผู้ที่เกี่ยวข้องกับครุนิพนธ์ฉบับนี้ที่กรุณาให้ความช่วยเหลือ ให้คำปรึกษาแนะนำในด้านความรู้ แนวคิดวิธีการและข้อคิดต่าง ๆ ตลอดจนช่วยเหลือแก้ไขข้อบกพร่องจนกระทั่งครุนิพนธ์ฉบับนี้เสร็จสมบูรณ์

9. เอกสารอ้างอิง

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(176-TH-EDU)

การศึกษาผลสัมฤทธิ์ทางการเรียนและความคงทนในการเรียนรู้คณิตศาสตร์ เรื่อง รูปเรขาคณิตสามมิติ ของนักเรียนชั้นประถมศึกษาปีที่ 6 โรงเรียนวัดบางปะกอก โดยใช้เทคนิคการจัดการเรียนรู้รูปแบบ STAD

รุ่งนภา ทองประเสริฐ[1], พงศ์รัศมิ์ เฟื่องฟู[1] และปุณยวัจน์ โพธิ์เกิด[1*]

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บทคัดย่อ

การวิจัยครั้งนี้มีวัตถุประสงค์ คือ (1) เพื่อเปรียบเทียบผลสัมฤทธิ์ทางการเรียน เรื่อง รูปเรขาคณิตสามมิติ ของนักเรียนชั้นประถมศึกษาปีที่ 6 ก่อนเรียนและหลังเรียนโดยใช้เทคนิคการจัดการเรียนรู้รูปแบบ STAD (2) เพื่อเปรียบเทียบผลสัมฤทธิ์ทางการเรียน เรื่อง รูปเรขาคณิตสามมิติ ของนักเรียนชั้นประถมศึกษาปีที่ 6 หลังเรียนโดยใช้เทคนิคการจัดการเรียนรู้รูปแบบ STAD กับเกณฑ์ร้อยละ 60 (3) เพื่อศึกษาความคงทนในการเรียนรู้วิชาคณิตศาสตร์ เรื่อง รูปเรขาคณิตสามมิติ ของนักเรียนชั้นประถมศึกษาปีที่ 6 โดยใช้เทคนิคการจัดการเรียนรู้รูปแบบ STAD (4) เพื่อศึกษาความพึงพอใจของนักเรียนชั้นประถมศึกษาปีที่ 6 ที่มีต่อเทคนิคการจัดการเรียนรู้รูปแบบ STAD เรื่อง รูปเรขาคณิตสามมิติ กลุ่มตัวอย่างที่ใช้วิจัยในครั้งนี้ คือ นักเรียนชั้นประถมศึกษาปีที่ 6 ภาคเรียนที่ 2 ปีการศึกษา 2566 โรงเรียนวัดบางปะกอก จำนวน 40 คน ซึ่งได้จากการสุ่มแบบแบ่งกลุ่ม โดยใช้ห้องเรียนเป็นหน่วยสุ่ม เครื่องมือที่ใช้ในการวิจัยประกอบไปด้วย (1) แผนการจัดการเรียนรู้โดยใช้เทคนิค STAD เรื่อง รูปเรขาคณิตสามมิติ ชั้นประถมศึกษาปีที่ 6 จำนวน 8 แผน (2) แบบทดสอบวัดผลสัมฤทธิ์ทางการเรียนวิชาคณิตศาสตร์ เรื่อง รูปเรขาคณิตสามมิติ ชั้นประถมศึกษาปีที่ 6 เป็นข้อสอบปรนัย 20 ข้อ มีค่าความยากง่าย ตั้งแต่ 0.27 ถึง 0.80 มีค่าอำนาจจำแนก ตั้งแต่ 0.27 ถึง 0.73 และมีความเชื่อมั่นเท่ากับ 0.80 (3) แบบสอบถามความพึงพอใจที่มีต่อการจัดการเรียนรู้โดยใช้เทคนิค STAD เรื่อง รูปเรขาคณิตสามมิติ ชั้นประถมศึกษาปีที่ 6 สถิติที่ใช้ในการวิเคราะห์ข้อมูล ได้แก่ ค่าเฉลี่ยเลขคณิต ส่วนเบี่ยงเบนมาตรฐาน ร้อยละ และทดสอบสมมติฐานโดยใช้ค่าที ผลการวิจัยพบว่า (1) ผลสัมฤทธิ์ทางการเรียน เรื่อง รูปเรขาคณิตสามมิติ ของนักเรียนชั้นประถมศึกษาปีที่ 6 หลังเรียนโดยใช้เทคนิคการจัดการเรียนรู้รูปแบบ STAD สูงกว่าก่อนเรียน อย่างมีนัยสำคัญทางสถิติที่ระดับ .05 (2) ผลสัมฤทธิ์ทางการเรียน เรื่อง รูปเรขาคณิตสามมิติ ของนักเรียนชั้นประถมศึกษาปีที่ 6 หลังเรียนโดยใช้เทคนิคการจัดการเรียนรู้รูปแบบ STAD สูงกว่าเกณฑ์ร้อยละ 60 อย่างมีนัยสำคัญทางสถิติที่ระดับ .05 (3) นักเรียนชั้นประถมศึกษาปีที่ 6 มีความคงทนในการเรียนรู้ เรื่อง รูปเรขาคณิตสามมิติ หลังเรียนโดยใช้เทคนิคการจัดการเรียนรู้รูปแบบ STAD (4) นักเรียนมีความพึงพอใจต่อการจัดการเรียนรู้โดยใช้เทคนิคการจัดการเรียนรู้รูปแบบ STAD รูปเรขาคณิตสามมิติ อยู่ในระดับมาก

คำสำคัญ: ความคงทนในการเรียน; เทคนิคการจัดการเรียนรู้รูปแบบ STAD; ผลสัมฤทธิ์; รูปเรขาคณิตสามมิติ

The Study of Learning Achievement and Retention on Three-Dimensional Geometric Figures of Prathomsuksa 6 Students from Wat Bangpakok School Using the STAD Learning Management Technique.

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ABSTRACT

The purposes of this research were to (1) compare the learning achievement of Prathomsuksa 6 students on three-dimensional geometric figures before and after studying using the STAD learning management technique, (2) evaluate whether the learning achievement of these students on three-dimensional geometric figures after studying using the STAD learning management technique met the criterion to 60%, and (3) examine the retention of mathematical knowledge on three-dimensional geometric figures among these students after using the STAD learning management technique. The sample consisted of 40 Prathomsuksa 6 students from Wat Bangpakok school during the second semester of the 2023 academic year, selected through cluster random sampling. Research instruments included (1) eight lesson plans, (2) a 20-item achievement test on three-dimensional geometric figures difficulty indices ranging (p) from 0.27 to 0.80, discrimination indices ranging (r) from 0.27 to 0.73 overall the reliability of test (r_{tt}) 0.80, and (3) satisfaction questionnaire regarding the STAD learning management technique. The research findings were as follows : (1) Learning achievement in three-dimensional geometric figures significantly improved after using the STAD learning management technique at the .05 level of significance. (2) Learning achievement in three-dimensional geometric figures after using the STAD learning management technique exceed the of 60% criterion at the .05 level of significance. (3) Students retained their knowledge three-dimensional geometric figures after studying with the STAD learning management technique. (4) Students expressed a high level of satisfaction with the STAD learning management technique for learning three-dimensional geometric figures.

Keywords : Achievement; Three-dimensional geometrie figures; STAD learning management

1. บทนำ

คณิตศาสตร์มีบทบาทสำคัญยิ่งต่อความสำเร็จในการเรียนรู้ศตวรรษที่ 21 เนื่องจากมนุษย์มีความคิดสร้างสรรค์ คิดอย่างเป็นระบบ มีแบบแผน สามารถวิเคราะห์ปัญหาสถานการณ์ได้ถี่ถ้วน รอบคอบ ช่วยให้คาดการณ์ วางแผน ตัดสินใจ แก้ปัญหา และนำไปใช้ในชีวิตประจำวันได้อย่างถูกต้องเหมาะสม สามารถนำไปใช้ในชีวิตจริงได้อย่างมีประสิทธิภาพ (กระทรวงศึกษาธิการ, 2560: 1) นอกจากนี้คณิตศาสตร์ยังเป็นเครื่องมือในการศึกษาทางวิทยาศาสตร์เทคโนโลยี และศาสตร์ อื่น ๆ (จินตนา กุจพันธ์ม, 2561: 2) ผู้เรียนส่วนใหญ่มีพื้นฐานทางคณิตศาสตร์ไม่ดี เพราะไม่สนใจเรียน ไม่ชอบคิดคำนวณ ไม่ชอบแบบฝึกหัด จดจำสูตรไม่ได้ เนื้อหาวิชาที่เรียนมากเกินไป นำความรู้มาประยุกต์ใช้ในการแก้ปัญหาทางคณิตศาสตร์ไม่ได้ ผู้สอนสอนจริงจังทำให้บรรยากาศในห้องเรียนเครียด ไม่น่าเรียน สื่อการสอนไม่เพียงพอ ซึ่งพฤติกรรมการเตรียมตัวของผู้สอน สำคัญมาก จะมีผลต่อเจตคติของผู้เรียน ผู้สอนควรเลือกใช้เทคนิคการสอนและวิธีการสอนที่เหมาะสม ในการจัดการเรียน การสอนรายวิชาคณิตศาสตร์ ผู้สอนต้องคำนึงถึงรูปแบบการจัดการเรียนรู้ที่หลากหลายและนำมาปรับใช้ในการจัดการเรียน การสอน เพื่อส่งเสริมให้นักเรียนสามารถพัฒนาความสามารถด้านคณิตศาสตร์ของตนได้อย่างเต็มที่

การจัดการเรียนการสอนนั้นมีหลายรูปแบบ หนึ่งในนั้นคือรูปแบบการสอนแบบแบ่งกลุ่มผลสัมฤทธิ์ (STAD : Student Teams-Achievement Division) เป็นการจัดการเรียนรู้ในลักษณะกลุ่มย่อยคละความสามารถ กลุ่มละ 4 – 5 คน คือ เก่ง ปานกลาง และอ่อน ซึ่งเป็นวิธีการหนึ่งที่จะช่วยให้ผู้เรียนได้มีโอกาสปรึกษากัน ช่วยเหลือซึ่งกันและกัน ร่วมกันเรียนรู้และ แก้ปัญหาได้เป็นอย่างดี โดย วัฒนาพร ระงับทุกข์ (2542 อ้างอิงจาก อรรถพล ปลัดพรหม, 2563: 3) กล่าวว่า วิธีสอนแบบ แบ่งกลุ่มผลสัมฤทธิ์ คือ วิธีการจัดการเรียนการสอนที่จัดสภาพแวดล้อมทางการเรียนรู้ร่วมกันเป็นกลุ่มเล็ก สมาชิกในกลุ่ม แต่ละกลุ่มที่ความรู้ความสามารถแตกต่างกัน โดยที่แต่ละส่วนร่วมอย่างแท้จริงในการเรียนรู้และในความสำเร็จของกลุ่ม จากการแลกเปลี่ยนความคิดเห็น การแบ่งปันทรัพยากรการเรียนรู้รวมทั้งเป็นกำลังใจให้กันและกัน คนที่เรียนเก่งจะช่วยเหลือ คนที่อ่อนกว่า สมาชิกในกลุ่มต้องรับผิดชอบต่อการเรียนตนเองและร่วมรับผิดชอบต่อการเรียนรู้ของสมาชิกทุกคนในกลุ่ม ความสำเร็จแต่ละบุคคลคือความสำเร็จของกลุ่ม วิธีการสอนแบบแบ่งกลุ่มผลสัมฤทธิ์ สามารถนำมาใช้ได้กับการเรียนทุกวิชา และทุกระดับชั้น และจะมีประสิทธิภาพยิ่งกับกิจกรรมการเรียนรู้ที่มุ่งพัฒนาผู้เรียนในด้านการแก้ปัญหา การกำหนดเป้าหมาย ในการเรียนรู้ การคิดแบบหลากหลาย การปฏิบัติภารกิจที่ซับซ้อน การเน้นคุณธรรมจริยธรรม การเสริมสร้างประชาธิปไตย ในชั้นเรียน ทักษะทางสังคม การสร้างวินัย ความรับผิดชอบร่วมงานและความร่วมมือภายในกลุ่ม (อรรถพล ปลัดพรหม, 2563: 3) ขั้นตอนการจัดการเรียนรู้ มีดังนี้ 1) ขั้นนำเสนอเนื้อหา 2) ขั้นปฏิบัติกิจกรรมกลุ่ม 3) ขั้นทดสอบย่อย 4) ขั้นคิด คะแนนความก้าวหน้าแต่ละคน และของกลุ่มย่อย 5) ชมเชย ยกย่อง บุคคลหรือกลุ่มที่มีคะแนนยอดเยี่ยม ซึ่งเนื้อหาที่จะพบ ปัญหาได้บ่อยคือเรื่องของการทำโจทย์ปัญหา การที่นักเรียนไม่สามารถทำโจทย์ปัญหาได้ เนื่องจากนักเรียนขาดทักษะการคิด คำนวณ บกพร่องในการอ่าน ตีความโจทย์ปัญหาไม่ได้ ไม่แน่ใจในการใช้วิธีการในการหาคำตอบ และขาดการฝึกทักษะในการ ทำโจทย์ปัญหา

จากการทดสอบทางการศึกษาระดับชาติขั้นพื้นฐาน (O-NET) ระดับประถมศึกษาปีที่ 6 ปีการศึกษา 2561 - 2565 พบว่า คะแนนการทดสอบทางการศึกษาระดับชาติขั้นพื้นฐานในรายวิชาคณิตศาสตร์ ในปีการศึกษา 2561 ได้คะแนนเฉลี่ย 37.50 ในการศึกษาปี 2562 ได้คะแนนเฉลี่ย 32.90 ในปีการศึกษา 2563 ได้คะแนนเฉลี่ย 29.99 ในปีการศึกษา 2564 ได้คะแนนเฉลี่ย 36.83 และในปีการศึกษา 2565 ปรากฏว่าได้คะแนนเฉลี่ย 28.06 ซึ่งจะเห็นได้ว่าปีการศึกษา 2565 มีค่าเฉลี่ย น้อยกว่าปีการศึกษา 2561 – 2564 หรือมีค่าเฉลี่ยสถิติพื้นฐานระดับประเทศลดลง (สถาบันทดสอบทางการศึกษาแห่งชาติ องค์การมหาชน, 2565) ผู้วิจัยได้ศึกษาปัญหาของการจัดการเรียนการสอนคณิตศาสตร์ พบว่า ปัจจุบันนักเรียนยังขาด ความสามารถในการแก้ปัญหา การให้เหตุผล การสื่อสาร การสื่อความหมายทางคณิตศาสตร์และการนำเสนอ การเชื่อมโยง และความคิดสร้างสรรค์ และสิ่งเหล่านี้ก็คือทักษะและกระบวนการทางคณิตศาสตร์ ซึ่งสาเหตุเกิดจากการจัดกิจกรรม

การเรียนรู้คณิตศาสตร์ของครูคณิตศาสตร์ ส่วนใหญ่ครูผู้สอนจะเน้นที่เนื้อหาวิชามากกว่าทักษะและกระบวนการทาง คณิตศาสตร์ จึงทำให้นักเรียนตั้งคำถามบ่อยครั้งว่า "ทำไมต้องเรียนวิชาคณิตศาสตร์ เรียนวิชาคณิตศาสตร์ไปทำไม" สิ่งเหล่านี้ ก็เกิดจากการที่นักเรียนขาดทักษะและกระบวนการทางคณิตศาสตร์นั่นเอง

จากเหตุข้างต้น ทำให้ผู้วิจัยสนใจศึกษาการพัฒนาการแก้โจทย์ปัญหา โดยใช้เทคนิคการสอนแบบแบ่งกลุ่มผลสัมฤทธิ์ (STAD : Student Teams-Achievement Division) เรื่อง รูปเรขาคณิตสามมิติ สำหรับนักเรียนชั้นประถมศึกษาปีที่ 6 โรงเรียนวัดบางประกอก จังหวัดกรุงเทพมหานคร เพื่อใช้ในการส่งเสริมความสามารถในการแก้โจทย์ปัญหาคณิตศาสตร์ และ เพื่อเป็นแนวทางในการจัดการเรียนการสอนในรายวิชาคณิตศาสตร์ให้มีประสิทธิภาพสูงสุด ตลอดจนส่งเสริมให้นักเรียนได้ มีโอกาสพัฒนาความสามารถในการแก้ปัญหาทางคณิตศาสตร์ให้ดียิ่งขึ้น

2. วัตถุประสงค์การวิจัย

1. เพื่อเปรียบเทียบผลสัมฤทธิ์ทางการเรียน เรื่อง รูปเรขาคณิตสามมิติ ของนักเรียนชั้นประถมศึกษาปีที่ 6 ก่อนเรียนและหลังเรียน โดยใช้เทคนิคการจัดการเรียนรู้รูปแบบ STAD

2. เพื่อเปรียบเทียบผลสัมฤทธิ์ทางการเรียน เรื่อง รูปเรขาคณิตสามมิติ ของนักเรียนชั้นประถมศึกษาปีที่ 6 หลังเรียน โดยใช้เทคนิคการจัดการเรียนรู้รูปแบบ STAD กับเกณฑ์ร้อยละ 60

3. เพื่อศึกษาความคงทนในการเรียนวิชาคณิตศาสตร์ เรื่อง รูปเรขาคณิตสามมิติและปริมาตรของรูปเรขาคณิต สามมิติ ของนักเรียนชั้นประถมศึกษาปีที่ 6 โดยใช้เทคนิคการจัดการเรียนรู้รูปแบบ STAD

4. เพื่อศึกษาความพึงพอใจของนักเรียนชั้นประถมศึกษาปีที่ 6 ที่มีต่อเทคนิคการจัดการเรียนรู้รูปแบบ STAD เรื่อง รูปเรขาคณิตสามมิติ

3. สมมติฐานการวิจัย

1. ผลสัมฤทธิ์ทางการเรียน เรื่อง รูปเรขาคณิตสามมิติ ของนักเรียนชั้นประถมศึกษาปีที่ 6 หลังเรียน โดยใช้เทคนิค การจัดการเรียนรู้รูปแบบ STAD สูงกว่าก่อนเรียน

2. ผลสัมฤทธิ์ทางการเรียน เรื่อง รูปเรขาคณิตสามมิติ ของนักเรียนชั้นประถมศึกษาปีที่ 6 หลังเรียน โดยใช้เทคนิค การจัดการเรียนรู้รูปแบบ STAD สูงกว่าเกณฑ์ร้อยละ 60

3. นักเรียนชั้นประถมศึกษาปีที่ 6 มีความคงทนในการเรียนรู้ เรื่อง รูปเรขาคณิตสามมิติ หลังได้รับการจัดการเรียนรู้ โดยใช้เทคนิคการจัดการเรียนรู้รูปแบบ STAD

4. นักเรียนชั้นประถมศึกษาปีที่ 6 มีความพึงพอใจในการจัดการเรียนรู้รูปแบบ STAD เรื่อง รูปเรขาคณิตสามมิติ อยู่ในระดับมากขึ้นไป

4. วิธีการดำเนินการวิจัย

4.1 ประชากรและกลุ่มตัวอย่าง

ประชากรที่ใช้ในวิจัยครั้งนี้ คือ นักเรียนชั้นประถมศึกษาปีที่ 6 ภาคเรียนที่ 2 ปีการศึกษา 2566 โรงเรียนวัดบาง ปะกอก จำนวน 7 ห้อง รวมทั้งสิ้น 287 คน

กลุ่มตัวอย่างที่ใช้ในการวิจัยครั้งนี้ คือ นักเรียนชั้นประถมศึกษาปีที่ 6/6 ภาคเรียนที่ 2 ปีการศึกษา 2566 โรงเรียน วัดบางปะกอก จำนวน 40 คน ซึ่งได้จากการสุ่มแบบแบ่งกลุ่ม โดยใช้ห้องเรียนเป็นหน่วยสุ่ม

4.2 ตัวแปรที่ศึกษา

ตัวแปรอิสระ คือ การจัดการเรียนโดยใช้เทคนิคการจัดการเรียนรู้รูปแบบ STAD เรื่อง รูปเรขาคณิตสามมิติ

ตัวแปรตาม ได้แก่ 1. ผลสัมฤทธิ์ทางการเรียน

2. ความคงทนในการเรียน

3. ความพึงพอใจ

4.3 เนื้อหา

เนื้อหาที่ใช้ในการวิจัยครั้งนี้ เป็นเนื้อหารายวิชาคณิตศาสตร์พื้นฐาน เรื่อง รูปเรขาคณิตสามมิติ ของนักเรียนชั้น ประถมศึกษาปีที่ 6 ตามหลักสูตรแกนกลางขั้นพื้นฐานพุทธศักราช 2551 (ฉบับปรับปรุง 2560) กลุ่มสาระการเรียนรู้ คณิตศาสตร์ ซึ่งประกอบไปด้วยเรื่อง

1. เรขาคณิตสองมิติและลักษณะของรูปเรขาคณิตสามมิติ 1 คาบเรียน
2. ชนิดและลักษณะของรูปเรขาคณิตสามมิติ 2 คาบเรียน
3. รูปคลี่ของรูปเรขาคณิตสามมิติ 2 คาบเรียน
4. ปริมาตรของรูปเรขาคณิตสามมิติ 1 คาบเรียน
5. โจทย์ปัญหาปริมาตรของรูปเรขาคณิตสามมิติ 2 คาบเรียน

4.4 ระยะเวลาที่ศึกษา

ผู้วิจัยได้ดำเนินการในภาคเรียนที่ 2 ปีการศึกษา 2566 จำนวน 11 คาบเรียน โดยทดสอบก่อนเรียนจำนวน 1 คาบ ดำเนินการสอน 8 คาบ ทดสอบหลังเรียนไป 1 คาบ และทดสอบความคงทนในการเรียน 1 คาบ

4.5 ขั้นตอนในการสร้างเครื่องมือ

เครื่องมือชิ้นที่ 1

แผนการจัดการเรียนรู้ เรื่อง รูปเรขาคณิตสามมิติ สำหรับนักเรียนชั้นประถมศึกษาปีที่ 6 จำนวน 8 แผน ผู้วิจัย ดำเนินการสร้างดังมีขั้นตอนต่อไปนี้

1. ศึกษาเอกสารเกี่ยวกับหลักสูตรกลุ่มสาระการเรียนรู้คณิตศาสตร์ (ฉบับปรับปรุง พ.ศ. 2560) ตามหลักสูตร แกนกลางการศึกษาขั้นพื้นฐานพุทธศักราช 2551 ในระดับชั้นประถมศึกษาตอนปลาย และหลักสูตรสถานศึกษา เพื่อเป็น แนวทางในการจัดการเรียนรู้ให้บรรลุจุดมุ่งหมายของหลักสูตร

2. ศึกษาเอกสารเกี่ยวกับเนื้อหาและจุดประสงค์การเรียนรู้ เรื่อง รูปเรขาคณิตสามมิติ

3. ศึกษาวิธีสอน เทคนิคการสอน สื่อการสอนและการจัดการเรียนรู้รูปแบบ STAD

4. จัดทำแผนการจัดการเรียนรู้ เรื่อง รูปเรขาคณิตสามมิติ จำนวน 8 คาบเรียน แล้วเสนอต่ออาจารย์ที่ปรึกษา ครุนิพนธ์ เพื่อตรวจสอบจุดประสงค์ เนื้อหา ความเหมาะสมของกิจกรรมการเรียนรู้ สื่อการเรียนรู้ การวัดและการประเมินผล การเรียนรู้ หลังจากนั้นผู้วิจัยนำแผนการจัดการเรียนรู้มาปรับปรุงแก้ไขตามคำแนะนำที่ได้รับ

5. นำแผนการจัดการเรียนรู้ที่ผ่านการแก้ไขแล้วเสนอต่ออาจารย์ที่ปรึกษาอีกครั้ง จากนั้นนำแผนการจัดการ เรียนรู้เสนอให้ผู้เชี่ยวชาญ จำนวน 3 ท่าน เพื่อตรวจสอบคุณภาพโดยใช้แบบประเมินคุณภาพของแผนการจัดการเรียนรู้ซึ่งเป็น มาตรประมาณค่า 5 ระดับ (1-5) แล้วนำไปวิเคราะห์ข้อมูล โดยพบว่า แผนการจัดการเรียนรู้ เรื่อง รูปเรขาคณิตสามมิติ สำหรับนักเรียนชั้นประถมศึกษาปีที่ 6 มีค่าเฉลี่ยของระดับคะแนนความเหมาะสมโดยรวมเท่ากับ 4.97 ซึ่งแสดงว่า แผนการ จัดการเรียนรู้มีระดับคุณภาพอยู่ในระดับ ดีมาก ซึ่งสามารถนำไปใช้ในการจัดการเรียนรู้ได้

หมายเหตุ : เกณฑ์พิจารณาค่าเฉลี่ยของระดับคะแนนความเหมาะสม

คะแนนเฉลี่ย 1.00 – 1.50 มีคุณภาพและความเหมาะสมอยู่ในระดับ ปรับปรุง

คะแนนเฉลี่ย 1.51 – 2.50 มีคุณภาพและความเหมาะสมอยู่ในระดับ พอใช้

คะแนนเฉลี่ย 2.51 – 3.50 มีคุณภาพและความเหมาะสมอยู่ในระดับ ปานกลาง

คะแนนเฉลี่ย 3.51 – 4.50 มีคุณภาพและความเหมาะสมอยู่ในระดับ ดี

คะแนนเฉลี่ย 4.51 – 5.00 มีคุณภาพและความเหมาะสมอยู่ในระดับ ดีมาก

6. นำแผนการจัดการเรียนรู้ที่ได้ปรับปรุงแก้ไขจนสมบูรณ์พร้อมผลการวิเคราะห์คุณภาพของแผนการจัดการเรียนรู้เสนอต่ออาจารย์ที่ปรึกษาครุนิพนธ์อีกครั้ง ก่อนนำไปใช้จริงกับกลุ่มตัวอย่าง

เครื่องมือชิ้นที่ 2

แบบทดสอบวัดผลสัมฤทธิ์ทางการเรียน เรื่อง รูปเรขาคณิตสามมิติ สำหรับนักเรียนชั้นประถมศึกษาปีที่ 6 ซึ่งเป็นแบบทดสอบปรนัยชนิดเลือกตอบ 4 ตัวเลือก จำนวน 20 ข้อ ผู้วิจัยดำเนินการสร้างดังมีขั้นตอนต่อไปนี้

1. ศึกษาเอกสารหลักสูตรกลุ่มสาระการเรียนรู้คณิตศาสตร์ (ฉบับปรับปรุง พ.ศ. 2560) ตามหลักสูตรแกนกลางการศึกษาขั้นพื้นฐานพุทธศักราช 2551 ระดับชั้นประถมศึกษาปีที่ 6

2. สร้างแบบทดสอบวัดผลสัมฤทธิ์ เรื่อง รูปเรขาคณิตสามมิติ สำหรับนักเรียนชั้นประถมศึกษาปีที่ 6 แบบปรนัยชนิดเลือกคำตอบ 4 ตัวเลือก จำนวน 30 ข้อ แล้วนำแบบทดสอบเสนออาจารย์ที่ปรึกษาครุนิพนธ์ เพื่อตรวจสอบความถูกต้องของการใช้ภาษา จุดประสงค์ และการตั้งคำถาม แล้วนำไปแก้ไขตามคำแนะนำที่ได้รับ

3. นำแบบทดสอบที่แก้ไขเสร็จแล้วไปเสนอต่ออาจารย์ที่ปรึกษาครุนิพนธ์ตรวจสอบอีกครั้ง จากนั้นเสนอต่อผู้เชี่ยวชาญ 3 ท่าน เพื่อตรวจสอบความสอดคล้องระหว่างจุดประสงค์กับข้อสอบแต่ละข้อ โดยใช้แบบประเมินค่าดัชนีความสอดคล้อง (IOC) แล้วนำไปวิเคราะห์ข้อมูล หากมีข้อสอบข้อใดมีค่าดัชนีความสอดคล้อง (IOC) ต่ำกว่า 0.5 หรือสูงกว่า 0.5 แต่มีคำแนะนำผู้วิจัยจะปรับแก้ตามคำแนะนำของผู้เชี่ยวชาญจนผ่านเกณฑ์ครบทุกข้อ

+ 1 หมายถึง แน่ใจว่าข้อสอบนั้นสอดคล้องกับจุดประสงค์เชิงพฤติกรรมที่ตั้งไว้

0 หมายถึง ไม่แน่ใจว่าข้อสอบนั้นสอดคล้องกับจุดประสงค์เชิงพฤติกรรมที่ตั้งไว้

- 1 หมายถึง แน่ใจว่าข้อสอบนั้นไม่สอดคล้องกับจุดประสงค์เชิงพฤติกรรมที่ตั้งไว้

4. นำแบบทดสอบที่ผ่านการตรวจสอบจากผู้เชี่ยวชาญ เสนอต่ออาจารย์ที่ปรึกษาครุนิพนธ์อีกครั้งเพื่อตรวจสอบความถูกต้อง จากนั้นนำไปทดลองกับกลุ่มที่ไม่ใช่กลุ่มตัวอย่าง จำนวน 30 คน เพื่อหาค่าความยากง่าย (p) และค่าอำนาจจำแนก (r)

5. คัดเลือกข้อสอบปรนัยชนิดเลือกคำตอบ จำนวน 20 ข้อ ที่มีค่าดัชนีความสอดคล้อง (IOC) ตั้งแต่ 0.5 ขึ้นไป มีค่าความยากง่าย (p) ตั้งแต่ 0.20 ถึง 0.80 และค่าอำนาจจำแนก (r) ตั้งแต่ 0.20 ขึ้นไป โดยพบว่า ข้อสอบที่คัดเลือกไว้มีค่าดัชนีความสอดคล้อง (IOC) เท่ากับ 1.00 ค่าความยากง่าย (p) ตั้งแต่ 0.27 ถึง 0.80 และค่าอำนาจจำแนก (r) ตั้งแต่ 0.27 ถึง 0.73

6. นำแบบทดสอบที่คัดเลือกไว้ จำนวน 20 ข้อ ไปคำนวณค่าความเชื่อมั่น (r_{tt}) ของแบบทดสอบวัดผลสัมฤทธิ์ ซึ่งมีค่าความเชื่อมั่น เท่ากับ 0.80

7. นำแบบทดสอบฉบับสมบูรณ์พร้อมผลการวิเคราะห์แบบทดสอบทั้งหมดเสนอต่ออาจารย์ที่ปรึกษาครุนิพนธ์อีกครั้ง เพื่อตรวจสอบความถูกต้องก่อนนำแบบทดสอบไปทดลองกับกลุ่มตัวอย่าง

เครื่องมือชิ้นที่ 3

แบบทดสอบถามความพึงพอใจของนักเรียนชั้นประถมศึกษาปีที่ 6 ที่มีต่อการจัดกิจกรรมการเรียนรู้ด้วย STAD เรื่อง รูปเรขาคณิตสามมิติ ซึ่งเป็นแบบประเมินความพึงพอใจ 5 ระดับ จำนวน 10 ข้อ ซึ่งมีขั้นตอน ดังนี้

1. ศึกษาเอกสารที่เกี่ยวข้องกับแบบสอบถามวัดความพึงพอใจและการสร้างแบบสอบถามความพึงพอใจ

2. กำหนดกรอบและจุดประสงค์ในการสร้างแบบสอบถามวัดความพึงพอใจต่อการจัดการเรียนรู้รูปแบบ STAD

3. สร้างแบบสอบถามความพึงพอใจที่มีผลต่อการจัดการเรียนรู้รูปแบบ STAD จำนวน 10 ข้อ ประมาณค่า 5 ระดับ ตามวิธีของลิเคิร์ธ ดังนี้

เหมาะสมมากที่สุด	ระดับคะแนน	5
เหมาะสมมาก	ระดับคะแนน	4
เหมาะสมปานกลาง	ระดับคะแนน	3
เหมาะสมน้อย	ระดับคะแนน	2
เหมาะสมน้อยที่สุด	ระดับคะแนน	1

4. นำแบบสอบถามวัดความพึงพอใจที่ผู้วิจัยสร้างขึ้น เสนอต่ออาจารย์ที่ปรึกษาครุนิพนธ์เพื่อตรวจสอบความเหมาะสมของข้อคำถามในแบบสอบถามแล้วนำไปแก้ไขตามคำแนะนำ

5. นำแบบประเมินความพึงพอใจที่ผ่านการแก้ไขเรียบร้อยแล้วเสนอต่ออาจารย์ที่ปรึกษาครุนิพนธ์อีกครั้ง จากนั้นนำไปเสนอต่อผู้เชี่ยวชาญ 3 ท่าน เพื่อตรวจสอบความเหมาะสมแล้วนำไปแก้ไขตามคำแนะนำ

6. นำแบบสอบถามวัดความพึงใจฉบับสมบูรณ์ที่แก้ไขตามคำแนะนำของผู้เชี่ยวชาญเสนอต่ออาจารย์ที่ปรึกษาครุนิพนธ์ เพื่อตรวจสอบความถูกต้องอีกครั้ง ก่อนที่จะนำมาทดลองกับกลุ่มตัวอย่าง

หมายเหตุ : เกณฑ์พิจารณาค่าเฉลี่ยของระดับความพึงพอใจ

คะแนนเฉลี่ย	1.00 – 1.50	มีความพึงพอใจอยู่ในระดับ	น้อยที่สุด
คะแนนเฉลี่ย	1.51 – 2.50	มีความพึงพอใจอยู่ในระดับ	น้อย
คะแนนเฉลี่ย	2.51 – 3.50	มีความพึงพอใจอยู่ในระดับ	ปานกลาง
คะแนนเฉลี่ย	3.51 – 4.50	มีความพึงพอใจอยู่ในระดับ	มาก
คะแนนเฉลี่ย	4.51 – 5.00	มีความพึงพอใจอยู่ในระดับ	มากที่สุด

4.6 การเก็บรวบรวมข้อมูล

วิธีการดำเนินการเก็บรวบรวมข้อมูลการศึกษาวัดผลสัมฤทธิ์ทางการเรียนและความคงทนในการจัดการเรียนรู้คณิตศาสตร์ เรื่อง รูปเรขาคณิตสามมิติ สำหรับนักเรียนชั้นประถมศึกษาปีที่ 6 ผู้วิจัยได้ดำเนินการเก็บรวบรวมข้อมูล ดังนี้

1. ผู้วิจัยนำแบบทดสอบวัดผลสัมฤทธิ์ทางการเรียน เรื่อง รูปเรขาคณิตสามมิติ จำนวน 20 ข้อ ไปทดสอบก่อนเรียน โดยใช้เวลาทดสอบ 1 คาบเรียน

2. ผู้วิจัยดำเนินการสอนตามแผนการจัดการเรียนรู้กับกลุ่มตัวอย่าง โดยใช้เวลาทดลองทั้งหมด 8 คาบเรียน

3. นำแบบทดสอบวัดผลสัมฤทธิ์ทางการเรียน เรื่อง รูปเรขาคณิตสามมิติ จำนวน 20 ข้อ ไปทดสอบหลังเรียนกับนักเรียนกลุ่มตัวอย่าง โดยใช้เวลาทดสอบ 1 คาบเรียน

4. นำแบบสอบถามวัดความพึงพอใจของนักเรียนที่มีต่อการจัดการเรียนรู้ โดยใช้เทคนิค STAD เรื่อง รูปเรขาคณิตสามมิติ ไปดำเนินการสอบถามกับนักเรียนกลุ่มตัวอย่าง

5. หลังจากทำการทดสอบหลังเรียนไป 2 สัปดาห์ ดำเนินการทดสอบโดยใช้แบบทดสอบวักความคงทนในการเรียนรู้ ที่ผู้วิจัยสร้างขึ้นเป็นแบบทดสอบชุดเดียวกันกับแบบทดสอบหลังเรียน

6. นำข้อมูลที่ได้จากการทำแบบทดสอบวัดผลสัมฤทธิ์ทางการเรียน เรื่อง รูปเรขาคณิตสามมิติ และแบบสอบถามวัดความพึงพอใจมาทำการวิเคราะห์ข้อมูลทางสถิติ

4.7 การวิเคราะห์ข้อมูล

1. หาค่าสถิติพื้นฐาน ได้แก่ ค่าเฉลี่ย ส่วนเบี่งงเบนมาตรฐาน ค่าร้อยละ

2. หาค่าสถิติที่ใช้ตรวจสอบคุณภาพเครื่องมือ ได้แก่ ค่าดัชนีความสอดคล้อง (IOC) ค่าความยากง่าย (p) ค่าอำนาจจำแนก (r) ค่าความเชื่อมั่น (r_{tt})

3. หาค่าสถิติทดสอบสมมติฐาน ได้แก่ ค่าที (t-test)

5. ผลการวิจัย

การวิจัย เรื่อง การศึกษาผลสัมฤทธิ์ทางการเรียนและความคงทนในการเรียนรู้คณิตศาสตร์ เรื่อง รูปเรขาคณิตสามมิติ ของนักเรียนชั้นประถมศึกษาปีที่ 6 โรงเรียนวัดบางปะกอก โดยใช้เทคนิคการจัดการเรียนรู้รูปแบบ STAD นำข้อมูลมาวิเคราะห์ ดังนี้

ตอนที่ 1 การเปรียบเทียบผลสัมฤทธิ์ทางการเรียน เรื่อง รูปเรขาคณิตสามมิติ ของนักเรียนชั้นประถมศึกษาปีที่ 6 ก่อนเรียนและหลังเรียน โดยใช้เทคนิคการจัดการเรียนรู้รูปแบบ STAD ปรากฏดังตารางที่ 1

ตารางที่ 1 แสดงผลการเปรียบเทียบผลสัมฤทธิ์ทางการเรียน เรื่อง รูปเรขาคณิตสามมิติและปริมาตร ของรูปเรขาคณิตสามมิติ ของนักเรียนชั้นประถมศึกษาปีที่ 6 ก่อนเรียนและหลังเรียน โดยใช้เทคนิคการจัดการเรียนรู้รูปแบบ STAD

การทดสอบ	N	คะแนนเต็ม	$\overline{X}$	S.D.	ร้อยละ	t
ก่อนเรียน	40	20	9.25	4.29	46.25	6.91*
หลังเรียน	40	20	13.20	3.92	66.00	

* t มีนัยสำคัญทางสถิติที่ระดับ .05 ค่า ($t_{.05, 39}$ = 1.6849)

จากตารางที่ 1 ผลสัมฤทธิ์ทางเรียนวิชาคณิตศาสตร์ เรื่อง รูปเรขาคณิตสามมิติ ของนักเรียนชั้นประถมศึกษาปีที่ 6 ก่อนเรียน มีค่าเฉลี่ยเท่ากับ 9.25 ส่วนเบี่ยงเบนมาตรฐานเท่ากับ 4.29 คิดเป็นร้อยละ 46.25 และหลังเรียน โดยใช้เทคนิคการจัดการเรียนรู้รูปแบบ STAD มีค่าเฉลี่ยเท่ากับ 13.2 ส่วนเบี่ยงเบนมาตรฐานเท่ากับ 3.92 คิดเป็น ร้อยละ 66 จึงสรุปได้ว่า ผลสัมฤทธิ์ทางการเรียนวิชาคณิตศาสตร์ เรื่อง รูปเรขาคณิตสามมิติ ของนักเรียนชั้นประถมศึกษาปีที่ 6 โดยใช้เทคนิค STAD สูงกว่าก่อนเรียน อย่างมีนัยสำคัญที่ระดับ .05

ตอนที่ 2 ผลการเปรียบเทียบผลสัมฤทธิ์ทางการเรียน เรื่อง รูปเรขาคณิตสามมิติ ของนักเรียนชั้นประถมศึกษาปีที่ 6 หลังเรียน โดยใช้เทคนิคการจัดการเรียนรู้รูปแบบ STAD กับเกณฑ์ร้อยละ 60 ปรากฏดังตารางที่ 2

ตารางที่ 2 แสดงผลการเปรียบเทียบผลสัมฤทธิ์ทางการเรียนวิชาคณิตศาสตร์ เรื่อง รูปเรขาคณิตสามมิติ ของนักเรียนชั้นประถมศึกษาปีที่ 6 หลังเรียน โดยใช้เทคนิคการจัดการเรียนรู้รูปแบบ STAD กับเกณฑ์ร้อยละ 60

การทดสอบ	N	คะแนนเต็ม	$\overline{X}$	S.D.	ร้อยละ	t
หลังเรียน	40	20	13.20	3.92	66.00	1.94*

* ค่า t มีนัยสำคัญทางสถิติที่ระดับ .05 ค่า ($t_{.05, 39}$ = 1.6849)

จากตารางที่ 2 พบว่า ผลสัมฤทธิ์ทางการเรียนวิชาคณิตศาสตร์ เรื่อง รูปเรขาคณิตสามมิติ ของนักเรียนชั้นประถมศึกษาปีที่ 6 โดยใช้เทคนิคการจัดการเรียนรู้รูปแบบ STAD มีค่าเฉลี่ยเท่ากับ 13.2 ส่วนเบี่ยงเบนมาตรฐานเท่ากับ 3.92 คิดเป็นร้อยละ 66 จึงสรุปได้ว่า ผลสัมฤทธิ์ทางการเรียนวิชาคณิตศาสตร์ เรื่อง รูปเรขาคณิตสามมิติ ของนักเรียนชั้นประถมศึกษาปีที่ 6 โดยใช้เทคนิค STAD สูงกว่าเกณฑ์ร้อยละ 60

ตอนที่ 3 ผลการศึกษาความคงทนในการเรียนวิชาคณิตศาสตร์ เรื่อง รูปเรขาคณิตสามมิติ ของนักเรียนชั้นประถมศึกษาปีที่ 6 โดยใช้เทคนิคการจัดการเรียนรู้รูปแบบ STAD ปรากฏดังตารางที่ 3

ตารางที่ 3 แสดงผลการศึกษาความคงทนในการเรียนวิชาคณิตศาสตร์ เรื่อง รูปเรขาคณิตสามมิติของนักเรียนชั้นประถมศึกษาปีที่ 6 โดยใช้เทคนิคการจัดการเรียนรู้รูปแบบ STAD

การทดสอบ	N	คะแนนเต็ม	$\overline{X}$	S.D.	ร้อยละ	t
หลังเรียน	40	20	13.2	3.92	66	4.68*
หลังเรียน 2 สัปดาห์	40	20	12.38	4.47	61.88	

* ค่า t มีนัยสำคัญทางสถิติที่ระดับ .05 ค่า ($t_{.05, 39}$ = 2.0227)

จากตารางที่ 3 พบว่า ผลสัมฤทธิ์ทางการเรียนวิชาคณิตศาสตร์ เรื่อง รูปเรขาคณิตสามมิติ ของนักเรียนชั้นประถมศึกษาปีที่ 6 โดยใช้เทคนิค STAD หลังเรียนมีค่าเฉลี่ยเท่ากับ 13.20 ส่วนเบี่ยงเบนมาตรฐานเท่ากับ 3.92 คิดเป็นร้อยละ 66.0 และหลังเรียน 2 สัปดาห์ ค่าเฉลี่ยเท่ากับ 12.38 ส่วนเบี่ยงเบนมาตรฐานเท่ากับ 4.47 คิดเป็นร้อยละ 61.88 เมื่อเปรียบเทียบระหว่าง $t_{คำนวณ}$ และ $t_{ตาราง}$ พบว่า $t_{คำนวณ}$ มากกว่า $t_{ตาราง}$ จึงสรุปได้ว่า ผลสัมฤทธิ์ทางการเรียนวิชาคณิตศาสตร์ เรื่อง รูปเรขาคณิตสามมิติ ของนักเรียนชั้นประถมศึกษาปีที่ 6 โดยใช้เทคนิค STAD หลังเรียนและหลังเรียน 2 สัปดาห์ ไม่มีความแตกต่างกัน นั่นคือ นักเรียนชั้นประถมศึกษาปีที่ 6 ที่ใช้เทคนิค STAD เรื่อง รูปเรขาคณิตสามมิติ มีความคงทนในการเรียนรู้

ตอนที่ 4 ผลการศึกษาความพึงพอใจของนักเรียนชั้นประถมศึกษาปีที่ 6 ที่มีต่อเทคนิคการจัดการเรียนรู้รูปแบบ STAD เรื่อง รูปเรขาคณิตสามมิติและปริมาตรของรูปเรขาคณิตสามมิติ

ตารางที่ 4 ผลการศึกษาความพึงพอใจของนักเรียนชั้นประถมศึกษาปีที่ 6 ที่มีต่อเทคนิคการจัดการเรียนรู้รูปแบบ STAD เรื่อง รูปเรขาคณิตสามมิติ ปรากฏดังตารางที่ 4

ข้อ	รายการประเมิน	$\overline{X}$	S.D.	แปลผล
1	เทคนิค STAD ทำให้นักเรียนได้ทำงานร่วมกับเพื่อนร่วมกลุ่ม	3.98	0.73	พึงพอใจมาก
2	เทคนิค STAD ทำให้นักเรียนได้ฝึกทักษะทางการเรียนและทางสังคม	4.23	0.92	พึงพอใจมาก
3	เทคนิค STAD ทำให้นักเรียนได้เปิดโอกาสแสดงความคิดเห็นกับเพื่อนร่วมกลุ่ม	4.10	0.90	พึงพอใจมาก
4	เทคนิค STAD ทำให้นักเรียนมีความเอาใจใส่รับผิดชอบต่อตนเองและเพื่อนร่วมกลุ่ม	3.98	0.97	พึงพอใจมาก
5	เทคนิค STAD ทำให้นักเรียนที่มีความสามารถแตกต่างกันทำงานร่วมกันกับเพื่อนในกลุ่ม	4.05	1.01	พึงพอใจมาก
6	ครูแจ้งจุดประสงค์ในการเรียนอย่างชัดเจน	4.30	1.09	พึงพอใจมาก
7	ครูให้ความสนใจกับนักเรียนทุกคนขณะสอน	4.50	0.75	พึงพอใจมาก
8	ครูมีความตั้งใจในการสอน ให้คำแนะนำแก่นักเรียน	4.78	0.48	พึงพอใจมากที่สุด
9	ครูปฏิบัติกับนักเรียนอย่างเป็นธรรม ไม่เลือกปฏิบัติ	4.50	0.68	พึงพอใจมาก
10	ครูให้ความช่วยเหลือและอำนวยความสะดวกแก่นักเรียนในการเรียน	4.55	0.68	พึงพอใจมากที่สุด
ผลการประเมินความพึงพอใจโดยรวม		4.30	0.80	พึงพอใจมาก

จากตารางที่ 4 พบว่า ความพึงพอใจของนักเรียนชั้นประถมศึกษาปีที่ 6 ที่มีต่อการจัดการเรียนรู้โดยใช้เทคนิค STAD เรื่อง รูปเรขาคณิตสามมิติ มีค่าเฉลี่ยโดยรวมเท่ากับ 4.30 ส่วนเบี่ยงเบนมาตรฐานเท่ากับ 0.80 นั่นคือ นักเรียนชั้นประถมศึกษาปีที่ 6 มีความพึงพอใจต่อการจัดการเรียนรู้ เรื่อง รูปเรขาคณิตสามมิติ โดยใช้เทคนิค STAD อยู่ในระดับพึงพอใจมาก เมื่อพิจารณาเป็นรายข้อพบว่าที่มีระดับความพึงพอใจมาก คือ ครูมีความตั้งใจในการสอนให้คำแนะนำแก่นักเรียน และครูให้ความช่วยเหลือและอำนวยความสะดวกแก่นักเรียนในการเรียน และข้อที่มีระดับความพึงพอใจน้อยที่สุด คือ เทคนิค STAD ทำให้นักเรียนได้ทำงานร่วมกับเพื่อนร่วมกลุ่ม และเทคนิค STAD ทำให้นักเรียนมีความเอาใจใส่รับผิดชอบต่อตนเองและเพื่อนร่วมกลุ่ม

6. สรุปผลและอภิปรายผล

6.1 สรุปผลการวิจัย

1. ผลสัมฤทธิ์ทางการเรียน เรื่อง รูปเรขาคณิตสามมิติ ของนักเรียนชั้นประถมศึกษาปีที่ 6 หลังเรียน โดยใช้เทคนิคการจัดการเรียนรู้รูปแบบ STAD สูงกว่าก่อนเรียน อย่างมีนัยสำคัญทางสถิติที่ระดับ .05

2. ผลสัมฤทธิ์ทางการเรียน เรื่อง รูปเรขาคณิตสามมิติ ของนักเรียนชั้นประถมศึกษาปีที่ 6 หลังเรียน โดยใช้เทคนิคการจัดการเรียนรู้รูปแบบ STAD สูงกว่าเกณฑ์ร้อยละ 60 อย่างมีนัยสำคัญทางสถิติที่ระดับ .05

3. นักเรียนชั้นประถมศึกษาปีที่ 6 มีความคงทนในการเรียนรู้ เรื่อง รูปเรขาคณิตสามมิติ หลังเรียนโดยใช้เทคนิคการจัดการเรียนรู้รูปแบบ STAD

4. นักเรียนมีความพึงพอใจต่อการจัดการเรียนรู้โดยใช้เทคนิคการจัดการเรียนรู้รูปแบบ STAD รูปเรขาคณิตสามมิติ อยู่ในระดับมาก

6.2 อภิปรายผล

จากการวิจัย เรื่อง การศึกษาผลสัมฤทธิ์ทางการเรียนและความคงทนในการเรียนรู้คณิตศาสตร์ เรื่อง รูปเรขาคณิตสามมิติ ของนักเรียนชั้นประถมศึกษาปีที่ 6 โรงเรียนวัดบางปะกอก โดยใช้เทคนิคการจัดการเรียนรู้รูปแบบ STAD ในการวิจัยครั้งนี้ผู้วิจัยอภิปรายผลได้ดังนี้

1. ผลสัมฤทธิ์ทางเรียนวิชาคณิตศาสตร์ เรื่อง รูปเรขาคณิตสามมิติ ของนักเรียนชั้นประถมศึกษาปีที่ 6 ก่อนเรียน โดยใช้เทคนิค STAD มีค่าเฉลี่ยเท่ากับ 9.25 ส่วนเบี่ยงเบนมาตรฐานเท่ากับ 4.29 คิดเป็นร้อยละ 46.25 และหลังเรียนมีค่าเฉลี่ยเท่ากับ 13.20 ส่วนเบี่ยงเบนมาตรฐานเท่ากับ 3.92 คิดเป็นร้อยละ 66 เมื่อเปรียบเทียบระหว่าง $t_{คำนวณ}$ และ $t_{ตาราง}$ พบว่า $t_{คำนวณ}$ มากกว่า $t_{ตาราง}$ จึงสรุปได้ว่า ผลสัมฤทธิ์ทางการเรียนวิชาคณิตศาสตร์ เรื่อง รูปเรขาคณิตสามมิติ ของนักเรียนชั้นประถมศึกษาปีที่ 6 โดยใช้เทคนิค STAD สูงกว่าก่อนเรียนอย่างมีนัยสำคัญที่ระดับ .05 ซึ่งผลการวิจัยสอดคล้องกับสมมติฐานที่ตั้งไว้ ทั้งนี้ การจัดการเรียนรู้รูปแบบ STAD เป็นการเรียนรู้เพื่อให้นักเรียนได้ฝึกกระบวนการทำงานเป็นกลุ่ม เด็กเก่งช่วยเพื่อนที่อ่อนกว่า ซึ่งผลการวิจัยสอดคล้องกับสมมติฐานที่ตั้งไว้ และสอดคล้องกับวิจัยของ วรัญญา พลทหาร (2564 : บทคัดย่อ) ได้ศึกษาเกี่ยวกับ การศึกษาผลสัมฤทธิ์ทางคณิตศาสตร์ เรื่อง รูปเรขาคณิต โดยใช้การจัดการเรียนรู้ร่วมมือเทคนิค STAD ร่วมกับสื่อประสม สำหรับนักเรียนชั้นประถมศึกษาปีที่ 3 พบว่า ผลสัมฤทธิ์ทางการเรียนเฉลี่ยหลังเรียนสูงกว่าก่อนเรียน อย่างมีนัยสำคัญทางสถิติที่ระดับ .05 (t = 22.02, sig = 0.00) โดยนักเรียนมีความพึงพอใจในภาพรวม อยู่ในระดับมากที่สุด

2. ผลสัมฤทธิ์ทางการเรียนวิชาคณิตศาสตร์ เรื่อง รูปเรขาคณิตสามมิติ ของนักเรียนชั้นประถมศึกษาปีที่ 6 โดยใช้เทคนิคการจัดการเรียนรู้รูปแบบ STAD มีค่าเฉลี่ยเท่ากับ 13.20 ส่วนเบี่ยงเบนมาตรฐานเท่ากับ 3.92 คิดเป็นร้อยละ 66 เมื่อเปรียบเทียบระหว่าง $t_{คำนวณ}$ และ $t_{ตาราง}$ พบว่า $t_{คำนวณ}$ มากกว่า $t_{ตาราง}$ จึงสรุปได้ว่า ผลสัมฤทธิ์ทางการเรียนวิชาคณิตศาสตร์

เรื่อง รูปเรขาคณิตสามมิติ ของนักเรียนชั้นประถมศึกษาปีที่ 6 โดยใช้เทคนิค STAD สูงกว่าเกณฑ์ร้อยละ 60 ซึ่งผลการวิจัยมี
ความสอดคล้องกับสมมติฐานที่ตั้งไว้

      3. ผลสัมฤทธิ์ทางการเรียนวิชาคณิตศาสตร์ เรื่อง รูปเรขาคณิตสามมิติ ของนักเรียนชั้นประถมศึกษาปีที่ 6 โดยใช้
เทคนิค STAD หลังเรียนมีค่าเฉลี่ยเท่ากับ 13.20 ส่วนเบี่ยงเบนมาตรฐานเท่ากับ 3.92 คิดเป็นร้อยละ 66 และหลังเรียน 2
สัปดาห์ ค่าเฉลี่ยเท่ากับ 12.38 ส่วนเบี่ยงเบนมาตรฐานเท่ากับ 4.47 คิดเป็นร้อยละ 61.88 เมื่อเปรียบเทียบระหว่าง $t_{คำนวณ}$
และ $t_{ตาราง}$ พบว่า $t_{คำนวณ}$ มากกว่า $t_{ตาราง}$ จึงสรุปได้ว่า ผลสัมฤทธิ์ทางการเรียนวิชาคณิตศาสตร์ เรื่อง รูปเรขาคณิตสามมิติ ของ
นักเรียนชั้นประถมศึกษาปีที่ 6 โดยใช้เทคนิค STAD หลังเรียนและหลังเรียน 2 สัปดาห์ ไม่มีความแตกต่างกัน นั่นคือ นักเรียน
ชั้นประถมศึกษาปีที่ 6 ที่ใช้เทคนิค STAD เรื่อง รูปเรขาคณิตสามมิติ มีความคงทนในการเรียนรู้ ซึ่งผลการวิจัยมีความ
สอดคล้องกับสมมติฐานที่ตั้งไว้

      4. ความพึงพอใจของนักเรียนชั้นประถมศึกษาปีที่ 6 ที่มีต่อการจัดการเรียนรู้โดยใช้เทคนิค STAD เรื่อง
รูปเรขาคณิตสามมิติ มีค่าเฉลี่ยโดยรวมเท่ากับ 4.30 ส่วนเบี่ยงเบนมาตรฐานเท่ากับ 0.80 นั่นคือ นักเรียนชั้นประถมศึกษา
ปีที่ 6 มีความพึงพอใจต่อการจัดการเรียนรู้ เรื่อง รูปเรขาคณิตสามมิติ โดยใช้เทคนิค STAD อยู่ในระดับ มาก เมื่อพิจารณาเป็น
รายข้อพบว่าที่มีระดับความพึงพอใจมาก คือ ครูมีความตั้งใจในการสอนให้คำแนะนำแก่นักเรียน และครูให้ความช่วยเหลือและ
อำนวยความสะดวกแก่นักเรียนในการเรียน และข้อที่มีระดับความพึงพอใจน้อยที่สุด คือ เทคนิค STAD ทำให้นักเรียนได้งาน
ร่วมกับเพื่อนร่วมกลุ่ม และเทคนิค STAD ทำให้นักเรียนมีความเอาใจใส่รับผิดชอบต่อตนเองและเพื่อนร่วมกลุ่ม ซึ่งผลการวิจัย
มีความสอดคล้องกับสมมติฐานที่ตั้งไว้

7. ข้อเสนอแนะ

7.1 ข้อเสนอในการนำผลการวิจัยไปใช้

      1. ครูผู้สอนควรจัดสรรเวลาให้เหมาะสม เพื่อให้นักเรียนมีเวลาเพียงพอในการเรียนรู้

      2. ครูผู้สอนควรให้ความสนใจนักเรียนให้ครบทุกคน เนื่องจากนักเรียนในห้องมีนักเรียนพิเศษเรียนร่วม จึงควร
ให้ความสนใจอย่างทั่วถึงในคาบเรียนนั้น ๆ

7.2 ข้อเสนอแนะในการวิจัยครั้งต่อไป

      ควรมีการศึกษาผลสัมฤทธิ์ทางการเรียนวิชาคณิตศาสตร์ โดยการจัดการเรียนรู้รูปแบบ STAD ให้หลากหลาย
เพื่อเพิ่มประสิทธิภาพในการจัดการเรียนการสอน

8. กิตติกรรมประกาศ

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(180-TH-EDU)

การศึกษาผลสัมฤทธิ์ทางการเรียนผ่านกิจกรรมประสบการณ์กลุ่มแบบร่วมมือ
Active Learning เกมส์สิ่งประดิษฐ์เชิงแข่งขัน สำหรับนักเรียนชั้นมัธยมศึกษาปีที่ 1

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บทคัดย่อ

การวิจัยนี้มีวัตถุประสงค์เพื่อศึกษาผลสัมฤทธิ์ทางการเรียนผ่านกิจกรรมประสบการณ์กลุ่มแบบร่วมมือ Active Learning เกมส์สิ่งประดิษฐ์เชิงแข่งขัน สำหรับนักเรียนชั้นมัธยมศึกษาปีที่ 1 กลุ่มตัวอย่าง ได้แก่ นักเรียนชั้นมัธยมศึกษาปีที่ 1 โรงเรียนทุ่งกุลาวิทยาคาร จำนวน 10 คน ที่กำลังศึกษาอยู่ในภาคเรียนที่ 2 ปีการศึกษา 2567 ได้มาจากการเลือกด้วยวิธีเฉพาะเจาะจง (Purposive Sampling) เครื่องมือที่ใช้ในการเก็บรวบรวมข้อมูล ประกอบด้วย แบบทดสอบวัดความรู้ความเข้าใจ มีความยากง่ายอยู่ระหว่าง 0.20-0.80 มีค่าอำนาจจำแนกมากกว่า 0.20 มีค่าความเชื่อมั่น เท่ากับ .85 วิเคราะห์ข้อมูลโดยใช้สถิติค่าเฉลี่ย ส่วนเบี่ยงเบนมาตรฐาน และใช้การทดสอบค่าที (t-test for Dependent)

ผลการวิจัย พบว่า

ผลสัมฤทธิ์ทางการเรียนผ่านกิจกรรมประสบการณ์กลุ่มแบบร่วมมือ Active Learning เกมส์สิ่งประดิษฐ์เชิงแข่งขัน สำหรับนักเรียนชั้นมัธยมศึกษาปีที่ 1 มีผลสัมฤทธิ์ทางการเรียนหลังเรียนสูงกว่าก่อนเรียนอย่างมีนัยสำคัญทางสถิติที่ระดับ .05

คำสำคัญ: การเรียนรู้แบบร่วมมือ; เกมส์สิ่งประดิษฐ์เชิงแข่งขัน; ผลสัมฤทธิ์; Active Learning

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Study of academic achievement through cooperative group experience activities Active Learning, competitive invention games for Mathayom 1 students

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Abstract

This research aimed to study the academic achievement through cooperative group experience activities, Active Learning, and competitive invention games for Mathayom 1 students. The sample group consisted of 10 Mathayom 1 students of Thung Kula Witthayakhan School who were studying in the second semester of the academic year 2024. They were selected by purposive sampling. The tools used to collect data consisted of a knowledge and understanding test with a difficulty level between 0.20-0.80, a discrimination power of more than 0.20, and a reliability value of .85. Data were analyzed using statistics of mean, standard deviation, and t-test for Dependent.

The research results found that:

The academic achievement through cooperative group experience activities, Active Learning, and competitive invention games for Mathayom 1 students had significantly higher academic achievement after learning than before learning at a statistical level of .05.

Keywords: Achievement; Collaborative learning; Active Learning; Competitive invention games

1. บทนำ

การเรียนรู้ด้านวิทยาศาสตร์สำหรับพัฒนาให้ผู้เรียนเกิดความรู้ความเข้าใจและรักในการเรียนมีผลสำคัญอย่างยิ่งต่อการนำไปสู่การออกแบบประสบการณ์เรียนรู้ที่ท้าทายความคิด การลงมือทำ การประดิษฐ์คิดค้น การวิเคราะห์ และการทำงานเป็นทีมที่สร้างสรรค์

การเรียนรู้แบบ Active Learning เป็นกระบวนการเรียนรู้อย่างหนึ่ง เป็นการเรียนรู้ผ่านการปฏิบัติ หรือการลงมือทำ "ความรู้" ที่เกิดขึ้นก็เป็นความรู้ที่ได้จากประสบการณ์ กระบวนการในการจัดกิจกรรมการ เรียนรู้ที่ผู้เรียนต้องได้มีโอกาสลงมือกระทำมากกว่าการฟังเพียงอย่างเดียว ต้องจัดกิจกรรมให้ผู้เรียนได้การ เรียนรู้โดยการอ่าน การเขียน การโต้ตอบ และการแก้ปัญหา อีกทั้งให้ผู้เรียนได้ใช้กระบวนการคิดขั้นสูง ได้แก่ การวิเคราะห์ การสังเคราะห์ และการประเมินค่า "เป็นกระบวนการเรียนรู้ให้ผู้เรียนได้เรียนรู้อย่างมีความหมาย โดยการร่วมมือระหว่างผู้เรียนด้วยกัน ในการนี้ ครูต้องลดบทบาทในการสอน และการให้ข้อความรู้แก่ผู้เรียนโดยตรง แต่ไปเพิ่มกระบวนการ และ กิจกรรมที่จะทำให้ผู้เรียนเกิดความกระตือรือร้นในการจะทำกิจกรรมต่างๆ มากขึ้น และอย่างหลากหลาย [1] ไม่ ว่าจะเป็นการแลกเปลี่ยนประสบการณ์ โดยการพูด การเขียน การอภิปรายกับเพื่อนๆ การสอนแบบ Active Learning คือ กระบวนการจัดการเรียนรู้ที่ผู้เรียนทุกคนมีส่วนร่วมในการลงมือ กระทำและใช้กระบวนการคิด โดยผู้เรียนจะเปลี่ยนบทบาทจากผู้รับความรู้ (Receivers) ไปสู่การมีส่วนรวมในการสร้างความรู้ (Co - creators) ในศตวรรษที่ 21 เป็นยุคของข้อมูลข่าวสารและการเปลี่ยนแปลงด้วยความก้าวหน้าของเทคโนโลยี สารสนเทศทำให้การสื่อสารไร้พรมแดน การเข้าถึงแหล่งข้อมูลสามารถทำได้ทุกที่ทุกเวลา ผลกระทบจากยุคโลกาภิวัตน์นี้ส่งผลให้ผู้เรียนจำเป็นจะต้องมีความสามารถเรียนรู้ได้ด้วยตนเองอย่างต่อเนื่องและเป็นผู้แสวงหา ความรู้อยู่ตลอดเวลา ประกอบกับปัจจุบันมีองค์ความรู้ใหม่เกิดขึ้นมากมายทุกวินาทีทำให้เนื้อหาวิชามีมากเกินกว่าที่จะเรียนรู้จากในห้องเรียนได้หมด ซึ่งการสอนแบบเดิมด้วยการ [2] "พูด บอก เล่า" ไม่สามารถจะพัฒนาให้ ผู้เรียนให้นำความรู้ที่ได้จากการเรียนในชั้นเรียนไปปฏิบัติได้ดี ดังนั้น จึงจำเป็นต้องปรับเปลี่ยนวิธีการจัดการ เรียนรู้ให้สอดคล้องกับการเปลี่ยนแปลงของสังคม เทคโนโลยี และการเรียนรู้ของผู้เรียน จากผู้สอนคือผู้ ถ่ายทอด ปรับเปลี่ยนบทบาทเป็นผู้ชี้แนะวิธีการค้นคว้าหาความรู้เพื่อพัฒนาผู้เรียนให้สามารถแสวงหาความรู้ และประยุกต์ใช้ทักษะต่างๆ สร้างความเข้าใจด้วยตนเอง [3] จนเกิดเป็นการเรียนรู้อย่างมีความหมาย Active Learning เป็นการจัดการเรียนรู้แบบเน้นพัฒนากระบวนการเรียนรู้ ส่งเสริมให้ผู้เรียน ประยุกต์ใช้ทักษะและเชื่อมโยงองค์ความรู้นำไปปฏิบัติเพื่อแก้ไขปัญหาหรือประกอบอาชีพในอนาคตหลักการ จัดการเรียนรู้แบบ Active Learning เป็นการนำเอาวิธีการสอน เทคนิคการสอนที่หลากหลายมาใช้ออกแบบ แผนการสอนและกิจกรรมกระตุ้นให้ผู้เรียนมีส่วนร่วมในชั้นเรียน ส่งเสริมปฏิสัมพันธ์ระหว่างผู้เรียนกับผู้เรียน [4] และผู้เรียนกับผู้สอน Active Learning จึงถือเป็นการจัดการเรียนรู้ประเภทหนึ่งที่ส่งเสริมให้ผู้เรียนมี คุณลักษณะสอดคล้องกับการเปลี่ยนแปลงในยุคปัจจุบัน อีกทั้งยังช่วยส่งเสริม student engagement, enhance relevance, and improve motivation ของผู้เรียน

ดังนั้น ผู้วิจัยจึงมีความสนใจที่จะศึกษา เรื่อง การศึกษาผลสัมฤทธิ์ทางการเรียนผ่านกิจกรรมประสบการณ์กลุ่มแบบร่วมมือ Active Learning เกมส์สิ่งประดิษฐ์เชิงแข่งขัน สำหรับนักเรียนชั้นมัธยมศึกษาปีที่ 1 โดยแบ่งนักเรียนออกเป็นกลุ่มเท่า ๆ กัน และออกแบบประสบการณ์ โดยมีการจัดกิจกรรมวิทยาศาสตร์แนวทางประดิษฐ์ของเล่น และมีการแข่งขัน การทำงานเป็นทีม การคิดวิเคราะห์ การแก้ปัญหา โดยใช้กระบวนการทางวิทยาศาสตร์ จำนวนนักเรียน 10 คน ทำการทดลองโดยใช้แบบทดสอบวัดความรู้ความเข้าใจก่อนเรียนและเทียบกับคะแนนหลังเรียนเพื่อให้ทราบว่าผลการจัดกิจกรรมทางวิทยาศาสตร์นั้นนักเรียนมีผลสัมฤทธิ์ทางการเรียนรู้ที่มีการออกแบบเป็นกิจกรรมกลุ่มและมีชุดการเรียนรู้กำกับมากน้อยและแตกต่างกันอย่างมีนัยสำคัญทางสถิติหรือไม่ ซึ่งจะนำไปสู่การพัฒนาผู้เรียนทางวิทยาศาสตร์ในระดับที่สูงขึ้นต่อไป

2. วัตถุประสงค์ของการวิจัย

เพื่อศึกษาผลสัมฤทธิ์ทางการเรียนผ่านกิจกรรมประสบการณ์กลุ่มแบบร่วมมือ Active Learning เกมส์สิ่งประดิษฐ์เชิงแข่งขัน สำหรับนักเรียนชั้นมัธยมศึกษาปีที่ 1

3. สมมติฐานการวิจัย

ผลสัมฤทธิ์ทางการเรียนผ่านกิจกรรมประสบการณ์กลุ่มแบบร่วมมือ Active Learning เกมส์สิ่งประดิษฐ์เชิงแข่งขัน สำหรับนักเรียนชั้นมัธยมศึกษาปีที่ 1 หลังเรียนสูงกว่าก่อนเรียน

4. วิธีดำเนินการวิจัย

การวิจัยครั้งนี้เป็นการวิจัยเชิงทดลองเบื้องต้น (Pre-Experimental design) ใช้แบบแผนการวิจัยแบบกลุ่มเดียวสอบก่อนสอบหลัง (One group pretest-posttest design) โดยมีรายละเอียดวิธีดำเนินการวิจัยดังต่อไปนี้

ประชากรและกลุ่มตัวอย่าง

ประชากร ได้แก่ นักเรียนชั้นมัธยมศึกษาปีที่ 1 โรงเรียนทุ่งกุลาวิทยาคาร จังหวัดสุรินทร์ ภาคเรียนที่ 2 ปีการศึกษา 2567 จำนวนรวมนักเรียน 10 คน

กลุ่มตัวอย่าง ได้แก่ นักเรียนชั้นมัธยมศึกษาปีที่ 1 โรงเรียนทุ่งกุลาวิทยาคาร จังหวัดสุรินทร์ ภาคเรียนที่ 2 ปีการศึกษา 2567 ด้วยวิธีการเลือกแบบเฉพาะเจาะจง (Purposive Sampling) จำนวน 10 คน

เครื่องมือที่ใช้ในการวิจัย

เครื่องมือที่ใช้ในการเก็บรวบรวมข้อมูล ประกอบด้วย แบบทดสอบวัดความรู้ความเข้าใจ มีความยากง่ายอยู่ระหว่าง 0.20-0.80 มีค่าอำนาจจำแนกมากกว่า 0.20 มีค่าความเชื่อมั่น เท่ากับ .85

เครื่องมือที่ใช้ในการวิจัยครั้งนี้ ประกอบด้วย

1) แผนการจัดการเรียนรู้วิชาวิทยาศาสตร์ ทางการเรียนผ่านกิจกรรมประสบการณ์กลุ่มแบบร่วมมือ Active Learning เกมส์สิ่งประดิษฐ์เชิงแข่งขัน สำหรับนักเรียนชั้นมัธยมศึกษาปีที่ 1

2) แบบทดสอบวัดผลสัมฤทธิ์ทางการเรียนวิทยาศาสตร์วิชาวิทยาศาสตร์ การเรียนผ่านกิจกรรมประสบการณ์กลุ่มแบบร่วมมือ Active Learning เกมส์สิ่งประดิษฐ์เชิงแข่งขัน สำหรับนักเรียนชั้นมัธยมศึกษาปีที่ 1

ขั้นตอนการสร้างเครื่องมือ

1) ศึกษาหลักสูตรแกนกลางการศึกษาขั้นพื้นฐาน พุทธศักราช 2551

2) วิเคราะห์คำอธิบายรายวิชา สาระการเรียนรู้และหน่วยการเรียนรู้

3) วิเคราะห์ตัวชี้วัด เพื่อนำมาเขียนเป็นจุดประสงค์การเรียนรู้โดยให้ควบคุมพฤติกรรมด้านความรู้ ทักษะกระบวนการ เจตคติ

4) วิเคราะห์สาระการเรียนรู้โดยเลือกเนื้อหาสาระการเรียนรู้ให้สอดคล้องกับผู้เรียน ชุมชนและท้องถิ่น

5) วิเคราะห์การประเมินผลโดยการเลือกสื่อและแหล่งการเรียนรู้ทั้งในและนอกห้องเรียน ให้เหมาะสมและสอดคล้องกับกระบวนการเรียนรู้

6) ขั้นออกแบบและจัดทำแผนการจัดการเรียนรู้ ซึ่งมีองค์ประกอบดังนี้

- เวลาเรียน

- สาระสำคัญ

- จุดประสงค์การเรียนรู้

- สาระการเรียนรู้

- กิจกรรมการเรียนรู้

- สื่อการเรียนรู้

- การวัดผลประเมินผล

- บันทึกผลหลังการสอน

การเก็บรวมรวมข้อมูล

ในการวิจัยครั้งนี้ ผู้วิจัยทำการทดลองและเก็บรวบรวมข้อมูลกลุ่มตัวอย่าง ในภาคเรียนที่ 2 ปีการศึกษา 2567 โดยดำเนินการเก็บรวบรวมข้อมูล ดังนี้

1) ผู้วิจัยวิเคราะห์ปัญหาการจัดการเรียนรู้วิชาวิทยาศาสตร์ การเรียนผ่านกิจกรรมประสบการณ์กลุ่มแบบร่วมมือ Active Learning เกมส์สิ่งประดิษฐ์เชิงแข่งขัน สำหรับนักเรียนชั้นมัธยมศึกษาปีที่ 1 จากการสอบถามครูและสัมภาษณ์ นักเรียนที่เคยเรียนเรื่องนี้มาแล้ว รวมทั้งศึกษาสภาพสังคมของชุมชนของนักเรียน

2) ปฐมนิเทศชี้แจงวัตถุประสงค์ของการวิจัยให้นักเรียนกลุ่มตัวอย่างทราบ และอธิบายถึงบทบาทหน้าที่ของนักเรียนและผู้วิจัย

3) ผู้วิจัยทำการทดสอบก่อนการทดลอง (Pretest) โดยให้นักเรียนได้ทำแบบทดสอบวัดผลสัมฤทธิ์ทางการเรียนวิชาวิทยาศาสตร์ การเรียนผ่านกิจกรรมประสบการณ์กลุ่มแบบร่วมมือ Active Learning เกมส์สิ่งประดิษฐ์เชิงแข่งขัน สำหรับนักเรียนชั้นมัธยมศึกษาปีที่ 1 ฉบับจริงที่ผู้วิจัยสร้างขึ้น จำนวน 10 ข้อ โดยมีระยะเวลาทำแบบทดสอบ 30 นาที

4) ดำเนินการจัดการวิชาวิทยาศาสตร์ การเรียนผ่านกิจกรรมประสบการณ์กลุ่มแบบร่วมมือ Active Learning เกมส์สิ่งประดิษฐ์เชิงแข่งขัน สำหรับนักเรียนชั้นมัธยมศึกษาปีที่ 1

5) เมื่อสิ้นสุดการจัดการเรียนรู้ตามแผนที่วางไว้ จึงทำการทดสอบวัดหลังการทดลอง (Post-test) โดยนำแบบทดสอบวัดผลสัมฤทธิ์ทางการเรียนวิชาวิทยาศาสตร์ การเรียนผ่านกิจกรรมประสบการณ์กลุ่มแบบร่วมมือ Active Learning เกมส์สิ่งประดิษฐ์เชิงแข่งขัน สำหรับนักเรียนชั้นมัธยมศึกษาปีที่ 1 ฉบับเดิม ที่ใช้ทำการทดสอบก่อนการทดลอง มาให้นักเรียนทดสอบอีกครั้ง มีระยะเวลาในการทำแบบทดสอบ 20 นาที

6) ผู้วิจัยนำข้อมูลที่ได้จากคะแนนผลการเรียนระหว่างเรียน และคะแนนจากการทำแบบทดสอบวัดผลสัมฤทธิ์ทางการเรียนวิชาวิทยาศาสตร์ การเรียนผ่านกิจกรรมประสบการณ์กลุ่มแบบร่วมมือ Active Learning เกมส์สิ่งประดิษฐ์เชิงแข่งขัน สำหรับนักเรียนชั้นมัธยมศึกษาปีที่ 1 วิเคราะห์ด้วยวิธีการทางสถิติ โดยใช้โปรแกรมคอมพิวเตอร์ และเก็บรวบรวมข้อมูลเชิงคุณภาพ ประมวลผลและเรียบเรียงนำเสนอในรูปความเรียง

การวิเคราะห์ข้อมูล

ในการวิเคราะห์ข้อมูลเกี่ยวกับผลสัมฤทธิ์ทางการเรียนวิชาวิทยาศาสตร์ การเรียนผ่านกิจกรรมประสบการณ์กลุ่มแบบร่วมมือ Active Learning เกมส์สิ่งประดิษฐ์เชิงแข่งขัน สำหรับนักเรียนชั้นมัธยมศึกษาปีที่ 1 ผู้วิจัยดำเนินการโดยใช้โปรแกรมสำเร็จรูปทางสถิติ ตามขั้นตอนดังนี้

1) วิเคราะห์ผลสัมฤทธิ์ทางการเรียนวิชาวิทยาศาสตร์ การเรียนผ่านกิจกรรมประสบการณ์กลุ่มแบบร่วมมือ Active Learning เกมส์สิ่งประดิษฐ์เชิงแข่งขัน สำหรับนักเรียนชั้นมัธยมศึกษาปีที่ 1

2) เปรียบเทียบคะแนนผลสัมฤทธิ์ทางการเรียนวิชาวิทยาศาสตร์ การเรียนผ่านกิจกรรมประสบการณ์กลุ่มแบบร่วมมือ Active Learning เกมส์สิ่งประดิษฐ์เชิงแข่งขัน สำหรับนักเรียนชั้นมัธยมศึกษาปีที่ 1 ระหว่างก่อนและหลังการจัดการเรียนรู้ โดยใช้สถิติการทดสอบที ชนิดกลุ่มตัวอย่างไม่เป็นอิสระต่อกัน (t-test for Dependent)

ด้านการศึกษา

สถิติที่ใช้ในการวิจัย

วิเคราะห์ข้อมูลโดยใช้สถิติค่าเฉลี่ย ($\overline{X}$) ส่วนเบี่ยงเบนมาตรฐาน (S.D.) และใช้การทดสอบค่าที (t-test for Dependent)

5. ผลการวิจัย

ผลการเปรียบเทียบคะแนนผลสัมฤทธิ์ทางการเรียนวิชาวิทยาศาสตร์ เรื่อง การเรียนผ่านกิจกรรมประสบการณ์กลุ่มแบบร่วมมือ Active Learning เกมส์สิ่งประดิษฐ์เชิงแข่งขัน สำหรับนักเรียนชั้นมัธยมศึกษาปีที่ 1 ปรากฏผลดังตารางที่ 1

