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Objective

As mentioned above the aim of this journal is to provide a platform and a means for disseminating and exchanging of knowledge and experience pertaining to academic advancement and research findings which may be beneficial for academy and society as a whole.
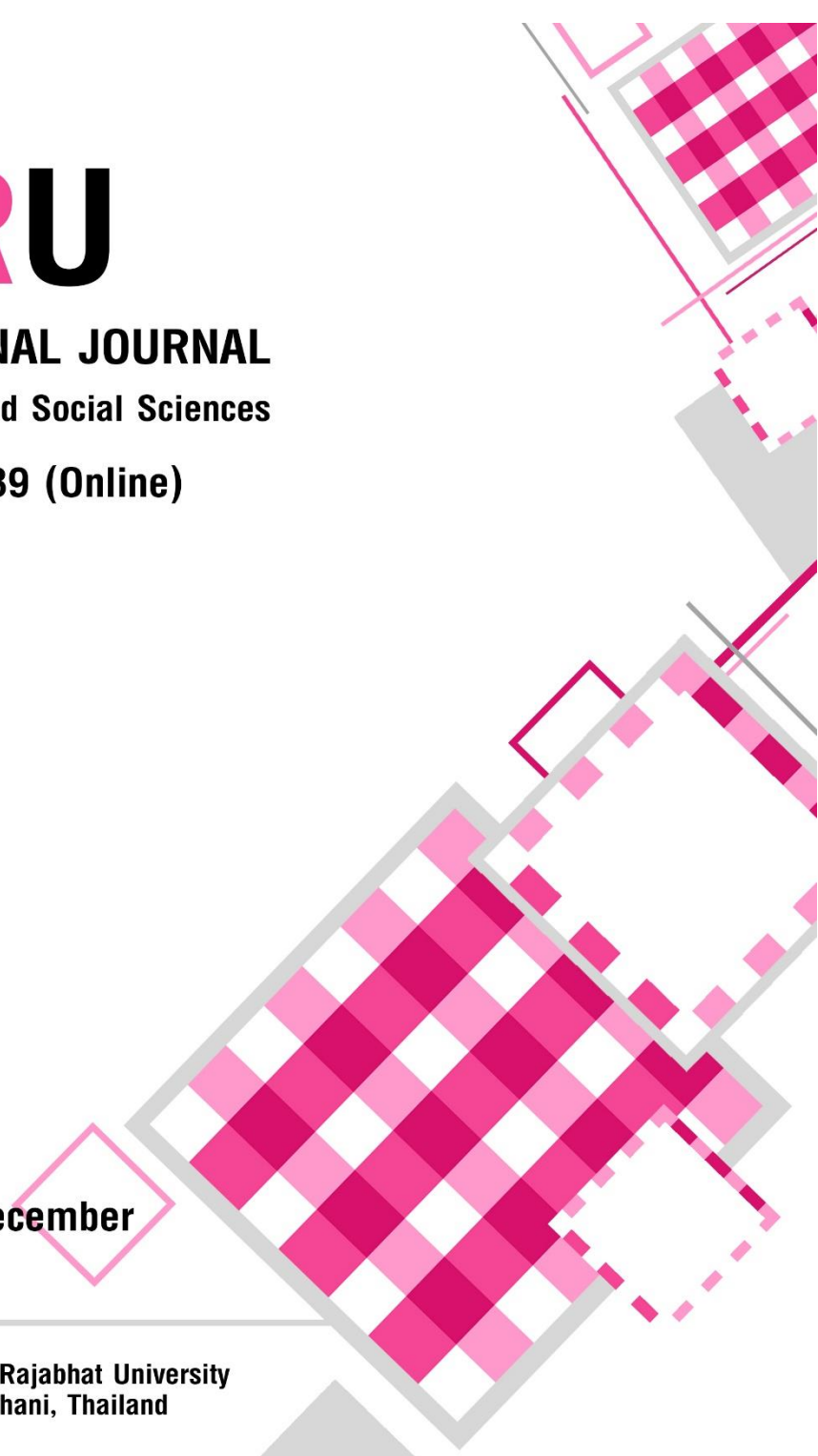
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EDITORIAL

Dear Esteemed Readers and Contributors,

On behalf of the Editorial Board, it is my privilege to extend our formal greetings as we enter the year 2025. We wish all members of the academic community continued success, good health, and scholarly advancement in the year ahead. Time progresses rapidly, and each academic year presents both challenges and opportunities for knowledge creation and dissemination.

Throughout 2023, the journal has remained steadfast in its commitment to upholding rigorous academic standards and ethical publishing practices. We have focused on the careful selection, peer review, and publication of high-quality research articles that contribute meaningfully to the advancement of knowledge across disciplines. Our objective has been to strengthen the journal's role as a credible academic platform that supports scholarly inquiry, critical analysis, and evidence-based discussion at both national and international levels.

The publication of Volume 5, Number 3 (September–December 2025) reflects our ongoing dedication to academic excellence and continuous improvement in editorial quality, review processes, and dissemination standards. In line with this commitment, we cordially invite researchers, scholars, and practitioners to submit original research articles, review papers, and academic studies for consideration in future issues of the journal.

Manuscripts and further information regarding submission guidelines are available through the ThaiJo online journal system at: https://so04.tci-thaijo.org/index.php/ubruij

We trust that the articles published in this issue will provide scholarly value, stimulate critical reflection, and support the academic and professional endeavors of our readership. The Editorial Board sincerely appreciates the continued trust, cooperation, and contributions of authors, reviewers, and readers, which remain essential to the journal's sustained development and academic standing.

Sincerely,

Assistant Professor Dr. Pimook Somchob
Editor
UBRU International Journal
December 2025

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Research on the Knowledge Sharing Process of University Teachers

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Abstract

In the knowledge economy era and the context of the "Double First-Class" initiative, universities, as core hubs for knowledge creation and dissemination, are crucial for the efficiency of knowledge flows within them. University faculty are the primary bearers of knowledge capital, and knowledge sharing among them is a key process for enhancing universities' overall innovation capabilities, teaching quality, and disciplinary development. However, knowledge sharing among university faculty is not simply a matter of information transfer; it is a complex socio-psychological and organizational behavioral process influenced by multiple factors. This paper aims to systematically explore the connotations and characteristics of knowledge sharing among university faculty, constructing an integrative analytical framework encompassing three dimensions: antecedents, processes, and outcomes. First, the paper defines the concept of knowledge sharing among university faculty and analyzes its unique characteristics, including its implicit nature, mutual benefit, and disciplinary cultural dependence. Second, it conducts an in-depth analysis of the key factors influencing faculty knowledge sharing willingness and behavior from the individual, group, organizational, and technological perspectives. Next, the knowledge sharing process is deconstructed into three core stages: knowledge externalization, knowledge transfer, and knowledge internalization. The operating mechanisms of both formal and informal sharing channels are explored. Finally, the paper demonstrates the positive effects of knowledge sharing on individual faculty professional development, the quality of student training, research team innovation, and the improvement of university organizational effectiveness. Finally, based on the above analysis, we propose management and practical recommendations for promoting effective knowledge sharing among university faculty from four perspectives: fostering a sharing culture, optimizing institutional design, building a technological platform, and promoting interdisciplinary approaches.

Keywords: University Faculty, Knowledge Sharing, Sharing Process, Influencing Factors, Incentive Mechanisms

Introduction

As human society enters a new economic era centered on knowledge and information as core production factors, competition between countries and regions is increasingly manifesting itself as a competition of innovation capabilities. As crucial hubs for knowledge production, dissemination, application, and innovation, universities' core mission is to cultivate high-quality talent and create cutting-edge knowledge. In this process, faculty are the holders and creators of universities' most valuable and core intellectual assets. Their knowledge, teaching experience, and research insights form the cornerstone of a university's core competitiveness. However, if knowledge remains limited to the individual level, its value is limited. Only when knowledge is effectively circulated, shared, collided, and integrated within an organization can it spark new ideas, achieve exponential growth in knowledge, and thus comprehensively enhance universities' teaching standards, research capabilities, and social service capabilities.

Therefore, the topic of "knowledge sharing among university faculty" has garnered widespread attention in recent years from both academics and management practitioners. Knowledge sharing refers to the process by which individuals transfer their knowledge, experience, and skills to other members of an organization through oral, written, or other means, with the ultimate goal of promoting the shared ownership and innovative application of knowledge. For university faculty, this process encompasses not only sharing their codified explicit knowledge (e.g., papers and lesson plans) in formal settings (e.g., academic conferences and teaching seminars) but also the transfer of their more difficult-to-express tacit knowledge (e.g., research intuition, teaching techniques, and project application experience) through informal interactions (e.g., lunchtime conversations and private consultations).

Despite widespread consensus on the importance of knowledge sharing, knowledge sharing among faculty members still faces numerous challenges in university management practices. For example, the traditional evaluation system, which prioritizes research over teaching, can discourage faculty from investing time in sharing their teaching experiences. The competitive environment of "academic tournaments" can foster intellectual protectionism, hindering the sharing of core research ideas and data. The significant cultural differences between disciplines (such as the paradigms of "hard science" and "soft science") also create invisible barriers to knowledge circulation. These phenomena suggest that knowledge sharing among university faculty is a complex, context-sensitive process, rather than a spontaneous, linear activity.

Based on this, this study aims to systematically examine and explore the knowledge sharing process among university faculty. This article will address the following core questions:

1. What is the connotation and uniqueness of knowledge sharing among university faculty?

2. What key factors influence university faculty's willingness and behavior to share knowledge?

3. How does the specific process of knowledge sharing among university faculty occur and evolve?

4. What positive organizational and individual outcomes can effective knowledge sharing bring?

5. How can knowledge sharing among university faculty be promoted from a management and practical perspective?

Through in-depth exploration of these questions, this study hopes to provide theoretical foundations and practical approaches for university administrators to understand and optimize internal knowledge management, stimulate faculty knowledge sharing, and enhance overall organizational effectiveness.

1. The Connotation and Uniqueness of Knowledge Sharing among University Faculty

To deeply study the knowledge sharing process among university faculty, we must first clearly define its conceptual connotations and grasp its unique characteristics that distinguish it from knowledge sharing in other organizations (such as enterprises).

Definition

Knowledge sharing, originating from knowledge management theory, is generally defined as the process of exchanging knowledge and jointly creating new knowledge between individuals, teams, or organizations through various channels. For university faculty, knowledge sharing refers to the process of transferring explicit and tacit knowledge to colleagues, research team members, or students through formal or informal channels, integrating, applying, and recreating knowledge in the process. It is not just a behavior but also a complex social interaction encompassing three dimensions: cognition, emotion, and behavior.

Specifically, the content of knowledge sharing among university faculty can be broken down into the following categories:

1. Research knowledge: This includes cutting-edge theoretical developments, research methods, experimental techniques, data analysis skills, experience in writing and publishing papers, and insights into project proposals.

2. Teaching knowledge: This includes curriculum design, lesson plan development, classroom management skills, application experience with new teaching methods (such as flipped classrooms and blended learning), and innovative student assessment methods.

3. Management and social service knowledge: This includes departmental management experience, academic committee operations, university-enterprise collaboration project integration, and the processes and strategies for social consulting services.