ตารางที่ 1 ผลการเปรียบเทียบคะแนนผลสัมฤทธิ์ทางการเรียนวิชาวิทยาศาสตร์ การเรียนผ่านกิจกรรมประสบการณ์กลุ่มแบบร่วมมือ Active Learning เกมส์สิ่งประดิษฐ์เชิงแข่งขัน สำหรับนักเรียนชั้นมัธยมศึกษาปีที่ 1

กลุ่มตัวอย่าง	n	คะแนนเต็ม	ก่อนเรียน		หลังเรียน		t	df	sig
			$\overline{X}$	S.D.	$\overline{X}$	S.D.			
ผู้เรียน	10	10	4.28	1.84	9.24	0.42	-18.39	9	.000

*ค่านัยสำคัญทางสถิติที่ระดับ .05

จากตารางที่ 1 ผลการเปรียบเทียบคะแนนผลสัมฤทธิ์ทางการเรียนก่อนเรียน และหลังเรียนวิชาวิทยาศาสตร์ การเรียนผ่านกิจกรรมประสบการณ์กลุ่มแบบร่วมมือ Active Learning เกมส์สิ่งประดิษฐ์เชิงแข่งขัน สำหรับนักเรียนชั้นมัธยมศึกษาปีที่ 1 พบว่า คะแนนทดสอบหลังเรียนสูงกว่าคะแนนการทดสอบก่อนเรียน อย่างมีนัยสำคัญทางสถิติที่ระดับ .05 จึงกล่าวได้ว่า คะแนนก่อนเรียน และหลังเรียน มีความแตกต่างกันจริง โดยคะแนนหลังเรียนมีค่าสูงกว่าก่อนเรียน และแสดงว่านักเรียนมีการพัฒนาผลการเรียนสูงขึ้น หลังจากการใช้ชุดกิจกรรมการเรียนรู้วิชาวิทยาศาสตร์ การเรียนผ่านกิจกรรมประสบการณ์กลุ่มแบบร่วมมือ Active Learning เกมส์สิ่งประดิษฐ์เชิงแข่งขัน สำหรับนักเรียนชั้นมัธยมศึกษาปีที่ 1

6. สรุปและอภิปรายผล

การศึกษาวิจัยครั้งนี้เป็นการวิจัย การเรียนผ่านกิจกรรมประสบการณ์กลุ่มแบบร่วมมือ Active Learning เกมส์สิ่งประดิษฐ์เชิงแข่งขัน นักเรียนมีความกระตือรือร้นในการคิดแก้ปัญหาและทำงานเป็นทีม ซึ่งสอดคล้องกับการเรียนรู้แบบ Active Learning เป็นกระบวนการเรียนรู้อย่างหนึ่ง เป็นการเรียนรู้ผ่านการปฏิบัติ หรือการลงมือทำ "ความรู้" ที่เกิดขึ้นก็เป็นความรู้ที่ได้จากประสบการณ์ กระบวนการในการจัดกิจกรรมการ เรียนรู้ที่ผู้เรียนต้องได้มีโอกาสลงมือกระทำ มากกว่าการฟังเพียงอย่างเดียว ต้องจัดกิจกรรมให้ผู้เรียนได้การ เรียนรู้โดยการอ่าน การเขียน การโต้ตอบ และการแก้ปัญหา อีกทั้งให้ผู้เรียนได้ใช้กระบวนการคิดขั้นสูง ได้แก่ การวิเคราะห์ การสังเคราะห์ และการประเมินค่า "เป็นกระบวนการเรียนรู้ที่ให้ผู้เรียนได้เรียนรู้อย่างมีความหมาย โดยการร่วมมือระหว่างผู้เรียนด้วยกัน ในการนี้ ครูต้องลดบทบาทในการสอน และการให้ข้อความรู้แก่ผู้เรียนโดยตรง แต่ไปเพิ่มกระบวนการ และ กิจกรรมที่จะทำให้ผู้เรียนเกิดความกระตือรือร้นในการจะทำกิจกรรมต่างๆ มากขึ้น และอย่างหลากหลาย [1] ไม่ ว่าจะเป็นการแลกเปลี่ยนประสบการณ์ โดยการพูด การเขียน การอภิปรายกับเพื่อนๆ การสอนแบบ Active Learning คือ กระบวนการจัดการเรียนรู้ที่ผู้เรียนทุกคนมีส่วนร่วมในการลงมือ กระท ฯ และใช้กระบวนการคิด โดยผู้เรียนจะเปลี่ยนบทบาทจากผู้รับความรู้ (Receivers) ไปสู่การมีส่วนรวม ในการสร้างความรู้ (Co - creators) ในศตวรรษที่ 21 เป็นยุคของข้อมูลข่าวสารและการเปลี่ยนแปลงด้วยความก้าวหน้าของเทคโนโลยี สารสนเทศ ฯให้การสื่อสารไร้พรมแดน การเข้าถึงแหล่งข้อมูลสามารถทำได้ทุกที่ทุกเวลา ผลกระทบจากยุค โลกาภิวัตน์นี้ส่งผลให้ผู้เรียนจ าเป็นจะต้องมี

ความสามารถเรียนรู้ได้ด้วยตนเองอย่างต่อเนื่องและเป็นผู้แสวงหา ความรู้อยู่ตลอดเวลา ประกอบกับปัจจุบันมีองค์ความรู้ใหม่ เกิดขึ้นมากมายทุกวินาทีทำให้เนื้อหาวิชามีมากเกินกว่าที่จะเรียนรู้จากในห้องเรียนได้หมด ซึ่งการสอนแบบเดิมด้วยการ [2] "พูด บอก เล่า" ไม่สามารถจะพัฒนาให้ ผู้เรียนให้นำความรู้ที่ได้จากการเรียนในชั้นเรียนไปปฏิบัติได้ดี ดังนั้น จึงจ าเป็นต้อง ปรับเปลี่ยนวิธีการจัดการ เรียนรู้ให้สอดคล้องกับการเปลี่ยนแปลงของสังคม เทคโนโลยี และการเรียนรู้ของผู้เรียน จากผู้สอน คือผู้ ถ่ายทอด ปรับเปลี่ยนบทบาทเป็นผู้ชี้แนะวิธีการค้นคว้าหาความรู้เพื่อพัฒนาผู้เรียนให้สามารถแสวงหาความรู้ และ ประยุกต์ใช้ทักษะต่างๆ สร้างความเข้าใจด้วยตนเอง [3] จนเกิดเป็นการเรียนรู้อย่างมีความหมาย Active Learning เป็นการ จัดการเรียนรู้แบบเน้นพัฒนากระบวนการเรียนรู้ ส่งเสริมให้ผู้เรียน ประยุกต์ใช้ทักษะและเชื่อมโยงองค์ความรู้น ำไปปฏิบัติเพื่อ แก้ไขปัญหาหรือประกอบอาชีพในอนาคตหลักการ จัดการเรียนรู้แบบ Active Learning เป็นการนำเอาวิธีการสอน เทคนิค การสอนที่หลากหลายมาใช้ออกแบบ แผนการสอนและกิจกรรมกระตุ้นให้ผู้เรียนมีส่วนร่วมในชั้นเรียน ส่งเสริมปฏิสัมพันธ์ ระหว่างผู้เรียนกับผู้เรียน [4] และผู้เรียนกับผู้สอน Active Learning จึงถือเป็นการจัดการเรียนรู้ประเภทหนึ่งที่ส่งเสริมให้ ผู้เรียนมี คุณลักษณะสอดคล้องกับการเปลี่ยนแปลงในยุคปัจจุบัน อีกทั้งยังช่วยส่งเสริม student engagement, enhance relevance, and improve motivation ของผู้เรียน

7. ข้อเสนอแนะ

ข้อเสนอแนะในการนำผลวิจัยไปใช้

1. ก่อนการจัดการเรียนรู้ทางการเรียนผ่านกิจกรรมประสบการณ์กลุ่มแบบร่วมมือ Active Learning เกมส์ สิ่งประดิษฐ์เชิงแข่งขัน สำหรับนักเรียนชั้นมัธยมศึกษาปีที่ 1 และการแก้ปัญหาเชิงระบบครูผู้สอนควรมีความรู้ความเข้าใจใน การจัดการเรียนรู้ตามแนวคิดสะเต็มศึกษาได้เป็นอย่างดี ครูผู้สอนควรเตรียมตัวและทำหน้าที่ตนเองให้พร้อมต่อการจัดการ เรียนรู้ เช่น การวางแผนการจัดการเรียนรู้อย่างรอบคอบและมีประสิทธิภาพ การดำเนินการจัดการเรียนรู้ตามขั้นตอนที่ วางแผนไว้เพื่อให้การจัดการเรียนรู้เป็นไปอย่างมีประสิทธิภาพ

2. ก่อนการจัดการเรียนรู้ ครูผู้สอนควรชี้แจงทำความเข้าใจให้นักเรียนเข้าใจรูปแบบการจัดการเรียนรู้ให้ชัดเจน เพื่อให้นักเรียนเข้าใจในบทบาทหน้าที่ของตนเอง โดยให้นักเรียนมีอิสระในด้านการคิด โดยครูผู้สอนมีหน้าที่คอยชี้แนะให้ คำปรึกษาอย่างใกล้ชิด

3.ครูผู้สอนควรศึกษาการจัดการเรียนรู้การเรียนการเรียนผ่านกิจกรรมประสบการณ์กลุ่มแบบร่วมมือ Active Learning เกมส์สิ่งประดิษฐ์เชิงแข่งขัน สำหรับนักเรียนชั้นมัธยมศึกษาปีที่ 1 ให้เข้าใจอย่างลึกซึ้งเพื่อการจัดการเรียนรู้ที่มี ประสิทธิภาพและเกิดประโยชน์ต่อผู้นักเรียนมากที่สุด

4.การจัดการเรียนรู้ผลสัมฤทธิ์ทางการเรียนการเรียนผ่านกิจกรรมประสบการณ์กลุ่มแบบร่วมมือ Active Learning เกมส์สิ่งประดิษฐ์เชิงแข่งขัน สำหรับนักเรียนชั้นมัธยมศึกษาปีที่ 1 มีข้อจำกัดเรื่องเวลา ครูผู้สอนควรยืดหยุ่นเรื่องระยะเวลาที่ ใช้ในการดำเนินกิจกรรมในแต่ละขั้นตอนของการจัดการเรียนรู้ตามความเหมาะสม

8. เอกสารอ้างอิง

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ด้านมนุษยศาสตร์และสังคมศาสตร์

(51-TH-HSS)

การเปลี่ยนแปลงทางรายได้ และปัจจัยที่มีผลต่อรายได้ของแรงงานสตรีในครัวเรือนไทย
ภายใต้ช่วงเวลาการแพร่ระบาดของโควิด-19

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บทคัดย่อ

การศึกษาครั้งนี้มีวัตถุประสงค์เพื่อศึกษาการเปลี่ยนแปลงทางรายได้ และปัจจัยที่มีผลต่อรายได้ของแรงงานสตรีในครัวเรือนไทย ภายใต้ช่วงเวลาการแพร่ระบาดของโควิด-19 โดยมีกลุ่มตัวอย่าง คือ แรงงานสตรี อายุ 15-59 ปี จากข้อมูลการสำรวจภาวะเศรษฐกิจและสังคมของครัวเรือน (Household Socio-Economic Survey: SES) ที่ดำเนินการเก็บรวบรวมโดยสำนักงานสถิติแห่งชาติ ประจำปี พ.ศ. 2562 2564 และ 2566 ด้วยการวิเคราะห์การถดถอยพหุคูณ (Multiple Regression) ผลการศึกษาชี้ให้เห็นว่ารายได้เฉลี่ยต่อเดือนของแรงงานสตรีตามกลุ่มอายุเพิ่มขึ้นในทุกกลุ่มอายุจนถึงกลุ่มอายุ 40-44 ปี หลังจากนั้นจะเริ่มลดลงเล็กน้อยในกลุ่มอายุ 45-49 ปี และจะกลับมามีรายได้เพิ่มขึ้นอีกครั้งในกลุ่มอายุ 50-54 ปี และเมื่อเปรียบเทียบรายได้เฉลี่ยทั้ง 3 ปี พบว่า ช่วงก่อนการระบาดของโควิด-19 และช่วงระหว่างการแพร่ระบาดของโควิด-19 มีรายได้เฉลี่ยที่ไม่แตกต่างกัน ส่วนช่วงหลังการแพร่ระบาดของโควิด-19 มีรายได้เฉลี่ยต่อเดือนสูงกว่า 2 ปีก่อนหน้า เมื่อพิจารณาแยกตามพื้นที่ พบว่า รายได้เฉลี่ยต่อเดือนของแรงงานสตรีมีแนวโน้มเช่นเดียวกันกับภาพรวมของประเทศ โดยแรงงานสตรีในกรุงเทพ และในเขตเมือง มีรายได้ที่สูงกว่าแรงงานสตรีในเขตชนบท สำหรับผลการศึกษาปัจจัยที่มีผลต่อรายได้ พบว่า ระดับการศึกษาที่สูงขึ้น พื้นที่อาศัยอยู่ในเขตเทศบาล การเป็นหัวหน้าครัวเรือน รายได้ของครัวเรือน ช่วงเวลาหลังการแพร่ระบาดของโควิด-19 แรงงานสตรีที่อยู่ในกลุ่มอาชีพผู้ประกอบวิชาชีพด้านต่าง ๆ แรงงานสตรีที่อยู่ในภาคอุตสาหกรรมสินค้าอุปโภคบริโภค ชั่วโมงการทำงาน และประสบการณ์ทำงาน ส่งผลให้แรงงานสตรีมีรายได้สูงกว่ากลุ่มอ้างอิง ในขณะที่ เมื่ออายุเพิ่มขึ้นจะทำให้รายได้ลดลง ส่วนสถานภาพสมรสที่ไม่โสด พื้นที่อาศัยในภูมิภาคต่าง ๆ ยกเว้นกรุงเทพ รูปแบบของครัวเรือนที่มีประชากรวัยพึ่งพิงเฉพาะวัยเด็ก จำนวนเด็กและจำนวนผู้สูงอายุในครัวเรือน และจำนวนคนในครัวเรือนที่ทำงาน ส่งผลให้แรงงานสตรีมีรายได้น้อยกว่ากลุ่มอ้างอิง อย่างมีระดับนัยสำคัญทางสถิติ

คำสำคัญ: ครัวเรือนไทย; โควิด-19; รายได้; แรงงานสตรี

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Income Changes and Factors Affecting Income of Female Labors in Thai Households during the COVID-19 Pandemic.

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Abstract

This study aimed to study the income changes and factors affecting income of female labors in Thai Households during the COVID-19 Pandemic in Thailand. The sample consisted of female workers aged 15-59 years from the Household Socio-Economic Survey (SES), collected by the National Statistics Office in 2019, 2021, and 2023 using multiple regression analysis. The results indicate that the average monthly income of female workers by age group increased in all age groups up to the age group 40-44 years, after that it began to decrease slightly in the age group 45-49 years and then increased again in the age group 50-54 years. When comparing the average income over the 3 years, it was found that the average income before the COVID-19 outbreak and during the COVID-19 outbreak were not different, while the average monthly income after the COVID-19 outbreak was higher than the previous 2 years. Regarding an area, the results signify that the average monthly income of female workers tends to be similar overall, with female workers in Bangkok and urban areas having higher incomes than female workers in rural areas. The analysis of determinants of income female workers in Thai households during the COVID-19 pandemic reflects that higher education levels, living in urban areas, being a household head, household income, the period after the COVID-19 outbreak, professional occupations, commodity and manufacturing industry, working hours, and work experience resulted in female workers having higher incomes than the reference group. On the contrary, increasing age will lead to lower income, as for marital status, household type with only dependent children, number of children and elderly persons in the household, and number of employed household members, and also residential areas in different regions except Bangkok resulted in lower income for female workers, with statistical significance.

Keywords: Thai Households; COVID-19; Income; Female Labors

1. บทนำ

การพัฒนาเศรษฐกิจของประเทศไทยในช่วง 40 ปีที่ผ่านมา อยู่บนพื้นฐานของแนวพัฒนาการสร้างความเติบโตของ ภาคอุตสาหกรรมและการส่งออก การเติบโตของกลุ่มทุนต่าง ๆ เกิดขึ้นอย่างรวดเร็วทั้งทุนธนาคาร ทุนการผลิต และทุนการค้า (Modern Trade) แต่ความมั่งคั่งของประชาชาติตกอยู่ในมือของคนส่วนน้อย และระบบเศรษฐกิจมีความเหลื่อมล้ำสูง การเปลี่ยนแปลงทางนโยบายเศรษฐกิจของภาครัฐเหล่านี้ ส่งผลกระทบต่อวิถีชีวิตของเกษตรกร ทำให้แรงงานภาคเกษตร บางส่วนผันตัวไปเป็นแรงงานในระบบภาคอุตสาหกรรมและบริการ แต่การพัฒนาอุตสาหกรรมไทยในหลายทศวรรษที่ผ่านมา ตั้งอยู่บนฐานของการใช้แรงงานราคาถูก (Low Wage Regime) ผลประโยชน์ของการผลิตจึงตกกับทุนเป็นส่วนใหญ่ไม่ได้ ถูกกระจายให้กับแรงงานในรูปของการเพิ่มค่าจ้างและสวัสดิการ นอกจากนี้ การพัฒนาประเทศที่คำนึงถึงการเติบโต ทางเศรษฐกิจมากกว่าสังคม นำไปสู่การพัฒนาที่ไม่สมดุลระหว่างเมืองและชนบท หรือแม้แต่ในเมืองด้วยกัน และยิ่งพัฒนา เมืองมากเท่าไหร่ก็ยิ่งมีกลุ่มคนด้อยโอกาสเพิ่มมากขึ้นเท่านั้น

ปัจจุบันสตรีเข้ามามีส่วนสำคัญต่อตลาดแรงงานของประเทศไทยเป็นอย่างมากทั้งในเชิงปริมาณและคุณภาพ เพราะแรงงานสตรีเข้ามามีบทบาทในทุกภาคส่วนของตลาดแรงงานทั้งในภาคอุตสาหกรรมและภาคบริการ จนทำให้เป็นส่วนสำคัญ ในการขับเคลื่อนระบบเศรษฐกิจรวมถึงธุรกิจต่าง ๆ ให้สามารถเดินหน้าต่อไปได้ผ่านการเปลี่ยนแปลงและพัฒนาตามบริบท ทางเศรษฐกิจ สังคม และวัฒนธรรม โดยสัดส่วนของแรงงานสตรีในตลาดแรงงานไทยปัจจุบันมีสัดส่วนสูงถึงประมาณ 45-50 % ของแรงงานทั้งหมดในประเทศไทย ซึ่งแสดงถึงบทบาทที่สำคัญของผู้หญิงในระบบเศรษฐกิจ ในบางภาคส่วน เช่น ภาคเกษตรกรรม และภาคอุตสาหกรรม แรงงานสตรีมีบทบาทสำคัญโดยเฉพาะในอุตสาหกรรมที่ใช้แรงงานหนาแน่น เช่น การผลิตสิ่งทอและ อิเล็กทรอนิกส์ หรือในภาคบริการ แรงงานสตรีครองสัดส่วนสูง เช่น การค้าขาย การดูแลสุขภาพ การศึกษา และการท่องเที่ยว เป็นต้น จะเห็นได้ว่าการมีส่วนร่วมทางเศรษฐกิจของผู้หญิงส่งผลต่อผลิตภาพแรงงาน (Productivity) ของประเทศ เนื่องจาก สตรีเป็นกำลังแรงงานสำคัญที่สามารถยกระดับการผลิตและสร้างมูลค่าเพิ่ม การเข้าสู่ตลาดแรงงานของผู้หญิงมีบทบาทสำคัญ ในการขับเคลื่อนการเติบโตทางเศรษฐกิจ โดยเฉพาะในช่วงการเปลี่ยนผ่านทางเศรษฐกิจ (Economic Transition) เช่น การพัฒนาประเทศเข้าสู่สังคมอุตสาหกรรมและดิจิทัล องค์กรระหว่างประเทศอย่าง ILO และ World Bank ชี้ให้เห็นว่า หากสตรีมีโอกาสในการทำงานอย่างเท่าเทียม จะช่วยเพิ่ม GDP ของประเทศได้อย่างมีนัยสำคัญ

เนื่องจากจำนวนของประชากรวัยแรงงานลดลง การวางแผนกำลังคนโดยเฉพาะเรื่องของจำนวนแรงงานจึงเป็นสิ่งสำคัญ โดยเฉพาะอย่างยิ่ง ในส่วนของบทบาทของสตรีวัยทำงานในประเทศไทย ซึ่งพบว่า สตรีวัยทำงานส่วนใหญ่เคยเป็นและเป็น ส่วนหนึ่งของกำลังแรงงานที่ได้รับค่าจ้างมีสัดส่วนลดลงเล็กน้อย ส่วนสัดส่วนของสตรีวัยทำงานที่ไม่ได้เป็นส่วนหนึ่งของกำลัง แรงงานเพิ่มขึ้นอย่างช้า ๆ จากในอดีต เหตุผลหลักคือการเป็นแม่บ้าน สัดส่วนของแม่บ้านในกลุ่มสตรีวัยทำงานเพิ่มขึ้น เพียงเล็กน้อยจากปี พ.ศ.2527 นอกจากนี้ ยังพบว่าการเปลี่ยนแปลงสถานภาพการจ้างงานสตรีในช่วง 3 ทศวรรษที่ผ่านมา เปลี่ยนจากแรงงานนอกระบบไปเป็นแรงงานในระบบ โดยเพิ่มขึ้นจาก 37% เป็น 48% ในปี พ.ศ.2557 (Pothisiri, et al., 2018) แม้แรงงานสตรีจะเป็นส่วนสำคัญในระบบเศรษฐกิจ แต่กลับถูกละเลยความสำคัญโดยเฉพาะในอุตสาหกรรมที่มีผู้ชายเป็นกำลัง แรงงาน อีกทั้งยังต้องเผชิญกับความไม่แน่นอนของรายได้และสัญญาจ้างงานที่เป็นธรรม ทั้ง ๆ ที่ทำงานในลักษณะแบบเดียวกัน

ค่าจ้างแรงงานสตรีและชั่วโมงการทำงาน สะท้อนให้เห็นว่า ตลอด 3 ทศวรรษ ค่าจ้างที่แท้จริงโดยเฉลี่ยของสตรีเพิ่มขึ้น ในทุกภาคส่วน สตรีในภาคบริการได้รับค่าจ้างที่แท้จริงสูงสุด สตรีในกรุงเทพฯ และเขตเมืองมีรายได้มากกว่าสตรีในชนบท อัตราค่าจ้างภาคบริการสูงเป็น 3 เท่าของอัตราค่าจ้างภาคเกษตรกรรม และอัตราค่าจ้างภาคการผลิตสูงกว่าอัตราค่าจ้างภาค เกษตรกรรมถึงสองเท่า (Pothisiri, et al., 2018) จากการแพร่ระบาดของโรคติดเชื้อไวรัสโคโรนา (โควิด-19) ส่งผลกระทบ รุนแรงต่อภาวะเศรษฐกิจของไทย เนื่องจากภาครัฐจำเป็นต้องใช้มาตรการควบคุมสถานการณ์การแพร่ระบาดทั้งมาตรการ lockdown และ social distancing ซึ่งมีผลกระทบต่อกิจกรรมทางสังคมและเศรษฐกิจในระดับสูง และส่งผลกระทบอย่าง

รุนแรงต่อตลาดแรงงาน นอกจากแรงงานจะประสบกับการสูญเสียรายได้จากจำนวนชั่วโมงการทำงานที่ลดลงแล้วนั้นแรงงาน ยังประสบกับภาวะการว่างงานเป็นจำนวนมาก ประกอบกับปัญหาของแรงงานสตรีในครัวเรือนของประเทศไทยพบปัญหา หลายประการที่ส่งผลกระทบต่อชีวิตและการทำงาน เช่น ภาระงานบ้านที่หนักหน่วง ขาดความเข้าใจและการสนับสนุนจาก สมาชิกในครอบครัว และข้อจำกัดทางเศรษฐกิจ เช่น การดูแลเด็ก การดูแลผู้สูงอายุ ฯลฯ (จงจิตต์ โศภนคณาภรณ์, 2549)

วิกฤติการณ์โควิด-19 ที่เกิดขึ้นนี้ส่งผลกระทบที่แตกต่างกันต่อแรงงานแต่ละกลุ่มและมีระดับความรุนแรงที่ไม่เท่าเทียมกัน โดยแรงงานที่อยู่ในอุตสาหกรรมที่มีระดับความเสี่ยงต่อโควิด-19 สูง (High COVID--19 Risk Exposure) หรืออยู่ในอาชีพที่มี ความยืดหยุ่นของเวลาการทำงานต่ำ (Occupations with Less Flexibility) มีแนวโน้มที่ได้รับผลกระทบที่สูงมาก นอกจากนี้ ยังพบอีกว่าโควิด-19 ส่งผลกระทบเชิงลบต่อกลุ่มแรงงานสตรีมากที่สุด จนกระทั่งมีการขนานนามวิกฤติการณ์ครั้งนี้ว่า 'She-cession' (ศศิวิมล วรุณศิริ ปวีณวัฒน์, 2565) สอดคล้องกับการวิเคราะห์ของ ยงยุทธ แฉล้มวงษ์ และ โชคชัยชาญ วิโรจน์สัตตบุษย์ (2563) ที่พบว่า จากการแพร่ระบาดของ โควิด-19 แรงงานหญิงมีงานทำลดลงการมีงานทำของผู้หญิง เปรียบเทียบไตรมาส 2 กับไตรมาส 1 ปี 2563 พบว่าการมีงานทำลดลงจาก 17.16 ล้านคน เป็น 16.82 ล้านคน หรือ ลดลงประมาณ 0.34 ล้านคน คิดเป็นร้อยละ 1.97 เมื่อเทียบกับไตรมาส 2 ด้วยกันกับปี 2562 พบว่า สตรีมีงานทำลดลง ร้อยละ 2.3(YoY) ซึ่งถือว่าสตรีได้รับผลกระทบมากกว่าผู้ชาย ซึ่งการมีงานทำลดลงเพียงร้อยละ 1.5(YoY) จากการว่างงานของ สตรีเป็นผู้ที่ไม่เคยทำงานมาก่อน (ส่วนใหญ่เป็นผู้จบการศึกษาใหม่) ซึ่งส่งผลทำให้รายได้และชั่วโมงการทำงานของสตรีลดลง

จากข้อมูลต่าง ๆ จะเห็นได้ว่าแรงงานสตรีมีส่วนสำคัญในตลาดแรงงานในทุกด้าน เช่น ในด้านเศรษฐกิจและการพัฒนา ประเทศ โดยเฉพาะอย่างยิ่ง บทบาทเชิงเศรษฐกิจในตลาดแรงงานจนทำให้เป็นส่วนสำคัญในการขับเคลื่อนระบบเศรษฐกิจ ถึงแม้ว่าแรงงานสตรีจะเข้ามามีบทบาทและพัฒนาทักษะที่สูงขึ้นจากในอดีต แต่ก็ยังเกิดความแตกต่างขึ้นในหลาย ๆ ด้าน โดยความแตกต่างที่เกิดขึ้นมักจะอยู่ในรูปของรายได้ อาชีพที่เหมาะสมกับระดับการศึกษา หรือคุณภาพของงานที่ทำ เป็นต้น จากงานวิจัยที่ผ่านมาได้ชี้ช่องให้เห็นถึงการศึกษาถึงการเปลี่ยนแปลงทางรายได้ของแรงงานสตรีผ่านช่วงเวลาสถานการณ์ โควิด-19 ที่ยังมีการศึกษาในประเด็นนี้น้อยและยังไม่ครอบคลุม โดยมีเพียงการวิเคราะห์บทบาทของสตรีวัยแรงงานในมิติ ด้านเศรษฐกิจและสังคมเท่านั้น แต่ยังขาดการวิเคราะห์ในมิติด้านครัวเรือนที่เป็นปัจจัยสำคัญของการเปลี่ยนแปลงทางรายได้ ของสตรีวัยแรงงานในประเทศไทย ฉะนั้น ในการศึกษาครั้งนี้จึงมุ่งเน้นที่จะศึกษาการเปลี่ยนแปลงทางรายได้ของแรงงานสตรี ผ่านช่วงเวลาสถานการณ์โควิด-19 และปัจจัยที่มีผลต่อรายได้ของแรงงานสตรีในประเทศไทยเพื่อเป็นประโยชน์ให้แก่บุคคล ทั่วไปที่สนใจ และหน่วยงานที่เกี่ยวข้องในการวางแผนการบริหารจัดการแรงงาน และลดความแตกต่างที่เกิดขึ้นได้อย่าง เป็นรูปธรรมมากขึ้น

2. วัตถุประสงค์ของการศึกษา

เพื่อศึกษาการเปลี่ยนแปลงทางรายได้ และปัจจัยที่มีผลต่อรายได้ของแรงงานสตรีในครัวเรือนไทย ภายใต้ช่วงเวลา การแพร่ระบาดของโควิด-19

3. ทฤษฎีที่เกี่ยวข้อง

3.1 ทฤษฎีการกระจายรายได้

แนวคิดทางทฤษฎีการกระจายรายได้ แบ่งออกเป็น 2 ทฤษฎีใหญ่ ๆ คือ 1) ทฤษฎีการกระจายรายได้ตามหน้าที่ (Functional Distribution of Income) หรือทฤษฎีการกระจายรายได้ของกลุ่มปัจจัยการผลิต (Factor Pricing) และ 2) ทฤษฎีการกระจายรายได้ระหว่างบุคคล (Personal Distribution of Income) หรือทฤษฎีการกระจายรายได้ตามชั้น รายได้ (Distribution of Income by Size) (บุญธรรม ราชรักษ์, 2539)

การประชุมวิชาการระดับชาติและนานาชาติบ้านสมเด็จเจ้าพระยา ครั้งที่ 1 (BS2C 2025)
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3.1.1 ทฤษฎีการกระจายรายได้ตามหน้าที่ (Functional Distribution of Income) หรือทฤษฎีการกระจายรายได้ของกลุ่มปัจจัยการผลิต (Factor Pricing)

รูปแบบของการจ่ายค่าตอบแทนแก่ปัจจัยการผลิต ได้แก่ ค่าเช่า ค่าจ้าง ดอกเบี้ย และกำไร ถูกกำหนดโดยอุปทานและอุปสงค์ของปัจจัยการผลิตแต่ละชนิด กล่าวคือ ในการผลิตสินค้าใด ๆ ก็ตาม ถ้าอุปทานของปัจจัยการผลิตเพื่อผลิตสินค้านั้นมีมาก ขณะเดียวกันอุปสงค์ของปัจจัยการผลิตเพื่อการผลิตสินค้านั้นมีน้อย ราคาที่ปัจจัยการผลิตชนิดนั้นได้รับก็จะต่ำ แต่ถ้าอุปทานของปัจจัยการผลิตเพื่อผลิตสินค้านั้นมีน้อย ขณะเดียวกันอุปสงค์ของปัจจัยการผลิตเพื่อการผลิตสินค้านั้นมีมาก ราคาที่ปัจจัยการผลิตชนิดนั้นได้รับก็จะสูง

ด้านอุปสงค์ต่อปัจจัยการผลิตจะมีมากน้อยเพียงใดขึ้นอยู่กับอุปสงค์ต่อสินค้าและบริการที่ปัจจัยการผลิตชนิดนั้นมีส่วนร่วมในการผลิต อุปสงค์ต่อปัจจัยการผลิตจึงเป็นอุปสงค์ต่อเนื่องของสินค้าและบริการซึ่งใช้ปัจจัยนั้นในการผลิต ราคาหรือผลตอบแทนของปัจจัยจะขึ้นอยู่กับมูลค่าของผลผลิตที่ปัจจัยการผลิตนั้นก่อให้เกิดขึ้น

ความแตกต่างกันในรายได้ของปัจจัยการผลิตจึงเป็นผลจากความแตกต่างกันในผลิตภาพของปัจจัย (Marginal Physical Product) และอุปสงค์ต่อผลผลิตที่ปัจจัยนั้น ๆ ใช้ในการผลิต ซึ่งแสดงได้โดยราคาของสินค้าและบริการนั้น ๆ หากกำหนดให้ปัจจัยการผลิตมีผลิตภาพเพิ่มเท่ากัน อุตสาหกรรมที่มีมูลค่าการผลิตสูงจะให้ผลตอบแทนแก่ปัจจัยการผลิตสูงกว่าอุตสาหกรรมที่มีมูลค่าของผลผลิตต่ำ และปัจจัยการผลิตจะถูกจ้างงานในอุตสาหกรรมที่ให้ผลตอบแทนที่สูง

อย่างไรก็ตาม ผลิตภาพเพิ่มของปัจจัยใด ๆ จะขึ้นอยู่กับส่วนผสมของปัจจัยที่ใช้ในการผลิตด้วย ดังนั้น ผลตอบแทนที่จ่ายแก่ปัจจัยการผลิตจะเป็นผลกระทบกับผลิตภาพเพิ่มของปัจจัยการผลิตอื่น ๆ ที่ใช้ในการผลิตร่วมกันด้วย

3.1.2 ทฤษฎีการกระจายรายได้ระหว่างบุคคล (Personal Distribution of Income) หรือทฤษฎีการกระจายรายได้ตามชั้นรายได้ (Distribution of Income by Size)

ทฤษฎีนี้ให้ความสนใจไปที่รายได้ที่บุคคลหรือครัวเรือนได้รับ พร้อมทั้งพยายามอธิบายว่าอะไรเป็นตัวกำหนดความสามารถในการกระจายได้ของบุคคล หรือทำไมจึงเกิดความเหลื่อมล้ำในการกระจายรายได้ การศึกษาการกระจายรายได้ระหว่างบุคคลจะพิจารณาเกี่ยวกับความไม่เท่าเทียมกันของฐานะทางเศรษฐกิจ โดยพิจารณาร้อยละส่วนแบ่งรายได้ที่ตัวบุคคลหรือครัวเรือนในชั้นรายได้ต่าง ๆ ได้รับ เช่น ถ้าเราแบ่งบุคคลหรือครัวเรือนในประเทศออกเป็น 5 กลุ่ม กลุ่มละเท่า ๆ กัน คือ กลุ่มคนร่ำรวย กลุ่มคนค่อนข้างร่ำรวย กลุ่มคนปานกลาง กลุ่มคนค่อนข้างยากจน และกลุ่มคนยากจน ร้อยละส่วนแบ่งรายได้ที่บุคคลหรือครัวเรือนในชั้นรายได้ต่าง ๆ ได้รับจะชี้ให้เห็นว่าความไม่เท่าเทียมกันของการกระจายรายได้ในสังคมมีความแตกต่างกันมากน้อยเพียงใด

3.2 แนวคิดบทบาทของสตรีในครัวเรือน

แนวคิดบทบาทของสตรีในครัวเรือน (Women Role Theory in the Household หรือ Theory of Women's Role in the Household) คือ แนวคิดที่วิเคราะห์บทบาทและหน้าที่ของสตรีในบ้านหรือครอบครัว โดยมองในแง่ของบทบาทที่มีการกำหนดเอาไว้โดยสังคม และวิเคราะห์ผลกระทบที่เกิดขึ้นจากบทบาทนั้นต่อสตรีและสังคมโดยรวม ทฤษฎีนี้มีบทบาทสำคัญในการเข้าใจพฤติกรรมและหน้าที่ของสตรีในครอบครัว โดยสร้างพื้นฐานให้เข้าใจว่าสตรีมีบทบาทและหน้าที่อย่างไรในบ้าน รวมถึงวิเคราะห์ความสัมพันธ์และประสิทธิภาพของบทบาทนั้นต่อการทำงานและความสำเร็จในชีวิต บทบาทของสตรีในครอบครัวเรือนอาจมีลักษณะ ดังนี้ 1) บทบาทของผู้ดูแลบ้านและครอบครัว 2) บทบาทในการจัดการเงินและทรัพย์สิน 3) บทบาทในการดูแลสุขภาพและอาหาร 4) บทบาทในการสร้างสังคมในครอบครัว และ5) บทบาทในการศึกษาและการพัฒนา (สมหวัง หล้าหนัก, 2543)

4. ระเบียบวิธีการวิจัย

4.1 กรอบแนวคิดที่ใช้ในการศึกษา

ผู้วิจัยได้ศึกษาการเปลี่ยนแปลงทางรายได้ของแรงงานสตรีในครัวเรือนไทย ภายใต้ช่วงเวลาการแพร่ระบาดของโควิด-19 ผ่านปัจจัยที่คาดว่าจะส่งผล ดังต่อไปนี้

ปัจจัยด้านประชากร ได้แก่ อายุ สถานภาพสมรส และระดับการศึกษา

ปัจจัยด้านสังคม ได้แก่ พื้นที่อาศัย และภูมิภาค

ปัจจัยด้านครัวเรือน ได้แก่ รูปแบบของครัวเรือน จำนวนผู้สูงอายุในครัวเรือน จำนวนเด็กในครัวเรือน การเป็นหัวหน้าครัวเรือน จำนวนคนที่ทำงานในครัวเรือน และรายได้ของครัวเรือน

ปัจจัยด้านเศรษฐกิจ ได้แก่ ประเภทอาชีพ ประเภทอุตสาหกรรม ชั่วโมงการทำงาน และประสบการณ์ทำงาน

ปัจจัยช่วงเวลาการแพร่ระบาดโควิด-19

4.2 ข้อมูลที่ใช้ในการศึกษา

ในการศึกษาในครั้งนี้ใช้ข้อมูลทุติยภูมิ (Secondary Data) โดยจะใช้ข้อมูลการสำรวจภาวะเศรษฐกิจและสังคมของครัวเรือน ที่เก็บรวบรวมข้อมูลโดยสำนักงานสถิติแห่งชาติ และจะใช้ข้อมูลปี พ.ศ. 2562 2564 และ 2566 เนื่องจาก เป็นข้อมูล 3 ปีล่าสุดที่ได้มีการเก็บรวบรวมข้อมูล และเป็นชุดข้อมูลที่อยู่ในช่วงเวลาก่อน ระหว่าง และหลังการแพร่ระบาดของโควิด-19 เพื่อเป็นการศึกษาการเปลี่ยนแปลงทางรายได้ของแรงงานสตรีในครัวเรือนไทย ในช่วงเวลาการแพร่ระบาดของโควิด-19

4.3 ประชากรและกลุ่มตัวอย่าง

4.3.1 ประชากร

ประชากรที่ใช้ในการศึกษาครั้งนี้ คือ สตรีวัยแรงงานในประเทศไทย

4.3.2 กลุ่มตัวอย่าง

กลุ่มตัวอย่างที่ใช้ในการศึกษาครั้งนี้ คือ แรงงานสตรี อายุ 15-59 ปี โดยต้องอาศัยอยู่ในประเทศไทย และอยู่ในการสำรวจภาวะเศรษฐกิจและสังคมของครัวเรือน ปี พ.ศ.2562 2564 และ 2566 จำนวน 15,000 คน

4.3.3 การคัดเลือกกลุ่มตัวอย่าง

เนื่องจากการวิเคราะห์ต้องการที่จะศึกษาสตรีวัยแรงงานอายุ 15-59 ปี และรูปแบบของครัวเรือนของสตรี ดังนั้น จึงได้มีการคัดเลือกกลุ่มตัวอย่างที่เป็นสตรีที่มีอายุ 15-59 ปีโดยต้องเป็นครัวเรือนที่สามารถระบุความสัมพันธ์สมาชิกในครัวเรือนได้ แต่เนื่องจากข้อจำกัดของข้อมูลการสำรวจภาวะเศรษฐกิจและสังคมของครัวเรือนนั้นสามารถระบุความสัมพันธ์ระหว่างสมาชิกในครัวเรือนได้เฉพาะความสัมพันธ์ระหว่างหัวหน้าครัวเรือนกับสมาชิกในครัวเรือนเท่านั้น ทำให้ในบางครัวเรือนไม่สามารถระบุความสัมพันธ์ระหว่างสตรีที่ต้องการศึกษากับสมาชิกในครัวเรือนได้ ฉะนั้น ครัวเรือนในลักษณะดังกล่าวจึงไม่ได้นำมาพิจารณา สำหรับวิธีการคัดเลือกสตรีที่เป็นกลุ่มตัวอย่าง มีรูปแบบดังต่อไปนี้

กรณีที่ 1 คัดเลือกจากสตรีวัยแรงงานที่เป็นหัวหน้าครัวเรือน

กรณีที่ 2 คัดเลือกสตรีวัยแรงงานที่เป็นคู่สมรสของหัวหน้าครัวเรือน หรือสตรีที่อยู่กับพ่อแม่เป็นหัวหน้าครัวเรือน หากในครัวเรือนมีมากกว่า 1 คน จะเลือกสตรีที่อยู่ในลำดับความสัมพันธ์ลำดับแรกสุด

โดยมีขั้นตอนการคัดเลือกกลุ่มตัวอย่าง ดังต่อไปนี้

ขั้นตอนที่ 1 นำข้อมูลครัวเรือนทั้งหมดจากการสำรวจภาวะเศรษฐกิจและสังคมของครัวเรือน ปี พ.ศ.2562 2564 และ 2566 มาคัดเลือกตามรูปแบบกรณีที่ 1 และกรณีที่ 2 เพื่อให้ได้ข้อมูลกลุ่มตัวอย่างของสตรีวัยแรงงานที่เป็นหัวหน้าครัวเรือนและไม่ได้เป็นหัวหน้าครัวเรือน

ขั้นตอนที่ 2 นำข้อมูลที่คัดเลือกได้จากขั้นตอนที่ 1 มาวิเคราะห์การทำงานของสตรีวัยแรงงาน

ขั้นตอนที่ 3 นำข้อมูลที่ผ่านการวิเคราะห์จากขั้นตอนที่ 2 มาคัดเลือกเอาเฉพาะครัวเรือนที่มีสตรีวัยแรงงานที่ทำงาน

ขั้นตอนที่ 4 นำข้อมูลที่คัดเลือกได้จากขั้นตอนที่ 3 มาวิเคราะห์ปัจจัยที่สงผลต่อรายได้ของแรงงานสตรีในประเทศไทย

4.4 วิธีการศึกษา

นำข้อมูลทุติยภูมิการสำรวจภาวะเศรษฐกิจและสังคมของครัวเรือน ที่ดำเนินการเก็บรวบรวมโดยสำนักงานสถิติแห่งชาติในปี พ.ศ.2562 2564 และ 2566 มาวิเคราะห์ปัจจัยที่มีผลต่อรายได้ของแรงงานสตรีในครัวเรือนไทย ภายใต้ช่วงเวลาการแพร่ระบาดของโควิด-19 โดยใช้การวิเคราะห์การถดถอยพหุคูณ (Multiple Regression) ในการวิเคราะห์

4.5 จริยธรรมการวิจัย

การวิจัยนี้ได้รับการพิจารณาและผ่านการรับรองการพิจารณาจริยธรรมการวิจัยในมนุษย์ จากคณะกรรมการพิจารณาจริยธรรมการวิจัยในคน กลุ่มสหสถาบัน ชุดที่ 1 จุฬาลงกรณ์มหาวิทยาลัย เลขที่ใบรับรอง 123/67 รับรองวันที่ 31 พฤษภาคม 2567

5. ผลการศึกษา

ภาพที่ 1 แสดงรายได้เฉลี่ยต่อเดือนตามกลุ่มอายุของแรงงานสตรีในครัวเรือนไทย แยกตามพื้นที่ที่อยู่อาศัย พบว่า ภาพ 1A แสดงให้เห็นถึงรายได้เฉลี่ยต่อเดือนตามกลุ่มอายุที่เพิ่มขึ้นในทุกกลุ่มอายุจนถึงกลุ่มอายุ 40-44 ปี หลังจากนั้นรายได้เฉลี่ยต่อเดือนของแรงงานสตรีในครัวเรือนไทยจะเริ่มลดลงเล็กน้อยในกลุ่มอายุ 45-49 ปี และจะกลับมามีรายได้เพิ่มขึ้นอีกครั้งในกลุ่มอายุ 50-54 ปี และเมื่อเปรียบเทียบรายได้เฉลี่ยทั้ง 3 ปี พบว่า ช่วงก่อนการระบาดของโควิด-19 (2562) และช่วงระหว่างการแพร่ระบาดของโควิด-19 (2564) มีรายได้เฉลี่ยที่ไม่แตกต่างกัน ส่วนช่วงหลังการแพร่ระบาดของโควิด-19 (2566) พบว่า มีรายได้เฉลี่ยต่อเดือนสูงกว่า 2 ปีก่อนหน้าจนถึงกลุ่มอายุ 40-45 ปี และจะกลับมามีรายได้ที่ไม่แตกต่างกันกับ 2 ปีก่อนหน้า นอกจากนี้เมื่อพิจารณาแยกตามพื้นที่ พบว่า รายได้เฉลี่ยต่อเดือนของแรงงานสตรีมีแนวโน้มเช่นเดียวกันกับภาพรวมของประเทศ และยังพบถึงความแตกต่างของรายได้ตามพื้นที่ที่อยู่อาศัยอย่างค่อนข้างชัดเจน โดยแรงงานสตรีในกรุงเทพ (ภาพ 1B) และในเขตเมือง (ภาพ 1C) มีรายได้ที่สูงกว่าแรงงานสตรีในเขตชนบทอย่างมีนัยสำคัญ โดยมีรายได้ต่อเดือน 10,000-28,000 บาท ในกรุงเทพและในเขตเมือง และมีรายได้ต่อเดือนเฉลี่ย 9,000-15,000 บาท ในเขตชนบท นอกจากนี้ ยังพบว่าแรงงานสตรีจะกลับมามีรายได้เพิ่มขึ้นอีกครั้งในกลุ่มอายุ 55-59 ปี ในพื้นที่กรุงเทพ และในเขตเมือง
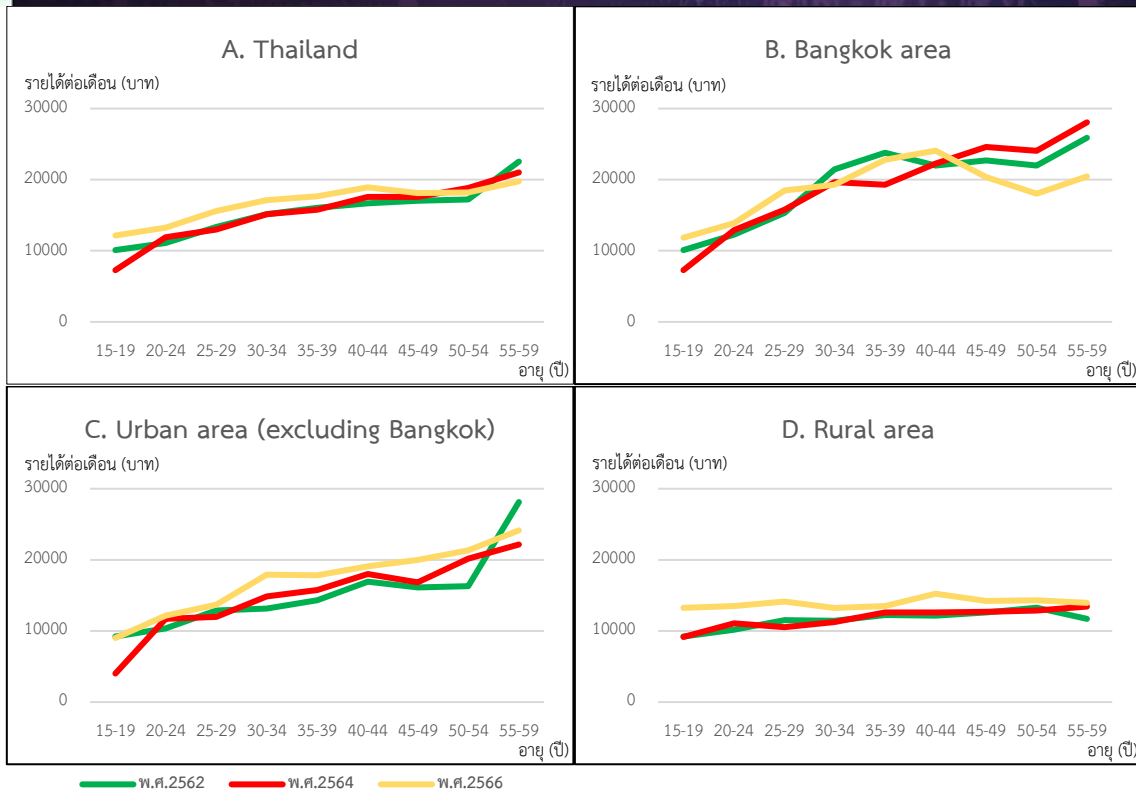
ภาพที่ 1 แสดงรายได้เฉลี่ยต่อเดือนของแรงงานสตรี ตามกลุ่มอายุ

ที่มา: จัดทำโดยผู้วิจัย

จากการวิเคราะห์ปัจจัยที่ส่งผลต่อรายได้ของแรงงานสตรีในครัวเรือนไทย ภายใต้ช่วงเวลาการแพร่ระบาดของโควิด-19 โดยใช้การวิเคราะห์การถดถอยพหุคูณ (Multiple Regression) ในการวิเคราะห์ ดังผลที่แสดงในตารางที่ 1 ดังนี้

ปัจจัยด้านประชากร พบว่า เมื่อกำหนดให้ปัจจัยอื่น ๆ คงที่ แรงงานสตรีมีอายุเพิ่มขึ้น 1 ปี จะทำให้รายได้ลดลง ร้อยละ 7 ด้านสถานภาพสมรส แรงงานสตรีที่ไม่โสดจะมีรายได้น้อยกว่าแรงงานสตรีที่โสด ร้อยละ 2.3 และระดับการศึกษา แรงงานสตรีที่มีระดับการศึกษาในระดับมัธยมศึกษาตอนต้น มัธยมศึกษาตอนปลายหรือปวช. อนุปริญญาหรือปวส. ปริญญาตรี และสูงกว่าปริญญาตรี จะมีรายได้มากกว่าแรงงานสตรีที่มีระดับการศึกษาในระดับประถมศึกษาหรือต่ำกว่า อย่างมีระดับนัยสำคัญทางสถิติ

ปัจจัยด้านสังคม พบว่า เมื่อกำหนดให้ปัจจัยอื่น ๆ คงที่ แรงงานสตรีที่อาศัยอยู่ในพื้นที่ในเขตเทศบาล จะมีรายได้สูงกว่าแรงงานสตรีที่อาศัยอยู่ในพื้นที่นอกเขตเทศบาล ร้อยละ 7.4 และแรงงานสตรีที่อาศัยอยู่ในภาคกลาง ภาคเหนือ ภาคตะวันออกเฉียงเหนือ และภาคใต้ จะมีรายได้น้อยกว่าแรงงานสตรีที่อาศัยอยู่ในกรุงเทพและปริมณฑล ร้อยละ 8.6, 29.7, 25.6 และ 19.1 ตามลำดับ อย่างมีระดับนัยสำคัญทางสถิติ

ปัจจัยด้านครัวเรือน พบว่า เมื่อกำหนดให้ปัจจัยอื่น ๆ คงที่ แรงงานสตรีที่มีรูปแบบของครัวเรือนในลักษณะครัวเรือนที่มีประชากรวัยพึ่งพิงเฉพาะวัยเด็ก จะมีรายได้น้อยกว่าแรงงานสตรีที่มีรูปแบบของครัวเรือนในลักษณะครัวเรือนที่ไม่มีประชากรวัยพึ่งพิง ร้อยละ 3.9 ครัวเรือนที่มีเด็กอายุ 0-14 ปี ในครัวเรือน หากครัวเรือนมีจำนวนเด็กเพิ่มขึ้น 1 คน จะทำให้แรงงานสตรีมีรายได้ลดลง ร้อยละ 3.3 ในทางเดียวกัน ครัวเรือนที่มีผู้สูงอายุ 60 ปีขึ้นไป หากครัวเรือนมีจำนวนผู้สูงอายุเพิ่มขึ้น 1 คน จะทำให้แรงงานสตรีมีรายได้ลดลง ร้อยละ 6.2 ในขณะที่ แรงงานสตรีที่เป็นหัวหน้าครัวเรือนจะมีรายได้มากกว่าแรงงานสตรีที่ไม่เป็นหัวหน้าครัวเรือน ร้อยละ 5.4 อย่างไรก็ดี หากในครัวเรือนนั้นมีจำนวนคนในครัวเรือนที่ทำงานเพิ่มขึ้น 1 คน

จะทำให้แรงงานสตรีมีรายได้ลดลง ร้อยละ 9.1 แต่ถ้ารายได้ของครัวเรือนเพิ่มขึ้น 100 บาท ส่งผลให้รายได้ของแรงงานสตรี
เพิ่มขึ้น ร้อยละ 0.65 อย่างมีระดับนัยสำคัญทางสถิติ

ปัจจัยช่วงเวลาการแพร่ระบาดของโควิด-19 พบว่า เมื่อกำหนดให้ปัจจัยอื่น ๆ คงที่ ช่วงเวลาหลังการแพร่ระบาดของ
โควิด-19 (พ.ศ. 2566) แรงงานสตรีจะมีรายได้เพิ่มขึ้นจากช่วงเวลาก่อนการแพร่ระบาดของโควิด-19 (พ.ศ. 2562) ร้อยละ 5.6
อย่างมีระดับนัยสำคัญทางสถิติ

ปัจจัยด้านเศรษฐกิจ พบว่า เมื่อกำหนดให้ปัจจัยอื่น ๆ คงที่ แรงงานสตรีที่อยู่ในกลุ่มอาชีพผู้ประกอบวิชาชีพด้านต่าง ๆ
จะมีรายได้มากกว่าแรงงานสตรีที่อยู่ในกลุ่มอาชีพผู้จัดการ ข้าราชการระดับอาวุโส และผู้บัญญัติกฎหมาย ร้อยละ 17.5
ส่วนแรงงานสตรีที่อยู่ในกลุ่มอาชีพเสมียน พนักงานบริการ และผู้จำหน่ายสินค้า ผู้ปฏิบัติงานที่มีฝีมือด้านการเกษตร ประมง
และป่าไม้ ช่างฝีมือ และผู้ปฏิบัติงานที่เกี่ยวข้อง และผู้ประกอบอาชีพพื้นฐาน จะมีรายได้น้อยกว่าแรงงานสตรีที่อยู่ในกลุ่ม
อาชีพผู้จัดการ ข้าราชการระดับอาวุโส และผู้บัญญัติกฎหมาย ในขณะที่ แรงงานสตรีอยู่ในภาคอุตสาหกรรมสินค้าอุปโภค
บริโภค จะมีรายได้มากกว่าแรงงานสตรีที่อยู่ในภาคอุตสาหกรรมเกษตรและอุตสาหกรรมอาหาร ร้อยละ 6.6 ส่วนแรงงานสตรี
ที่อยู่ในภาคอุตสาหกรรมสินค้าอุตสาหกรรม อสังหาริมทรัพย์และก่อสร้าง ทรัพยากร และบริการ จะมีรายได้น้อยกว่าแรงงาน
สตรีที่อยู่ในภาคอุตสาหกรรมเกษตรและอุตสาหกรรมอาหาร อย่างไรก็ดี เมื่อแรงงานสตรีมีชั่วโมงการทำงานเพิ่มขึ้น 1 ชั่วโมง
จะทำให้รายได้ของแรงงานสตรีเพิ่มขึ้น ร้อยละ 8.5 และเมื่อประสบการณ์ทำงานของแรงงานสตรีเพิ่มขึ้น 1 ปี จะทำให้รายได้
ของแรงงานสตรีเพิ่มขึ้น ร้อยละ 4.8 อย่างมีระดับนัยสำคัญทางสถิติ

ตารางที่ 1 ปัจจัยที่ส่งผลต่อรายได้ของแรงงานสตรีในครัวเรือนไทย

LogIncome	Coef.	Robust Std. Err.	t	p-value
ค่าคงที่	9.346	0.150	62.33	0.000[***]
อายุ	-0.070	0.009	-8.00	0.000[***]
อายุ^{2}	0.001	0.000	10.10	0.000[***]
สถานภาพสมรส (กลุ่มอ้างอิง: สตรีที่โสด)				
สตรีที่ไม่โสด	-0.023	0.014	-1.56	0.118
มัธยมศึกษาตอนต้น	0.051	0.027	1.92	0.056[*]
มัธยมศึกษาตอนปลายหรือปวช.	0.155	0.040	3.83	0.000[***]
อนุปริญญาหรือปวส.	0.301	0.053	5.72	0.000[***]
ปริญญาตรี	0.532	0.062	8.60	0.000[***]
สูงกว่าปริญญาตรี	0.715	0.078	9.18	0.000[***]
กำลังศึกษา	-0.123	0.104	-1.18	0.236

การประชุมวิชาการระดับชาติและนานาชาติบ้านสมเด็จเจ้าพระยา ครั้งที่ 1 (BS2C 2025)
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ตารางที่ 1 ปัจจัยที่ส่งผลต่อรายได้ของแรงงานสตรีในครัวเรือนไทย (ต่อ)

LogIncome	Coef.	Robust Std. Err.	t	p-value
พื้นที่อาศัย (กลุ่มอ้างอิง: พื้นที่นอกเขตเทศบาล)				
พื้นที่ในเขตเทศบาล	0.074	0.013	5.63	0.000***
ภูมิภาค (กลุ่มอ้างอิง: กรุงเทพและปริมณฑล)				
ภาคกลาง	-0.086	0.015	-5.79	0.000***
ภาคเหนือ	-0.297	0.019	-15.63	0.000***
ภาคตะวันออกเฉียงเหนือ	-0.256	0.018	-14.02	0.000***
ภาคใต้	-0.191	0.017	-11.37	0.000***
รูปแบบของครัวเรือน (กลุ่มอ้างอิง: ครัวเรือนที่ไม่มีประชากรวัยพึ่งพิง)				
ครัวเรือนที่มีประชากรวัยพึ่งพิงเฉพาะวัยเด็ก	-0.039	0.024	-1.65	0.099*
ครัวเรือนที่มีประชากรวัยพึ่งพิงเฉพาะวัยสูงอายุ	0.016	0.031	0.50	0.617
ครัวเรือนที่มีประชากรวัยพึ่งพิงทั้ง 2 วัย	0.028	0.039	0.72	0.470
จำนวนผู้สูงอายุที่อายุ 60 ปี ขึ้นไป และอาศัยอยู่ในครัวเรือนเดียวกัน	-0.062	0.021	-2.96	0.003***
จำนวนเด็กที่อายุ 0-14 ปี และอาศัยอยู่ในครัวเรือนเดียวกัน	-0.033	0.014	-2.35	0.019**
การเป็นหัวหน้าครัวเรือน (กลุ่มอ้างอิง: ไม่ได้เป็นหัวหน้าครัวเรือน)				
เป็นหัวหน้าครัวเรือน	0.054	0.012	4.56	0.000***
จำนวนคนในครัวเรือนที่ทำงาน	-0.091	0.013	-6.97	0.000***
รายได้ของครัวเรือน (บาทต่อเดือน)	$6.47e^{-06}$	$7.39e^{-07}$	8.75	0.000***
ช่วงเวลาการแพร่ระบาดของ โควิด-19 (กลุ่มอ้างอิง: ช่วงเวลาก่อนการแพร่ระบาด (พ.ศ.2562))				
ระหว่างการแพร่ระบาด (พ.ศ.2564)	-0.020	0.013	-1.62	0.105
หลังการแพร่ระบาด (พ.ศ.2566)	0.056	0.012	4.74	0.000***

ตารางที่ 1 ปัจจัยที่ส่งผลต่อรายได้ของแรงงานสตรีในครัวเรือนไทย (ต่อ)

LogIncome	Coef.	Robust Std. Err.	t	p-value
ประเภทอาชีพ (กลุ่มอ้างอิง: ผู้จัดการ ข้าราชการระดับอาวุโส และผู้บัญญัติกฎหมาย)				
ผู้ประกอบวิชาชีพด้านต่าง ๆ	0.175	0.034	5.17	0.000***
เจ้าหน้าที่เทคนิค และผู้ประกอบวิชาชีพที่เกี่ยวข้องด้านต่าง ๆ	0.017	0.037	0.46	0.646
เสมียน	-0.086	0.037	-2.28	0.022**
พนักงานบริการ และผู้จำหน่ายสินค้า	-0.199	0.043	-4.60	0.000***
ผู้ปฏิบัติงานที่มีฝีมือด้านการเกษตร ประมง และป่าไม้	-0.271	0.057	-4.75	0.000***
ช่างฝีมือ และผู้ปฏิบัติงานที่เกี่ยวข้อง	-0.218	0.049	-4.45	0.000***
ผู้ควบคุมเครื่องจักรโรงงานและเครื่องจักร และผู้ปฏิบัติงานด้านประกอบ	-0.063	0.044	-1.42	0.155
ผู้ประกอบอาชีพพื้นฐาน	-0.308	0.045	-6.92	0.000***
ประเภทอุตสาหกรรม (กลุ่มอ้างอิง: เกษตรและอุตสาหกรรมอาหาร)				
สินค้าอุปโภคบริโภค	0.066	0.030	2.18	0.030**
ธุรกิจการเงิน	0.017	0.037	0.46	0.646
สินค้าอุตสาหกรรม	-0.086	0.037	-2.28	0.022**
อสังหาริมทรัพย์และก่อสร้าง	-0.199	0.043	-4.60	0.000***
ทรัพยากร	-0.271	0.057	-4.75	0.000***
บริการ	-0.218	0.049	-4.45	0.000***
เทคโนโลยี	-0.063	0.044	-1.42	0.155
ชั่วโมงการทำงาน (ชั่วโมงต่อวัน)	0.085	0.009	9.93	0.000***
ประสบการณ์การทำงาน (ปี)	0.048	0.006	7.88	0.000***
ประสบการณ์การทำงาน^2	-0.001	0.000	-14.10	0.000***

F = 363.58, p-value = 0.000, R2 = 0. 7084

*** ระดับนัยสำคัญ 0.01, ** ระดับนัยสำคัญ 0.05, * ระดับนัยสำคัญ 0.10

ที่มา: จากผลการวิเคราะห์

6. บทสรุป

      การวิจัยในครั้งนี้สามารถสรุปได้ว่า รายได้เฉลี่ยต่อเดือนตามกลุ่มอายุของแรงงานสตรีในครัวเรือนไทย แยกตามพื้นที่ที่อยู่อาศัย แสดงให้เห็นถึงรายได้เฉลี่ยต่อเดือนตามกลุ่มอายุที่เพิ่มขึ้นในทุกกลุ่มอายุจนถึงกลุ่มอายุ 40-44 ปี หลังจากนั้น

รายได้เฉลี่ยต่อเดือนของแรงงานสตรีในครัวเรือนไทยจะเริ่มลดลงเล็กน้อยในกลุ่มอายุ 45-49 ปี และจะกลับมามีรายได้เพิ่มขึ้น อีกครั้งในกลุ่มอายุ 50-54 ปี ซึ่งสาเหตุมาจากการเพิ่มขึ้นของการมีส่วนร่วมของสตรีที่แต่งงานแล้ว (Ortiz-Ospina, Tzvetkova and Roser, 2018) และเมื่อเปรียบเทียบรายได้เฉลี่ยทั้ง 3 ปี พบว่า ช่วงก่อนการแพร่ระบาดของโควิด-19 (พ.ศ. 2562) และ ช่วงระหว่างการแพร่ระบาดของโควิด-19 (พ.ศ. 2564) มีรายได้เฉลี่ยที่ไม่แตกต่างกัน ส่วนช่วงหลังการแพร่ระบาดของโควิด-19 (พ.ศ. 2566) พบว่า มีรายได้เฉลี่ยต่อเดือนสูงกว่า 2 ปีก่อนหน้าจนถึงกลุ่มอายุ 40-45 ปี และจะกลับมามีรายได้ที่ไม่แตกต่างกันกับ 2 ปีก่อนหน้า นอกจากนี้ เมื่อพิจารณาแยกตามพื้นที่ พบว่า รายได้เฉลี่ยต่อเดือนของแรงงานสตรีมีแนวโน้มเช่นเดียวกันกับ ภาพรวมของประเทศ และยังพบถึงความแตกต่างของรายได้ตามพื้นที่ที่อยู่อาศัยอย่างค่อนข้างชัดเจน โดยแรงงานสตรีใน กรุงเทพ และในเขตเมือง มีรายได้ที่สูงกว่าแรงงานสตรีในเขตชนบทอย่างมีนัยสำคัญ ซึ่งเป็นผลมาจากการพัฒนาที่แตกต่างกัน อย่างชัดเจนใน 3 พื้นที่ คือ กรุงเทพฯ เขตเมืองและเขตชนบท (Pothisiri, et al., 2018) นอกจากนี้ ยังพบว่าแรงงานสตรีจะ กลับมามีรายได้เพิ่มขึ้นอีกครั้งในกลุ่มอายุ 55-59 ปี โดยเฉพาะ ในพื้นที่กรุงเทพ และในเขตเมือง ซึ่งเป็นผลมาจากการมีอยู่ใน ตลาดแรงงานของสตรีในภาครัฐบาล

จากการวิเคราะห์ปัจจัยที่ส่งผลต่อรายได้ของแรงงานสตรีในครัวเรือนไทย ภายใต้ช่วงเวลาการแพร่ระบาดของโควิด-19 พบว่า ปัจจัยด้านประชากร ที่ประกอบด้วย อายุ สถานภาพสมรสที่ไม่โสด จะมีผลให้รายได้ลดลง ส่วนระดับการศึกษาของ แรงงานสตรีที่สูงขึ้นจะส่งผลให้มีรายได้เพิ่มขึ้น แสดงให้เห็นว่าหากแรงงานมีการลงทุนเพื่อการศึกษาซึ่งส่งผลต่อผลิตภาพ แรงงานที่เพิ่มขึ้นย่อมส่งผลให้รายได้เพิ่มขึ้นตาม

ปัจจัยด้านสังคม พบว่า แรงงานสตรีที่อาศัยอยู่ในพื้นที่ในเขตเทศบาล จะมีรายได้สูงกว่าแรงงานสตรีที่อาศัยอยู่ในพื้นที่ นอกเขตเทศบาล และแรงงานสตรีที่อาศัยอยู่ในภาคกลาง ภาคเหนือ ภาคตะวันออกเฉียงเหนือ และภาคใต้ จะมีรายได้น้อยกว่า แรงงานสตรีที่อาศัยอยู่ในกรุงเทพและปริมณฑล ทั้งนี้ เพราะการจ้างงานที่แตกต่างกันเป็นไปตามประเภทอุตสาหกรรม ในแต่ละภูมิภาค สะท้อนถึงมีการกระจุกตัวของอุตสาหกรรมการผลิตที่ต้องใช้แรงงานจำนวนมาก จะสังเกตได้ว่าการกระจุกตัว ของอุตสาหกรรมการผลิตที่แตกต่างกันไปตามภูมิภาค โดยจะส่งผลให้เกิดความไม่สมดุลระหว่างความต้องการทำงานของ แรงงานและความต้องการจ้างงานของสถานประกอบการได้

ปัจจัยด้านครัวเรือน พบว่า แรงงานสตรีที่มีรูปแบบของครัวเรือนในลักษณะครัวเรือนที่มีประชากรวัยพึ่งพิงเฉพาะวัยเด็ก จะมีรายได้น้อยกว่าแรงงานสตรีที่มีรูปแบบของครัวเรือนในลักษณะครัวเรือนที่ไม่มีประชากรวัยพึ่งพิง สอดคล้องกับครัวเรือนที่ มีเด็กอายุ 0-14 ปี ในครัวเรือน หากครัวเรือนมีจำนวนเด็กเพิ่มขึ้น จะทำให้แรงงานสตรีมีรายได้ลดลง โดยภาระการพึ่งพา ของบุตรเป็นหน้าที่ของแรงงานสตรีที่ต้องรับภาระมากขึ้น ทำให้แรงงานสตรีอาจเลือกที่จะไม่ทำงานล่วงเวลาเพื่อมาดูแลบุตร และใช้เวลาในบ้านมากขึ้น อีกทั้ง ความต้องการจ้างงานของนายจ้างที่ลดลง ก็อาจส่งผลให้เวลาในการทำงานของแรงงานสตรี ลดลง ซึ่งส่งผลให้รายได้ลดลงอย่างสืบเนื่อง กล่าวอีกนัยหนึ่งคือ จำนวนบุตรที่เพิ่มขึ้นจะมีผลต่อการลดลงของรายได้ของ แรงงานสตรี เนื่องด้วยภาระการดูแลบุตรเป็นหน้าที่ของสตรีโดยตรง จึงทำให้ต้องรับภาระทั้งงานในการบ้านและงานนอกบ้าน และอาจส่งผลให้แรงงานสตรีบางส่วนต้องออกจากตลาดแรงงานไป (ฐิตาวรรณ อินสะอาด, 2565) ในส่วนของครัวเรือนที่มี ผู้สูงอายุ 60 ปีขึ้นไป หากครัวเรือนมีจำนวนผู้สูงอายุเพิ่มขึ้นจะทำให้แรงงานสตรีมีรายได้ลดลง เช่นกัน แรงงานสตรีที่เป็น หัวหน้าครัวเรือนจะมีรายได้มากกว่าแรงงานสตรีที่ไม่เป็นหัวหน้าครัวเรือน หากในครัวเรือนนั้นมีจำนวนคนในครัวเรือนที่ ทำงานเพิ่มขึ้นจะทำให้แรงงานสตรีมีรายได้ลดลง และถ้ารายได้ของครัวเรือนเพิ่มขึ้นส่งผลให้รายได้ของแรงงานสตรีเพิ่มขึ้น

ปัจจัยช่วงเวลาการแพร่ระบาดของโควิด-19 พบว่า ช่วงเวลาหลังการแพร่ระบาดของโควิด-19 (พ.ศ. 2566) แรงงาน สตรีจะมีรายได้เพิ่มขึ้นจากช่วงเวลาก่อนการแพร่ระบาดของโควิด-19 (พ.ศ. 2562) ซึ่งเป็นผลมาจากการฟื้นตัวของระบบ เศรษฐกิจ และการกลับมาเปิดกิจการแบบเต็มรูปแบบของกิจการต่าง ๆ สำหรับปัจจัยด้านเศรษฐกิจ พบว่า แรงงานสตรีที่อยู่ ในกลุ่มอาชีพผู้ประกอบวิชาชีพด้านต่าง ๆ จะมีรายได้มากกว่าแรงงานสตรีที่อยู่ในกลุ่มอาชีพผู้จัดการ ข้าราชการระดับอาวุโส

และผู้บัญญัติกฎหมาย ส่วนแรงงานสตรีที่อยู่ในกลุ่มอาชีพเสมียน พนักงานบริการ และผู้จำหน่ายสินค้า ผู้ปฏิบัติงานที่มีฝีมือ ด้านการเกษตร ประมง และป่าไม้ ช่างฝีมือ และผู้ปฏิบัติงานที่เกี่ยวข้อง และผู้ประกอบอาชีพพื้นฐาน จะมีรายได้น้อยกว่า แรงงานสตรีที่อยู่ในกลุ่มอาชีพผู้จัดการ ข้าราชการระดับอาวุโส และผู้บัญญัติกฎหมาย แรงงานสตรีที่อยู่ในภาคอุตสาหกรรม สินค้าอุปโภคบริโภค จะมีรายได้มากกว่าแรงงานสตรีที่อยู่ในภาคอุตสาหกรรมเกษตรและอุตสาหกรรมอาหาร ส่วนแรงงานสตรี ที่อยู่ในภาคอุตสาหกรรมสินค้าอุตสาหกรรมอสังหาริมทรัพย์และก่อสร้าง ทรัพยากร และบริการ จะมีรายได้น้อยกว่าแรงงานสตรี ที่อยู่ในภาคอุตสาหกรรมเกษตรและอุตสาหกรรมอาหาร แสดงให้เห็นว่า เมื่อแรงงานสตรีทำงานในอุตสาหกรรมการผลิต ที่แตกต่างกันจะมีผลต่อรายได้แตกต่างกันตามระดับและประเภททักษะฝีมือแรงงานด้วย เมื่อแรงงานสตรีมีชั่วโมงการทำงาน เพิ่มขึ้นจะทำให้รายได้ของแรงงานสตรีเพิ่มขึ้น และเมื่อประสบการณ์ทำงานของแรงงานสตรีเพิ่มขึ้นจะทำให้รายได้ของแรงงาน สตรีเพิ่มขึ้น

ข้อจำกัดและข้อเสนอแนะ

การวิจัยนี้อาจยังมีข้อจำกัดบางประการ เช่น ข้อมูลทุติยภูมิที่ใช้ในการวิเคราะห์ทั้งหมดเป็นการใช้ข้อมูลภาคตัดขวาง (Cross Section Data) ซึ่งเป็นการเก็บมาจากประชากรในช่วงเวลาใดเวลาหนึ่งเท่านั้น และการใช้ข้อมูลการสำรวจภาวะ เศรษฐกิจและสังคมของครัวเรือนที่นำมาวิเคราะห์ปัจจัยที่ส่งผลต่อการทำงานของสตรีวัยแรงงาน มีความจำเป็นต้องตัดกลุ่ม ตัวอย่างที่ไม่สามารถบ่งบอกความสัมพันธ์ของสมาชิกในครัวเรือนกับหัวหน้าครัวเรือนออกไป ทำให้กลุ่มตัวอย่างอาจไม่ ครอบคลุมประชากรทั้งหมด ซึ่งในการทำวิจัยต่อไปในอนาคตควรวิเคราะห์เพิ่มเติมเกี่ยวกับปัจจัยที่ส่งผลต่อการทำงานของ สตรีโดยใช้ข้อมูลช่วงเวลา (Panel Data) ในการวิเคราะห์เพื่อให้เห็นการเปลี่ยนแปลงของครัวเรือนในเชิงพลวัต

สำหรับข้อเสนอแนะเชิงนโยบาย หน่วยงานภาครัฐ และหน่วยงานที่เกี่ยวข้องควรส่งเสริม และสนับสนุนการเรียนรู้ที่มี คุณภาพตลอดช่วงชีวิต เพื่อเป็นเครื่องมือที่จะช่วยพัฒนาขีดความสามารถของการทำงานอย่างต่อเนื่อง ซึ่งจะส่งผลให้แรงงาน ได้รับรายได้ที่เพิ่มขึ้น นอกจากนี้ ควรปรับปรุงกฎหมาย ประกาศ หรือข้อบังคับต่าง ๆ ที่เป็นการสนับสนุนการสร้างสมดุล ระหว่างการทำงานของแรงงานสตรีในตลาดแรงงานและการดูแลสมาชิกที่มีภาวะพึ่งพิง เช่น แก้ไขนโยบายการลาสำหรับ แรงงานชายและหญิง เพื่อดูแลสมาชิกในครัวเรือนที่มีภาวะพึ่งพิง โดยเฉพาะวัยเด็ก เพื่อทำให้เกิดการแบ่งเบาภาระในครัวเรือน และสร้างความเท่าเทียมกันระหว่างเพศ รวมถึงการสนับสนุนให้นายจ้างให้สิทธิแรงงานทำงานที่บ้าน หรือทำงานบางเวลาใน กรณีที่จำเป็นต้องดูแลสมาชิกในครัวเรือนที่มีภาวะพึ่งพิง รวมถึงส่งเสริมให้มีการจัดสวัสดิการให้แก่แรงงานสตรีที่มีบุตรแรกเกิด และเด็กก่อนวัยเรียน เช่น มีการจัดห้องปั๊มน้ำนมและเวลาพักในการปั๊มน้ำนม หรือการจัดให้มีสถานบริการดูแลเด็กก่อนวัย เรียนในสถานประกอบการ เพื่อสนับสนุนสตรีวัยแรงงานให้มีส่วนร่วมในกำลังแรงงานมากขึ้น และควรส่งเสริมการเตรียม ความพร้อมด้านการปรับทักษะทั้งการ Up skill และ Reskill เพื่อรับมือกับวิกฤตการณ์ที่คล้ายกับการแพร่ระบาดของโควิด-19 เพื่อให้แรงงานมีโอกาสได้กลับเข้ามาทำงานหรือได้รับการจ้างงานอย่างต่อเนื่อง นอกจากนี้ ควรสนับสนุนการเพิ่มทักษะในการ ประกอบอาชีพอื่น ๆ โดยเฉพาะการใช้เทคโนโลยีเข้ามามีส่วนในการทำงานทั้งในการเป็นลูกจ้างและอาชีพอิสระ เพื่อเพิ่ม โอกาสในการทำงานและรายได้ต่อไป

7. เอกสารอ้างอิง

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ข้อคิดเห็นบางประการเกี่ยวกับซากเจดีย์ตาปราสาท (ธาตุบ้านแทรง)
ตำบลห้วยสำราญ อำเภอขุขันธ์ จังหวัดศรีสะเกษ

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บทคัดย่อ

วัดเทพทวาราบ้านแทรง บ้านแทรงหมู่ที่ 1 ตำบลห้วยสำราญ อำเภอขุขันธ์ จังหวัดศรีสะเกษ เคยเป็นวัดโบราณที่สร้างขึ้นในปลายพุทธศตวรรษที่ 24 ที่มีอาณาเขตครอบคลุมไปถึงโรงเรียนบ้านแทรงในปัจจุบัน ดังที่มีการพบซากเจดีย์ตาปราสาทหรือธาตุบ้านแทรงอยู่บริเวณข้างโรงเรียนด้านทิศตะวันออก ซึ่งเคยมีการนำเสนออย่างกว้างขวางในหนังสืออ้างอิงระดับจังหวัดว่า ซากพระเจดีย์หรือธาตุเจดีย์นี้เป็นสถานที่บรรจุอัฐิของพระยาขุขันธ์ภักดีศรีนครลำดวนท่านที่ 4 (พระสังฆะบุรีหรือทองด้วง) อดีตเจ้าเมืองขุขันธ์ แต่จากการศึกษาจากหลักฐานทางด้านประวัติศาสตร์โบราณคดีและบริบทต่างๆ เปรียบเทียบแล้ว มีความเป็นไปได้ว่า ซากพระเจดีย์นี้อาจเป็นพระเจดีย์ประจำชุมชนโบราณบ้านแทรง ซึ่งเป็นหนึ่งในชุมชนโบราณของเมืองขุขันธ์ด้านทิศตะวันตก เป็นเจดีย์ที่คุมเส้นทางการค้าการเดินทางของคนที่จะเข้าเมืองขุขันธ์ด้านทิศตะวัตก เจดีย์แห่งนี้ถูกสร้างขึ้นตามคติพระพุทธศาสนาในวัฒนธรรมล้านช้าง มากกว่าที่จะเป็นเพียงพระเจดีย์บรรจุอัฐิของอดีตเจ้าเมือง ต่อมาได้ถูกทิ้งร้างเนื่องจากภาวะสงครามโลกครั้งที่ 2 และสงครามอินโดจีนในพื้นที่เมืองขุขันธ์ รวมถึงเจดีย์บริวารองค์เล็กได้ถูกรื้อถอนเนื่องจากการใช้พื้นที่สร้างโรงเรียนบ้านแทรง เจดีย์ตาปราสาทจึงหักพังและรกร้างจนเหลือตั้งบนเนินอิฐเพียงองค์เดียวในปัจจุบัน

คำสำคัญ: เจดีย์ตาปราสาท; ธาตุบ้านแทรง; พระมหาธาตุเจดีย์; เมืองขุขันธ์; วัดเทพทวาราบ้านแทรง

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Some comments on the ruins of Ta Prasat Chedi (Tha Ban Taeng), Huai Samran Subdistrict, Khukhan District, Sisaket Province

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Abstract

Wat Thep Thawara Ban Taeng, Ban Taeng Village No. 1, Huai Samran Subdistrict, Khukhan District, Si Sa Ket Province, used to be an ancient temple built in the late 24th Buddhist century, with the territory covering the current Ban Taeng School, as evidenced by the discovery of the remains of the Ta Prasat Chedi or That Ban Taeng on the east side of the school, which was widely presented in provincial reference books that the remains of the Chedi or That Chedi were the place where the ashes of Phraya Khukhan Phakdi Si Nakhon Lamduan the 4th (Phra Sangkhaburi or Thong Duang), the former governor of Khukhan City, were enshrined. However, from the study of historical archaeological evidence and various contexts, it is possible that the remains of this pagoda may be the pagoda of the ancient community of Ban Taeng, which is one of the ancient communities of Mueang Khukhan in the west. It is a pagoda that controls the trade route of people traveling to Mueang Khukhan in the west. This pagoda was built according to the Buddhist beliefs of Lan Xang culture, rather than just a pagoda to contain the remains of the former city lord. Later, it was abandoned due to World War II and Indochina Wars in Mueang Khukhan area, including the small surrounding pagodas that were demolished in order to use the area to build Ban Taeng School. Therefore, the Ta Prasat pagoda was broken and deserted until it was left standing on a brick mound alone at present.