Key Unique Characteristics

Knowledge sharing among university faculty exhibits the following significant characteristics, which determine the complexity of the process and the unique nature of its management:

1. Highly implicit and specialized knowledge: University faculty, especially senior professors and academic leaders, often possess highly implicit "personal knowledge," such as keen academic insights, unique research thinking patterns, and refined teaching techniques. This type of knowledge is difficult to codify and convey, and its sharing relies heavily on deep interactions such as mentoring, long-term collaboration, and observation and imitation.

2. Mutual benefit and reputation-based sharing motivations: Unlike corporate employees, who may be more focused on economic gains, university faculty's sharing motivations are more complex. While they seek to gain new insights and solve their own challenges through sharing (mutual benefit), they also prioritize building a reputation within the academic community, earning respect, and recognition (reputation-based). Sharing behavior is often viewed as a means of accumulating academic and social capital.

3. Strong reliance on disciplinary culture: Burton Clark noted that the higher education system is composed of distinct "disciplinary tribes." Different disciplines (such as physics and history) exhibit significant differences in knowledge paradigms, research methods, and

communication practices, resulting in unique "disciplinary cultures." This culture profoundly impacts faculty identity and communication patterns, making cross-disciplinary knowledge sharing particularly difficult while sharing within the same field is more fluid.

4. Loosely coupled organizational structure: Universities are typically characterized by a "loosely coupled system," with departments, institutes, and teaching and research offices enjoying significant autonomy, and individual faculty members also possessing strong independence in their work (especially research). While this structure protects academic freedom, it also weakens the ability to enforce organizational integration, making top-down strategies for promoting knowledge sharing often ineffective. Bottom-up sharing based on shared interests is more effective.

5. Coexistence and complementarity of formal and informal channels: Universities have both formal sharing channels such as academic conferences, teaching training, and workshops, as well as numerous informal channels such as café conversations, online community discussions, and informal academic salons. The latter often play a decisive role in the transfer of tacit knowledge and the building of trust, serving as an indispensable complement to formal channels.

2. Key Factors Influencing Knowledge Sharing Among University Faculty

Knowledge sharing among university faculty does not occur in a vacuum; rather, it is influenced by a multi-layered and multi-dimensional system of factors. This study categorizes these factors into four levels: individual, group, organizational, and technical.

Individual-Level Factors

1. Willingness to Share Knowledge: This is the psychological foundation that determines whether sharing occurs. Willingness is influenced by the following sub-factors:

Benefit balancing: Faculty weigh the potential benefits of knowledge sharing (e.g., enhanced reputation, collaboration opportunities, and contributions to teaching and research) against the potential costs (e.g., investment of time and energy, and loss of exclusive knowledge advantages). Willingness decreases when they perceive their "knowledge power" as being diminished by sharing.

Self-efficacy: Confidence in the value of one's knowledge and the belief in one's ability to convey it clearly and effectively significantly enhance willingness to share.

Intrinsic motivation: The enduring driving force behind sharing stems from a love of knowledge itself, the satisfaction of helping others, and a sense of responsibility to adhere to the "communalist" norms of the academic community.

Trust tendency: A teacher's trust in colleagues, particularly their confidence that they will not misuse or steal their knowledge, is a crucial prerequisite for sharing tacit knowledge.

2. Knowledge sharing ability: Willingness without the ability to share knowledge will significantly reduce its effectiveness. These abilities include:

Knowledge encoding and externalization ability: The ability to transform implicit and ambiguous personal knowledge into explicit knowledge that others can understand (e.g., by writing a guide or creating a PowerPoint presentation).

Communication and expression ability: The ability to present clearly and coherently, either verbally or in writing.

Learning and absorption ability: Teachers themselves also need strong learning abilities to better understand and absorb the knowledge shared by others and foster positive interactions.

Group/Interpersonal Factors

1. Shared Vision and Goals: Within a research team or course group, if members have a high degree of consensus on the team's development direction and goals, they are more willing to share key knowledge for the sake of shared success.

2. Group Norms and Climate: A group atmosphere that encourages collaboration, tolerates failure, and fosters mutual support significantly promotes knowledge sharing. Conversely, a group atmosphere filled with competition, suspicion, and criticism inhibits sharing.

3. Social Network Structure: A teacher's position in the social network within the organization influences their knowledge acquisition and sharing. Teachers at the center of the network or those who bridge "structural holes" typically have access to richer sources of information and greater influence in sharing.

Organizational Factors

This is the level at which university administrators can exert the greatest influence and intervention.

1. Organizational Culture and Atmosphere: Whether a university fosters an organizational culture of "openness, trust, collaboration, and innovation" directly determines whether the soil for knowledge sharing is fertile. A bureaucratic and administrative culture stifles the vitality of sharing.

2. Evaluation and Incentive Systems: This is the most crucial lever. The current widespread "Five Only" evaluation model (papers, titles, professional titles, academic qualifications, and awards) leads faculty to focus on easily quantifiable and demonstrable individual achievements, while seriously neglecting the value of knowledge sharing activities such as collaboration and teaching and inheritance. Establishing a system that recognizes and rewards knowledge sharing (such as incorporating mentoring young faculty and teamwork achievements into professional title evaluation criteria) is crucial.

3. Organizational Structure and Communication Mechanisms: A flat organizational structure, matrix-style project teams, and regular interdisciplinary forums and luncheons can create more opportunities for face-to-face communication among faculty, breaking down disciplinary and departmental barriers. 4. Leadership support and demonstration: Whether department leaders and academic leaders actively participate in and advocate knowledge sharing, their actions have a strong demonstration and signaling effect.

3. The Process and Mechanism of Knowledge Sharing by University Teachers

Knowledge sharing among university teachers is a dynamic, multi-stage process. Drawing on Ikujiro Nonaka's SECI model (socialization, externalization, combination, and internalization) and applying it to university realities, the process can be broken down into the following three core stages.

Stage 1: Knowledge Externalization

This is the starting point of knowledge sharing. It involves the knowledge owner (supplier) organizing, refining, and expressing their knowledge, especially tacit knowledge, to make it understandable to others.

Tacit knowledge to tacit knowledge (socialization): This is primarily accomplished through observation, imitation, and practice. For example, young teachers can serve as teaching assistants for senior professors and subtly learn their teaching styles and classroom management techniques through close observation. This is a form of "implicit" sharing.

Tacit knowledge to explicit knowledge (externalization): This is a key step in knowledge creation and also a challenging part of sharing. Teachers need to clearly express their often difficult-to-express personal knowledge through metaphors, analogies, concepts,

models, or documentation. For example, a teacher summarizes his or her successful "project application experience" into a "checklist" or a "methodological framework", thus completing the externalization of knowledge.

Stage 2: Knowledge Transfer

After knowledge is externalized, it needs to be transmitted to the knowledge demander (recipient) through specific channels. The core of this phase is communication and interaction.

Formal Channels:

Institutionalized channels: Examples include teaching observation activities, new teacher training, academic seminars, and disciplinary development workshops. These channels are highly structured, but the depth of interaction may be limited.

Documented channels: Examples include establishing shared libraries of teaching plans, case studies, experimental procedures, and project experience summaries. This approach facilitates the accumulation and widespread dissemination of knowledge, but lacks immediate feedback.

Informal Channels:

Interpersonal networks: These are the most effective channels for transmitting tacit knowledge. Mentoring relationships, collaborative friendships, and informal exchanges within the academic community (such as academic salons, luncheons, and online group discussions) can provide a high-trust, interactive environment, ideal for the transfer of complex knowledge and sensitive information.

Communities of Practice: These are spontaneously formed groups of teachers with a shared interest in a specific field (such as "blended learning" or "AI educational applications"). Through ongoing interaction, they share insights, solve problems, and jointly advance knowledge in that field.

Stage 3: Knowledge Internalization and Application

The completion of knowledge transfer does not equate to successful sharing. The sharing process is considered closed only when the recipient understands, absorbs, and applies the knowledge, transforming it into part of their own knowledge system and potentially creating new knowledge.

Internalization: Through reading, listening, practice, and application, the recipient transforms the acquired explicit knowledge into their own implicit knowledge and practical application skills. For example, a teacher who learns the theory of the PBL teaching method practices it in their own classroom and gradually grasps its essence through practice.

Application and Innovation: The recipient integrates the internalized new knowledge with their existing knowledge and applies it to new teaching scenarios or research problems, potentially sparking new research ideas or teaching methods, thereby achieving knowledge value-added and innovation.

The entire process is not a one-way linear process, but rather a spiral cycle. After applying the new knowledge, the recipient may become a new knowledge supplier, initiating a new round of sharing.

4. Positive Outcomes of Knowledge Sharing by University Faculty

Effective knowledge sharing can bring significant positive benefits to multiple stakeholders, including universities, faculty, and students.

Value to Individual Faculty

1. Promoting Professional Development and Lifelong Learning: The sharing process itself is a process of deep learning and reflection, helping faculty to organize and consolidate their own knowledge systems. Furthermore, acquiring new knowledge from others is an

important way for faculty to stay current in their academic endeavors and update their teaching philosophies.

2. Improving Research Output and Innovation: The interdisciplinary exchange of knowledge is a major source of innovation. Through sharing, faculty can gain new research perspectives, methods, and techniques, helping them overcome challenging research challenges and produce high-quality interdisciplinary research results.

3. Enhancing Professional Identity and Well-being: Through sharing and mutual assistance, faculty can experience a sense of belonging and support within the academic community, gain recognition and respect from their peers, and thus enhance their job satisfaction and professional well-being.

Value to Student Development

1. Improving Teaching Quality: The rapid dissemination of excellent teaching experiences and methods directly benefits a broad range of students, leading to an improvement in overall teaching standards. Teachers can also promptly incorporate new knowledge and methods gained through sharing into classroom instruction.

2. Enhancing the Learning Experience: Close collaboration among teachers facilitates the design of more coherent and systematic curriculum systems. Furthermore, teachers' own collaborative spirit sets an example for students, subtly cultivating their teamwork skills.

Value to Research Teams and Discipline Development

1. Strengthening Team Cohesion and Effectiveness: Smooth knowledge sharing is a core characteristic of effective research teams. It accelerates the flow of knowledge within the team, avoids duplication of effort, and creates a synergistic effect where "1+1>2."

2. Promoting Interdisciplinary Integration: Knowledge sharing that breaks down disciplinary barriers is key to fostering new disciplinary growth and solving complex social problems. It helps universities develop distinctive interdisciplinary strengths.

Value to the University Organization as a Whole

1. Improving organizational learning and adaptability: An organization that excels at internal knowledge sharing can more quickly absorb new external knowledge, more effectively respond to environmental changes, and achieve continuous organizational evolution.

2. Preserving organizational memory and preventing knowledge loss: Especially when senior faculty retire or leave, effective knowledge sharing mechanisms can preserve their valuable experience and knowledge within the organization, avoiding the emergence of "knowledge gaps."

3. Building sustainable core competitiveness: A university's core competitiveness ultimately stems from its intellectual capital and its ability to leverage it. Effective knowledge sharing is the fundamental path to transforming individual knowledge into organizational capital, thereby building a sustainable competitive advantage that is difficult to imitate.

Conclusion

Knowledge sharing among university faculty is a complex, multi-layered, multi-stage process influenced by multiple factors. It is not simply a simple exchange of behaviors between individual faculty members, but rather an organizational capability deeply embedded in the specific organizational culture, institutional environment, and technological foundations of universities. This article systematically reveals the inherent logic of knowledge sharing among university faculty by constructing an integrated "antecedent-process-outcome" analytical framework.

Research indicates that promoting knowledge sharing among university faculty requires a systematic strategy, rather than piecemeal measures. The key lies in achieving four shifts: from encouraging individual competition to promoting teamwork, from focusing on static outcomes to prioritizing dynamic processes, from relying on administrative directives to fostering a culture of sharing, and from building information silos to fostering a smart ecosystem. In the future, with the advancement of technologies like artificial intelligence and big data, the models and mechanisms for knowledge sharing among university faculty may also undergo new transformations, such as personalized knowledge recommendations based on learning analytics and the rise of virtual academic communities. These are all worthy of further research.

In short, stimulating the knowledge sharing enthusiasm of university faculty is a strategic fulcrum for revitalizing the internal knowledge reserves of universities and increasing the flow of knowledge innovation. Only by deeply understanding and carefully managing this complex process can Chinese universities truly consolidate their inherent and sustainable core competitiveness in the "Double First-Class" construction journey and make irreplaceable contributions to the construction of an innovative nation.

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English Oral Communication Apprehension among Myanmar Graduate Students in Thailand

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Abstract

This study investigates the level of English oral communication apprehension (OCA) among Myanmar graduate students. Oral communication is a crucial skill in language learning, and apprehension in speaking often hinders students' academic success and participation. This research aimed to explore the level of oral communication apprehension among Myanmar graduate students studying in Thailand. To achieve the objectives, the study employed a quantitative methods design. The Personal Report of Communication Apprehension (PRCA-24) was utilised as the main instrument to collect data from a sample of 100 Myanmar graduate students from two universities in Thailand. The findings revealed that a majority of students experienced moderate levels of oral communication apprehension, particularly in public speaking situations and unfamiliar academic contexts.

Keywords: Oral Communication Apprehension, Myanmar Graduate Students, PRCA-24

Introduction

The purpose of this study is to examine the level of English oral communication apprehension (OCA) among Myanmar graduate students studying in Thailand and to explore the key factors contributing to their anxiety in academic settings. Grounded in McCroskey's (1984) theoretical framework, this study employs four dimensions of communication apprehension: trait-like apprehension, generalised context apprehension, person-group apprehension, and situational apprehension. These dimensions capture both stable and context-dependent aspects of communication anxiety, allowing for a comprehensive understanding of how OCA manifests among this student population.

The significance of this research lies in its response to a critical gap in the literature. While previous studies have examined communication apprehension in various international contexts, little attention has been paid to Myanmar graduate students navigating academic life abroad, particularly in Thailand. These students face the dual challenge of meeting global English proficiency expectations while grappling with linguistic insecurity and culturally embedded communication norms that may hinder oral participation. In an era of increasing academic internationalisation and student mobility, educators, institutions, and policymakers need to understand and address the specific communicative barriers faced by this demographic.

Accordingly, this study seeks to address the following research question:

1. What is the level of English oral communication apprehension among Myanmar's graduate students in Thailand?

The findings aim to inform targeted pedagogical strategies and institutional policies.

By identifying contexts where students experience heightened anxiety, such as classroom discussions, presentations, or interactions with professors, educators can design more inclusive, low-stress learning environments. Simultaneously, policymakers may implement curriculum reforms that emphasize collaborative learning, establish peer-mentoring systems, and provide workshops on stress management and oral communication skills development.

Literature Review

Oral communication is a vital skill in today's globalized world, serving as a key medium for conveying thoughts, emotions, knowledge, and ideas. As the demand for international engagement in education and employment continues to grow, the ability to communicate effectively in English, a global lingua franca, has become increasingly important (Alkhaldi et al., 2023; Mar, 2020). English proficiency encompasses four primary skills: listening, speaking, reading, and writing. Among these, speaking is widely considered the most challenging because it demands not only mastery of linguistic elements such as grammar and vocabulary but also an awareness of the cultural expectations and social norms that shape verbal exchanges (Ice-Murcia & Olshtain, 2000).

For graduate students, particularly those pursuing studies abroad, effective oral communication is indispensable. It supports academic achievement through class participation and presentations, and also facilitates professional success by enabling clear interpersonal communication and public speaking (Dansieh et al., 2021). Despite early English exposure in their educational backgrounds, many university students from Myanmar continue to struggle with oral fluency. This difficulty largely stems from limited speaking practice and a curriculum heavily skewed toward reading and writing, which traditionally define English education in Myanmar (Tun, 2020).

Moreover, Myanmar's educational system has long been characterized by a teacher-centred, lecture-based approach that prioritizes memorization over interaction. Such an approach restricts students' opportunities for verbal expression, leaving them underprepared for communicative tasks in higher education and professional contexts. According to Welch and Hayden (2013), students who attend elite private or international institutions may have better access to interactive instruction. However, the vast majority, especially those from rural areas, face persistent challenges such as low self-confidence, fear of speaking, and overall communication apprehension when required to interact in English abroad.

In recent years, the emphasis on oral communication has intensified for Myanmar students, especially those seeking educational opportunities overseas. This shift is driven by the global academic and workplace expectation that students possess not just theoretical knowledge but also the ability to express it verbally. However, many students continue to face Oral Communication Apprehension (Oca), a psychological condition characterised by anxiety or fear associated with speaking, particularly in public or academic settings (McCroskey, 1984).

The root causes of OCA are numerous and include fear of negative evaluation, inadequate speaking practice, and discomfort in unfamiliar or high-pressure social contexts. These global causes are compounded in Myanmar by culturally specific dynamics such

as rigid educational hierarchies, emphasis on rote learning, and norms of indirect communication that discourage assertive self-expression (San & Htwe, 2023). The result is a pervasive anxiety among Myanmar graduate students, especially those studying abroad, who often feel ill-equipped to speak confidently in English.

Oral communication is defined as the exchange of information using spoken words and sometimes visual cues (Prabavathi & Nagasubramani, 2018). This skill is crucial not only for academic achievement but also for career advancement and social mobility (McCartney & Patterson, 2021; Mar, 2020). For Myanmar graduate students, developing fluency and reducing apprehension in English speaking is particularly critical, given its direct link to their performance in seminars, conferences, and job interviews. According to Butler et al. (2021), students experiencing OCA are often hesitant to speak in group discussions, deliver presentations, or articulate their views clearly, all of which can hinder their academic progress.

OCA is not just a language issue but also a mental health and well-being concern. It can affect a student's confidence, self-esteem, and classroom engagement, and in more severe cases, may lead to withdrawal from interactive academic tasks. Agrawal and Krishna (2021) stress that high levels of communication anxiety can negatively impact both mental health and academic outcomes.

For Myanmar students in graduate programs, overcoming OCA is imperative for integrating into the global academic environment and preparing for international careers.

Research into OCA has shown that a blend of psychological, cultural, and pedagogical factors influences it. In Myanmar's context, these are uniquely intertwined. Mar (2020) notes that the country's cultural norms, grounded in collectivism, respect for elders, and avoidance of confrontation, contribute to students' reluctance to speak up. Even students with reasonable English competence may hesitate to participate in class or speak to professors due to fear of making mistakes or offending authority figures. Despite the urgency of addressing this issue, limited research has focused on Myanmar graduate students abroad, especially in countries like Thailand, where many pursue higher education.

Historically, Myanmar's complex linguistic and political history has also shaped its English education landscape. English was first introduced during the colonial period as the language of administration and education (Aye, 2020). However, after independence in 1948 and subsequent political upheavals, English lost its status as a primary medium of instruction and was relegated to a secondary school subject. This downgrade led to a significant shift toward a nationalized education system that emphasized the Burmese language and minimized the role of English, particularly in spoken forms (Welch & Hayden, 2013).

In the 1980s, efforts were made to reintroduce English as a compulsory subject from kindergarten, especially in fields like science and economics (Kam, 2002). Nevertheless, these reforms often lacked comprehensive implementation and were undermined by outdated methodologies. English instruction in many schools remained exam-focused, heavily reliant on translation and grammar drills, with little to no space for real-time interaction or communicative tasks (Lin, 2021). Even with growing demand for English proficiency due to globalization and economic reforms post-2010, both teachers and students in Myanmar continue to face challenges in oral fluency (Suriya, 2019).

As the country opens up economically and politically, English has increasingly been recognized as a valuable form of "human capital" that enhances employment opportunities, income levels, and international mobility (Mar 2020). However, most students still lack meaningful access to high-quality English education, particularly in speaking. Private language institutes have emerged to fill this gap, but access remains limited for rural and low-income populations (Low & Ao, 2018).

The recent political crisis in Myanmar has further exacerbated these educational inequalities. With domestic institutions disrupted, many students have sought higher education abroad, especially in nearby countries like Thailand, where they can find more stable and resource-rich learning environments (Phyu & Siriwato, 2022). For these students, integrating into an international academic setting requires not only academic competence but also confidence in oral communication. In this area, many feel underprepared due to their prior educational experiences.

Culture also plays a pivotal role in shaping communication behavior. Unlike individualistic societies where self-expression is encouraged and speaking out is seen as a sign of leadership, Myanmar's collectivist culture values humility, social harmony, and deference to authority (San & Htwe, 2023). These cultural norms often discourage students from voicing their opinions, especially in settings that involve professors or large audiences. Such tendencies significantly contribute to OCA and make it difficult for Myanmar students to adjust to academic environments that reward active participation and verbal engagement.

While a few international studies have explored the causes and effects of OCA across student populations, from medical students in Iran to engineering students in Brazil, the specific challenges faced by Myanmar graduate students studying abroad have been largely overlooked (Thaher, 2005; Mobarak, 2020; Jalleh et al., 2021; Rimkeeratikul, 2016). These students, despite facing similar anxiety-inducing academic contexts, must also navigate cultural, psychological, and systemic barriers that are deeply rooted in Myanmar's socio-educational fabric. For instance, the fear of "losing face" by making mistakes in public is particularly acute in collectivist societies.

It often prevents students from taking the risks necessary to improve their speaking skills (Ibna Seraj et al., 2021).

Oral Communication

Recent research on graduate students' oral communication highlights the essential need for strong communicative competencies to meet academic and professional demands. Li (2020) emphasizes, based on graduate employment survey data, the increasing importance of enhancing college students' oral expression abilities to align with workforce expectations. Similarly, Chidambaram et al. (2020) argue that while technical expertise is crucial in engineering education, persuasive communication skills are equally important for professional success. Evseev (2021) addresses the challenges graduate students face in mastering business communication in a foreign language, focusing on improving their business correspondence skills. Yin (2022) introduces an innovative approach by integrating embedded microprocessor technology into oral English instruction to improve students' intercultural communication competence.