Keywords: Ta Prasat pagoda ; That Ban Taeng ; Phra Mahathat pagoda ; Mueang Khukhan ; Wat Thep Thawara Ban Taeng

1. บทนำ

แดนดินถิ่นอีสาน มีรากเหง้าทางวัฒนธรรมหลักๆ อยู่สองกระแสคือ ตั้งแต่ในยุคที่วัฒนธรรมขอมรุ่งเรืองอำนาจทางการเมือง แดนดินถิ่นนี้ก็ล้วนแล้วแต่อยู่ในวัฒนธรรมขอมเป็นกระแสหลักตั้งแต่สมัยหลัง พ.ศ.1500 โดยเฉพาะในยุคหลังสมัยพระเจ้าชัยวรมันที่ 7 จนเมื่อสิ้นรัชกาล อิทธิพลขอมในแถบนี้จึงได้เสื่อมลงและถูกแทนที่ด้วยอิทธิพลศิลปวัฒนธรรมล้านช้าง ตั้งแต่หลัง พ.ศ.2000 โดยวัฒนธรรมลาวได้เข้ามาพร้อมกับการเคลื่อนย้ายของชุมชนชาวลาวฝั่งซ้ายเข้ามาอยู่ในดินแดนอีสาน ด้วยสาเหตุความขัดแย้งทางการเมือง ทำให้ดินแดนแถบนี้เป็นที่รองรับชุมชนชาวลาว โดยผสมผสานทางชาติพันธุ์กับกลุ่มชนพื้นเมืองที่มีอยู่บ้าง โดยขยายชุมชนเข้าสู่แอ่งโคราช ส่วนแอ่งสกลนครนั้นเป็นดินแดนในเขตอิทธิพลของลาวล้านช้างอยู่ก่อนแล้ว และต่อมาก็กลายเป็นคนอีสานในปัจจุบัน (อุศนา นาศรีเคน, 2548 และอุบล ลิ้มสุวรรณ, 2535) ดังนั้น ศิลปะและวัฒนธรรมประเพณีต่างๆ จึงเป็นการถ่ายมาจากวัฒนธรรมลาวเป็นกระแสหลัก และในช่วงต้นรัตนโกสินทร์จะมีอิทธิพลจากภายนอกเข้ามาผสมผสานกับวัฒนธรรมลาวของชาวอีสาน (พรรณิกา ฉายากุล, 2556 และ ติ๊ก แสนบุญ (บ.ก)., 2556)

"ขุขันธ์" เคยเป็นชุมชนโบราณขนาดใหญ่และและมีความสำคัญเมืองหนึ่งในแถบภูมิภาคอีสานใต้ อดีตตั้งแต่ยุคสมัยโบราณเคยเป็นชุมชนเก่าแก่มาก่อนตั้งแต่สมัยอาณาจักรฟูนัน อาณาจักรเจนละ ตลอดมาจนถึงยุคสมัยขอมหรือเขมรโบราณ โดยได้เรียกชุมชนแห่งนี้ว่า "สรกสด็กโคกขันธ์" หรือ "สรกโคกขันธ์" ซึ่งต่อมาก็คือ "ภูมิโคกลำดวน" หรือ "ภูมิลำดวน" ซึ่งมีปราสาทสี่เหลี่ยมที่สร้างขึ้นมาในยุคสมัยของพระเจ้าสุริยวรมันที่ 1 ซึ่งพระองค์พยายามที่จะขยายอำนาจเข้าสู่เขตภาคอีสานของไทยในปัจจุบัน โดยเฉพาะการสร้างศาสนสถานแบบเขมรเพิ่มมากขึ้นในรูปแบบศิลปกรรมแบบบาปวน โดยเฉพาะการสร้างศาสนสถานแบบเขมรเพิ่มมากขึ้นในรูปแบบศิลปกรรมแบบบาปวน โดยเฉพาะรูปแบบของปราสาทอิฐอยู่บนฐานสี่เหลี่ยม (นิติภูมิ ขุขันธิน, 2560 และ สุทัศน์ กองทรัพย์, 2536) อันเป็นที่มาของสถานที่ๆ เรียกว่า "บ้านปราสาทสี่เหลี่ยมโคกลำดวน" ที่เป็นจุดเริ่มต้นของเมืองศรีสะเกษที่น่าจะมีจุดเริ่มต้นมาจากสถานที่แห่งนี้ ภายหลังสภาพบ้านเมืองก็มีความเปลี่ยนแปลงไปตามสภาพบริบทต่างๆ และพัฒนาการทางประวัติศาสตร์ ปัจจุบันเมืองขุขันธ์ได้กลายมาเป็นที่ตั้งตัวอำเภอขุขันธ์ ซึ่งเป็นส่วนหนึ่งของจังหวัดศรีสะเกษใน พ.ศ.2481 ส่วนราชการได้ออกพระราชกฤษฎีกาเปลี่ยนชื่อจังหวัดขุขันธ์จนถึงปัจจุบัน ฉะนั้นจึงกล่าวได้ว่าจังหวัดศรีสะเกษในปัจจุบันก็คือจังหวัดขุขันธ์ในอดีตนั่นเอง (กระทรวงมหาดไทย, 2529) ในบริเวณเขตชุมชนโบราณของอำเภอขุขันธ์ด้านทิศตะวันตก (ภูมิตะวันตก) บริเวณใกล้เคียงกับห้วยเหนือ ลุ่มน้ำสำคัญของเมืองขุขันธ์ มีการพบร่องรอยโบราณสถานหลายแห่งทั้งในเขตวัด โรงเรียน และชุมชน ที่มีความสำคัญและพัฒนาการทางประวัติศาสตร์ที่แตกต่างกัน โดยเฉพาะอย่างยิ่งวัดเทพทวาราที่ในอดีตครอบคลุมพื้นที่ถึง 2 ฝั่งถนนเหนือใต้ มีปรากฏฐานพระเจดีย์และพระเจดีย์ก่อด้วยอิฐในวัฒนธรรมล้านช้าง มีชื่อว่าธาตุบ้านแทรงหรือเจดีย์ตาปราสาท ซึ่งเป็นหนึ่งในเจดีย์แบบล้านช้างที่พบในเขตวัดเขียนบูรพาราม วัดลำภูรัมพนิวาส วัดโคกโพน เป็นต้น แต่ทว่าข้อมูลทางด้านประวัติศาสตร์และโบราณคดีของเจดีย์ตาปราสาทหรือธาตุบ้านแทรงแห่งนี้ กลับไม่ได้รับการศึกษาค้นคว้าอย่างเป็นระบบเท่าใดนัก

โรงเรียนบ้านแทรง สังกัด สพป.ศรีสะเกษ เขต 3 ตั้งอยู่เลขที่ 69 หมู่ที่ 1 ถนนศรีสะเกษ-ขุขันธ์ ตำบลห้วยสำราญ อำเภอขุขันธ์ จังหวัดศรีสะเกษ ตั้งอยู่ทางทิศเหนือของวัดเทพทวารา ที่เป็นส่วนหนึ่งของบ้านแทรงหมู่ที่ 1 ด้านทิศตะวันออกของโรงเรียน มีเนินดินที่เป็นที่ตั้งของเจดีย์ตาปราสาทหรือธาตุบ้านแทรง ซึ่งธาตุนั้น นับเนื่องเป็นผลงานทางด้านสถาปัตยกรรมประเภทอนุสาวรีย์ ซึ่งหมายถึงที่บรรจุอัฐิธาตุของบรรพบุรุษหรือผู้ที่ล่วงลับ รวมไปถึงสามัญชนคนครองเรือน ดังบทกวีของวิโรฒ ศรีสุโร (2542) ที่ว่า "ก่ออิฐไว้ใส่กระดูกโดยลูกหลาน เป็นพยานแห่งความดีมีคนเห็น ปั้นลายขดก้านดกม้วนล้วนเป็นลายพื้นถิ่นเห็นใครก็รู้อยู่กุมภวา" และ "หลังความตายกลายเป็นธาตุสะอาดขาว ใส่ขวดเข้าเก็บใส่กรุบุทาสี มีชื่อบอกตอกย้ำคุณความดี เป็นอนุสาวรีย์ที่มีค่าเตือนตาตน" ตลอดถึงพระสงฆ์องค์เจ้า อาทิ ญาท่าน ญาคู เป็นต้น ส่วนในภาษาลาวมักเรียกกันว่าเป็น "ธาตุทรงหมากน้ำเต้า" หรือ "ทรงรวงปลี (กล้วย)" ตามทรวดทรงที่คล้ายผลพืชเช่นนั้น (วิโรฒ ศรีสุโร, 2531) ทั้งนี้ธาตุนี้ตั้งอยู่บริเวณทางเข้าหมู่บ้านแทรงหมู่ 1 ในอดีตมีเนินดินที่เต็มไปด้วยเศษก้อนอิฐขนาดใหญ่กว่าที่นิยมใช้อยู่ในปัจจุบัน

การประชุมวิชาการระดับชาติและนานาชาติบ้านสมเด็จเจ้าพระยา ครั้งที่ 1 (BS2C 2025)
The 1st Bansomdejchaopraya National and International Conference (BS2C 2025)

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เป็นจำนวนมาก ซึ่งเชื่อกันว่าเป็นเจดีย์บริวาร ฐานบัลลังก์ ที่พังทลายลงภายหลังการขยายพื้นที่ของโรงเรียน และได้ถูกขุด
ค้นหาสิ่งของโดยมิจฉาชีพ นับเป็นโบราณสถานเก่าแก่ที่สุดที่พบในเขตชุมชนโบราณสถานบ้านแทรงแห่งนี้

ที่ผ่านมา ซากพระเจดีย์ดังกล่าวในเขตโรงเรียนบ้านแทรงในปัจจุบันถูกนำเสนอข้อมูลผ่านหนังสือชื่อ "วัฒนธรรม
พัฒนาการทางประวัติศาสตร์ เอกลักษณ์ และภูมิปัญญาจังหวัดศรีสะเกษ" ซึ่งต่อมาถูกนำมาใช้เป็นเอกสารอ้างอิงสำคัญของ
จังหวัด ระบุว่า ซากพระเจดีย์ดังกล่าวเป็นสถานที่บรรจุอัฐิของพระยาขุขันธ์ภักดีศรีนครลำดวนท่านที่ 4 (พระสังฆะบุรีหรือทอง
ด้วง) อดีตเจ้าเมืองขุขันธ์ ซึ่งใช้ข้อมูลเกี่ยวกับอดีตเจ้าเมืองดังกล่าวก็ไม่ได้มีความชัดเจนมากนัก แต่ก็ถูกนำมาอ้างอิงและเชื่อถือ
กันเป็นอย่างมากในปัจจุบัน

ในบทความนี้ คณะผู้เขียนจึงมีความพยายามที่จะนำเสนอข้อสันนิษฐานใหม่เกี่ยวกับซากพระเจดีย์ตาปราสาท (ธาตุ
บ้านแทรง) ในเขตโรงเรียนบ้านแทรง (ปัจจุบัน) และในเขตวัดเทพทวารา (เดิม) ซึ่งไม่น่าจะมีความเกี่ยวข้องใดๆ กับการเป็น
สถานที่บรรจุอัฐิของพระยาขุขันธ์ภักดีศรีนครลำดวนท่านที่ 4 ด้วยเหตุผลเพียงประการเดียว คือ ท่านเป็นผู้ดำริให้สร้างวัดแห่ง
นี้ เนื่องจากเจ้าเมืองขุขันธ์ได้มีดำริเกี่ยวกับการสร้างวัดเป็นส่วนใหญ่ จึงไม่มีหลักฐานชัดเจนที่ว่าอัฐิของท่านมาอยู่ที่แห่งนี้ซึ่ง
เป็นวัดชานเมือง อีกทั้งเนื่องจากหากมีอัฐิของเจ้าเมืองควรจะนำไปไว้ที่วัดกลางเมือง เป็นต้น ทั้งนี้ธาตุแห่งนี้เป็นธาตุโบราณ
ดั้งเดิม ซึ่งอาจจะมีมาก่อนการสถาปนาเมืองขุขันธ์เสียด้วยซ้ำ ดังนั้นเจดีย์แห่งนี้จึงควรเป็นพระเจดีย์ที่บรรจุพระบรมสารีริกธาตุ
พระอัฐิธาตุของพระเถราจารย์ หรือเป็นพระมหาธาตุเจดีย์สำคัญของชุมชนโบราณเมืองขุขันธ์ตามคติความเชื่อทาง
พระพุทธศาสนาในวัฒนธรรมล้านช้างมากกว่า ดังปรากฏทั่วไปตามชุมชนโบราณสำคัญในวัฒนธรรมล้านช้างที่ปรากฏ ณ พื้นที่
ภาคอีสานของประเทศไทย

จากการสำรวจงานศึกษาที่เกี่ยวข้องยังไม่พบงานที่ศึกษาเกี่ยวกับเจดีย์ตาปราสาทหรือธาตุบ้านแทรงโดยตรง มีเพียง
งานที่ศึกษาธาตุเจดีย์ในพื้นที่ของวัดเขียนบูรพาราม ซึ่งอยู่ทางทิศตะวันออก (ภูมิตะวันออก) ของเมืองขุขันธ์ คือ งานของ
ธันยพงศ์ สารรัตน์ เอนก ศรีภพ ธนพล ป้องแก้ว และธีรพัฒน์ ผงกุลา (2567) เรื่อง "ชุมชนบ้านพราน บ้านตะแบก บ้านภูมิ
และเจดีย์ทรงบัวเหลี่ยมสมัยล้านช้าง ภายในวัดเขียนบูรพาราม อำเภอขุขันธ์ จังหวัดศรีสะเกษ" ซึ่งงานนี้ทำให้ได้ความรู้
พื้นฐานเกี่ยวกับร่องรอยวัฒนธรรมล้านช้างในพื้นที่อำเภอขุขันธ์ที่ปรากฏร่องรอยผ่านงานศิลปกรรมประเภทเจดีย์ รวมถึงงาน
กลุ่มอื่นๆ ที่ให้ภาพรวมของวัฒนธรรมการสร้างพระธาตุเจดีย์อีสาน เช่น งานของสังเวียน สาผาง (2562) เรื่อง "การศึกษาเชิง
วิเคราะห์ตำนานพระธาตุเจดีย์อีสาน" งานของสุวิทย์ ทองปั้น (2559) เรื่อง "พุทธศิลปะในล้านช้าง : แนวคิด พัฒนาการ
คุณค่าทางศิลปะและวัฒนธรรม" งานของธีระวัฒน์ แสนคำ (2560) เรื่อง "พระธาตุสำคัญในล้านช้าง วิเคราะห์ประวัติศาสตร์
พุทธศิลป์ และความสัมพันธ์กับผู้คนสองฝั่งโขง" งานของวัชรวร วงศ์กัณหา (2558) เรื่อง "พระธาตุล้านช้าง : สังเคราะห์ความ
หลากหลายทางวัฒนธรรมด้านประวัติศาสตร์ โบราณคดี และศิลปกรรมของท้องถิ่นอีสาน" และงานของพงศ์ผกา ทีบัวบาน
(2559) เรื่อง "ปราสาทเขมรในภาคตะวันออกเฉียงเหนือ : การซ่อมแปลงและแรงบันดาลใจสู่ธาตุเจดีย์" ซึ่งงานกลุ่มดังกล่าว
ทำให้ทราบถึงรูปแบบงานศิลปกรรมความเชื่อ พุทธศิลป์แบบล้านช้างที่ปรากฏในภาคอีสานของประเทศไทยเบื้องต้น ซึ่งผู้เขียน
ได้นำองค์ความรู้จากงานกลุ่มดังกล่าวมาใช้เป็นแนวทางศึกษาค้นคว้าและอภิปรายผลในบทความเรื่องนี้

2. ข้อมูลเกี่ยวกับซากเจดีย์ตาปราสาท (ธาตุบ้านแทรง) อำเภอขุขันธ์ จังหวัดศรีสะเกษ

บริเวณเนินดินด้านทิศตะวันออกของโรงเรียนบ้านแทรง มีลักษณะโดยรอบเป็นวงกลม ขนาดเส้นผ่านศูนย์กลาง
ประมาณ 10 เมตร ใต้เดินดินมีเศษก้อนอิฐขนาดประมาณ 10×20 เซนติเมตรจำนวนมากกระจายอยู่ เชื่อกันว่าเป็นส่วนหนึ่ง
ของเจดีย์บริวาร ทางตอนเหนือเป็นหนองน้ำ ต้นไม้ใหญ่ ศาลปู่ตา และเนินขนาดเล็กที่เป็นที่ตั้งของธาตุบ้านแทรง ซึ่งเป็น
ชุมชนคนเขมรถิ่นไทยที่มีบรรพชนอพยพมาจากกัมพูชา

ในเอกสารราชการที่น่าเชื่อถือได้ คือ หนังสือประวัติวัดทั่วราชอาณาจักรของกรมการศาสนา ได้บันทึกข้อมูลเกี่ยวกับ

การประชุมวิชาการระดับชาติและนานาชาติบ้านสมเด็จเจ้าพระยา ครั้งที่ 1 (BS2C 2025)
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ชื่อวัดเทพทวาราและซากพระเจดีย์นี้ว่า "ภายในวัดเทพทวาราบ้านแทรง อำเภอขุขันธ์ จังหวัดศรีสะเกษ เคยมีธาตุเจดีย์เก่าแก่ อายุราวพุทธศตวรรษที่ 21-22 (กวินวัฒน์ หิรัญบูรณะ, 2561-2562, 121) ปัจจุบันอยู่ข้างโรงเรียนบ้านแทรง" (กรมการ ศาสนา กระทรวงศึกษาธิการ, 2534) ส่วนข้อมูลจากคำบอกเล่าที่สืบต่อกันมาของชาวขุขันธ์ในชั้นหลังเรียกซากพระเจดีย์นี้ว่า "พระธาตุบ้านแทรง" หรือ "ธาตุบ้านแทรง" ที่มีชื่อว่า "เจดีย์ตาปราสาท" (คณะกรรมการฝ่ายประมวลเอกสารและจดหมาย เหตุ, 2540) หรือเรียกสั้นๆ ว่า "ธาตุ" ก็มี ส่วนใหญ่นิยมสร้างเป็นธาตุบัวเหลี่ยมหรือเจดีย์ระฆังทรงสี่เหลี่ยม ไม่นิยมย่อเหลี่ยม อย่างเช่นปรางค์ขอม (ติ๊ก แสนบุญ, 2556) ที่ถือเป็นเอกลักษณ์ของตนเอง มีความเรียบง่าย พอเหมาะพอดี พองาม (ติ๊ก แสน บุญ (บ.ก.), 2548) ดังที่วิโรฒ ศรีสุโร (2543) ที่กล่าวเป็นบทกวีไว้ว่า "พระธาตุเหลี่ยมมิเอี่ยมใหม่อวดรวย เล็กแต่สวย นี่แหล่ะ วัดกำจัดมาร" และเป็นรูปแบบที่แพร่หลายมากที่สุด จนกล่าวได้ว่าเป็นลักษณะเด่นทางวัฒนธรรม และกลายเป็นสัญลักษณ์ ของกลุ่มชน ซึ่งหากสถานที่ใดที่มีเจดีย์แบบนี้ตั้งอยู่ก็มักแสดงว่ามีชาวลาวตั้งหลักแหล่งอยู่ในท้องที่นั้นๆ แม้กระทั่งในปัจจุบันก็ ยังมีการสร้างเจดีย์รูปแบบนี้อยู่ โดยส่วนใหญ่สร้างเป็นเจดีย์บรรจุอัฐิ พร้อมคำจารึกอุทิศส่วนกุศลตามแบบอย่างโบราณ (ศักดิ์ ชัย สายสิงห์, 2555) ซึ่งธาตุบ้านแทรงดังกล่าวไม่ปรากฏข้อมูลการสร้างที่ชัดเจน แต่จากลักษณะรูปทรงสามารถวิเคราะห์ได้ว่า เป็นธาตุเจดีย์ทรงบัวเหลี่ยมสมัยล้านช้างสร้างด้วยอิฐฉาบปูน ตั้งอยู่บนฐานบัวคว่ำบัวหงาย 2 ชั้น มีลวดบัวเพิ่มมุม หันหน้าทาง ทิศตะวันออก เรือนธาตุก่อทึบอยู่ในแผนผังรูปสี่เหลี่ยมจัตุรัสเพิ่มมุมรับกับส่วนฐาน แต่ละด้านของเรือนธาตุไม่ปรากฏซุ้มจรนำ พระพุทธรูป และรูปเคารพ ส่วนยอดทำเป็นเรือนชั้นซ้อนลดหลั่นขึ้นไป 3 ชั้น เป็นบัวเหลี่ยมที่ถูกปรับปรุงให้มีรูปทรงสูงเพรียว มากขึ้น มีการทำลวดบัวงานสะบัดประดับที่องค์ประกอบต่างๆ ซึ่งก็เป็นเอกลักษณ์ของช่างลาวอีกเช่นกัน (ประภัสสร์ ชูวิเชียร, 2557) และมีลักษณะคล้ายคลึงกับปราสาทด้านทิศใต้ของปราสาทศีขรภูมิที่มียอดหักเหลี่ยมย่อมุมเป็นศิลปะแบบล้านช้าง ซึ่ง เข้ามามีอิทธิพลในพุทธศตวรรษที่ 22 (สมัย สุทธิธรรม, 2537) ซึ่งเป็นความสำเร็จเชิงช่างล้านช้างที่ได้รับอิทธิพลจากดินแดน ห่างไกลภายนอก รวมทั้งดินแดนอันเป็นเครือข่ายของอาณาจักรล้านช้างด้วย (สันติ เล็กสุขุม, 2545 และ สันติ เล็กสุขุม, 2546) อีกทั้งรูปแบบศิลปกรรมยังมีการประดับด้วยกลีบบัว ทั้งนี้ส่วนปลายยอดสุดที่หายไปนั้น สันนิษฐานว่าจะมีลักษณะเป็น ปลียอดทรงกรวย ส่วนยอดจะเรียวคมตามแบบชุมชนในวัฒนธรรมไทย-ลาว ซึ่งทั้งนี้จากการวิเคราะห์ส่วนฐานพบว่า ฐานเป็น ฐานบัวคว่ำบัวหงาย 2 ชั้น ถัดขึ้นมาจึงเป็นเรือนธาตุ เป็นรูปแบบฐานที่แตกต่างไปจากปราสาทเขมร คือ ส่วนใหญ่ปราสาท เขมรจะพบหลักฐานเป็นฐานบัวลูกฟักหรือชุดฐานบัวคว่ำบัวหงาย แต่มีการประดับด้วยลวดบัวขนาดใหญ่ (สุภัทรดิศ ดิศกุล หม่อมเจ้า, 2533 และ สุภัทรดิศ ดิศกุล หม่อมเจ้า, 2540) ในขณะที่ฐานของธาตุบ้านแทรงนี้ไม่มีการประดับลวดบัวและเป็น ชุดฐานที่มีขนาดไม่สูง ส่วนการทำชุดฐานบัวคว่ำบัวหงาย เป็นรูปแบบหนึ่งที่พบในองค์ประกอบของการสร้างเจดีย์ ตัวอย่างเช่น ฐานของพระธาตุศรีสองรักจังหวัดเลย ซึ่งเป็นพระธาตุกลุ่มฐานต่ำ (ประภัสสร์ ชูวิเชียร, 2560) จะเห็นได้ว่าฐานล่างเป็นบัวคว่ำ บัวหงาย มีการทำหยักมุมและทำฐานเตี้ย เพราะฉะนั้นการทำฐานของเจดีย์ตาปราสาทและธาตุบ้านแทรงนี้จึงน่าจะสัมพันธ์กับ รูปแบบของเจดีย์มากกว่าปราสาทเขมร ส่วนเรือนธาตุนั้นเป็นเรือนธาตุทึบ ที่มีความตั้งใจที่จะสร้างให้เป็นเจดีย์ลักษณะ เดียวกับเจดีย์ทรงปราสาทหลายแห่งในภาคตะวันออกเฉียงเหนือ ตัวอย่างเช่น เจดีย์หนองสามหมื่น จังหวัดชัยภูมิ (นันทวรรณ เหล่าฤทธิ์, 2560) เรือนธาตุของธาตุบ้านแทรงจึงเป็นการจำลองปราสาทเขมรให้เล็กลงเพื่อบูชาเจดีย์และในส่วนยอดที่มี ลักษณะทรงพุ่มคล้ายพุ่มดอกบัว มีส่วนหยักมุมเป็นรูปทรงคล้ายกับทรงบัวเหลี่ยมที่ทำมุมกับเรือนธาตุ จึงอาจกล่าวได้ว่า พระ ธาตุเจดีย์ทรงดอกบัวเหลี่ยม 12 เหลี่ยม เป็นรูปแบบที่พัฒนาการตามงานช่างแต่ละพื้นที่ที่มีความแตกต่างกันไป มีทั้งที่เป็น เจดีย์ประธาน และเจดีย์ราย ทั้งนี้ถือได้ว่าเป็นเอกลักษณ์ของศิลปะลาวล้านช้างที่แพร่เข้ามาในภาคตะวันออกเฉียงเหนือเป็น จำนวนมาก

จากการประมวลข้อมูลจากคำสัมภาษณ์ผู้สูงอายุที่มีภูมิลำเนาอยู่ใกล้กับโรงเรียนและวัด พบว่า เดิมพื้นที่แถบนี้ ชาวบ้านใช้เป็นฌาปนสถาน ก่อนสงครามโลกครั้งที่ 2 เจดีย์ตาปราสาทแห่งนี้มียอดธาตุเป็นรูปดวงปลีขนาดใหญ่สวยงาม แต่ พังลงมา เนื่องจากโดนแรงสะเทือนจากสงครามโลกครั้งที่ 2 และสงครามอินโดจีน บ้างก็ว่า ถูกทำลายโดยการยิงจากเครื่องบิน

การประชุมวิชาการระดับชาติและนานาชาติบ้านสมเด็จเจ้าพระยา ครั้งที่ 1 (BS2C 2025)
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ในสมัยสงครามโลกครั้งที่ 2 เพราะพื้นที่แถบนี้เป็นพื้นที่ๆ มีการเก็บสะสมเสบียงอาหารจากชาวบ้าน (อดิเรก บุญคง, 2536) ส่วนด้านทิศใต้ของเจดีย์แห่งนี้จะมีบัลลังก์ (สันนิษฐานว่าเป็นฐานเจดีย์คู่กัน แต่ชำรุดเหลือแต่ฐานไปแล้วก่อนหน้านี้) การรื้อ ถอนบัลลังก์และกลุ่มเจดีย์องค์เล็กนั้น พบว่าภายในบัลลังก์และเจดีย์องค์เล็กทั้ง 4 พบพระเครื่องเป็นจำนวนมาก โดยชาวบ้าน ได้นำไปไว้ที่วัดบ้านแทรง ปัจจุบันได้สูญหายไปหมดแล้ว และบริเวณข้างองค์เจดีย์จะมีศาลปู่ตาและต้นสำโรงใหญ่ 1 ต้น นับเป็นเจดีย์เก่าแก่ที่ศักดิ์สิทธิ์และเป็นที่เคารพสักการะของผู้คนในท้องถิ่น (คณะกรรมการจัดทำหนังสือเมืองขุขันธ์, 2548) ซึ่ง ปัจจุบันเวลาชาวบ้านป่วยไม่สบายหรือได้โชคลาภก็จะนำของมาเซ่นไหว้เป็นประจำ เพราะถือว่าเป็นสถานที่ศักดิ์สิทธิ์แห่งหนึ่ง ของชุมชนเขตบริการของโรงเรียนบ้านแทรงและเป็นแหล่งเรียนรู้ยึดเหนี่ยวจิตใจของคนในชุมชน เป็นปูชนียสถานและเป็นหลัก ชัยให้ผู้คนได้กราบไหว้บูชาและเกิดธรรมเนียมประเพณีวิธีปฏิบัติต่อองค์พระธาตุที่ส่งผลต่อความสามัคคีและสันติสุขของผู้คน ในชุมชน

ภาพที่ 1 องค์ประกอบโดยสังเขปของเจดีย์ตาปราสาท (ธาตุบ้านแทรง) อำเภอขุขันธ์ จังหวัดศรีสะเกษ

ที่มา: คณะผู้เขียน

อย่างไรก็ดี บริเวณบัลลังก์และเจดีย์อีก 4 องค์ที่ล้อมรอบอยู่ สันนิษฐานว่าจะเป็นทรงบัวเหลี่ยมแบบย่อมุม เช่นเดียวกับธาตุองค์ใหญ่ สันนิษฐานว่าสร้างขึ้นเพื่อเป็นที่สักการบูชาแทนเจดีย์เดิมที่อยู่ในสภาพชำรุดเพราะโดนระเบิดด้วย (รัตนา ขุขันธิน, 2567) และส่วนใหญ่คนจะเล่าว่าไม่มีใครเคยเห็นธาตุปราสาทที่อยู่ในสภาพสมบูรณ์ เจดีย์ที่อยู่ในสภาพ สมบูรณ์ พร้อมบัลลังก์และเจดีย์รายทั้ง 4 องค์สูงราว 3.5 เมตร ประกอบกับมีเรื่องเล่าว่า ชุมชนบ้านแทรงเคยตั้งอยู่ในบ้าน หนองก๊อก ซึ่งบ้านหนองก๊อกได้เกิดก่อนบ้านแทรง ภายหลังได้มีการเปลี่ยนชื่อหมู่บ้านเป็นบ้านแทรงตามชื่อต้นไม้คือต้น "แตรง" และเพี้ยนเป็น "แทรง" และเรียกตามชื่อห้วยขนาดเล็กที่ไหนผ่านหมู่บ้านและมารวมกับห้วยเหนือนั่นเอง ต่อมาได้มี การย้ายมาอยู่ทางทิศเหนือของธาตุแต่อยู่ไม่ได้เพราะในสมัยนั้นมีโรคระบาดและย้ายออกไป ซึ่งตาทองม้วน หงส์โสภา เป็นคน ตั้งโรงเรียนและช่วยติดต่อกับทางการ ซึ่งแถบนี้เดิมเป็นป่าและมีเจดีย์ตั้งอยู่ 4 รูป ซึ่งโรงเรียนบ้านแทรงสมัยก่อนชื่อว่า "โรงเรียนประชาบาล 4" อยู่ในพื้นที่ของวัดเทพทวารา พอจะตั้งโรงเรียนก็ได้เตรียมพื้นที่โดยการเอาเจดีย์ออก จนใน พ.ศ. 2491 ได้มีการย้ายโรงเรียนในพื้นที่วัดมาบริเวณเยื้องของวัดฝั่งตรงข้ามจนถึงปัจจุบัน (สมปอง ขุขันเขต, 2567) ทั้งนี้จากผล ของการปรับพื้นที่ศาสนสถานให้เป็นโรงเรียน จึงเป็นอีกสาเหตุหนึ่งที่ทำให้เหลือร่องรอยชิ้นส่วนสถาปัตยกรรมของพระเจดีย์ อื่นๆ อยู่บนเนินดินนี้ด้วย แต่มีบางข้อมูลระบุว่า เจดีย์รายทั้ง 4 นั้น เป็นส่วนยอดของเจดีย์อีกองค์ที่หักพังลงเหลือแต่ฐาน บัลลังก์ (จักรี บุปผาหอม, 2567) และเจดีย์รายได้ถูกสร้างแบบสมัยใหม่ตามคำบอกเล่าของคุณสมปอง ขุขันเขต (2567) ซึ่ง ผู้เขียนมีความเห็นว่า เป็นไปได้น้อยมากที่จะเป็นส่วนยอดของพระเจดีย์ เนื่องจากสมปอง ขุขันเขต (2567) เล่าว่า ระหว่าง ก้อนอิฐมีการสอด้วยปูนซีเมนต์สมัยใหม่ ใช้เหล็กเส้นเป็นแกนกลาง คนเก่าคนแก่อายุ 80 ปีขึ้นไปหลายคนก็บอกตรงกันว่า แต่

ก่อนยังไม่มีสมบูรณ์เช่นนี้ มีเพียงเจดีย์ตาปราสาท ที่มาจากชื่อ "ตาทองม้วน" ผู้ก่อตั้งโรงเรียน ที่มีความอุดมสมบูรณ์มากที่สุด หากยอดเจดีย์หักลงมาจริงก็คงไม่ได้อยู่ในสภาพที่ตั้งอยู่เช่นนี้ และมีลักษณะเป็นองค์พระเจดีย์ขนาดเล็กมากกว่าจะเป็นยอดพระเจดีย์ แต่ปัจจุบันไม่ปรากฏร่องรอยแล้ว จึงทำให้ยากต่อการสรุปความในประเด็นนี้ แต่ข้อสรุปเบื้องต้นคือ เจดีย์ทั้ง 4 น่าจะเป็นพระเจดีย์รายหรือพระเจดีย์บริวารของพระมหาธาตุ ต่อมาคงพังทลายลงแล้วถูกบูรณปฏิสังขรณ์ใหม่ในภายหลัง ทำให้มีลักษณะคล้ายยอดดอกบัวตูมก่อนที่จะถูกรื้อถอนภายหลังจากการขยายพื้นที่ของโรงเรียน

นอกจากนี้ยังมีข้อมูลเกี่ยวกับเนินดินบริเวณธาตุบ้านแทรงว่า ได้มีการขุดพบพระพุทธรูปนาคปรกทองคำขนาดเล็ก อยู่ภายในซากพระเจดีย์องค์นี้ด้วย แต่ไม่ทราบว่าปัจจุบันประดิษฐานอยู่ที่ใด (สมลักษณ์ ศรีมงคล, 2567) รวมถึงพระพิมพ์บางส่วน ตลอดจนขุดพบกรุพระพุทธรูป 1 ไห ฆ้อง ระฆัง และเคยมีเศษกระเบื้องดินเผาและเครื่องปั้นดินเผาประเภทเครื่องใช้ของอุทิศของชาวบ้าน และเครื่องประดับปะปนอยู่บนเนินดิน (วาทิน ศรีมงคล, 2567)

ภาพที่ 2 ส่วนยอดของธาตุบ้านแทรงที่ชำรุด

ที่มา: คณะผู้เขียน

นอกจากนี้ยังมีคำบอกเล่าจากผู้สูงอายุว่า เวลาค่ำคืนในช่วงเทศกาลแซนโฎนตาในช่วงเดือนกันยายนหรือเทศกาลบุญเดือนสิบของทุกปี จะมีดวงแก้วสุกใสส่องสว่างบริเวณถนนหน้าโรงเรียนบ้านแทรงไปยังวัดเทพทวารา และในราวช่วงวันขึ้น 8 ค่ำ และขึ้น 14-15 ค่ำ จะมีเสียงฆ้อง กลอง ระฆัง ดังออกมาจากซากเจดีย์ตาปราสาทด้วย (สุนัย ขุขันธิน, 2567)

ภาพที่ 3 แผนที่สังเขปที่ตั้งเจดีย์ตาปราสาท (ธาตุบ้านแทรง) อำเภอขุขันธ์ จังหวัดศรีสะเกษ

ที่มา: คณะผู้เขียน

3. เจดีย์บรรจุอัฐิพระยาขุขันธ์ภักดีศรีนครลำดวนท่านที่ 4 (พระสังฆะบุรีหรือทองด้วง) : ข้อมูลในเอกสารสำคัญของจังหวัดศรีสะเกษ

ในหนังสือ "วัฒนธรรม พัฒนาการทางประวัติศาสตร์ เอกลักษณ์ และภูมิปัญญาจังหวัดศรีสะเกษ" ซึ่งเป็นหนังสือที่มีการกล่าวถึงและใช้เป็นเอกสารประกอบการเรียนการสอนในสถานศึกษาต่างๆ ในจังหวัดศรีสะเกษมาตั้งแต่ พ.ศ.2544 เป็นต้นมา เรียบเรียงโดยคณะกรรมการฝ่ายประมวลเอกสารและจดหมายเหตุ ในคณะกรรมการอำนวยการจัดงานเฉลิมพระเกียรติพระบาทสมเด็จพระเจ้าอยู่หัวฯ จัดพิมพ์เนื่องในโอกาสพระราชพิธีมหามงคลเฉลิมพระชนมพรรษา 6 รอบ วันที่ 5 ธันวาคม 2542 ระบุว่า "พระยาขุขันธ์ภักดีศรีนครลำดวน เดิมชื่อพระยาสังฆะบุรี (ทองด้วง) เป็นบุตรเจ้าเมืองสังขะคนที่ 1 คือ พระยาสังฆะบุรี (เชียงฆะ) เมื่อ พ.ศ.2371 เมืองขุขันธ์ในตำแหน่งเจ้าเมืองได้ว่างลงจึงได้รับโปรดเกล้าฯ ให้มารับตำแหน่งเจ้าเมืองขุขันธ์ และโปรดเกล้าฯ ให้ใช้ราชทินนามประจำตำแหน่งเจ้าเมืองขุขันธ์ว่า พระยาขุขันธ์ภักดีศรีนครลำดวน รับเป็นเจ้าเมืองขุขันธ์ท่านที่ 4 จนมาถึงแก่อนิจกรรมใน พ.ศ.2393 อยู่ในตำแหน่งเจ้าเมืองขุขันธ์ 22 ปี" (คณะกรรมการฝ่ายประมวลเอกสารและจดหมายเหตุ, 2544) นอกจากนี้ในส่วนประเด็นของธาตุเจดีย์ยังมีข้อความระบุว่า "วัดเทพทวาราทางทิศตะวันตก มีเจดีย์โบราณที่บรรจุอัฐิเจ้าเมืองขุขันธ์ท่านที่ 4 และเป็นผู้ดำริให้สร้างวัดแห่งนี้ และท่านเป็นผู้ที่ทรงทูลขอให้ทรงพระกรุณาโปรดเกล้าฯ ตั้งบ้านไพรตระหนักขึ้นเป็นเมืองมโนไพร โดยใน พ.ศ.2393 พระยาขุขันธ์ภักดีศรีนครลำดวน เจ้าเมืองขุขันธ์ท่านที่ 4 ได้ถึงแก่อนิจกรรม จึงได้โปรดเกล้าฯ แต่งตั้งให้พระภักดีภูธรสงคราม (ท้าวใน บุตรตากะจะ) ขึ้นดำรงตำแหน่งเจ้าเมืองขุขันธ์ในราชทินนาม พระยาขุขันธ์ภักดีศรีนครลำดวน เจ้าเมืองขุขันธ์ท่านที่ 5 (คณะกรรมการฝ่ายประมวลเอกสารและจดหมายเหตุ, 2544)

ภาพที่ 4 ปกหนังสือประวัติศาสตร์กระแสหลักของจังหวัดศรีสะเกษ
ที่มา: คณะผู้เขียน

การประชุมวิชาการระดับชาติและนานาชาติบ้านสมเด็จเจ้าพระยา ครั้งที่ 1 (BS2C 2025)
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ภาพที่ 5-8 ภูมิบ้านนามเมืองบ้านแทรง

ที่มา: คณะผู้เขียน

เมื่อพิจารณาจากหลักฐานประวัติศาสตร์ที่เกี่ยวข้อง เช่น ในงานของขุนบริบาลบุรีภัณฑ์ ได้กล่าวถึงโบราณสถานใน
แถบนี้ว่า "ทางมณฑลอีสานด้านตะวันออกเมืองคูขันธ์นั้น มีธาตุโบราณอยู่บริเวณทางสัญจรผู้คน ผู้คนไปมาถึงถือโอกาสกราบ
ไหว้ คาดว่าจะเป็นธาตุของพระเกจิชื่อดังแถบนั้น" (ขุนบริบาลบุรีภัณฑ์, 2531) และเอกสารของสำนักหอจดหมายเหตุแห่งชาติ
ร.ศ.119 กล่าวถึงเหตุการณ์นี้ไว้เพียงว่า "เมืองคูขัณฑ์เป็นเมืองใหญ่ มีโบราณสถานมากมาย เจดีย์ตาปราสาทเป็นเจดีย์ใหญ่
สร้างโดยได้รับการอุปการะโดยเจ้าเมืองคูขัณฑ์ มีผู้คนแวะเวียนผ่านไปมาเพราะอยู่กลางเมือง และเป็นพระบรมธาตุของ
พระพุทธเจ้าหรือธาตุของพระครูท่านใดท่านหนึ่ง" (สำนักหอจดหมายเหตุแห่งชาติ หจช.ม.ร.6 ม.1/14 รายงานราชการมณฑล
อีสาน และ สำนักหอจดหมายเหตุแห่งชาติ หจช.ม.ร.5 ม.57/14 มณฑลอีสาน (11 สิงหาคม ร.ศ.119 – 20 พฤษภาคม ร.ศ.
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จากหลักฐานประวัติศาสตร์ทั้งหมดล้วนแล้วแต่กล่าวสอดคล้องกันว่า เจดีย์ธาตุนี้บรรจุพระบรมสารีริกธาตุของ
พระพุทธเจ้าหรือพระสงฆ์ ไม่ได้บรรจุธาตุของพระยาขุขันธ์ท่านที่ 4 ดังที่ระบุในหนังสือ "วัฒนธรรม พัฒนาการทาง
ประวัติศาสตร์ เอกลักษณ์ และภูมิปัญญาจังหวัดศรีสะเกษ" แต่อย่างใด

และแม้กระทั่งในบันทึกของพระยาสุนทรพิพิธ (2515) ซึ่งเป็นบันทึกความจำ (3) เมื่อเป็นปลัดจังหวัดขุขันธ์
(ศรีสะเกษ) ซึ่งเป็นบันทึกความทรงจำที่เกี่ยวข้องกับเมืองศรีสะเกษโดยตรง กลับไม่มีข้อความใดๆ ว่า ธาตุนี้เป็นอัฐิของเจ้า
เมืองขุขันธ์ท่านที่ 4 เพราะในบันทึกระบุแต่เพียงว่าเป็น "ธาตุก่ออิฐถือปูนที่ถวายเป็นพุทธบูชา" ทั้งที่ปรากฏในหลักฐาน
ภายนอกอื่นๆ หลายแห่ง ซึ่งสอดคล้องกับหลักฐานของขุนบริบาลบุรีภัณฑ์ และสำนักหอจดหมายเหตุแห่งชาติ ก็ไม่ได้กล่าวถึง
เรื่องราวเหล่านี้เอาไว้เช่นกัน แต่เอกสารที่ระบุถึงอัฐิธาตุของเจ้าเมืองขุขันธ์คนที่ 4 นั้น กลับเป็นหนังสือที่ถูกเขียนขึ้นหรือแต่ง
ขึ้นในภายหลัง โดยอาศัยการตีความผ่านเอกสารประวัติศาสตร์และบันทึกความทรงจำข้างต้น แล้วได้รับการตีพิมพ์อย่าง
แพร่หลาย และถูกนำมาใช้ในการอ้างอิงงานเขียนประวัติศาสตร์นิพนธ์ของนักวิชาการในยุคหลัง โดยละเลยการค้นคว้าหรือ

สอบทานกับเอกสารชั้นต้น เช่น หนังสือประวัติศาสตร์อีสานของเติม วิภาคย์พจนกิจ (2542) พิมพ์ครั้งแรก พ.ศ.2513 และหนังสือประวัติศาสตร์ลาวของเติม วิภาคย์พจนกิจ (2540) พิมพ์ครั้งแรก พ.ศ.2530 เช่นเดียวกับหนังสือประวัติศาสตร์ วัฒนธรรม อันเป็นเอกลักษณ์และภูมิปัญญาจังหวัดศรีสะเกษ : ประวัติหมู่บ้าน ตำบล อำเภอ ในจังหวัดศรีสะเกษ ของ สำนักงานจังหวัดศรีสะเกษ (2548) ซึ่งได้รับการนำไปอ้างอิงและกล่าวถึงมากที่สุด

ดังนั้น จะเห็นได้ว่าในหลักฐานทางประวัติศาสตร์ข้างต้นไม่ได้ระบุอย่างชัดเจนว่าธาตุเจดีย์บ้านแทรงหรือตาปราสาท เป็นธาตุที่บรรจุอัฐิธาตุของเจ้าเมืองขุขันธ์คนที่ 4 หรือไม่ อาจเป็นอัฐิธาตุของพระเกจิ ดังบทกวีของวิโรฒ ศรีสุโร (2543) ที่ว่า "ธาตุญาคูญาท่าน (คำนำหน้าเรียกพระผู้ใหญ่) กลางลานวัด ลูกศิษย์จัดสร้างเดินเป็นอนุสรณ์ ระลึกคุณบูรพาจารย์ท่านพร่ำ วอน แว่วคำสอนทุกเช้าค่ำทำความดี" เช่นเดียวกับธาตุฝุ่นของเจ้าราชครูหลวงโพนสะเม็กที่นครจำปาศักดิ์ ตามที่สมหมาย โพธิ สิตา (2547) ได้กล่าวไว้ และเป็นไปได้น้อยมากที่จะเป็นธาตุของบุคคลทั่วไปเพราะมีความใหญ่โตมาก นอกจากนี้เมื่อพิจารณา จากหลักฐานประวัติศาสตร์ที่เกี่ยวข้องกับเครือญาติและบริบทของเจ้าเมืองขุขันธ์แล้ว โดยเฉพาะในงานของนิติภูมิ ขุขันธิน (2553) เรื่อง "เอกสารประกอบการศึกษาประวัติศาสตร์ท้องถิ่นบรรพบุรุษเมืองขุขันธ์" ความว่า "ปี พ.ศ.2321 สมเด็จพระเจ้า ตากสิน โปรดเกล้าฯ ให้พระยาจักรี (ทองด้วง) ยกทัพไปปราบกบฏที่เวียงจันทน์ และพระยาไกรภักดีศรีนครลำดวนได้ยกทัพ จากเมืองขุขันธ์ร่วมปราบศึกสงครามในครั้งนี้ด้วย เมื่อชนะศึกมีความชอบ จึงได้เลื่อนบรรดาศักดิ์เป็น พระยาไกรภักดีศรีนคร ลำดวน จนมาในสมัยเจ้าเมืองขุขันธ์ท่านที่ 2 คือ หลวงปราบ จึงทรงพระกรุณาโปรดเกล้าฯ ให้เปลี่ยนบรรดาศักดิ์ใหม่เป็น พระ ยาขุขันธ์ภักดีศรีนครลำดวน เป็นบรรดาศักดิ์ราชทินนามที่ทรงพระกรุณาโปรดเกล้าฯ พระราชทานเพื่อประจำตำแหน่งเจ้า เมืองขุขันธ์ลำดับต่อๆ มาจนถึงสุดท้ายคือท่านที่ 9 คือ อำมาตย์ตรีพระยาขุขันธ์ภักดีศรีนครลำดวน (นายปัญญา ขุขันธิน) ก่อน จะเปลี่ยนเป็นตำแหน่งผู้ว่าราชการเมืองขุขันธ์ (นิติภูมิ ขุขันธิน, 2553) ดังกล่าวก็ไม่ปรากฏหรือกล่าวถึงสถานที่บรรจุอัฐิของ ท่านเจ้าเมืองคนที่ 4 แต่อย่างใด ซึ่งข้อมูลดังกล่าวนี้ คณะกรรมการผู้จัดทำหนังสือ คงคัดลอกหรือเรียบเรียงข้อมูลมาจาก ตำนานเรื่องเล่าที่เป็นปรัมปรามากกว่าการค้นคว้าเอกสารชั้นต้นแล้วเรียบเรียงใหม่ ในฐานะที่ผู้เขียนเป็นผู้สนใจค้นคว้า ประวัติศาสตร์เมืองศรีสะเกษ ข้อมูลดังกล่าวก่อให้เกิดข้อสงสัยบางประการที่ในอนาคตข้างหน้าควรมีการชำระหรือพิจารณา วิเคราะห์หลักฐานใหม่ เพื่อศึกษาข้อเท็จจริงและสร้างความเข้าใจที่ถูกต้องในประเด็นนี้ให้เกิดขึ้นกับชาวขุขันธ์และศรีสะเกษ ต่อไป

ดังนั้นจึงแทบเป็นไปไม่ได้หรือเป็นไปได้น้อยมากที่ซากเจดีย์ตาปราสาทหรือธาตุบ้านแทรงจะเป็นพระเจดีย์บรรจุอัฐิ ธาตุของเจ้าเมืองขุขันธ์ท่านที่ 4 อย่างที่เคยเข้าใจในปัจจุบัน แต่ควรจะเป็นพระเจดีย์ที่สร้างขึ้นตามความเชื่อทาง พระพุทธศาสนาในลักษณะของธาตุเจดีย์หรืออุเทสิกเจดีย์มากกว่า เพราะซากฐานพระเจดีย์มีขนาดใหญ่ มีคำบอกเล่าว่าเคย พบพระเจดีย์บริวารและมีการค้นพบโบราณวัตถุที่เกี่ยวเนื่องกับความเชื่อทางพระพุทธศาสนาอยู่ในซากฐานพระเจดีย์จากการ ขุดค้นของอดีตเจ้าอาวาสวัดเทพทวาราบ้านแทรงและชาวบ้านบ้านแทรง

การประชุมวิชาการระดับชาติและนานาชาติบ้านสมเด็จเจ้าพระยา ครั้งที่ 1 (BS2C 2025)
The 1st Bansomdejchaopraya National and International Conference (BS2C 2025)

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ภาพที่ 9-10 ภาพถ่ายธาตุเมื่อวันที่ 24 กันยายน 2554 และวันที่ 8 สิงหาคม 2564

ที่มา: โรงเรียนบ้านแทรง

4. ซากเจดีย์ตาปราสาทกับคติการสร้างเจดีย์ในวัฒนธรรมล้านช้าง

ในหลักฐานทางประวัติศาสตร์และโบราณคดีได้แสดงให้เห็นถึงอิทธิพลทางวัฒนธรรมล้านช้างในเขตฝั่งขวาแม่น้ำโขง หรือภาคอีสานของประเทศไทยตามคติพระพุทธศาสนาเถรวาทลัทธิลังกาวงศ์ (ดนัย ไชยโยธา, 2547) รวมถึงแสดงถึง สัญลักษณ์พลังศรัทธาของผู้คนในลุ่มแม่น้ำโขง ปรากฏให้เห็นถึงการสร้างเจดีย์ ซึ่งเจดีย์ถือได้ว่าเป็นหลักฐานศิลปกรรมที่บ่ง บอกถึงความเป็นมาทางประวัติศาสตร์ วัฒนธรรม ความเป็นอยู่ และศรัทธาความเชื่อในพระพุทธศาสนาในแต่ละชนชาติในแต่ ละยุคสมัย ด้วยเหตุนี้การประดิษฐานพระพุทธศาสนา ณ ที่ใดจะมีการสร้างศาสนสถานและสถาปนาเจดีย์ขึ้นก่อน เพราะเจดีย์ คือที่บรรจุพระบรมสารีริกธาตุ อันเปรียบเสมือนตัวแทนขององค์พระสัมมาสัมพุทธเจ้า ด้วยเหตุนี้เจดีย์จึงสร้างด้วยวัสดุที่มั่นคง ถาวร ก่อด้วยอิฐ หิน ศิลาแลงฉาบปูน และอาจมีการปั้นปูนประดับลวดลาย (ศักดิ์ชัย สายสิงห์, 2560) ดังกล่าวสัมพันธ์กับ แนวคิดการสร้างพระมหาธาตุกลางเมืองตามคติของธาตุบูชา หรือการกราบไหว้บูชาอัฐินั้นมีที่มาตั้งแต่สมัยก่อนประวัติศาสตร์ เป็นความพยายามที่จะอธิบายว่าความเชื่อของพระพุทธศาสนาฝ่ายเถรวาทเหนือกว่าความเชื่อด้านพระพุทธศาสนาฝ่าย มหายานและศาสนาพราหมณ์-ฮินดู (ธนกร กิตติกานต์, 2557) ซึ่งสะท้อนให้เห็นว่าเมืองขุขันธ์ในช่วงพุทธศตวรรษที่ 22-24 คงจะเป็นเมืองใหญ่และมีความสำคัญไม่น้อย เพราะหากไม่ใช่เมืองใหญ่ มีธาตุเจดีย์ที่ใกล้ชุมทางการค้า และมีความมั่งคั่งทาง เศรษฐกิจแล้วก็ยากที่จะมีการสร้างพระพุทธรูปขนาดใหญ่ ดังเช่นกรณีของวัดเขียนบูรพาราม หรือธาตุเจดีย์ขนาดใหญ่เล็ก จำนวนมากขึ้นภายในชุมชนได้ แต่เจดีย์ดังกล่าวส่วนใหญ่จะสร้างเพื่อระลึกถึงพระพุทธองค์ (สงวน รอดบุญ, 2545) มีลักษณะ เป็นหลักหรือธาตุเจดีย์ คือ สิ่งก่อสร้างที่เรียกว่า พระสถูป ที่สร้างขึ้นเพื่อบรรจุพระบรมสารีริกธาตุของพระพุทธเจ้า และมี องค์ประกอบตามคำบอกเล่าของชาวบ้านเกี่ยวกับศาสนวัตถุที่พบประกอบ จะมีลักษณะของความเป็นอุเทสิกเจดีย์ คือ สิ่งที่ สร้างขึ้นโดยเจตนาอุทิศต่อพระพุทธเจ้าโดยไม่กำหนดว่าจะต้องทำเป็นอย่างไร เช่น พระพิมพ์ดินเผา หรือการสร้างบัลลังก์ให้ หมายแทนที่ประทับของพระพุทธองค์ เป็นต้น (สมเด็จฯ กรมพระยาดำรงราชานุภาพ, 2547)

ทั้งนี้จากข้อเสนอของวิโรฒ ศรีสุโร (2539) กล่าวว่า ในช่วงหลังพุทธศตวรรษที่ 23 ลงมายังมีการเริ่มสร้างพระเจดีย์ ขนาดย่อมขึ้นมาเป็นที่บรรจุอัฐิธาตุของพระเถราจารย์ สืบเนื่องถึงอัฐิของพระมหากษัตริย์ พระราชวงศ์ เจ้าเมือง และ พุทธศาสนิกชนทั่วไป ซึ่งก็ถูกเรียกว่า "พระธาตุ" หรือ "ธาตุ" เช่นเดียวกับกรณีการบรรจุพระบรมสารีริกธาตุ (กรมศิลปากร, 2561) ซึ่งต่อมาเมื่อมีธาตุเป็นศูนย์กลางแล้ว ย่อมเกิดมีวัดและชุมชน ตลอดจนการขยายตัวของชุมชนตามลำดับ (ฉัตรทิพย์ นาถสุภา, 2544)

แผนที่ทางอากาศที่ตั้งของเจดีย์ตาปราสาท (ธาตุบ้านแทรง) อำเภอขุขันธ์ จังหวัดศรีสะเกษ

แหล่งที่มา : <u>Google Earth</u> P58H+FHX โรงเรียนบ้านแทรง ตำบล ห้วยสำราญ อำเภอ ขุขันธ์ ศรีสะเกษ 33140

ภาพที่ 11 แผนที่ทางอากาศที่ตั้งของเจดีย์ตาปราสาท (ธาตุบ้านแทรง) อำเภอขุขันธ์ จังหวัดศรีสะเกษ

ที่มา: Google Earth

5. การสันนิษฐานเบื้องต้นเกี่ยวกับซากเจดีย์ตาปราสาท (ธาตุบ้านแทรง)

จากข้อมูลที่ผู้เขียนได้นำเสนอมาข้างต้น สามารถสรุปเป็นข้อสันนิษฐานเบื้องต้นเกี่ยวกับศากพระเจดีย์ตาปราสาท เบื้องต้นได้ว่า ข้อมูลจากการสัมภาษณ์ ไม่มีใครเคยพบเห็นเจดีย์บริวาร ฐานบัลลังก์ และส่วนยอดของเจดีย์ตาปราสาทปัจจุบัน เลย ซึ่งหากในอนาคตซากเจดีย์ตาปราสาทหรือธาตุบ้านแทรงได้รับการขุดค้นและศึกษาตามวิธีการทางโบราณคดี คงทำให้เรา ทราบข้อมูลที่ชัดเจนหรือใกล้เคียงกับข้อเท็จจริงเพิ่มมากขึ้น ซึ่งสันนิษฐานว่าส่วนฐานของเจดีย์ฝังอยู่ใต้ดิน เป็นสัญลักษณ์แห่ง การเคารพบูชาอันศักดิ์สิทธิ์ของชาวพุทธ ซึ่งจากเจดีย์ตาปราสาทหรือธาตุบ้านแทรงที่เหลืออยู่ประกอบกับหลักฐาน ประวัติศาสตร์บอกเล่าที่มี ทำให้สันนิษฐานได้ว่าน่าจะเป็นพระเจดีย์ที่สร้างขึ้นตามคติทางพระพุทธศาสนาในลักษณะธาตุเจดีย์ หรืออุเทสิกเจดีย์ เป็นธาตุในย่านชุมชน คุมเส้นทางการคมนาคมผ่านวัดที่มีการตั้งในกาลต่อมาคือ "วัดเทพทวาราบ้านแทรง" ซึ่งพระยาสุนทรพิพิธ (2515) ได้เล่าว่า "ในสมัยโบราณ การเดินทางไปยังเมืองสังขะ เมืองสุรินทร์ เมืองบุรีรัมย์ และเมือง นครราชสีมาของเจ้าเมือง กรมการเมืองต่างๆ ทหาร พ่อค้า คหบดี และราษฎร ก็ต้องเดินทางผ่านเส้นทางบ้านแทรงเท่านั้น ถึง เส้นทางเดินทางในอดีตไม่ใช่เป็นถนนเส้นปัจจุบันแต่เป็นถนนที่อยู่ทิศใต้ของวัดเทพทวาราในปัจจุบันไม่เหลือร่องรอยแล้ว (วาทิน ศรีมงคล, 2567) ดังที่มีการตั้งชื่อว่า "วัดเทพทวารา" จะสื่อความหมายถึง ประตูทางเข้าของเทพเจ้า ในที่นี้ก็คือ เจ้าขุน มูลนายที่จะผ่านเข้าออกจากเมืองขุขันธ์ทางด้านทิศตะวันออกนั่นเอง ซึ่งเจดีย์ที่ปรากฏจึงไม่น่าจะเป็นพระเจดีย์บรรจุอัฐิของ เจ้าเมืองขุขันธ์ท่านที่ 4 เพราะเป็นธาตุเจดีย์ที่เก่าแก่มากร่วมสมัยกับธาตุเจดีย์ที่วัดเขียนบูรพาราม และวัดลำภูรัมภนิวาส อายุ ราวพุทธศตวรรษที่ 22-24 อีกทั้งเจดีย์บรรจุอัฐิเจ้าเมืองควรจะรวมอยู่ด้วยกันที่วัดกลางเมือง เช่น วัดกลางขุขันธ์ เนื่องจากเป็น สายตระกูลเดียวกัน จึงไม่น่าจะมาบรรจุ ณ ศาสนสถานชายขอบของเมือง ณ ที่แห่งนี้อย่างที่เข้าใจกันตามตำนานปรัมปราของ ท้องถิ่น แต่จะเป็นกรณีของธาตุเจดีย์หรืออุเทสิกเจดีย์นั้น ขณะนี้ยังไม่มีหลักฐานทางประวัติศาสตร์ใดๆ มายืนยันได้ แต่ ค่อนข้างชัดเจนว่าไม่น่าจะใช่เจดีย์บรรจุอัฐิอดีตของเจ้าเมือง

ภาพที่ 12 แผนที่สันนิษฐานอาณาบริเวณพื้นที่ของวัดทวาราบ้านแทรงที่มีเจดีย์ตาปราสาทหรือธาตุบ้านแทรงเป็นส่วนหนึ่ง

ที่มา: คณะผู้เขียน

       ที่น่าสนใจอีกประเด็นหนึ่งคือ ชาวบ้านเล่าว่าธาตุเจดีย์นี้สร้างปิดรูพญานาคที่เคยอาศัยอยู่ในห้วยแทรงและห้วยเหนือ รวมถึงลุ่มน้ำห้วยสำราญที่ขึ้นมาพ่นพิษที่ทำให้ชุมชนในแถบนี้เกิดโรคระบาดจนทำให้ต้องย้ายถิ่นฐานไป ซึ่งแสดงถึงอำนาจของพระพุทธศาสนาที่มีเหนืออำนาจความเชื่อท้องถิ่นดั้งเดิม รวมถึงในเขตศักดิ์สิทธิ์ของเจดีย์ตาปราสาทหรือธาตุบ้านแทรงนี้ หากคนเข้ามาอยู่ชุมนุมกันก็จะช่วยป้องกันภัยจากระเบิดจากเครื่องบินในช่วงสงครามอินโดจีนได้ (บรรณ มากนวล, 2564 และ บรรณ มากนวล, 2565) และผู้เขียนยังได้ตั้งข้อสังเกตอีกว่า ธาตุบ้านแทรงนี้อาจมีสถานะเป็นหลักฐานได้ด้วยอีกประการหนึ่ง ซึ่งหลักบ้านมีความสัมพันธ์กับการตั้งถิ่นฐานของชุมชน โดยมีตำแหน่งที่ตั้งอยู่ใจกลางหมู่บ้าน ซึ่งในภาคอีสานหมู่บ้านมักเป็นพื้นที่เนิน หลักบ้านจัดตั้งอยู่บนเนินกลางหมู่บ้าน และมีลานกลางบ้านเป็นองค์ประกอบเพื่อกิจกรรมอเนกประสงค์ รวมทั้งพิธีกรรมในการเซ่นบวงสรวงหลักบ้านและในปัจจุบัน พื้นที่ลานกลางบ้านมักถูกครอบครองโดยโรงเรียน ศาลากลางบ้าน หรือศาลาอ่านหนังสือ จึงทำให้ขนาดของลานกลางบ้านเล็กลง จนบางแห่งหลักบ้านอาจยังหลงเหลืออยู่โดยตั้งบริเวณแอบข้างถนน และนอกจากหลักบ้านแล้ว ในพื้นที่ของหมู่บ้านอาจมีพื้นที่ป่าชุมชนเล็กๆ ที่เรียกว่า "ดอนปู่ตา" สำหรับเป็นที่สิงสถิตของดวงวิญญาณบรรพชน ซึ่งดอนปู่ตาหรือศาลปู่ตามักตั้งอยู่ชายหมู่บ้าน และอาจมีพิธีเซ่นสรวงในเวลาเดียวกันกับการเซ่นสรวงหลักบ้าน (วิโรฒ ศรีสุโร, 2540) ภายหลังจึงมีการเปลี่ยนแปลงภายหลังจึงมีการเปลี่ยนแปลงภายหลังจากการที่เป็นส่วนหนึ่งของโรงเรียนและได้รับการพัฒนาและปรับปรุงภูมิทัศน์มาจนถึงปัจจุบัน

ภาพที่ 13-14 นานาความเชื่อของผู้คนในชุมชนบ้านแทรง

ที่มา: คณะผู้เขียน

ภาพที่ 15 ต้นสำโรงใหญ่หลังธาตุบ้านแทรง
ที่มา: คณะผู้เขียน

        แต่อย่างไรก็ดี ด้วยความขาดแคลนหลักฐานทางประวัติศาสตร์และโบราณคดีในการศึกษาครั้งนี้จึงถือเป็นการอาศัยเพียงข้อมูลความเชื่อเทียบเคียงกับเหตุการณ์ทางประวัติศาสตร์ที่จำเป็นต้องมีการพิสูจน์ และขุดค้นตามวิธีการทางโบราณคดีไม่ควรยุติแต่เพียงเท่านี้เพื่อให้ได้ข้อมูลที่ชัดเจนมากยิ่งขึ้นต่อไป อีกทั้งการศึกษาครั้งนี้ควรมีการขยายผลสู่การศึกษาประวัติศาสตร์ชุมชนโบราณและประวัติศาสตร์ท้องถิ่นในพื้นที่รอบๆ พระธาตุสำคัญด้วย เพื่อจะได้เห็นพัฒนาการของวัฒนธรรม ความเชื่อ และพิธีกรรมที่เกิดขึ้นมาอย่างต่อเนื่อง อีกทั้งแม้ว่าการศึกษาดังกล่าวนี้จะเกี่ยวข้องกับเรื่องราวในทางศิลปกรรมและสถาปัตยกรรมค่อนข้างมาก แต่ความรู้ที่ได้รับทั้งในเรื่องราวของพระพุทธศาสนาลังกาวงศ์ ประวัติศาสตร์บ้านเมือง ซึ่งมีความเกี่ยวข้องทั้งในทางการเมือง สังคม และวัฒนธรรมนั้น น่าจะเป็นความรู้ใหม่ที่ช่วยส่งเสริมให้เรื่องราวทางประวัติศาสตร์ของชาติบ้านเมืองให้มีความสมบูรณ์มากยิ่งขึ้น

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การศึกษารูปแบบการใช้กลยุทธ์หน้าจอที่สองของรายการโทรทัศน์ในประเทศไทย

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บทคัดย่อ

วัตถุประสงค์ของการศึกษาโครงสร้าง กระบวนและขั้นตอนการทำงาน กลยุทธ์หน้าจอที่สองในการสื่อสารผ่านสื่อสังคมออนไลน์ของรายการโทรทัศน์ในประเทศไทย กรณีศึกษารายการลายกนกยกสยาม การศึกษานี้เป็นการวิจัยเชิงคุณภาพโดยใช้วิธีการเก็บข้อมูลด้วยการสัมภาษณ์เชิงลึกกับบุคลากรที่เป็นทีมผู้ผลิตรายการ จำนวน 4 ท่าน และการวิเคราะห์ข้อมูลในสื่อสังคมออนไลน์ ได้แก่ เพจเฟซบุ๊ก ช่องยูทูปของรายการ ผลการศึกษาพบว่า โครงสร้างการทำงานของการผลิตรายการเป็นการบริหารงานแบบองค์รวม กระบวนการทำงานกลยุทธ์ด้านการสื่อสาร มีการทำงานร่วมกัน 3 ส่วน 1) ส่วนผลิตรายการควบคุมโดยผู้อำนวยการผลิตและทีมผลิตรายการ 2) ส่วนผู้ดำเนินรายการโดยจะมีผู้ดำเนินรายการหลัก 2 ท่าน 3) ส่วนงานประชาสัมพันธ์และส่งเสริมการตลาด โดยงานในส่วนนี้ จะทำหน้าที่ในการนำเสนอเนื้อหาลงบนสื่อสังคมออนไลน์ทุกช่องทางของรายการ ผลการวิเคราะห์ จากการสัมภาษณ์เชิงลึกพบว่า รายการ มีรูปแบบการสื่อสาร ผ่าน 3 ช่องทางหลัก ได้แก่ ออกอากาศทางสถานีโทรทัศน์ เฟซบุ๊ก ยูทูป คู่ขนานและปรับประยุกต์เผยแพร่เนื้อหาให้สอดคล้องกับสื่อสังคมออนไลน์นั้น ๆ กลยุทธ์หน้าจอที่สองที่ถูกนำมาใช้ 3 ลำดับ ลำดับแรกคือก่อนออกอากาศ มุ่งเน้นสร้างความเคลื่อนไหว กระตุ้นความสนใจ แพร่กระจายคอนเทนต์ ลำดับที่สองระหว่างการออกอากาศคือการนำเสนอความสอดคล้องและความเป็นปัจจุบันในขณะที่มีการออกอากาศผ่านสื่อช่องทางหลัก ลำดับที่สาม หลังการออกอากาศคือการจัดการรับชมย้อนหลัง ตัดคลิปสั้นทำนำเสนอแบบ Reels & Shorts การจัดการ Feedback เสริมสร้างปฏิสัมพันธ์ด้วยการตอบคำถามแฟนรายการและสร้างกิจกรรมสัมพันธ์ผ่านสื่อสังคมออนไลน์

คำสำคัญ: กลยุทธ์หน้าจอที่สอง; รายการโทรทัศน์; สื่อสังคมออนไลน์

ด้านมนุษยศาสตร์และสังคมศาสตร์

The study of the use of second-screen strategies in thai television programs

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Abstract

The objective of this study is to examine the structure, processes, and strategies of second-screen engagement in social media communication by television programs in Thailand, using the case of the program Lai khanok Yok Siam as a case study. This qualitative research employs data collection methods through in-depth interviews with four members of the program's production team, along with social media content analysis from the program's Facebook page and YouTube channel. The findings indicate that the program's production structure follows an integrated management model, with the communication strategy process operating across three collaborative components: 1) program production, led by the production director and production team. 2) hosting, with two main hosts and 3) public relations and marketing, responsible for disseminating content across the program's social media platforms. Analysis from in-depth interviews reveals that the program communicates through three main channels: broadcast television, Facebook, and YouTube. The program also adapts and content for each specific social media platform. The second-screen strategy is implemented in three phases: The first phase, pre-broadcast, focuses on generating engagement, stimulating interest, and spreading content. The second phase, during broadcast, aims to align content in real-time with the main broadcast, ensuring relevance and immediacy. The third phase, post-broadcast, includes managing on-demand viewing, creating short clips for Reels & Shorts, managing feedback, enhancing interaction by answering questions from viewers, and fostering audience engagement through social media activities.