Additionally, Yoel et al. (2022) explore the impact of online courses on the interpersonal communication skills of graduate students in STEM fields, emphasising the role of digital learning environments in communication training. Wei (2022) examines the experiences of Chinese EFL postgraduate students with public speaking anxiety, particularly its effect on their performance at international academic conferences. Together, these studies underscore that oral communication proficiency is a fundamental attribute for graduates, with various strategies and instructional methods being explored to tackle existing challenges and enhance students' communicative competence across educational contexts.

Oral communication apprehension

Practical oral communication skills are essential in various contexts, including tertiary education, postgraduate education, the workplace, and business environments (Moslehifar & Ibrahim, 2012). McCroskey (1984) identified four communication contexts that can lead to apprehension: group discussions, meetings, conversations, and public speaking, collectively referred to as oral communication apprehension. In group discussions, participants use spoken language to address different issues (McCroskey, 1986). Engaging in these discussions can significantly benefit individuals by enhancing their understanding and retention of the concepts being explored (Young & Henquinet, 2000, cited in Jalleh et al., 2021). Additionally, group discussions promote creativity as members collaborate to generate ideas (Sunwolf, 2002). For second language (L2) learners, these discussions are particularly valuable for improving communication skills and building self-confidence (Bakar & Latif, 2010, cited in Jalleh et al., 2021).

Meetings serve as another context for oral communication, where participants convene to discuss specific problems, issues, or matters of importance (Harris & Sherblom, 2018). According to Sabri & Qin (2014), activities similar to meetings facilitate face-to-face interactions among L2 learners, allowing them to practice their oral communication skills (cited in Jalleh et al., 2021).

The fourth context identified by McCroskey (1984) is public speaking, which involves sharing ideas verbally with an audience. Within these four contexts, many individuals experience challenges related to oral communication apprehension, defined by McCroskey (1977) as the fear or anxiety encountered during actual or anticipated communication situations (cited in Rauf et al., 2021). Rauf et al. (2021) note that one major contributor to poor communication skills is communication anxiety, which stems from fear, worry, and a lack of confidence in interactions with others, ultimately hindering effective communication. Oral Communication Apprehension (OCA) refers explicitly to the anxiety or fear associated with verbal communication, which may also involve the use of visual aids.

The Role of English in Myanmar

Kachru's (1989) model classifies countries that use English into three categories: the Expanding Circle, where English is learned as a foreign language, and the Outer Circle, where English serves as an official or second language, as seen in countries like India and Singapore (cited in Tin, 2013). Although Myanmar was previously a British colony, Kirkpatrick (2008) argues that it better fits within the Expanding Circle due to its current usage of English (Tin, 2013). After gaining independence in 1948, Burmese replaced English as the official language, and English was designated as a foreign language taught starting from the fifth grade (Aye, 2020; Tin, 2014). In the 1980s, policies were introduced to make English a compulsory subject from kindergarten, especially in science and economics (Kam, 2002).

Myanmar's long-standing political isolation has restricted its integration into global networks; however, reforms since 2010 have created more opportunities for English education (Suriya, 2019). Despite these advancements, challenges persist. English proficiency remains limited among both students and teachers due to outdated, exam-focused teaching methods that prioritize reading and writing over speaking and listening skills (Lin, 2021). The absence of communicative language teaching and inadequate teacher training have exacerbated these issues (Suriya, 2019).

As Myanmar shifts toward a more open economy, English proficiency is increasingly recognized as essential human capital (Mar, 2020). Improved English skills are associated with better employment opportunities and competitiveness in the global job market. Nevertheless, English is primarily taught in schools, with few native speakers teaching it as

their first language at home (Low, 2018). In response to the rising demand for English proficiency, private language schools have emerged to bridge the gap between academic instruction and practical communication needs.

Previous studies related to oral communication apprehension

Several studies have investigated oral communication apprehension (OCA) in various academic contexts and among different student populations. Rasakumaran and Devi (2017) examined OCA levels among first-year medical students at the Faculty of Medicine, Siri Linka University. Their study utilized the Personal Report of Communication Apprehension (PRCA-24) and included 24 students (9 males and 15 females) along with semi-structured interviews. The results indicated a moderate level of apprehension, with female students reporting higher levels of OCA.

Similarly, Hashemi et al. (2020) explored communication anxiety among 340 paramedical and medical students at Rafsanjan University of Medical Sciences in Iran. This study found that students frequently felt anxious and hesitant to participate in classroom discussions, highlighting the prevalence of communication anxiety in medical education. Previous literature has suggested that foreign language anxiety (FLA) adversely affects language learning outcomes, as anxious learners are less likely to engage in communicative activities and may struggle with language comprehension and retention (Desta, 2020).

Focusing on EFL learners in Malaysia, Jalleh et al. (2021) conducted a study on Japanese EFL international students participating in a language immersion program. Using the PRCA-24, the researchers found that students experienced high levels of OCA, particularly during group discussions and conversations, while meetings and public speaking also triggered significant apprehension.

In Thailand, Rimkeeratikul (2016) investigated communication apprehension among first-year and second-year students in a Master's program focused on English for international communication. The findings indicated that students exhibited moderate levels of OCA across four communication contexts, with no significant difference between the two academic years.

Theoretical Framework

McCroskey (1977, p. 78) defined communication apprehension (CA) as "an individual's level of fear or anxiety associated with either real or anticipated communication with another person or persons." Building on this foundation, Byrne and Marann (2012) categorized CA into two types: oral communication apprehension (OCA) and written communication apprehension (WCA). This study focuses explicitly on OCA among Myanmar graduate students. McCroskey (1982) further distinguished between trait CA and state CA, and later, McCroskey (1984) expanded the concept into four dimensions: trait-like CA, generalised-context CA, individual-group CA, and situational CA.

Trait-like CA is characterised as a stable personality trait, where individuals experience communication anxiety across various contexts, audiences, and settings (McCroskey, 1984). Such individuals often avoid communication situations, as CA becomes ingrained in their daily lives (Dwyer, 1995). Generalised-context CA, on the other hand, refers to anxiety triggered by specific communication situations, such as public speaking, meetings, small group discussions, or dyadic interactions (McCroskey, 1984). Individual-group CA encompasses apprehension related to specific individuals or groups, independent of broader personality traits or context-based tendencies (McCroskey, 1984). Lastly, situational CA arises from particular communication scenarios that combine unique audience and context factors, making it a temporary yet significant form of apprehension (McCroskey, 1984).

Previous research supports the relevance of this model in diverse contexts. Rasakumaran and Devi (2017) found moderate levels of CA among Sri Lankan medical students, with females reporting higher levels of apprehension, highlighting the influence of individual factors, such as gender, on CA. Similarly, Jalleh et al. (2021) and Rimkeeratikul (2016) emphasized the context-specific nature of CA among Japanese and Thai students, respectively, noting that group discussions and formal academic settings elicited heightened levels of anxiety. These findings align with McCroskey's assertion that the interaction of individual predispositions and situational context shapes communication apprehension.
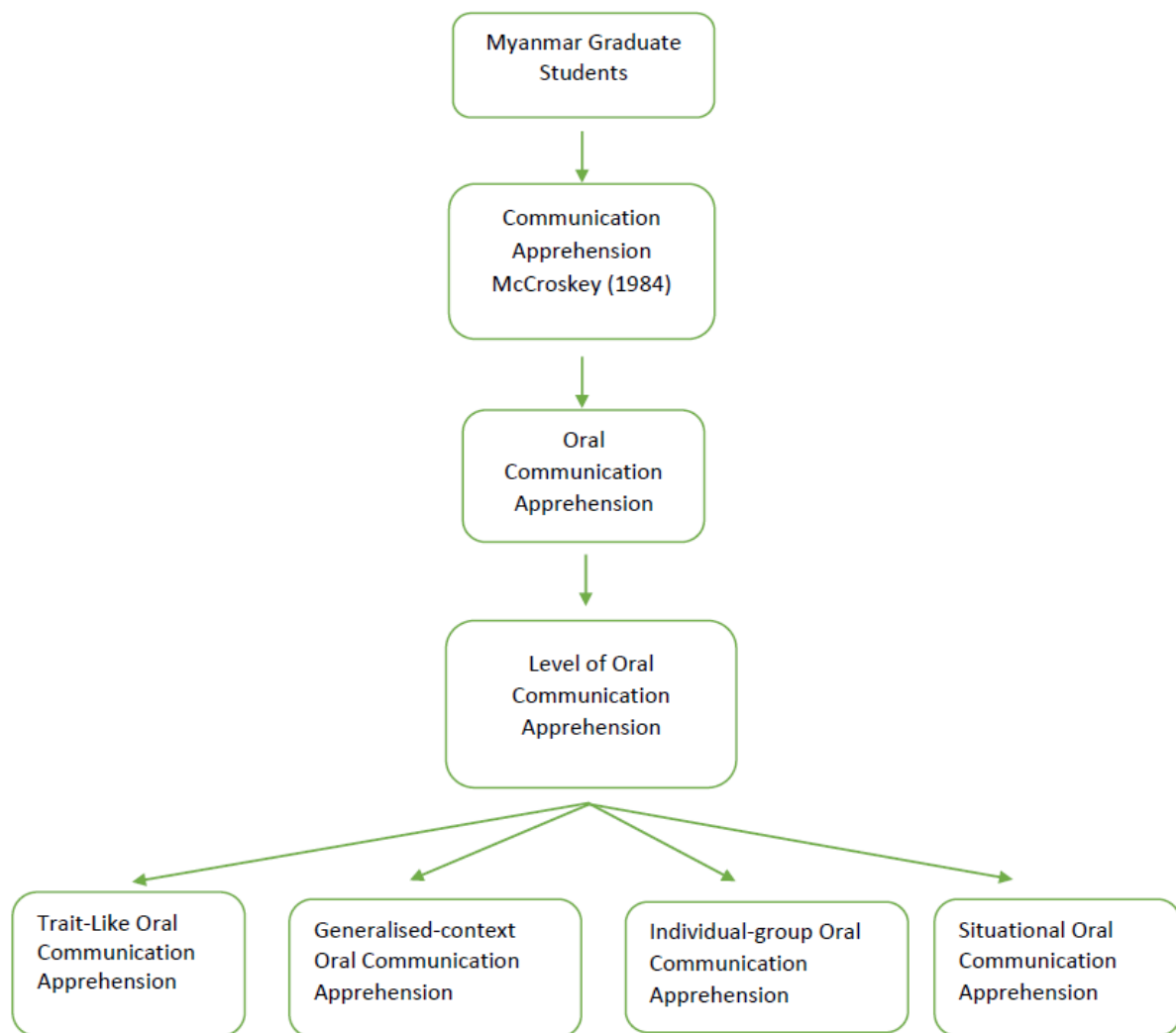
Figure 1: The conceptual Framework

Research Methodology

This study utilised a quantitative research approach to examine the level of English oral communication apprehension (OCA) among Myanmar graduate students enrolled in international programs at two universities in Thailand. The primary instrument for assessing OCA was the Personal Report of Communication Apprehension (PRCA-24), developed by McCroskey (1984), which evaluates apprehension across four communication contexts: Trait-like OCA, general context OCA, individual-group OCA, and situational OCA.