Keywords: second-screen strategies; television program; social media

1. บทนำ

การใช้สื่อสังคมออนไลน์ของรายการโทรทัศน์เป็นวิธีการแพร่กระจายข้อมูลเพื่อเชื่อมต่อผู้ชมและขยายฐานผู้ติดตามด้วยการใช้สื่อสังคมออนไลน์เช่น เฟซบุ๊ก(Facebook) อินสตราแกรม(Instagram) ทวิตเตอร์(Twitter) และ ยูทูป(YouTube) รายการโทรทัศน์สามารถประชาสัมพันธ์เนื้อหาของรายการ ใช้สื่อสังคมออนไลน์เพื่อนำเสนอสิ่งอันเป็นสาระสำคัญ เช่น การปล่อยตัวอย่างตอนใหม่ ความสำคัญของเนื้อหาของรายการในตอนนั้น ๆ การนำเสนอไฮไลต์จากตอนล่าสุดของรายการเพื่อช่วยกระตุ้นความสนใจของผู้ชม สร้างการมีส่วนร่วมด้วยการสร้างกิจกรรมบนสื่อสังคมออนไลน์ เช่น การตั้งคำถาม ให้ผู้ชมแสดงความคิดเห็น สามารถสร้างการมีส่วนร่วมระหว่างรายการกับผู้ชมได้อย่างมาก เปิดพื้นที่การสื่อสารสองทาง สื่อสังคมออนไลน์ทำให้ผู้ชมสามารถแสดงความคิดเห็น ส่งคำถามหรือแบ่งปันเนื้อหาของรายการไปยังเพื่อนและครอบครัวได้ ทำให้เกิดปฏิสัมพันธ์ในระดับที่มากขึ้น การใช้ Influencer และแฮชแท็กยอดนิยมช่วยให้เนื้อหาของรายการมีโอกาสแพร่กระจายได้มากขึ้น รวมถึงเพิ่มการรับรู้และประชาสัมพันธ์เนื้อหาของรายการได้อย่างมีประสิทธิภาพ การสตรีมสดเป็นวิธีที่รายการใช้การถ่ายทอดสด (Live Streaming) บนแพลตฟอร์มสื่อสังคมออนไลน์เพื่อดึงดูดผู้ชมให้ติดตามเนื้อหาแบบเรียลไทม์ เช่น การถ่ายทอดสดไปพร้อมกับการออกอากาศทางสถานีโทรทัศน์หรือการสื่อสารกับนักแสดงและผู้ดำเนินรายการ การใช้สื่อสังคมออนไลน์ในทางที่สร้างสรรค์สามารถเสริมความนิยมของรายการโทรทัศน์และดึงดูดกลุ่มผู้ชมใหม่ได้มากยิ่งขึ้น

เฟซบุ๊ก (Facebook) ของรายการโทรทัศน์ในประเทศไทยเป็นหนึ่งในกลยุทธ์สำคัญในการโปรโมทและสื่อสารกับผู้ชม รายการโทรทัศน์ไทยใช้แพลตฟอร์มนี้อย่างแพร่หลายเพราะเข้าถึงผู้ใช้ได้อย่างกว้างขวางและมีฟีเจอร์ที่หลากหลาย โดยสามารถแยกแนวทางการใช้งานออกเป็นดังนี้ ประชาสัมพันธ์รายการและเนื้อหาใหม่โดยรายการโทรทัศน์จะโพสต์ภาพนิ่ง วิดีโอ หรือคลิปตัวอย่างของตอนใหม่ที่กำลังจะออกอากาศเพื่อสร้างความตื่นเต้นและกระตุ้นความสนใจให้ผู้ชมกลับมารับชมต่อ การถ่ายทอดสด (Live Streaming) หลายรายการเลือกใช้การถ่ายทอดสดผ่าน Facebook Live เพื่อให้ผู้ชมสามารถติดตามกิจกรรมพิเศษ เช่น การสัมภาษณ์นักแสดง รายการสด หรือการเปิดตัวเนื้อหาใหม่ๆ ที่ทำให้ผู้ชมรู้สึกใกล้ชิดกับรายการมากขึ้น การมีปฏิสัมพันธ์กับผู้ชมรายการโทรทัศน์ในไทยมักจะโพสต์คอนเทนต์เชิงสนทนา เช่น การตั้งคำถาม ให้ผู้ชมแสดงความคิดเห็น หรือการโหวตในเรื่องราวต่างๆ ที่เกี่ยวข้องกับเนื้อหารายการ ช่วยสร้างการมีส่วนร่วม การใช้แฮชแท็ก(Hashtag) รายการจะกำหนดแฮชแท็กเฉพาะของรายการ เช่น #ลายกนกยกสยาม #กนก #JKN18 เพื่อใช้เป็นเครื่องมือในการกระตุ้นให้ผู้ชมร่วมโพสต์และแชร์เนื้อหา ซึ่งทำให้การตลาดแบบปากต่อปากผ่านผู้ชมเกิดขึ้นอย่างรวดเร็ว

ยูทูป (YouTube) เป็นช่องทางที่มีบทบาทสำคัญในการเพิ่มการเข้าถึงผู้ชมและเพิ่มการมองเห็นเนื้อหาของรายการไปยังแพลตฟอร์มออนไลน์ เนื่องจาก ยูทูป(YouTube) เป็นแพลตฟอร์มวิดีโอที่ได้รับความนิยมสูงสุดในประเทศไทย ทำให้รายการโทรทัศน์สามารถเข้าถึงผู้ชมได้หลากหลายกลุ่ม กลยุทธ์ที่นิยมใช้ได้แก่ การอัปโหลดเนื้อหารายการย้อนหลังโดยรายการโทรทัศน์ไทยมักจะอัปโหลดตอนเต็มของรายการย้อนหลังให้ผู้ชมสามารถดูได้ฟรีบน YouTube โดยเฉพาะรายการวาไรตี้ เกมโชว์ หรือละคร ทำให้ผู้ชมที่พลาดการรับชมทางทีวีสามารถดูย้อนหลังได้ การโพสต์คลิปไฮไลต์ของรายการโทรทัศน์จะโพสต์คลิปช่วงสำคัญหรือไฮไลต์จากรายการในรูปแบบคลิปสั้นๆ เพื่อดึงดูดผู้ชมใหม่ๆ ให้สนใจและกลับมาดูเนื้อหาเต็ม

ฐิตินัน บุญภาพ คอมมอน[1] กล่าวถึงแนวคิดเรื่องหน้าจอที่สอง (Second Screen) ว่าเป็นการเปิดรับรายการโทรทัศน์ผ่านจอที่ สอง ซึ่งเป็นการรับชมรายการโทรทัศน์ผ่านอุปกรณ์ดิจิตอลอื่นๆ อาทิ คอมพิวเตอร์ แท็บเล็ต สมาร์ทโฟน อีกทั้งยังมีแนวคิดของ นัทพร แบบประเสริฐ[2] ที่กล่าวว่าหน้าจอที่สอง (Second Screen) หมายถึง ช่องทางในการสื่อสารเนื้อหารายการหรือข้อมูลต่าง ๆ ที่ผู้ส่งสารจัดทำขึ้นโดยผ่านอุปกรณ์ประเภท Mobile Device Tablet ต่าง ๆ ซึ่งสามารถให้ข้อมูลมากกว่า (More Information) หน้าจอหลัก (First Screen) และทำงานเชื่อมโยงสอดคล้องกับเนื้อหาที่ออกอากาศอยู่บนหน้าจอหลักได้สอดคล้องกัน อย่างลงตัว ไม่แยกขาดจากกัน และจะต้องเป็นการสื่อสาร 2 ทาง (Interactive Two Way Communication)

จากแนวคิดทฤษฎีและเหตุผลที่หลากหลายในข้างต้น จึงเป็นที่มาของงานวิจัยเรื่องนี้ที่มุ่งเน้นศึกษารูปแบบการนำเอากลยุทธ์ผสมผสานกับวิธีการต่าง ๆ เพื่อสร้างประสบการณ์ให้กับผู้ชมตามความมุ่งหมายของผู้ผลิตรายการโทรทัศน์จากการศึกษาแนวทางการวิจัยในเบื้องต้น โดยผู้วิจัยเลือกเอารายการลายกนกยกสยามมาใช้เป็นกรณีศึกษาเนื่องจากรูปแบบรายการมีความน่าสนใจเป็นการต่อยอดการผลิตสารคดีท่องเที่ยวชุมชน สอดแทรกเกร็ดความรู้ประเด็นประวัติศาสตร์ มุ่งนำเสนอในรูปแบบที่เข้าใจง่าย สนุกสนาน มีฐานผู้ชมจำนวนมาก รายการไม่มีเนื้อหาที่เกี่ยวข้องกับการเมืองหรือความขัดแย้งทางความคิด สามารถศึกษาแนวโน้มการพัฒนารูปแบบของการแพร่กระจายเนื้อหาของรายการโทรทัศน์ การสร้างแบบแผนการมีส่วนร่วม การสร้างความภักดี ที่หลากหลายและแตกต่างจำเป็นต้องมีการรวบรวม แนวทางปฏิบัติที่เป็นรูปแบบชัดเจน เป็นกระบวนการที่ถูกต้อง ลดการลองผิดลองถูก เพื่อสร้างองค์ความรู้ในศาสตร์ของวิชาชีพให้สอดคล้องกับลักษณะพฤติกรรม และค่านิยมของผู้บริโภค ผู้ผลิตรายการโทรทัศน์ อีกทั้งสามารถเป็นสูตรสำเร็จให้กับกระบวนการผลิตรายการ เป็นประโยชน์ทั้งทางวิชาการและวิชาชีพต่อไปในอนาคต

2. วัตถุประสงค์การวิจัย

2.1 เพื่อศึกษารูปแบบและวิธีการใช้กลยุทธ์หน้าจอที่สองในรายการโทรทัศน์ของประเทศไทยมุ่งเน้นที่วิธีการนำเสนอเนื้อหาผ่านสื่อสังคมออนไลน์และการสื่อสารกับผู้ชม

2.2 เพื่อวิเคราะห์ความสำคัญและบทบาทของหน้าจอที่สองในการเสริมสร้างประสบการณ์การรับชมรายการโทรทัศน์ เพื่อข้อเสนอแนะแก่ผู้ผลิตรายการโทรทัศน์และผู้ผลิตเนื้อหาในการใช้กลยุทธ์หน้าจอที่สองอย่างมีประสิทธิภาพ

3. ขอบเขตการวิจัย

3.1 การศึกษาโครงสร้างกระบวนและขั้นตอนการทำงานการผลิตรายการ มุ่งศึกษาเฉพาะกลยุทธ์หน้าจอที่สองในการสื่อสารผ่านสื่อสังคมออนไลน์ของรายการโทรทัศน์ในประเทศไทย กรณีศึกษารายการลายกนกยกสยาม รายการโทรทัศน์ออกอากาศทางช่อง JKN18 ทุกวันอาทิตย์ เวลา 20.10 -21.10น. นำเสนอเรื่องราวประวัติศาสตร์ บุคคล สถานที่ท่องเที่ยว

3.2 สื่อสังคมออนไลน์ของรายการลายกนกยกสยามที่นำมาศึกษาวิเคราะห์ ได้แก่ เพจเฟซบุ๊กลายกนกยกสยามและช่องยูทูป TOP NEWS LIVE, ลายกนกยกสยาม วิเคราะห์และเก็บข้อมูลที่มีการเผยแพร่ตั้งแต่ 1 มกราคม พ.ศ. 2566 – ธันวาคม 2566

4. เอกสารและงานวิจัยที่เกี่ยวข้อง

4.1 แนวคิดเกี่ยวกับภูมิทัศน์สื่อใหม่ในยุคดิจิทัล

ทิพย์ภาศิริ แก้วเทศ [3] กล่าวว่า ภูมิทัศน์สื่อใหม่ในยุคดิจิทัลเป็นปรากฏการณ์ของการหลอมรวมสื่อเกิดเป็นสื่อใหม่ที่มีการเชื่อมโยงระหว่างอินเทอร์เน็ตกับโทรศัพท์มือถืออัจฉริยะ แท็บเล็ต คอมพิวเตอร์ตั้งโต๊ะ และคอมพิวเตอร์เคลื่อนที่ ด้วยการใช้งานบนแอปพลิเคชันต่าง ๆ โดยผู้ใช้สื่อใหม่เป็นผู้เลือกจัดผังในการรับชมข้อมูลข่าวสาร และความบันเทิงที่สอดคล้องกับความต้องการของแต่ละบุคคล ผู้ใช้สื่อใหม่สามารถเป็นได้ทั้งผู้รับสารและผู้ผลิตเนื้อหาสาระในเวลาเดียวกัน อีกทั้งยังมีการพัฒนาแอปพลิเคชันที่ช่วยส่งเสริมให้ผู้ใช้สื่อใหม่เข้ามาสร้างสรรค์เนื้อหา การสร้างธุรกิจในสินค้าและบริการให้มีการบริโภคที่สูง การสร้างตัวตน การสร้างรายการเพื่อสร้างกระแสในอัตราการรับชมและอัตราการติดตามที่สูงสู่การสร้างรายได้ ดังนั้นจึงเป็นแรงสนับสนุนให้สื่อหลัก ผู้ผลิตรายการโทรทัศน์ ละคร ภาพยนตร์ และโฆษณาในทุกแขนงมีการบูรณาการประยุกต์ใช้สื่อใหม่สร้างแฟลตฟอร์มสตรีมมิ่ง เฟซบุ๊กแฟนเพจ ช่องยูทูปเป็นเส้นทางคู่ขนานกับสื่อโทรทัศน์ เพื่อตอบสนองพฤติกรรมการรับชมบนภูมิทัศน์สื่อใหม่ของพลเมืองดิจิทัล

การประชุมวิชาการระดับชาติและนานาชาติบ้านสมเด็จเจ้าพระยา ครั้งที่ 1 (BS2C 2025)
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ภาควิชานิเทศศาสตร์ มหาวิทยาลัยบูรพา [4] กล่าวว่า ยุคที่เทคโนโลยีพัฒนาไปอย่างไม่มีที่สิ้นสุด โลกอันกว้างใหญ่ ของเรากลับถูกย่อให้เล็กลงด้วยเทคโนโลยีต่าง ๆ โดยเฉพาะสื่ออันทรงอิทธิพลอย่างสื่อดิจิทัล หรือสื่อใหม่ ซึ่งเข้ามามีบทบาท กับคนแทบทุกเพศ ทุกวัย เพื่อตอบโจทย์ความต้องการในชีวิตประจำวัน รวมไปถึงการทำงาน สื่อดิจิทัลจึงมีส่วนสำคัญที่เข้ามา ช่วยเสริมกระบวนการทางนิเทศศาสตร์ให้มีประสิทธิภาพมากยิ่งขึ้นการเปลี่ยนแปลงที่ขับเคลื่อนด้วยอุปกรณ์ดิจิทัลอัน หลากหลาย ถูกผนวกรวมเข้าเป็นส่วนหนึ่งของวิถีชีวิตและความต้องการของผู้คนตามที่ได้กล่าวไว้ข้างต้น สิ่งเหล่านี้เองที่ ก่อให้เกิดความเปลี่ยนแปลงทั้งทางด้านช่องทางการรับสื่อ พฤติกรรมการเปิดรับสื่อ และการตอบสนองของผู้บริโภคซึ่ง เปลี่ยนแปลงไปอย่างสิ้นเชิง สื่อเก่ากำลังถูกกาลเวลาทำให้มีบทบาทลดน้อยลงไป ทิ้งไว้เป็นเพียงสิ่งที่ครั้งหนึ่งเคยเฟื่องฟู อย่าง ผลการศึกษาจากรายงานภูมิทัศน์สื่อในประเทศไทยและสิ่งที่เกิดขึ้นในยุคความปกติใหม่ (WHAT'S NEXT IN THE NEW NORMAL) ของนีลเส็น (Nielsen) ชี้ให้เห็นว่าสื่อดิจิทัลมีอัตราการเติบโตที่สูงขึ้น โดยสื่อประเภท สื่อเสียง ยังคงได้รับความ นิยมมากที่สุด ซึ่งการเข้ามาของสื่อดิจิทัลทำให้ไม่มีใครถือวิทยุเดินไปเดินมาเพื่อเปิดฟังเนื้อหาประเภทต่างๆ อีกต่อไปแล้ว แต่ ถูกแทนที่ด้วยพอสแคสต์ที่มาในรูปแบบของการสมัครสมาชิกผ่านเว็บไซต์ สามารถฟังผ่านอุปกรณ์ที่หลากหลาย

ผู้จัดการ 360 [5] กล่าวว่า พัฒนาการของสื่อสังคมออนไลน์นับจากนี้ไม่ได้จำกัดอยู่เฉพาะในมิติของเทคโนโลยี หากแต่ ยังครอบคลุมประเด็นว่าด้วยเนื้อหาและรูปแบบในการสื่อที่นับเป็นปัจจัยสำคัญนับจากนี้ด้วยว่าสื่อกระแสหลักจะสามารถผสาน การนำเสนอกับสื่อสังคมออนไลน์ได้อย่างมีประสิทธิภาพและดำรงสถานะการมีอยู่ขององค์กรสื่อ กลยุทธ์การสร้างดารา พิธีกร นักข่าว ให้มีชื่อเสียงเพื่อส่งออกคนเหล่านี้ไปร่วมกิจกรรมการตลาดและแบ่งสัดส่วนรายได้เข้าสู่ช่องตามสัดส่วนที่เหมาะสม เป็นอีกหนึ่งวิธีที่คงไว้ซึ่งความอยู่รอดขององค์กร และเป็นหนึ่งในกลยุทธ์ที่สำคัญ และอาจไปได้ดี เพราะสินค้าแต่ละชิ้นที่สร้าง ขึ้นมาอาจนำไปสร้างรายได้ในหลากหลายช่องทางควบคู่กับการสร้างสินค้าใหม่ที่จะเป็นโอกาสให้องค์กรได้พบกับธุรกิจใหม่ ๆ เพิ่มขึ้น ประเด็นว่าด้วยการพัฒนาคอนเทนต์หรือเนื้อหาสาระเป็นอีกกรณีหนึ่งที่น่าสนใจติดตามไม่น้อย เพราะในขณะที่การ ผลิตสร้างคอนเทนต์ขึ้นมาเองใหม่ทั้งระบบอาจต้องใช้งบประมาณที่สูงกว่าการซื้อคอนเทนต์จากต่างประเทศ ซึ่งทำให้ในห้วง ปัจจุบันมีการนำเข้าคอนเทนต์ราคาไม่แพงจากต่างประเทศเข้ามากระจายและจัดสรรปันส่วนไปสู่ช่องทางของสื่อกระแสหลัก และกลายเป็นช่องทางธุรกิจที่เติบโตอย่างรวดเร็ว

4.2 งานวิจัยที่เกี่ยวข้อง

งานวิจัยที่ศึกษาถึงการศึกษารูปแบบการใช้กลยุทธ์หน้าจอที่สองของรายการโทรทัศน์ในประเทศไทย ของฐิติภาและ คณะ [6] ที่กล่าวถึงกระบวนการทำงาน รูปแบบ และกลยุทธ์การสื่อสารการตลาดผ่านสื่อสังคมออนไลน์ของบริษัท จีเอ็มเอ็ม ไท หับ จำกัด (จีทีเอช) กรณีศึกษาภาพยนตร์เรื่อง ATM เออรัก..เออเร่อ พบว่าโครงสร้างการทำงานของบริษัทเป็นการ บริหารงานแบบรวมอำนาจและใน ด้านกระบวนการการทำงาน ด้านการสื่อสารการตลาดของบริษัทมีแผน 4 แผนก ที่ รับผิดชอบหลักได้แก่ แผนกการตลาด และสื่อสารการตลาด แผนกการประชาสัมพันธ์ แผนกสื่อสัมพันธ์และการส่งเสริม การตลาด และแผนกสื่อออนไลน์สัมพันธ์ ผลการวิเคราะห์เอกสารพบว่าบริษัทมีรูปแบบการสื่อสารผ่านสื่อสังคมออนไลน์หลัก 3 ประเภท ได้แก่ เฟซบุ๊กเพจ ทวิตเตอร์ และยูทูป ส่วนกลยุทธ์การสื่อสารการตลาดที่นำมาใช้ในสื่อสังคมออนไลน์ของบริษัท ที่ถูกนำมาใช้มากที่สุด 3 อันดับแรกคือ กลยุทธ์การให้ข้อมูล รองลงมาได้แก่กลยุทธ์ สิ่งช่วยเตือนความจำ และกลยุทธ์การ โต้ตอบและ ปรากฏใน ทุกช่วงของการวางแผนการสื่อสารการตลาด

งานวิจัยของนัทพร แบบประเสริฐ [2] ที่พบว่า Second Screen เป็นตัวที่เสริม First Screen ให้คนติดตามมากขึ้น เพียงแต่เน้นกันในคนละส่วน Second Screen เป็นตัวสร้างหรือเพิ่มคุณค่าให้คนอยากดูในตอนออกอากาศจริงจากสื่อ โทรทัศน์หรือหน้าจอหลัก ส่วนตัวเนื้อหา (Content) จะทำให้มีระดับหรือไฮคลาส (Hi-Class) มากไม่ได้เพราะคนเมืองส่วน ใหญ่ไม่ค่อยดูโทรทัศน์แล้ว ต่อไปสื่อโทรทัศน์จะต้องนึกถึงกลุ่มคนต่างจังหวัด (Rural Mass) ให้มากยิ่งขึ้น ต้องมีการคิดที่แปลก ใหม่รวดเร็วและอัพเดทมากขึ้นด้วย

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การศึกษาเรื่องการสร้างคอนเทนต์บนภูมิทัศน์สื่อใหม่ในยุคดิจิทัลของ ทิพย์ภาศิริ แก้วเทศ [3] กล่าวว่า การเติบโตที่หลากหลายในการผลิตเนื้อหาและช่องทางการรับชมบนสื่อใหม่ ที่มีการแข่งขันในการผลิตเนื้อหาจากผู้ใช้สื่อที่เป็นปัจเจกบุคคล และผู้ประกอบการสื่ออื่น ๆ บนแพลตฟอร์มวิดีโอสตรีมมิ่ง การแข่งขันในอุตสาหกรรมสื่อไทยจึงมิได้มีเพียงแค่สื่อหลักกับสื่อหลักอีกต่อไป สื่อหลักจึงต้องมีการปรับตัวในการบูรณาการ โดยใช้ประโยชน์ในการสร้างช่องทางการรับชมและการสร้างรายได้บนสื่อใหม่อย่างเฟซบุ๊ก ยูทูป และแอปพลิเคชัน เพื่อนำรายการมาออกอากาศสดและรับชมย้อนหลังและยังใช้ประโยชน์เพื่อสร้างรายได้จากผู้ประกอบการสื่ออื่น ๆ เช่น การขายลิขสิทธิ์รายการและละครของสถานีไปออกอากาศบนแพลตฟอร์มสตรีมมิ่งอย่าง Netflix การสร้างสรรค์เนื้อหาบนสื่อภูมิทัศน์สื่อใหม่จึงเป็นปัจจัยสำคัญของอุตสาหกรรมสื่อไทยทุกแขนงต้องประยุกต์ใช้สื่อใหม่ให้สอดรับและรับมือต่อการสร้างสรรค์เนื้อหาที่มีการแข่งขันของผู้ประกอบการสื่ออื่น ๆ และผู้ใช้สื่อที่กำลังเติบโตในการสร้างเนื้อหาที่มีความหลากหลายบนภูมิทัศน์สื่อใหม่ของพลเมืองดิจิทัล

5. วิธีการวิจัย

การวิจัยในครั้งนี้เป็นการวิจัยโดยศึกษาโครงสร้างกระบวนและขั้นตอนการทำงานกลยุทธ์หน้าจอที่สองในการสื่อสารผ่านสื่อสังคมออนไลน์ของรายการโทรทัศน์ในประเทศไทย กรณีศึกษารายการลายกนกยกสยาม การศึกษาครั้งนี้ใช้ระเบียบวิธีวิจัยเชิงคุณภาพ (Qualitative Research) ใช้การเก็บรวบรวมข้อมูลด้วยการสัมภาษณ์เชิงลึก (In-depth Interview) โดยกลุ่มผู้ให้ข้อมูลสำคัญคือ ผู้อำนวยการผลิตและทีมผู้ผลิตรายการ จำนวน 4 ท่าน ผู้ให้ข้อมูลสำคัญ (Key Informants) คือ ผู้อำนวยการผลิต ทีมงานผู้ผลิตรายการ ทีมประชาสัมพันธ์และสื่อสารการตลาด รายการลายกนกยกสยาม จำนวน 4 คน วิธีเลือกผู้ให้ข้อมูลสำคัญเลือกโดยวิธีการแบบเจาะจง (Purposive sampling)

6. เครื่องมือในการวิจัย

การวิจัยในครั้งนี้ใช้แบบสัมภาษณ์เชิงลึก (In-depth Interview) แบบมีโครงสร้าง (Structure Interview) โดยแนวคำถามนั้น ผู้วิจัยได้พัฒนาจากแนวคิดและทฤษฎีที่เกี่ยวข้องกับกลยุทธ์หน้าจอที่สองกับงานการผลิตรายการโทรทัศน์ และส่งให้ผู้เชี่ยวชาญตรวจสอบความถูกต้องในเนื้อหาและปรับแก้ตามข้อเสนอแนะ แล้วจึงนำส่งให้กับผู้ให้ข้อมูลสำคัญล่วงหน้า ก่อนมีการนัดหมายเพื่อสัมภาษณ์เก็บข้อมูลการวิจัย โดยมีการตั้งประเด็นคำถามไว้ดังนี้

6.1 ทีมผู้ผลิตรายการลายกนกยกสยามเลือกใช้สื่อสังคมออนไลน์ทั้งหมดกี่ช่องทาง และกำหนดวัตถุประสงค์ของการใช้สื่อสังคมออนไลน์ของรายการลายกนก ยกสยามที่กำหนดไว้มีอะไรบ้าง?

6.2 การใช้สื่อสังคมออนไลน์เพื่อเผยแพร่เนื้อหาในกระบวนการก่อน - ระหว่าง – หลังของการออกอากาศของรายการได้มีการกำหนดแนวทางของการนำเสนอเนื้อหาหรือมีกลยุทธ์การประชาสัมพันธ์บน สื่อสังคมออนไลน์ไว้อย่างไรบ้าง อยากให้อธิบายขั้นตอน

6.3 ทีมผู้ดูแลสื่อสังคมออนไลน์ได้กำหนดการกำกับควบคุมการใช้งานหรือการนำเสนอเนื้อหาไว้เป็นขอปฏิบัติร่วมกันของทีมงานเบื้องหน้าและเบื้องหลังอย่างไรบ้าง

6.4 การควบคุมความหลากหลายของเนื้อหารวมถึงความถี่ในการสร้างโพสต์เพื่อนำเสนอเนื้อหาบนสื่อสังคมออนไลน์ได้มีการกำหนดแนวทางการทำงานไว้อย่างไรบ้าง ทีมงานดูแลระบบหลังบ้านของงานสื่อสังคมออนไลน์แบ่งหน้าที่การทำงานหรือกำหนดแนวทางการทำงานไว้อย่างไรบ้าง

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7. การวิเคราะห์ข้อมูล

การวิเคราะห์ข้อมูลการวิจัยเชิงคุณภาพในการศึกษาวิจัยครั้งนี้ใช้การตรวจสอบข้อมูลเพื่อการสร้างถูกต้องและน่าเชื่อถือ ใช้วิธีการการตรวจสอบข้อมูลเชิงคุณภาพ ได้แก่ การตรวจสอบแบบสามเส้า การเปรียบเทียบจากการใช้วิธีการเก็บรวบรวมข้อมูลหลายวิธี ดังรายละเอียดต่อไปนี้

7.1 การตรวจสอบข้อมูลแบบสามเส้า (Data Triangulation) คือ การพิสูจน์ว่าข้อมูลที่ผู้วิจัยได้มานั้นถูกต้องหรือไม่ วิธีการตรวจสอบของข้อมูลนั้น จะต้องตรวจสอบแหล่งที่มา 3 แหล่ง ได้แก่ เวลา สถานที่ และบุคคล โดยการตรวจสอบแหล่งเวลา หมายถึง การตรวจสอบข้อมูลในช่วงเวลาที่ต่างกันเพื่อให้ทราบว่าข้อมูลที่ได้รับในช่วงเวลาต่าง ๆ นั้นเหมือนกันหรือไม่ การตรวจสอบสถานที่หมายถึง ถ้าข้อมูลต่างสถานที่กันจะเหมือนกันหรือไม่ และการตรวจสอบบุคคลหมายถึง ถ้าบุคคลผู้ให้ข้อมูลเปลี่ยนไปข้อมูลจะเหมือนเดิมหรือไม่

7.2 การเปรียบเทียบจากการใช้วิธีการเก็บรวบรวมข้อมูลหลายวิธี (Methodological Triangulation) คือการเก็บรวบรวมข้อมูลจากแหล่งต่าง ๆ กัน เพื่อรวบรวมข้อมูลเรื่องเดียวกัน เช่น การซักถามผู้ให้ข้อมูลสำคัญอาจซักถามผู้ให้ข้อมูลหลังจากสรุปผลการศึกษา เพื่อความแน่นอนว่าข้อสรุปนั้นเที่ยงตรงตามความเป็นจริงหรือไม่

ผู้ให้ข้อมูลสำคัญ (Key Informants) คือ การกำหนดกลุ่มผู้ให้ข้อมูลมักใช้วิธีการเลือกแบบเจาะจง (criterion- based selection) ซึ่งเป็นผู้ที่มีความรู้ความเข้าใจและสามารถให้ข้อมูลในเรื่องนั้นได้ลึกซึ้งดีที่สุด เช่น ผู้อำนวยการผลิต ประธานเจ้าหน้าที่บริหาร เจ้าของกิจการ ผู้นำท้องถิ่น หรือผู้ที่เกี่ยวข้องกับเรื่องนั้นโดยตรง โดยผู้ให้ข้อมูลสำคัญของการวิจัยครั้งนี้คือ ผู้อำนวยการผลิต ทีมงานผู้ผลิตรายการ ทีมประชาสัมพันธ์และสื่อสารการตลาดของรายการลายกนกยกสยาม จำนวน 4 คน โดยมีเกณฑ์การคัดเลือก ผู้ให้ข้อมูลสำคัญทั้ง 4 คน จากความสามารถและบทบาทในการเป็นผู้มีส่วนร่วมหลักในการผลิตรายการลายกนกยกสยาม ทั้งผู้อำนวยการผลิต ทีมงานผู้ผลิตรายการ ทีมประชาสัมพันธ์และสื่อสารการตลาด โดยตำแหน่งของผู้ปฏิบัติงานทั้งหมดเป็นผู้ที่มีความรู้ในเชิงลึก เนื่องมาจากปฏิบัติงานร่วมกับการผลิตรายการมาในระยะเวลานาน สามารถให้คำตอบกับงานวิจัยได้เป็นอย่างดี

8. ผลการวิจัย

ผลการศึกษาเรื่องการศึกษารูปแบบการใช้กลยุทธ์หน้าจอที่สองของรายการโทรทัศน์ในประเทศไทย ประกอบด้วยกระบวนการเลือกกลยุทธ์หน้าจอที่สองผ่านสื่อสังคมออนไลน์เพื่อเผยแพร่และประชาสัมพันธ์เนื้อหารายการ กระบวนการก่อน ระหว่าง หลังของรายการที่ออกอากาศในแต่ละสัปดาห์ว่ามีขั้นตอนอย่างไรบ้าง ซึ่งจากการสัมภาษณ์เชิงลึกเพื่อเก็บรวบรวมวิเคราะห์ข้อมูลสามารถอธิบายได้ดังนี้

8.1 ก่อนออกอากาศ (Pre – On Air) เริ่มจากการเลือกใช้สื่อสังคมออนไลน์ของรายการลายกนกยกสยาม เลือกใช้ทั้งหมด 3 ช่องทาง คือ 1) เพจเฟซบุ๊ก "รายการลายกนก ยกสยาม" มียอดผู้ติดตาม 159,000 คน (รายงาน ณ วันที่ 31 กันยายน 2567) 2) ช่องยูทูป TOP NEWS LIVE มียอดผู้ติดตาม 2,090,000 คน (รายงาน ณ วันที่ 31 กันยายน 2567) 3) ช่องยูทูป "ลายกนก ยกสยาม" มียอดผู้ติดตาม 320,000 คน (รายงาน ณ วันที่ 31 กันยายน 2567) โดยจะออกอากาศในช่องทางหลักทางสถานีโทรทัศน์ช่อง JKN18 ทุกวันอาทิตย์ เวลา 20.10 -21.10น. โดยช่วงระหว่างสัปดาห์ จะเป็นช่วงเวลาที่รายการจะสร้างความเคลื่อนไหวให้เกิดขึ้นบนสื่อสังคมออนไลน์ของรายการ ซึ่งจากการเก็บรวบรวมข้อมูลสัมภาษณ์ มีรายละเอียดดังต่อไปนี้

8.1.1 สร้างความเคลื่อนไหว รายการลายกนกยกสยามมีวัตถุประสงค์หลักเพื่อใช้ในการสื่อสารเพื่อมุ่งเน้นการประชาสัมพันธ์เนื้อหาไปสู่แฟนรายการหรือผู้ชม โดยเนื้อหาต่างๆที่นำเสนอจะมุ่งเน้นการสร้างปฏิสัมพันธ์ ตัวอย่างเช่น การ

สร้างโพสต์ในรูปแบบของการสร้าง engagement ช่วยสร้างการมีส่วนร่วมระหว่างรายการกับผู้ชมได้เป็นอย่างมาก เช่นการ เล่นเกมการแจกของรางวัลให้แฟนรายการหรือผู้ที่เข้าร่วมชมในช่องทางออนไลน์ ได้เข้ามาร่วมสนุก ทำตามกติกาที่รายการ กำหนด ผู้อำนวยการผลิตยังเล่าถึงแนวทางการสร้างปฏิสัมพันธ์ผ่านการร่วมสนุกเล่นเกมว่า ในช่วงแรกของการเริ่มกิจกรรม ดังกล่าว ยังใช้ลักษณะของการจัดการแบบง่ายๆ โดยกำหนดกติกาและการร่วมสนุกโดยใช้คุณสมบัติที่มีอยู่บนสื่อสังคม ออนไลน์เช่นบนเพจเฟซบุ๊ก โดยกติกาการร่วมสนุกจำเป็นจะต้องกำหนดขึ้นอย่างรัดกุม เพื่อป้องกันปัญหาความเข้าใจผิดที่ อาจจะเกิดขึ้นได้ โดยต้องคำนึงถึง แนวทางการปฏิบัติที่เข้าใจง่ายและมีความยุติธรรม ถึงแม้รางวัลที่ได้รับจะไม่ได้มีมูลค่าสูง มากนักแต่กลับมีผลทางใจ เนื่องจากกลุ่มบุคคลที่เข้ามาเล่นเกมคือกลุ่มบุคคลที่เป็นแฟนรายการตัวจริงเสียเป็นส่วนใหญ่ หาก เกิดความขุ่นข้องหมองใจแล้วอาจทำให้เกิดความไม่พอใจกับกลุ่มแฟนรายการได้ ทีมประชาสัมพันธ์และสื่อสารการตลาดยัง กล่าวเสริมอีกว่านอกเหนือจากการสร้างความเคลื่อนไหวการสร้าง engagement ของรายการแล้ว เพจเฟซบุ๊คของรายการ ยัง ผลิตเนื้อหาที่นำเสนอเฉพาะในสื่อสังคมออนไลน์จะเป็นโพสต์สั้น เน้นเนื้อตามกระแสปัจจุบัน เรื่องประเพณีและวันสำคัญอยู่ เสมอ เพื่อเป็นการบ่งบอกถึงความคิดสร้างสรรค์ที่เป็นปัจจุบันของผู้ดูแลเพจรายการ หรือบางกรณีทีมงานอาจต้องใช้วิธีการรู้ ใจและรู้จักผู้ชมว่าในขณะนั้นผู้ชมหรือแฟนเพจต้องการเนื้อหาในลักษณะใด ในบางช่วงบางเวลาของสังคมอาจมีกระแส บางอย่างที่เกิดขึ้นไม่ว่าจะเป็นข่าวสารบ้านเมือง เหตุการณ์เกี่ยวกับบุคคลสำคัญ เพจของรายการสามารถหยิบเนื้อหาหรือ เหตุการณ์ดังกล่าวมาทำเป็นคอนเทนต์เพื่อนำเสนอในเพจของรายการได้ตลอดเวลา หรือที่เรียกว่า เรียลไทม์คอนเทนต์(Real-time Content) ทั้งนี้ทีมงานจะประชุมเพื่อพิจารณาถึงความเหมาะสมของเนื้อหานั้น ๆ อีกครั้งก่อนการผลิตโพสต์

ผู้วิจัยยังมีความคิดเห็นว่าความเคลื่อนไหวบนสื่อสังคมออนไลน์และกิจกรรมการสร้าง engagement ดังกล่าว มี ประโยชน์ในเรื่องการสร้างการมองเห็นจากกลุ่มคนที่เป็นแฟนรายการอยู่แล้ว และช่วยขยายฐานกลุ่มผู้ชมใหม่ อีกทั้งยัง สามารถวัดและตรวจสอบความนิยมของรายการในทางตรงได้อีกด้วย ผู้วิจัยได้มีความคิดเห็นกับทีมผู้ผลิตรายการว่าในอนาคต หากมีความต้องการเก็บข้อมูลวิจัยเพื่อพัฒนารูปแบบของรายการ ยังสามารถใช้ช่องทางและกลยุทธ์นี้ ในการเก็บรวบรวม ข้อมูลได้อีกทางหนึ่งด้วย

ภาพที่ 1 โพสต์สร้าง engagement ผ่านเฟซบุ๊กรายการลายกนก ยกสยาม ให้ผู้ชมร่วมเล่นเกม

ที่มา: [เฟซบุ๊กรายการลายกนก ยกสยาม]

8.1.2 กระตุ้นความสนใจ ผู้อำนวยการผลิตได้กล่าวถึงการใช้สื่อสังคมออนไลน์ในช่วงออกกองถ่ายทำรายการซึ่ง เป็นช่วงระหว่างสัปดาห์ที่ไม่มีการเคลื่อนไหวของสื่อสังคมออนไลน์ทุกช่องทางของรายการ ทีมงานในส่วนการประชาสัมพันธ์ ผู้ทำหน้าที่ดูแลเพจเฟสบุ๊ครายการลายกนกยกสยาม เราจะสร้างโพสต์เพื่อบอกเป็นนัยว่าวันนี้ทีมงานลงพื้นที่เพื่อออกกองถ่าย

ทำรายการ โพสต์ที่ลงในเพจเฟซบุ๊ครายการลายกนกยกสยาม เน้นโพสต์เป็นภาพนิ่งประกอบกับข้อความง่ายๆ ถึงสถานที่ต่างๆ ที่ทีมงานไปถ่ายทำ ใส่แคปชั่นให้แฟนรายการได้ทายว่าเป็นสถานที่ใด กระตุ้นให้เกิดการมีส่วนร่วมแสดงความคิดเห็นแบบ ง่ายๆ ส่วนในช่วงก่อนการออกอากาศตอนใหม่ในสัปดาห์นั้นทีมงานจะสร้างโพสต์ขึ้นล่วงหน้า 3 วันก่อนออกอากาศ รายการ ออกอากาศวันอาทิตย์ โพสต์กระตุ้นจะเกิดขึ้นในวันพฤหัสบดี ซึ่งทีมผู้ผลิตได้ทดสอบแล้วพบว่าเป็นช่วงเวลาที่เหมาะสมและมี ประสิทธิภาพ กลยุทธ์นี้จะเป็นตัวช่วยกระตุ้นให้คนอยากดูรายการตอนออกอากาศจริงทางโทรทัศน์ ผู้อำนวยการผลิตยังได้ กล่าวอีกว่า พฤติกรรมของคนเมือง มักจะมีเวลาน้อยเน้นความสะดวกสบาย อีกทั้งการดำเนินชีวิตค่อนข้างเร่งรีบ การรับชม ผ่านหน้าจอที่สองจึงเป็นสิ่งที่ได้รับความนิยม เมื่อเปรียบเทียบกับคนต่างจังหวัดที่มีวิถีชีวิตตรงกันข้ามมักบริโภคข่าวสารหรือ ชมรายการต่างๆ ผ่านทางสถานีโทรทัศน์ที่ออกอากาศตามเวลา

ภาพที่ 2 โพสต์กระตุ้นความสนใจในช่วงออกกองถ่ายทำรายการ

ที่มา: [เฟซบุ๊กรายการลายกนก ยกสยาม]

8.1.3 ผู้ดำเนินรายการช่วยแพร่กระจายคอนเทนต์ คุณกนก รัตน์วงศ์สกุลคือผู้ดำเนินรายการหลักของรายการ ลายกนก ยกสยาม พร้อมกับทีมผู้ดำเนินรายการร่วมที่จะสลับสับเปลี่ยนมาดำเนินรายการร่วมกับคุณกนก ได้แก่ คุณอุบลรัตน์ เถาว์น้อย คุณรุ่งราตรี สุหงษา และคุณนิธิตรา เชาว์พยัคฆ์ ผู้ดำเนินรายการทุกท่านล้วนเป็นบุคคลที่มีชื่อเสียงและมีผู้ติดตาม ในช่องทางสื่อสังคมออนไลน์ส่วนตัวอยู่จำนวนมาก ทีมงานในส่วนการประชาสัมพันธ์จึงได้กำหนดแนวทางปฏิบัติให้ผู้ดำเนิน รายการทุกท่าน ให้ลงโพสต์เกี่ยวกับรายการลายกนกยกสยาม พร้อมทั้งแชร์โพสต์จากเพจเฟซบุ๊คหลักของรายการลายกนกยก สยามไปที่แฟนเพจส่วนตัวของผู้ดำเนินรายการ แนวทางปฏิบัตินี้เป็นตัวช่วยแพร่กระจายคอนเทนต์เพื่อการมองเห็น ขยายกลุ่ม ฐานแฟนรายการลายกนกยกสยามได้อย่างมีประสิทธิภาพ

ภาพที่ 3 การแชร์โพสต์จากเพจเฟสบุ๊คของรายการโดยผู้ดำเนินรายการ

ที่มา: [เฟซบุ๊ก Kanok Ratwongsakul Fan Page, Yai Rungratree]

8.2 ระหว่างการออกอากาศ (On Air) รายการลายกนกยกสยามเป็นรายการโทรทัศน์ในรูปแบบวาไรตี้ ออกอากาศ ทางสถานีโทรทัศน์ช่อง JKN18 ทุกวันอาทิตย์ เวลา 20.10 -21.10 น. รายการมุ่งเน้นการนำเสนอเรื่องราวประวัติศาสตร์ บุคคล สถานที่ท่องเที่ยว ผู้ชมสามารถรับชมรายการสดผ่าน Live Streamimg ผ่านเฟซบุ๊กรายการลายกนกยกสยาม Live Streamimg ผ่านช่องยูทูป TOP NEWS LIVE โดยจะออกอากาศพร้อมกันไปทั้งทางสถานีโทรทัศน์ช่อง JKN18 ที่เป็นช่องทาง หลักและเชื่อมต่อสัญญาณผ่านสื่อสังคมออนไลน์ไปพร้อมกัน โดยเมื่อเริ่มถึงเวลาออกอากาศโพสต์ตอนใหม่ของรายการลาย กนกยกสยามในทุกช่องทางก็จะแจ้งเตือนขึ้นพร้อม ๆ กัน ทีมประชาสัมพันธ์และงานสื่อสารองค์กร ยังได้มีการกำหนดกลยุทธ์ ที่ใช้ในระหว่างการออกอากาศของรายการลายกนกยกสยาม โดยให้มีการสร้างความเคลื่อนไหวขณะออกอากาศ ไปยังช่องทาง ที่เป็นเพจเฟซบุ๊กของรายการโดยจะเตรียมเนื้อหาของการโพสไว้ล่วงหน้า โดยเนื้อหานั้น จะเป็นไฮไลท์ของเนื้อหารายการใน แต่ละเบรค โดยจะแบ่งการโพสออกเป็น 4 ช่วงตามเบรกทั้งหมด 4 เบรค ลักษณะเช่นนี้เป็นการสร้างความเคลื่อนไหวและ สามารถเซ็ตปฏิสัมพันธ์ที่เกิดขึ้นกับผู้ชมที่อยู่ในสื่อสังคมออนไลน์ เป็นรูปแบบการสร้างสรรค์เนื้อหาแบบเรียลไทม์ (Real-time Content) เป็นตัวส่งเสริม ให้เกิดการรับชมหรือการแสดงออกทางความคิดเห็นที่เกิดกับรายการ ในเทปนั้น ๆ ได้เป็นอย่างดี

ผู้อำนวยการผลิตในมุมมองของผู้ให้นโยบายและกำหนดกลยุทธ์ของการใช้หน้าจอที่สองโดยมองเห็นถึงความสำคัญของ การใช้สื่อสังคมออนไลน์ เข้ามาเป็นตัวช่วยผลักดันและการรวบรวมกลุ่มแฟนรายการซึ่งถือเป็นผู้ชมกลุ่มใหญ่ที่มีส่วนช่วย สนับสนุนและส่งเสริมให้รายการได้รับความนิยมกลยุทธ์หน้าจอที่สองจึงต้องเน้นในส่วนของเนื้อหาที่นำเสนอเป็นพิเศษ เลือก และออกแบบให้เข้ากับกลุ่มเป้าหมาย เป็นการส่งเสริมคุณค่าของเนื้อหาเพื่อให้ผู้ชมได้มองเห็นมากยิ่งขึ้นในทุกแพลตฟอร์ม
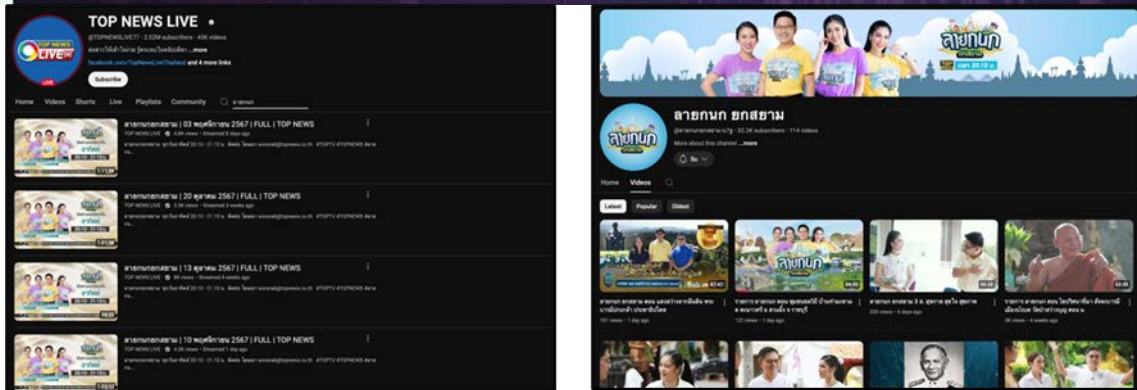
ภาพที่ 3 การแชร์โพสต์จากเพจเฟสบุ๊คของรายการโดยผู้ดำเนินรายการ

ที่มา: [ช่องยูทูป TOP NEWS LIVE , ช่องยูทูปลายกนก ยกสยาม]

        8.3 หลังการออกอากาศ (Post – On Air) รายการลายกนกยกสยามเป็นรายการโทรทัศน์ในรูปแบบวาไรตี้ ออกอากาศทางช่อง JKN18 ทุกวันอาทิตย์ เวลา 20.10 -21.10 น. นำเสนอเรื่องราวประวัติศาสตร์ บุคคล สถานที่ท่องเที่ยว ผู้ชมสามารถรับชมรายการสดผ่าน Live Streamimg ผ่านเฟซบุ๊กรายการลายกนก ยกสยาม Live Streamimg ผ่านช่องยู ทูป ผู้อำนวยการผลิตและทีมประชาสัมพันธ์และงานสื่อสารองค์กร ให้ความเห็นกับกลยุทธ์หน้าจอที่สองหลังการออกอากาศ ไว้ว่า เมื่อจบการออกอากาศทุกครั้ง อนุมานว่ายังคงมีกลุ่มผู้ชมอีกจำนวนมากที่ไม่สามารถชมสดผ่านทางช่องทางหลักของ สถานีโทรทัศน์ JKN18 หรือ Live Streamimg ตามช่องทางต่าง ๆ ในสื่อสังคมออนไลน์ที่รายการได้ จึงจำเป็นต้องมีการ กำหนดแนวทางในการจัดการไว้ดังนี้

        8.3.1 การรับชมย้อนหลัง เมื่อสิ้นสุดการออกอากาศสดทางสถานีโทรทัศน์ JKN18 และ Live Streamimg ผ่าน สื่อสังคมออนไลน์ ระบบออกอากาศออนไลน์จะถูกตั้งค่าให้โพสต์รายการ Ep. ล่าสุดฉบับเต็มบน New Feed เฟซบุ๊กรายการ ลายกนก ยกสยาม เช่นเดียวกับบนช่องยูทูป TOP NEWS LIVE วิธีการนี้เป็นความตั้งใจเพื่อให้แฟนรายการที่พลาดการรับชม การออกอากาศสดทางสถานีโทรทัศน์ และสำหรับผู้ที่ได้รับชมรายการแบบออกอากาศสดทางสถานีโทรทัศน์ไปแล้วสามารถ รับชมซ้ำและเมื่อเกิดความพึงพอใจจะเกิดการแชร์หรือส่งต่อให้กับเพื่อนต่อไปเป็น การแพร่กระจายตามหลักของสื่อสังคม ออนไลน์ที่ผู้ผลิตรายการมีความตั้งใจให้เกิดขึ้น สอดคล้องกับผลงานศึกษาของ Burger[7] ที่ระบุว่าสถานการณ์เป็นตัวกำหนด พฤติกรรมการแชร์ข้อมูลข่าวสาร เมื่อคนเรามีสิ่งกระตุ้นทางอารมณ์ จะทำให้การแชร์เรื่องเหล่านั้นเพิ่มขึ้น ดังนั้นจึงสันนิษฐาน ได้ว่าเนื้อหาที่มีความเร้าใจน่าสนใจ ตอบผู้ใช้สื่อ เป็นผลทำให้มีการแบ่งปันเนื้อหาเหล่านั้นถูกส่งต่อเพื่อแพร่กระจายเนื้อหาให้ สาธารณชนสนใจ

        8.3.2 ตัดคลิปสั้นทำ Reels & Shorts ความยาวของรายการลายกนกยกสยาม เมื่อออกอากาศร่วมกับ การเบรก โฆษณาทั้ง 4 ช่วง โดยรวมมีความยาวทั้งสิ้น 60 นาที ในแต่ละช่วงแต่ละตอนของรายการจะมีไฮไลท์ที่เกิดขึ้นมากมาย ผู้อำนวยการผลิตได้กล่าวว่า การนำเทปรายการที่ออกอากาศแล้วมาตัดตอนเป็นคลิปสั้นเพื่อโพสต์ลงบน Feature ของเฟซบุ๊ก คือ Reels และ Feature ของยูทูป คือ Shorts มีผลทำให้อัตราการมองเห็นเพิ่มมากขึ้น สอดคล้องกับผลงานศึกษาของ Bhushan[8] ที่กล่าวว่า Reels & Shorts ได้รับความนิยมอย่างสูงเนื่องจากสามารถมอบความบันเทิงในรูปแบบกระชับ ที่ เหมาะกับโลกที่เวลาเป็นสิ่งล้ำค่า แพลตฟอร์มเหล่านี้ใช้ประโยชน์จากอัลกอริธึมเพื่อให้ผู้ใช้มีส่วนร่วมอย่างต่อเนื่อง โดยการ นำเสนอวิดีโอสั้น ๆ ที่กระตุ้นสายตาอย่างต่อเนื่อง ด้วยเนื้อหาที่ออกแบบมาให้เสพติดและบริโภคได้ง่าย ผู้ใช้พบว่าตนเองชื่น ชอบในวิดีโอสั้น ๆ ที่ดึงดูดความสนใจแบบไม่สิ้นสุด ทีมประชาสัมพันธ์เทปรายการที่ออกอากาศไปแล้วที่ถูกเลือกมาใช้ตัดเป็น คลิปสั้น จะต้องถูกพิจารณาแล้วว่าเป็นเนื้อหาหรือตอนที่มีความน่าสน หรือได้รับความนิยมจากผู้ชมโดยพิจารณาจากยอดวิวที่ ปรากฏขึ้นจะคลิปต้นฉบับที่ถูกแชร์ขึ้นหลังจากออกอากาศสดทางสถานีโทรทัศน์แล้ว
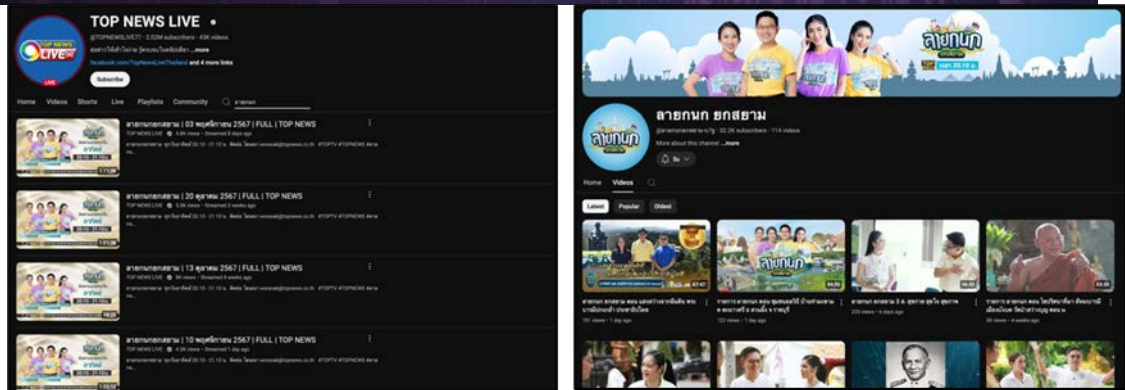
ภาพที่ 4 การแชร์โพสต์จากเพจเฟสบุ๊คของรายการโดยผู้ดำเนินรายการ

ที่มา: [เฟซบุ๊คเพจลายกนก ยกสยาม, ช่องยูทูปลายกนก ยกสยาม]

8.3.3 การจัดการ Feedback ทีมประชาสัมพันธ์และสื่อสารการตลาดของรายการลายกนกยกสยาม กล่าวว่า การให้ความสำคัญกับข้อความคอมเมนต์ในเพจเฟซบุ๊ก มีความสำคัญอย่างมากเนื่องจากสามารถแบ่งรายละเอียดออกได้ดังนี้

1) สร้างความน่าเชื่อถือและภาพลักษณ์ที่ดีเพราะการตอบสนองต่อคอมเมนต์แสดงให้เห็นว่าเพจที่เป็นตัวแทนของ รายการให้ความใส่ใจความคิดเห็นของแฟนรายการผู้ติดตาม ช่วยสร้างความรู้สึกว่าความคิดเห็นของพวกเขามีคุณค่า

2) เสริมสร้างความสัมพันธ์กับแฟนรายการ การตอบคอมเมนต์ช่วยสร้างความใกล้ชิดและความผูกพันได้อย่างดี เมื่อผู้ติดตามรู้สึกว่าพวกเขาได้รับการตอบกลับหรือได้รับการสนใจจากเพจ ทำให้มีแนวโน้มที่จะกลับมาเยี่ยมชมและมีส่วน ร่วมกับเพจบ่อยขึ้น

3) เพิ่มการมีส่วนร่วม (Engagement) และการเข้าถึงการโต้ตอบคอมเมนต์ช่วยเพิ่มจำนวนการมีส่วนร่วม ผู้วิจัย เห็นด้วยในประเด็นนี้เนื่องจากการปฏิบัติดังกล่าวเป็นหนึ่งในปัจจัยที่เฟซบุ๊กใช้ในการพิจารณาให้เพจมีการเข้าถึงสูงขึ้นเพราะ ยิ่งมีคอมเมนต์และการตอบโต้มากเท่าไหร่โอกาสที่โพสต์จะถูกแสดงให้ผู้คนเห็นมากขึ้นก็จะเพิ่มขึ้น

4) รับฟังความคิดเห็นและข้อเสนอแนะ คอมเมนต์สามารถเป็นแหล่งข้อมูลสำคัญในการรับฟังข้อเสนอแนะ ความ ต้องการหรือปัญหา นำมาพิจารณาปรับปรุงเนื้อหาให้ตรงกับความต้องการของกลุ่มเป้าหมายได้ดียิ่งขึ้น

5) จัดการปัญหาและลดข้อคิดเห็นเชิงลบ การติดตามและตอบกลับคอมเมนต์เชิงลบอย่างรวดเร็ว สามารถช่วยลด ผลกระทบที่อาจเกิดจากข้อมูลเชิงลบได้ โดยการตอบอย่างมีสติและให้ข้อมูลที่ถูกต้อง นอกจากนี้ยังช่วยให้ลูกค้าคนอื่นเห็นว่า ธุรกิจใส่ใจในการแก้ไขปัญหาอย่างจริงจัง ดังนั้น การให้ความสำคัญกับคอมเมนต์ในเพจ Facebook ไม่เพียงแค่ช่วยสร้าง ความสัมพันธ์ที่ดีระหว่างเพจกับผู้ติดตาม แต่ยังเป็นส่วนสำคัญที่ช่วยขับเคลื่อนการเติบโตและความสำเร็จของเพจในระยะยาว

9. บทสรุป

การศึกษากลยุทธ์หน้าจอที่สองในการสื่อสารผ่านสื่อสังคมออนไลน์ของรายการโทรทัศน์ในประเทศไทย กรณีศึกษา รายการลายกนกยกสยาม ได้ผลการวิเคราะห์ความสำคัญและบทบาทของหน้าจอที่สองในการเสริมสร้างประสบการณ์การ รับชมรายการโทรทัศน์ เพื่อข้อเสนอแนะแก่ผู้ผลิตรายการโทรทัศน์และผู้ผลิตเนื้อหาในการใช้กลยุทธ์หน้าจอที่สองอย่างมี ประสิทธิภาพ ผลการศึกษาพบว่า โครงสร้างการทำงานของการผลิตรายการเป็นการบริหารงานแบบองค์รวมมีผู้อำนวยการ ผลิตเป็นผู้ควบคุมกำหนดทิศทางของการผลิตรายการ กระบวนการทำงานแบ่งการทำงานร่วมกัน 3 ส่วนใหญ่ 1) ส่วนผลิต รายการควบคุมโดยผู้อำนวยการผลิตและทีมผลิตรายการที่ประกอบด้วย ทีมช่างภาพวิดีโอและภาพนิ่ง ทีมประสานงาน ทีมตัด ต่อ 2) ส่วนผู้ดำเนินรายการโดยจะมีผู้ดำเนินรายการหลัก 2 ท่าน 3) ส่วนงานประชาสัมพันธ์และส่งเสริมการตลาด โดยงาน ในส่วนนี้ จะทำหน้าที่ในการนำเสนอเนื้อหาลงบนสื่อสังคมออนไลน์ทุกช่องทางของรายการ ผลการวิเคราะห์จากการสัมภาษณ์

เชิงลึกพบว่า รายการ มีรูปแบบการสื่อสาร ผ่าน 3 ช่องทางหลัก ได้แก่ รายการทางสถานีโทรทัศน์ เฟซบุ๊ก ยูทูป คู่ขนานกัน ไป มีการปรับประยุกต์การเผยแพร่เนื้อหาให้สอดคล้องกับคุณสมบัติเชิงเทคนิคของสื่อสังคมออนไลน์ค่ายนั้น ๆ กลยุทธ์ หน้าจอที่สองที่ถูกนำมาใช้ 3 อันดับ อันดับแรกคือก่อนออกอากาศ (Pre – On Air) การนำเสนอเนื้อไฮไลท์แบบกระตุ้นเตือน ให้เกิดความน่าสนใจของรายการในแต่ละสัปดาห์รวมถึงการนำเสนอเบื้องหลังการทำงานของตอนถัดไป สร้างความเคลื่อนไหว แพร่กระจายคอนเทนต์ด้วยความมือชื่อเสียงของผู้ดำเนินรายการ อันดับสองคือระหว่างการออกอากาศ (On Air) เป็นการ นำเสนอความสอดคล้องในแบบเรียลไทม์ขณะที่มีการออกอากาศผ่านสื่อช่องทางหลัก การสร้างความเคลื่อนไหวและสามารถ เช็คปฏิสัมพันธ์ที่เกิดขึ้นกับผู้ชมที่อยู่ในสื่อสังคมออนไลน์ เป็นรูปแบบการสร้างสรรค์เนื้อหาแบบเรียลไทม์ (Real-time Content) เป็นตัวส่งเสริมให้เกิดการรับชมหรือการแสดงออกทางความคิดเห็นที่เกิดกับรายการ อันดับสามคือการบริการ จัดการกับการรับชมย้อนหลัง ตัดคลิปสั้นทำ Reels & Shorts ที่ตอบสนองกับพฤติกรรมผู้ชมในปัจจุบันที่ชอบชมคลิปสั้น กระชับได้ใจความ และลงท้ายด้วยการจัดการ Feedback ความคิดเห็นของกลุ่มเป้าหมายการสร้างปฏิสัมพันธ์กับผู้ชมตอบ คำถามแฟนรายการและสร้างกิจกรรมสัมพันธ์ผ่านสื่อสังคมออนไลน์ สอดคล้องกับผลการศึกษาของ Frankie Karrer [9] มี ผู้ชมที่ใช้หน้าจอที่สองใช้แอปพลิเคชันหลากหลายขณะชมโทรทัศน์ ผู้ใช้หน้าจอที่สองจะค้นหาข้อมูลเพิ่มเติมเกี่ยวกับเนื้อหาที่ นำเสนอจากการชมโทรทัศน์ โดยแบ่งรายละเอียดออกได้ดังนี้ สำรวจเว็บไซต์ของแบรนด์ที่ปรากฏในจอโทรทัศน์ 34% เข้า ชมเว็บไซต์ซื้อขายออนไลน์เพื่อค้นหาสินค้าหรือบริการ 19% โดยกิจกรรมบนหน้าจอของผู้ใช้จะขึ้นอยู่กับสิ่งที่พวกเขากำลัง ชม เมื่อพิจารณาการใช้หน้าจอที่สองตามกลุ่มอายุ กลุ่มผู้ชมรายการโทรทัศน์อายุน้อย 16-24 ปี มักจะใช้แอปพลิเคชันสื่อ สังคมออนไลน์ 86.9% เล่นเกมขณะชมโทรทัศน์ 73.7% ใช้แอปพลิเคชันสั่งอาหาร 39.4% ส่วนผู้ชมรายการโทรทัศน์อายุ 35-44 ปี จะใช้แอปพลิเคชันธนาคาร 59.7% และเว็บไซต์ซื้อขายออนไลน์ 30.9% ขณะที่ผู้ชมรายการโทรทัศน์อายุ 55 ปีขึ้น ไปมีแนวโน้มใช้แอปพลิเคชันเพื่อค้นเรื่องการท่องเที่ยว (30.9%) อีกทั้งผลการศึกษาของนัทพร แบบประเสริฐ [2] ที่กล่าวว่า กระบวนการสร้างสรรค์และการส่งเสริมความสามารถในการสร้างให้เกิดการสื่อสารสองทางแบบ Interactivity นั้นเป็น สาระสำคัญที่สถานีโทรทัศน์หรือผู้ผลิตรายการโทรทัศน์ในระบบดิจิทัลต้องสร้างกลยุทธ์และเพิ่มเติมในด้านหลักการตลาด และ การสร้างสรรค์กลยุทธ์ Second-Screen ที่นอกเหนือจากการรับชมรายการบนหน้าจอหลัก (Extended Content) เพื่อสร้าง ฐานผู้ชมที่เพิ่มขึ้นท่ามกลางนวัตกรรมและเทคโนโลยีที่พัฒนาไปอย่างไม่หยุดยั้ง ซึ่งในต่างประเทศมีหลากสถานีที่เริ่มใช้ เทคโนโลยีของ Second Screen เข้ามาเป็นส่วนหนึ่งของ รายการโดยให้ผู้ชมทางบ้านได้มีส่วนร่วมสนุกไปกับเนื้อหาของ รายการที่ออกอากาศอยู่ ทั้งร่วมโหวตให้คะแนนแก่ผู้ที่ตนชื่นชอบแสดงความคิดเห็นและทัศนคติได้รับข้อมูลเกี่ยวกับเนื้อหา เพิ่มเติมในขณะที่ออกอากาศอยู่ใช้ Promotion ของสินค้าที่เป็นผู้สนับสนุนรายการบนหน้าจอหลักที่มีอยู่ และจองรายการที่ ต้องการรับชมครั้งต่อไป แต่ในประเทศไทยนั้นยังไม่มีรายการใด หรือสถานีไหนที่มีการประกาศตนออกมาอย่างชัดเจนว่าเป็น ผู้สำเร็จ หรือเป็นเจ้าของรายการที่ใช้เทคโนโลยีSecond Screen ในการผลิตเนื้อหารายการอาจเป็นเพราะต้องทำให้ผู้ชมนั้นมี ความเข้าใจในรูปแบบและวิธีการใช้งานและยังมีผู้รับสารหลายท่านยังไม่มีโทรศัพท์ที่ทันสมัยที่ใช้งานร่วมกับ Second Screen ได้

10. กิตติกรรมประกาศ

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ด้านวิทยาศาสตร์และเทคโนโลยี

(14-TH-SCT)
การคัดแยกแบคทีเรียกรดแล็กติกที่ผลิตสารกาบาจากอาหารหมัก

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บทคัดย่อ
กรดแกมมา-อะมิโนบิวทิริกหรือกาบาเป็นกรดอะมิโนที่ไม่ใช่โปรตีนที่พบได้ทั่วไปในสิ่งมีชีวิต กาบามีหน้าที่เกี่ยวกับการส่ง
สัญญาณประสาท ในงานวิจัยนี้มีวัตถุประสงค์เพื่อแยกเชื้อแบคทีเรียกรดแล็กติกที่ผลิตสารกาบาจากตัวอย่างอาหารหมักดอง โดย
จากตัวอย่างอาหารหมักดอง 30 ตัวอย่าง คัดแยกแบคทีเรียกรดแล็กติกได้ 57 ไอโซเลต โดยทุกไอโซเลตถูกตรวจสอบการผลิตสาร
กาบาเบื้องต้นด้วยวิธี colorimetric assay และตามด้วยการหาปริมาณสารกาบาที่แบคทีเรียกรดแล็กติกผลิตเมื่อเลี้ยงในอาหาร
MSR ผสมโมโนโซเดียมกลูตาเมตที่ร้อยละ 5.0 พบว่า ไอโซเลต LNN29a ผลิตสารกาบาได้สูงที่สุดอย่างมีนัยสำคัญทางสถิติที่ 11.11
g/L ไอโซเลตนี้จึงถูกนำไประบุสายพันธุ์ด้วยลักษณะทางสัณฐานวิทยาร่วมกับลำดับยีน 16S rDNA พบว่าใกล้เคียงกับ
Lacticaseibacillus paracasei ซึ่งเชื้อนี้จะเป็นทางเลือกหนึ่งในการนำไปประยุกต์ใช้ในการผลิตอาหารเพื่อสุขภาพต่อไป

คำสำคัญ: กาบา; แบคทีเรียกรดแล็กติก; แล็กติเคซีอัยบาซิลลัส; โพรไบโอติกส์; อาหารหมัก

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Isolation of gramma aminobutyric acid-producing lactic acid bacteria from fermented foods

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Abstract

Gamma-aminobutyric acid (GABA) is a non-protein amino acid that is widely present in organisms. GABA has been characterized as a neurotransmitter. This study aimed to isolate GABA-producing lactic acid bacteria (LAB) from fermented food samples. Fifty-seven isolates of LAB were isolated from 30 fermented food samples. All isolates were determined to produce GABA using a colorimetric assay, followed by determination of GABA contents of LAB cultured in MRS containing 5.0% monosodium glutamate. The result found that isolate LNN29a showed significantly highest GABA production at 11.11 g/L. Isolate LNN29a was identified as *Lacticaseibacillus paracasei* based on cell morphology and 16S rDNA sequencing. This strain will be an alternative for further application in the functional food product.

Keywords: GABA; Lactic acid bacteria; *Lacticaseibacillus*; probiotic; fermented food

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1. บทนำ

กรดแกมมาอะมิโนบิวทิริก (gramma-aminobutyric acid; GABA) เป็นกรดอะมิโนที่ไม่ใช่โปรตีนที่พบในเซลล์ของสิ่งมีชีวิต [1] สารกาบาทำหน้าที่เป็นสารสื่อประสาทชนิดยับยั้งที่สำคัญ ในระบบประสาทของสัตว์เลี้ยงลูกด้วยน้ำนม มีรายงานว่าสารกาบาช่วยเพิ่มระดับฮอร์โมนการเจริญเติบโต การสังเคราะห์โปรตีนในสมอง ความจำ และความสามารถทางปัญญา ลดความดันโลหิต และช่วยให้ระบบประสาทผ่อนคลาย [2] อีกทั้งสารกาบายังผลิตได้จากพืชหลายชนิด เช่น มันฝรั่งและใบชา [3] และจากข้าวสายพันธุ์ต่าง ๆ [4] ในการผลิตสารกาบาประกอบด้วยสามกระบวนการหลัก ได้แก่ การสังเคราะห์ทางเคมี (chemical synthesis) การผลิตด้วยกระบวนการเร่งปฏิกิริยาด้วยเอนไซม์ (enzymatic biocatalysis) และกระบวนการหมักด้วยจุลินทรีย์ [5] ในด้านการผลิตสารกาบาของจุลินทรีย์พบว่ากลุ่มราและแบคทีเรียสามารถผลิตสารกาบาได้ในปริมาณสูง ตัวอย่างราที่มีการผลิตสารกาบาสูงได้แก่ *Monascus* sp., *Neurospora* sp., *Rhizopus* sp. และ *Aspergillus* sp. [6] ตัวอย่างยีสต์ได้แก่ *Pichia silvicola* และ *Sporobolomyces carnicolor* [7] และกลุ่มแบคทีเรีย ได้แก่จีนัส *Lactobacillus* sp., *Lactococcus* sp., *Streptococcus* sp., *Enterococcus* sp. และ *Lactobacillus* sp. [8] ซึ่งแบคทีเรียเหล่านี้จัดอยู่ในกลุ่มแบคทีเรียกรดแล็กติก ที่เป็นจุลินทรีย์ที่มีความสำคัญในอุตสาหกรรมอาหาร มีการศึกษาว่าเป็นกลุ่มแบคทีเรียที่มีความปลอดภัย รวมถึงการใช้เป็นโพรไบโอติกส์ในอาหารเพื่อสุขภาพ อีกทั้งการผลิตสารกาบาจากแบคทีเรียยังจัดว่ามีความเป็นมิตรต่อสิ่งแวดล้อมและมีความปลอดภัย ในการได้มาซึ่งสารกาบาที่จะใช้เป็นองค์ประกอบที่มีศักยภาพในการผลิตผลิตภัณฑ์ใหม่ ๆ ที่เป็นประโยชน์ต่อสุขภาพ

แบคทีเรียกรดแล็กติก (Lactic acid bacteria) เป็นแบคทีเรียแกรมบวก ไม่สร้างสปอร์ และไม่สร้างเอนไซม์คะตะเลส มีทั้งชนิดที่เซลล์มีลักษณะรูปท่อนและกลม [9] มักพบในอาหารหมักดองรวมถึงลำไส้สัตว์และมนุษย์ เป็นจุลินทรีย์กลุ่มใหญ่ที่ถูกนำไปศึกษาในการใช้เป็นโพรไบโอติกส์ที่มีประโยชน์หลายด้าน อีกทั้งแบคทีเรียกรดแล็กติกได้ถูกนำมาใช้อย่างแพร่หลายในอุตสาหกรรมอาหาร โดยเฉพาะอย่างยิ่งในการผลิตอาหารหมัก ซึ่งช่วยเพิ่มคุณค่าทางโภชนาการของผลิตภัณฑ์อาหารหมักให้มีประโยชน์ต่อผู้บริโภค [10] นอกจากสามารถผลิตกรดแล็กติกแล้วแบคทีเรียกลุ่มนี้ยังสามารถผลิตกรดอินทรีย์อื่น ๆ ได้ รวมถึงผลิตสารประกอบที่ออกฤทธิ์ทางชีวภาพได้หลายชนิด โดยเฉพาะอย่างยิ่งแบคทีเรียกรดแล็กติกสามารถผลิตแบคเทอริโอซิน (bacteriocin) ที่สามารถยับยั้งเชื้อก่อโรคได้หลายสายพันธุ์และถูกนำไปใช้เป็นสารถนอมอาหารที่มีความปลอดภัย [11]

แบคทีเรียกรดแล็กติกนิยมใช้ในผลิตภัณฑ์ทางการค้าในกลุ่มอาหารหมักหลายประเภท และใช้เป็นโพรไบโอติกส์ที่มีศักยภาพในการส่งเสริมสุขภาพร่างกายและการผลิตสารออกฤทธิ์ที่ดีต่อร่างกายหลายประการ ตัวอย่างแบคทีเรียกรดแล็กติกที่มีรายงานการผลิตสารกาบา ได้แก่ *Lacticaseibacillus paracasei* NFRI 7415 ที่แยกได้จากปลาหมักแบบญี่ปุ่น [12] *Lactobacillus brevis* BJ20 แยกจากอาหารหมักเกาหลี [13] *L. rhamnosus* YS9 ที่แยกมาจากผักดองแบบจีน [14] และสายพันธุ์ *Lactiplantibacillus plantarum* L42g ที่แยกได้จากแหนมหมูซึ่งเป็นอาหารหมักของไทย [15] จากหลายการศึกษาพบว่าแหล่งที่มีการคัดแยกแบคทีเรียกรดแล็กติกที่มีศักยภาพในการผลิตสารกาบาคือกลุ่มอาหารหมักดอง ดังนั้นในงานวิจัยนี้จึงมีวัตถุประสงค์คือการคัดแยกแบคทีเรียกรดแล็กติกจากอาหารหมักของไทย และระบุสายพันธุ์แบคทีเรียกรดแล็กติกที่มีศักยภาพในการผลิตสารกาบา เพื่อเป็นจุลินทรีย์สายพันธุ์ใหม่ ๆ ในการใช้พัฒนาอาหารเพื่อสุขภาพ

2. วิธีดำเนินการวิจัย

2.1 การคัดแยกเชื้อแบคทีเรียกรดแล็กติกจากตัวอย่างอาหารหมักดอง

การคัดแยกทำตามวิธีของ Meidong et al [16] โดยนำตัวอย่างอาหารหมักดองมาเจือจางแบบ ten-fold dilution ในสารละลาย Normal saline solution (NSS, 0.85% NaCl) ปริมาตร 9 มิลลิลิตร จากนั้นเกลี่ยลงในอาหาร de Man, Rogosa,

การประชุมวิชาการระดับชาติและนานาชาติบ้านสมเด็จเจ้าพระยา ครั้งที่ 1 (BS2C 2025)
the 1ˢᵗ Bansomdejchaopraya National and International Conference (BS2C 2025)

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and Sharpe (MRS) agar (Biomerier, France) ที่เติม 0.5% CaCO₃ (Himedia, India) โดยใช้เทคนิค spread plate นำไปบ่มที่อุณหภูมิ 35 องศาเซลเซียส เป็นเวลา 24-48 ชั่วโมง คัดเลือกโคโลนีที่แตกต่างกันและมีโซนใส streak ให้ได้เชื้อบริสุทธิ์ จากนั้นเก็บรักษาในกลีเซอรอล ร้อยละ 20 ที่อุณหภูมิ -80 องศาเซลเซียส เพื่อใช้ในการทดลองต่อไป

2.2 ตรวจสอบการผลิตสารกาบาเบื้องต้น

ตรวจสอบการผลิตสารกาบาเบื้องต้นตามวิธีของ Santos-Espinosa et al [17] โดยเชื้อแบคทีเรียกรดแล็กติกเลี้ยงใน MRS broth ที่เติมโมโนโซเดียมกลูตาเมต (monosodium glutamate, MSG; Ajinomoto, Thailand) เข้มข้นร้อยละ 5 บ่มเขย่าที่ 150 rpm อุณหภูมิ 35 องศาเซลเซียส ก่อนนำไปปั่นเหวี่ยงเพื่อเก็บเซลล์ (6000 rpm, 4 องศาเซลเซียส, 10 นาที) นำส่วนตะกอนเซลล์ไปแขวนลอยใน NSS ปรับความขุ่นของเชื้อแบคทีเรียทดสอบให้มีความขุ่นที่ OD_{600} เท่ากับ 2.0 (1×10^8 CFU/ml) การศึกษานี้ใช้เชื้อ *L. plantarum* L42g [15] ซึ่งเป็นสายพันธุ์ที่ผลิตสารกาบาเป็นเชื้ออ้างอิงในการศึกษา จากนั้นเซลล์แขวนลอยที่ใช้ทดสอบผสมกับสารละลาย GAD (GAD solution: glutamic acid, 1g; Triton X-100, 0.3g; NaCl, 90g; bromocresol green, 0.05g; น้ำกลั่น 1000 มิลลิลิตร, pH 4) โดยใช้เชื้อ 0.2 มิลลิลิตร กับสารละลาย 5 มิลลิลิตร ผสมด้วย vortex mixture เป็นเวลา 1 นาที นำไปบ่มเป็นเวลา 4 ชั่วโมง ภายใต้สภาวะไร้อากาศ ด้วยโถบ่มไร้อ๊อกซิเจน (anaerobic jar) ตรวจผลการทดสอบด้วยการสังเกตปฏิกิริยาการเปลี่ยนสีจากสีเขียวเป็นสีคราม และให้คะแนนการผลิตเป็น (+) แทนการเปลี่ยนสีน้อย, (++) แทนการเปลี่ยนสีปานกลาง, (+++) แทนการเปลี่ยนสีมากที่สุด และเครื่องหมาย (-) ไม่เกิดการเปลี่ยนสี จากนั้นเลือกสายพันธุ์ที่สามารถผลิตสารกาบาได้ไปศึกษาต่อ

2.3 การวิเคราะห์ปริมาณการผลิตสารกาบาของแบคทีเรียกรดแล็กติก

นำแบคทีเรียกรดแล็กติกที่มีกิจกรรมการผลิตสารกาบาจากข้อ 2.2 มาตรวจปริมาณการผลิตสารกาบาตามวิธีของ Tanamool et al [18] โดยนำแบคทีเรียกรดแล็กติกมาเลี้ยงในอาหาร MRS broth ที่เติม (MSG) ความเข้มข้นร้อยละ 5 บ่มเขย่าที่ 150 rpm อุณหภูมิ 35 องศาเซลเซียส เป็นเวลา 72 ชั่วโมง จากนั้นนำไปปั่นเหวี่ยงเพื่อเก็บส่วนใส ในการวิเคราะห์เริ่มจากนำส่วนใสของแบคทีเรียกรดแล็กติก ปริมาตร 50 ไมโครลิตร ผสมกับ 0.2 M borate buffer ปริมาตร 100 ไมโครลิตร 6% phenol reagent ปริมาตร 500 ไมโครลิตร 6% sodium hypochlorite ปริมาตร 200 ไมโครลิตร ผสมให้เข้าด้วย vortex mixture นำไปต้มเป็นเวลา 10 นาที ทำให้เย็นโดยแช่ในน้ำเย็นเป็นเวลา 5 นาที นำไปวัดค่าดูดกลืนแสงที่ความยาวคลื่น 630 nm ด้วย UV-Vis spectrophotometer (C7100, Peak instruments Inc., USA) โดยการผลิตสารกาบาของแบคทีเรียกรดแล็กติกทำการเทียบกับกราฟมาตรฐานเพื่อหาความเข้มข้นของสารกาบาที่เชื้อผลิตได้ สารกาบามาตรฐานที่ใช้เทียบในการศึกษานี้ ใช้ที่ความเข้มข้น 250 - 4,000 μg/ml โดยทำการวิเคราะห์ดังที่กล่าวไว้ข้างต้น

2.4 การจำแนกแบคทีเรียกรดแล็กติก LNN29a

ไอโซเลต LNN29a จำแนกด้วยลักษณะทางสัณฐานวิทยาร่วมกับการยืนยันด้วยลำดับ 16S rDNA โดยเพิ่มจำนวนของยีนบริเวณ 16S rRNA gene ด้วยวิธี Polymerase chain reaction (PCR) ด้วยเอนไซม์ Taq DNA polymerase ร่วมกับไพรเมอร์ 20F (5'-GAG TTT GAT CCT GGC TCA G-3') และ 1500R (5'-GTT ACC TTG TTA CGA CTT-3') จากนั้นนำลำดับ 16S rDNA ของไอโซเลต LNN29a ไปเปรียบเทียบกับเชื้อแบคทีเรียกรดแล็กติกสายพันธุ์ต่าง ๆ ที่มีในฐานข้อมูล GenBank databases และ Ezbiocloud databases และสร้าง phylogenetic tree ด้วยโปรแกรม MEGA ver. 11 [19]

2.5 สถิติในการวิจัย

ในการศึกษาทำการทดลอง 3 ซ้ำ และวิเคราะห์ความแปรปรวนแบบทางเดียว (One way Analysis of variance: ANOVA) ตรวจสอบความแตกต่างระหว่างค่าเฉลี่ยด้วยวิธี Duncan new Multiple Range Test (DMRT) ที่ความเชื่อมั่นร้อยละ 99 โดยใช้โปรแกรม SPSS version 21

3. ผลการวิจัย

3.1 ผลการคัดแยกแบคทีเรียกรดแล็กติกจากอาหารหมักดอง

ในการศึกษานี้ได้ทำการคัดแยกแบคทีเรียกรดแล็กติกจากอาหารหมักดอง จำนวน 30 ตัวอย่าง จากตลาดสดในพื้นที่ของกรุงเทพมหานคร ตัวอย่างอาหารหมักที่นำมาศึกษาได้แก่ แหนมเนื้อ แหนมปลา แหนมหมู ไส้กรอกอีสาน ปลาส้ม ผักกาดดอง กะหล่ำดอง ต้นหอมดอง หน่อไม้ดองและผักเสี้ยนดอง (ตารางที่ 1) โดยแยกเชื้อแบคทีเรียกรดแล็กติกได้ทั้งหมด 57 ไอโซเลต

ตารางที่ 1 ตัวอย่างอาหารหมักดองและแบคทีเรียกรดแล็กติกที่คัดแยกได้

ชนิดตัวอย่าง	จำนวนตัวอย่าง	จำนวนไอโซเลต
แหนมเนื้อ	3	8
แหนมปลา	3	3
แหนมหมู	7	14
ไส้กรอกอีสาน	4	10
ปลาส้ม	2	5
ผักกาดดอง	3	2
กะหล่ำดอง	4	7
ต้นหอมดอง	1	3
หน่อไม้ดอง	1	0
ผักเสี้ยนดอง	2	5
รวม	30	57

3.2 ผลการตรวจสอบการผลิตกาบาเบื้องต้น

ผลการตรวจสอบการสร้างสารกาบาของแบคทีเรียกรดแล็กติกทั้ง 57 ไอโซเลต แสดงในตารางที่ 2 พบว่าไอโซเลตที่ผลิตสารกาบาได้สูงที่สุดคือระดับสามได้แก่ ไอโซเลต LFC08a, LFC08b และ LF16b ไอโซเลตที่มีการผลิตสารกาบาได้ที่ระดับสองคือ ไอโซเลต LF22a, LNN29a และ LF30b และไอโซเลตที่ผลิตได้ที่ระดับหนึ่งได้แก่ ไอโซเลต LF21c, LPS24b, LNM26b และ LNM26c โดยสายพันธุ์ *L. plantarum* L42g ที่ใช้เป็นเชื้ออ้างอิงในการศึกษาครั้งนี้มีการผลิตสารกาบาได้ที่ระดับสอง

3.3 ผลการวิเคราะห์ปริมาณสารกาบา

ปริมาณสารกาบาที่แบคทีเรียกรดแล็กติกผลิตเมื่อเลี้ยงในอาหาร MRS ผสม 5% MSG แสดงในภาพที่ 1 ซึ่งแบคทีเรียกรด
แล็กติกที่นำมาทดสอบ มีปริมาณสารกาบาที่ผลิตได้อยู่ระหว่าง 3.50 - 11.11 g/L โดยสายพันธุ์ *L. plantarum* L42g ที่เป็นเชื้อ
อ้างอิง พบว่ามีสามารถผลิตสารกาบาได้ที่ 5.58 g/L ขณะที่ไอโซเลต LNN29a สามารถผลิตกาบาได้สูงที่สุดและสูงกว่าสายพันธุ์
อ้างอิงอย่างมีนัยสำคัญทางสถิติ (p <0.01) ที่ 11.11 g/L รองลงมาคือไอโซเลต LF21c และ LFC08b สามารถผลิตสารกาบาได้
11.08 g/L และ 8.03 g/L ตามลำดับ

3.4 ผลการจำแนก LNN229a

ไอโซเลต LNN29a เป็นสายพันธุ์ที่ผลิตสารกาบาได้ปริมาณสูงที่สุดนั้นแยกมาจากตัวอย่างอาหารหมักดองคือแหนมเนื้อ โดย
ไอโซเลตนี้เป็นแบคทีเรียแกรมบวก รูปท่อน ทั้งนี้ผลจากการจำแนกด้วย 16S rDNA พบว่าใกล้เคียงกับเชื้อ *Lacticaseibacillus
paracasei* JCM 1171 ที่ร้อยละ 99.80 ดังแสดงในภาพที่ 2

ตารางที่ 2 การผลิตสารกาบาของแบคทีเรียกรดแล็กติกด้วยวิธี GAD assay

ลำดับ	ไอโซเลต	การสร้างกาบา	ลำดับ	ไอโซเลต	การสร้างกาบา
1	LFC08a	+++	6	LPS24b	+
2	LFC08b	+++	7	LNM26b	+
3	LF16b	+++	8	LNM26c	+
4	LF21c	+	9	LNN29a	++
5	LF22a	++	10	LF30b	++
			11	L42g	++

*หมายเหตุ เครื่องหมาย (+) แทนการเปลี่ยนสีน้อย, (++) แทนการเปลี่ยนสีปานกลาง, (+++) แทนการเปลี่ยนสีมากที่สุด และ
เครื่องหมาย (-) ไม่เกิดการเปลี่ยนสี

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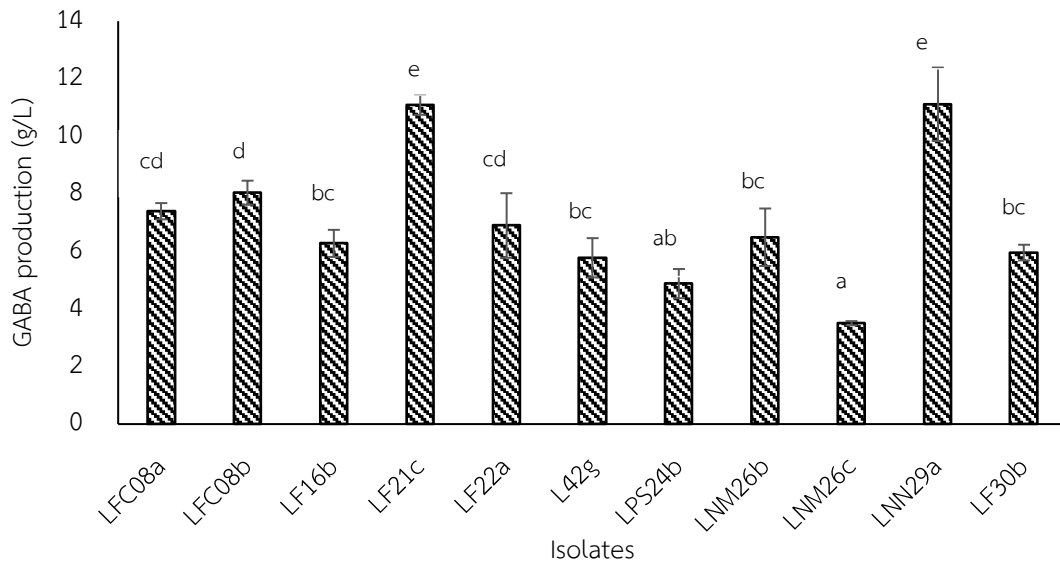
ภาพที่ 1 การผลิตสารกาบาของแบคทีเรียกรดแล็กติกในอาหาร MRS ที่มี 5% MSG เป็นเวลา 72 ชั่วโมง (สัญลักษณ์ที่แตกต่างกัน ในแต่ละแท่งกราฟแสดงความแตกต่างกันอย่างมีนัยสำคัญทางสถิติที่ความเชื่อมั่นร้อยละ 99; $p < 0.01$)

4. วิจารณ์ผลการวิจัย

แบคทีเรียกรดแล็กติกถูกรายงานว่าเป็นจุลินทรีย์ที่ผลิตสารกาบา ซึ่งสามารถคัดแยกได้จากตัวอย่างอาหารหมักดอง [12, 13, 14] ทั้งนี้ในปัจจุบันแบคทีเรียกรดแล็กติกที่ผลิตสารกาบาได้รับความสนใจในการศึกษาและคัดแยกหาสายพันธุ์ใหม่ ๆ ที่มี ประสิทธิภาพเพื่อประโยชน์ในการนำไปประยุกต์ใช้ในผลิตภัณฑ์ต่าง ๆ [20] เนื่องจากสารกาบามีบทบาทสำคัญในการทำหน้าที่เป็น สารสื่อประสาทชนิดยับยั้ง (inhibitory neurotransmitter) ในระบบประสาทส่วนกลาง เพื่อรักษาสมดุลในสมองที่ได้รับการ กระตุ้นทำให้สมองเกิดการผ่อนคลายและนอนหลับสบาย [21] ในงานวิจัยนี้สามารถคัดแยกแบคทีเรียกรดแล็กติก จากตัวอย่าง อาหารหมักดองทั้งสิ้น 57 ไอโซเลต พบว่าแบคทีเรียกรดแล็กติกที่มีศักยภาพสูงที่สุดคือ *Lc. paracesei* LNN29a ที่แยกมาจาก แหนมเนื้อ ซึ่งในหลายงานวิจัยสามารถแยกแบคทีเรียที่ผลิตสารกาบาได้จากอาหารหมักดอง เช่นในงานของ Kim et al [20] แยก เชื้อแบคทีเรียกรดแล็กติกที่ผลิตสารกาบาได้จากอาหารหมักของเกาหลี ได้แก่สายพันธุ์ *Levilactobacillus brevis, Lactococcus lactis, L. plantarum, L. acidophilus, Limosilactobacillus reuteri, Enterococcus faecium* และ *Enterococcus faecalis* ซึ่งสามารถผลิตสารกาบาได้ระหว่าง 0.26 – 0.32 g/L เมื่อเลี้ยงในอาหาร MRS ผสม 1.0% MSG [20] สายพันธุ์ *Le. brevis* BJ-20 ที่แยกมาจากกิมจิ [13] และ *Lactobacillis futsaii* CS3 ที่สามารถผลิตสารกาบาในระหว่างการหมักกุ้งจ่อมซึ่งเป็น อาหารหมักของไทย [22] สายพันธุ์ *L. plantarum* L42g ที่แยกมาจากแหนมหมูและพบว่าสามารถผลิตสารกาบาในระหว่างการ หมักเครื่องดื่มแพลนต์เบสต์ [15] จะเห็นได้ว่าอาหารหมักเป็นแหล่งของจุลินทรีย์กรดแล็กติกที่มีศักยภาพในการผลิตสารกาบาได้

การศึกษานี้ตรวจการผลิตสารกาบาจากแบคทีเรียกรดแล็กติกที่แยกจากอาหารหมักดองชนิดต่าง ๆ เบื้องต้นด้วยวิธี colorimetric assay ซึ่งไอโซเลตที่ผลิตสารกาบาได้เนื่องจากมีเอนไซม์ Glutamic Acid Decarboxylase (GAD) จึงทำให้เกิดการ เปลี่ยนสี Bromocresol green ที่ใช้เป็นอินดิเคเตอร์ ในงานของ Santos-Espinosa et al [17] ตรวจสอบการผลิตสารกาบาของ

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เชื้อ *Lactococcus lactis* L-571เบื้องต้นด้วยวิธี colorimetric assay ก่อนนำเชื้อไปศึกษาการผลิตสารกาบาในน้ำนมหมัก ใน การศึกษาครั้งนี้พบว่า *Lc. paracesei* LNN29a ให้ผลการทดสอบเป็นบวกในการทดสอบด้วย colorimetric assay และเมื่อนำไป ศึกษาการผลิตสารกาบาด้วยวิธี spectrophotometric assay ตามวิธีของ Tanamool et al [18] ที่ใช้วิธีนี้ในการศึกษาปริมาณ การผลิตสารกาบาของ *L. plantarum* LB1 ที่ประยุกต์ใช้ในการหมักผักดอง โดยจากการศึกษาในงานนี้พบว่าแบคทีเรียกรดแล็ก ติก *Lc. paracasei* LNN29a ผลิตสารกาบาอยู่ระหว่าง ระหว่าง 3.50 – 11.11 g/L ซึ่ง *Lc. paracasei* LNN29a เป็นสายพันธุ์ที่ ผลิตสารกาบาสูงที่สุดและสูงกว่าเชื้ออ้างอิงอย่างมีนัยสำคัญทางสถิติ
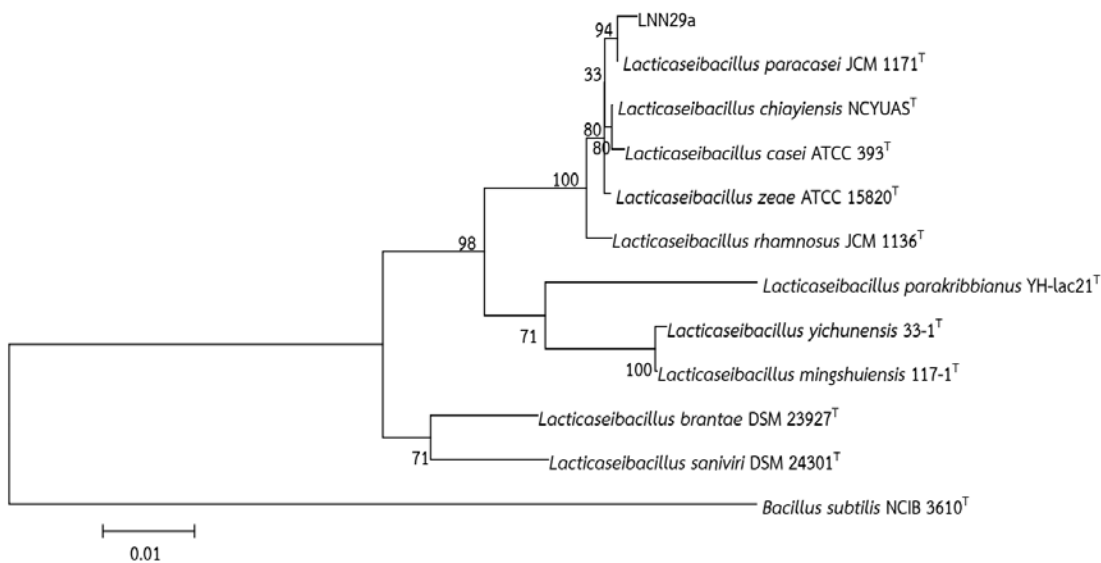
ภาพที่ 2 Phylogenetic tree จากการวิเคราะห์ลำดับนิวคลีโอไทด์ของยีน 16S rDNA ของไอโซเลต LNN29a
เมื่อเทียบกับเชื้อกลุ่ม *Lacticaseibacillus* sp.