Population and Sample

The population for this study consisted of Myanmar graduate students enrolled in international programs at universities in Thailand. Specifically, data were collected from two institutions: A University, a private university with English as the medium of instruction, and

B University, a public university with a significant enrollment of Myanmar graduate students in its international programs. A total of 100 participants were selected using snowball sampling, with 50 students from each university. Snowball sampling was chosen due to its effectiveness in reaching specific groups through referrals, particularly within a defined community such as Myanmar graduate students studying abroad.

Ethical Considerations

This study adhered to strict ethical guidelines from planning through to publication. Informed consent was obtained from all participants, ensuring they understood the study's objectives, procedures, and their right to withdraw at any time without consequence. Participants' responses were anonymized, securely stored, and accessible only to the researcher. Interviews were conducted respectfully and supportively, allowing participants to skip questions or stop the interview if they felt uncomfortable. The study received ethical approval from the relevant institutional review board. Throughout the research, we maintained integrity in data analysis and reporting, ensuring confidentiality, transparency, and minimizing researcher bias.

Research Instrument

The Personal Report of Communication Apprehension (PRCA-24), developed by McCroskey (2005), was used for quantitative research in this study as it is the most widely recognised instrument for measuring communication apprehension. To ensure cultural and linguistic relevance, the PRCA-24 was adapted to reflect the indirect communication style and educational context of Myanmar graduate students. Modifications were made to specific items while preserving the instrument's core structure, by McCroskey's recommendations, to maintain validity across different cultural settings. To validate content relevance, the Index of Item-Objective Congruence (IOC) was conducted. The PRCA-24 consists of 24 Likert-scale items, allowing for the efficient and reliable assessment of communication apprehension across multiple contexts, making it suitable for large-scale academic research (Aisyah et al., 2019; Kenza, 2024).

Data Analysis

The PRCA-24 responses were collected through Google Forms and reviewed to ensure data quality. The dataset was screened to eliminate missing, incomplete, or duplicate entries. Scoring was conducted according to McCroskey's standardised procedure, summing individual scores to determine each participant's overall level of oral communication apprehension (OCA). Based on the total scores, participants were categorised into three levels of apprehension: low, moderate, or high. Descriptive statistical analyses were employed to summarise the distribution of OCA levels among the participants. Measures of central tendency (mean), dispersion (standard deviation), and frequency distributions were calculated

to provide a comprehensive overview of the data. All statistical analyses were performed using SPSS software to ensure accuracy and reliability in the findings.

Results and Discussion

Level of English Oral Communication Apprehension Among Myanmar's Graduate Students in Thailand

This section reports the findings of the research question (What is the level of English oral communication apprehension among Myanmar's graduate students in Thailand?). Data were gathered using the Personal Report of Communication Apprehension (PRCA-24), a standardised tool based on McCroskey's (1984) Oral Communication Apprehension Theory. This instrument assesses four dimensions of OCA: trait-like, situational, individual-group, and generalised-context apprehension, each addressing different facets of communication anxiety in both academic and social settings. Table 1 presents a summary of the overall OCA levels. The mean score was M = 2.91 (SD = 0.95), indicating a moderate level of oral communication apprehension among the participants. Trait-like OCA, which reflects a person's persistent tendency to experience communication anxiety, had a mean of M = 2.71 (SD = 0.10). Situational OCA, which pertains to context-specific anxiety, showed a slightly higher mean of M = 3.03 (SD = 0.95). Likewise, Individual-group OCA recorded a mean of M = 2.90 (SD = 0.95), and Generalized-context OCA had a mean of M = 2.98 (SD = 0.90), both indicating moderate levels of apprehension.

Table 1 Overall Level of Students' Oral Communication Apprehension (OCA)

Item	Statement	M	S.D.	Interpretation
1	Overall Trait-like OCA	2.71	0.10	Moderate
2	Overall Situational OCA	3.03	0.95	Moderate
3	Overall Individual-group OCA	2.90	0.95	Moderate
4	Overall Generalized- Context OCA	2.98	0.90	Moderate
	Overall OCA	**2.91**	**0.95**	**Moderate**

Level of English oral communication apprehension among Myanmar's graduate students in Thailand based on Trait-Like Oral Communication Apprehension

In Table 2, the study focused on the Trait-like Oral Communication Apprehension (OCA) dimension, which indicates students' consistent tendency to feel anxious in oral communication situations, especially during group discussions. Descriptive statistics for this dimension can be found in the Table.

Table 2 Level Of English Oral Communication Apprehension Among Myanmar's Graduate Students in Thailand Based on Trait-Like Oral Communication Apprehension

Item	Statement	M	S.D.	Interpretation
Trait-like OCA				
1	I dislike participating in group discussions.	2.68	1.11	Moderate
2	Generally, I am comfortable while participating in group discussions.	2.36	0.89	Low
3	I am tense and nervous while participating in group discussions.	3.02	1.04	Moderate
4	I like to get involved in group discussions.	2.29	0.80	Low
5	Engaging in group discussion with new people makes me tense and nervous.	3.44	1.11	Moderate
6	I am calm and relaxed while participating in group discussions.	2.54	0.92	Moderate
	Overall	**2.71**	**0.10**	**Moderate**

The overall mean score for Trait-like Oral Communication Apprehension (OCA) was M = 2.71 (SD = 0.10), indicating a moderate level of apprehension among Myanmar graduate students. This suggests that while students do not experience severe anxiety, they often feel discomfort during group interactions. Among the six items, Item 5 ("Engaging in group discussion with new people makes me tense and nervous") had the highest mean score (M = 3.44, SD = 1.11), highlighting that unfamiliar social situations significantly increase students' anxiety. This finding aligns with McCroskey's (1984) concept of situational trait anxiety, which posits that new group dynamics heighten communication apprehension. Items 1 ("I dislike participating in group discussions", M = 2.68, SD = 1.11) and Item 3 ("I am tense and nervous while participating in group discussions", M = 3.02, SD = 1.04) also reflected moderate scores, indicating a tendency toward avoidance and nervousness in group settings.

In contrast, Items 2 ("Generally, I am comfortable while participating in group discussions", M = 2.36, SD = 0.89) and Item 4 ("I like to get involved in group discussions", M = 2.29, SD = 0.80) received low ratings, suggesting that students do not view themselves as confident or enthusiastic participants. These low scores indicate a reluctance to engage rather than a sense of comfort. Item 6 ("I am calm and relaxed while participating in group discussions") also showed a moderate mean (M = 2.54, SD = 0.92), reinforcing the overall finding of moderate yet persistent discomfort during group interactions.

These results indicate that Myanmar graduate students exhibit moderate trait-like communication apprehension, particularly in situations involving unfamiliar peers. Cultural factors, such as Myanmar's teacher-centred learning environments and emphasis on respectful silence (Tun, 2020; San & Htwe, 2023), may contribute to this cautious approach to group discussions. The findings highlight the need for instructional strategies that gradually build students' confidence in oral participation. Incorporating collaborative activities in

low-pressure settings could help reduce apprehension and foster a more interactive learning environment.

Level Of English Oral Communication Apprehension Among Myanmar's Graduate Students in Thailand Based on Situational Oral Communication Apprehension

Situational Oral Communication Apprehension (OCA) refers to the anxiety that arises in specific contexts during communication events, such as oral presentations or formal meetings.

This is particularly evident when the stakes are high, the topics are unfamiliar, or authority figures are present (McCroskey, 1984). Descriptive statistics for this dimension are presented in Table 3.

Table 3 Level of English Oral Communication Apprehension Among Myanmar's Graduate Students in Thailand Based on Situational Oral Communication Apprehension

Item	Statement	M	S.D.	Interpretation
Situational OCA				
7	Generally, I am nervous when I have to do an oral presentation.	3.29	0.98	Moderate
8	Usually, I am comfortable when I have to do an oral presentation.	2.73	0.83	Moderate
9	I remain calm and relaxed when called upon to express an opinion at a meeting, unless it is a high-stakes situation or involves senior colleagues.	2.89	1.09	Moderate
10	I am afraid to express myself at meetings, particularly when I do not feel prepared or when the meeting involves unfamiliar topics.	3.60	0.96	High
11	Communicating at meetings usually makes me uncomfortable, especially when I am asked unexpected questions or speak in a formal setting.	3.26	0.96	Moderate
12	I remain very relaxed when answering questions at a meeting, unless it is a stressful or time-sensitive situation.	2.45	0.90	Low
	Overall	**3.03**	**0.95**	**Moderate**

Among Myanmar graduate students in Thailand, the overall mean score for this dimension was M = 3.03 (SD = 0.95), indicating a moderate level of situational apprehension. The highest mean score was observed for Item 10 ("I am afraid to express myself at meetings, particularly when I don't feel prepared or when the meeting involves unfamiliar topics"), with M = 3.60 (SD = 0.96). This suggests that students experience considerable anxiety in unpredictable academic situations, highlighting their strong sensitivity to preparation and familiarity with content. These findings may reflect cultural factors, including fear of negative evaluation and a preference for structured interactions.

Moderate levels of anxiety were also noted in other items, such as apprehension during oral presentations (M = 3.10) and speaking up in formal meetings (M = 3.15). In contrast, Item 12 ("I am very relaxed when answering questions at a meeting unless it's a stressful or time-sensitive situation") received the lowest mean score (M = 2.45, SD = 0.90), indicating that students feel more comfortable in casual or familiar settings but become anxious under pressure.

Overall, these findings underscore that situational factors—such as topic familiarity, the formality of the setting, and the presence of authority figures—significantly impact students' oral communication apprehension. This aligns with McCroskey's (1984) situational CA theory and supports existing literature on how academic pressures and cultural norms influence communication behaviors in high-context societies like Myanmar.

Level Of English Oral Communication Apprehension Among Myanmar's Graduate Students in Thailand Based on Individual-Group Oral Communication Apprehension

Table 4 presents the study's focus on the Individual-Group Oral Communication Apprehension (OCA) dimension, which reflects students' consistent tendency to experience anxiety in oral communication situations, particularly during group discussions. Descriptive statistics for this dimension are provided in the Table.

Table 4 Level of English Oral Communication Apprehension Among Myanmar's Graduate Students in Thailand Based on Individual-Group Oral Communication Apprehension

Item	Statement	M	S.D.	Interpretation
Individual-Group OCA				
13	While participating in a group discussion, I feel very nervous.	3.04	1.01	Moderate
14	I have no fear of speaking up in group discussions or meetings.	2.73	0.97	Moderate
15	Ordinarily, I am very tense and nervous in group settings.	3.10	0.95	Moderate
16	Ordinarily, I am very calm and relaxed in group discussions.	2.70	0.92	Moderate
17	While conversing in group settings, I feel very relaxed.	2.65	0.80	Moderate

Item	Statement	M	S.D.	Interpretation
18	I am afraid to speak up in group discussions.	3.15	1.03	Moderate
Overall		**2.90**	**0.95**	**Moderate**

The analysis of Individual-Group Oral Communication Apprehension (OCA) among Myanmar graduate students reveals a moderate level of anxiety, with an overall mean score of M = 2.90 (SD = 0.95). This indicates that students tend to feel apprehensive during group discussions, team presentations, and academic seminars. The highest mean score was recorded for Item 18 ("I'm afraid to speak up in group discussions"), which received a score of M = 3.15 (SD = 1.03). This suggests a significant hesitation among students to contribute publicly in peer settings. Similarly, Item 13 ("While participating in a group discussion, I feel very nervous") scored M = 3.04 (SD = 1.01), and Item 15 ("Ordinarily, I am very tense and nervous in group settings") had a mean of M = 3.10 (SD = 0.95), further indicating a consistent level of discomfort during group interactions.