5. บทสรุป

การศึกษานี้คัดแยกแบคทีเรียกรดแล็กติกจากตัวอย่างอาหารหมักดอง ซึ่งได้แบคทีเรียกรดแล็กติกที่มีความสามารถในการ ผลิตสารกาบาสูงโดยแยกมาจากแหนมเนื้อ เมื่อจำแนกเชื้อจากการวิเคราะห์ลำดับยีน 16S rDNA พบว่าเชื้อที่มีประสิทธิภาพนี้ตรง กับสายพันธุ์ *Lacticaseibacillus paracasei* และเชื้อนี้สามารถผลิตสารกาบาได้ที่ปริมาณ 11.11 g/L เมื่อเลี้ยงในอาหารที่มี MSG ร้อยละ 5.0 ซึ่งในการศึกษาถัดไปจะทำการศึกษาปริมาณ MSG ที่เหมาะสม รวมถึงสภาวะการเพาะเลี้ยงที่เหมาะสมต่อการ ผลิตสารกาบาของเชื้อนี้ และการนำเชื้อ *Lacticaseibacillus paracasei* LNN29a ไปประยุกต์ใช้ในการพัฒนาผลิตภัณฑ์เพื่อ สุขภาพต่อไป

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6. กิตติกรรมประกาศ

7. เอกสารอ้างอิง

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การลดเวลาการปรับตั้งค่าเครื่องจักรของกระบวนการผลิตลูกรีด
กรณีศึกษา บริษัทผลิตลูกรีดแห่งหนึ่ง กรุงเทพมหานคร

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บทคัดย่อ

จากการที่ผู้วิจัยได้มีโอกาสเข้าไปศึกษากระบวนการผลิตลูกรีด พบว่า บริษัทประสบปัญหาเรื่องเวลาการตั้งค่า
เครื่องจักรในการผลิต ซึ่งระยะเวลาการผลิตลูกรีดต่อหนึ่งคำสั่งซื้อใช้เวลานาน ทำให้ต้องทำงานล่วงเวลาเพื่อให้ผลิตได้ตาม
ความต้องการ ดังนั้น งานวิจัยนี้จึงมีวัตถุประสงค์เพื่อ 1) ศึกษากระบวนการในการปรับตั้งค่าเครื่องจักรในกระบวนการผลิตลูก
รีด 2) วิเคราะห์ปัญหาและสาเหตุที่เกิดขึ้นในการปรับตั้งค่าเครื่องจักรในกระบวนการผลิตลูกรีด และ 3) สร้างแนวทางการลด
เวลาในการปรับตั้งค่าเครื่องจักรของกระบวนการผลิตลูกรีด โดยใช้แผนภูมิกระบวนการไหล เครื่องมือควบคุมคุณภาพ และ
การลดความสูญเปล่าในการดำเนินงานด้วยหลัก ECRS ผลการทำวิจัย พบว่า ก่อนการทำวิจัยบริษัทใช้เวลาในการเตรียม
วัตถุดิบที่จะทำการผลิตและใช้เวลาในการเปลี่ยนหัวจับชิ้นงานรวมทั้งหมด 225 นาที หลังจากการทำวิจัย พบว่า สามารถลด
เวลาในการเตรียมวัตถุดิบและการเปลี่ยนหัวจับชิ้นงานลงได้รวมทั้งหมด 165 นาที คิดเป็นร้อยละ 73.33

คำสำคัญ: การลดเวลา; ตั้งค่าเครื่องจักร; ลูกรีด

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Reducing the setting time of the rolling mill production process

Case study: A rolling mill manufacturing company in Bangkok

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Abstract

For the researcher to study the production process of rolling mills, The company had a problem with the time to set up the production machinery. The production time of rolling mills per order took a long time, causing overtime work to be done to meet the demand. Therefore, this research objective analyze 1) Study of the process of machine setting in the rolling mill production process 2) Analyze problems and causes in machine settings in the rolling mill production process, and 3) create a guideline to reduce the time to adjust the machine settings of the rolling mill production process by using the process flow chart, quality control tools, and ECRS principle. The research results found that before the research, the company time for a total of 225 minutes preparing the raw materials to be used in production and changing the workpiece chuck. After the research, it was found that the time to prepare the raw materials and change the workpiece chuck could be reduced by a total of 165 minutes, or 73.33 percent.

Keywords: Reduce setup time; Set up the machine; Rolling Mills

1. บทนำ

การผลิตเครื่องจักรนั้น ชิ้นส่วนอะไหล่มีความสำคัญต่อประสิทธิภาพของการทำงานของเครื่องจักร หากแยกชิ้นส่วนใด ชิ้นส่วนหนึ่งออกจากกัน จะทำให้เครื่องจักรไม่สามารถทำงานได้อย่างมีประสิทธิภาพหรือหากมีชิ้นส่วนอะไหล่เครื่องจักร บางส่วนเกิดการชำรุด อาจทำให้เครื่องจักรไม่สามารถทำงานได้อย่างปกติ โดยชิ้นส่วนอะไหล่เครื่องจักรนอกจากจะเป็น ส่วนประกอบของเครื่องจักรแล้วนั้น ยังสามารถนำมาใช้ทดแทนของเดิมที่ชำรุดเสียหายหรือเสื่อมสภาพ ดังนั้น อุตสาหกรรม การผลิตชิ้นส่วนอะไหล่เครื่องจักรจึงมีความสำคัญต่ออุตสาหกรรมการผลิตเครื่องจักร จากการที่ผู้วิจัยได้มีโอกาสเข้าไปศึกษา กระบวนการผลิตชิ้นส่วนอะไหล่เครื่องจักรของบริษัทแห่งหนึ่ง พบว่า บริษัทผลิตลูกรีดประสบปัญหาเกี่ยวกับเวลาที่ใช้ของการ ตั้งค่าเครื่องจักรในการผลิตลูกรีด ซึ่งระยะเวลาการผลิตลูกรีดต่อหนึ่งคำสั่งซื้อจะใช้เวลานาน ดังภาพที่ 1 ทำให้จำนวนการผลิต ชิ้นงานในเวลาการทำงานปกติไม่เป็นไปตามเป้าหมาย สำหรับการสั่งซื้อลูกรีด 10 ชิ้น จะต้องผลิตให้ได้ 5 ชิ้นในหนึ่งวัน เพื่อให้ ส่งทันตามกำหนดของลูกค้า แต่การผลิตปัจจุบัน ในหนึ่งวันทำการสามารถผลิตได้เพียง 3 ชิ้น เนื่องจากการปรับตั้งค่า เครื่องจักรที่ใช้เวลามาก ทำให้เวลาในการผลิตล่าช้าและไม่ต่อเนื่อง เป็นผลให้จำนวนชิ้นงานที่ผลิตได้ใน 1 วัน ไม่เป็นตาม ความต้องการ จึงต้องมีการทำงานล่วงเวลาเพื่อให้ผลิตได้จำนวนตามความต้องการ ดังนั้น ผู้วิจัยในงานวิจัยนี้จึงทำการลดเวลา การปรับตั้งค่าเครื่องจักรของกระบวนการผลิตลูกรีด กรณีศึกษา บริษัทผลิตลูกรีดแห่งหนึ่ง จังหวัดกรุงเทพมหานคร

2. วัตถุประสงค์การวิจัย

2.1 ศึกษากระบวนการในการปรับตั้งค่าเครื่องจักรในกระบวนการผลิตลูกรีด

2.2 วิเคราะห์ปัญหาและสาเหตุที่เกิดขึ้นในการปรับตั้งค่าเครื่องจักรในกระบวนการผลิตลูกรีด

2.3 สร้างแนวทางการลดเวลาในการปรับตั้งค่าเครื่องจักรของกระบวนการผลิตลูกรีด

3. ขอบเขตการวิจัย

3.1 ขอบเขตพื้นที่

การวิจัยนี้ทำการเก็บข้อมูลกระบวนการปรับตั้งค่าเครื่องจักรในการผลิตลูกรีดแผนกเครื่องกลึงของโรงงานผลิตลูก รีดแห่งหนึ่ง ในจังหวัดกรุงเทพมหานคร

3.2 ขอบเขตด้านเนื้อหา

1) ใช้หลักการ ECRS ในการสร้างแนวทางการลดเวลาในการปรับตั้งค่าเครื่องจักรของกระบวนการผลิตลูกรีด

2) ใช้ข้อมูลย้อนหลัง 3 เดือน ตั้งแต่เดือนมิถุนายน 2564 ถึง เดือนสิงหาคม 2564 ในการทำวิจัย

3.3 ขอบเขตทางด้านเวลา

ระยะเวลาในการทำวิจัย ตั้งแต่เดือนสิงหาคม 2564 ถึง เดือนมิถุนายน 2565

4. การทบทวนวรรณกรรม

จากการทบทวนวรรณกรรมที่เกี่ยวข้องกับการลดเวลาในการปรับตั้งค่าเครื่องจักร พบว่า ในอดีตที่ผ่านมาจนถึง ปัจจุบันได้มีการทำวิจัยเกี่ยวกับการลดเวลาในการปรับตั้งค่าเครื่องจักรที่หลากหลาย ไม่ว่าจะเป็น อาคม เหลืองวิทยากร (2553) การลดเวลาล่าช้ารวมในเครื่องจักรแบบขนานด้วยวิธีการค้นหาแบบตาบู ประจวบ กล่อมจิตร และ สุภชัย เบ้าอุฬาร (2556) การลดเวลาสูญเสียของเครื่องจักรในอุตสาหกรรมผลิตชิ้นส่วนยานยนต์ด้วยวิธีการบำรุงรักษาโดยมุ่งความน่าเชื่อถือ เป็นศูนย์กลาง มาณิก นิลสุวรรณ และ จรัมพร หรรษมนตร์ (2557) การลดเวลานำในการประกอบเครื่องจักรโดยการจัดกลุ่ม ชิ้นส่วนตามสายการผลิต สมเกียรติ อับดุลเลาะ (2559) การพัฒนาโปรแกรมการจัดการฐานข้อมูลเพื่อลดเวลาการสืบค้นข้อมูล

ของเครื่องจักร กรณีศึกษา: บริษัทผลิตเครื่องจักรอัดขึ้นรูปโลหะแผ่น มงคล กิตติญาณขจร และคณะ (2563) การประยุกต์ใช้เทคนิคการปรับเปลี่ยนเครื่องจักรอย่างรวดเร็ว และ ECRS เพื่อลดเวลาการปรับตั้งเครื่องจักร: กรณีศึกษา กระบวนการผลิตหัวเชื้อเครื่องดื่มชนิดผง เวทรินทร์ อธิจิระสิงห์ และคณะ (2565) การเพิ่มผลิตภาพเครื่องขัดผิวอัตโนมัติโดยเทคนิคการลดเวลาปรับตั้งเครื่องจักร พิชญา บุญมา และคณะ (2566) การลดเวลาปรับตั้งในกระบวนการผลิตกล่องถาดพับได้ชนิดสี่มุมด้วยเทคนิคการปรับตั้งเครื่องจักรอย่างรวดเร็ว

5. ระเบียบวิธีวิจัย

5.1 ประชากรและกลุ่มตัวอย่าง

ประชากรและกลุ่มตัวอย่างในการวิจัยนี้ ประกอบด้วย หัวหน้าช่างกลึง จำนวน 1 คน และพนักงานผลิต จำนวน 1 คน

5.2 ขั้นตอนการดำเนินการวิจัย

1) ศึกษากระบวนการปรับตั้งค่าเครื่องจักรการผลิตลูกรีด โดยใช้แผนภูมิกระบวนการไหล

2) วิเคราะห์ปัญหาจากแผนภูมิกระบวนการไหลและหาสาเหตุที่เกิดขึ้นในการปรับตั้งค่าเครื่องจักรในกระบวนการผลิตลูกรีดด้วยแผนภูมิก้างปลา

3) สร้างแนวทางการลดเวลาในการปรับตั้งค่าเครื่องจักรของกระบวนการผลิตลูกรีด โดยใช้หลักการ ECRS

4) ประเมินผลหลังการวิจัยด้วยแผนภูมิกระบวนการไหล

6. ผลการวิจัยและอภิปรายผล

การวิจัยนี้ได้ทำการศึกษา การลดเวลาการปรับตั้งค่าเครื่องจักรของกระบวนการผลิตลูกรีด กรณีศึกษา บริษัทผลิตลูกรีดแห่งหนึ่ง จังหวัดกรุงเทพมหานคร โดยมีวัตถุประสงค์เพื่อ 1) ศึกษากระบวนการในการปรับตั้งค่าเครื่องจักรในกระบวนการผลิตลูกรีด 2) วิเคราะห์ปัญหาและสาเหตุที่เกิดขึ้นในการปรับตั้งค่าเครื่องจักรในกระบวนการผลิตลูกรีด และ 3) สร้างแนวทางการลดเวลาในการปรับตั้งค่าเครื่องจักรของกระบวนการผลิตลูกรีด ซึ่งผลการวิจัย พบว่า

6.1 ผลการศึกษากระบวนการในการปรับตั้งค่าเครื่องจักรในกระบวนการผลิตลูกรีด

จากการศึกษากระบวนการในการตั้งค่าเครื่องกลึงชิ้นงานลูกรีด พบว่า มีกระบวนการผลิตทั้งหมด 7 ขั้นตอน ประกอบด้วย

1) เตรียมความพร้อมในการทำงานของเครื่องกลึง ใช้เวลาในการดำเนินการ 50 นาที

2) เตรียมวัตถุดิบที่จะทำการผลิต ใช้เวลาในการดำเนินการ 75 นาที

3) เปลี่ยนหัวจับให้ได้ขนาดพอดีกับชิ้นงาน ใช้เวลาในการดำเนินการ 150 นาที

4) เปลี่ยนใบมีดที่ใช้แล้ว ใช้เวลาในการดำเนินการ 30 นาที

5) เซ็ทค่าใบมีดแกน X แกน Y ใช้เวลาในการดำเนินการ 45 นาที

6) นำชิ้นงานที่จะทำการผลิตใส่เครื่องกลึง ใช้เวลาในการดำเนินการ 75 นาที

7) ชิ้นงานที่กลึงสำเร็จแล้วนำมาฉีดน้ำมันกันสนิม ใช้เวลาในการดำเนินการ 75 นาที

จากข้อมูลข้างต้น สามารถเขียนโดยใช้แผนภูมิกระบวนการไหล ดังภาพที่ 1

6.2 ผลการวิเคราะห์ปัญหาและสาเหตุที่เกิดขึ้นในการปรับตั้งค่าเครื่องจักรในกระบวนการผลิตลูกรีด

จากแผนภูมิการไหลของกระบวนการตั้งค่าเครื่องกลึงชิ้นงานลูกรีด พบว่า ขั้นตอนที่ใช้เวลาในการตั้งค่านาน คือ ขั้นตอนการเตรียมวัตถุดิบที่จะทำการผลิตที่ใช้เวลา 75 นาที และการเปลี่ยนหัวจับให้ได้ขนาดพอดีกับชิ้นงาน ซึ่งใช้เวลา 150

การประชุมวิชาการระดับชาติและนานาชาติบ้านสมเด็จเจ้าพระยา ครั้งที่ 1 (BS2C 2025)
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นาที ดังนั้น ในการวิจัยนี้จึงได้ทำการเลือก 2 ขั้นตอนดังกล่าว มาทำการวิเคราะห์หาสาเหตุของปัญหาที่เกิดขึ้นในการปรับตั้ง
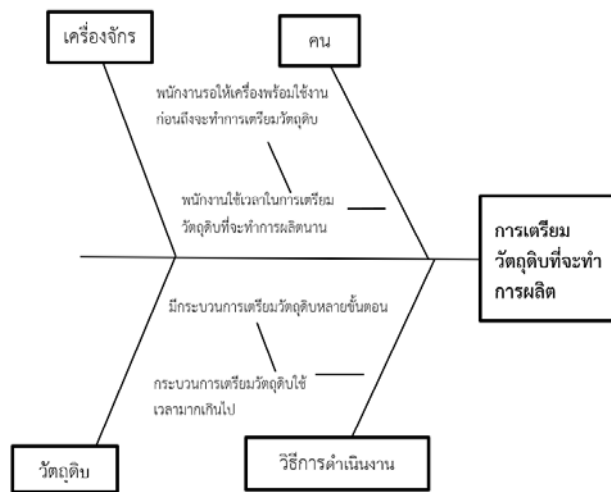ค่าเครื่องจักรในกระบวนการผลิตลูกรีดโดยใช้แผนภูมิก้างปลา พบว่า

1) สาเหตุของปัญหาการเตรียมวัตถุดิบที่จะทำการผลิตใช้เวลานาน เกิดจากพนักงานต้องรอให้เครื่องพร้อมใช้
งานก่อนถึงจะทำการเตรียมวัตถุดิบ และเนื่องจากกระบวนในการเตรียมวัตถุดิบมีหลายขั้นตอน ดังภาพที่ 2

2) สาเหตุของปัญหาการเปลี่ยนหัวจับให้ได้ขนาดพอดีกับชิ้นงานใช้เวลานาน ดังภาพที่ 3 ซึ่งเกิดจาก

- ตำแหน่งที่จัดเก็บหัวจับชิ้นงานอยู่ไกลจากเครื่อง ทำให้พนักงานต้องใช้เวลาในการเดินไปตำแหน่งที่เก็บหัว
จับชิ้นงานนาน

- ลักษณะตำแหน่งของหัวจับชิ้นงานของเครื่องจักรนั้นอยู่ในตำแหน่งไม่เหมาะสม

- การขึ้นชิ้นงานที่มีขนาดแตกต่างกันต้องเปลี่ยนหัวจับชิ้นงานเสมอ ทำให้ในส่วนของวิธีการดำเนินงานนั้น
ใช้เวลาในการเปลี่ยนหัวจับหลายขั้นตอน

6.3 ผลการสร้างแนวทางการลดเวลาในการปรับตั้งค่าเครื่องจักรของกระบวนการผลิตลูกรีด

จากผลการวิเคราะห์ปัญหาและสาเหตุที่เกิดขึ้นในการปรับตั้งค่าเครื่องจักรในกระบวนการผลิตลูกรีด ผู้วิจัยได้นำ
หลักการ ECRS ที่ประกอบด้วยการกำจัด (Eliminate) การรวมกัน (Combine) การจัดใหม่ (Rearrange) และการทำให้ง่าย
(Simplify) มาใช้ในการปรับปรุงขั้นตอนกระบวนการปรับตั้งค่าเครื่องจักรในการผลิตลูกรีด เพื่อสร้างแนวทางการลดเวลาใน
การปรับตั้งค่าเครื่องจักรของกระบวนการผลิตลูกรีด โดยมีรายละเอียด ดังตารางที่ 1

แผนภูมิการไหลของกระบวนการ		
ชื่อกระบวนการ : ตั้งค่าเครื่องกลึงชิ้นงานลูกรีด	สัญลักษณ์	สรุปผล
สถานะ ◯ ก่อนการปรับปรุง ◯ หลังการปรับปรุง	◯ การปฏิบัติงาน	6
	➡ การเคลื่อนที่หรือการขนส่ง	1
สรุปผล	◻ การตรวจสอบ	-
เวลา (นาที)	500	D การรอคอย	-
	▽ การเก็บรักษา	-

ขั้นตอน	เวลา (นาที)	สัญลักษณ์ ◯ ➡ ◻ D ▽					หมายเหตุ
1. การเตรียมความพร้อมในการทำงานของเครื่องกลึง	50	●					
2. เตรียมวัตถุดิบที่จะทำการผลิต	75	●					
3. เปลี่ยนหัวจับให้ได้ขนาดพอดีกับชิ้นงาน	150	●					
4. เปลี่ยนใบมีดที่ใช้แล้ว	30	●					
5. เซ็ทค่าใบมีดแกน X แกน Y	45		●				
6. นำชิ้นงานที่จะทำการผลิตใส่เครื่องกลึง	75	●					
7. ชิ้นงานที่กลึงสำเร็จแล้วนำมาฉีดน้ำมันกันสนิม	75	●					

ภาพที่ 1 แผนภูมิกระบวนการไหลของกระบวนการปรับตั้งค่าเครื่องจักรในการผลิตลูกรีด (ก่อนปรับปรุง)

การประชุมวิชาการระดับชาติและนานาชาติบ้านสมเด็จเจ้าพระยา ครั้งที่ 1 (BS2C 2025)
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ภาพที่ 2 สาเหตุของปัญหาการเตรียมวัตถุดิบที่จะทำการผลิต
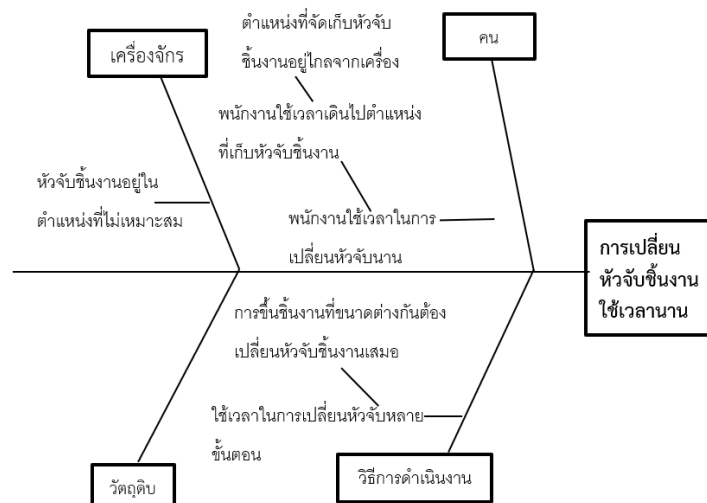
ภาพที่ 3 สาเหตุของปัญหาการเปลี่ยนหัวจับชิ้นงานใช้เวลานาน

ตารางที่ 1 การนำหลัก ECRS ปรับปรุงขั้นตอนกระบวนการปรับตั้งค่าเครื่องจักรในการผลิตลูกรีด

ขั้นตอน	ปัญหา	การแก้ไขด้วยหลัก ECRS	แนวทางการแก้ไขปรับปรุง	วิธีการดำเนินงานก่อนการปรับปรุง	วิธีการดำเนินงานหลังการปรับปรุง
การเตรียมวัตถุดิบที่จะทำการผลิต	ใช้เวลาในการเตรียมวัตถุดิบที่จะทำการผลิตนาน	C= Combine	ทำการรวมขั้นตอนการเตรียมวัตถุดิบในระหว่างการเปิดเครื่องกลึงและการตั้งค่าเครื่องกลึง	จะทำการเตรียมวัตถุดิบเมื่อเครื่องกลึงพร้อมใช้งาน	หลังจากตั้งค่าเครื่องกลึง ในระหว่างรอเครื่องกลึงพร้อมใช้งาน จะให้พนักงานทำการเตรียมวัตถุดิบมาหน้าเครื่อง เพื่อพร้อมสำหรับการผลิตทันที
เปลี่ยนหัวจับให้ได้ขนาดพอดีกับชิ้นงาน	ใช้เวลาเปลี่ยนหัวจับเป็นเวลานาน	R=Rearrange	ดำเนินการโดยการเปลี่ยนเครื่องกลึงที่ทำงานกลึงชิ้นงานในขนาดเดียวกัน	การขึ้นชิ้นงานที่มีขนาดต่างกันจะต้องทำการเปลี่ยนหัวจับชิ้นงานอยู่เสมอ	ทำการนำเหล็กที่ได้จากการผลิตชิ้นงานที่ได้ขนาดที่ต้องการครบแล้ว นำไปขึ้นเครื่องกลึงที่ผลิตชิ้นงานขนาดเดียวกัน

จากการนำหลักการ ECRS มาใช้ในการปรับปรุงขั้นตอนกระบวนการปรับตั้งค่าเครื่องจักรในการผลิตลูกรีด สามารถลดกระบวนการผลิต 1 ขั้นตอน ทำให้เหลือกระบวนการผลิตทั้งหมด 6 ขั้นตอน ประกอบด้วย

1) การเตรียมความพร้อมในการทำงานของเครื่องกลึง และเตรียมวัตถุดิบที่จะทำการผลิต ใช้เวลาในการดำเนินการ 50 นาที

2) เปลี่ยนหัวจับให้ได้ขนาดพอดีกับชิ้นงาน ใช้เวลาในการดำเนินการ 60 นาที

3) เปลี่ยนใบมีดที่ใช้แล้ว ใช้เวลาในการดำเนินการ 30 นาที

4) เซ็ทค่าใบมีดแกน X แกน Y ใช้เวลาในการดำเนินการ 45 นาที

5) นำชิ้นงานที่จะทำการผลิตใส่เครื่องกลึง ใช้เวลาในการดำเนินการ 75 นาที

6) ชิ้นงานที่กลึงสำเร็จแล้วนำมาฉีดน้ำมันกันสนิม ใช้เวลาในการดำเนินการ 75 นาที

จากข้อมูลข้างต้น สามารถวิเคราะห์โดยใช้แผนภูมิกระบวนการไหล ดังภาพที่ 4

6.4 ประเมินผลหลังการวิจัย

ในการวิจัยนี้ ทำการประเมินผลหลังการวิจัยด้วยการวิเคราะห์โดยใช้แผนภูมิการไหลของกระบวนตั้งค่าเครื่องกลึง ชิ้นงานลูกรีดก่อนและหลังการปรับปรุง พบว่า ก่อนปรับปรุงบริษัทใช้เวลาในกระบวนการตั้งค่าเครื่องกลึงชิ้นงานลูกรีดรวมทั้งหมด 500 นาที หลังปรับปรุง พบว่า บริษัทใช้เวลาในกระบวนการตั้งค่าเครื่องกลึงชิ้นงานลูกรีดรวมทั้งหมด 335 นาที ดัง

ตารางที่ 2 และก่อนการวิจัยบริษัทใช้เวลาในการเตรียมวัตถุดิบที่จะทำการผลิตและใช้เวลาในการเปลี่ยนหัวจับชิ้นงานรวม
ทั้งหมด 225 นาที หลังจากการวิจัย พบว่า สามารถลดเวลาในการเตรียมวัตถุดิบและการเปลี่ยนหัวจับชิ้นงานลงได้รวมทั้งหมด
165 นาที คิดเป็นร้อยละ 73.33

6.5 อภิปรายผล

จากผลการวิจัย พบว่า สามารถลดเวลาการปรับตั้งค่าเครื่องจักรได้ เนื่องจาก ได้มีการนำทฤษฎีการลดความสูญ
เปล่าในการทำงานด้วยหลัก ECRS มาประยุกต์ใช้ในการปรับปรุงการทำงาน โดยใช้แผนภูมิกระบวนการไหลในการหาปัญหาที่
ทำให้ทราบว่าปัญหาใดในกระบวนการผลิตควรมีการแก้ไขปัญหา หลังจากนั้นนำแผนภูมิก้างปลามาใช้ในการหาสาเหตุที่
แท้จริงของปัญหาที่เกิดขึ้นในการผลิต แล้วทำการนำสาเหตุนั้นมาหาแนวทางการแก้ไขที่ตรงจุดด้วยหลัก ECRS ซึ่งทำให้
สามารถลดเวลาในการปรับตั้งค่าเครื่องจักรในกระบวนการผลิตลูกรีด

แผนภูมิการไหลของกระบวนการ				
ชื่อกระบวนการ : ตั้งค่าเครื่องกลึงชิ้นงานลูกรีด	สัญลักษณ์			สรุปผล
สถานะ : ก่อนการปรับปรุง / หลังการปรับปรุง	○ การปฏิบัติงาน			5
	⇨ การเคลื่อนที่หรือการขนส่ง			1
สรุปผล	□ การตรวจสอบ			-
เวลา (นาที)	335	D การรอคอย		-
		▽ การเก็บรักษา		-

ขั้นตอน	เวลา (นาที)	สัญลักษณ์					หมายเหตุ
		○	⇨	□	D	▽	
1. เตรียมความพร้อมในการทำงานของเครื่องกลึง และเตรียมวัตถุดิบที่จะทำการผลิต	50	●					
2. เปลี่ยนหัวจับให้ได้ขนาดพอดีกับชิ้นงาน	60	●					
3. เปลี่ยนใบมีดที่ใช้แล้ว	30	●					
4. เซ็ทค่าใบมีดแกน X แกน Y	45		●				
5. นำชิ้นงานที่จะทำการผลิตใส่เครื่องกลึง	75	●					
6. ชิ้นงานที่กลึงสำเร็จแล้วนำมาฉีดน้ำมันกันสนิม	75	●					

ภาพที่ 4 แผนภูมิกระบวนการไหลของกระบวนการปรับตั้งค่าเครื่องจักรในการผลิตลูกรีด (หลังปรับปรุง)

ตารางที่ 2 แผนภูมิการไหลของกระบวนตั้งค่าเครื่องกลึงชิ้นงานลูกรีดก่อนและหลังการปรับปรุงในการผลิตชิ้นงาน 5 ชิ้นต่อวัน

แผนภูมิการไหลของกระบวนการ					
กระบวนการ : ตั้งค่าเครื่องกลึงชิ้นงานลูกรีด	สัญลักษณ์			ก่อน	หลัง
สถานะ/สรุปผล	◯ การปฏิบัติงาน			6	5
	⇨ การเคลื่อนที่หรือการขนส่ง			1	1
เวลา (นาที) — ก่อน 500	☐ การตรวจสอบ			-	-
เวลา (นาที) — หลัง 335	D การรอคอย			0	0
	▽ การเก็บรักษา			-	-

ขั้นตอนการผลิต	ก่อนการปรับปรุง						หลังการปรับปรุง					
	เวลา (นาที)	◯	⇨	☐	D	▽	เวลา (นาที)	◯	⇨	☐	D	▽
1. การเตรียมความพร้อมในการทำงานของเครื่องกลึง	50	●					50	●				
2.เตรียมวัตถุดิบที่จะทำการผลิต	75	●					0					
3.เปลี่ยนหัวจับให้ได้ขนาดพอดีกับชิ้นงาน	150	●					60	●				
4. เปลี่ยนใบมีดที่ใช้แล้ว	30	●					30	●				
5. เซ็ทค่าใบมีดแกน X แกน Y	45		●				45		●			
6. นำชิ้นงานที่จะทำการผลิตใส่เครื่องกลึง	75	●					75	●				
7.ชิ้นงานที่กลึงสำเร็จแล้วนำมาฉีดน้ำมันกันสนิม	75	●					75	●				

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(127-TH-SCT)

ศึกษาผลสัมฤทธิ์ทางการเรียนรู้วิชาวิทยาศาสตร์ของนักเรียนชั้นมัธยมศึกษาปีที่ 3 โรงเรียนสวนอนันต์ เรื่อง วงจรไฟฟ้าอย่างง่าย ผ่านการเรียนรู้แบบสืบเสาะหาความรู้ 5E โดยใช้เกมเป็นฐาน

สุนันทิณี แป้นพุ่ม[1*] และจิตตวิสุทธิ์ วิมุตติปัญญา[1]

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บทคัดย่อ

การวิจัยนี้มีวัตถุประสงค์เพื่อศึกษาผลสัมฤทธิ์ทางการเรียนรู้วิชาวิทยาศาสตร์ของนักเรียนชั้นมัธยมศึกษาปีที่ 3 โรงเรียนสวนอนันต์ เรื่อง วงจรไฟฟ้าอย่างง่ายผ่านการ เรียนรู้แบบสืบเสาะหาความรู้ 5E โดยใช้เกมเป็นฐาน กลุ่มตัวอย่าง ได้แก่ นักเรียนชั้นมัธยมศึกษาปีที่ 3 โรงเรียนสวนอนันต์ จำนวน 11 คน ที่กำลังศึกษาอยู่ในภาคเรียนที่ 2 ปีการศึกษา 2567 ได้มาจากการเลือกด้วยวิธีเฉพาะเจาะจง (Purposive Sampling) เครื่องมือที่ใช้ในการเก็บรวบรวมข้อมูล ประกอบด้วย แบบทดสอบวัดความรู้ความเข้าใจ มีความยากง่ายอยู่ระหว่าง 0.20-0.80 มีค่าอำนาจจำแนกมากกว่า 0.20 มีค่าความเชื่อมั่น เท่ากับ .86 วิเคราะห์ข้อมูลโดยใช้สถิติค่าเฉลี่ย ส่วนเบี่ยงเบนมาตรฐาน และใช้การทดสอบค่าที (t-test for Dependent)

ผลการวิจัย พบว่า

ผลสัมฤทธิ์ทางการเรียนรู้วิชาวิทยาศาสตร์ของนักเรียนชั้นมัธยมศึกษาปีที่ 3 โรงเรียนสวนอนันต์ เรื่อง วงจรไฟฟ้าอย่าง ง่ายผ่านการ เรียนรู้แบบสืบเสาะหาความรู้ 5E โดยใช้เกมเป็นฐาน กลุ่มตัวอย่าง ได้แก่ นักเรียนชั้นมัธยมศึกษาปีที่ 3 โรงเรียน สวนอนันต์ มีผลสัมฤทธิ์ทางการเรียนหลังเรียนสูงกว่าก่อนเรียนอย่างมีนัยสำคัญทางสถิติที่ระดับ .05

คำสำคัญ: เกมเป็นฐาน; วงจรไฟฟ้าอย่างง่าย; วิทยาศาสตร์; สืบเสาะหาความรู้; 5E

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learning achievement in science of Mathayom 3 students at Suan Anan School on the topic of simple electric circuits through 5E inquiry-based learning using games as a base

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Abstract

This research aimed to study the learning achievement in science of Mathayom 3 students at Suan Anan School on the topic of simple electric circuits through 5E inquiry-based learning using games as a base. The sample group consisted of 38 Mathayom 3 students at Suan Anan School who were studying in the second semester of the academic year 2024, selected by purposive sampling. The tools used for data collection consisted of a knowledge and understanding test with a difficulty level between 0.20-0.80, a discrimination power greater than 0.20, and a reliability value of .86. Data were analyzed using statistics of mean, standard deviation, and t-test for Dependent.

The results of the research found that:

The learning achievement in science of Mathayom 3 students at Suan Anan School on the topic of simple electric circuits through 5E inquiry-based learning using games as a base. The sample group consisted of Mathayom 3 students at Suan Anan School. The academic achievement after studying was significantly higher than before studying at a statistical level of .05.

Keywords: Game-Based; Simple Circuits; Science; Inquiry; 5E

1. บทนำ

การศึกษาในยุคปัจจุบันมุ่งเน้นการพัฒนาผู้เรียนให้มีทักษะการคิดวิเคราะห์ การแก้ปัญหา และความสามารถในการเรียนรู้ด้วยตนเอง เพื่อเตรียมความพร้อมในการเผชิญกับสภาพสังคมที่เปลี่ยนแปลงอย่างรวดเร็ว วิชาวิทยาศาสตร์เป็นหนึ่งในกลุ่มสาระการเรียนรู้ที่สำคัญซึ่งช่วยพัฒนาทักษะเหล่านี้ โดยเฉพาะการสร้างความเข้าใจในหลักการพื้นฐานและการนำความรู้ไปใช้แก้ไขปัญหาจริงในชีวิตประจำวัน การเรียนรู้แบบสืบเสาะหาความรู้ (Inquiry-Based Learning) เป็นแนวทางที่ได้รับการยอมรับว่ามีประสิทธิภาพในการเสริมสร้างความเข้าใจและพัฒนาทักษะของผู้เรียน การเรียนรู้ในรูปแบบนี้กระตุ้นให้ผู้เรียนมีบทบาทในการตั้งคำถาม ค้นหาคำตอบ และสร้างความรู้ใหม่ผ่านการสำรวจและทดลอง แนวทางการเรียนรู้แบบ 5E ซึ่งประกอบด้วยการกระตุ้นความสนใจ (Engage) การสำรวจ (Explore) การอธิบาย (Explain) การขยายความรู้ (Extend) และการประเมินผล (Evaluate) ได้รับการออกแบบเพื่อสนับสนุนกระบวนการเรียนรู้เชิงรุกและเน้นผู้เรียนเป็นศูนย์กลาง

สำหรับเนื้อหาเรื่อง "วงจรไฟฟ้าอย่างง่าย" เป็นหัวข้อสำคัญในวิชาวิทยาศาสตร์ระดับมัธยมศึกษาตอนต้นที่มีความเกี่ยวข้องกับชีวิตประจำวัน เช่น การใช้อุปกรณ์ไฟฟ้าภายในบ้าน ความเข้าใจเกี่ยวกับกระแสไฟฟ้าและแรงดันไฟฟ้า การประยุกต์ใช้ในวงจรไฟฟ้าแบบต่าง ๆ การเรียนรู้เรื่องนี้ไม่ได้เป็นเพียงการสร้างความรู้ความเข้าใจพื้นฐาน แต่ยังช่วยเสริมทักษะการแก้ปัญหาและการประยุกต์ใช้งานในอนาคต

อย่างไรก็ตาม การเรียนการสอนในรูปแบบเดิมที่เน้นการบรรยายและการท่องจำอาจไม่สามารถกระตุ้นความสนใจและพัฒนาทักษะการคิดของผู้เรียนได้อย่างเต็มที่ ในหลายกรณี นักเรียนพบว่าวิทยาศาสตร์เป็นเรื่องยากและไม่เกี่ยวข้องกับชีวิตจริง ส่งผลให้ผลสัมฤทธิ์ทางการเรียนลดลง เพื่อแก้ไขปัญหาดังกล่าว การใช้เกมเป็นฐาน (Game-Based Learning) ร่วมกับการเรียนรู้แบบ 5E ถือเป็นแนวทางที่มีศักยภาพในการเพิ่มความสนุกสนาน ความกระตือรือร้น และความมีส่วนร่วมของผู้เรียน เกมช่วยสร้างแรงจูงใจและกระตุ้นให้ผู้เรียนมีความสนใจในเนื้อหา รวมทั้งเปิดโอกาสให้ผู้เรียนได้พัฒนาทักษะการคิดวิเคราะห์และการแก้ปัญหาผ่านสถานการณ์จำลองที่ใกล้เคียงกับชีวิตจริง

งานวิจัยนี้มุ่งศึกษาผลสัมฤทธิ์ทางการเรียนรู้วิชาวิทยาศาสตร์ของนักเรียนชั้นมัธยมศึกษาปีที่ 3 เรื่อง "วงจรไฟฟ้าอย่างง่าย" โดยใช้การเรียนรู้แบบสืบเสาะหาความรู้ 5E ร่วมกับเกมเป็นฐาน เพื่อประเมินว่าการเรียนรู้ในรูปแบบนี้สามารถส่งเสริมการเรียนรู้และพัฒนาทักษะของนักเรียนได้อย่างมีประสิทธิภาพ ผลการวิจัยคาดว่าจะช่วยสนับสนุนแนวทางการพัฒนาการเรียนการสอนในห้องเรียน และเป็นตัวอย่างที่สามารถนำไปปรับใช้ในบริบทอื่น ๆ ได้ในอนาคต

2. วัตถุประสงค์ของการวิจัย

เพื่อศึกษาผลสัมฤทธิ์ทางการเรียนรู้วิชาวิทยาศาสตร์ของนักเรียนชั้นมัธยมศึกษาปีที่ 3 โรงเรียนสวนอนันต์ เรื่องวงจรไฟฟ้าอย่างง่ายผ่านการเรียนรู้แบบสืบเสาะหาความรู้ 5E โดยใช้เกมเป็นฐาน

3. สมมติฐานการวิจัย

ผลสัมฤทธิ์ทางการเรียนรู้วิชาวิทยาศาสตร์ของนักเรียนชั้นมัธยมศึกษาปีที่ 3 โรงเรียนสวนอนันต์ เรื่อง วงจรไฟฟ้าอย่างง่ายผ่านการเรียนรู้แบบสืบเสาะหาความรู้ 5E โดยใช้เกมเป็นฐาน หลังเรียนสูงกว่าก่อนเรียน

4. วิธีดำเนินการวิจัย

การวิจัยครั้งนี้เป็นการวิจัยเชิงทดลองเบื้องต้น (Pre-Experimental design) ใช้แบบแผนการวิจัยแบบกลุ่มเดียวสอบก่อนสอบหลัง (One group pretest-posttest design) โดยมีรายละเอียดวิธีดำเนินการวิจัยดังต่อไปนี้

การประชุมวิชาการระดับชาติและนานาชาติบ้านสมเด็จเจ้าพระยา ครั้งที่ 1 (BS2C 2025)
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ประชากรและกลุ่มตัวอย่าง

ประชากร ได้แก่ นักเรียนชั้นมัธยมศึกษาปีที่ 3 โรงเรียนสวนอนันต์ กรุงเทพมหานคร ภาคเรียนที่ 2 ปีการศึกษา 2567 จำนวนรวมนักเรียน 20 คน

กลุ่มตัวอย่าง ได้แก่ นักเรียนชั้นมัธยมศึกษาปีที่ 3 โรงเรียนสวนอนันต์ กรุงเทพมหานคร ภาคเรียนที่ 2 ปีการศึกษา 2567 ด้วยวิธีการเลือกแบบเฉพาะเจาะจง (Purposive Sampling) จำนวน 11 คน

เครื่องมือที่ใช้ในการวิจัย

เครื่องมือที่ใช้ในการเก็บรวบรวมข้อมูล ประกอบด้วย แบบทดสอบวัดความรู้ความเข้าใจ มีความยากง่ายอยู่ระหว่าง 0.20-0.80 มีค่าอำนาจจำแนกมากกว่า 0.20 มีค่าความเชื่อมั่น เท่ากับ .86

เครื่องมือที่ใช้ในการวิจัยครั้งนี้ ประกอบด้วย

1) แผนการจัดการเรียนรู้วิชาวิทยาศาสตร์ เรื่อง วงจรไฟฟ้าอย่างง่าย

2) แบบทดสอบวัดผลสัมฤทธิ์ทางการเรียนวิทยาศาสตร์วิชาวิทยาศาสตร์ เรื่อง วงจรไฟฟ้าอย่างง่ายผ่านการ เรียนรู้แบบสืบเสาะหาความรู้ 5E โดยใช้เกมเป็นฐาน

ขั้นตอนการสร้างเครื่องมือ

1) ศึกษาหลักสูตรแกนกลางการศึกษาขั้นพื้นฐาน พุทธศักราช 2551

2) วิเคราะห์คำอธิบายรายวิชา สาระการเรียนรู้และหน่วยการเรียนรู้

3) วิเคราะห์ตัวชี้วัด เพื่อนำมาเขียนเป็นจุดประสงค์การเรียนรู้โดยให้ควบคุมพฤติกรรมด้านความรู้ ทักษะ กระบวนการ เจตคติ

4) วิเคราะห์สาระการเรียนรู้โดยเลือกเนื้อหาสาระการเรียนรู้ให้สอดคล้องกับผู้เรียน ชุมชนและท้องถิ่น

5) วิเคราะห์การประเมินผลโดยการเลือกสื่อและแหล่งการเรียนรู้ทั้งในและนอกห้องเรียน ให้เหมาะสมและสอดคล้อง กับกระบวนการเรียนรู้

6) ขั้นออกแบบและจัดทำแผนการจัดการเรียนรู้ ซึ่งมีองค์ประกอบดังนี้

- เวลาเรียน

- สาระสำคัญ

- จุดประสงค์การเรียนรู้

- สาระการเรียนรู้

- กิจกรรมการเรียนรู้

- สื่อการเรียนรู้

- การวัดผลประเมินผล

- บันทึกผลหลังการสอน

การเก็บรวบรวมข้อมูล

ในการวิจัยครั้งนี้ ผู้วิจัยทำการทดลองและเก็บรวบรวมข้อมูลกลุ่มตัวอย่าง ในภาคเรียนที่ 2 ปีการศึกษา 2567 โดยดำเนินการเก็บรวบรวมข้อมูล ดังนี้

1) ผู้วิจัยวิเคราะห์ปัญหาการจัดการเรียนรู้วิชาวิทยาศาสตร์ เรื่อง วงจรไฟฟ้าอย่างง่ายผ่านการ เรียนรู้แบบสืบ เสาะหาความรู้ 5E โดยใช้เกมเป็นฐาน จากการสอบถามครูและสัมภาษณ์ นักเรียนที่เคยเรียนเรื่องนี้มาแล้ว รวมทั้งศึกษาสภาพ สังคมของชุมชนของนักเรียน

2) ปฐมนิเทศชี้แจงวัตถุประสงค์ของการวิจัยให้นักเรียนกลุ่มตัวอย่างทราบ และอธิบายถึงบทบาทหน้าที่ของนักเรียนและผู้วิจัย

3) ผู้วิจัยทำการทดสอบก่อนการทดลอง (Pretest) โดยให้นักเรียนได้ทำแบบทดสอบวัดผลสัมฤทธิ์ทางการเรียนวิชาวิทยาศาสตร์ เรื่อง วงจรไฟฟ้าอย่างง่ายผ่านการ เรียนรู้แบบสืบเสาะหาความรู้ 5E โดยใช้เกมเป็นฐาน ฉบับจริงที่ผู้วิจัยสร้างขึ้น จำนวน 10 ข้อ โดยมีระยะเวลาทำแบบทดสอบ 30 นาที

4) ดำเนินการจัดการวิชาวิทยาศาสตร์ เรื่อง วงจรไฟฟ้าอย่างง่ายผ่านการ เรียนรู้แบบสืบเสาะหาความรู้ 5E โดยใช้เกมเป็นฐาน

5) เมื่อสิ้นสุดการจัดการเรียนรู้ตามแผนที่วางไว้ จึงทำการทดสอบวัดหลังการทดลอง (Post-test) โดยนำแบบทดสอบวัดผลสัมฤทธิ์ทางการเรียนวิชาวิทยาศาสตร์ เรื่อง วงจรไฟฟ้าอย่างง่ายผ่านการ เรียนรู้แบบสืบเสาะหาความรู้ 5E โดยใช้เกมเป็นฐาน ฉบับเดิม ที่ใช้ทำการทดสอบก่อนการทดลอง มาให้นักเรียนทดสอบอีกครั้ง มีระยะเวลาในการทำแบบทดสอบ 20 นาที

6) ผู้วิจัยนำข้อมูลที่ได้จากคะแนนผลการเรียนระหว่างเรียน และคะแนนจากการทำแบบทดสอบวัดผลสัมฤทธิ์ทางการเรียนวิชาวิทยาศาสตร์ เรื่อง วงจรไฟฟ้าอย่างง่ายผ่านการ เรียนรู้แบบสืบเสาะหาความรู้ 5E โดยใช้เกมเป็นฐาน วิเคราะห์ด้วยวิธีการทางสถิติ โดยใช้โปรแกรมคอมพิวเตอร์ และเก็บรวบรวมข้อมูลเชิงคุณภาพ ประมวลผลและเรียบเรียงนำเสนอในรูปความเรียง

การวิเคราะห์ข้อมูล

ในการวิเคราะห์ข้อมูลเกี่ยวกับผลสัมฤทธิ์ทางการเรียนวิชาวิทยาศาสตร์ เรื่อง วงจรไฟฟ้าอย่างง่ายผ่านการเรียนรู้แบบสืบเสาะหาความรู้ 5E โดยใช้เกมเป็นฐาน ผู้วิจัยดำเนินการโดยใช้โปรแกรมสำเร็จรูปทางสถิติ ตามขั้นตอนดังนี้

1) วิเคราะห์ผลสัมฤทธิ์ทางการเรียนวิชาวิทยาศาสตร์ เรื่อง วงจรไฟฟ้าอย่างง่ายผ่านการ เรียนรู้แบบสืบเสาะหาความรู้ 5E โดยใช้เกมเป็นฐาน

2) เปรียบเทียบคะแนนผลสัมฤทธิ์ทางการเรียนวิชาวิทยาศาสตร์ เรื่อง วงจรไฟฟ้าอย่างง่ายผ่านการ เรียนรู้แบบสืบเสาะหาความรู้ 5E โดยใช้เกมเป็นฐาน ระหว่างก่อนและหลังการจัดการเรียนรู้ โดยใช้สถิติการทดสอบที ชนิดกลุ่มตัวอย่างไม่เป็นอิสระต่อกัน (t-test for Dependent)

สถิติที่ใช้ในการวิจัย

วิเคราะห์ข้อมูลโดยใช้สถิติค่าเฉลี่ย ($\overline{X}$) ส่วนเบี่ยงเบนมาตรฐาน (S.D.) และใช้การทดสอบค่าที (t-test for Dependent)

5. ผลการวิจัย

ผลการเปรียบเทียบคะแนนผลสัมฤทธิ์ทางการเรียนวิชาวิทยาศาสตร์ เรื่อง วงจรไฟฟ้าอย่างง่ายผ่านการเรียนรู้แบบสืบเสาะหาความรู้ 5E โดยใช้เกมเป็นฐาน ปรากฏผลดังตารางที่ 1

ตารางที่ 1 ผลการเปรียบเทียบคะแนนผลสัมฤทธิ์ทางการเรียนวิชาวิทยาศาสตร์ เรื่อง วงจรไฟฟ้าอย่างง่ายผ่านการ เรียนรู้แบบสืบเสาะหาความรู้ 5E โดยใช้เกมเป็นฐาน

กลุ่มตัวอย่าง	n	คะแนนเต็ม	ก่อนเรียน		หลังเรียน		t	df	sig
			$\overline{X}$	S.D.	$\overline{X}$	S.D.			
ผู้เรียน	20	20	8.63	1.31	17.21	0.56	-22.15	19	.000

*ค่านัยสำคัญทางสถิติที่ระดับ .05

การประชุมวิชาการระดับชาติและนานาชาติบ้านสมเด็จเจ้าพระยา ครั้งที่ 1 (BS2C 2025)
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จากตารางที่ 1 ผลการเปรียบเทียบคะแนนผลสัมฤทธิ์ทางการเรียนก่อนเรียน และหลังเรียนวิชาวิทยาศาสตร์ เรื่อง วงจรไฟฟ้าอย่างง่ายผ่านการ เรียนรู้แบบสืบเสาะหาความรู้ 5E โดยใช้เกมเป็นฐาน พบว่า คะแนนทดสอบหลังเรียนสูงกว่า คะแนนการทดสอบก่อนเรียน อย่างมีนัยสำคัญทางสถิติที่ระดับ .05 จึงกล่าวได้ว่า คะแนนก่อนเรียน และหลังเรียน มีความ แตกต่างกันจริง โดยคะแนนหลังเรียนมีค่าสูงกว่าก่อนเรียน และแสดงว่านักเรียนมีการพัฒนาผลการเรียนสูงขึ้น หลังจากการใช้ ชุดกิจกรรมการเรียนรู้วิชาวิทยาศาสตร์ เรื่อง วงจรไฟฟ้าอย่างง่ายผ่านการ เรียนรู้แบบสืบเสาะหาความรู้ 5E โดยใช้เกมเป็น ฐาน

6. สรุปและอภิปรายผล

การศึกษาวิจัยครั้งนี้เป็นการวิจัย เรื่อง วงจรไฟฟ้าอย่างง่ายผ่านการ เรียนรู้แบบสืบเสาะหาความรู้ 5E โดยใช้เกมเป็นฐาน สามารถนำมาอภิปรายผลได้ดังนี้ การศึกษานี้มีเป้าหมายเพื่อประเมินผลสัมฤทธิ์ทางการเรียนรู้ของนักเรียนชั้นมัธยมศึกษาปีที่ 3 เรื่อง "วงจรไฟฟ้าอย่างง่าย" โดยใช้การเรียนรู้แบบสืบเสาะหาความรู้ 5E ร่วมกับเกมเป็นฐาน ผลการวิจัยแสดงให้เห็นว่า นักเรียนมีผลสัมฤทธิ์ทางการเรียนหลังเรียนสูงกว่าก่อนเรียนอย่างมีนัยสำคัญทางสถิติ ซึ่งสะท้อนให้เห็นว่าการเรียนรู้ที่ ผสมผสานระหว่างกระบวนการสืบเสาะและการใช้เกมช่วยเสริมสร้างความเข้าใจและการเรียนรู้อย่างมีประสิทธิภาพ

การวิเคราะห์ผลการเรียนรู้ชี้ให้เห็นว่าการใช้กระบวนการเรียนรู้แบบ 5E ช่วยกระตุ้นให้นักเรียนมีบทบาทสำคัญใน กระบวนการเรียนรู้ โดยเฉพาะการมีส่วนร่วมในขั้นตอนการสำรวจ (Explore) และการขยายความรู้ (Extend) ซึ่งเปิดโอกาสให้ นักเรียนได้ลงมือทดลองและค้นหาคำตอบด้วยตนเอง การใช้เกมเป็นฐานช่วยสร้างแรงจูงใจและความสนุกสนานในการเรียนรู้ ส่งผลให้นักเรียนเกิดความสนใจในบทเรียนมากยิ่งขึ้น

นอกจากนี้ กระบวนการเรียนรู้ดังกล่าวยังช่วยส่งเสริมทักษะการคิดวิเคราะห์และการแก้ปัญหา นักเรียนสามารถ เชื่อมโยงความรู้ที่เรียนรู้กับการประยุกต์ใช้ในสถานการณ์จริง เช่น การวิเคราะห์ส่วนประกอบของวงจรไฟฟ้า การคำนวณ กระแสไฟฟ้า และการประเมินผลที่เกิดขึ้นในวงจร สิ่งเหล่านี้แสดงให้เห็นถึงการพัฒนาทักษะการเรียนรู้เชิงลึกที่ส่งผลต่อความ เข้าใจในระยะยาวอย่างไรก็ตาม งานวิจัยนี้มีข้อจำกัดบางประการ เช่น ขนาดกลุ่มตัวอย่างที่จำกัดและการเลือกกลุ่มตัวอย่าง แบบเฉพาะเจาะจง ซึ่งอาจส่งผลต่อการสรุปผลในเชิงทั่วไป นอกจากนี้ การใช้เกมเป็นฐานอาจต้องการเวลาและทรัพยากร มากกว่าการสอนในรูปแบบเดิม ซึ่งอาจเป็นข้อจำกัดสำหรับโรงเรียนที่มีทรัพยากรจำกัด

ข้อเสนอแนะสำหรับการวิจัยในอนาคตคือการขยายกลุ่มตัวอย่างให้หลากหลายยิ่งขึ้น เพื่อให้สามารถนำผลการวิจัย ไปประยุกต์ใช้ในบริบทที่กว้างขวางกว่าเดิม นอกจากนี้ ควรมีการประเมินผลในมิติอื่น ๆ เช่น การเปลี่ยนแปลงทัศนคติ ความ สนใจในการเรียนรู้วิทยาศาสตร์ หรือทักษะการทำงานเป็นทีม เพื่อสร้างความเข้าใจในผลกระทบของวิธีการเรียนรู้แบบ 5E ร่วมกับเกมในเชิงลึกมากขึ้น

โดยสรุป การเรียนรู้แบบสืบเสาะหาความรู้ 5E ร่วมกับเกมเป็นฐาน เป็นแนวทางที่มีศักยภาพในการพัฒนาผลสัมฤทธิ์ ทางการเรียนรู้และทักษะของนักเรียน งานวิจัยนี้ชี้ให้เห็นถึงความสำคัญของการเรียนรู้ที่เน้นผู้เรียนเป็นศูนย์กลางและการสร้าง สภาพแวดล้อมที่ส่งเสริมการเรียนรู้เชิงรุก ครูผู้สอนจึงควรนำแนวทางนี้ไปปรับใช้ในการจัดการเรียนรู้ เพื่อส่งเสริมการเรียนรู้ที่ มีประสิทธิภาพและยั่งยืนในอนาคต

7. ข้อเสนอแนะ

ข้อเสนอแนะในการนำผลวิจัยไปใช้

1. ก่อนการจัดการเรียนรู้วงจรไฟฟ้าอย่างง่ายผ่านการ เรียนรู้แบบสืบเสาะหาความรู้ 5E โดยใช้เกมเป็นฐานครูผู้สอน ควรมีความรู้ความเข้าใจในการจัดการเรียนรู้ตามแนวคิดสะเต็มศึกษาได้เป็นอย่างดี ครูผู้สอนควรเตรียมตัวและทำหน้าที่ตนเอง

ให้พร้อมต่อการจัดการเรียนรู้ เช่น การวางแผนการจัดการเรียนรู้อย่างรอบคอบและมีประสิทธิภาพ การดำเนินการจัดการเรียนรู้ตามขั้นตอนที่วางแผนไว้เพื่อให้การจัดการเรียนรู้เป็นไปอย่างมีประสิทธิภาพ

2. ก่อนการจัดการเรียนรู้ ครูผู้สอนควรชี้แจงทำความเข้าใจให้นักเรียนเข้าใจรูปแบบการจัดการเรียนรู้ให้ชัดเจน เพื่อให้นักเรียนเข้าใจในใบบทบาทหน้าที่ของตนเอง โดยให้นักเรียนมีอิสระในด้านการคิด โดยครูผู้สอนมีหน้าที่คอยชี้แนะให้คำปรึกษาอย่างใกล้ชิด

3. ครูผู้สอนควรศึกษาการจัดการเรียนรู้วงจรไฟฟ้าอย่างง่ายผ่านการ เรียนรู้แบบสืบเสาะหาความรู้ 5E โดยใช้เกมเป็นฐานให้เข้าใจอย่างลึกซึ้งเพื่อการจัดการเรียนรู้ที่มีประสิทธิภาพและเกิดประโยชน์ต่อผู้นักเรียนมากที่สุด

4. การจัดการเรียนรู้วงจรไฟฟ้าอย่างง่ายผ่านการ เรียนรู้แบบสืบเสาะหาความรู้ 5E โดยใช้เกมเป็นฐานมีข้อจำกัดเรื่องเวลา ครูผู้สอนควรยืดหยุ่นเรื่องระยะเวลาที่ใช้ในการดำเนินกิจกรรมในแต่ละขั้นตอนของการจัดการเรียนรู้ตามความเหมาะสม

7. เอกสารอ้างอิง

[1] รังสิมันตุ์ ฉิมรักษ์. 2560. ผลการจัดการเรียนรู้โดยใช้วัฏจักรการสืบเสาะหาความรู้5 ขั้น (5Es) ร่วมกับการจัดการเรียนรู้แบบ ร่วมมือด้วยเทคนิคจิ๊กซอว์II เรื่องยีนและโครโมโซม ที่มีต่อผลสัมฤทธิ์ ทางการเรียนวิชาชีววิทยา พฤติกรรมการทำงานกลุ่ม และจิตวิทยาศาสตร์ของนักเรียนชั้นมัธยมศึกษาปีที่4. วิทยานิพนธ์การศึกษามหาบัณฑิต มหาวิทยาลัยบูรพา.

[2] กรันย์ลักษณ์ รัตนวโรภาส. 2563. การตรวจสอบเอกสารอย่างเป็นระบบและการวิเคราะห์อภิมานเรื่องวิธีการสอนแบบสืบเสาะหาความรู้ขั้นสูงเพื่อพัฒนาทักษะความคิดอย่างสร้างสรรค์ของผู้เรียน 35 : 3-4.

[3] ณัชชา เจริญชนะกิจ **และ**โสมฉาย บุญญานันต์. 2566. แนวทางการออกแบบบอร์ดเกมเพื่อส่งเสริมความสามารถในการออกแบบการเรียนรู้สะตีมศึกษาที่มีประสิทธิภาพ และเครื่องมือวางแผนการออกแบบบอร์ดเกมการศึกษา 50 : 2-3.

[4] ปัญญ์ปภัส สิงห์อร. 2562. การศึกษาความคิดสร้างสรรค์ทางวิทยาศาสตร์ของนักเรียนระดับชั้นมัธยมศึกษาปีที่ 4 ตามกรอบแนวคิด The Scientific Structure Creativity Model (SSCM) 34 : 2-3.

[5] ณัชชา เจริญชนะกิจ **และ**โสมฉาย บุญญานันต์. 2562. การพัฒนาชุดกิจกรรมการเรียนคณิตศาสตร์ โดยใช้การสอนแบบเปิดร่วมกับ การใช้ปัญหาเป็นฐาน และ STEM Education ที่ส่งผลต่อความคิดสร้างสรรค์ ความสุขในการเรียน และผลสัมฤทธิ์ทางการเรียน ของนักเรียนชั้นมัธยมศึกษาปีที่ 1 3 : 2-4.

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แนวทางการเพิ่มผลผลิตในกระบวนการผลิตรองเท้าผ้าใบ BE7
แผนกเย็บจักร U19 ด้วยระบบค่าแรงจูงใจ กรณีศึกษา
บริษัทผลิตรองเท้าผ้าใบแห่งหนึ่งในเขตบางขุนเทียน

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บทคัดย่อ

งานวิจัยนี้มี วัตถุประสงค์ของการวิจัยเพื่อ 1) ศึกษากระบวนการผลิตรองเท้าผ้าใบ BE7แผนกเย็บจักร U19 2) ศึกษา
เวลาในกระบวนการผลิตรองเท้าผ้าใบ BE7 แผนกเย็บจักร U19 และ 3) ศึกษาแนวทางการเพิ่มผลผลิตในกระบวนการผลิต
รองเท้าผ้าใบ BE7 แผนกเย็บจักร U19 ด้วยระบบค่าแรงจูงใจ จากการศึกษาพบว่า กระบวนการผลิตรองเท้าผ้าใบ BE7 แผนก
เย็บจักร U19 มีงานย่อยเฉพาะการปฏิบัติการของกระบวนการผลิตทั้งหมด 16 ขั้นตอน เวลาในกระบวนการผลิตมีอัตราการ
ผลิตอยู่ที่ 52.18 วินาที/คู่ และแนวทางการเพิ่มผลผลิตในกระบวนการผลิตด้วยระบบค่าแรงจูงใจ 1) วิธี Daywork อัตราการ
ผลิตอยู่ที่ 57.00 วินาที/คู่ จ่ายเงินจูงใจอยู่ที่ 0 บาท ปริมาณการผลิตจะไม่เพิ่มขึ้นเนื่องจากไม่มีการจ่ายค่าแรงจูงใจ 2) วิธี
Piecework อัตราการผลิตอยู่ที่ 36.12 วินาที/คู่ ปริมาณการผลิตจะเพิ่มขึ้น 57.14% จ่ายเงินจูงใจอยู่ที่ 153.61 บาท และ 3)
วิธีจ่ายเงินจูงใจแบบก้าวหน้า อัตราการผลิตอยู่ที่ 36.12 วินาที/คู่ จ่ายเงินจูงใจอยู่ที่ 208.27 บาท ปริมาณการผลิตจะเพิ่มขึ้น
57.14% ดังนั้น วิธี Piecework จึงเหมาะสมที่สุด เพราะมีการจ่ายเงินจูงใจที่น้อยกว่า

คำสำคัญ: การเพิ่มผลผลิต; กระบวนการผลิตรองเท้าผ้าใบ; ระบบค่าแรงจูงใจ

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The ways to Increase Productivity in the Production Process of BE7 Sneakers Sewing Department U19 with Incentive System, a Case Study of a Sneaker Manufacturing Company in Bang Khun Thian district, Bangkok.

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Abstract

This research has the objectives of this research were to study the production process of BE7 canvas shoes, U19 sewing department, to study the production time of BE7 canvas shoes, U19 sewing department. And to study ways to increase productivity in the production process of BE7 sneakers, U19 sewing machine department. With an incentive system the study found that BE7 sneaker production process U19 sewing machine department has 16 operation specific subtasks of the production process. Process time It has a production rate of 52.18 seconds/pair. And ways to increase productivity in the production process with the incentive system 1) daywork method, the production rate is 57.00 seconds/pair, paying incentives at 0 baht, the production volume will not increase because there is no incentive payment. 2) piecework method, the production rate was 36.12 seconds/pair, the production volume was increased by 57.14%, the incentive payment was 153.61 baht. And 3) a progressive incentive payment method, the production rate was 36.12 seconds/pair, the incentive payment was 208.27 baht, and the production volume increased by 57.14%.

Keywords: Productivity; Sneaker production process; Incentive system

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1. บทนำ

ปัจจุบันโรงงานอุตสาหกรรมการผลิตรองเท้าในประเทศไทยมีการแข่งขันทางด้านธุรกิจกันอย่างต่อเนื่องบริษัทผลิต รองเท้าผ้าใบแห่งหนึ่งในเขตบางขุนเทียน กรุงเทพมหานคร ดำเนินธุรกิจการผลิตและจัดจำหน่ายสินค้าประเภทรองเท้าสวมใส่ สำหรับทุกเพศทุกวัย โดยมี 4 ประเภท ดังนี้ รองเท้าแตะแบบสวมใส่ รองเท้าแตะแบบหูหนีบ รองเท้า รัดส้น และรองเท้าผ้าใบ ซึ่งจากการที่ผู้วิจัยได้สำรวจข้อมูลเบื้องต้นระหว่างวันที่ 1 ถึง 31 มีนาคม 2566 เป็นจำนวน 27 วันทำงาน พบว่า รองเท้าผ้าใบ กลุ่มโมเดล BE ซึ่งมีทั้งหมด 4 โมเดลคือ BE7 BE8 BE17 และ BE18 โดยจะมีปริมาณการจำหน่ายของแต่ละโมเดลดังภาพที่ 1

โมเดล	BE7	BE8	BE17	BE18	รวม
ปริมาณการจำหน่าย (คู่)	19,845	12,230	9,620	8,980	50,675
ปริมาณการจำหน่าย (%)	39.16	24.13	18.98	17.73	100

ภาพที่ 1 ปริมาณการจำหน่ายรองเท้าผ้าใบกลุ่มโมเดล BE ระหว่างวันที่ 1 ถึง 31 มีนาคม 2566

จากภาพที่ 1 จะเห็นได้ว่าปริมาณการจำหน่ายรองเท้าผ้าใบ กลุ่มโมเดล BE ทั้งหมดนั้น เมื่อนำมาวิเคราะห์และ เปรียบเทียบ จะเห็นได้ว่ารองเท้าผ้าใบโมเดล BE7 มีปริมาณการจำหน่าย 19,845 คู่ คิดเป็นร้อยละ 39.16 โมเดล BE8 มี ปริมาณการจำหน่าย 12,230 คู่ คิดเป็นร้อยละ 24.13 โมเดล BE17 มีปริมาณการจำหน่าย 9,620 คู่ คิดเป็นร้อยละ 18.98 และโมเดล BE18 มีปริมาณการจำหน่าย 8,980 คู่ คิดเป็นร้อยละ 17.73 ซึ่งรองเท้าผ้าใบโมเดล BE7 นั้นมีปริมาณการจำหน่าย ที่สูงกว่ารองเท้าผ้าใบโมเดล BE8 BE17 และ BE18 โดยจะมีปริมาณการผลิตของรองเท้าผ้าใบกลุ่มโมเดล BE ดังภาพที่ 2

ภาพที่ 2 ปริมาณการผลิตรองเท้าผ้าใบ กลุ่มโมเดล BE ระหว่างวันที่ 1 ถึง 31 มีนาคม 2566

จากภาพที่ 2 จะเห็นได้ว่า ตั้งแต่วันที่ 1 ถึง 31 มีนาคม 2566 เป็นจำนวน 27 วันทำงาน ปริมาณการผลิตรองเท้าผ้าใบ กลุ่มโมเดล BE โดยมีรองเท้าผ้าใบ BE7 ปริมาณการผลิต คือ 13,608 คู่ คิดเป็นร้อยละ 26.44 เฉลี่ยวันละ 504 คู่ รองเท้า ผ้าใบ BE8 ปริมาณการผลิต คือ 13,804 คู่ คิดเป็นร้อยละ 26.83 เฉลี่ยวันละ 511 คู่ รองเท้าผ้าใบ BE17 ปริมาณการผลิต คือ 12,544 คู่ คิดเป็นร้อยละ 24.37 เฉลี่ยวันละ 464 คู่ และรองเท้าผ้าใบ BE18 ปริมาณการผลิต คือ 11,509 คู่ คิดเป็นร้อยละ 22.36 เฉลี่ยวันละ 426 คู่

ผู้วิจัยจึงทำการเปรียบเทียบปริมาณการจำหน่ายกับปริมาณการผลิตรองเท้าผ้าใบกลุ่มโมเดล BE ทั้ง 4 โมเดล ดังภาพ ที่ 3 และแสดงเป็นแผนภูมิแท่ง ดังภาพที่ 4

รายการ	โมเดล			
	BE7	BE8	BE17	BE18
ปริมาณการจำหน่ายที่ได้ (คู่)	19,845	12,230	9,620	8,980
ปริมาณการผลิตที่ได้ (คู่)	13,608	13,804	12,544	11,509
ผลต่าง (คู่)	-6,237	1,574	2,924	2,529
ผลต่าง (%)	-31.43	+12.87	+30.39	+28.16

ภาพที่ 3 เปรียบเทียบปริมาณการจำหน่ายกับปริมาณการผลิตของรองเท้าผ้าใบกลุ่มโมเดล BE ทั้ง 4 โมเดล

ภาพที่ 4 แผนภูมิแท่งแสดงการเปรียบเทียบปริมาณการจำหน่ายกับปริมาณการผลิตของรองเท้าผ้าใบ
กลุ่มโมเดล BE ทั้ง 4 โมเดล

จากตารางที่ 3 จะเห็นได้ว่าปริมาณการผลิตรองเท้าผ้าใบโมเดล BE7 เปรียบเทียบกับปริมาณการจำหน่ายรองเท้าผ้าใบ โมเดล BE7 ผลต่าง -6,237 คู่ คิดเป็นร้อยละ -31.43 ปริมาณการผลิตรองเท้าผ้าใบโมเดล BE8 เปรียบเทียบกับปริมาณการ จำหน่ายรองเท้าผ้าใบโมเดล BE8 ผลต่าง 1,574 คู่ คิดเป็นร้อยละ 12.87 ปริมาณการผลิตรองเท้าผ้าใบโมเดล BE17 เปรียบเทียบกับปริมาณการจำหน่ายรองเท้าผ้าใบโมเดล BE17 ผลต่าง 2,924 คู่ คิดเป็นร้อยละ 30.39 และปริมาณการผลิต รองเท้าผ้าใบโมเดล BE18 เปรียบเทียบกับปริมาณการจำหน่ายรองเท้าผ้าใบโมเดล BE18 ผลต่าง 2,529 คู่ คิดเป็นร้อยละ 28.16 ซึ่งจากข้อมูล รองเท้าผ้าใบโมเดล BE7 มีร้อยละที่มีค่าเป็นลบต่างจากรองเท้าผ้าใบ อีก 3 โมเดล ในกลุ่มเดียวกัน และ จากภาพที่ 4 จะเห็นได้ว่าปริมาณการจำหน่ายสูงกว่าปริมาณการผลิต

ดังนั้น ผู้วิจัยสนใจที่จะทำศึกษาแนวทางการเพิ่มผลผลิตในกระบวนการผลิตรองเท้าผ้าใบ BE7 แผนกเย็บจักร U19 ด้วยระบบค่าแรงจูงใจ เพื่อเพิ่มปริมาณการผลิตให้เพียงพอต่อปริมาณการจำหน่าย

2. วัตถุประสงค์การวิจัย

1. เพื่อศึกษากระบวนการผลิตรองเท้าผ้าใบ BE7 แผนกเย็บจักร U19
2. เพื่อศึกษาเวลาในกระบวนการผลิตรองเท้าผ้าใบ BE7 แผนกเย็บจักร U19

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3. เพื่อศึกษาแนวทางการเพิ่มผลผลิตในกระบวนการผลิตรองเท้าผ้าใบ BE7 แผนกเย็บจักร U19 ด้วยระบบค่าแรงจูงใจ

3. ระเบียบวิธีวิจัย

การวิจัยนี้ เป็นวิจัยแนวทางการเพิ่มผลผลิตในกระบวนการผลิตรองเท้าผ้าใบ BE7 แผนกเย็บจักร U19 ด้วยระบบค่าแรงจูงใจ ผู้วิจัยได้กำหนดวิธีการดำเนินงานซึ่งมีรายละเอียด โดยศึกษากระบวนการผลิตรองเท้าผ้าใบ BE7 แผนกเย็บจักร U19 และศึกษาเวลาในกระบวนการผลิตรองเท้าผ้าใบ BE7 แผนกเย็บจักร U19 เพื่อศึกษาแนวทางการเพิ่มผลผลิตในกระบวนการผลิตรองเท้าผ้าใบ BE7 แผนกเย็บจักร U19 ด้วยระบบค่าแรงจูงใจ

ประชากรที่ใช้ในการศึกษา ได้แก่ พนักงานฝ่ายประสิทธิภาพ จำนวน 1 คน หัวหน้าแผนกเย็บจักร U19 จำนวน 1 คน พนักงานปฏิบัติงานภายในส่วนของการผลิต จำนวน 6 คน

3.1 เครื่องมือที่ใช้ในการวิจัย

1. แบบสัมภาษณ์

2. แบบสังเกต

3. แบบบันทึกเวลา

4. แผนภูมิกระบวนการไหล

3.2 การวิเคราะห์ข้อมูล

นำข้อมูลที่ได้จากการสัมภาษณ์ และการสังเกตไปเรียบเรียงเป็นกระบวนการในการปฏิบัติงาน ตั้งแต่กระบวนการเริ่มต้นจนถึงสิ้นสุดกระบวนการผลิตแล้วนำผลที่ได้มาสร้างเป็นแผนภูมิการไหล และนำข้อมูลเวลาที่ได้ทำการจับเวลาแต่ละรอบงานย่อยของกระบวนการผลิตมาคำนวนเวลามาตรฐาน ดังภาพที่ 5

ภาพที่ 5 วิธีการคำนวณหาเวลามาตรฐาน

ผู้วิจัยได้นำเวลามาตรฐานในกระบวนการผลิตรองเท้าผ้าใบ BE7 แผนกเย็บจักร U19 มาทำการวิเคราะห์เพื่อศึกษาการเพิ่มผลผลิตด้วยระบบค่าแรงจูงใจ 3 วิธีดังนี้ 1) วิธี Daywork 2) วิธี Piecework และ 3) วิธีจ่ายเงินจูงใจแบบก้าวหน้า หลังจากนั้นผู้วิจัยจะทำการเปรียบเทียบต้นทุนค่าแรง ปริมาณการผลิต และปริมาณความต้องการของลูกค้ากับแต่ละแผนการจ่ายเงินจูงใจทั้ง 3 วิธี

4. ผลการวิจัยและอภิปรายผล

4.1 ผลการศึกษากระบวนการผลิตรองเท้าผ้าใบ BE7 แผนกเย็บจักร U19

ภาพที่ 6 ผลการศึกษากระบวนการผลิตรองเท้าผ้าใบ BE7 แผนกเย็บจักร U19

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4.2 ผลการศึกษาเวลาในกระบวนการผลิตรองเท้าผ้าใบ BE7 แผนกเย็บจักร U19

ภาพที่ 7 ผลการศึกษาเวลาในกระบวนการผลิตรองเท้าผ้าใบ BE7 แผนกเย็บจักร U19

4.3 ผลการศึกษาแนวทางการเพิ่มผลผลิตในกระบวนการผลิตรองเท้าผ้าใบ BE7 แผนกเย็บจักร U19 ด้วยระบบค่าแรงจูงใจ
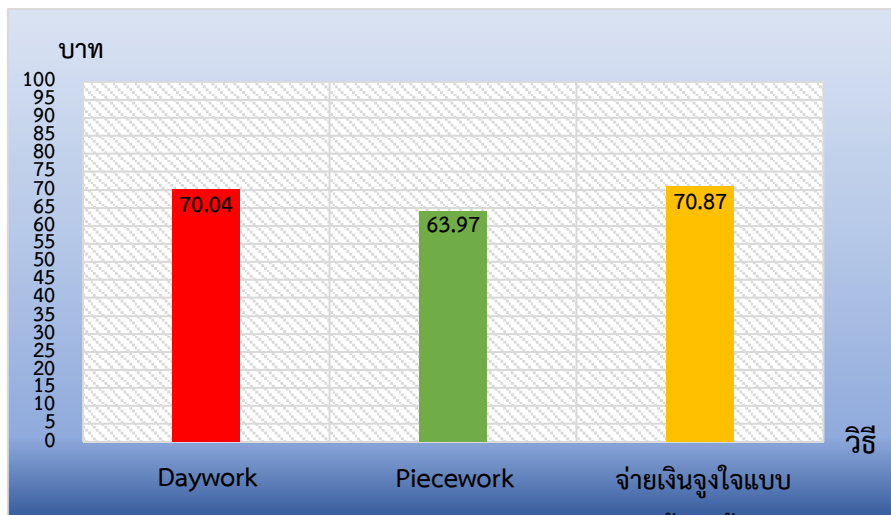
ภาพที่ 8 การเปรียบเทียบในแต่ละแบบแผนการจ่ายเงินจูงใจของต้นทุนค่าแรงทางตรงต่อหน่วยผลิต 100 คู่
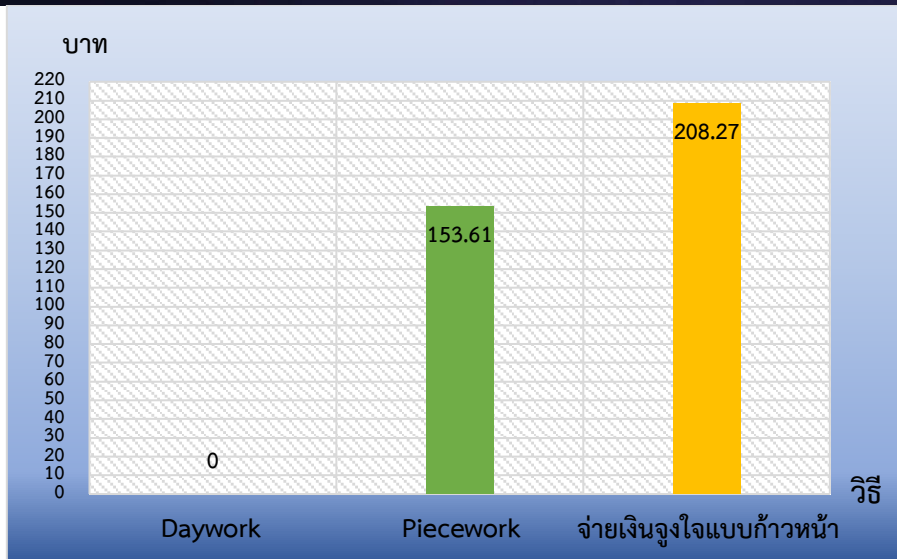
ภาพที่ 9 การเปรียบเทียบเงินจูงใจที่จ่าย
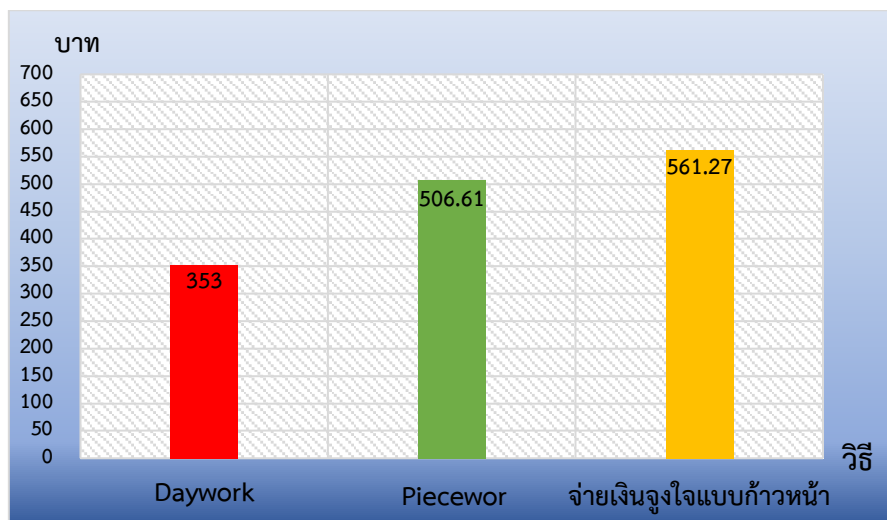
ภาพที่ 10 เปรียบเทียบค่าแรงที่จ่ายทั้งหมด
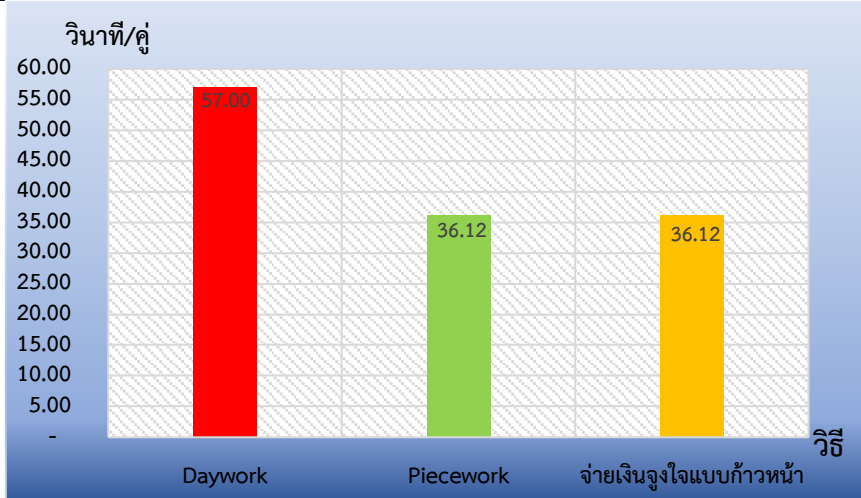
ภาพที่ 11 เปรียบเทียบอัตราการผลิต

การเปรียบเทียบปริมาณการผลิตของแบบแผนการจ่ายเงินจูงใจกับปริมาณการความต้องการของลูกค้า

ปริมาณการผลิตของแบบแผนการจ่ายเงินจูงใจทั้ง 3 วิธี

1) วิธี Daywork มีอัตราการผลิตอยู่ที่ 57.00 วินาที/คู่ มีปริมาณการผลิตดังนี้

ปริมาณการผลิตใน 1 ชั่วโมง	=	$\dfrac{3{,}600}{57}$
	=	63 คู่
ปริมาณการผลิตใน 1 วันทำงาน	=	63 × 8
	=	504 คู่
ปริมาณการผลิตใน 27 วันทำงาน	=	504 × 27
	=	13,608 คู่

2) วิธี Piecework มีอัตราการผลิตอยู่ที่ 36.12 วินาที/คู่ มีปริมาณการผลิตดังนี้

ปริมาณการผลิตใน 1 ชั่วโมง	=	$\dfrac{3{,}600}{36.12}$
	=	99 คู่
ปริมาณการผลิตใน 1 วันทำงาน	=	99 × 8
	=	792 คู่
ปริมาณการผลิตใน 27 วันทำงาน	=	792 × 27
	=	21,384 คู่

3) วิธีจ่ายเงินจูงใจแบบก้าวหน้า มีอัตราการผลิตอยู่ที่ 36.12 วินาที/คู่

มีปริมาณการผลิต ดังนี้

ปริมาณการผลิตใน 1 ชั่วโมง	=	$\dfrac{3{,}600}{36.12}$
	=	99 คู่
ปริมาณการผลิตใน 1 วันทำงาน	=	99 × 8
	=	792 คู่
ปริมาณการผลิตใน 27 วันทำงาน	=	792 × 27
	=	21,384 คู่

การเปรียบเทียบปริมาณการผลิตของแบบแผนการจ่ายเงินจูงใจกับปริมาณความต้องการของลูกค้า

ผู้วิจัยได้ทำการเปรียบเทียบปริมาณการผลิตในแต่ละแบบแผนการจ่ายเงินจูงใจทั้ง 3 วิธี กับปริมาณความต้องการของลูกค้า ดังตารางที่ 1 และแสดงเป็นแผนภูมิแท่งดังภาพที่ 11

ตารางที่ 1 การเปรียบเทียบปริมาณการผลิต ผลต่าง ในแต่ละแบบแผนการจ่ายเงินจูงใจทั้ง 3 วิธีกับปริมาณความต้องการของลูกค้า

รายการ	วิธี		
	Daywork	Piecework	จ่ายเงินจูงใจแบบก้าวหน้า
ปริมาณการผลิตที่ได้ (คู่)	13,608	21,384	21,384
ปริมาณความต้องการของลูกค้า (คู่)	19,845	19,845	19,845
ผลต่าง (คู่)	-6,237	1,539	1,539
ผลต่าง (%)	-31.43	+7.76	+7.76
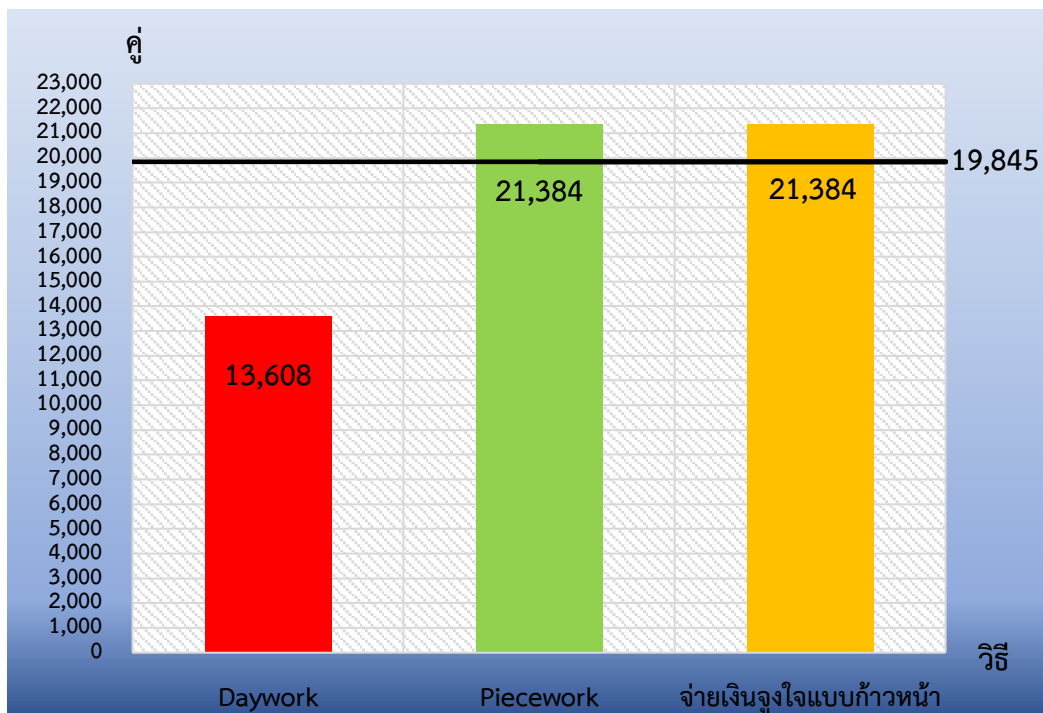
ภาพที่ 12 เปรียบเทียบปริมาณการผลิตในแต่ละแบบแผนการจ่ายเงินจูงใจทั้ง 3 วิธี กับปริมาณความต้องการของลูกค้า

จากตางรางที่ 1 จะเห็นได้ว่าปริมาณการผลิตทั้ง 3 วิธี เมื่อนำมาเปรียบเทียบกับปริมาณความต้องการของลูกค้า 1) วิธี Daywork มีปริมาณการผลิตอยู่ที่ 13,608 คู่ เปรียบเทียบกับปริมาณความต้องการของลูกค้าอยู่ที่ 19,845 คู่ ผลต่าง -6,237 คู่ คิดเป็นร้อยละ -31.43 2) วิธี Piecework มีปริมาณการผลิตอยู่ที่ 21,384 คู่ เปรียบเทียบกับปริมาณความต้องการของลูกค้าอยู่ที่ 19,845 คู่ ผลต่าง 1,539 คู่ คิดเป็นร้อยละ +7.76 3) วิธีจ่ายเงินจูงใจแบบก้าวหน้า มีปริมาณการผลิตอยู่ที่ 21,384 คู่ เปรียบเทียบกับปริมาณความต้องการของลูกค้าอยู่ที่ 19,845 คู่ ผลต่าง 1,539 คู่ คิดเป็นร้อยละ +7.76 ซึ่งจากข้อมูล วิธี Daywork นั้นยังไม่สามารถเพิ่มปริมาณการผลิตได้แตกต่างจากวิธี Piecework และวิธีจ่ายเงินจูงใจแบบก้าวหน้า

การประชุมวิชาการระดับชาติและนานาชาติบ้านสมเด็จเจ้าพระยา ครั้งที่ 1 (BS2C 2025)
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ที่สามรถเพิ่มปริมาณการผลิตให้ทันต่อปริมาณความต้องการของลูกค้าได้ และจากภาพที่ 12 ปริมาณการผลิตของ วิธี Daywork ต่ำกว่าปริมาณความต้องการของลูกค้า และปริมาณการผลิตของ วิธี Piecework และวิธีจ่ายเงินจูงใจแบบก้าวหน้า สูงกว่าปริมาณความต้องการของลูกค้าเมื่อเปรียบเทียบกับปริมาณความต้องการของลูกค้าแล้วทำให้ วิธี Piecework และวิธี จ่ายเงินจูงใจแบบก้าวหน้า ทั้ง 2 วิธี มีปริมาณการผลิตอยู่ที่ 21,384 คู่ และปริมาณความต้องการของลูกค้าอยู่ที่ 19,845 คู่ จะ เห็นได้มีปริมาณการผลิตที่เท่ากัน ซึ่งวิธี Piecework เป็นวิธีที่เหมาะสมที่สุดในการเพิ่มผลผลิตด้วยระบบค่าแรงจูงใจเพื่อให้ทัน ต่อปริมาณความต้องการของลูกค้ามากกว่าแบบแผนการจ่ายเงินจูงใจ วิธี Daywork และวิธีจ่ายเงินจูงใจแบบก้าวหน้า เนื่องจากวิธี Daywork ไม่มีการจ่ายค่าแรงจูงใจทำให้ต้นทุนค่าแรงจะแปรผันโดยตรงกับประสิทธิภาพการทำงานของพนักงาน และวิธีจ่ายเงินจูงใจแบบก้าวหน้ามีต้นทุนค่าแรงทางตรงต่อหน่วยผลิต 100 คู่ เงินจูงใจที่จะจ่ายและค่าแรงที่จ่ายทั้งหมดนั้นสูง กว่า วิธี Piecework

อภิปรายผล

ผู้วิจัยได้ศึกษากระบวนการผลิต ศึกษาเวลาในกระบวนการผลิต และศึกษาแนวทางการเพิ่มผลผลิตในกระบวนการ ผลิตด้วยระบบค่าแรงจูงใจ จากนั้นทำการเปรียบเทียบระบบแบบแผนการจ่ายค่าแรงจูงใจ ทำให้ทราบว่าปริมาณการผลิตปกติ อยู่ที่ 13,608 คู่ ต่อ 27 วันทำงาน แนวทางการเพิ่มผลผลิตด้วยระบบค่าแรงจูงใจ วิธี Daywork จะทำให้ปริมาณการผลิตอยู่ที่ 13,608 คู่ต่อ 27 วันทำงาน แนวทางการเพิ่มผลผลิตด้วยระบบค่าแรงจูงใจ วิธี Piecework จะทำให้ปริมาณการผลิตอยู่ที่ 21,384 คู่ ต่อ 27 วันทำงาน และแนวทางการเพิ่มผลผลิตด้วยระบบค่าแรงจูงใจวิธีจ่ายเงินจูงใจแบบก้าวหน้า จะทำให้ปริมาณ การผลิตอยู่ที่ 21,384 คู่ ต่อ 27 วันทำงาน จึงนำข้อมูลที่ได้มาเทียบกับปริมาณความต้องการของลูกค้าอยู่ที่ 19,845 คู่ ต่อ 27 วันทำงานซึ่งแนวทางการเพิ่มผลผลิตด้วยระบบค่าแรงจูงใจ วิธี Piecework และแนวทางการเพิ่มผลผลิตด้วยระบบค่าแรงจูงใจ วิธีจ่ายเงินจูงใจแบบก้าวหน้า มีปริมาณการผลิตที่มากกว่าความต้องการของลูกค้าอยู่ที่ 1,539 คู่ คิดเป็นร้อยละ +7.76

5. ข้อเสนอแนะ

การนำผลไปใช้สามารถนำแผนวิธีการจ่ายเงินจูงใจอีก 3 วิธี จากทั้งหมด 6 วิธี ที่ผู้วิจัยยังไม่ได้นำมาวิเคราะห์ คือ วิธีที่ 1) แผนการจ่ายเงินจูงใจแบบสัดส่วน 2) แผนการจ่ายเงินจูงใจแบบถดถอย และ 3) แผนการจ่ายเงินจูงใจดูจากเวลาที่ ลดลง ไปทำการวิเคราะห์หาผลลัพธ์เพื่อมาเปรียบเทียบกับผลลัพธ์ 3 วิธีการจ่ายเงินจูงใจของผู้วิจัยนั้นดีกว่าอย่างไร วิธีไหน เหมาะสมที่สุด

6. เอกสารอ้างอิง

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การประชุมวิชาการระดับชาติและนานาชาติบ้านสมเด็จเจ้าพระยา ครั้งที่ 1 (BS2C 2025)
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(157-TH-SCT)
การศึกษาความเป็นไปได้ในการซื้อเรือขนส่งทดแทนการจ้างเรือขนส่งภายนอก
สำหรับบริษัทกรณีศึกษา

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บทคัดย่อ
บทความการศึกษาวิจัยในครั้งนี้ มีวัตถุประสงค์เพื่อศึกษาหาความเป็นไปได้ในการลงทุนในโครงการจ้างบริการเรือ เทียบกับ โครงการซื้อเรือของท่าเรือกรณีศึกษา เพื่อทำการเปรียบเทียบหาความคุ้มค่าสูงสุด ในทางเลือกระหว่างทั้ง 2 โครงการ โดยศึกษาข้อมูลค่าใช้จ่ายในการขนส่งต่อเที่ยว โดยข้อมูลค่าใช้จ่ายในการลงทุนและการปฏิบัติงานจะถูกมาวิเคราะห์ด้วยค่าดัชนีทางเศรษฐศาสตร์ ได้แก่ โดยใช้ มูลค่าปัจจุบันสุทธิ (NPV) มูลค่ารายปีสุทธิ (AW) และอัตราผลตอบแทนภายใน (IRR) รวมถึงวิเคราะห์ความไวตัวทางเศรษฐศาสตร์ (Sensitivity Analysis) ในการพิจารณาเปรียบเทียบระหว่าง 2 โครงการ

ผลจากการวิเคราะห์ปรากฏว่าทางเลือกในการซื้อเรือเป็นทางเลือกที่เหมาะสม เนื่องจากมีมูลค่าตอบแทนมากกว่า ประหยัดค่าใช้จ่ายมากกว่าโครงการจ้างบริการเรือ โดยมีมูลค่าปัจจุบันสุทธิ (NPV) เท่ากับ 38,883,000 บาท มูลค่ารายปี (AW)เท่ากับ 5,535,940 บาท และอัตราผลตอบแทนภายใน (IRR) โครงการเท่ากับ 13.09 เปอร์เซ็นต์ โดยพิจารณาที่ระยะ ดำเนินการ 10 ปี และอัตราผลตอบแทนขั้นต่ำ (MARR) ที่ 7 เปอร์เซ็นต์

คำสำคัญ: การขนส่ง; การศึกษาความเป็นไปได้; เศรษฐศาสตร์

การประชุมวิชาการระดับชาติและนานาชาติบ้านสมเด็จเจ้าพระยา ครั้งที่ 1 (BS2C 2025)
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Feasibility Study of Investment in Purchasing Ship Transportation Instead of Hiring the Outsource Ship Transportation for the Case Study Company

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Abstract

This research aims to study the feasibility of investing in a ship purchase project to replace the ship service contracting project of a case study port. To compare and find the highest value in the two alternatives projects by studying the data of transportation costs per trip. The expense of investment and operation will be brought to calculate the economic indexes including the Net Present Value: NPV, the Annual Worth: AW, and the Internal Rate of Return: IRR. then using the data for economic analysis using Present Value (PW), Annual Value (AW), and Internal Rate of Return (IRR), including economic sensitivity analysis in considering the comparison between the 2 projects.

The results of the analysis show that the option of purchasing a ship is the most suitable option because it has a higher return and is more cost-saving than the project of hiring a ship service, with a net present value of 38,883,000 baht, an annual value of 5,535,940 baht, and an internal rate of return of 13.09 percent, considering the operation period of 10 years and a minimum rate of return (MARR) of 7 percent.

Keywords: Transportation; Feasibility study; Economic

1. บทนำ

ในปัจจุบันประเทศต่างๆ มีการติดต่อทำการค้ากันมากขึ้น การขนส่งสินค้าระหว่างประเทศมีจำนวนสูงขึ้นโดยมีช่อง
ทางการขนส่ง ทั้งทางบก ทางอากาศและทางทะเล สำหรับการขนส่งทางทะเลของประเทศไทยนั้น จากสถิติกรมเจ้าท่า ใน
ระหว่างปีพ.ศ. 2558 - 2564 พบว่ามีปริมาณการขนส่งเพิ่มขึ้นอย่างต่อเนื่องแสดงดังภาพที่ 1
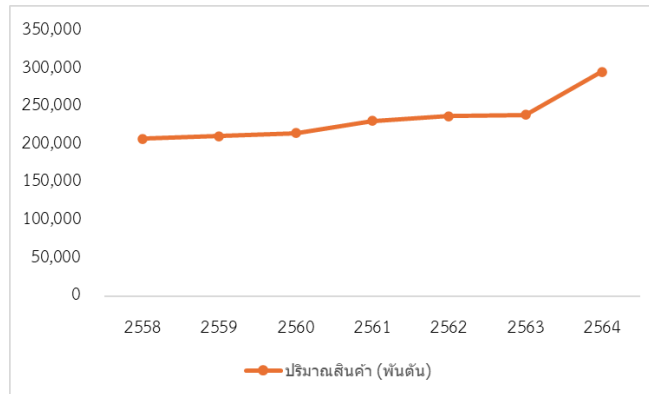
ภาพที่ 1 สถิติการให้บริการขนส่งสินค้าทางเรือระหว่างประเทศ (กรมเจ้าท่า, 2565)

หากเทียบข้อมูลการขนส่งสินค้าระหว่างประเทศทั้งหมด การขนส่งทางทะเลถือว่าเป็นการขนส่งสินค้าหลักที่มี
ปริมาณการขนส่งคิดเป็นร้อยละ 84.90 จากการขนส่งระหว่างประเทศทั้งหมด   โดยธุรกิจการขนส่งทางทะเลถือได้ว่า มีการ
แข่งขันกันอย่างสูง ทำให้แต่ละองค์กรต้องมีการพัฒนาการบริการและการลดต้นทุนในองค์กรให้ต่ำที่สุด   เพื่อที่ให้องค์กรมี
ความสามารถในการแข่งขันกับคู่แข่งที่มีอยู่ในตลาดได้

สำหรับบริษัทกรณีศึกษา   เป็นบริษัททำธุรกิจขนส่งตู้คอนเทนเนอร์เพื่อนำขึ้นเรือทั้งภายในประเทศและระหว่าง
ประเทศ ณ ท่าเทียบเรือแหลมฉบัง   มีปัญหาการไม่สามารถให้บริการขนส่งตู้คอนเทนเนอร์ได้ทันต่อเวลา บริษัทได้จัดการโดย
การเช่าเรือขนส่งเพื่อให้บริการเสริมเพื่อสนองตอบความต้องการของลูกค้าเพิ่ม แต่พบว่าค่าใช้จ่ายในการจ้างนั้นมีราคา
ค่อนข้างสูง ประกอบกับกรณีมีความต้องการเร่งด่วนจะไม่สามารถปรับเปลี่ยนได้ตามต้องการ   จากเหตุผลดังกล่าวบริษัทมี
ความสนใจที่จะลงทุนซื้อเรือเพิ่มเติมเพื่อให้ตอบสนองกับการให้บริการและรองรับการขยายขนาดของการบริการในอนาคต
เนื่องจากการขนส่งทางเรือมีแนวโน้มเพิ่มสูงขึ้น อย่างไรก็ดีการลงทุนซื้อเรือมีค่าใช้จ่ายการลงทุนและปัจจุบันปริมาณการ
ให้บริการยังไม่เต็มความจุของการให้บริการด้วยเรือ 2 ลำแต่ด้วยการเช่าเรือเสริมนั้นมีปัญหาในส่วนของการสนองตอบตามการ
วางแผนการจัดส่งที่ไม่บรรลุตามช่วงเวลาที่ต้องการและราคาการเช่าที่สูงขึ้น   ดังนั้น เพื่อให้การตัดสินใจลงทุนซื้อเรือซึ่งเป็น
แนวทางที่บริษัทสนใจนำมาใช้เพื่อตอบสนองต่อการบริการซึ่งเป็นการลงทุนที่ค่อนข้างสูงนั้นเกิดความเสี่ยงในการตัดสินใจน้อย
ที่สุดและเพื่อให้เกิดความคุ้มค่ากับการตัดสินใจลงทุนทดแทนวิธีการเดิมมากที่สุดจึงมีความจำเป็นต้องต้องศึกษาความเป็นไป
ได้ในการพิจารณาลงทุนซื้อเรือสำหรับการให้บริการขนส่ง

2. วัตถุประสงค์

สำหรับการศึกษาสำหรับงานวิจัยนี้ เพื่อศึกษาความเป็นไปได้ของการลงทุนซื้อเรือขนส่งใช้บริการในบริษัททดแทนการ
จ้างเรือขนส่งภายนอก โดยวิธีการศึกษาทางเศรษฐศาสตร์

3. ทฤษฎีและงานวิจัยที่เกี่ยวข้อง

3.1 วิธีการวิเคราะห์ทางเศรษฐศาสตร์

ปัญหาเพื่อการตัดสินใจของผู้ประกอบการ คือ ปัญหาการเลือกทำในกิจกรรมทุกประเภทที่ผู้ประกอบการต้อง
ตัดสินใจ มักจะมีทางเลือกที่จะดำเนินการมากกว่าหนึ่งทาง ปัญหาการตัดสินใจอาจเป็นได้หลายประการ ได้แก่ การ
ตัดสินใจขยายการผลิต ตัดสินใจเปลี่ยนรูปแบบการผลิต การใช้เครื่องจักรแทนแรงงานคน การลงทุนโครงการใหม่ เป็น
ต้น ซึ่งเป็นการตัดสินใจเลือกการลงทุนที่ใช้ทรัพยากร จำเป็นต้องใช้ด้วยเกณฑ์ดัชนีทางเศรษฐศาสตร์ต่างๆ ช่วยตัดสินใจใน
ด้านความคุ้มค่าเหมาะสมของการใช้ทรัพยากร โดยเกณฑ์ดัชนีที่เป็นที่นิยมเกณฑ์หนึ่ง ได้แก่ ดัชนีมูลค่าเทียบเท่าปัจจุบัน
(Net Present Value) ดัชนีมูลค่ารายปี (Annual Worth) และอัตราผลตอบแทนภายในสุทธิ (Internal Rate of Return
:IRR)

3.1.1 มูลค่าเทียบเท่าปัจจุบัน

นำมาใช้ในการตัดสินใจเลือกโครงการต่างๆ โดยการแปลงค่าของเงินที่ช่วงเวลาต่างๆ มาที่ปีปัจจุบันแล้วทำการ
เปรียบเทียบกันว่าโครงการใดใช้ค่าใช้จ่ายต่ำสุด หรือได้กำไรสูงสุดจึงเลือกโครงการนั้น (พิชญ์ จงวัฒนากุล, 2564)

มูลค่าปัจจุบันสุทธิ (Net Present Value) หรือ NPV สามารถคำนวณได้จากสูตรต่อไปนี้

$$NPV = F_0(1+i)^{-0} + F_0(1+i)^{-1} + F_0(1+i)^{-2} + \ldots F_n(1+i)^{-n} \tag{1}$$

F_t กระแสของเงินอนาคตที่ระยะเวลา t ใดๆ

i อัตราดอกเบี้ย

t ปีของโครงการที่ 1,2…….,n

n อายุของโครงการ

โดยโครงการที่น่าลงทุนจะมีมูลค่าปัจจุบันสุทธิ มากกว่าศูนย์ หรือหากเป็นการเปรียบเทียบทางเลือก 2 โครงการ
โครงการที่น่าลงทุนจะมีมูลค่าที่สูงกว่าอีกทางเลือกหนึ่ง

3.1.2 มูลค่าเทียบเท่ารายปี

การเปรียบเทียบความคุ้มค่าในการลงทุนโดยพิจารณาจากมูลค่ารายปี หรือ AW (Annual Worth) มีการใช้อัตรา
ปรับค่าเงินด้วยอัตราผลตอบแทนต่ำสุด (MARR) ให้อยู่ในรูปอนุกรมรายปี การตัดสินใจยอมรับโครงการจะประเมินจากผลการ
คำนวณที่ต้องมีค่าเป็นบวก (มากกว่าหรือเท่ากับศูนย์) เช่นเดียวกัน โดยกรณีเปรียบเทียบโครงการ ตั้งแต่ 2 โครงการขึ้นไป
จะเลือกโครงการที่ค่ารายปีเป็นบวกมากที่สุด กรณีลักษณะโครงการเป็นโครงการเกี่ยวกับค่าใช้จ่าย จะเลือกโครงการที่ค่า
รายปีเป็นลบน้อยที่สุด

โดยการคำนวณกระแสเงินที่เกิดขึ้นตลอดโครงการให้อยู่ในรูปอนุกรมรายปี ภายใต้อัตราดอกเบี้ยที่กำหนด ในการ
คำนวณใช้หลักการของการเทียบเท่ามูลค่าเงินที่ปีต่าง ๆด้วยตัวประกอบ เช่น (A/P i%,n) (A/F i%,n) (A/G i%,n) ให้เป็นค่า
เทียบเท่าต่อปี (A) แสดงตัวอย่างการเขียนเป็นสมการความสัมพันธ์กับมูลค่าปัจจุบันได้ดังนี้

$$AW(i) = \left[\sum_{t=0}^{n} A_t(P|F\ i,t)\right](A|P\ i,n) \tag{2}$$

$$AW(i) = NPV(i)(A|P\ i,n) \tag{3}$$

A_t กระแสของเงินรายปีที่ระยะเวลา t ใดๆ

AW มูลค่ารายปี

$(P/F\ i\%,n)$ ตัวประกอบเพื่อปรับค่ากระแสเงินอนาคตให้เป็นมูลค่าปัจจุบัน

$(A/P\ i\%,n)$ ตัวประกอบเพื่อปรับค่ากระแสเงินปัจจุบันให้เป็นมูลค่ารายปี

i อัตราดอกเบี้ย

t   ปีของโครงการที่ 1,2.......,n

n   อายุของโครงการ

โดยโครงการที่น่าลงทุนจะมีมูลค่าปัจจุบันสุทธิ มากกว่าศูนย์ หรือหากเป็นการเปรียบเทียบทางเลือก 2 โครงการ โครงการที่น่าลงทุนจะมีมูลค่าที่สูงกว่าอีกทางเลือกหนึ่ง

3.1.3 อัตราผลตอบแทนภายใน (Internal Rate of Return : IRR)

อัตราผลตอบแทนภายใน (Internal Rate of Return : IRR) คืออัตราผลตอบแทนที่ให้มูลค่าตอบแทนโดยรวมเท่ากับศูนย์พอดี ซึ่งผลรวมของมูลค่านี้สามารถคิดที่ปีปัจจุบัน(PW) หรือมูลค่ารายปี(AW) หรือมูลค่าอนาคต(FW) ซึ่งจะหมายถึงอัตราผลตอบแทนที่เกิดจากกระแสเงินภายในโครงการ โดยโครงการจะน่าลงทุนเมื่อค่า IRR หรือผลตอบแทนจากโครงการ มีค่ามากกว่าหรือเท่ากับอัตราผลตอบแทนขั้นต่ำที่คาดหวัง (MARR) ค่า IRR แสดงความหมายได้ดังสมการ

$$NPV\ (i*\%) = 0 \tag{4}$$

จากสมการกำหนดให้ อัตราดอกเบี้ยที่ทำให้เกิดความสัมพันธ์นี้แทนด้วย i^* เรียกว่า IRR สามารถคำนวณหาอัตรานี้ได้จากสมการความสัมพันธ์ที่ให้ค่าผลรวมเป็น 0 ที่กล่าวมา เช่น กรณีความสัมพันธ์ที่ทำให้ผลตอบแทนที่ปีปัจจุบันเป็น 0 ; PW(i^*%)   แทนด้วยสัญลักษณ์ ดังนี้

$$P= A \left[\frac{[(1+i)^n -1]}{i(1+i)^n}\right] \tag{5}$$

เรียกค่าตัวประกอบ $\left[\frac{[(1+i)^n -1]}{i(1+i)^n}\right]$ ว่า uniform series present worth factor

จากสมการ 4 การรวมผลของค่ากระแสเงินที่เวลา t ใดๆ ที่ค่าอัตราผลตอบแทนภายใน i^* (IRR) แล้วทำให้สมการเป็นจริง คือทำให้มูลค่าผลรวมปัจจุบันสุทธิ มีค่าเป็น 0 จะเป็นค่าอัตราผลตอบแทนภายในของโครงการ (สุวภัทร ตั้งผลพูล, 2560)

3.1.4 ทบทวนงานวิจัยที่เกี่ยวข้อง

สมศักดิ์ พรพันธ์ (2552) ศึกษาความเป็นไปได้ในการซื้อรถในธุรกิจให้บริการขนส่งสินค้า เก็บข้อมูลต้นทุนและผลตอบแทน ดำเนินการวิเคราะห์เปรียบเทียบทางเศรษฐศาสตร์ระหว่างรถบรรทุกน้ำมันดีเซลกับรถบรรทุกเชื้อเพลิงก๊าซ NGV ผลการศึกษาต์ พบว่า สำหรับรถเทรล์เลอร์เชื้อเพลิงดีเซล ไม่เหมาะสมที่อายุการใช้งาน 6 ปี เนื่องจากมีค่าใช้จ่ายราคาน้ำมันดีเซลสูงโดยรถเทรลเลอร์ที่ใช้แก๊ส NGV จะมีความคุ้มค่ามากกว่า ผลการวิเคราะห์ทางเศรษฐศาสตร์พบว่าค่าสัดส่วนผลประโยชน์ต่อเงินลงทุนของรถบรรทุกเทรลเลอร์ เชื้อเพลิงดีเซลมีค่าผลเท่ากับ 0.984 ซึ่งแสดงถึงการไม่เหมาะสมแก่การลงทุนเพราะมีค่าน้อยกว่า 1 ค่า NPV ที่ดอกเบี้ย 7% พบว่า ค่า NPV เท่ากับ 259,883.36 บาท และ IRR เท่ากับ 11.012% ในกรณีของรถบรรทุกเทรลเลอร์ เชื้อเพลิงก๊าซ NGV ค่าผลตอบแทนต่อค่าใช้จ่ายเท่ากับ 1.13 สมควรลงทุนเพราะมีค่ามากกว่า 1 ค่า NPV โดยใช้ดอกเบี้ย 7% ค่า NPV เท่ากับ 3,548,696.14 บาท และ IRR เท่ากับ (45.045%) ซึ่งเป็นทางเลือกที่เหมาะสมมากกว่ารถเชื้อเพลิงดีเซล

ณัทภัค พึ่งสวัสดิ์ (2547) ได้ทำการศึกษาวิเคราะห์ความเป็นไปได้ของการลงทุนธุรกิจขนส่งสินค้าระหว่างประเทศแห่งหนึ่งในจังหวัดเชียงใหม่ เก็บข้อมูลด้านต้นทุนผลิต บริการและผลตอบแทนทางการเงินต่างๆ ของบริษัท กำหนดอายุโครงการเป็นระยะเวลา 10 ปี กำหนดให้อัตราผลตอบแทนขั้นต่ำ 10% จากการวิเคราะห์ด้วยค่าดัชนีมูลค่าปัจจุบันสุทธิ ผลตอบแทนภายในโครงการ (IRR)   พบว่าธุรกิจขนส่งสินค้าระหว่างประเทศมีความเป็นไปได้ในการลงทุน โดยมีค่าผลตอบแทนสุทธิ (NPV) เท่ากับ 9,367,707 ผลตอบแทนภายในโครงการ (IRR) เท่ากับ 24.78% อัตราส่วนของผลตอบแทนต่อต้นทุน (B/C Ratio) เท่ากับ 1.04 และระยะเวลาคืนทุนเท่ากับ 2 ปี 7 เดือน

ทองดี ปู่ด้วง (2550) วิเคราะห์เพื่อการตัดสินใจลงทุนในโครงการจัดซื้อรถโดยสาร กรณีศึกษาบริษัท ชัยพัฒนา
ขนส่งเชียงใหม่ จำกัด เพื่อตัดสินใจเลือกโครงการใช้รถโดยสารรุ่น A หรือรถโดยสารรุ่น B โดยพิจารณาจากมูลค่าปัจจุบันสุทธิ
ระยะเวลาคืนทุน อัตราผลตอบแทนภายในและวิเคราะห์ความไว จากการวิเคราะห์พบว่าโครงการรถโดยสารรุ่น B มี
ผลตอบแทนจากโครงการเป็น 149,121,839 บาท ต้นทุนของโครงการเป็น 135,029,393 บาท โดยมีทุนเริ่มต้น22,590,000
บาท และมีต้นทุนในการดำเนินงานตลอดโครงการเป็น 114,939,393 บาทมีระยะเวลาคืนทุน 82.4 เดือน มูลค่าปัจจุบันสุทธิ
379,547 บาท อัตราผลตอบแทนภายในร้อยละ 14.6 โดยมีระยะเวลาในการดำเนินโครงการ 7 ปี และได้ทำการวิเคราะห์
ความไวในสถานการณ์ให้ทุนด้านน้ำมันเพิ่มขึ้นในปีที่ 2-7 เป็น 3%, 5%, 7% และ 10% ผลที่ได้มูลค่าปัจจุบันสุทธิมีค่าน้อยลง
อัตราผลตอบแทนภายในน้อยกว่า 14% ระยะเวลาคืนทุนนานขึ้น แสดงว่าโครงการมีความเสี่ยงที่จะไม่คุ้มค่าในการลงทุน

พรทิพย์ ภัทรประดับวงศ์ (2551) วิเคราะห์ความเป็นไปได้ด้านเศรษฐศาสตร์จากการใช้ก๊าซธรรมชาติ (NGV) ทดแทน
น้ำมันน้ำมันดีเซลในรถโดยสารประจำทางประจำทางปรับอากาศ (ป.1) ยี่ห้อ NISSAN ขนาดเครื่องยนต์ 11,000 ซีซี เป็น
ระยะเวลา 5 ปี วิเคราะห์ทางด้านการเงินด้วยวิธีมูลค่าปัจจุบันสุทธิ (NPV) อัตราส่วนผลตอบแทนต่อต้นทุน(B/C Ratio) และ
ระยะเวลาคืนทุน (PP) ผลการวิเคราะห์คพบว่าการแปลงระบบเครื่องยนต์ทดแทน เหมาะสมกว่าซ่อมแซม โดยมูลค่าปัจจุบัน
สุทธิ (NPV) 2,687,288 บาท แบบเปลี่ยนเครื่องยนต์ 2,087,288 บาท อัตราผลตอบแทนต่อต้นทุน (B/C Ratio) 5.84 และ
2.84 ระยะเวลาคืนทุน (PB) 0.91 และ 1.83 ปี การวิเคราะห์ความไวที่ราคาน้ำมันดีเซลเพิ่มขึ้น 5% จะคุ้มค่ามากที่สุด

Booth & Nile (2015) ศึกษาความเหมาะสมเชิงเศรษฐศาสตร์ในการผลิตไบโอดีเซลจาก RAPESEED ที่ปลูกในตอน
ประเทศสก๊อตแลนด์ เพื่อเพิ่มมูลค่าของวัตถุดิบทางการเกษตร โดยศึกษาทางเลือก 5 ทาง ได้แก่ ทางเลือกที่ 1 อุตสาหกรรม
ครัวเรือน ขนาด 190 ตัน แปรรูปเป็นน้ำมัน ทางเลือกที่ 2 กลุ่ม เกษตรกรขนาดเล็ก กำลังผลิตน้ำมันเรฟดิบ 1,030 ตัน
ทางเลือกที่ 3 กลุ่มเกษตรกรขนาดใหญ่ กำลังการผลิตไบโอดีเซล 150,000 ตัน ทางเลือกที่ 4 กำลังผลิตขนาดกลาง 60,000
ตัน โดยแปรรูปเป็นไบโอดีเซล 30,000 ตัน ทางเลือกที่ 5 กำลังการผลิตขนาดใหญ่ จากการศึกษาทางเลือกทั้งหมดพบว่า
ทางเลือกที่ 4 เหมาะสมที่สุด เมื่อประเมินเป็นค่าใช้จ่ายต้นทุนต่อน้ำมันดิบ 1 ลิตร วัตถุดิบที่มีใช้เงินลงทุน 10.2 ล้านเหรียญ
อายุของโครงการ 10 ปี ผลตอบแทนการลงทุนร้อยละ 14.1% มีระยะเวลาคืนทุน 5 ปี

3.2 ข้อมูลบริษัทกรณีศึกษา

บริษัท กรณีศึกษา เป็นบริษัทท่าเทียบเรือตู้คอนเทนเนอร์ตั้งอยู่ริมแม่น้ำเจ้าพระยาสมุทรปราการ มีพื้นที่ทั้งหมด
48,000 ตารางเมตร หรือ 36 ไร่ สามารถให้บริการเรือสินค้าที่มีขนาด 180 เมตร สำหรับเรือทั้งในและต่างประเทศ อีกทั้งยัง
สามารถกลับหัวเรือบริเวณหน้าท่าเทียบเรือได้ มีทั้งการขนส่งทางทะเลระยะสั้นรายวัน (เรือชายฝั่ง) ระหว่างท่าเรือสุขสวัสดิ์กับ
ท่าเรือแหลมฉบัง และสามารถขนส่งทางทะเลระยะไกล (เรือแม่ขนาด 8 ระวาง) ได้อีกด้วย

ภาพที่ 2 ท่าเรือบริษัทกรณีศึกษา (บริษัทสุขสวัสดิ์เทอร์มินอล, 2565)

การประชุมวิชาการระดับชาติและนานาชาติบ้านสมเด็จเจ้าพระยา ครั้งที่ 1 (BS2C 2025)
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ปัจจุบันบริษัทดำเนินการธุรกิจในการให้บริการขนส่งสินค้า (ตู้คอนเทนเนอร์) ซึ่งสินค้าที่บรรจุภายในคอนเทนเนอร์จะเป็นสินค้าจำพวกสินค้าทางการเกษตรเป็นหลัก อาทิ แป้งสาลี ข้าวสาร ข้าวโพด และซังข้าวโพด เป็นต้น จากผู้ผลิตภายในประเทศ โดยผ่านบริษัทสายการเดินเรือหลักประมาณ 5 บริษัท ซึ่งเป็นบริษัทสายการเดินเรือที่ประกอบธุรกิจขนส่งตู้คอนเทนเนอร์ทางทะเล และเป็นลูกค้าหลักของบริษัท โดยบริษัทสายการเดินเรือจะติดต่อและนำคอนเทนเนอร์จากลูกค้ารายย่อย เข้ามาในลานเพื่อรอการส่งต่อไปยังท่าเรือปลาย โดยท่าเรือปลายทาง ได้แก่ ท่าเรือแหลมฉบัง อ.ศรีราชา จ.ชลบุรี ซึ่งมีระยะเวลาการรอรับบริการของคอนเทนเนอร์ของบริษัท ประมาณ 3 วัน

บริษัทกรณีศึกษา มีลานสำหรับจัดเก็บตู้คอนเทนเนอร์ได้สูงสุด 5,000 ทีอียู มีลานสำหรับจัดเก็บตู้คอนเทนเนอร์หนักได้สูงสุด สามารถจัดเก็บตู้คอนเทนเนอร์ชนิด 20 ฟุต ได้จำนวน 3,500 ทีอียู สามารถจัดเก็บตู้คอนเทนเนอร์ชนิด 40 ฟุต ได้จำนวน 1,500 ทีอียู มีลานสำหรับตู้คอนเทนเนอร์เปล่าได้สูงสุด 1,050 ทีอียู และจัดเก็บตู้ควบคุมอุณหภูมิ (Refer container) ได้จำนวน 750 ทีอียู โดยทางบริษัทมียอดตู้ขาเข้าเฉลี่ย 2,184 ทีอียู ค่าเฉลี่ยขาออก 2,080 ทีอียู

ท่าเรือกรณีศึกษามียอดตู้คอนเทนเนอร์ขาเข้า-ขาออก จากการรวบรวมข้อมูลยอดตู้คอนเทนเนอร์ขาเข้า-ขาออก จำนวน 6 เดือน ระหว่าง เดือนมิถุนายน ถึง เดือนพฤศจิกายน พ.ศ.2565 โดยแจกแจงรายละเอียด ดังตารางที่ 1

ตารางที่ 1 ขาเข้า-ขาออก ตู้คอนเทนเนอร์กรณีศึกษา

เดือน	ขาเข้า	ขาออก	คงเหลือ
มิถุนายน	2,183	2,080	103
กรกฎาคม	2,200	2,046	154
สิงหาคม	2,130	2,048	82
กันยายน	2,180	2,056	124
ตุลาคม	2,200	2,100	100
พฤศจิกายน	2,213	2,152	61
เฉลี่ย	2,184	2,080	104

จากตารางพบว่า บริษัทกรณีศึกษามียอดตู้คอนเทนเนอร์ค้างลานจัดเก็บเฉลี่ยต่อเดือน คือ 104 ตู้ เนื่องจากทางบริษัทกรณีศึกษามีเรือที่ใช้ในการขนส่งตู้คอนเทนเนอร์ เพียง 1 ลำ ซึ่งสามารถบรรทุกได้ เที่ยวละ 60 ทีอียู โดยใช้เวลาการเดินทางไป-กลับเฉลี่ยต่อเที่ยว คือ 7.40 ชั่วโมง โดยการโหลดในแต่ละครั้งจะใช้เวลา 2.40 ชั่วโมง รวมเวลาที่ใช้ทั้งการเดินทางและเวลาการโหลดขึ้นเรือบาร์จอยู่ที่ 10.20 ชั่วโมง/ครั้ง/ต่อเที่ยว เนื่องจากบริษัททำงานเพียงกะเดียว ตั้งแต่เวลา 08:00 น.-17:00 น.จึงมีความสามารถในการขนถ่ายจากทรัพยากรเรือขนถ่ายที่ขนถ่ายได้เพียงวันละ 60 ทีอียู จำนวนวันทำงานเดือนละ 30 วัน คิดเป็นความสามารถในการให้บริการ 1,800 ทีอียู สำหรับความต้องการในการใช้บริการจากข้อมูล เฉลี่ยประมาณ 2,184 ทีอียูต่อเดือน จึงทำให้บริษัทยังไม่สามารถบริการได้เพียงพอกับความต้องการ และพบปัญหากับการตอบสนองการให้บริการที่นอกจากได้ปริมาณแล้วยังต้องขนส่งให้ทันกับเที่ยวเรือแม่ที่ลูกค้านัดหมายกับท่าเรือปลายทาง (ท่าเรือแหลมฉบัง) ไว้

4. วิธีการศึกษา

ขั้นตอนในการศึกษาความเป็นไปได้ของการลงทุนในโครงการซื้อเรือทดแทนการจ้างบริการเรือของท่าเรือกรณีศึกษา แบ่งเป็น 5 ขั้นตอนได้แก่

4.1 ศึกษาสภาพปัญหาของการขนส่งสำหรับท่าเรือกรณีศึกษา

การประชุมวิชาการระดับชาติและนานาชาติบ้านสมเด็จเจ้าพระยา ครั้งที่ 1 (BS2C 2025)
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4.2 กำหนดทางเลือกในการแก้ปัญหา

4.3 ศึกษาข้อมูลแต่ละทางเลือกรวมถึงข้อมูลที่เกี่ยวข้อง

4.5 วิเคราะห์ข้อมูลด้วยวิธีการทางด้านเศรษฐศาสตร์

4.6 วิเคราะห์ความไวตัวของโครงการ

4.7 สรุปผลการวิเคราะห์

5. ผลการศึกษา

5.1 สภาพปัญหาของการขนส่งสำหรับท่าเรือกรณีศึกษา

จากการศึกษาสภาพปัญหาของท่าเรือกรณีศึกษาพบว่าท่าเรือกรณีศึกษา ซึ่งเป็นท่าเรือที่รับบริการขนส่งสินค้าไปยัง
ท่าเรือปลายทางที่มีการขยายตัวของการบริการอย่างต่อเนื่อง โดยการให้ปัจจุบันด้วยทรัพยากรเรือขนส่งของบริษัทที่มีเพียง
ลำเดียวนั้นยังไม่เพียงพอ บริษัทจำเป็นต้องจ้างบริษัทขนส่งซึ่งมีอัตราค่าจ้างสูงและบางครั้งไม่สามารถให้บริการได้ตามเวลาที่
ต้องการ ส่งผลให้บริษัทจะต้องแก้ไขปัญหาเฉพาะหน้าหรือมีสินค้าตกค้างซึ่งกระทบต่อความพอใจในการรับบริการของ
ผู้ใช้บริการ ซึ่งปัจจุบันความสามารถในการให้บริการของบริษัทอยู่ที่ 1,800 ที่อยู่ต่อเดือน โดยความต้องการใช้บริการเฉลี่ย
ประมาณเดือนละ 2,200 ที่อยู่ต่อเดือน ซึ่งมีจำนวนสินค้าที่บริษัทไม่สามารถจัดส่งได้ทันเท่ากับ 400 ที่อยู่ โดยประมาณ

5.2 กำหนดทางเลือกในการแก้ปัญหา

จากสภาพข้อมูลการให้บริการขนถ่ายในปัจจุบัน   พิจารณาทางเลือกในการแก้ปัญหาเพื่อสนองตอบความต้องการใช้
บริการขนถ่าย ได้ 2 ทางเลือก ได้แก่

1) ทางเลือกที่ 1 จ้างบริการเรือเพื่อช่วยในการขนถ่าย

2) ทางเลือกที่ 2 ซื้อเรือ เพื่อให้ตอบสนองอัตราการให้บริการต่อเที่ยวได้สูงขึ้นและรองรับการขยายตัวใน
อนาคต

5.3 ศึกษาข้อมูลแต่ละทางเลือกรวมถึงข้อมูลที่เกี่ยวข้อง

5.3.1 ทางเลือกที่ 1 จ้างบริการเรือ

การจ้างบริการเรือบริษัท จะทำการจ้างบริการเรือจาก บริษัท ภัทรมารีน จำกัด มีการจ้างบริการทุกๆ 4 ครั้งต่อ
เดือนผู้วิจัยทำการศึกษาข้อมูลต้นทุนในการเช่าเรือขนาดความยาวเรือ 68 เมตร น้ำหนักเรือ 610 ตัน สามารถบรรทุกได้สูงสุด
60 ที่อยู่ น้ำหนักสินค้ารวมไม่เกิน 535 ตัน รวมขนาดตันกรอส 1,145 ตัน มีค่าใช้จ่ายต้นทุน รายละเอียดแสดงดังตารางที่ 2
โดยมีรายละเอียดค่าใช้จ่ายที่เกี่ยวข้อง ดังนี้

1) ค่าจ้างบริการเรือ

ค่าใช้จ่ายในการจ้างบริการเรือ คิดเป็นต้นทุนเที่ยวละ 112,500 บาท เดือนละ 4 เที่ยว รวมเป็นค่าใช้จ่าย
450,000 บาทต่อเดือน หรือ 5,400,000 บาทต่อปี

2) ค่าเชื้อเพลิง

ค่าน้ำมันในการขนส่งต่อเที่ยวโดยประมาณ เท่ากับ 215 ลิตร   จำนวนการขนส่งเดือนละ 4 เที่ยว คิดเป็นค่า
น้ำมันเชื้อเพลิง 29,188 บาทต่อเดือน หรือ 350,260 บาทต่อปี

3) ค่าตัวแทนเรือ

ตัวแทนเรือ (Ship Agent) คือ ค่าธรรมเนียมในการบริการในฐานะผู้รับมอบอำนาจจากเจ้าของเรือให้เป็นผู้
ดำเนินงานแทนเจ้าของเรือ ณ เมืองท่าต้นทางและเมืองท่าปลายทางโดยมีค่าใช้จ่ายค่าตัวแทนเรือ คือ 1,000 บาทต่อเที่ยว คิด
เป็น 4,000 บาทต่อเดือน หรือ 48,000.00 บาทต่อปี

4) ต้นทุนค่าร่องน้ำ

เรือที่ศึกษามีขนาด 1,145 ตันกรอส ดังนั้นต้องเสียค่าร่องน้ำในอัตรา 3.0 บาทต่อตันกรอส คิดเป็น 3,435 บาทต่อเดือน หรือ 13,740 บาทต่อเดือน หรือ 164,880 บาทต่อปี

ตารางที่ 2 ค่าใช้จ่ายทางเลือกการจ้างบริการเรือ

ค่าเช่าเรือ (บาทต่อปี)	ค่าเชื้อเพลิง (บาทต่อปี)	ค่าตัวแทนเรือ (บาทต่อปี)	ค่าร่องน้ำ (บาทต่อปี)	รวม
5,400,000	350,260	48,000	164,880	5,963,140

โดยบริษัทจะสามารถมีรายได้จากการขนส่งตู้คอนเทนเนอร์ที่คิดจากการใช้เรือ จากทางเลือกที่ 1 การจ้างเรือขนส่ง จะมีรายได้ประมาณ 2000 บาทต่อตู้คอนเทนเนอร์ คิดที่การขนส่ง เที่ยวละ 60 ตู้ รวม 4 เที่ยวต่อเดือน คิดเป็นรายได้จากการ ขนส่งเท่ากับ 480,000 บาทต่อเดือน หรือ 5,760,000 บาทต่อปี

5.3.2 ทางเลือกที่ 2 ซื้อเรือ

ศึกษาข้อมูลต้นทุนในการซื้อเรือ ความยาว 68.03 เมตร น้ำหนัก 610 ตัน สามารถบรรทุกได้สูงสุด 60 ทีอียู น้ำหนัก สินค้ารวมไม่เกิน 535 ตัน รวมขนาดตันกรอส 1,145 ตัน มีต้นทุนค่าใช้จ่ายแสดงดังตารางที่ 4

1) ต้นทุนการซื้อเรือ

ต้นทุนเรือ ลำละ 36 ล้านบาท มีอายุการใช้งาน 30 ปี เมื่อครบอายุการใช้งานสามารถขายเป็นมูลค่าซากได้ 2,000,000 บาท

2) ค่าเชื้อเพลิง

ค่าใช้จ่ายเชื้อเพลิงคิดตามอัตราการใช้น้ำมันของเรือเดิมคือ 215 ลิตร ต่อเที่ยว ราคาน้ำมันลิตรละ 33.94 บาทจำนวนการขนส่งเดือนละ 4 เที่ยว คิดเป็นค่าน้ำมันเชื้อเพลิง 350,260 บาทต่อปี

3) ค่าตัวแทนเรือ

ค่าใช้จ่ายค่าตัวแทนเรือ คือ 1,000 บาทต่อเที่ยว คิดเป็น 48,000 บาทต่อปี

4) ค่าร่องน้ำ

โดยเรือที่ศึกษามีขนาด 1,145 ตันกรอส เสียค่าร่องน้ำในอัตรา 3 บาทต่อตันกรอส คิดเป็น 3,435 บาทต่อ เดือน หรือ 164,880 บาทต่อปี

5) ค่าจ้างพนักงาน

พนักงานบนเรือประกอบด้วย 4 ตำแหน่งงาน โดยมีรายละเอียดค่าจ้างและจำนวนพนักงานแสดงดังตารางที่ 3

ตารางที่ 3 ค่าจ้างพนักงาน

ตำแหน่ง	ค่าจ้างรวม (บาท/เดือน)
กัปตัน Caption	20,000
ต้นเรือ (Chief Officer)	17,000
ต้นหน (Second Officer)	15,000
ผู้ปฏิบัติงานทั่วไป (Deck Boy)	20,000
ประกันอุบัติเหตุ (ต่อคนต่อปี)	8,000

6) ค่าบำรุงรักษาเรือ

สำหรับค่าบำรุงรักษาเรือไม่อาจระบุเป็นตัวเลขที่แน่นอนจากการสอบถามอัตราการซ่อมบำรุง จะมีอัตราที่ต่างกันไป สำหรับในกรณีศึกษานี้กำหนดค่าซ่อมปีละ 1 % โดยเรือของบริษัทมีราคาต้นทุน 36 ล้านบาท ค่าซ่อมโดยประมาณเท่ากับ 360,000 บาทต่อปี

ตารางที่ 4 ค่าใช้จ่ายทางเลือกการจ้างบริการเรือ

ต้นทุนเรือ (บาท)	ค่าเชื้อเพลิง (บาทต่อปี)	ค่าตัวแทนเรือ (บาทต่อปี)	ค่าร่องน้ำ (บาทต่อปี)	ค่าพนักงาน (บาทต่อปี)	ค่าบำรุงรักษา (บาทต่อปี)	รวม
36,000,000	350,260	48,000	164,880	80,000	360,000	5,963,140

โดยบริษัทจะสามารถมีรายได้จากการขนส่งตู้คอนเทนเนอร์ที่คิดจากการใช้เรือ จากทางเลือกที่ 2 การลงทุนซื้อเรือซึ่งคาดการณ์ว่าจะมีรายได้จากการขนส่งจากตู้ที่เพิ่มขึ้น โดยการรับลูกค้าที่มากขึ้น ซึ่งจะประมาณการณ์จากลูกค้าสูงสุดที่เคยมีต่อเดือนตกเดือนละ 480 ตู้ ซึ่งคิดค่าขนส่ง 2000 บาทต่อตู้คอนเทนเนอร์ คิดเป็นรายได้จากการขนส่งหากมีการลงทุนซื้อเรือ โดยประมาณเท่ากับ 960,000 บาทต่อเดือน หรือ 11,520,000 บาทต่อปี

5.4 ผลการวิเคราะห์ข้อมูลด้วยวิธีการทางด้านเศรษฐศาสตร์

ในการวิเคราะห์ด้วยวิธีการทางเศรษฐศาสตร์จะเป็นการใช้ข้อมูลทางการเงินได้แก่ความคุ้มค่าทางการเงินเป็นเครื่องมือเปรียบเทียบ โดยในกรณีศึกษานี้ จะศึกษาจากค่าดัชนีมูลค่าปัจจุบันสุทธิ (NPV) ดัชนีมูลค่ารายปี (AW) และดัชนีอัตราผลตอบแทนภายในจากการลงทุน (IRR) ซึ่งจะดำเนินการศึกษาที่อายุโครงการ 10 ปี เพื่อไม่ให้ระยะเวลาของข้อมูลมีผลกระทบจากช่วงเวลาที่ประมาณการยาวเกินไป ซึ่งในที่นี้กำหนดที่เวลาดำเนินการ 10 ปี และกำหนดที่อัตราผลตอบแทนจากการลงทุนขั้นต่ำ ที่ 7% ซึ่งกำหนดจากอัตรดอกเบี้ยเงินกู้โดยเฉลี่ยขั้นต่ำ โดยวิธีการวิเคราะห์จะเป็นการวิเคราะห์เปรียบเทียบที่ผลต่างของโครงการลงทุนทั้งสอง โดยใช้จากข้อมูลที่ได้ศึกษามาแล้วแสดงดังตารางที่ 5 นำมาคำนวณค่าดัชนี NPV , AW มี และๆ IRR

ตารางที่ 5 ข้อมูลที่ใช้สำหรับคำนวณเปรียบเทียบทางเลือก

รายการ		ทางเลือกที่ 1 (เช่าเรือ)	ทางเลือกที่ 2 (ซื้อเรือ)
รายได้ต่อปี	(พันบาท/ปี)	5,760	11,520
ค่าลงทุน	(พันบาท)	-	36,000
ค่าใช้จ่ายต่อปี	(พันบาท/ปี)	5,963.14	1,003.14
มูลค่าซาก	(พันบาท)		2,000

5.4.1 ผลการคำนวณด้วยดัชนีมูลค่าปัจจุบันสุทธิ

จากสมการที่ 1

ทางเลือกที่ 1 NPV(7%) = (5,760-5,963.14) (P/A 7%,10)

= -203.14 (7.0236)

= -1,427 พันบาท

ทางเลือกที่ 2   NPV(7%)   = -36,000+ (11,520-1,003.14) (P/A 7%,10)+2,000(P/F 7%,10)

= -36,000+ (10,516.86) (7.0236)+2,000(0.5083)

= 38,883 พันบาท

โดยที่ (P/A 7%,10)   คือ ตัวประกอบปรับค่ารายปีเป็นปัจจุบันเมื่อ i มีค่า 7 % และ n มีค่า 10 ปี ได้ค่าตัว
ประกอบเท่ากับ 7.0236 และ (P/F 7%,10)   คือ ตัวประกอบปรับค่าอนาคตเป็นปัจจุบัน เมื่อ i มีค่า 7 % และ n มีค่า 10
ปี ได้ค่าตัวประกอบเท่ากับ 0.5083

5.4.2 ผลการคำนวนด้วยดัชนีมูลค่ารายปี

จากสมการที่ 2

ทางเลือกที่ 1 AW(7%)   = 5,760-5,963.14

= -203.14 พันบาทต่อปี   = -

ทางเลือกที่ 2   AW(7%)   = -36,000(A/P 7%,10) + (11,520-1,003.14)+2,000(A/F 7%,10)

= -36,000(0.14238) + (10,516.86) +2,000(0.07238)

= 5,535.94 พันบาท

โดยที่ (A/P 7%,10)   คือ ตัวประกอบปรับค่าปัจจุบันเป็นรายปีเมื่อ i มีค่า 7 % และ n มีค่า 10 ปี ได้ค่าตัว
ประกอบเท่ากับ 7.0236   และ (A/F 7%,10)   คือ ตัวประกอบปรับค่าอนาคตเป็นรายปี เมื่อ i มีค่า 7 % และ n มีค่า 10 ปี
ได้ค่าตัวประกอบเท่ากับ 0.07238

5.4.3 ผลการคำนวนอัตราผลตอบแทนภายใน

จากสมการที่ 5

ทางเลือกที่ 1   คำนวนหาค่า i% จาก

$$0 = -203.14 \left[\frac{[(1+i)^{10} -1]}{i(1+i)^{10}} \right]$$

ทำการ trial and error ได้ค่า i% ที่ทำให้สมการเป็นจริงเท่ากับ 0.45%

ทางเลือกที่ 2   คำนวนหาค่า i% จาก

$$0 = -36,000 -10,516.86 \left[\frac{[(1+i)^{10} -1]}{i(1+i)^{10}} \right] +2,000 \left[\frac{i}{((1+i)^{10}-1)} \right] \left[\frac{[(1+i)^{10} -1]}{i(1+i)^{10}} \right]$$

ทำการ trial and error ได้ค่า i% ที่ทำให้สมการเป็นจริงเท่ากับ 13.095%

ตารางที่ 6 สรุปผลการการศึกษาความเป็นไปได้ของทั้ง 2 ทางเลือก

	มูลค่าปัจจุบันสุทธิ (NPV) (พันบาท)	มูลค่ารายปีสุทธิ (AW) (พันบาทต่อปี)	อัตราผลตอบแทนภายใน (IRR) %
ทางเลือกที่ 1 จ้างเรือ	-1,427	-203.14	0.45%
ทางเลือกที่ 2 ซื้อเรือ	38,883	5,535.94	13.095%

จากผลการวิเคราะห์ความเป็นไปได้ระหว่างทางเลือกที่ 1 การจ้างเรือ ซึ่งเป็นทางเลือกเดิมและการทดแทนด้วยการ
ซื้อเรือ ซึ่งเป็นทางเลือกที่ 2 นั้น แสดงดังตารางที่ 6   พบว่าผลการวิเคราะห์ความเป็นไปได้ทางเศรษฐศาสตร์นั้น สำหรับค่า
ดัชนีมูลค่าปัจจุบันสุทธิ (NPV) ของทางเลือกที่ 2 (ซื้อเรือ) มีค่าเท่ากับ 38,883,000 บาท ซึ่งสูงกว่าทางเลือกที่ 1 จึงเลือก
ทางเลือกที่ 2   สำหรับผลค่าดัชนีมูลค่ารายปีสุทธิ (AW) ของทางเลือกที่ 2 (ซื้อเรือ) มีค่าเท่ากับ 5,535,940 บาทต่อปี ซึ่งสูง

กว่าทางเลือกที่ 1 จึงเลือกทางเลือกที่ 2 เช่นกัน สำหรับค่าอัตราผลตอบแทนภายใน (IRR) ค่า IRR ของทางเลือกที่ 2 มีค่า 13.09% ซึ่งสูงกว่าทางเลือกที่ 1 จึงเลือกทางเลือกที่ 2 (ซื้อเรือ)

5.5 ผลการวิเคราะห์ความไวตัวทางเศรษฐศาสตร์

การวิเคราะห์ความไวตัว เพื่อศึกษาความเสี่ยงจากกรณีเกิดการเปลี่ยนแปลงของ ปัจจัยขององค์ประกอบในการลงทุน ที่สำคัญได้แก่ รายได้จากการลงทุน และ ค่าใช้จ่ายจากการลงทุนโดยศึกษาที่ช่วงการเปลี่ยนแปลงระหว่าง บวก 50% ถึง ลบ 50% แสดงการเปลี่ยนแปลงของแต่ละปัจจัยดังตารางที่ 6

ตารางที่ 7 ความไวตัวของมูลค่าปัจจุบันสุทธิโครงการที่ช่วงการเปลี่ยนแปลงของปัจจัยที่ระดับต่าง ๆ

% คลาดเคลื่อน	รายได้ (พันบาท)	มูลค่าปัจจุบัน (พันบาท)	ค่าใช้จ่าย (พันบาท)	มูลค่าปัจจุบัน (พันบาท)
50%	8,100.00	3,043	-1,080.00	-2,185
40%	7,560.00	2,503	-1,008.00	-1,680
30%	7,020.00	1,963	-936.00	-1,174
20%	6,480.00	1,423	-864.00	-668
10%	5,940.00	883	-792.00	-163
0%	5,400.00	343	-720	343
-10%	4,860.00	-197	-648.00	849
-20%	4,320.00	-737	-576.00	1,354
-30%	3,780.00	-1,277	-504.00	1,860
-40%	3,240.00	-1,817	-432.00	2,366
-50%	2,700.00	-2,357	-360.00	2,872

ภาพที่ 3 กราฟความไวตัวของมูลค่าปัจจุบันสุทธิ

การประชุมวิชาการระดับชาติและนานาชาติบ้านสมเด็จเจ้าพระยา ครั้งที่ 1 (BS2C 2025)
the 1st Bansomdejchaopraya National and International Conference (BS2C 2025)

1039
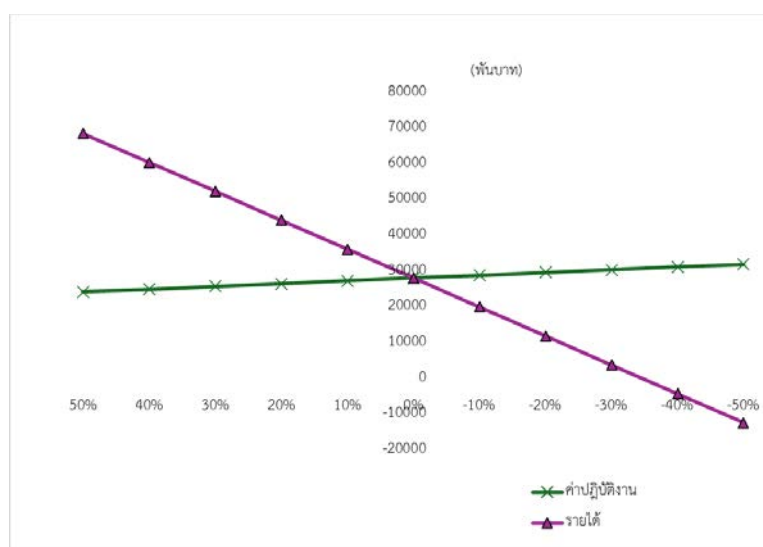
ผลการวิเคราะห์ความไวตัว พบว่าโครงการซื้อเรือมีความไวตัวต่ำมาก โดยพบว่าทั้งปัจจัยรายได้และค่าใช้จ่ายในการปฏิบัติงานที่เปลี่ยนไปไม่ส่งผลให้เกิดการเปลี่ยนแปลงความน่าลงทุนแต่อย่างได ไม่มีผลทำให้มูลค่าปัจจุบันสุทธิของทางเลือกในการซื้อเรือมีค่าติดลบ โดยสำหรับปัจจัยรายได้นั้นมีความไวตัวมากกว่าปัจจัยค่าใช้จ่ายในการปฏิบัติงาน จากการศึกษานี้พบว่าสำหรับการเปลี่ยนไปของรายได้ที่น้อยลง 40% หรือน้อยกว่า 6,912,000 บาท จากที่คาดหมายจะทำให้โครงการไม่น่าลงทุน สำหรับค่าใช้จ่ายในการปฏิบัติงานพบว่าไม่มีผลกระทบต่อการไวตัวของโครงการลงทุนซื้อเรือ

6. บทสรุป

ผลจากการศึกษาความเป็นไปได้ในการลงทุนซื้อเรือขนส่งทดแทนการจ้างเรือเพื่อทำการขนส่งของบริษัทท่าเรือกรณีศึกษา ที่การศึกษาการซื้อเรือซึ่งมีอายุการใช้งาน 30 ปี ที่ราคาลงทุน 36 ล้านบาท ซึ่งนำมาพิจารณาเปรียบเทียบกับทางเลือกการดำเนินการเดิมคือการจ้างเรือในการขนส่งในแต่ละปี พบว่ามีความเป็นไปได้จากการที่ค่าผลการวิเคราะห์การดำเนินการทางเศรษฐศาสตร์มีค่าเป็นบวก โดยดัชนีมูลค่าปัจจุบันสุทธิ (NPV) มีค่าเท่ากับ 38,883,000 บาท ดัชนีมูลค่ารายปีสุทธิ (AW) มีค่า 5,535,940 บาทต่อปี และค่าดัชนีอัตราผลตอบแทนภายใน (IRR) มีค่า 13.09% ซึ่งสูงกว่า MARR ซึ่งถือได้ว่าเป็นการลงทุนที่เหมาะสม มีผลตอบแทนที่สูงมีความเป็นไปได้ทางเศรษฐศาสตร์ และยังเป็นการสร้างความสามารถในการแข่งขันในอนาคตที่แนวโน้มธุรกิจจะมีการขยายตัวมากขึ้นเรื่อย โดยโครงการมีความไวตัวไม่สูงมากซึ่งจากการวิเคราะห์พบว่าโครงการจะเกิดความไม่น่าลงทุนที่การเปลี่ยนแปลงของรายได้ลดลงเกิน 40% หรือ เท่ากับ 6,912,000 บาท สำหรับค่าใช้จ่ายในการปฏิบัติงานที่เปลี่ยนไปในช่วง ±50% ไม่มีผลกระทบให้เกิดความไวตัว

โดยในการศึกษานี้ได้ทำการวิเคราะห์ในเปรียบเทียบกับทางเลือกเดิมคือการจ้างเรือขนส่ง ด้วยดัชนี มูลปัจจุบันสุทธิ (NPV) มูลค่ารายปี (AW) และ IRR แสดงสรุปดังตารางที่ 6 ซึ่งพบว่าทางเลือกที่ 2 ซึ่งเป็นทางเลือกในการซื้อเรือ นั้นมีความน่าสนใจมากกว่าทางเลือกเดิม ได้แก่ การจ้างเรือขนส่ง โดยมีความสอดคล้องกันของค่าดัชนีที่ทุกค่าให้ผลเป็นทางเดียวกัน

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การออกแบบและสร้างเตาอเนกประสงค์โดยใช้น้ำมันพืชเก่า
และน้ำมันเครื่องเก่าเป็นเชื้อเพลิง

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บทคัดย่อ

บทความนี้มีวัตถุประสงค์เพื่อออกแบบและสร้างเตาหุงต้มอเนกประสงค์ที่สามารถนำน้ำมันพืชเก่า และน้ำมันเครื่องเก่า มาใช้เป็นเชื้อเพลิงได้ ซึ่งมีการทดสอบคุณสมบัติการทำความร้อนโดยเปรียบเทียบระหว่างการใช้น้ำมันพืชเก่า คือ น้ำมันปาล์ม เก่า น้ำมันถั่วเหลืองเก่า น้ำมันพืชเก่าผสม เทียบกับการใช้น้ำมันเครื่องเก่า คือ น้ำมันเครื่อง 10W-40 เก่า น้ำมันเครื่อง 20W-50 น้ำมันเครื่องเก่าผสม ผลการทดลองพบว่า น้ำมันถั่วเหลืองเก่าให้ค่าพลังงานความร้อนด้านสูงที่ 44,150 แคลอรี่ น้ำมันปาล์มเก่าให้ค่าพลังงานความร้อนด้านสูงที่ 44,350 แคลอรี่ น้ำมันพืชเก่าผสมให้ค่าพลังงานความร้อนด้านสูงที่ 45,000 แคลอรี่ ส่วนน้ำมันเครื่อง 10W-40 เก่าให้ค่าพลังงานความร้อนด้านสูงที่ 44,150 แคลอรี่ น้ำมันเครื่อง 20W-50 เก่าให้ค่า พลังงานความร้อนด้านสูงที่ 44,050 แคลอรี่ น้ำมันเครื่องเก่าผสมให้ค่าพลังงานความร้อนด้านสูงที่ 45,150 แคลอรี่ สุดท้าย ถ่านหุงต้มให้ค่าพลังงานความร้อนด้านสูงที่ 32,350 แคลอรี่ ทั้งนี้น้ำมันพืชเก่าทั้ง 3 ชนิดและน้ำมันเครื่องเก่าทั้ง 3 ชนิด สามารถติดไฟและทำความร้อนได้เร็วกว่าถ่านหุงต้ม

คำสำคัญ: เตาอเนกประสงค์; น้ำมันเครื่องเก่า; น้ำมันพืชเก่า

การประชุมวิชาการระดับชาติและนานาชาติบ้านสมเด็จเจ้าพระยา ครั้งที่ 1 (BS2C 2025)
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Design and Construction of a Multi-Purpose Stove Using Waste Vegetable Oil and Used Engine Oil as Fuel

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Abstract

This article presents to design and construct a multi-purpose stove that can use used vegetable oil and used engine oil as fuel. The heating properties were tested by comparing the use of used vegetable oils, namely used palm oil, used soybean oil, and mixed used vegetable oils, compared to the use of used engine oils, namely used 10W-40 engine oil, 20W-50 engine oil, and mixed used engine oil.   The results of the experiment found that used soybean oil gave the highest calorific value at 44,150 calories, used palm oil gave the highest calorific value at 44,350 calories, mixed used vegetable oil gave the highest calorific value at 45,000 calories, old 10W-40 engine oil gave the highest calorific value at 44,150 calories, old 20W-50 engine oil gave the highest calorific value at 44,050 calories, mixed used engine oil gave the highest calorific value at 45,150 calories, and cooking charcoal gave the highest calorific value at 32,350 calories. The three types of used vegetable oil and the three types of used engine oil can ignite and heat up faster and better than cooking charcoal.