Conversely, items associated with calmness, such as Item 16 ("Ordinarily, I am very calm and relaxed in group discussions") with M = 2.70 (SD = 0.92) and Item 17 ("I feel very relaxed while conversing in group settings") with M = 2.65 (SD = 0.80), also fell within the moderate range. This suggests that students do not commonly experience relaxation during group communication. Even the positively phrased Item 14 ("I have no fear of speaking up in group discussions or meetings") received a modest mean score of M = 2.73 (SD = 0.97), indicating that few students feel genuinely confident in group interactions. These findings highlight a persistent yet moderate level of group communication apprehension, suggesting that while students can participate, they do so with discomfort. This unease may stem from Myanmar's traditional education system, which emphasises passive learning and discourages open verbal interaction (San & Htwe, 2023). Additionally, cultural norms regarding deference to authority and fear of making public mistakes further exacerbate this reluctance.

Level of English oral communication apprehension among Myanmar's graduate students in Thailand based on Generalised-context Oral Communication Apprehension

Table 5 Level of English Oral Communication Apprehension Among Myanmar's Graduate Students

Item	Statement	M	SD	Interpretation
Generalized-Context OCA				
19	I have no fear of giving a speech.	2.74	0.90	Moderate
20	Certain parts of my body feel very tense and rigid while giving a speech.	3.35	0.91	Moderate
21	I feel relaxed while giving a speech.	2.64	0.87	Moderate

22	My thoughts become confused and jumbled when I am giving a speech.	3.28	0.94	Moderate
23	I face the prospect of giving a speech with confidence.	2.55	0.75	Moderate
24	While giving a speech, I get so nervous that I forget facts I know.	3.33	0.97	Moderate
Overall		**2.98**	**0.90**	**Moderate**

The analysis of Generalised-Context Oral Communication Apprehension (OCA) among graduate students in Myanmar reveals a moderate level of anxiety, with an overall mean score of M = 2.98 (SD = 0.90). According to McCroskey (1984), generalised-context OCA reflects a person's consistent tendency to feel apprehensive in specific communicative contexts, such as public speaking, regardless of the audience or topic. The findings indicate that students experience noticeable tension during formal speaking situations. The highest levels of apprehension were associated with physiological and cognitive symptoms, particularly in high-pressure contexts. Item 20 ("Certain parts of my body feel very tense and rigid while giving a speech") recorded the highest mean score at M = 3.35 (SD = 0.91), followed closely by Item 24 ("While giving a speech, I get so nervous I forget facts I know") at M = 3.33 (SD = 0.97), and Item 22 ("My thoughts become confused and jumbled when I am giving a speech") at M = 3.28 (SD = 0.94). These results align with McCroskey's conceptualisation of OCA, which includes psychological discomfort, physiological arousal, and cognitive disorganisation during formal communication tasks.

Conversely, positively worded items reflecting self-perceived confidence and calmness during speeches displayed lower mean scores, still within the moderate range. Item 19 ("I have no fear of giving a speech") had a mean of M = 2.74 (SD = 0.90), followed by Item 21 ("I feel relaxed while giving a speech") at M = 2.64 (SD = 0.87), and Item 23 ("I face the prospect of giving a speech with confidence") with the lowest mean of M = 2.55 (SD = 0.75). These results indicate that while students do not suffer from severe speech anxiety, they also lack complete confidence, reflecting a cautious approach to public speaking.

Overall, the moderate scores for both anxiety and confidence-related items illustrate a balance between discomfort and functional participation. Students can deliver speeches, but they experience physical tension, mental blocks, and hesitation, particularly in evaluative or formal settings. Cultural factors, such as Myanmar's emphasis on modesty and avoidance of public mistakes, may further contribute to these trends, reinforcing students' cautious engagement in high-stakes communicative events. These findings highlight the need for structured public speaking practice in low-pressure environments and the incorporation of confidence-building strategies into academic programs to alleviate apprehension and enhance students' oral communication skills.

Conclusion

This study explored the level of English oral communication apprehension (OCA) among Myanmar graduate students studying in Thailand and examined its dimensions through McCroskey's PRCA-24 framework. The findings revealed that students exhibited moderate levels of apprehension across all four dimensions: trait-like, situational, individual-group, and generalized-context OCA. These results highlight that while students are not paralyzed by fear, they consistently experience discomfort, particularly in unfamiliar or high-pressure situations such as oral presentations, group discussions with unfamiliar peers, and formal academic meetings. Cultural factors, including Myanmar's hierarchical and teacher-centered educational traditions, contribute significantly to students' reluctance to speak up, along with fear of negative evaluation and limited speaking opportunities in prior education.

The implications of these findings are multifaceted. For educators, there is a pressing need to create inclusive, interactive, and low-anxiety classroom environments that gradually build students' oral confidence. For policymakers and curriculum developers, incorporating communicative activities and peer-supported speaking tasks into academic programs is essential. Furthermore, structured public speaking workshops and stress-reduction initiatives can address students' cognitive and physiological anxiety symptoms.

Ultimately, addressing English oral communication apprehension among Myanmar graduate students is critical to their academic success and integration into global academic and professional settings. Future research could expand the sample size and incorporate qualitative methods to gain deeper insights into students' lived experiences. This study provides a foundational understanding and calls for systemic changes to foster a more supportive environment for English language learners from culturally and linguistically diverse backgrounds.

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Compulsory English Textbook Evaluation Based on Byram's Intercultural Communicative Competence (Icc) in Alignment with Chinese English Curriculum Standard (Cecs) Educational Policy

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Abstract

This study aims to investigate the alignment of the intercultural component of Byram's (1997) Intercultural Communicative Competence (ICC) and Chinese English Curriculum Standards (CECS, 2022). ICC represents the international intercultural perspective, and CECS represents the Chinese intercultural perspective. This study answers 3 Objectives based on 3 research questions: 1. To conduct how compulsory English textbooks incorporate the intercultural dimensions of Byram's ICC framework. 2.To evaluate the alignment between compulsory English textbooks and the intercultural elements of the CECS educational policy. 3.To systematically examine the representation of knowledge, attitudes, and intercultural skills in textbooks and assess their alignment with CECS intercultural goals.

There are five dimensions of ICC: Knowledge, Intercultural Attitudes, Skills of interpreting and relating, Skills of discovery and interaction, and Critical Cultural Awareness. There are four dimensions of CECS: linguistic competence, cultural awareness, thinking capacity, and learning ability.

Content analysis method of qualitative research is adopted, using ICC dimensions and CECS as the initial coding templates, 465 contents in 12 English textbooks were encoded and allocated separately, and frequency and percentage statistics were performed in all dimensions. The key finding of this article is: The data reveals that the two frameworks have a high overlap in the knowledge base (ICC-Knowledge/CECS-Cultural Awareness), while the critical dimension (ICC-Critical Cultural Awareness/CECS-Learning Ability) has a significant weakening.

The conclusion of this study is to obtain three results by 12 books on content analysis of the 5 dimensions of ICC and four dimensions of CECS: Height Alignment, Moderate alignment and Low alignment.

Keywords: Ntercultural Communicative Competence (Icc), Chinese English Curriculum Standard (Cecs)

Introduction

Intercultural Communicative Competence (ICC) is a widely accepted framework in language education. It highlights the importance of not just learning to watch but also understanding and respecting different cultures. In today's globalized world, more communication across multicultural environments has become a very important thing for students (Byram, 1997). In the world today, ICC is widely accepted and applied in language teaching, making it a reliable and established framework for evaluating intercultural competence in education (Deardorff, 2006). Using ICC in the current study can help to make sure that the findings go along with global trends in English language education, contributing to a border conversation about how to prepare learners for a multicultural world.

The Chinese English Curriculum Standards (CECS) serve as a guideline for English language education in China, it outlines the goals and skills, and knowledge that students should achieve, including the ability to understand and respect cultural diversity (Wang & Liu, 2019). Since the current researcher is from China, the current study is aimed to contribute to improving English language education in the country. CECS is chosen because it reflects the specific educational context and the policy goal from China. Evaluating textbooks against CECS makes sure that the findings are relevant and practical for Chinese schools and students, helping the teachers and policymakers, and textbooks developers to address the gaps in intercultural communications education.

Combining ICC and CCS allows the current study to bring a bridge between the global theories, and local practices. ICC provides a well-accepted framework for understanding intercultural competence, while CECS reflects the specific requirements and goals of English language education in China. Measuring these two together can help to identify whether the global standard of intercultural communications education is being met with local content. This dual approach not only evaluates the effectiveness of the textbook but also highlights the opportunity to align Chinese educational practice with international trends. Such alignment is very important in preparing Chinese students to succeed in the globalized world (Chen, 2022).

Research Questions
The following research questions were developed for the current study.
1. How do compulsory English textbooks reflect the intercultural dimensions of Byram's ICC framework?
2. How do compulsory English textbooks align with the intercultural elements of the CECS educational policy?
3. How are knowledge, attitudes, and intercultural skills represented in the textbooks, and how do they align with CECS intercultural goals?

Objectives

The primary aim of the current study was to investigate the following objectives.
1. To conduct how compulsory English textbooks incorporate the intercultural dimensions of Byram's ICC framework.
2. To evaluate the alignment between compulsory English textbooks and the intercultural elements of the CECS educational policy.
3. To systematically examine the representation of knowledge, attitudes, and intercultural skills in textbooks and assess their alignment with CECS intercultural goals.

Literature Review

This chapter will elaborate on all the theoretical information used i n this study and provide accurate theoretical support for this study.

Overview of the Intercultural Communicative Competence (ICC) Framework

Byram's (1997) ICC framework represents a comprehensive approach to developing intercultural competence in language education. The model comprises five key components: attitudes (savoir être), knowledge (savoirs), skills of interpreting and relating (savoir comprendre), skills of discovery and interaction (savoir apprendre/faire), and critical cultural awareness (savoir s'engager).

According to Byram (1997), the attitudinal component emphasizes curiosity, openness, and readiness to suspend disbelief about other cultures. Deardorff (2006) highlights how these attitudes form the foundation for developing other ICC elements. Knowledge encompasses understandings of social groups, products, practices, and processes of interaction. According to Liddicoat and Scarino (2013), this component requires both general and specific cultural knowledge.

The skills dimension involves two distinct abilities: interpreting/relating and discovery/interaction. Liu (2012) explains how these skills enable learners to mediate between cultures and engage in real-time intercultural communication. Critical cultural awareness, the framework's central element, develops learners' ability to evaluate cultural perspectives critically.

Recent developments have expanded the framework's application. Kramsch (2014) incorporates digital literacy and online interaction considerations, while Porto and Byram (2015) emphasize the framework's role in global citizenship education. Critical cultural awareness has also been considered the central element, which involves evaluating cultural perspectives, practices, and products critically using explicit criteria. Byram et al. (2002) emphasize its role in developing intercultural citizens who can engage critically with different cultural perspectives.

Chinese English Curriculum Standards (Cecs)

The Chinese English Curriculum Standards represent a significant educational framework that has evolved to meet the demands of globalization and intercultural communication needs in Chinese education. The latest version of CECS (2022 Edition) demonstrates China's commitment to developing students' comprehensive language abilities while emphasizing intercultural communicative competence as a core educational objective (MOE of China, 2022). This policy framework marks an important shift from traditional language-focused instruction to a more holistic approach that integrates cultural awareness and intercultural communication skills.

Recent reforms in CECS have specifically emphasized the integration of ICC into English language education at various educational levels in China. Wang and Chen (2021) note that the standards now explicitly incorporate intercultural elements as mandatory components of English language teaching. It also represents a significant departure from earlier versions primarily focused on linguistic competence (Wang & Chen, 2021). This policy evolution reflects China's recognition of the importance of preparing students for international engagement in an increasingly interconnected world (Li & Edwards, 2023).

The alignment between CECS and ICC principles is evident in several key policy areas. Zhang et al. (2022) identify three primary dimensions where the standards support ICC development: cultural awareness cultivation, practical communication skills, and cross-cultural understanding. Their analysis reveals that the curriculum standards now require

teachers to incorporate cultural knowledge and intercultural communication scenarios in to their daily teaching practices, marking a significant shift in pedagogical approach (Zhang et al., 2022).

Empirical studies have demonstrated both the implementation challenges and successes of these policy initiatives. Liu and Wang (2023) conducted a comprehensive study of 50 high schools across different provinces, finding that while the policy framework provides clear guidelines for ICC integration. Liu and Wang (2023) also practically implement varies significantly across regions and schools. Their research highlights the importance of teacher training and resource availability in successful policy implementation (Liu & Wang, 2023).

Furthermore, research by Chen and Liu (2022) indicates that schools successfully implementing the new standards have seen measurable improvements in students' intercultural awareness and communication abilities. Their longitudinal study of 1,200 students over three years showed that students exposed to ICC-integrated curriculum demonstrated superior cross-cultural communication skills compared to those following traditional English language instruction methods.

Research Methodology

Qualitative Research Design

In this study, a qualitative research design with a focus on content analysis will use to examine the integration of intercultural communicative competence (ICC) within English language teaching (ELT) in the Chinese educational context. The research investigates the extent to which compulsory English textbooks for senior high school students align with Byram's (1997) ICC framework and the Chinese English Curriculum Standards (CECS).

The population for this study includes all compulsory English textbooks used in senior high schools across China. From this population, a sample of 12 textbooks has been selected. These textbooks are part of the national curriculum and are widely used in classrooms, making them representative of the materials shaping students' linguistic and cultural competencies. The sample was chosen purposively to ensure a comprehensive analysis of the textbooks' content and their alignment with ICC and CECS frameworks.

The analysis focuses on the cultural and linguistic components embedded in the textbooks, including content, language activities, and pedagogical approaches. Byram's ICC framework is used as the primary analytical tool to assess how the textbooks address intercultural knowledge, skills, attitudes, and critical cultural awareness. The CECS serves as a supplementary framework, ensuring that the analysis aligns with national educational policies and objectives.

Data analysis involves systematically coding and categorizing the content of the textbooks to identify explicit and implicit representations of ICC elements. The study examines the depth, breadth, and quality of cultural content, as well as the integration of intercultural communication skills in learning activities. The findings will highlight strengths and weaknesses in the textbooks' conformity to Byram's ICC framework and CECS guidelines, providing valuable insights for curriculum developers, educators, and policymakers.

Research Findings

The researchers presented the findings of the current study, which used 12 Chinese English textbooks to conduct content analysis for intercultural fields. After analysis, the results of ICC and CECS are obtained, and the research findings are introduced in detail in this chapter.

Findings from Research Objective 1

The first research objective was to conduct how compulsory English textbooks incorporate the intercultural dimensions of Byram's ICC framework.

Byram's ICC framework, which includes five main dimensions: Knowledge, Intercultural Attitudes, Skills of interpreting and relating, Skills of discovery and interaction, and Critical Cultural Awareness.

Table 1 ICC Dimensions Percentage

ICC Dimensions	Frequency	Percentage
Knowledge	181	38.92
Intercultural Attitudes	117	25.16
Skills of Interpreting and Relating	83	17.85
Skills of Discovery and Interaction	52	11.18
Critical Cultural Awareness	32	6.88
Total	**465**	**100.00**

Findings from Research Objective 2

The second research objective was to evaluate the alignment between compulsory English textbooks and the intercultural elements of the CECS educational policy.

Chinese English Curriculum Standards (CECS, 2022), include four main elements: linguistic competence, cultural awareness, thinking capacity, and learning ability.

Table 2 CECS Elements Percentage

CECS Elements	Frequency	Percentage
Cultural Awareness	214	46.02
Thinking Capacity	140	30.11
Linguistic Competence	63	13.55
Learning Ability	48	10.32
Total	**465**	**100.00**

Findings from Research Objective 3

The third research objective was to systematically examine the representation of knowledge, attitudes, and intercultural skills in textbooks and assess their alignment with CECS intercultural goals.

Table 3 ICC And CECS Percentage Table

ICC And CECS	Frequency	Percentage
CECS\Cultural Awareness	214	23.01
ICC\Knowledge	181	19.46
CECS\Thinking Capacity	140	15.05
ICC\Intercultural Attitudes	117	12.58
ICC\Skills of Interpreting and Relating	83	8.92
CECS\Linguistic Competence	63	6.77
ICC\Skills of Discovery and Interaction	52	5.59
CECS\Learning Ability	48	5.16
ICC\Critical Cultural Awareness	32	3.44
TOTAL (valid)	930	100.00
Total	**930**	**100.00**
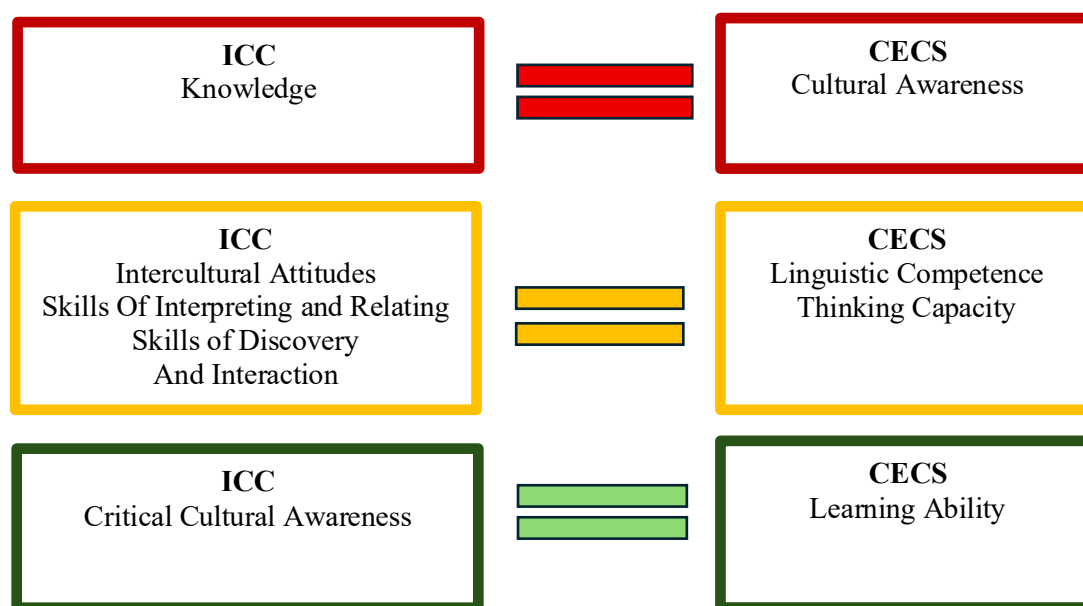
Figure 1: ICC and CECS Alignment Component

Conclusions

This study results were derived from content analysis between Byram's (1997) Intercultural Communicative Competence (ICC) and Chinese English Curriculum Standards (CECS, 2022).

Height Alignment: ICC's "Knowledge" and CECS's "Cultural Awareness" account for the highest proportion in texts (over 40% in total), confirming that both regard cultural factual knowledge (such as festivals, customs and cultural backgrounds) as the cornerstone of ability, reflecting cognitive consensus.

Moderate alignment: CECS\Thinking Capacity, ICC\Intercultural Attitudes, ICC\Skills of Interpreting and Relating, CECS\Linguistic Competence, ICC\Skills of Discovery and Interaction have a moderate proportion, indicating that although CECS does not directly name "skills", it implicitly intercultural behavior requirements through thinking and language application.

Low alignment: ICC's Critical Cultural Awareness accounted for the lowest proportion (<5%), and "CECS-Learning Ability" did not cover critical stances; this result may reflect that China's curriculum standards focus more on cultural understanding than critical thinking.

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First-Year Myanmar Students' Perceptions of English Teachers' TPACK Competence at A University in Ayutthaya

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Abstract

This study examined first-year Myanmar students' perceptions of English teachers' Technological Pedagogical and Content Knowledge (TPACK) competence at A university in Ayutthaya, Thailand. Grounded in Mishra and Koehler's (2006) TPACK framework, with its extension to include Contextual Knowledge (XK), the study employed a quantitative survey design. A total of 120 undergraduates completed a 33-item Likert scale questionnaire covering eight TPACK domains (CK, PK, TK, PCK, TCK, TPK, TPACK, and XK). Results indicated high ratings for content knowledge, pedagogical knowledge, and pedagogical content knowledge, but moderate perceptions of technological knowledge, technological content knowledge, and overall TPACK competence. Contextual knowledge was also rated moderate, reflecting challenges such as limited infrastructure and cultural adjustment. The findings highlight the need for targeted professional development, curriculum alignment, and institutional support to enhance technology integration.

Keywords: Myanmar Students' Perception, English Teachers' TPACK Competence

Introduction

Technology integration has become essential to modern education, shaping how teachers deliver instruction, and students engage with learning materials. In the 21st century, rapid information and communication technology (ICT) advancements have significantly transformed education, promoting interactive and student-centred learning environments (Hayati & Zaim, 2024; Scherer et al., 2021). Digital tools such as computers, mobile devices, and online platforms make it easier for teachers to facilitate personalised instruction while also providing students a chance to access to various resources and collaboration beyond traditional classroom settings (Hamilton et al., 2016; Mirzajani et al., 2016; Nguyen & Nguyen, 2023). Therefore, educational institutions or universities across the globe are integrating technology into their educational program to enhance pedagogical effectiveness and improve students' learning outcomes (Chai, Koh, & Teo, 2013).