Keywords: Multipurpose stove; used vegetable oil; used engine oil

1. บทนำ

ปัจจุบันสถานการณ์ราคาเชื้อเพลิงพลังงานของตลาดโลกยังคงผันผวน โดย ณ วันที่ 16 มกราคม 2566 ราคา ก๊าซ ปิโตรเลียมเหลว นำเข้าอยู่ที่ 698 เหรียญสหรัฐฯ ต่อตัน เทียบได้กับราคาขายปลีกก๊าซปิโตรเลียมเหลว ที่ประมาณ 423 บาท ต่อถัง 15 กิโลกรัม จึงได้มีการพิจารณาทบทวนแนวทางการกำหนดราคาก๊าซปิโตรเลียมเหลว โดยมีวัตถุประสงค์เพื่อเป็นการ ช่วยลดภาระค่าครองชีพของประชาชน ขณะเดียวกันยังคงต้องคำนึงถึงสภาพคล่องของกองทุนน้ำมันเชื้อเพลิง เนื่องจากความ กังวลต่อภาวะเศรษฐกิจที่ถดถอย ซึ่งอาจก่อให้เกิดความต้องการใช้น้ำมันและก๊าซปิโตรเลียมเหลวเพิ่มขึ้นภายในประเทศ (กรมเชื้อเพลิงธรรมชาติ, 2566)

เพื่อการลดใช้ก๊าซปิโตรเลียมเหลว ทำให้ประเทศไทยรวมไปถึงประเทศต่าง ๆ ทั่วโลกได้หันมาใส่ใจรณรงค์ในเรื่องของ การประหยัดพลังงานกันมากขึ้น รวมถึงการลดการพึ่งพาพลังงานจากแหล่งเดียว ทั้งนี้เนื่องจากก๊าซปิโตรเลียมเหลวมีราคาที่ สูงขึ้น ส่งผลกระทบโดยตรงต่อปริมาณทรัพยากรธรรมชาติ อย่างไรก็ตามมีการค้นคว้าศึกษาวิจัยในเรื่องของพลังงานทดแทน อย่างต่อเนื่อง เพื่อช่วยให้ประเทศไทยผ่านพ้นวิกฤตนี้ ปัจจุบันได้มีการนำน้ำมันเก่าที่ใช้แล้วมาผ่านกระบวนการแปรรูปเพื่อนำ กลับมาใช้ใหม่ แต่เนื่องจากคุณสมบัติที่ไม่ละลายน้ำของน้ำมันเก่าที่ใช้แล้วนั้นสามารถก่อให้เกิดปัญหามากมายถ้าไม่มีการ จัดการที่ถูกต้อง โดยส่วนใหญ่แล้วภาคครัวเรือนอาจจะไม่ได้ให้ความสำคัญต่อการจัดการของเสียกลุ่มนี้มากเท่าที่ควร โดยจะ นำไปเทรวมกับขยะมูลฝอย หรือเททิ้งลงท่อระบายน้ำที่ไม่ได้ติดตั้งบ่อ หรือถังดักไขมัน ซึ่งหัวใจสำคัญในการจัดการน้ำมันที่ใช้ แล้วอย่างถูกวิธี คือ การแยกน้ำมันเก่าที่ใช้แล้วออกจากขยะมูลฝอย และท่อระบายน้ำ หลังจากพักให้เย็นแล้วสามารถนำมา บรรจุลงในขวดพลาสติกและติดฉลากระบุว่าเป็นน้ำมันเก่าที่ใช้แล้ว สำหรับน้ำมันจากบ่อ หรือถังดักไขมัน ถ้าเป็นระบบขนาด เล็กที่ติดตั้งไว้ใต้อ่างล้างจาน ควรตักคราบมันหรือไขมันออกแล้วบรรจุใส่ขวดพลาสติกเช่นเดียวกับน้ำมันทอดอาหารที่ใช้แล้ว น้ำมันเก่าที่ใช้แล้วดังกล่าวยังสามารถนำไปขายเพื่อผลิตเป็นไบโอดีเซล หรือแปรรูปเป็นอาหารเสริมแก่ปศุสัตว์ (ปิโยรส ทิพย์ มงคล, 2563)

ดังนั้นในงานวิจัยนี้ทางผู้จัดทำได้ตระหนักถึงการลดใช้ก๊าซปิโตรเลียมเหลว จึงสนใจออกแบบและสร้างเตาหุงต้ม อเนกประสงค์โดยใช้น้ำมันพืชเก่า และน้ำมันเครื่องเก่าเป็นเชื้อเพลิงแทนก๊าซปิโตรเลียมเหลว อีกทั้งยังเป็นการจัดการทั้งน้ำมัน พืชและน้ำมันครื่องเก่าที่ใช้แล้วได้อย่างมีประสิทธิภาพอีกด้วย

2. วัตถุประสงค์การวิจัย

2.1 เพื่อสร้างเตาหุงต้มอเนกประสงค์โดยใช้น้ำมันพืชเก่า และน้ำมันเครื่องเก่าเป็นเชื้อเพลิง

2.2 เพื่อทดสอบคุณสมบัติเชิงความร้อนของน้ำมันพืชเก่า และน้ำมันเครื่องเก่าที่เป็นเชื้อเพลิง

3. สมมติฐานการวิจัย

การนำน้ำมันพืชเก่า และน้ำมันเครื่องเก่าหลากหลายชนิดที่ผ่านการใช้งานมาแล้วเป็นเชื้อเพลิงของเตาหุงต้ม อเนกประสงค์จะสามารถทดแทนการใช้ก๊าซปิโตรเลียมเหลวได้

4. ระเบียบวิธีวิจัย

4.1 การออกแบบการสร้างเตาเอนกประสงค์

การออกแบบและสร้างเตาอเนกประสงค์โดยใช้น้ำมันพืชเก่า และน้ำมันเครื่องเก่าเป็นเชื้อเพลิงนั้น มีขั้นตอนวิธีการ ดำเนินงานแสดงดังภาพที่ 1 ได้ดังนี้ 1. ใช้โปรแกรม Solid work 2023 ออกแบบโครงสร้างของตัวเตาอเนกประสงค์ 2. จัดหา วัสดุและอุปกรณ์เพื่อเตรียมสร้างเตาอเนกประสงค์ เช่น เหล็กกล่อง เครื่องเชื่อม และอุปกรณ์ป้องกัน เป็นต้น 3. สร้างและ

ทดสอบตัวเตาอเนกประสงค์แสดงได้ดังภาพที่ 2 โดยใช้กับน้ำมันพืชเก่า และน้ำมันเครื่องเก่าเป็นเชื้อเพลิง 5. เก็บบันทึกผล
การทดลอง

ภาพที่ 1 ขั้นตอนการสร้างเตาเอนกประสงค์

ภาพที่ 2 เตาเอนกประสงค์

4.2 การทดสอบเตาเอนกประสงค์

ในทดลองของเตาหุงต้มอเนกประสงค์โดยใช้น้ำมันพืชเก่า และน้ำมันเครื่องเก่านั้น ทีมผู้จัดทำได้กำหนดเชื้อเพลิงที่ใช้
ในการทดสอบออกเป็น 7 ชนิด ได้แก่ ถ่านหุงต้ม น้ำมันถั่วเหลืองเก่า น้ำมันปาล์มเก่า น้ำมันพืชเก่าผสม น้ำมันเครื่อง 10W-40
เก่า น้ำมันเครื่อง 20W-50 เก่า และน้ำมันเครื่องเก่าผสม โดยบันทึกค่าอุณหภูมิความร้อนทุก ๆ 1 นาที จนครบ 10 นาที เพื่อ
นำค่าอุณหภูมิความร้อนที่ได้มาเฉลี่ย และคำนวณหาค่าพลังงานความร้อนของแต่ละชนิดเชื้อเพลิงเพื่อใช้เปรียบเทียบกัน โดย
ภาพขั้นตอนการทดสอบแสดงดังภาพที่ 3 ทั้งนี้ตลอดการทดลองใช้ความเร็วลมอยู่ที่ระดับ 2 และไม่มีการควบคุม
สภาพแวดล้อม ซึ่งมีรายละเอียดในการทดลองดังนี้

การประชุมวิชาการระดับชาติและนานาชาติบ้านสมเด็จเจ้าพระยา ครั้งที่ 1 (BS2C 2025)
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4.2.1 ใช้ถ่านหุงต้มเป็นเชื้อเพลิง

1. ทดสอบการทำงานของเตาถ่านหุงต้มทั่วไปด้วยการใช้ถ่านหุงต้มเป็นเชื้อเพลิง โดยเป็นการทดลองแบบตัวเปล่า

2. ทดสอบการทำงานของเตาถ่านหุงต้มทั่วไปด้วยการใช้ถ่านหุงต้มเป็นเชื้อเพลิง ในขณะที่มีหม้อใส่น้ำ 500 มิลลิลิตร ตั้งอยู่บนเตา จากนั้นทำการวัดอุณหภูมิที่เปลี่ยนแปลงของน้ำ 500 มิลลิลิตร ทุก 1 นาที จนถึง 10 นาที แล้วบันทึกผลการทดลอง

4.2.2 ใช้น้ำมันพืชเก่าเป็นเชื้อเพลิง

1. ทดสอบการทำงานของเตาหุงต้มอเนกประสงค์ ด้วยการใช้น้ำมันพืชเก่า 3 ชนิดเป็นเชื้อเพลิง ได้แก่ น้ำมันถั่วเหลืองเก่า น้ำมันปาล์มเก่า และน้ำมันพืชเก่าผสม โดยทดลองแบบตัวเปล่า กำหนดความเร็วลมที่ใช้อยู่ระดับ 2

2. ทดสอบการทำงานของตัวเตาหุงต้มอเนกประสงค์ ด้วยการใช้น้ำมันพืชเก่าเป็นเชื้อเพลิง ในขณะที่มีหม้อใส่น้ำ 500 มิลลิลิตร ตั้งอยู่บนเตา จากนั้นทำการวัดอุณหภูมิที่เปลี่ยนแปลงของน้ำ 500 มิลลิลิตร ทุก 1 นาที จนถึง 10 นาที แล้วบันทึกผลการทดลอง

4.2.3 ใช้น้ำมันเครื่องเก่าเป็นเชื้อเพลิง

1. ทดสอบการทำงานของตัวเตาหุงต้มอเนกประสงค์ ด้วยการใช้น้ำมันเครื่องเก่า 3 ชนิดเป็นเชื้อเพลิง ได้แก่ น้ำมันเครื่อง 10W-40 เก่า น้ำมันเครื่อง 20W-50 เก่า และน้ำมันเครื่องเก่าผสม โดยเป็นการทดลองแบบตัวเปล่า กำหนดความเร็วลมที่ใช้อยู่ระดับที่ 2

2. ทดสอบการทำงานของตัวเตาหุงต้มอเนกประสงค์ ด้วยการใช้น้ำมันเครื่องเก่าเป็นเชื้อเพลิง ในขณะที่มีหม้อใส่น้ำ 500 มิลลิลิตร ตั้งอยู่บนเตา จากนั้นทำการวัดอุณหภูมิที่เปลี่ยนแปลงของน้ำ 500 มิลลิลิตร ทุก 1 นาที จนถึง 10 นาที แล้วบันทึกผลการทดลอง

ภาพที่ 3 การทดสอบเตาเอนกประสงค์

การประชุมวิชาการระดับชาติและนานาชาติบ้านสมเด็จเจ้าพระยา ครั้งที่ 1 (BS2C 2025)
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5. ผลการวิจัยและอภิปรายผล

5.1 ผลการออกแบบและสร้างเตาหุงต้มอเนกประสงค์

โครงสร้างของเตาหุงต้มอเนกประสงค์ประกอบด้วย ขนาดเตาอเนกประสงค์มีความกว้าง 410 มม. ความยาว 410 มม. และความสูง 410 มม. เสารองรับถาดน้ำมันทั้ง 2 ข้างมีความยาว 330 มม. ส่วนตัวเตาเหล็กหล่อด้านนอก มีขนาดเส้นผ่านศูนย์กลาง 250 มม. ความสูง 160 มม. และตัวเตาเหล็กหล่อด้านใน มีขนาดเส้นผ่านศูนย์กลาง 110 มม. ด้านล่างตัวเตามีท่อลมสำหรับพัดลมโบลเวอร์ 12 VDC 2.85 A เป็นตัวเป่าลมกระจายความร้อน ขนาดเส้นผ่านศูนย์กลาง 16 มม. ความยาว 400 มม. และมีท่อน้ำมันขนาดเส้นผ่านศูนย์กลาง 16 มม. ความยาว 400 มม. กับถาดสำหรับเติมเชื้อเพลิง ทำให้ตัวเตาอเนกประสงค์ที่ได้สร้างขึ้นมานี้มีน้ำหนักรวมประมาณ 16 กิโลกรัม แสดงดังภาพที่ 4

ภาพที่ 4 เตาหุงต้มอเนกประสงค์

ตารางที่ 1 ผลการทดลองวัดอุณหภูมิที่ได้จากการใช้น้ำมันพืชเก่าเป็นเชื้อเพลิง

เวลา (นาที)	อุณหภูมิที่ได้จากการต้มน้ำ 500 มิลลิลิตร โดยใช้น้ำมันพืชเก่าเป็นเชื้อเพลิง (องศาเซลเซียส)			ค่าพลังงานความร้อนที่กระทำ ต่อน้ำ 500 มิลลิลิตร (แคลอรี)		
	น้ำมันถั่วเหลือง	น้ำมันปาล์ม	น้ำมันพืชผสม	น้ำมันถั่วเหลือง	น้ำมันปาล์ม	น้ำมันพืชผสม
นาทีที่ 1	43.20	42.70	52.90	21,600.00	21,350.00	26,450.00
นาทีที่ 2	60.70	60.30	70.60	30,350.00	30,150.00	35,300.00
นาทีที่ 3	78.10	77.10	84.40	39,050.00	38,550.00	42,200.00
นาทีที่ 4	86.20	87.30	88.00	43,100.00	43,650.00	44,000.00
นาทีที่ 5	88.30	88.70	89.20	44,150.00	44,350.00	44,600.00
นาทีที่ 6	88.50	88.40	87.60	44,250.00	44,200.00	43,800.00
นาทีที่ 7	87.30	88.00	89.00	43,650.00	44,000.00	44,500.00
นาทีที่ 8	88.30	88.30	88.50	44,150.00	44,150.00	44,250.00
นาทีที่ 9	88.40	88.30	89.20	44,200.00	44,150.00	44,600.00
นาทีที่ 10	88.30	88.70	90.00	44,150.00	44,350.00	45,000.00

หมายเหตุ : อุณหภูมิห้องขณะทดลองมีอุณหภูมิอยู่ที่ 34 องศาเซลเซียส

5.2 ผลการทดสอบกรณีใช้น้ำมันพืชเก่าเป็นเชื้อเพลิง

การทดสอบการทำงานของเตาหุงต้มอเนกประสงค์ ด้วยการใช้น้ำมันพืชเก่า 3 ชนิดเป็นเชื้อเพลิง ได้แก่ น้ำมันถั่ว
เหลืองเก่า น้ำมันปาล์มเก่า และน้ำมันพืชเก่าผสม โดยทดสอบการต้มน้ำปริมาณ 500 มิลลิลิตร ที่มีพัดลมโบลเวอร์เป็นตัวเป่า
ลมกระจายความร้อน ซึ่งมีความเร็วลมที่ 1.2 เมตรต่อวินาที ทำการวัดอุณหภูมิที่เปลี่ยนแปลงของน้ำทุก ๆ 1 นาที จนถึง 10
นาที แสดงผลได้ดังตารางที่ 1

อุณหภูมิที่ได้จากการต้มน้ำ 500 มิลลิลิตร โดยใช้เชื้อเพลิงเป็นถ่านหุงต้มเทียบกับ
น้ำมันพืชเก่า 3 ชนิด

ภาพที่ 5 กราฟแสดงความสัมพันธ์ระหว่างอุณหภูมิและเวลาของเตาเอนกประสงค์
โดยใช้เชื้อเพลิงเป็นถ่านหุงต้มเทียบกับน้ำมันพืชเก่า 3 ชนิด

จากภาพที่ 5 กราฟแสดงอุณหภูมิที่ได้จากการต้มน้ำ 500 มิลลิลิตร โดยใช้เชื้อเพลิงเป็นถ่านหุงต้มเทียบกับน้ำมันพืช
เก่า 3 ชนิด พบว่าน้ำมันพืชเก่าผสมสามารถทำความร้อนได้ดีที่สุดภายใน 4 นาทีแรก ส่วนน้ำมันถั่วเหลืองเก่ากับน้ำมันปาล์ม
เก่าทำความร้อนได้อุณหภูมิที่ใกล้เคียงกัน ส่วนถ่านหุงต้มมีค่าพลังงานความร้อนในนาทีที่ 10 เทียบเท่ากับค่าพลังงานความ
ร้อนเฉลี่ยของน้ำมันพืชเก่าทั้ง 3 ชนิด จะเห็นว่าน้ำมันพืชเก่าสามารถทำความร้อนได้ดีกว่าและเร็วว่าตัวถ่านหุงต้ม

5.3 ผลการทดสอบกรณีใช้น้ำมันเครื่องเก่าเป็นเชื้อเพลิง

การทดสอบการทำงานของเตาหุงต้มอเนกประสงค์ ด้วยการใช้น้ำมันเครื่องเก่า 3 ชนิดเป็นเชื้อเพลิง ได้แก่
น้ำมันเครื่อง 10W-40 เก่า น้ำมันเครื่อง 20W-50 เก่า และน้ำมันเครื่องเก่าผสม ทดสอบโดยการต้มน้ำปริมาณ 500 มิลลิลิตร
มีพัดลมโบลเวอร์ที่มีความเร็วลม 1.2 เมตรต่อวินาที เป่ากระจายความร้อน ทำการวัดอุณหภูมิที่เปลี่ยนแปลงของน้ำทุก ๆ
1 นาที จนถึง 10 นาที แสดงผลได้ดังตารางที่ 2

จากภาพที่ 6 กราฟแสดงอุณหภูมิที่ได้จากการต้มน้ำ 500 มิลลิลิตร โดยใช้เชื้อเพลิงเป็นถ่านหุงต้มเทียบกับ
น้ำมันเครื่องเก่า 3 ชนิด พบว่าน้ำมันเครื่องเก่าผสมสามารถทำความร้อนได้ดีที่สุดใน 4 ชนิดเชื้อเพลิงนี้ โดยน้ำมันเครื่องเก่าทั้ง
3 ชนิด เริ่มมีค่าอุณหภูมิที่ใกล้เคียงกัน ในนาทีที่ 3 ส่วนถ่านหุงต้มมีค่าอุณหภูมิในนาทีที่ 10 เทียบเท่ากับค่าอุณหภูมิเฉลี่ยของ
น้ำมันเครื่องเก่าทั้ง 3 ชนิด จะเห็นว่าน้ำมันเครื่องเก่าสามารถทำความร้อนได้ดีกว่าและเร็วกว่าตัวถ่านหุงต้ม

การประชุมวิชาการระดับชาติและนานาชาติบ้านสมเด็จเจ้าพระยา ครั้งที่ 1 (BS2C 2025)
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ตารางที่ 2 ผลการทดลองวัดอุณหภูมิที่ได้จากการใช้น้ำมันเครื่องเก่าเป็นเชื้อเพลิง
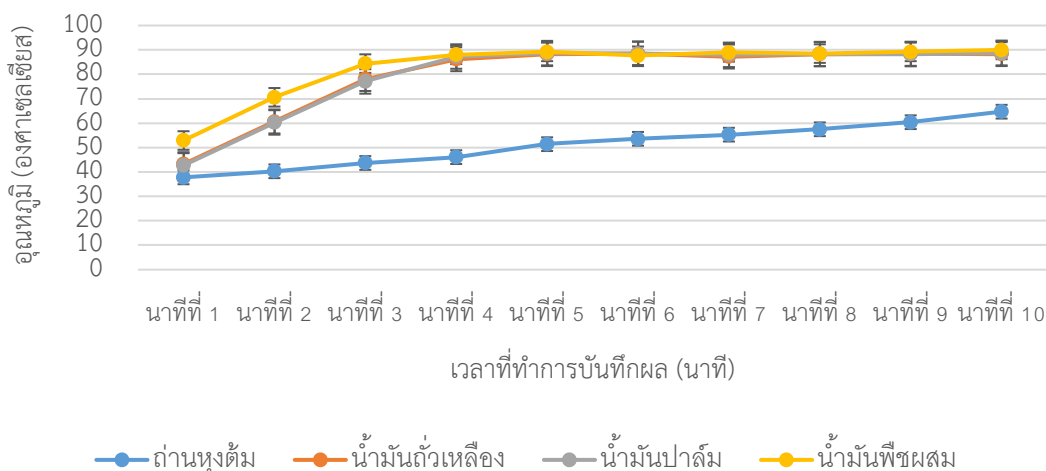
เวลา (นาที)	อุณหภูมิที่ได้จากการต้มน้ำ 500 มิลลิลิตร โดยใช้น้ำมันเครื่องเก่าเป็นเชื้อเพลิง (องศาเซลเซียส)			ค่าพลังงานความร้อนที่กระทำ ต่อน้ำ 500 มิลลิลิตร (แคลอรี)		
	10W-40	20W-50	น้ำมันเครื่องผสม	10W-40	20W-50	น้ำมันเครื่องผสม
นาทีที่ 1	52.60	54.30	56.00	26,300.00	27,150.00	28,000.00
นาทีที่ 2	70.20	72.30	73.00	35,100.00	36,150.00	36,500.00
นาทีที่ 3	86.00	86.90	86.00	43,000.00	43,450.00	43,000.00
นาทีที่ 4	87.30	87.70	89.00	43,650.00	43,850.00	44,500.00
นาทีที่ 5	88.20	88.30	89.00	44,100.00	44,150.00	44,500.00
นาทีที่ 6	88.20	87.70	90.00	44,100.00	43,850.00	45,000.00
นาทีที่ 7	88.30	88.10	90.30	44,150.00	44,050.00	45,150.00
นาทีที่ 8	87.90	86.20	89.70	43,950.00	43,100.00	44,850.00
นาทีที่ 9	87.90	88.30	88.60	43,950.00	44,150.00	44,300.00
นาทีที่ 10	88.30	87.60	89.50	44,150.00	43,800.00	44,750.00

หมายเหตุ : อุณหภูมิห้องขณะทดลองมีอุณหภูมิอยู่ที่ 34 องศาเซลเซียส

อุณหภูมิที่ได้จากการต้มน้ำ 500 มิลลิลิตร โดยใช้เชื้อเพลิงเป็นถ่านหุงต้มเทียบกับ
น้ำมันเครื่องเก่า 3 ชนิด
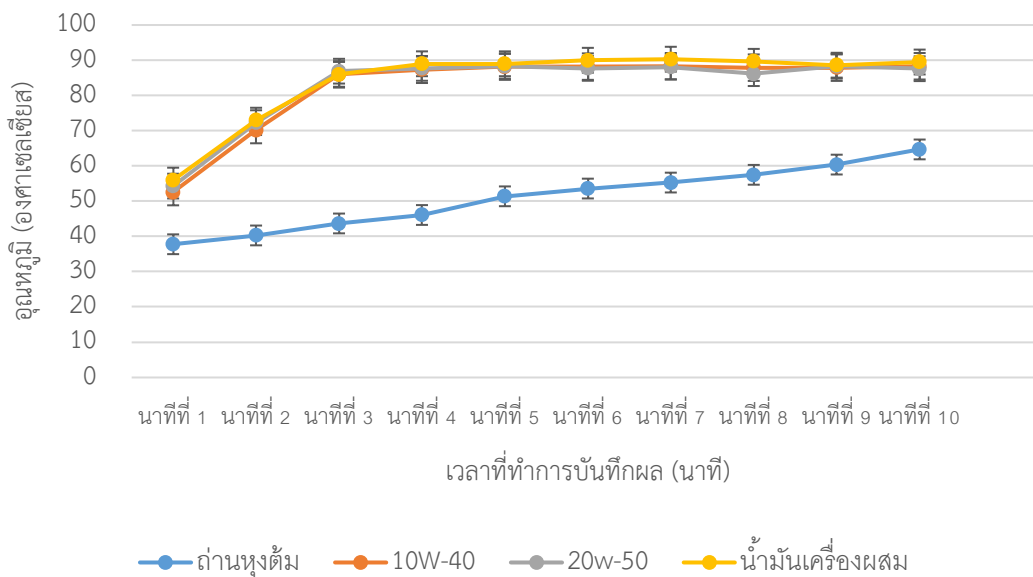
ภาพที่ 6 กราฟแสดงความสัมพันธ์ระหว่างอุณหภูมิและเวลาของเตาเอนกประสงค์
โดยใช้เชื้อเพลิงเป็นถ่านหุงต้มเทียบกับน้ำมันพืชเก่า 3 ชนิด

การประชุมวิชาการระดับชาติและนานาชาติบ้านสมเด็จเจ้าพระยา ครั้งที่ 1 (BS2C 2025)
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อุณหภูมิความร้อนที่ได้จากการต้มน้ำจากการใช้เชื้อเพลิงทั้งหมด 7 ชนิด ได้แก่ น้ำมันถั่วเหลืองเก่า น้ำมันปาล์มเก่า น้ำมันพืชเก่าผสม น้ำมันเครื่อง 10W-40 เก่า น้ำมันเครื่อง 20W-50 เก่า น้ำมันเครื่องเก่าผสม และถ่านหุงต้ม โดยวัดเก็บค่าอุณหภูมิความร้อนทุก ๆ 1 นาที จนครบ 10 นาที เพื่อนำค่าอุณหภูมิความร้อนที่ได้มาเฉลี่ย และคำนวณหาค่าพลังงานความร้อนด้านสูงของแต่ละชนิดเชื้อเพลิง จากนั้นนำผลที่ได้บันทึกค่าลงตารางเพื่อใช้เปรียบเทียบกัน ผลการทดลองพบว่าน้ำมันถั่วเหลืองเก่าให้ค่าพลังงานความร้อนด้านสูงที่ 44,150 แคลอรี่ น้ำมันปาล์มเก่าให้ค่าพลังงานความร้อนด้านสูงที่ 44,350 แคลอรี่ น้ำมันพืชเก่าผสมให้ค่าพลังงานความร้อนด้านสูงที่ 45,000 แคลอรี่ น้ำมันเครื่อง 10W-40 เก่าให้ค่าพลังงานความร้อนด้านสูงที่ 44,150 แคลอรี่ น้ำมันเครื่อง 20W-50 เก่าให้ค่าพลังงานความร้อนด้านสูงที่ 44,050 แคลอรี่ น้ำมันเครื่องเก่าผสมให้ค่าพลังงานความร้อนด้านสูงที่ 45,150 แคลอรี่ และถ่านหุงต้มให้ค่าพลังงานความร้อนด้านสูงที่ 32,350 แคลอรี่ จากการทดลองปรากฏว่า น้ำมันพืชเก่าทั้ง 3 ชนิดและน้ำมันเครื่องเก่าทั้ง 3 ชนิด สามารถติดไฟและทำความร้อนได้เร็วและดีกว่าถ่านหุงต้ม ทั้งนี้ในการทดลองได้ทดลองในห้องที่มีอุณหภูมิ 34 องศาเซลเซียส ด้วยความเร็วลม 1.2 เมตรต่อวินาที เมื่อเปรียบเทียบกับหัวเผาในเตาเบ้าเพื่อหลอมอะลูมิเนียมผสมเกรด AC4A ซึ่งสอดคล้องกับงานวิจัยของ (อวยชัย วงศ์รัตน์ , 2559) ที่ได้นำน้ำมันพืชใช้แล้วมาใช้เป็นเชื้อเพลิงให้กับหัวเผาในเตาเบ้าเพื่อหลอมอะลูมิเนียมผสมเกรด AC4A ด้วยใช้วิธีฉีดน้ำมันพืชใช้แล้วให้เป็นละอองสเปรย์กระจายสัมผัสกับอากาศให้มากที่สุด ภายในหัวเผากำหนดให้อัตราการไหลของอากาศคงที่ 7,400 ต่อนาที และปรับเปลี่ยนอัตราการไหลของน้ำมันพืชใช้แล้วตั้งแต่ 0.2 ถึง 1.2 ต่อนาที ผลการทดลองพบว่าที่ระดับอัตราการไหลน้ำมันพืชใช้แล้ว 0.8 ต่อนาที มีผลทำให้ภายในเบ้าหลอมมีอุณหภูมิสูงสุดถึง 825 องศาเซลเซียส และใช้เวลาในการหลอมเร็วสุด 75 นาที

6. สรุปผลการวิจัย

เตาหุงต้มอเนกประสงค์ที่ออกแบบเพื่อให้ใช้กับน้ำมันพืชเก่า และน้ำมันเครื่องเก่าเป็นเชื้อเพลิง มีโครงสร้างของเตาอเนกประสงค์ที่ผลิตจากเหล็กฉาก หุ้มด้านนอกด้วยแผ่นอลูมิเนียม ตัวเตาผลิตจากเหล็กหล่อเกรดทนความร้อนสูง มีพัดลมโบลเวอร์ขนาด 12 VDC 2.85 A เป็นตัวเป่าลมกระจายความร้อน มีน้ำหนักรวมประมาณ 16 กิโลกรัม สามารถเคลื่อนย้ายได้สะดวก แข็งแรงทนทาน ทนต่อความร้อนอุณหภูมิสูงได้ดี จากการทดสอบคุณสมบัติการทำความร้อนของน้ำมันพืชเก่า และน้ำมันเครื่องเก่าที่นำมาใช้เป็นพลังงานนั้น ส่วนของน้ำมันเก่าทั้งหมดมี 6 ชนิด ได้แก่ น้ำมันถั่วเหลืองเก่า น้ำมันปาล์มเก่า น้ำมันพืชเก่าผสม น้ำมันเครื่อง 10W-40 เก่า น้ำมันเครื่อง 20W-50 เก่า น้ำมันเครื่องเก่าผสม พบว่าน้ำมันเครื่องเก่าผสมทำความร้อนได้ดีที่สุด ซึ่งให้ค่าพลังงานความร้อนด้านสูงที่ 42,055 แคลอรี่ ส่วนน้ำมันถั่วเหลืองเก่าทำความร้อนได้น้อยที่สุด ซึ่งให้ค่าพลังงานความร้อนด้านสูงที่ 39,865 แคลอรี่

8. เอกสารอ้างอิง

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ด้านศิลปกรรม และงานสร้างสรรค์

(148-TH-ART)

การศึกษาและสร้างผลงานดนตรีจากทฤษฎีอดีตที่หลอกหลอนความเป็นดนตรี

ภาคภูมิ เตี๋ยวงษ์สุวรรณ์[1*] และเอกชัย พุหิรัญ[1]

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บทคัดย่อ

การนำแนวคิดของ แนวคิด Hauntology ซึ่งเป็นนิยามที่ถูกตั้งขึ้นโดย Mark Fisher ผู้เชี่ยวชาญด้านวัฒนธรรมศึกษา เป็นการสร้างสรรค์ทดลองความรู้ใหม่ทางดนตรีโดยการทบทวนทฤษฎี Hauntology มีแนวคิดที่สำคัญคือ การพัฒนาทดลอง (Experimental development) ด้วยการสร้างบทประพันธ์เพลงสมัยนิยมขึ้นมาเพื่อเป็นการทดลองบทเพลงที่ไม่ยึดติดกับแบบแผนเดิม เพื่ออธิบายแนวคิดของปรากฏการณ์ของอดีตที่ฉายซ้ำวนเวียนอยู่ในปัจจุบันและเป็นการฆ่าการมาถึงของอนาคต แนวคิดนี้ได้ถูกใช้มิติอื่น ๆ ของสังคม เช่น วัฒนธรรม เทคโนโลยี จิตวิเคราะห์ เศรษฐกิจแบบทุนนิยม มาร์กซิส การเมืองและการศึกษามานุษยวิทยา โดยผู้ประพันธ์นำแนวคิดนี้มาใช้ในการผลิตดนตรีสมัยนิยมในรูปแบบการสร้าง Code จากความถี่ระดับเสียง ความสั้น - ยาว ระเบียบของจังหวะ เทคนิคการบรรเลงและสีสันของเครื่องดนตรีที่อยู่บนสังคีตลักษณ์แบบหลายตอน หรือ sectional forms โดยในแต่ละท่อนจะมีอัตลักษณ์ขององค์ประกอบดนตรีที่แตกต่างกันอย่างสิ้นเชิงโดยมีชื่อเรียกแต่ละท่อนเป็น Prime, Uni, Sub-prime, Divis เป็นต้น โดยทั้งหมดมาจากแนวคิด coding pop เป็นชื่อเรียกของดนตรีประเภทนี้ รูปแบบวงดนตรีจะเป็นแบบสมัยนิยมแบบมาตราฐาน ประกอบไปด้วย กลองชุด กีตาร์ เบส และคีย์บอร์ด ทั้งบทเพลงมีความยาวประมาณ 5-6 นาที

คำสำคัญ: แนวคิดพัฒนาทดลอง; ประพันธ์เพลงสมัยนิยม; สภาวะปัจจุบันที่ถูกหลอกหลอนโดยอดีต

การประชุมวิชาการระดับชาติและนานาชาติบ้านสมเด็จเจ้าพระยา ครั้งที่ 1 (BS2C 2025)
The 1st Bansomdejchaopraya National and International Conference (BS2C 2025)

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Studying and Creating Music from Hauntology in Music

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Abstract

The concept of Hauntology is a definition coined by cultural studies expert Mark Fisher. There is a creative experiment with new musical knowledge by rethinking the theory of haunting people minds. The important concept as experimental development is the creation of popular song in the way of experimental songs without connections to the past by explaining the idea of the phenomenon of the past repeating in the present and killing the arrival of the future. This concept is applied to other social dimensions such as culture, technology, psychoanalysis, capitalist economy, Marxism, politics and anthropological studies. The composers brought this idea to produce a popular song in the form of codes or codes from frequency, pitch, short-length, rhythm control. The playing techniques and colors of the instrument are divided, each with a completely different identity of the musical element, with the names of each piece being Prime, Branch, Uni, Digi, Bug, etc. All of them come from the concept of coding pop, which is the name of this song. The style of the band is modern standard, consisting of drums, guitar, bass and keyboards, the whole song is about 5-6 minutes long.

Keywords: Hauntology, experimental development, popular music composition

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1. บทนำ

เนื่องจากสภาวการณ์ของดนตรีสากล อยู่ในรูปแบบของทุนนิยมผลิตซ้ำ สังเกตได้จากสื่อหลักจากตะวันตกอย่าง ประเทศสหรัฐอเมริกาที่นำเสนอดนตรีที่มีความจำเจมาตั้งแต่ ค.ศ 2000 มาจนถึงปัจจุบันผ่านดนตรีในวัฒนธรรมฮิปฮอป นอกจากนี้ทั้งในแง่ของแนวเพลงที่ไม่แปลกใหม่ซ้ำไปซ้ำมา อิงจากงานวิพากษ์ของ Mark Fisher โดยเฉพาะในด้านอารมณ์และ การนำเสนอในเชิงศิลปะที่มาจากดนตรีในรูปแบบเก่าจากทศวรรษที่ 70-90 มาเรียบเรียงใหม่ ผลิตซ้ำออกมาผ่านศิลปินใหม่ บ้างมีความแปลกใหม่อย่างเช่น ดนตรีอิเล็กทรอนิกส์ที่ยังสามารถพัฒนาต่อไปได้อย่างหลากหลายในรูปแบบที่มีความซับซ้อน ออกนอกกรอบทฤษฎีและแนวคิดทางดนตรีแบบเกณฑ์กลางที่เป็นจุดร่วมสำคัญในการกำหนดความเข้าใจของคนทั่วไปเรียกว่า Tonality หมายความว่าโทนเสียงและคีย์หลักที่สำคัญในดนตรี ซึ่งอาจจะอยู่ในข่ายการนิยามของ Noise music ใน ขณะเดียวกัน มีแนวเพลงอยู่มากภายใต้กระบวนการการผลิตแบบรีไซเคิลอย่าง ดนตรีคลาสสิก ร็อก แจ๊สและเฮฟวี่เมทัลใน ด้านลักษณะวนลูป อาจจะมีการแต่งเติมให้ร่วมสมัยมากขึ้นแต่ไม่สามารถบอกได้ว่าเป็นแนวทางใหม่ คล้ายกับแนวดนตรี กระแสหลักอย่างดนตรีพอป ฮิปฮอป และ R&B ร่วมสมัย

ตั้งแต่ทศวรรษที่ 90 เป็นต้นมา พัฒนาการของดนตรีขับเคลื่อนค่อนข้างช้าเมื่อเทียบกับตั้งแต่ช่วงปลายทศวรรษที่ 60 ทำให้เกิดความเชื่อมโยงกับแนวคิด Hauntology ซึ่งเป็นนิยามที่ถูกตั้งขึ้นโดย Mark Fisher ผู้เชี่ยวชาญด้านวัฒนธรรมศึกษา เพื่ออธิบายปรากฏการณ์ของอดีตที่ฉายซ้ำวนเวียนอยู่ในปัจจุบันและเป็นการฆ่าการมาถึงของอนาคต แนวคิดนี้ไม่ได้ถูกใช้ใน ลักษณะของดนตรีเพียงอย่างเดียว แต่เป็นการใช้นิยามกับทุกเรื่องในสังคมอย่างเช่น วัฒนธรรม เทคโนโลยี จิตวิเคราะห์ เศรษฐกิจแบบทุนนิยม มาร์กซิส การเมืองและการศึกษาความเป็นมนุษย์ในทุกด้านอย่างมานุษยวิทยา ซึ่งในด้านเศรษฐกิจแบบ ทุนนิยมเป็นปัจจัยสำคัญในการกำหนดทิศทางการเคลื่อนไหวของพัฒนาการทางดนตรี ตัวอย่างของการขัดขวางการมาถึงของ อนาคตเห็นได้ชัดจากการปฏิเสธเทคโนโลยี โดยเฉพาะในระบบราชการที่ยังใช้กระดาษปริ้นเอกสารมากมายแทนที่จะใช้ระบบ ออนไลน์ที่มีการบันทึกชัดเจนไม่ว่าจะในแง่ของลายลักษณ์อักษรและเวลา ในขณะที่ภาคเอกชนโดยทั่วไปเปิดกว้างในการรับ นวัตกรรมเข้ามาพัฒนาการทำงานอย่างสม่ำเสมอ ในแง่ของดนตรีก็เช่นเดียวกัน ถ้าปฏิเสธเสียงสังเคราะห์ยุคใหม่ก็อาจเป็นการ ขัดขวางการมาถึงของอนาคต สิ่งที่พบเห็นได้จากกระแสนิยมของดนตรีอิเล็กทรอนิกส์ในระดับนานาชาติคือตัวชี้วัดที่ทำให้เห็น ถึงพัฒนาการทางดนตรีได้ชัดเจนที่สุดและเป็นการปฏิเสธการฆ่าอนาคตทางดนตรีได้เช่นเดียวกัน

งานวิจัยชิ้นนี้เป็นงานวิจัยสร้างสรรค์ผสมผสานระหว่างการวิจัยแบบประยุกต์ (Applied Research) กับการพัฒนา ทดลอง (Experimental Development) เป็นการศึกษาค้นคว้าเพื่อหาความรู้ใหม่ทางดนตรีโดยการทบทวนทฤษฎี Hauntology เพื่ออธิบายรูปแบบการวนเวียนของดนตรีแบบเก่าในปัจจุบันและเป็นการฆ่าการมาถึงของอนาคตโดยการพัฒนา ทดลอง (Experimental development) ด้วยการสร้างงานดนตรีขึ้นมาเพื่อเป็นการทดลองการฟังบทเพลงที่ไม่ยึดติดกับแบบ แผนเดิม

2. วัตถุประสงค์การวิจัย

    1. เพื่อศึกษาทฤษฎี Hauntology ผ่านพัฒนาการของดนตรี

    2. เพื่อค้นหาแนวทางในการพัฒนาความแปลกใหม่และความก้าวหน้าของดนตรีในอนาคตที่ไม่ยึดติดกับอดีตผ่านการ ประพันธ์เพลง 1 บทเพลง พร้อมเผยแพร่ผ่าน Youtube

3. สมมติฐานการวิจัย (ถ้ามี)

    1. ทฤษฎี Hauntology ในพัฒนาการดนตรี

    2. พัฒนาการทางดนตรีในอนาคตที่ไม่ยึดติดกับอดีต

4. ระเบียบวิธีวิจัย

การวิจัยครั้งนี้ยังมีการรวบรวมข้อมูลทางดนตรีเพื่อทบทวนองค์ประกอบในการหลีกหนีอดีต ไปสู่การสร้างดนตรีใน
อนาคตที่ไม่ยึดติดกับอดีต โดยใช้แนวคิดทฤษฎี Hauntology เป็นตัวทบทวนค้นหาผลลัพธ์ทางความคิดเห็นและความรู้สึกของ
ผู้ฟังบทเพลงที่ถูกประพันธ์ขึ้นในการประกอบการหาข้อมูล ด้วยการรวบรวมเอกสารที่ได้ทำการคัดเลือกมาให้สอดคล้องกับ
สาระเนื้อหาของดนตรีในแต่ละแนวอย่างเช่น ดนตรีคลาสสิก แจ๊ส พอป ร็อก เฮฟวี่เมทัล ฟังก์ ดิสโก้ พังก์ อิเล็กทรอนิกส์ และ
แนวย่อยต่างๆในแต่ละแนวหลักที่กล่าวมาทั้งหมด รวมถึงการชี้ให้เห็นถึงปรากฏการณ์ครั้งใหญ่ที่เกิดขึ้นในอุตสาหกรรมดนตรี
โลกอย่างเช่น ปรากฏการณ์ของแนวดนตรีกรั้นจ์ในตอนต้นทศวรรษที่ 90 ที่มาล้มตลาดแฮร์แบนด์ที่เคยรุ่งเรืองสูงสุดใน
ทศวรรษที่ 80 (วิริยะ สว่างโชติ, 2562) และการฟังเพลงของคนไทยที่ค่อนข้างมีขอบเขตจำกัด ส่งผลให้พื้นที่ทางอุตสาหกรรม
ดนตรีนำเสนอดนตรีได้ไม่หลากหลาย ก่อให้เกิดวิกฤติต่ออาชีพนักดนตรีที่ต้องการผลิตผลงานที่แปลกใหม่แต่ไม่ได้รับการตอบ
รับที่ดีจากสังคม (สุกรี เจริญสุข, 2565) โดยงานวิจัยชิ้นนี้จะเริ่มจากการหาแนวทางในการประพันธ์เพลงที่ไม่สอดคล้องกับ
ดนตรีในอดีต โดยวิเคราะห์ผ่านกระบวนการรวบรวมและทบทวนทฤษฎีและเอกสารที่เกี่ยวข้อง รวมทั้งปรากฏการณ์ทางดนตรี
ดังที่กล่าวมา

5. ผลการวิจัยและอภิปรายผล

การเรียบเรียงดนตรีนี้เป็นการผสมผสานระหว่างการวิจัยประยุกต์และการพัฒนาสร้างสรรค์ของดนตรีเชิงทดลอง ซึ่ง
เป็นการศึกษาความรู้ใหม่ทางดนตรีสมัยนิยม โดยมีแนวคิดจากการทบทวนทฤษฎีหลอนวิทยาเพื่ออธิบายรูปแบบปัจจุบันของ
ดนตรีที่หลีกหนีอดีต และวิจัยทดลองเพื่อหาวิธีที่จะยับยั้งการทำลายการมาถึงของอนาคตด้วยการสร้างสรรค์ออกมาเป็น
ผลงานทางดนตรี เพราะที่ผ่านมาตามทฤษฎี Hauntology ของ Mark Fisher ได้ระบุไว้ชัดเจน ว่าด้วยเรื่องของการยกเลิกการ
มาถึงของอนาคตด้วยการวนเวียนของอดีตในปัจจุบัน ตัวอย่างเช่น การที่เกิดวงอย่าง Oasis ในช่วงทศวรรษที่ 90 เป็นการนำ
แนวคิดของ The Beatles วนกลับมาเล่าใหม่อีกครั้งในช่วงเวลาที่ต่างออกไป สื่อถึงความไม่สามารถปรากฏให้เห็นการก้าวข้าม
ไปหาสิ่งใหม่ได้เหมือนกับช่วงทศวรรษที่ 80 ที่ได้มีความพยายามสร้างสรรค์ผลงานและแนวทางในการเข้าถึงโลกอนาคตผ่าน
ผลงานเพลงจากศิลปินมากมายที่มักนำเสนอในเรื่องของ อวกาศ และอาจจะเป็นเพราะการแข่งขันทางเทคโนโลยีระหว่างสอง
ขั้วมหาอำนาจอย่างประเทศสหรัฐอเมริกาและสหภาพโซเวียด หรือที่เรียกกันว่า ช่วงสงครามตัวแทนหรือสงครามเย็น ดังนั้น
ข้อมูลของการพัฒนาเชิงทดลองจึงทำให้เกิดแนวทางการทำวิจัยประยุกต์เพื่อแสดงให้เห็นแนวทางใหม่ของดนตรีที่ไม่ยึดติดกับ
รูปแบบเดิมบนแนวคิดของกลุ่มเสียงที่ผู้วิจัยเรียกว่า "รหัสเสียง"

แนวคิดการจัดระบบเสียงจากรูปแบบการสร้างรหัสเสียง

ในการสร้างสรรค์บทเพลงสมัยนิยมโดยทั่วไปส่วนใหญ่จะสร้างจากกลุ่มโน้ตที่เรียกว่าบันไดเสียง โดยปกติอาจจะมี
กลุ่มโน้ต 5 ตัวหรือ 7 ตัว จาก 12 เสียง ซึ่งปกติจะมีการนำบันไดเสียงมาเป็นหลักในการสร้างบทเพลงทั้งแนวทำนองและเสียง
ประสาน แต่ละบันไดเสียงได้ถูกกำหนดเอกลักษณ์ของกลุ่มเสียงมาอย่างชัดเจน เช่น บันไดเสียงเมเจอร์ บันไดเสียงไมเนอร์
บันไดเสียงบลูส์ หรือบันไดเสียงเพนตาโทนิก แต่บทเพลงนี้ที่มีชื่อว่า "De GaB" สร้างจากกลุ่มโน้ต 12 เสียงที่ถูกถอดรหัสโดย
วิธีสุ่มจำนวน 5 ตัวเพื่อนำมาสร้างเป็นกลุ่มโน้ตหลักที่เรียกว่า ไพร์ม (prime) และมีระบบการจัดเสียงกับกลุ่มที่เหลือทั้งหมด

แนวคิดการสร้างเสียงประสานจากรูปแบบการสร้างรหัสเสียง

แนวคิดการสร้างเสียงประสานจะแตกต่างกันในแต่ละท่อน แต่การจัดระบบเสียงประสานมีแนวคิดมาจากการกลุ่ม
โน้ตที่เหลือจากไพร์ม ในท่อนไพร์ม คือ โดยกลุ่มแรกจากตัวโน้ตสุ่ม 5 ตัว และกลุ่มที่นำมาสร้างเสียงประสานจากโน้ตที่เหลือ
อีก 7 ตัว คือ Eb F F# Ab Bb และ C# โดยเครื่องดนตรีกีตาร์ไฟฟ้าที่มีเสียงแตกแบบ Distortion และเบสจะบรรเลงแยกกลุ่ม

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โน้ตกันแต่บรรเลงไปพร้อมๆกัน จากบทเพลง "De GaB" โดยมีเสียงกลองอิเล็กทรอนิกส์นำการประกอบจังหวะเป็น Loop ประกอบด้วยเสียงแตรที่จะมาในทุกห้องดนตรีเป็นสัญญะแห่งการสร้างความแปลกใหม่ผ่านดนตรีที่ตั้งใจจะหลีกเลี่ยงการหยุด อยู่กับที่ในอดีต เพื่อสร้างเสียงใหม่ มีเทคนิคการเล่นและแนวทำนองที่ไม่อยู่ในระบบดั้งเดิมในเรื่องความอิสระของทำนองและ จังหวะ ในบทเพลงนี้มีท่อนแนวคิดในการสร้างแนวทำนอง

แนวคิดสร้างสรรค์แนวทำนองมาจากการใช้ระบบรหัสเสียงเพื่อสร้างเสียงดนตรีจากตัวโน้ต 12 ตัวที่มีความสำคัญ เท่าเทียมกัน ในระบบบรหัสเสียง การสร้างสรรค์ดนตรีจะแตกต่างจากระบบคีย์และการประสานเสียงแบบเดิม แต่ยังคงแนวคิด ของการสร้างสรรค์ดนตรีสมัยนิยมเป็นหลักในการสร้างสรรค์ โดยมีวิธีการสร้างแนวทำนองแรกจากกลุ่มโน้ต 5 ตัวแบบสุ่ม ใน บทเพลงนี้คือกลุ่ม โน้ต A B D E และ G กลุ่มผู้ประพันธ์ได้นำมาตัวอักษรมาเรียงใหม่ตามลำดับดังนี้ D E G A และ B จึงได้ชื่อ ว่า De GaB และเป็นรหัสของชื่อเพลงนี้

ตารางที่ 1 แสดงการสุ่มโน้ตจากเสียงทั้งหมดที่มี 12 ตัวคัดเลือกมา 5 ตัวโน้ต

Pitch	C	C#	D	D#	E	F	F#	G	G#	A	A#	B
Prime			D		E			G		A		B
Bass			D		E			G		A		B

สังคีตลักษณ์ของบทเพลง

โครงสร้างของสังคีตลักษณ์ของเพลงเป็นแบบแยกส่วน (Sectional Form) มีทั้งหมด 5 ท่อนและมีท่อนจบ (Ending) ปิดท้าย คือ ท่อนไพร์ม (Section Prime) ท่อนสาขา (Section Branch) ท่อนร่วม (Section Uni) ท่อนดิจิ (Section Digi) และท่อนบัค (Section Bug) ตามตารางด้านล่าง ในแต่ละท่อนจะมีกลุ่มเสียงที่ใช้บรรเลงแบบเฉพาะเจาะจงที่มาจาก รหัสเสียง

ตารางที่ 2 แสดงโครงสร้างท่อนเพลง รหัสเสียงและเวลา

Section	Pitch	Time
Section Prime	D E G A B	00.00 – 01.05
Section Branch	F F# Bb C C#	01.06 – 02.09
Section Uni	E D B A G	02.10 – 02.41
Section Digi	D Ab E G Eb A B	02..42 – 03.20
Section Bug	Free improvisation	03.21 – 04.50
Ending	D E G A B	04.51 – 05.20

ท่อนไพร์ม (Section Prime) ประกอบด้วยโน้ต 5 ตัวที่สุ่มเลือกเพื่อสร้างทำนองหลักตามแนวคิดของ John Cage นักประพันธ์เพลงชาวอเมริกันเกี่ยวกับแนวคิดของดนตรีเสี่ยงทาย (chance music) ซึ่งบางครั้งเป็นแนวคิดที่ไม่มีความหมาย และคาดเดาไม่ได้ในดนตรีและงานศิลปะยุคใหม่ โน้ตตัวอย่างด้านล่างเป็นกระสวนจังหวะในท่อนไพร์มซึ่งจะบรรเลงโดยกีตาร์ จากกลุ่มโน้ต 5 เสียงนี้ คือ A B D E และ G

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ตัวอย่างที่ 1 แสดงกระสวนจังหวะหลักในท่อนไพร์ม

และในแนวเสียงเบส โน้ตจะนำโน้ตบางตัวในกลุ่มไพรม์มาบรรเลงคือโน้ต D A G B โดยบรรเลงอยู่บนกระสวน
จังหวะ (rhythmic pattern) ดังตัวอย่างด้านล่าง

ตัวอย่างที่ 2 แสดงแนวเบสในกระสวนจังหวะหลักจากกลุ่มโน้ตไพร์ม
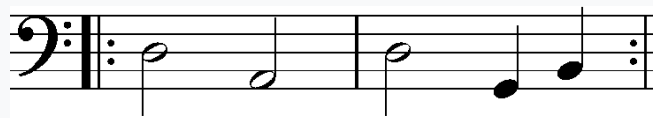
ท่อนสาขา (Section Branch) ประกอบด้วยโน้ตที่เพิ่มเติมโดยแยกจากท่อนไพร์ม ใช้รูปแบบกระสวนจังหวะ
เหมือน ท่อนไพร์ม โดยมีกลุ่มโน้ตเพิ่มเติมจากกลุ่มของโน้ตเรียกว่า Branch (สาขา) คือ F F# Bb C# ซึ่งแตกต่างอย่างสิ้นเชิง
จากไพร์ม เป็นการเล่นแยกกลุ่มเสียงของทำนองและเสียงเบส แต่แนวกีตาร์ที่บรรเลงทำนองหลักจะบรรเลงกลุ่มโน้ตใหม่
ร่วมกับไพร์มเดิม ในทำนองหลักของท่อนนี้จะเป็นกลุ่มโน้ต 7 ตัว คือ 5 ตัวจากท่อนไพร์มและเพิ่มอีก 2 ตัว คือ โน้ต Eb และ
Ab จึงได้กลุ่มโน้ต ดังนี้ D E G A B Eb และ Ab โดยแนวเบสจะบรรเลงโน้ตไม่เหมือนกับแนวหลักเลย ทำให้เกิดเป็นเสียง
ประสานที่ไม่เหมือนรูปแบบเดิม โดยมีโน้ตทั้งหมด 12 เสียงเกิดขึ้นพร้อมกัน แตกต่างจากแนวเพลงสมัยนิยมทั่วไปในอดีต

ตารางที่ 3 แสดงรหัสเสียงในท่อนสาขา

Pitch	C	C#	D	D#	E	F	F#	G	G#	A	A#	B
Prime			D		E			G		A		B
Branch				+Eb					+Ab			
Bass	C	C#				F	F#				Bb	

ท่อนร่วม (Section Uni) เป็นส่วนที่นำเสนอความแตกต่างของบทเพลงจากกระสวนจังหวะที่ช้าลงและแนวคิด
การจัดเสียงที่แตกต่างจากท่อนที่ผ่านมา โดยเฉพาะอัตราความเร็วของจังหวะที่แตกต่างจากท่อนไพร์มและท่อนสาขา ท่อน
ร่วมนี้หมายถึงการเล่นกลุ่มโน้ตเดียวกันคือกลุ่มโน้ตหลักที่ประกอบด้วยโน้ต E D B A G บรรเลงพร้อมกันแนวทำนองและแนว

เบส ในส่วนท้ายของท่อนร่วมนี้อัตราจังหวะได้ถูกยืดออกไป โดยใช้กลุ่มโน้ต คือ E D B A G โดยบรรเลงถอยหลังให้เสียงต่ำลง
ตามลำดับจากโน้ต E สูงไป E ต่ำ เพื่อเชื่อมไปยังท่อนถัดไป
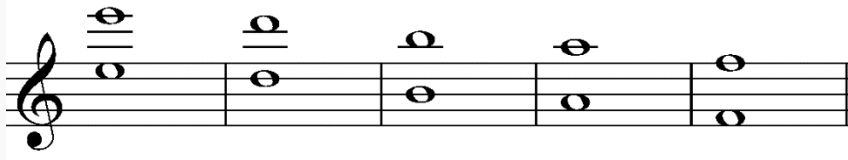
   ท่อนดิจิ (Section Digi) ท่อนดิจิเป็นท่อนที่มีจังหวะซับซ้อนกว่าท่อนอื่น บรรเลงด้วยอัตราจังหวะเร็วกระสวน
จังหวะที่เปลี่ยนไปจากอัตราจังหวะเดิม โดยกีตาร์และแนวเบสใช้กลุ่มโน้ตเดียวในการบรรเลงเปลี่ยนไปจามรูปแบบจังหวะ
กลุ่มโน้ตที่สุ่มมาใช้ 5 เสียง คือ โน้ต C# D E Ab Bb ซึ่งเป็นรหัสเสียงใหม่

ตารางที่ 4 แสดงรหัสเสียงในท่อนร่วม

Pitch	C	C#	D	D#	E	F	F#	G	G#	A	A#	B
Prime			D		E			G		A		B
Branch				+Eb					+Ab			
Bass	C	C#				F	F#				Bb	
Digi	C	C#			E				AB		Bb	

   ท่อนบัค (Section Bug) ซึ่งเป็นท่อนสุดท้ายของบทเพลง เป็นการใช้เทคนิคการบรรเลงแบบสร้างสรรค์อิสระ
(free improvisation) เป็นการบรรเลงแบบปัจจุบันทันด่วนหรือเรียกว่าด้นสด โดยใช้โน้ตทั้งหมด 12 เสียง บรรเลงอย่างอิสระ
ตามอารมณ์เพลงในปัจจุบันที่เป็นสื่อสารระหว่างกันของผู้ร่วมบรรเลง ซึ่งมีการใช้เทคนิคการทดลองโทนเสียงจากเครื่องดนตรี
เทคนิคการสร้างรูปแบบและพัฒนาแนวทำนองอิสระ การใช้เสียงประสานที่อิสระ ไม่จำกัดจินตนาการบนพื้นฐานและ
ประสบการณ์ของผู้บรรเลงแต่ละคน โดยได้รับแรงบันดาลใจจาก Allan Holdsworth นักกีตาร์แจ๊สแนวฟิวชั่นที่มีชื่อเสียงซึ่งอ
ลันมีการทดลองเสียงวรรณยุกต์พิเศษ และใช้เสียงชินธิไซเซอร์จบ (ending) ที่มีรหัสเสียงเดียวกันกับท่อนไพรม์เพื่อแสดงถึง
กลุ่มโน้ตหลักและเสียงประสานที่มาจากรหัสเสียงหลัก เป็นการสื่อสารว่าจุดเริ่มต้นคือจุดสิ้นสุดของเพลง

   รูปแบบการประพันธ์ดนตรีที่ออกมาเป็นผลงาน DE GAB Coding Pop ด้วยการทบทวนวรรณกรรมแบ่งออกเป็น 5
ประเด็นดังนี้ ทฤษฎี Hauntology, สุนทรียศาสตร์, วิวัฒนาการของดนตรีสมัยนิยม, ปัจจัยของดนตรีสมัยนิยม และสภาวะของ
อุตสาหกรรมดนตรีในสังคมไทย โดยใน 4 ประเด็นแรกถูกทบทวนเพื่อหลีกหนีอดีต ซึ่งในตัวงานชิ้นนี้สามารถหลีกเลี่ยงอดีต
ของดนตรีได้อย่างไม่เด็ดขาดสักทีเดียว เพราะยังปรากฏแนวคิดจากแนวเพลงที่ยังหลงเหลือในแง่ความสอดคล้องกับอดีตที่ยัง
ปรากฏในงานประพันธ์ชิ้นนี้อยู่คือ องค์ประกอบของดนตรีร็อกด้วยกีตาร์ไฟฟ้าเสียง Distortion กับแนวคิดจากแนวเพลง
Fusion jazz และ Free improvisation จังหวะกลองหลักในบทประพันธ์ไม่มีความซับซ้อนมากนัก เน้นเป็นการบรรเลงแบบ

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ลูปเป็นส่วนใหญ่ ซึ่งไม่ได้เป็นเรื่องใหม่แต่อย่างใด แต่ถ้าทำการทบทวนในแง่ของการผสมผสานแนวดนตรีก็สามารถยืนยันถึง
การสร้างสรรค์สิ่งใหม่ได้ แล้วถ้ายิ่งนำแนวคิดการ Coding มาใช้ในการสุ่มเลือกโน้ตในการเรียบเรียงทำนอง ริฟฟออกมา ก็ยิ่ง
พิสูจน์ให้เห็นถึงความไม่ยึดติดกับอดีตในดนตรีตามทฤษฎี Hauntology และยิ่งในแง่ของสุนทรียศาสตร์ล้วนเกิดจากการ
ปลูกฝังเป็นหลักสำคัญ

จากผลการวิจัยในการศึกษาและสร้างผลงานดนตรีจากทฤษฎีอดีตที่หลอกหลอนความเป็นดนตรี ตามวัตถุประสงค์ที่
กำหนดไว้ มีการวิเคราะห์เชื่อมโยงกับการศึกษาจากแนวคิดและทฤษฎีหลัก รวมทั้งเอกสารและงานวิจัยที่เกี่ยวข้อง ซึ่งสามารถ
อภิปรายได้ดังนี้

1. ทฤษฎี Hauntology ผ่านพัฒนาการของดนตรี

ในด้านการทบทวนทฤษฎีนี้ชี้ให้เห็นถึง การวนลูปของอดีตผ่านพัฒนาการของดนตรีในอดีตมาจนถึงดนตรีสมัยนิยม
ที่ยังไม่มีการอุบัติแนวทางใหม่เกิดขึ้น ทำให้การมาถึงของอนาคตถูกฆ่า สกัดให้หายไป หรือมาถึงช้าลง และแนวดนตรีที่มีเกิด
นำเทคโนโลยีเก่าในทศวรรษที่ 60 มานำเสนองานประพันธ์ในปัจจุบันเป็นการย้อนสุนทรียศาสตร์ในอดีต ตรงกับข้อมูลใน
งานวิจัยเรื่อง "Cultural Ghosts: Hauntology and The Caretaker" (Slayton, 2021) และการวิเคราะห์ของ Mark
Fisher ในเรื่องของการรักษาความทรงจำในอดีตผ่านการประพันธ์ดนตรีด้วยเทคโนโลยีเก่าเพื่อให้ได้รำลึกความทรงจำในอดีต
ในเชิงคุณค่าที่มีต่อดนตรีในยุคสมัยเก่าก่อน แต่ในขณะเดียวกันก็เป็นการฆ่าการมาถึงของอนาคตตามที่ Mark Fisher
วิเคราะห์ไว้ว่าตั้งแต่ทศวรรษที่ 90 เป็นต้นมาจนถึงต้นศตวรรษที่ 21 แนวดนตรีส่วนมากมีการผสมผสานจนจำแนกแนวเพลงได้
ยากถึงแม้จะเป็นการต่อยอดพัฒนาในบางกรณีอย่างเช่น Dubstep ที่ผู้เขียนได้ใช้เป็นตัวอย่างไว้ แต่แนวเพลงส่วนมากนั้นก็ไม่
พ้นการนำของเก่ามาเล่าใหม่เปรียบดั่งการรีไซเคิลในนิยามของแนวคิด Hauntology เพราะผู้คนส่วนมากตามผลวิจัยจาก เฟ
รดอริก คอนราด ล้วนแต่ชอบฟังเพลงที่ตนเองคุ้นเคยและชื่นชอบเท่านั้น จึงเป็นส่วนหนึ่งของการวนลูปของอดีต (Conrad,
2018)

2. การประพันธ์เพลง De GaB from Coding Pop Style

ในด้านการประพันธ์บทเพลงนี้มีแนวคิดที่พยายามจะหลีกหนีอดีตและการรีไซเคิลใดๆตามคำนิยามของ Mark
Fisher ให้ได้มากที่สุดเท่าที่จะทำได้ แต่ก็ไม่อาจหลีกหนีได้ทั้งหมดตามที่ในบทสรุปได้ชี้ให้เห็นชัดว่า ยังมีการนำกีตาร์เสียง
Distortion มาใช้กับจังหวะกลองอิเล็กทรอนิกส์ในรูปแบบลูปและแนวคิดการด้นสดแบบ Fusion jazz ซึ่งไม่ได้หลีกหนีอดีต
แต่ในแนวคิดในการประพันธ์หลักที่มีกระบวนการคิดแบบ Coding ตัวโน้ต คอร์ด โครงสร้างของเพลงจึงก่อให้เกิดแนวทางใหม่
ในการทำดนตรีที่หลีกหนีอดีตอยู่พอสมควร เมื่อเปรียบเทียบกับงานดนตรีคลาสสิกในช่วงต้นและกลางศตวรรษที่ 20 ได้มี
ความพยายามสร้างสรรค์สิ่งใหม่ด้วยการใช้เสียงสังเคราะห์และรูปแบบการประพันธ์อย่าง Serialism ที่มีการนำการใช้โน้ต 12
ตัวมาใช้อย่างครบถ้วน ทำให้เกิดการเรียบเรียงและการนำเสนอที่แปลกใหม่ในขณะนั้น เพื่อหลีกหนีการเรียบเรียงตามหลัก
Tonality ที่ค่อนข้างจำเจในขณะนั้น แต่ก็ยังใช้กันอย่างหลีกเลี่ยงไม่ได้ในปัจจุบัน สอดคล้องกับบทความเรื่อง "สุนทรียภาพ
ของการฟังดนตรีทดลองไฟฟ้า" ของ กุลธีร์ บรรจุแก้ว ที่ได้มุ่งเน้นสร้างเสริมความเข้าใจในการฟังดนตรีทดลองไฟฟ้าผ่าน
ประเด็นของสุนทรียศาสตร์ ซึ่งประกอบด้วยแนวคิดในเรื่องความสามารถในการรับรู้ของสมองผ่านงานของ แคทเทอรีน มา
ลาบู ซึ่งอธิบายในประเด็นการรื้อถอนความคิดโครงสร้างทางดนตรีตะวันตกแบบดั้งเดิมออกไป เพื่อเปิดรับสิ่งใหม่และเข้าใจ
บรรทัดฐานของสุนทรียศาสตร์ในแบบที่ไม่ยึดติดกับโครงสร้างทางความคิดดั้งเดิม นำไปสู่การเปลี่ยนแปลงที่ปรากฏให้เห็นชัด
ว่าความจริงไม่ได้มีเพียงหนึ่งเดียว และแสดงให้เห็นว่าสมองมนุษย์มีความสามารถในการปรับตัวให้เข้ากับสภาพแวดล้อมได้อยู่
เสมอ สอดคล้องกับหนังสือวิชาการทางดนตรีเรื่อง "เสียงแห่งการเปลี่ยนแปลง" โดยอติภพ ภัทรเดชไพศาล ในแง่ของการ
ความขัดแย้งระหว่างความคิดใหม่และเก่าในดนตรีตั้งแต่ดนตรีคลาสสิกสมัยใหม่ไปจนถึงแนวคิด Postmodernism ผ่านดนตรี
ทดลองและการเปลี่ยนผ่านของยุคสมัย ซึ่งงานประพันธ์เพลง De GaB from Coding Pop Style มีจุดประสงค์ในการหลีกหนี

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อดีตเพื่อการเปลี่ยนแปลงในอนาคต ถึงแม้อาจจะไม่ทันทีด้วยผลการเผยแพร่ที่ได้รับถือว่าไม่ประสบความสำเร็จ แต่อาจเป็น
ส่วนหนึ่งในการทำให้อนาคตทางดนตรีมาถึงในที่สุด สุดท้ายนี้ขอเชิญผู้อ่านรับฟังบทประพันธ์ได้ตาม QR Code นี้
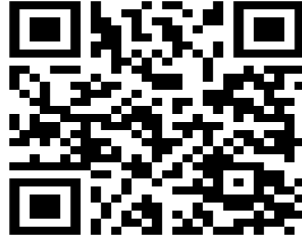
6. ข้อเสนอแนะ

6.1 ข้อเสนอแนะเพื่อการปฏิบัติ

6.1.1 ควรจัดทำดนตรีในรูปแบบที่มีการนำเสนอเนื้อหาของดนตรีสมัยนิยมในแนวอื่นๆ เพิ่มขึ้นต่อไปใน
อนาคต และมุ่งเน้นกลุ่มเป้าหมายไปในทุกกลุ่มอายุคน

6.1.2 ควรทำการวิจัยด้านการประพันธ์ดนตรีโดยการลงพื้นที่ภาคสนามจริง และควรทำหลายครั้งเพื่อเก็บ
ตัวอย่างให้ได้มากที่สุดเท่าที่จะทำได้เพื่อประโยชน์สูงสุดของการชี้วัดการเข้าถึงของผู้ฟัง

6.2 ข้อเสนอแนะในการวิจัยครั้งต่อไป

6.2.1 ควรนำเสนอพัฒนาแนวดนตรีที่แปลกใหม่ต่อไปผ่านการวิจัย เพื่อดึงดูดความน่าสนใจและเพิ่มการ
กระจายความเข้าใจในดนตรีสมัยนิยมที่หลากหลายในรูปแบบที่ทันสมัยเท่าทันโลกเพื่อตอบสนองทั้งอุตสาหกรรมดนตรี
ภายในประเทศและในระดับโลก

6.2.3 ควรนำผลสำรวจจากการวิจัยครั้งนี้ไปอ้างอิงถึงการสร้างแนวทางการประพันธ์ดนตรีให้เข้าถึงผู้คน
ได้มากขึ้น

7. กิตติกรรมประกาศ

8. เอกสารอ้างอิง

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การใช้เทคโนโลยี Gemini และ Suno เพื่อยกระดับการสร้างสรรค์เพลงสำหรับครูปฐมวัย

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บทคัดย่อ

การวิจัยนี้มีวัตถุประสงค์ 1) เพื่อศึกษาผลลัพธ์ของการใช้เทคโนโลยี Gemini และ Suno ในการสร้างสรรค์เพลงสำหรับครูปฐมวัย และ 2) เพื่อนำเสนอแนวทางและรูปแบบการใช้เทคโนโลยี Gemini และ Suno ในการพัฒนาสื่อการเรียนรู้ทางดนตรีที่มีประสิทธิภาพและสร้างสรรค์สำหรับเด็กปฐมวัย กลุ่มตัวอย่างประกอบด้วยครูปฐมวัยหญิงจำนวน 21 คน ซึ่งคัดเลือกด้วยวิธีการเจาะจง เครื่องมือที่ใช้ในการวิจัย ได้แก่ แผนการใช้เทคโนโลยี Gemini และ Suno จำนวน 8 แผนที่พัฒนาขึ้นโดยผู้วิจัย และแบบประเมินทักษะทางดนตรี รวมถึงแบบประเมินความคิดสร้างสรรค์ ข้อมูลที่ได้จากการวิจัยวิเคราะห์ด้วยโปรแกรม SPSS เพื่อหาค่าเฉลี่ย ส่วนเบี่ยงเบนมาตรฐาน และการทดสอบค่าทีเพื่อเปรียบเทียบผลก่อนและหลังการเข้าร่วมโครงการ

ผลการวิจัยชี้ให้เห็นว่า การนำเทคโนโลยี Gemini และ Suno มาประยุกต์ใช้ในการพัฒนาศักยภาพของครูปฐมวัยสามารถส่งเสริมการสร้างสรรค์สื่อการเรียนรู้ทางดนตรีที่หลากหลายและมีประสิทธิภาพสำหรับเด็กปฐมวัย โดยพบว่า 1) ครูปฐมวัยมีความเข้าใจในการสร้างสรรค์สื่อการเรียนรู้ทางดนตรีเพิ่มขึ้นอย่างมีนัยสำคัญทางสถิติที่ระดับ .05 และ 2) ครูปฐมวัยสามารถสร้างสื่อการเรียนรู้ที่มีความหลากหลายและน่าสนใจมากยิ่งขึ้น ซึ่งส่งผลให้เด็กปฐมวัยมีประสบการณ์การเรียนรู้ที่สนุกสนานและพัฒนาทักษะต่าง ๆ อย่างรอบด้าน นอกจากนี้ ผลการวิจัยยังสนับสนุนการนำเทคโนโลยี Gemini และ Suno มาประยุกต์ใช้ในกิจกรรมการเรียนรู้ที่ช่วยเสริมสร้างความคิดสร้างสรรค์และทักษะทางดนตรีของเด็กปฐมวัย

คำสำคัญ: การจัดประสบการณ์การเรียนรู้; การสร้างสรรค์เพลง; เด็กปฐมวัย; เทคโนโลยีการสร้างสรรค์เพลง; ปัญญาประดิษฐ์

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Leveraging Gemini and Suno Technologies to Enhance Music Creation for Early Childhood Educators

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Abstract

This study aims to 1) investigate the outcomes of using Gemini and Suno technologies in music creation for preschool teachers, and 2) propose guidelines and models for utilizing Gemini and Suno to develop effective and creative music-based learning resources for young children. The participants consisted of 21 female preschool teachers selected through purposive sampling. The research tools included eight music creation plans designed by the researcher using Gemini and Suno technologies, along with assessment instruments such as a music skill evaluation form and a creative performance evaluation form. The collected data were analyzed using SPSS to calculate mean, standard deviation, and paired t-tests for comparing pre- and post-intervention results.

The findings revealed that the integration of Gemini and Suno technologies in enhancing the capabilities of preschool teachers significantly improved the effectiveness of music-based learning experiences for young children. Specifically, 1) preschool teachers demonstrated a statistically significant improvement in their understanding of creating music-based learning resources ($p < .05$), and 2) teachers enhanced their ability to produce diverse and engaging music materials, contributing to more effective and enjoyable learning experiences for preschool children. Additionally, the study supports the application of Gemini and Suno technologies in designing activities that foster both musical skills and creativity in early childhood education.

Keywords: Music creation, music creation technology, learning experience design, preschool children, artificial intelligence

1. บทนำ

ดนตรีได้รับการยอมรับว่าเป็นส่วนสำคัญของการศึกษามาตั้งแต่ยุคกรีกโบราณ โดยนักปรัชญาชื่อดัง เช่น อริสโตเติล พีธากอรัส และเพลโต ได้เน้นย้ำบทบาทของดนตรีในกระบวนการพัฒนามนุษย์ ในปัจจุบัน นักวิชาการด้านการศึกษา ผู้กำหนด นโยบาย และผู้เชี่ยวชาญด้านการออกแบบหลักสูตรทั่วโลกต่างเห็นพ้องว่า การศึกษาด้านดนตรีควรเป็นส่วนหนึ่งของการ พัฒนาเด็กปฐมวัย เนื่องจากดนตรีมีบทบาทสำคัญในการเสริมสร้างพัฒนาการด้านต่าง ๆ เช่น สติปัญญา อารมณ์ สังคม และ ร่างกาย โดยเฉพาะอย่างยิ่ง ดนตรีช่วยพัฒนาทักษะการรับรู้ การประสานงานระหว่างประสาทสัมผัส และการเคลื่อนไหว ซึ่ง เป็นรากฐานสำคัญของการเรียนรู้ ดังที่ Bautista (2022) ได้ชี้ให้เห็นว่าการมีส่วนร่วมในกิจกรรมทางดนตรีสามารถส่งเสริม พัฒนาการที่รอบด้านของเด็กปฐมวัย เช่น แรงจูงใจ ความนับถือตนเอง การแก้ปัญหา และความเข้าใจในความหลากหลายทาง วัฒนธรรม

นอกจากนี้ Welch (1979) ยังเสนอว่า การใช้บทเพลงที่เหมาะสมกับวัยในกิจกรรมสำหรับเด็กปฐมวัยสามารถพัฒนา ทักษะดนตรีพื้นฐาน เช่น จังหวะ ทำนอง และความสูงต่ำของเสียง ซึ่งสอดคล้องกับพัฒนาการทางธรรมชาติของเด็กในช่วงวัยนี้ เช่น การฟัง การพูด และการเคลื่อนไหว เนื่องจากช่วงเสียงของเด็กปฐมวัยยังอยู่ระหว่างการพัฒนา เด็กวัยนี้จึงมักมีช่วงเสียงที่ จำกัด โดยทั่วไปอยู่ระหว่างโน้ตโด (C) ถึงลา (A) การมีส่วนร่วมในกิจกรรมดนตรีอย่างสม่ำเสมอ เช่น การร้องเพลง การเล่น เครื่องดนตรี และการเต้นรำ ไม่เพียงแต่ช่วยพัฒนาทักษะทางดนตรี แต่ยังส่งเสริมการเรียนรู้ด้านคณิตศาสตร์ วิทยาศาสตร์ อารมณ์ และสังคม โดยดนตรีช่วยให้เด็กแสดงออกทางอารมณ์อย่างสร้างสรรค์และพัฒนาทักษะการทำงานร่วมกับผู้อื่น

อย่างไรก็ตาม แม้ว่าดนตรีจะมีความสำคัญต่อพัฒนาการของเด็กปฐมวัย ครูปฐมวัยหลายคนกลับเผชิญกับความท้า ทายในการจัดกิจกรรมทางดนตรี เนื่องจากขาดทักษะหรือเครื่องมือที่เหมาะสม เช่น การเลือกบทเพลง การกำหนดจังหวะ หรือการสร้างกิจกรรมที่หลากหลาย Savage (2024) ชี้ให้เห็นว่า การสนับสนุนครูปฐมวัยด้วยการพัฒนาทักษะทางดนตรีหรือ การนำเทคโนโลยีเข้ามาช่วย จะช่วยเพิ่มประสิทธิภาพในการสอน เทคโนโลยีปัญญาประดิษฐ์ (AI) เช่น Suno AI สามารถทำ หน้าที่เป็นผู้ช่วยครูในการสร้างสรรค์กิจกรรมดนตรีที่เหมาะสมกับความต้องการของเด็กแต่ละคน ช่วยเพิ่มความน่าสนใจและ ประสิทธิผลของการเรียนรู้

การนำ AI มาประยุกต์ใช้ในการสอนดนตรีสอดคล้องกับแนวคิดการเรียนรู้เชิงสร้างสรรค์ (Constructivism) ที่เน้น ให้ผู้เรียนมีส่วนร่วมในการสร้างความรู้ด้วยตนเอง AI ช่วยให้เด็กสำรวจและทดลองกับดนตรีได้อย่างอิสระ ส่งผลให้เกิด ความคิดสร้างสรรค์และความสุขในการเรียนรู้ดนตรีมากยิ่งขึ้น เช่น งานวิจัยของ Nanjo (2022) พบว่าการใช้ระดับเสียงเพนทา โทนิก (Do, Re, Mi, Sol, La) ซึ่งเข้าใจง่าย สามารถช่วยให้ครูและเด็กสร้างบทเพลงได้อย่างอิสระและสนุกสนาน แม้ว่าครูจะ ไม่มีความรู้ทางดนตรีในเชิงลึก สอดคล้องกับ Dalam, 2023 กล่าวว่า AI สามารถโต้ตอบเหมือนมนุษย์และสามารถเก็บ รวบรวมข้อมูลได้มากมายและเหมาะสมกับการนำไปใช้ในด้านการศึกษา ซึ่งถูกออกแบบมาเพื่อให้มีความสามารถรอบด้านและ มีความเชี่ยวชาญในหลากหลายงาน เช่น การแปลภาษา การเขียนโปรแกรม การสร้างสรรค์เนื้อหา และการตอบคำถามที่ ซับซ้อนนั้นคือ Gemini ที่พัฒนาโดย Google เพื่อเป็นตัวช่วยหนึ่งสำหรับครูในยุคปัจจุบัน

นอกจากนี้ Zhang (2024) ชี้ให้เห็นว่า AI สามารถช่วยสร้างสรรค์เพลงที่หลากหลายและตรงกับความต้องการได้ อย่างรวดเร็ว ทำให้ครูนำไปปรับใช้ในกิจกรรมดนตรีได้อย่างมีประสิทธิภาพ เช่น การสร้างทำนองเพลงที่สอดคล้องกับเนื้อหา หรือการสร้างเสียงประกอบที่น่าสนใจเพื่อดึงดูดความสนใจของเด็ก เมื่อผนวกรวมเทคโนโลยีและแนวคิดทางดนตรีที่เข้าใจง่าย เข้าด้วยกัน ครูปฐมวัยสามารถสร้างสรรค์กิจกรรมทางดนตรีที่หลากหลาย ส่งเสริมพัฒนาการด้านต่าง ๆ ของเด็กได้อย่างรอบ ด้าน

จากเหตุผลดังกล่าว การวิจัยนี้จึงมีความมุ่งหมายที่จะศึกษาการใช้เทคโนโลยี Gemini และ Suno ในการพัฒนา ความสามารถของครูปฐมวัยในการสร้างสรรค์บทเพลง อีกทั้งยังนำเสนอแนวทางและรูปแบบการใช้เทคโนโลยีดังกล่าวเพื่อจัด ประสบการณ์การเรียนรู้ที่เหมาะสมและสร้างสรรค์สำหรับเด็กปฐมวัยอย่างมีประสิทธิภาพต่อไป

2. วัตถุประสงค์การวิจัย

2.1 เพื่อศึกษาผลลัพธ์ของการใช้เทคโนโลยี Gemini และ Suno ในการพัฒนาความสามารถของครูปฐมวัยในการ สร้างสรรค์เพลงที่ส่งเสริมประสบการณ์การเรียนรู้ของเด็กปฐมวัย

2.2 เพื่อนำเสนอแนวทางและรูปแบบการใช้เทคโนโลยี Gemini และ Suno ในการสร้างสรรค์เพลงสำหรับครูปฐมวัย ที่สามารถนำไปใช้ในการจัดประสบการณ์การเรียนรู้ที่มีประสิทธิภาพและสร้างสรรค์สำหรับเด็กปฐมวัย

3. สมมติฐานการวิจัย

3.1 การใช้เทคโนโลยี Gemini และ Suno สามารถพัฒนาทักษะการสร้างสรรค์บทเพลงของครูปฐมวัยได้อย่างมี นัยสำคัญทางสถิติ เมื่อเปรียบเทียบระหว่างก่อนและหลังการเข้าร่วมอบรมการใช้เทคโนโลยี Gemini และ Suno

3.2 ครูปฐมวัยที่ผ่านการอบรมการใช้เทคโนโลยี Gemini และ Suno มีความสามารถในการสร้างบทเพลงที่ สอดคล้องกับการจัดประสบการณ์การเรียนรู้ของเด็กปฐมวัยได้ดีกว่าก่อนการอบรมอย่างมีนัยสำคัญ

4. ระเบียบวิธีวิจัย

การวิจัยนี้เป็นการศึกษาเชิงกึ่งทดลอง (Quasi-Experimental Research) โดยมีวัตถุประสงค์เพื่อศึกษาผลลัพธ์ของ การใช้เทคโนโลยี Gemini และ Suno ในการพัฒนาศักยภาพของครูปฐมวัยในการสร้างสรรค์บทเพลงที่ส่งเสริมประสบการณ์ การเรียนรู้ที่หลากหลายและมีประสิทธิภาพสำหรับเด็กปฐมวัย อีกทั้งยังมุ่งพัฒนาแนวทางและรูปแบบการประยุกต์ใช้ เทคโนโลยีดังกล่าวในบริบทของการศึกษาปฐมวัย

ประชากรและตัวอย่างการวิจัย

ประชากรเป้าหมายในการวิจัยครั้งนี้ คือ บุคลากรทางการศึกษาที่ปฏิบัติงานในระดับปฐมวัย ประกอบด้วย ครู ประจำชั้น ครูผู้ช่วย ครูดนตรีสากล และนักศึกษาฝึกสอน จำนวน 21 คน โรงเรียนอนุบาลพรพระร่วง กรุงเทพมหานคร

กลุ่มตัวอย่างในการวิจัยครั้งนี้ คัดเลือกโดยวิธีเจาะจง (Purposive Sampling) จากบุคลากรทางการศึกษาที่ ปฏิบัติงานในระดับปฐมวัย ประกอบด้วย ครูประจำชั้น จำนวน 9 คน ครูผู้ช่วย จำนวน 3 คน ครูดนตรีสากล จำนวน 2 คน และนักศึกษาฝึกสอน จำนวน 7 คน รวมทั้งสิ้นจำนวน 21 คน สังกัดโรงเรียนอนุบาลพรพระร่วง กรุงเทพมหานคร โดยมี คุณสมบัติ คือ อายุระหว่าง 22-60 ปี และปฏิบัติงานในระดับชั้นอนุบาล 1-3 ในภาคเรียนที่ 2 ปีการศึกษา 2567

เครื่องมือที่ใช้ในการวิจัย

การสร้างรูปแบบเทคโนโลยี Gemini และ Suno สำหรับครูปฐมวัย ที่ส่งเสริมประสบการณ์การเรียนรู้ของเด็ก ปฐมวัย

1. แผนการใช้เทคโนโลยี Gemini และ Suno สำหรับครูปฐมวัยส่งเสริมประสบการณ์การเรียนรู้ของเด็กปฐมวัย จำนวน 8 แผน ซึ่งออกแบบโดยใช้เทคโนโลยี Gemini และ Suno เพื่อพัฒนาศักยภาพครูในการสร้างสรรค์บทเพลงที่เหมาะสม กับพัฒนาการของเด็กปฐมวัย โดยแต่ละแผนประกอบด้วย จุดประสงค์การเรียนรู้ สาระการเรียนรู้ กิจกรรมการเรียนรู้ สื่อการ เรียนรู้ และการประเมินผล การจัดกิจกรรมในแต่ละแผนใช้เวลา 60 นาที โดยดำเนินการในช่วงเวลา 16.30-17.30 น. ต่อเนื่อง เป็นระยะเวลา 8 สัปดาห์

การประชุมวิชาการระดับชาติและนานาชาติบ้านสมเด็จเจ้าพระยา ครั้งที่ 1 (BS2C 2025)
The 1st Bansomdejchaopraya National and International Conference (BS2C 2025)

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2. แบบประเมินเชิงปฏิบัติทักษะทางดนตรีของครูปฐมวัย ใช้ประเมินความสามารถด้านจังหวะ ทำนอง และความเข้าใจพื้นฐานทางดนตรี

3. แบบประเมินเชิงปฏิบัติทักษะการสร้างสรรค์บทเพลงใช้ประเมินความสามารถของครูปฐมวัยในการใช้เทคโนโลยี Gemini และ Suno พัฒนาความสามารถของครูปฐมวัยในการสร้างสรรค์เพลงที่ส่งเสริมประสบการณ์การเรียนรู้ของเด็กปฐมวัย

4. แบบประเมินเชิงปฏิบัติทักษะความสามารถในการใช้เทคโนโลยี Gemini และ Suno ในการสร้างสรรค์เพลงสำหรับครูปฐมวัยที่สามารถนำไปใช้ในการจัดประสบการณ์การเรียนรู้ที่มีประสิทธิภาพสำหรับเด็กปฐมวัย

การตรวจสอบคุณภาพเครื่องมือวิจัย

ผู้วิจัยได้ได้ดำเนินการสร้างเครื่องมือและหาคุณภาพเครื่องมือมีขั้นตอน ดังนี้

1. ศึกษาเนื้อหาจากเอกสารและงานวิจัยที่เกี่ยวข้อง เพื่อออกแบบแผนการใช้เทคโนโลยี Gemini และ Suno

2. นำแผนการจัดการเรียนรู้เสนอผู้เชี่ยวชาญด้านการศึกษาปฐมวัยและดนตรีศึกษา จำนวน 3 ท่าน เพื่อประเมินความเหมาะสม โดยใช้ดัชนีความสอดคล้อง (Index of Item Objective Congruence: IOC)

3. ปรับปรุงแผนการเรียนรู้ตามข้อเสนอแนะของผู้เชี่ยวชาญ เพื่อเพิ่มความสมบูรณ์และความเหมาะสม

การวิเคราะห์ข้อมูล

ข้อมูลที่ได้จากการวิจัยถูกวิเคราะห์ด้วยโปรแกรม SPSS โดยใช้วิธีการดังนี้

1. คำนวณค่าเฉลี่ยและส่วนเบี่ยงเบนมาตรฐาน เพื่อสรุปผลเชิงพรรณนา

2. ใช้การทดสอบค่าที (t-test) เพื่อเปรียบเทียบผลก่อนและหลังการใช้เทคโนโลยี Gemini และ Suno

5. ผลการวิจัยและอภิปรายผล

การวิจัยในครั้งนี้ ผู้วิจัยได้ทำการรวบรวมข้อมูลเพื่อนำมาวิเคราะห์ และนำเสนอผลการวิจัยดังนี้

ผลการเปรียบเทียบคะแนนทักษะทางดนตรีของครูปฐมวัย ในด้านความสามารถด้านจังหวะ ทำนอง และความเข้าใจพื้นฐานทางดนตรี ก่อนและหลังได้รับการใช้เทคโนโลยี Gemini และ Suno ดังตารางที่ 1.

ตารางที่ 1 ผลการเปรียบเทียบคะแนนเฉลี่ย ส่วนเบี่ยงเบนมาตรฐานและ (t-test for Dependent Samples) ของทักษะทางดนตรีของครูปฐมวัย ในด้านความสามารถด้านจังหวะ ทำนอง และความเข้าใจพื้นฐานทางดนตรี ก่อนและหลังได้รับการใช้เทคโนโลยี Gemini และ Suno(n = 21)

ทักษะทางดนตรีของครูปฐมวัย	คะแนนเต็ม	$\overline{XX}$	SD	t-test
ก่อนการเข้าร่วมอบรม	12	4.95	1.28	16.56*
หลังการเข้าร่วมอบรม	12	10.38	1.53	

*p < 0.5

จากตารางที่ 1 พบว่าครูปฐมวัยที่ได้รับการใช้เทคโนโลยี Gemini และ Suno ก่อนการจัดประสบการณ์มีค่าเฉลี่ยของคะแนนทักษะทางดนตรีของครูปฐมวัย เท่ากับ 4.95 ค่าเบี่ยงเบนมาตรฐานมีค่าเท่ากับ 1.28 หลังการจัดประสบการณ์มีค่าเฉลี่ยของคะแนนทักษะทางดนตรีของครูปฐมวัย เท่ากับ 10.38 ค่าเบี่ยงเบนมาตรฐานมีค่าเท่ากับ 1.53 กล่าวได้ว่าครูปฐมวัยที่ได้รับการใช้เทคโนโลยี Gemini และ Suno มีค่าเฉลี่ยของคะแนนทักษะทางดนตรีของครูปฐมวัย สูงกว่าก่อนการเข้า

ร่วมอบรมอย่างมีนัยสำคัญทางสถิติที่ระดับ .05 และเป็นไปตามสมมติฐานที่ตั้งไว้ ครูปฐมวัยที่ได้เข้าร่วมอบรมการใช้เทคโนโลยี Gemini และ Suno นั้นสามารถพัฒนาความสามารถทักษะทางดนตรีของครูปฐมวัยได้

ผลการเปรียบเทียบคะแนนทักษะความสามารถในการสร้างสรรค์บทเพลงของครูปฐมวัยส่งเสริมประสบการณ์การเรียนรู้ของเด็กปฐมวัย ก่อนและหลังได้รับการใช้เทคโนโลยี Gemini และ Suno ดังตารางที่ 2

ตารางที่ 2 ผลการเปรียบเทียบคะแนนเฉลี่ย ส่วนเบี่ยงเบนมาตรฐานและ (t-test for Dependent Samples) ของการพัฒนา
ทักษะการสร้างสรรค์บทเพลงของครูปฐมวัย ก่อนและหลังได้รับการใช้เทคโนโลยี Gemini และ Suno (n=21)

ทักษะการสร้างสรรค์บทเพลงของครูปฐมวัย	คะแนนเต็ม	$\overline{\overline{X}}$	SD	t-test
ก่อนการเข้าร่วมอบรม	12	5.8	1.22	17.59*
หลังการเข้าร่วมอบรม	12	10.45	1.47	

*p < 0.5

จากตารางที่ 2 ผลการวิจัยพบว่า ก่อนเข้าร่วมอบรมการใช้เทคโนโลยี Gemini และ Suno สามารถพัฒนาทักษะการสร้างสรรค์เพลงสำหรับครูปฐมวัย มีค่าเฉลี่ยของคะแนนทักษะการสร้างสรรค์บทเพลงของครูปฐมวัย เท่ากับ 5.8 ค่าเบี่ยงเบนมาตรฐานมีค่าเท่ากับ 1.22 หลังการเข้าร่วมอบรมมีค่าเฉลี่ยของคะแนนทักษะการสร้างสรรค์บทเพลงของครูปฐมวัย เท่ากับ 10.45 ค่าเบี่ยงเบนมาตรฐานมีค่าเท่ากับ 1.47 กล่าวได้ว่าครูปฐมวัยที่ได้รับการใช้เทคโนโลยี Gemini และ Suno คะแนนเฉลี่ยทักษะการสร้างสรรค์บทเพลงของครูปฐมวัยหลังการเข้าร่วมอบรมสูงกว่าก่อนการอบรม โดยมีคะแนนเฉลี่ยอย่างมีนัยสำคัญทางสถิติที่ระดับ .05 และเป็นไปตามสมมติฐานที่ตั้งไว้ ครูปฐมวัยที่ได้เข้าร่วมอบรมการใช้เทคโนโลยี Gemini และ Suno สามารถพัฒนาทักษะการสร้างสรรค์บทเพลงของครูปฐมวัยได้ สอดคล้องกับ Salmon (2016) กล่าวว่า การนำบทเพลงสร้างสรรค์และมีการใช้แบบแผนของตัวโน้ตซ้ำที่เดินอยู่ตลอดทั้งเพลง สามารถให้เด็กปฐมวัยได้ฝึกเลียนแบบ สังเกต การคิดแบบคาดคะเน และสามารถสร้างสรรค์องค์ความรู้ใหม่ ๆ ออกมาได้ โดยครูปฐมวัยสามารถนำไปประยุกต์ใช้ให้เข้ากับบริบทของผู้เรียนและสภาพแวดล้อม ซึ่งการนำเพลงที่แปลกใหม่ควรนำไปสอนวัยต้น ๆ เพราะเป็นช่วงวัยที่สามารถเรียนรู้ได้เป็นอย่างดี ซึ่งสอดคล้องกับ Rane et al. (2024) กล่าวว่า เทคโนโลยีปัญญาประดิษฐ์ Gemini นับเป็นก้าวสำคัญในการพัฒนาระบบปัญญาประดิษฐ์แบบสร้างสรรค์ (Generative AI) ที่สามารถประมวลผลข้อมูลได้หลากหลายรูปแบบ (Multimodal AI) โดยใช้ทั้งข้อมูลข้อความ ภาพ และเสียงในสร้างผลงานออกมาก ทำให้ปัญญาประดิษฐ์มีความสามารถในการสร้างผลลัพธ์ที่ซับซ้อนและหลากหลายยิ่งขึ้น การพัฒนาดังกล่าวมีศักยภาพในการนำไปประยุกต์ใช้ในหลากหลายสาขา เช่น การค้นหาข้อมูลและการสร้างสรรค์บทเพลง ผลงานทางศิลปะ รวมถึงการพัฒนาสื่อการสอนสำหรับเด็กปฐมวัย อาทิ การสร้างสรรค์บทเพลงปัญญาประดิษฐ์จึงเป็นเครื่องมือที่ทรงประสิทธิภาพในการ สร้างสรรค์ผลลัพธ์ได้อย่างครอบคลุมและเป็นตัวช่วยที่ดีสำหรับครูปฐมวัยที่มีความสนใจในการสร้างบทเพลงสร้างสรรค์ในชั้นเรียน

ผลการเปรียบเทียบคะแนนทักษะความสามารถในในการใช้เทคโนโลยี Gemini และ Suno ในการสร้างสรรค์เพลงสำหรับครูปฐมวัยที่สามารถนำไปใช้ในการจัดประสบการณ์การเรียนรู้สำหรับเด็กปฐมวัยก่อนและหลังได้รับการใช้เทคโนโลยี Gemini และ Suno ดังตารางที่ 3

การประชุมวิชาการระดับชาติและนานาชาติบ้านสมเด็จเจ้าพระยา ครั้งที่ 1 (BS2C 2025)
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ตารางที่ 3 ผลการเปรียบเทียบคะแนนเฉลี่ย ส่วนเบี่ยงเบนมาตรฐานและ (t-test for Dependent Samples) ของครูปฐมวัย
ที่ผ่านการอบรมการใช้เทคโนโลยี Gemini และ Suno มีความสามารถในการสร้างบทเพลงที่สามารถนำไปใช้ในการ
จัดประสบการณ์การเรียนรู้ที่มีประสิทธิภาพสำหรับเด็กปฐมวัยได้ดีกว่าก่อนการอบรมอย่างมีนัยก่อนและหลังได้รับ
การใช้เทคโนโลยี Gemini และ Suno (n = 21)

การทดสอบ	ก่อนการเข้าร่วมอบรม		หลังการเข้าร่วมอบรม		t-test
	$\overline{XX}$	SD	$\overline{XX}$	SD	
การสร้างสรรค์เพลงสำหรับครูปฐมวัยที่สามารถนำไปใช้ในการจัดประสบการณ์การเรียนรู้สำหรับเด็กปฐมวัย	5.95	1.00	10.65	1.20	18.62*

*p < 0.5

       จากตารางที่ 3 ผลการวิจัยพบว่า ก่อนเข้าร่วมอบรมครูปฐมวัยที่ผ่านการอบรมการใช้เทคโนโลยี Gemini และ Suno
มีความสามารถในนำบทเพลงสร้างสรรค์เพื่อนำไปใช้ในการจัดประสบการณ์การเรียนรู้ที่มีประสิทธิภาพสำหรับเด็กปฐมวัย มี
ค่าเฉลี่ยของคะแนนทักษะความสามารถในนำบทเพลงสร้างสรรค์ไปใช้ในการจัดประสบการณ์การเรียนรู้ที่มีประสิทธิภาพ
สำหรับเด็กปฐมวัย เท่ากับ 5.95 ค่าเบี่ยงเบนมาตรฐานมีค่าเท่ากับ 1.00 หลังการนำบทเพลงสร้างสรรค์ไปใช้ในการจัด
ประสบการณ์การเรียนรู้ที่มีประสิทธิภาพสำหรับเด็กปฐมวัย เท่ากับ 10.65 ค่าเบี่ยงเบนมาตรฐานมีค่าเท่ากับ 1.20 กล่าวได้ว่า
เด็กปฐมวัยที่ได้รับการจัดประสบการณ์จากบทเพลงสร้างสรรค์จากครูปฐมวัยผ่านการอบรมการใช้เทคโนโลยี Gemini และ
Suno มีคะแนนเฉลี่ยทักษะความสามารถในนำบทเพลงสร้างสรรค์ไปใช้ในการจัดประสบการณ์การเรียนรู้ที่มีประสิทธิภาพ
สำหรับเด็กปฐมวัย หลังการเข้าร่วมอบรมสูงกว่าก่อนการอบรม โดยมีคะแนนเฉลี่ยอย่างมีนัยสำคัญทางสถิติที่ระดับ .05 และ
เป็นไปตามสมมติฐานที่ตั้งไว้ ครูปฐมวัยที่ผ่านการอบรมการใช้เทคโนโลยี Gemini และ Suno นั้นสามารถนำไปสร้างบทเพลง
ที่สอดคล้องกับการจัดประสบการณ์และความต้องการของเด็กปฐมวัยได้ สอดคล้องกับ Bruner (1956) กล่าวว่า พัฒนาการ
และการเรียนรู้ของเด็กเกิดจากกระบวนการภายใน อินทรีย์ (Organism) เน้นความสำคัญของสิ่งแวดล้อมและวัฒนธรรมที่
แวดล้อมเด็ก ซึ่งจะพัฒนาได้ดีเพียงใดนั้นขึ้นอยู่กับประสบการณ์และสิ่งแวดล้อมรอบตัวเด็ก และ Bruner ยังเชื่อว่า การจัด
ประสบการณ์การเรียนรู้สำหรับเด็กปฐมวัยควรออกแบบห้องเรียนและสื่อการสอนให้ตรงกับพัฒนาการ หากเด็กปฐมวัยได้รับ
บรรยากาศภายในห้องเรียนและสื่อการสอนที่ดีจะทำให้เด็กปฐมวัยมีการพัฒนาการเรียนรู้ได้อย่างธรรมชาติ ซึ่งสอดคล้องกับ
Rane. (2024) กล่าวว่าการนำเทคโนโลยี Gemini หรือ การนำปัญญาประดิษฐ์มาสนับสนุนในการศึกษาทำให้การเรียนการสอน
นั้นมีความหลากหลายยิ่งขึ้น เนื่องจากครูสามารถป้อนชุดคำสั่ง เนื้อหา หรือกิจกรรมที่สร้างตามที่ต้องการ และสามารถ
ปรับเปลี่ยนให้มีประสิทธิภาพได้ดียิ่งขึ้น การอบรมการใช้เทคโนโลยี Gemini และ Suno จึงเป็นเครื่องมือที่สำคัญของครู
ปฐมวัยที่สามารถนำไปใช้กับการสร้างสรรค์เพลงให้ตรงกับการจัดประสบการณ์การเรียนของเด็กปฐมวัยให้เหมาะสมและตรง
ตามบริบทของผู้เรียน ยกตัวอย่างการสร้างสรรค์บทเพลงสำหรับครูปฐมวัยจากการเข้าร่วมอบรมการใช้เทคโนโลยี Gemini
และ Suno ครูปฐมวัยจำเป็นต้องใช้บทเพลงในการเรียนจัดประสบการณ์การเรียนรู้เรื่อง "กลางวัน กลางคืน" โดยบทเพลงที่
ครูปฐมวัยได้ค้นหาจากเว็บไซต์ต่าง ๆ อาจไม่ตรงกับบริบทของเด็กปฐมวัยในชั้นเรียน มักพบปัญหาเรื่องการใช้คำที่ออกเสียง
ยาก หรือเนื้อหาของเพลงไกลตัวเด็กปฐมวัยมากจนเกินไป การนำเทคโนโลยี Gemini และ Suno ในสร้างสรรค์ผลงานเพลง
เพื่อให้ตรงกับเนื้อหาที่ครูปฐมวัยต้องการ จึงมีประโยชน์สำหรับครูปฐมวัยและเด็กปฐมวัยอย่างมาก เนื่องจากครูปฐมวัย
สามารถป้อนชุดคำสั่งได้อย่างครอบคลุม คำนึงถึงพัฒนาการของเด็กปฐมวัย และยังสามารถเลือกแนวเพลงให้ตรงกับยุคสมัย

การประชุมวิชาการระดับชาติและนานาชาติบ้านสมเด็จเจ้าพระยา ครั้งที่ 1 (BS2C 2025)
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ของเด็กในปัจจุบันได้อย่างสนุกสนาน ทำให้การจัดประสบการณ์การเรียนรู้ของเด็กปฐมวัยนั้นตรงตามหัวข้อการเรียนรู้และมี
ประสิทธิภาพเหมาะสมตามวัยของผู้เรียน ซึ่งสอดคล้องกับ Imran. (2014) กล่าวเพิ่มเติมว่า Gemini เหมาะสมสำหรับผู้เรียน
ในทุกช่วงวัยเพราะประโยชน์จากฟังก์ชั่นต่างๆ ของ Gemini มีฐานข้อมูลที่หลากหลายและมีประสบการณ์ทำให้การศึกษาเพื่อ
การเรียนรู้ส่วนบุคคล เป็นเครื่องมือที่สามารถช่วยในการค้นหาคำตอบสำหรับคำถามที่เกี่ยวข้องกับหัวข้อใด ๆ ในลักษณะที่
ชัดเจนและให้ข้อมูล ปรับและปรับแต่งตามความต้องการและความเข้าใจเฉพาะของแต่ละบุคคล นอกจากนั้น Gemini ยัง
สามารถปรับคำอธิบายให้เข้ากับรูปแบบการเรียนรู้ ระดับ และวิชาของผู้เรียน โดยให้การสนับสนุนแบบกำหนดเป้าหมายได้
เช่นกัน

6. ข้อเสนอแนะ

ข้อเสนอแนะในการนำผลวิจัยไปใช้

1. การใช้เทคโนโลยี Gemini และ Suno ในการพัฒนาความสามารถของครูปฐมวัยในการสร้างสรรค์เพลงเฉพาะ
ทาง ดังนั้นผู้ที่ต้องการใช้เทคโนโลยี Gemini และ Suno จะต้องมีความรู้และพื้นฐานทางดนตรีและคำศัพท์ทางดนตรี เพื่อที่จะ
นำไปใช้ในการจัดประสบการณ์กับเด็กให้ถูกวิธีและเกิดประโยชน์มากที่สุด

2. การใช้เทคโนโลยี Gemini และ Suno ในการสร้างสรรค์เพลง อาจยังไม่ตรงเป้าหมายที่ครูปฐมวัยตั้งไว้เนื่องจาก
ตัวเลือกในการปรับแต่งเพลงยังมีจำกัดทั้งในด้านเนื้อหาของเพลงหรือด้านดนตรี

ข้อเสนอแนะในการทำวิจัยครั้งต่อไป

1. การใช้เทคโนโลยี Gemini และ Suno ในการพัฒนาความสามารถของครูปฐมวัยในการสร้างสรรค์เพลงที่ส่งเสริม
ประสบการณ์การเรียนรู้ของเด็กปฐมวัย โดยนำไปทดลองกับครูในระดับชั้นที่หลากหลายโดยสร้างสรรค์บทเพลงและเนื้อหาให้
เหมาะสมกับอายุของผู้เรียนที่

2. ควรมีการศึกษาการใช้เทคโนโลยี Gemini และ Suno ที่มีผลต่อความสามารถหรือทักษะในด้านอื่น ๆ เช่น พัฒนา
ทักษะด้านความคิดสร้างสรรค์ โดยการให้ครู หรือเด็กสร้างสร้างสรรค์บทเพลงตามความคิดของตนเองโดยการใช้เทคโนโลยี
Gemini และ Suno เพื่อให้ครู หรือเด็กเกิดความภาคภูมิใจในตนเองและมีทักษะความคิดสร้างสรรค์ที่สูงขึ้น

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(162-TH-ART)

การศึกษาสภาพและแนวทางการพัฒนาการเรียนการสอนเครื่องสายสากล:
กรณีศึกษาวงเครื่องสายสากลโรงเรียนสาธิตมหาวิทยาลัยราชภัฏสงขลา

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บทคัดย่อ

การวิจัยนี้มีวัตถุประสงค์เพื่อ 1) ศึกษาสภาพการจัดการเรียนการสอนเครื่องสายสากล กรณีศึกษาวงเครื่องสายสากล ของโรงเรียนสาธิตมหาวิทยาลัยราชภัฏสงขลา 2) วิเคราะห์แนวทางการพัฒนาการเรียนการสอนเครื่องสายสากล กรณีศึกษาวง เครื่องสายสากลของโรงเรียนสาธิตมหาวิทยาลัยราชภัฏสงขลา การวิจัยเชิงคุณภาพนี้ใช้การสัมภาษณ์แบบไม่มีโครงสร้างและ การสังเกตแบบไม่มีส่วนร่วมในการเก็บรวบรวมข้อมูล โดยผลการวิจัยนำเสนอในรูปแบบการพรรณนาและการวิเคราะห์เชิง พรรณนา เพื่อให้ได้ภาพรวมและรายละเอียดที่ชัดเจนเกี่ยวกับสภาพการเรียนการสอนและแนวทางการพัฒนาที่เหมาะสม

ผลการวิจัยพบว่า สภาพการเรียนการสอนเครื่องสายสากลประกอบด้วยปัจจัยสำคัญ ได้แก่ 1) ครูผู้สอน มีบทบาทสำคัญในการพัฒนาศักยภาพของผู้เรียน 2) การสนับสนุนงบประมาณอย่างต่อเนื่องผ่านโครงการจัดหารายได้ และ 3) ความพร้อมของวัสดุ ครุภัณฑ์ และสถานที่ การเรียนการสอนใช้หลักสูตรตามแนวทางชินนิชิ ซูซูกิ โดยแบ่งกลุ่มผู้เรียน ตามระดับทักษะความสามารถ รวมทั้งยังได้จัดกิจกรรมคอนเสิร์ตประจำปีเพื่อเสริมสร้างประสบการณ์การแสดงดนตรีแก่ ผู้เรียน ผลการศึกษาชี้ให้เห็นว่าสภาพการจัดการเรียนการสอนมีความเหมาะสมในการส่งเสริมการเรียนรู้และการพัฒนาทักษะ ทางดนตรีของผู้เรียน สำหรับแนวทางการพัฒนาการเรียนการสอนสามารถแบ่งออกเป็น 3 ด้านหลัก ได้แก่ การเพิ่มจำนวน ครูผู้สอนให้รองรับกับจำนวนผู้เรียน การจัดสรรงบประมาณประจำปีอย่างต่อเนื่อง และการสนับสนุนทางทรัพยากรที่เหมาะสม ต่อการจัดการเรียนการสอน ดังนั้นแนวทางเหล่านี้จึงนับว่ามีศักยภาพต่อการนำไปปรับใช้เพื่อพัฒนาการเรียนการสอนใน สถาบันการศึกษาอื่น ๆ ที่มีบริบทคล้ายคลึงกัน และยังสามารถช่วยยกระดับคุณภาพการศึกษาด้านดนตรีให้ตอบสนองต่อ ความต้องการของผู้เรียนได้สอดคล้องกับการเปลี่ยนแปลงในยุคปัจจุบัน

คำสำคัญ การจัดการเรียนการสอน; การเรียนการสอนเครื่องสายสากล; แนวทางการพัฒนา; โรงเรียนสาธิต

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A Study of the Current State and Development Approaches for String Instrument Education: A Case Study of the String Instrument Ensemble at the Demonstration School of Songkhla Rajabhat University

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Abstract

This research aims to 1) study the current state of orchestral string instrument teaching, with a case study of the orchestral string ensemble at the Demonstration School of Songkhla Rajabhat University, and 2) analyze the development strategies for orchestral string instrument teaching, using the same case study. This qualitative research employed unstructured interviews and non-participant observation as data collection methods. The research findings were presented in a descriptive and analytical format to provide a comprehensive overview and detailed insights into the current teaching conditions and suitable development strategies.

The findings revealed that several key factors influence the teaching of orchestral string instruments: 1) the significant role of teachers in developing students' potential, 2) continuous financial support through income-generating projects, and 3) the availability of materials, equipment, and facilities. The teaching is based on the Shinichi Suzuki method, grouping students according to their skill levels. Annual concert activities are also organized to enhance students' performance experiences. The study indicated that the teaching approach is effective in fostering both learning and the development of students' musical skills. Regarding strategies for improving teaching, three main areas were identified: increasing the number of teachers to match the student population, ensuring consistent annual budget allocation, and providing appropriate resources to support the teaching process. These strategies are seen as highly applicable for enhancing music education in similar institutions. They can help improve the quality of music education, better meet students' needs, and align with contemporary educational changes

Keywords: string ensemble instruction; development strategies; demonstration school;
instructional management

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1. บทนำ

ปัจจุบันดนตรีเป็นหนึ่งในศาสตร์ที่สามารถพัฒนาทักษะและความคิดสร้างสรรค์ของผู้เรียนได้อย่างลึกซึ้ง ผ่านกระบวนการเรียนรู้ทั้งเชิงเนื้อหา ทฤษฎี และการปฏิบัติ (กระทรวงศึกษาธิการ, 2551) ได้กำหนดให้ดนตรีเป็นส่วนหนึ่ง ของกลุ่มสาระศิลปะในหลักหลักสูตรแกนกลางการศึกษาขั้นพื้นฐานโดยมุ่งเน้นการพัฒนาผู้เรียนให้เกิดความสมดุลในทุกมิติ ทั้งด้านสมอง และสุนทรียภาพ ดนตรีจึงมีส่วนช่วยในการสร้างผู้เรียนให้มีความคิดสร้างสรรค์ การมีจินตนาการทางศิลปะ และชื่นชมความงามของสุนทรียภาพ ซึ่งเป็นคุณสมบัติและมีคุณค่าที่มีผลต่อคุณภาพชีวิตของผู้เรียน ดนตรียังมีคุณค่า ในหลากหลายมิติที่ส่งเสริมพัฒนาการของผู้เรียน ดังที่ณรุทธ์ สุทธจิตต์ (2539) ได้กล่าวไว้ ดังนี้

1. พัฒนาความคิดสร้างสรรค์ ดนตรีช่วยกระตุ้นความคิดริเริ่มสร้างสรรค์ ผ่านการสร้างจังหวะและทำนอง ตั้งแต่ระดับพื้นฐานจนถึงการประพันธ์เพลงขั้นสูง ซึ่งต้องอาศัยการคิดเชิงออกแบบและการวิเคราะห์อย่างละเอียด

2. พัฒนาด้านอารมณ์ความรู้สึก ดนตรีเป็นโสตศิลป์ที่ส่งผลโดยตรงต่ออารมณ์และความรู้สึก ช่วยให้ผู้เรียนเข้าใจ และตอบสนองต่ออารมณ์ของตนเองได้ดีขึ้น ส่งผลให้เกิดพัฒนาการทางอารมณ์ที่สมดุล

3. พัฒนาด้านภาษา เพลงที่มีเนื้อร้องสละสลวยช่วยเสริมสร้างทักษะด้านภาษา การร้องเพลงเป็นเครื่องมือสำคัญ ที่ช่วยพัฒนาทักษะการออกเสียงและการสื่อสารอย่างมีประสิทธิภาพ

4. พัฒนาด้านร่างกาย การเคลื่อนไหวตามจังหวะดนตรี เช่น การเต้นหรือการแสดงออกทางร่างกาย ช่วยเสริมสร้าง พัฒนาการด้านการเคลื่อนไหวและการประสานงานของร่างกายอย่างเป็นธรรมชาติ

5. พัฒนาด้านปัญญาเอกลักษณ์เฉพาะบุคคล ดนตรีเป็นศาสตร์ที่มีโครงสร้างลึกซึ้ง การเรียนรู้ดนตรีช่วยพัฒนา ทักษะการคิดอย่างมีเหตุผล ขณะเดียวกัน การแสดงออกทางดนตรียังช่วยให้ผู้เรียนค้นพบเอกลักษณ์เฉพาะตัวและเสริมสร้าง ความมั่นใจในตนเอง

6. พัฒนาด้านสุนทรียภาพ ดนตรีปลูกฝังความรู้สึกชื่นชมในความงามของเสียงเพลง สร้างความประทับใจที่นำไปสู่ พัฒนาการด้านสุนทรียภาพ ซึ่งส่งผลต่อคุณภาพชีวิตของผู้เรียนในระยะยาว

ปัจจุบันพบว่าสถานศึกษาต่างๆ ทั่วประเทศต่างให้ความสำคัญในการจัดกิจกรรมทางด้านดนตรีแก่ผู้เรียน หลายโรงเรียนได้จัดกิจกรรมดนตรีทั้งในรายวิชาภาคบังคับและรวมไปถึงกิจกรรมนอกหลักสูตร โรงเรียนสาธิตมหาวิทยาลัยราช ภัฏสงขลาเป็นหนึ่งในสถานศึกษาขั้นพื้นฐานที่มุ่งเน้นพัฒนาการเรียนการสอนดนตรี โดยเฉพาะในด้านเครื่องสายสากล ด้วย เหตุนี้ การศึกษาครั้งนี้ จึงมุ่งสำรวจสภาพและแนวทางการพัฒนาผู้เรียนในด้านเครื่องสายสากล เพื่อสร้างแนวทาง การจัดการเรียนการสอนดนตรีที่สามารถตอบสนองความต้องการของสถานศึกษาอื่น ๆ ที่มีบริบทคล้ายคลึงกันในอนาคต

2. วัตถุประสงค์

2.1 เพื่อศึกษาสภาพการจัดการเรียนการสอนเครื่องสายสากล กรณีศึกษาวงเครื่องสายสากลของโรงเรียนสาธิต มหาวิทยาลัยราชภัฏสงขลา

2.2 วิเคราะห์แนวทางการพัฒนาการเรียนการสอนเครื่องสายสากล กรณีศึกษาวงเครื่องสายสากลของโรงเรียนสาธิต มหาวิทยาลัยราชภัฏสงขลา

3. วิธีดำเนินการวิจัย

เพื่อให้การวิจัยดำเนินไปตามระเบียบวิธีวิจัยและสอดคล้องกับวัตถุประสงค์ของการวิจัยที่กำหนดไว้ ผู้วิจัยได้กำหนด ขั้นตอนการดำเนินงานวิจัย ดังนี้

ขั้นตอนที่ 1 ผู้ให้ข้อมูลหลัก

ผู้วิจัยเลือกผู้ให้ข้อมูลหลักประกอบด้วยครูผู้สอนเครื่องสายสากล โรงเรียนสาธิตมหาวิทยาลัยราชภัฏสงขลา จำนวน 2 คน โดยเลือกด้วยวิธีเจาะจง (Purposive sampling) เพื่อให้ได้ข้อมูลที่เกี่ยวข้องและมีความน่าเชื่อถือ นอกจากนี้ อาจรวมถึงนักเรียนในวงเครื่องสายสากลและผู้บริหารที่เกี่ยวข้อง เพื่อให้ได้มุมมองที่หลากหลาย

ขั้นตอนที่ 2 การสร้างเครื่องมือ

การสร้างเครื่องมือ ผู้วิจัยศึกษาแนวคิด ทฤษฎี และงานวิจัยที่เกี่ยวข้อง เพื่อให้ทราบข้อมูลเกี่ยวกับสภาพการเรียนการสอนดนตรีและแนวทางการพัฒนาการเรียนการสอนดนตรี แล้วนำมาสร้างแบบสัมภาษณ์กึ่งโครงสร้าง (Semi-Structured Interview) หลังจากนั้นนำเครื่องมือดังกล่าวไปตรวจสอบความเที่ยงตรง (Validity) ด้วยผู้เชี่ยวชาญทางด้านดนตรี ก่อนนำไปใช้เป็นเครื่องมือในการเก็บรวบรวมข้อมูลต่อไป

ขั้นตอนที่ 3 การเก็บรวบรวมข้อมูล

ผู้วิจัยเข้าถึงผู้ให้ข้อมูลด้วยการสร้างความคุ้นเคยและสร้างสัมพันธ์ที่ดีต่อกัน เพื่อให้เกิดความไว้วางใจและอธิบายให้เห็นถึงประโยชน์ของการมีส่วนร่วมในการวิจัยในครั้งนี้ ซึ่งผู้วิจัยเก็บรวบรวมข้อมูลภาคสนามและใช้ตัวเองเป็นเครื่องมือในการเก็บข้อมูล โดยอธิบายวัตถุประสงค์และประเด็นคำถามให้กับผู้ถูกสัมภาษณ์เพื่อให้เกิดความเข้าใจในประเด็นคำถามมากขึ้น จากนั้นผู้วิจัยได้ทำการสัมภาษณ์ ร่วมกับการสังเกตแบบไม่มีส่วนร่วมในกิจกรรมต่าง ๆ ก่อนนำมาทำการวิเคราะห์ข้อมูลต่อไป

ขั้นตอนที่ 4 การวิเคราะห์ข้อมูล

ผู้วิจัยวิเคราะห์ข้อมูลด้วยวิธีการวิเคราะห์เนื้อหา (Content analysis) โดยจัดแยกเป็นหมวดหมู่ตามประเด็นต่าง ๆ ที่เกี่ยวข้อง เช่น สภาพการเรียนการสอน และแนวทางการพัฒนา ข้อมูลที่ได้จากการสัมภาษณ์ การสังเกต และการวิเคราะห์เอกสาร จะถูกเปรียบเทียบและเชื่อมโยงกันเพื่อให้ได้ข้อสรุปที่ชัดเจน แล้วจึงนำมาเขียนรายงานการวิจัยในลักษณะการพรรณนาและพรรณนาวิเคราะห์ตามวัตถุประสงค์ของการวิจัย

ขั้นตอนที่ 5 การตรวจสอบความน่าเชื่อถือ (trustworthiness)

ผู้วิจัยได้ออกแบบกระบวนการตรวจสอบความน่าเชื่อถือของข้อมูล ด้วยการใช้วิธีการตรวจสอบสามเส้า (Triangulation) โดยเปรียบเทียบข้อมูลจากแหล่งข้อมูลที่หลากหลาย รวมทั้งยังได้มีการส่งผลการวิเคราะห์กลับไปยังผู้ให้ข้อมูล (Member checking) เพื่อให้ตรวจสอบความถูกต้องของข้อมูล

4. ผลการวิจัย

จากการศึกษาในครั้งนี้ สามารถสรุปผลการวิจัย ดังต่อไปนี้

4.1 สภาพการจัดการเรียนการสอนเครื่องสายสากล

4.1.1 บุคลากรผู้สอน

โรงเรียนสาธิตมหาวิทยาลัยราชภัฏสงขลาให้ความสำคัญกับการจัดหาครูผู้สอนที่มีความรู้ความสามารถเฉพาะทางด้านเครื่องสายสากล โดยมีการจ้างครูประจำจำนวน 1 อัตรา ซึ่งรับหน้าที่ควบคู่ไปกับการสอนรายวิชาดนตรีตามหลักสูตรแกนกลางการศึกษาขั้นพื้นฐาน อย่างไรก็ตาม ด้วยภาระงานของครูประจำที่มีค่อนข้างมาก ทางโรงเรียนจึงจ้างครูพิเศษเพิ่มเติมอีก 1 อัตรา เพื่อทำหน้าที่สอนและดูแลวงเครื่องสายสากลโดยเฉพาะ

สำหรับช่วงเวลาในการฝึกซ้อม วงเครื่องสายสากลมีการจัดตารางฝึกซ้อมทั้งในช่วงเปิดภาคเรียนและปิดภาคเรียน ดังนี้:

ช่วงเปิดภาคเรียน (จันทร์-ศุกร์)

การประชุมวิชาการระดับชาติและนานาชาติบ้านสมเด็จเจ้าพระยา ครั้งที่ 1 (BS2C 2025)
The 1ˢᵗ Bansomdejchaopraya National and International Conference (BS2C 2025)

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ช่วงเช้า: 07:30 - 08:30 น.

ช่วงเที่ยง: 12:30 - 13:00 น.

ช่วงปิดภาคเรียน (จันทร์-ศุกร์)

ช่วงเช้า: 09:00 - 12:00 น.

การฝึกซ้อมแบ่งนักเรียนออกเป็น 2 กลุ่มตามระดับความสามารถ

กลุ่มผู้เรียนระดับเริ่มต้น:

มีครูประจำกลุ่มรับผิดชอบการสอนพื้นฐาน เช่น การจับเครื่องดนตรี การจับคันชัก การพัฒนาคุณภาพเสียง ทักษะด้านจังหวะและการฟัง โดยใช้แนวทางการสอนของชินนิชิ ซูซูกิ ซึ่งเป็นที่ยอมรับทั้งในประเทศและต่างประเทศ

กลุ่มผู้เรียนระดับสูง:

มีครูผู้สอนดูแลและสอนเนื้อหาที่เข้มข้นยิ่งขึ้น เช่น การอ่านโน้ต การเล่นประสานเสียง และเทคนิคการเล่น ขั้นสูงแนวทางการสอนยังคงยึดหลักของชินนิชิ ซูซูกิ ควบคู่ไปกับการบรรเลงรวมวงและการฝึกเพลงในแนวป๊อปไทยและสากล ซึ่งครูผู้สอนเรียบเรียงโน้ตเพลงเฉพาะสำหรับการฝึกซ้อม

ครูผู้สอนได้รับการสนับสนุนจากโรงเรียนและครูวิชาอื่น ๆ ในการเอื้ออำนวยความสะดวกและเปิดโอกาส ให้นักเรียนเข้าร่วมกิจกรรมการฝึกซ้อมอย่างเต็มที่

4.1.2 การสนับสนุนงบประมาณ

โรงเรียนสาธิตมหาวิทยาลัยราชภัฏสงขลาให้การสนับสนุนงบประมาณสำหรับวงเครื่องสายสากลมาอย่าง ต่อเนื่อง โดยงบประมาณส่วนใหญ่มาจากโครงการจัดหารายได้ ซึ่งมีการเก็บค่าลงทะเบียนจากผู้เรียนจำนวน 6,000 บาทต่อปี การศึกษา งบประมาณดังกล่าวถูกนำไปใช้เพื่อสนับสนุนกิจกรรมในด้านต่าง ๆ ได้แก่ ค่าตอบแทนครูพิเศษ ค่าวัสดุอุปกรณ์ การเรียนการสอน และการจัดกิจกรรมแสดงคอนเสิร์ตประจำปี งบประมาณที่ได้รับการจัดสรรอย่างต่อเนื่องช่วยให้การจัด การเรียนการสอนมีความมั่นคงและสามารถพัฒนาผู้เรียนได้อย่างมีประสิทธิภาพ

4.1.3 ความพร้อมของวัสดุ ครุภัณฑ์ และสถานที่

โรงเรียนจัดสรรสถานที่สำหรับการฝึกซ้อมวงเครื่องสายสากลอย่างเหมาะสม โดยแบ่งพื้นที่การเรียนการสอน ออกเป็น 2 ห้องเรียนเพื่อรองรับนักเรียนในแต่ละระดับความสามารถ นอกจากนี้ ยังมีการสนับสนุนวัสดุและครุภัณฑ์ที่จำเป็น เช่น เครื่องดนตรี เครื่องขยายเสียง และอุปกรณ์ฝึกซ้อมต่าง ๆ ซึ่งช่วยให้การเรียนการสอนดำเนินไปได้อย่างราบรื่น และมีคุณภาพ

จากการศึกษาสภาพการจัดการเรียนการสอนเครื่องสายสากล ทำให้เห็นได้ว่าโรงสาธิตมหาวิทยาลัยราชภัฏ สงขลามีความพร้อมในการจัดการเรียนการสอน เนื่องมีบุคลากรผู้สอนที่มีความรู้ความสมารถเฉพาะ ประกอบกับการสนับสนุน ทางด้านงบประมาณที่ส่งผลให้กิจกรรมสามารถดำเนินไปได้อย่างมีประสิทธิภาพ ตลอดจนความพร้อมของวัสดุ ครุภัณฑ์ และสถานที่ซึ่งเป็นอีกปัจจัยพื้นฐานที่มีความจำเป็นอย่างยิ่งต่อการจัดการเรียนสอนทางด้านตรีดนตรี

4.2 แนวทางการพัฒนาการเรียนการสอนเครื่องสายสากล

4.2.1 การเพิ่มจำนวนครูผู้สอน

จากการวิเคราะห์ข้อมูล พบว่าการเพิ่มจำนวนครูผู้สอนที่มีความรู้เฉพาะทางเป็นปัจจัยสำคัญ เนื่องจาก วงเครื่องสายสากลมีนักเรียนจำนวนมากถึง 60 คน และระดับความสามารถที่แตกต่างกัน การมีครูผู้สอนที่เพียงพอจะช่วยให้ การจัดการเรียนการสอนมีประสิทธิภาพและสามารถพัฒนาศักยภาพของนักเรียนในทุกระดับได้อย่างเหมาะสม อีกทั้งยังส่งผล ต่อประสิทธิภาพของจัดกิจกรรมทางด้านดนตรีทั้งที่เกิดขึ้นภายในโรงเรียน หรือนอกโรงเรียน ด้วยจำนวนครูผู้สอนที่เพียงพอ

จึงทำให้เกิดความคล่องตัวในการบริหารจัดการและลดปัญหาต่าง ๆ ทั่วไป ซึ่งมักพบเจอได้บ่อยระหว่างการเรียนการสอน หรือการจัดกิจกรรมดนตรี เช่น ปัญหาการปรับจูนเสียงของผู้เรียน ปัญหาคิวการแสดงสด ปัญหาระบบเครื่องเสียงระหว่าง แสง และการประสานงานต่างๆ เป็นต้น การเล็งเห็นความสำคัญของจำนวนครูผู้สอนที่สอดรับกับจำนวนภาระงานที่เกิดขึ้น จริง จึงนับว่าแนวทางดังกล่าวสามารถช่วยเพิ่มประสิทธิภาพของการทำงานที่เกี่ยวกับการเรียนการสอนเครื่องสายสากล ได้อย่างน่าสนใจทีเดียว

       4.2.2 การจัดสรรงบประมาณอย่างต่อเนื่อง

       การสนับสนุนงบประมาณประจำปีเป็นปัจจัยสำคัญที่ช่วยให้กิจกรรมของวงเครื่องสายสากลสามารถ ดำเนินการได้อย่างต่อเนื่อง งบประมาณจากโครงการจัดหารายได้ช่วยสนับสนุนการจ้างครูผู้สอนเพิ่มเติม การจัดหาอุปกรณ์ การเรียนการสอน และการจัดแสดงผลงานในคอนเสิร์ตประจำปี สะท้อนให้เห็นถึงการส่งเสริมการเรียนการสอนเครื่องสาย อย่างจริงจัง ซึ่งงบประมาณส่วนนี้เกิดจากค่าลงทะเบียนเรียน ซึ่งถูกนำกลับมาใช้เพื่อพัฒนาศักยภาพทางด้านดนตรีของผู้เรียน ผ่านการใช้งบประมาณเพื่อสนับสนุนด้านต่าง ๆ ที่เกี่ยวข้องต่อการพัฒนาการเรียนการสอนอย่างเกิดประโยชน์สูงสุด ทั้งต่อผู้เรียนและโรงเรียนในฐานะสถานศึกษาที่มีหน้าที่สนับสนุนการเรียนรู้ของผู้เรียนในมิติต่าง ๆ

       4.2.3 การสนับสนุนทรัพยากรและสถานที่

       การจัดสรรทรัพยากรที่เหมาะสม เช่น อาคารสถานที่ ที่เป็นสัดส่วน อุปกรณ์การเรียนการสอน และบรรยากาศที่เอื้อต่อการเรียนรู้ เป็นอีกปัจจัยสำคัญที่ส่งเสริมให้การเรียนการสอนวงเครื่องสายสากลมีความต่อเนื่อง และประสิทธิภาพ นับเป็นเครื่องแสดงถึงศักยภาพและการให้ความสำคัญของทางโรงเรียนต่อการบริหารจัดการทรัพยากร ให้เกิดประโยชน์สูงสุดต่อผู้เรียนทางด้านเครื่องสายสากล

       การวิเคราะห์แนวการจัดการเรียนการสอน ทำให้พบว่าโรงสาธิตมหาวิทยาลัยราชภัฏสงขลามีรูปแบบ แนวทางในการพัฒนาการจัดการเรียนการสอนเครื่องสายสากลที่มีความน่าสนใจ ประกอบด้วย 3 ประเด็นสำคัญ ไม่ว่าจะเป็น การเพิ่มบุคลากรผู้สอนเพื่อให้สอดรับกับจำนวนผู้เรียน ด้วยการสนับสนุนทางด้านงบประมาณที่เกิดจากโครงการจัดหารายได้ เพื่อสนับสนุนอย่างต่อเนื่อง รวมทั้งการจัดเตรียมความพร้อมทางด้านวัสดุ ครุภัณฑ์ และสถานที่ที่เพียงพอต่อการเรียนการการ สอน

5. อภิปรายผล

       ผลการวิจัยนี้สอดคล้องกับวัตถุประสงค์ที่มุ่งศึกษาสภาพการจัดการเรียนการสอนเครื่องสายสากลและแนวทาง การพัฒนาของวงเครื่องสายสากล โรงเรียนสาธิตมหาวิทยาลัยราชภัฏสงขลา โดยผลการวิจัยแสดงให้เห็นปัจจัยสำคัญที่ส่งผล ต่อคุณภาพการจัดการเรียนการสอน ได้แก่ ความพร้อมด้านบุคลากร งบประมาณ และทรัพยากร ซึ่งมีบทบาทสำคัญ ในการพัฒนาผู้เรียน นอกจากนี้ แนวทางการพัฒนาที่เน้นการเพิ่มจำนวนครูผู้สอน การจัดสรรงบประมาณอย่างต่อเนื่อง และการสนับสนุนทรัพยากร ยังเป็นกรอบแนวคิดที่สามารถนำไปประยุกต์ใช้ในบริบทของสถานศึกษาอื่น ๆ ที่มีลักษณะ ใกล้เคียงกันได้

       ผู้วิจัยเห็นว่า ผลการวิจัยสะท้อนให้เห็นถึงความสำคัญของการบูรณาการปัจจัยต่าง ๆ อย่างเป็นระบบ โดยเฉพาะ ในด้านการจัดการบุคลากร การสนับสนุนงบประมาณ และการจัดหาอุปกรณ์ที่เอื้อต่อการเรียนการสอน ความสำเร็จ ของวงเครื่องสายสากล โรงเรียนสาธิตมหาวิทยาลัยราชภัฏสงขลา แสดงให้เห็นว่าความร่วมมือระหว่างครูผู้สอน ผู้บริหาร และการสนับสนุนจากแหล่งทรัพยากรในโรงเรียน เป็นรากฐานสำคัญที่นำไปสู่การพัฒนาศักยภาพของผู้เรียน ได้อย่างมีประสิทธิภาพ

5.1 สภาพการจัดการเรียนการสอนเครื่องสายสากล

       5.1.1 บุคลากรผู้สอน

การประชุมวิชาการระดับชาติและนานาชาติบ้านสมเด็จเจ้าพระยา ครั้งที่ 1 (BS2C 2025)
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โรงเรียนสาธิตมหาวิทยาลัยราชภัฏสงขลาให้ความสำคัญกับการจัดหาบุคลากรผู้สอนที่มีความเชี่ยวชาญเฉพาะทางด้านเครื่องสายสากล โดยแบ่งหน้าที่ครูออกเป็น 2 ส่วน ได้แก่ ครูประจำที่รับผิดชอบการสอนรายวิชาดนตรีตามหลักสูตรแกนกลาง ควบคู่กับการดูแลวงเครื่องสายสากล และครูพิเศษที่จ้างเพิ่มเติมเพื่อมุ่งเน้นการฝึกซ้อมวงโดยเฉพาะ การจัดการนี้ช่วยแบ่งเบาภาระงานของครูประจำ และเพิ่มความยืดหยุ่นในการจัดการเรียนการสอน โดยเฉพาะการดูแลนักเรียนที่มีความสามารถหลากหลาย

การแบ่งกลุ่มนักเรียนตามระดับความสามารถเป็นกลุ่มผู้เรียนระดับเริ่มต้นที่มุ่งเน้นการสร้างพื้นฐาน เช่น การจับคันชัก การสร้างคุณภาพเสียง และการพัฒนาจังหวะ และกลุ่มผู้เรียนระดับสูงที่เน้นการฝึกเทคนิคขั้นสูง การเล่นประสานเสียง และการบรรเลงเพลงที่ซับซ้อนมากขึ้น แนวทางการสอนยึดหลักของชินนิชิ ซูซูกิ ที่เน้นการฝึกซ้อมอย่างต่อเนื่อง การบรรเลงรวมวง และการแสดงผลงาน

การสอนในลักษณะนี้สอดคล้องกับแนวคิดของ ประพันธ์ศักดิ์ พุ่มอินทร์ (2555) ที่กล่าวถึงบทบาทของครูผู้สอนในแนวทางซูซูกิ ซึ่งควรมีความสามารถรอบด้าน ทั้งในด้านการถ่ายทอดความรู้ การฝึกฝนผู้เรียนอย่างต่อเนื่อง และการจัดกิจกรรมที่ส่งเสริมการแสดงออกทางดนตรี ซึ่งช่วยพัฒนาทักษะของผู้เรียนได้อย่างมีประสิทธิภาพ นอกจากนี้การสอนที่เน้นให้ผู้เรียนมีโอกาสแสดงออกอย่างต่อเนื่อง ยังมีส่วนช่วยเพิ่มแรงจูงใจและเสริมสร้างความมั่นใจในตนเองให้แก่ผู้เรียน

แนวทางดังกล่าวสอดคล้องกับมุมมองของผู้วิจัย ที่เห็นว่าการจัดสรรครูผู้สอนที่เหมาะสมและการปรับเนื้อหาการสอนให้สอดคล้องกับระดับความสามารถของผู้เรียน เช่น การเรียบเรียงเพลงป็อปทั้งไทยและสากลสำหรับการฝึกซ้อมเป็นปัจจัยสำคัญที่ช่วยเพิ่มความน่าสนใจในกิจกรรมการเรียนการสอน และส่งเสริมให้ผู้เรียนมีความกระตือรือร้นและมีส่วนร่วมในกิจกรรมอย่างเต็มที่

5.1.2 การสนับสนุนงบประมาณ

โรงเรียนให้การสนับสนุนงบประมาณสำหรับวงเครื่องสายสากลอย่างต่อเนื่อง โดยจัดสรรผ่านโครงการจัดหารายได้จากค่าลงทะเบียนของผู้เรียน ซึ่งกำหนดไว้ที่ 6,000 บาทต่อปี งบประมาณดังกล่าวถูกนำไปใช้สนับสนุนกิจกรรมสำคัญ เช่น การจ้างครูพิเศษ การจัดซื้อวัสดุอุปกรณ์ และการจัดแสดงคอนเสิร์ตประจำปี การสนับสนุนอย่างสม่ำเสมอนี้ช่วยสร้างความมั่นคงให้กับกิจกรรมการเรียนการสอน และส่งเสริมความยั่งยืนของวงเครื่องสายสากลในระยะยาว

แนวทางการสนับสนุนงบประมาณในลักษณะนี้สอดคล้องกับการศึกษาของ อภินันท์ พฤกษะศรี และประชุมรอดประเสริฐ (2563) ที่ชี้ให้เห็นว่าการบริหารงบประมาณที่มีประสิทธิภาพเป็นปัจจัยสำคัญที่ช่วยเพิ่มโอกาสให้ผู้เรียนได้พัฒนาทักษะดนตรี และส่งเสริมความเป็นเลิศในกิจกรรมดนตรีของสถานศึกษา การจัดสรรงบประมาณที่เหมาะสมยังช่วยสนับสนุนการจัดซื้ออุปกรณ์ที่จำเป็น รวมถึงการจัดกิจกรรมดนตรีที่เปิดโอกาสให้ผู้เรียนได้แสดงออกในรูปแบบที่หลากหลาย

ผู้วิจัยเห็นว่าการสนับสนุนงบประมาณที่เพียงพอและต่อเนื่องถือเป็นรากฐานสำคัญในการจัดการเรียนการสอนดนตรีในสถานศึกษา การจัดสรรงบประมาณจากค่าลงทะเบียนนักเรียน ช่วยสนับสนุนกิจกรรม เช่น การจัดคอนเสิร์ตประจำปี ไม่เพียงแต่ช่วยเสริมสร้างความมั่นใจของผู้เรียนในการแสดงผลงาน แต่ยังช่วยสร้างแรงจูงใจให้ผู้เรียนพัฒนาทักษะดนตรีอย่างต่อเนื่อง การลงทุนในทรัพยากรที่เกี่ยวข้อง เช่น การจ้างบุคลากรเพิ่มเติมและการจัดหาอุปกรณ์คุณภาพสูงเป็นส่วนสำคัญที่ช่วยเสริมศักยภาพของผู้เรียน และสนับสนุนให้การเรียนการสอนมีความยั่งยืนและมีคุณภาพยิ่งขึ้น

5.1.3 ความพร้อมของวัสดุ ครุภัณฑ์ และสถานที่

มีการจัดสรรสถานที่สำหรับการฝึกซ้อมวงเครื่องสายสากลอย่างเหมาะสม โดยแบ่งพื้นที่การเรียนการสอนออกเป็น 2 ห้องเรียน เพื่อรองรับนักเรียนในแต่ละระดับความสามารถ พร้อมทั้งจัดหาวัสดุและครุภัณฑ์ที่จำเป็น เช่น เครื่องดนตรี เครื่องขยายเสียง และอุปกรณ์ฝึกซ้อมต่าง ๆ ซึ่งช่วยสนับสนุนให้การเรียนการสอนดำเนินไปได้อย่างราบรื่น

การประชุมวิชาการระดับชาติและนานาชาติบ้านสมเด็จเจ้าพระยา ครั้งที่ 1 (BS2C 2025)
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และมีคุณภาพสูง การสนับสนุนทรัพยากรดังกล่าวสอดคล้องกับงานวิจัยของ รัตนาพร กุงพะหลวง (2561) ที่ระบุว่าสื่อ
และอุปกรณ์มีบทบาทสำคัญต่อการเรียนรู้ โดยเฉพาะในด้านดนตรี การจัดหาอุปกรณ์เครื่องดนตรีที่มีคุณภาพเป็นปัจจัยหลัก
ที่ช่วยเพิ่มประสิทธิภาพในการฝึกปฏิบัติของผู้เรียน นอกจากนี้ยังสอดคล้องกับงานวิจัยของ ธัญญ์รภัสร์ ดิตถ์ดำรงสกุล
และคณะ (2564) ที่ชี้ให้เห็นถึงความสำคัญของการจัดหาอุปกรณ์และสถานที่ที่เหมาะสมต่อการเรียนการสอนดนตรี เช่น
การใช้สื่อการเรียนที่ครบครัน การจัดหาเครื่องดนตรีที่มีคุณภาพ และการใช้เทคโนโลยีในการเรียนการสอน เช่น การเปิดวิดีโอ
หรือเสียงดนตรีตัวอย่างจากอินเทอร์เน็ต รวมถึงการใช้สื่อการสอนที่หลากหลาย เช่น เอกสารประกอบการเรียนที่จัดทำขึ้น
เฉพาะวิชา

        ผู้วิจัยเห็นว่า การจัดสรรทรัพยากรที่เพียงพอและเหมาะสม เช่น ห้องเรียนเฉพาะที่แบ่งตามระดับ
ความสามารถของผู้เรียน พร้อมอุปกรณ์คุณภาพสูง เช่น คอมพิวเตอร์ ลำโพงขยายเสียง และเครื่องดนตรีที่ตอบโจทย์
ความต้องการของผู้เรียน เป็นปัจจัยสำคัญที่ช่วยส่งเสริมบรรยากาศการเรียนรู้และกระตุ้นแรงจูงใจของผู้เรียน การสนับสนุน
ทรัพยากรที่มีคุณภาพยังเปิดโอกาสให้ผู้เรียนได้พัฒนาทักษะดนตรีในเชิงลึก และช่วยให้ผู้สอนสามารถปรับวิธีการสอน
ให้สอดคล้องกับความต้องการของผู้เรียนในแต่ละระดับได้อย่างมีประสิทธิภาพ

        ความพร้อมด้านสถานที่และวัสดุอุปกรณ์ในลักษณะนี้สะท้อนถึงความสำคัญของการจัดการทรัพยากร
อย่างเหมาะสม ซึ่งส่งผลโดยตรงต่อความราบรื่นของการเรียนการสอน รวมถึงศักยภาพในการพัฒนาทักษะดนตรีของผู้เรียน
อย่างต่อเนื่อง และเพิ่มโอกาสให้ผู้เรียนเข้าถึงการเรียนรู้ที่มีคุณภาพในระดับสูงสุด

5.2 แนวทางการพัฒนาการเรียนการสอนเครื่องสายสากล

5.2.1 การเพิ่มจำนวนครูผู้สอน

        จากการวิเคราะห์ข้อมูล พบว่าการเพิ่มจำนวนครูผู้สอนที่มีความรู้เฉพาะทางเป็นปัจจัยสำคัญ เนื่องจาก
วงเครื่องสายสากลมีนักเรียนจำนวนมากถึง 60 คน และมีระดับความสามารถที่แตกต่างกัน การมีครูผู้สอนที่เพียงพอจะช่วยให้
การจัดการเรียนการสอนมีประสิทธิภาพ และสามารถพัฒนาศักยภาพของนักเรียนในทุกระดับได้อย่างเหมาะสม

        แนวทางดังกล่าวสอดคล้องกับงานวิจัยของ ธันยาภรณ์ โพธิกาวิน (2563) ที่ระบุว่า โรงเรียนควรมีการจัดสรร
บุคลากรให้เพียงพอต่อความต้องการในสาขาวิชาดนตรีไทยและดนตรีสากล เพื่อพัฒนาผู้เรียนให้ได้รับการเรียนรู้ในระดับ
เชิงลึก และการจัดการเรียนการสอนดนตรีอย่างแท้จริง นอกจากนี้ ยังสอดคล้องกับงานวิจัยของ ธัญญ์รภัสร์ ดิตถ์ดำรงสกุล
และคณะ (2564) ซึ่งเสนอว่าครูผู้สอนมีบทบาทสำคัญในการวางโครงสร้างเนื้อหาและพัฒนาทักษะของผู้เรียน โดยการ
จัดกิจกรรมที่สร้างสรรค์และเชื่อมโยงเนื้อหาให้ทันสมัยจะช่วยส่งเสริมการเรียนรู้ของผู้เรียนอย่างมีประสิทธิภาพ

        ทั้งนี้ การจัดหาครูผู้สอนที่มีความเชี่ยวชาญเฉพาะทางในจำนวนที่เพียงพอ จะช่วยให้วงเครื่องสายสากล
สามารถรองรับความต้องการของนักเรียนในทุกระดับ และเพิ่มโอกาสในการเรียนรู้ของนักเรียนที่มีพื้นฐานแตกต่างกันได้
อย่างทั่วถึง

5.2.2 การจัดสรรงบประมาณอย่างต่อเนื่อง

        การสนับสนุนงบประมาณประจำปีเป็นปัจจัยสำคัญที่ช่วยให้กิจกรรมของวงเครื่องสายสากลสามารถ
ดำเนินการได้อย่างต่อเนื่อง งบประมาณจากโครงการจัดหารายได้ช่วยสนับสนุนการจ้างครูผู้สอนเพิ่มเติม การจัดหาอุปกรณ์
การเรียนการสอน และการจัดแสดงผลงานในคอนเสิร์ตประจำปี

        แนวทางนี้สอดคล้องกับงานวิจัยของ ธันยาภรณ์ โพธิกาวิน (2563) ที่เสนอว่าการบริหารจัดการ
ด้านงบประมาณในโรงเรียนมัธยมศึกษาควรมีการวางแผนเพื่อของบประมาณเพิ่มเติมจากแหล่งทุนทั้งภาครัฐและเอกชน
เนื่องจากงบประมาณส่วนใหญ่ถูกใช้ไปกับการบำรุงรักษาเครื่องดนตรีและการซื้ออุปกรณ์เพิ่มเติม การจัดสรรงบประมาณ
ที่เหมาะสมจึงเป็นกุญแจสำคัญที่ช่วยตอบสนองความต้องการในการเรียนการสอนดนตรีได้อย่างมีประสิทธิภาพ

การประชุมวิชาการระดับชาติและนานาชาติบ้านสมเด็จเจ้าพระยา ครั้งที่ 1 (BS2C 2025)
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การสนับสนุนงบประมาณที่เพียงพอจะช่วยเสริมสร้างความต่อเนื่องของกิจกรรมการเรียนการสอน และเปิดโอกาสให้นักเรียนได้พัฒนาทักษะผ่านกิจกรรมที่ได้รับการสนับสนุนอย่างเหมาะสม

5.2.3 การสนับสนุนทรัพยากรและสถานที่

การจัดสรรทรัพยากรที่เหมาะสม เช่น อาคารสถานที่ ที่เป็นสัดส่วน อุปกรณ์การเรียนการสอน และบรรยากาศที่เอื้อต่อการเรียนรู้ เป็นอีกปัจจัยสำคัญที่ส่งเสริมให้การเรียนการสอนวงเครื่องสายสากลมีความต่อเนื่อง และประสิทธิภาพ

แนวทางนี้สอดคล้องกับธันยาภรณ์ โพธิกาวิน (2563) จากการวิเคราะห์เพื่อเสนอแนวทางการพัฒนา โรงเรียนมัธยมศึกษาในอำเภอบางเลน จังหวัดนครปฐม ในส่วนของการบริหารจัดการด้านวัสดุครุภัณฑ์ (Material) จะเห็น ได้ว่า ผู้อำนวยการ โรงเรียนมีส่วนสำคัญเป็นอย่างมากในการขับเคลื่อนกระบวนการบริหารทั้งในด้านหลักสูตร การเรียน การสอน งบประมาณ อาคาร สถานที่ และเครื่องดนตรี ดังนั้น แนวทางในการพัฒนาจึงควรมีการวางแผนเพื่อของบประมาณ ในการก่อสร้างเพิ่มเติม หรือการบริหารจัดการเพื่อแยกอาคารสำหรับการเรียนการสอนดนตรีโดยเฉพาะ นอกจากนี้ ในห้องเรียนควรมีสื่อมัลติมีเดีย และอุปกรณ์คอมพิวเตอร์เพื่อเสริมความรู้ และทักษะ ทางด้านตรีในการเรียนการสอน ด้านดนตรี ในส่วนของเครื่องดนตรีไทย และเครื่องดนตรีสากล ควรมีการวางแผนงบประมาณในการซ่อมแซม และซื้อ เครื่องดนตรีเพื่อให้เพียงพอกับความต้องการของนักเรียน และเพื่อให้การเรียนการสอนดนตรีในด้านการปฏิบัติ นักเรียน ได้เรียนรู้จากเครื่องดนตรีจริง เกิดการเรียนรู้ในด้าน ดนตรีอย่างแท้จริง

การสนับสนุนทรัพยากรและสถานที่ให้มีความพร้อมต่อการจัดการเรียนการสอน ย่อมเป็นปัจจัยพื้นฐาน สำคัญที่เอื้ออำนวยต่อการจัดกิจกรรมทางดนตรีซึ่งมีลักษณะเฉพาะตัว รวมไปถึงการจัดสรรคุณภาพของเครื่องดนตรี อุปกรณ์ ต่างๆ ที่ส่งเสริมการเรียนรู้ย่อมช่วยสร้างบรรยากาศและแรงจูงใจที่ดีให้แก่ผู้เรียน

6. ข้อเสนอแนะในการทำวิจัยครั้งต่อไป

6.1 การวิจัยนี้มุ่งศึกษาสภาพการจัดการเรียนการสอนเครื่องสายสากลและแนวทางการพัฒนาของวงเครื่องสาย สากล โรงเรียนสาธิตมหาวิทยาลัยราชภัฏสงขลาเพียงแห่งเดียว ในอนาคตควรขยายการศึกษาเพิ่มเติมเพื่อเก็บข้อมูลความ คิดเห็นของผู้เรียนเกี่ยวกับการจัดการเรียนการสอนเครื่องสายสากล เพื่อให้ได้มุมมองที่ครอบคลุมและสามารถนำไปพัฒนาการ เรียนการสอนได้อย่างตรงจุดมากยิ่งขึ้น

6.2 ควรมีการศึกษาวิจัยเชิงเปรียบเทียบการจัดการเรียนการสอนเครื่องสายสากลในบริบทของสถานศึกษาอื่น ๆ เช่น โรงเรียนที่มีลักษณะและทรัพยากรแตกต่างกัน เพื่อวิเคราะห์จุดแข็งและจุดอ่อนในแต่ละบริบท และนำข้อมูลที่ได้มา พัฒนาเป็นแนวทางการจัดการเรียนการสอนและการออกแบบหลักสูตรที่เหมาะสม ซึ่งสามารถเผยแพร่และปรับใช้ได้ในวง กว้าง

6.3 ควรมีการศึกษาวิจัยเกี่ยวกับการรับรู้และความต้องการของผู้เรียนในสถานศึกษาที่จัดการเรียนการสอน เครื่องสายสากล เพื่อเข้าใจความคาดหวังและโอกาสทางการศึกษาของผู้เรียนในด้านนี้ โดยข้อมูลดังกล่าวสามารถนำไปใช้เป็น แนวทางในการปรับปรุงรูปแบบการจัดการเรียนการสอนให้ตอบสนองต่อความต้องการของผู้เรียนและส่งเสริมการพัฒนา วงการดนตรีเครื่องสายสากลในประเทศไทยต่อไป

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