With the development and advancement of technology in Education, the teaching and learning process has shifted from the 19th century to the 21st century. As a result, technology-enhanced pedagogy has become an important part of modern education, and teachers or educators need to integrate technology tools effectively into their teaching strategies to improve instructional quality (Gherhes et al., 2021). The introduction of pedagogical content knowledge (PCK) highlighted the importance of combining subject knowledge with

effective teaching strategies (Angeli & Valanides, 2013; Mishra & Koehler, 2006). More recently, the Technological Pedagogical and Content Knowledge (TPACK) framework has expanded this by stressing the integration of technology alongside pedagogy and content knowledge for successful teaching (Mishra & Koehler, 2006; Hughes, 2005; Chai, Koh, & Tsai, 2013). Considering the role of external factors, the framework now includes contextual knowledge such as institutional resources and cultural backgrounds to better address real-world teaching challenges (Mishra, 2019; Rosenberg & Koehler, 2015; Mishra et al., 2022).

Literature Review

The TPACK Framework and Its Evolution

The increasing role of digital technology in education has reshaped both teaching strategies and student learning experiences, requiring teachers to develop competencies that extend beyond subject knowledge alone. The Technological Pedagogical and Content Knowledge (TPACK) framework, initially proposed by Mishra and Koehler (2006), provides a conceptual lens for understanding how technology can be integrated meaningfully into pedagogy and content delivery. The framework builds on Shulman's (1986) notion of Pedagogical Content Knowledge (PCK), which emphasized the blending of subject expertise with pedagogical strategies. TPACK expands this model by introducing technological knowledge (TK) as a third pillar, stressing the need for educators to combine CK, PK, and TK to create effective, technology-enhanced instruction.

Over the years, TPACK has been widely adopted in teacher education and instructional design (Chai, Koh, & Tsai, 2013; Willermark, 2018; Wang et al., 2018). However, scholars continue to debate its conceptual clarity and practical implementation (Brantley-Dias & Ertmer, 2013; Kimmons, 2015; Zinger, Tate, & Warschauer, 2017). One key criticism concerns its limited attention to external and contextual factors that shape teachers' technology use. Responding to this gap, Mishra (2019) extended the model to include Contextual Knowledge (XK), acknowledging that classroom realities such as institutional policies, cultural norms, student demographics, and infrastructure play a vital role in determining how technology is adopted. Rosenberg and Koehler (2015) further argue that without considering context, the application of TPACK risks remaining theoretical rather than practical. This expanded view (TPACK + XK) is especially relevant for cross-cultural contexts, such as Myanmar students navigating technology-supported education in Thailand.

Empirical Studies on Students' Perceptions of TPACK

While much TPACK research has focused on teachers' self-assessment, an emerging body of work has explored students' perspectives. These studies provide valuable insights into how learners experience technology-mediated instruction and evaluate teacher competence. Hayati and Zaim (2024) found that Indonesian students appreciated technology-enhanced English instruction, associating it with higher engagement and learning efficiency. However, Ilmi, Drajati, and Putra (2023) reported that students in online EFL classrooms expressed concerns about inconsistent technology use, noting the need for better-structured content and interactive methods. Similarly, Setyowati and Rachmajanti (2023) emphasized students' expectations for improved integration of learning management systems and digital platforms during the pandemic.

Other studies underscore that teachers' TPACK directly shapes the learning environment. For instance, Nurina et al. (2019) observed that students respond positively when teachers blend effective pedagogy with technology, fostering dynamic classrooms. Conversely, when teachers lack technological confidence or training, students report reduced

motivation and engagement. These findings suggest that students' perceptions are a critical lens through which the effectiveness of TPACK can be evaluated.

Relevance to the Present Study

The reviewed literature establishes several key points that inform the present study. First, while the TPACK framework is widely recognized, its practical application requires attention to contextual knowledge, especially in multicultural settings. Second, in ELT, technology integration can significantly enhance learning outcomes, but barriers such as inadequate training, limited resources, and cultural challenges persist. Third, students' perceptions provide essential feedback on teachers' competence, yet little research has examined the experiences of Myanmar students in Thai higher education.

This study addresses these gaps by investigating first-year Myanmar students' perceptions of English teachers' TPACK competence at A University in Ayutthaya. By focusing on this under-researched population, the study extends TPACK scholarship into a cross-cultural context where infrastructure, cultural adjustment, and institutional factors interact with teachers' technological, pedagogical, and content knowledge. In doing so, it not only contributes to the empirical literature on students' perspectives but also reinforces the theoretical importance of incorporating contextual knowledge into the TPACK framework.

This study has answered this research question: How do first-year Myanmar students perceive their English language teachers' TPACK competence at A University in Ayutthaya?

Research Design

This study employed a quantitative survey research design to systematically investigate first-year Myanmar students' perceptions of their English teachers' Technological Pedagogical and Content Knowledge (TPACK) competence. The quantitative approach was appropriate as it allowed the collection of standardized responses from a relatively large sample, enabling statistical analysis of trends and patterns in students' evaluations across different TPACK domains.

Participants

The study involved 120 first-year Myanmar undergraduate students enrolled at A University in Ayutthaya, Thailand. Participants were drawn from three faculties: The Faculty of Education, the Faculty of Buddhism, and the Faculty of Humanities. Students represented diverse regions and states of Myanmar, ensuring a wide range of perspectives on their learning experiences.

All participants were native Burmese speakers who primarily used Burmese in daily communication. Both male and female students were included, with ages ranging from 16 to over 24 years. This variation in age reflects different academic pathways: some students entered university immediately after high school, while others delayed their studies or shifted programs. These demographic variations were expected to shape students' prior exposure to technology and their perceptions of their teachers' TPACK competence.

Research Instrument

A structured questionnaire was used as the primary research instrument to measure students' perceptions of their English teachers' TPACK competence. The instrument was adapted from Liu (2025), which was initially developed for teacher self-assessment. Modifications were made to shift the perspective from teacher self-evaluation to student assessment of their teachers.

Data Collection

Data were collected in June 2025 using paper-based questionnaires administered in classroom settings. Students were provided with sufficient time to complete the questionnaire and were encouraged to ask clarifying questions if needed. The researcher explained the

purpose of the study, assured participants of confidentiality, and obtained informed consent prior to participation.

The questionnaire had two sections:

1. **Section 1** – Demographic information (age, gender, faculty, background).

2. **Section 2** – Items assessing students' perceptions of teachers' TPACK competence. All 120 distributed questionnaires were completed and returned, resulting in a 100% response rate.

Data Analysis

The collected data were coded and analyzed using a statistical software. Descriptive statistics were used including mean scores and standard deviations. These were computed for each of the eight TPACK domains and overall scores. The interpretation of mean values followed the scale below:

- 4.50–5.00 = Very High
- 3.50–4.49 = High
- 2.50–3.49 = Moderate
- 1.50–2.49 = Low
- 1.00–1.49 = Very Low

The results were used to identify strengths and weaknesses in teachers' perceived TPACK competence and to highlight contextual challenges affecting technology integration in English language instruction.

Research Results

As mentioned above, the Likert scale was used to examine eight domains of TPACK in this research. The total mean scores are shown in Table 2, and the following sections explain the analysis results for each domain.

Table 1 Overall Perceptions of MCU Students Based on TPACK Eight Domains

Domains	Mean	Interpretation
Technological knowledge (TK)	3.42	Moderate
Pedagogical knowledge (PK)	3.54	High
Content knowledge (CK)	3.69	High
Pedagogical content knowledge (PCK)	3.69	High
Technological content knowledge (TCK)	3.44	Moderate
Technological Pedagogical Knowledge (TPK)	3.55	High
Technological pedagogical and content knowledge (TPACK)	3.40	Moderate
Contextual knowledge (XK)	3.38	Moderate
Total mean score of TPACK	**3.51**	**High**

The results of the study provide an insightful overview of how first-year Myanmar students at A university perceive their English teachers' TPACK competence. The overall mean score of 3.51 indicates a high level of perceived competence, suggesting that students generally recognize their teachers as knowledgeable and effective in integrating pedagogy and content with some degree of technology use.

Among the eight domains, Content Knowledge (CK) and Pedagogical Content Knowledge (PCK) both received the highest mean scores of 3.69, interpreted as high. This finding underscores students' confidence in their teachers' mastery of English subject matter and their ability to explain content using effective pedagogical strategies.

It also reflects the traditional strength of teachers in language instruction, where subject knowledge and pedagogy remain central. Similarly, Pedagogical Knowledge (PK) (3.54) and Technological Pedagogical Knowledge (TPK) (3.55) were also rated high, demonstrating that teachers are viewed as competent in lesson planning, classroom management, and adapting teaching strategies when incorporating technology.

In contrast, moderate ratings were found in areas directly related to technology: Technological Knowledge (TK) (3.42), Technological Content Knowledge (TCK) (3.44), Technological Pedagogical and Content Knowledge (TPACK) (3.40), and Contextual Knowledge (XK) (3.38). These results suggest that while teachers are willing to use technology, they may lack more profound expertise in selecting, integrating, and troubleshooting digital tools effectively. Furthermore, contextual barriers such as limited infrastructure, institutional support, or students' diverse cultural backgrounds may constrain technology integration.

The findings highlight a clear divide: teachers are strong in traditional pedagogy and subject knowledge but less confident in applying technology-rich strategies. This indicates the need for targeted professional development that emphasizes technological competence and context-sensitive approaches, ensuring that digital tools are meaningfully embedded into language instruction to enhance student engagement and learning outcomes.

Table 2 Technological Knowledge (TK)

Items	Mean	S.D.	Interpretation
My teacher is confident in using technology tools such as computers, tablets, and mobile devices for teaching English.	3.88	0.856	High
My teacher often avoids using technology because it is too complicated.	2.87	0.952	Moderate
My teacher likes using new technology tools for teaching.	3.66	0.855	High
My teacher finds it hard to fix tech issues during class.	3.30	0.820	Moderate
Overall	**3.42**	**0.87**	**Moderate**

Table 2 illustrates that the overall mean score for Technological Knowledge (TK) was 3.42 (SD = 0.87), interpreted as moderate. This indicates that while teachers demonstrate familiarity with basic digital tools, their overall technological competence remains limited. Students rated teachers highly for confidence in using standard devices such as computers, tablets, and mobile phones (M = 3.88) and for their willingness to adopt new technologies in teaching (M = 3.66). These results reflect a positive attitude toward technology integration and openness to innovation.

However, moderate ratings on avoiding technology due to complexity (M = 2.87) and difficulty troubleshooting technical issues during class (M = 3.30) suggest that teachers lack deeper technical proficiency. This limitation may hinder the seamless use of digital resources in instruction. Overall, findings highlight a need for targeted training to strengthen teachers' ability to manage technological challenges and confidently integrate tools in to English language teaching.

Table 3 Pedagogical Knowledge

Items	Mean	S.D.	Interpretation
My teacher designs lesson plans that help us learn English well.	3.80	0.763	High
My teacher often changes teaching methods to fit different learners' needs.	3.43	0.876	Moderate
My teacher is proficient in managing classroom dynamics to enhance student engagement in English learning.	3.36	0.887	Moderate
My teacher often uses students' feedback to improve his/her teaching methods.	3.56	0.858	High
Overall	**3.54**	**0.85**	**High**

The mean score for Pedagogical Knowledge (PK) was 3.54, interpreted as high. This suggests that students view their English teachers as effective in applying appropriate teaching strategies. Teachers were perceived as capable of designing lesson plans, adapting methods to meet diverse learner needs, and incorporating student feedback to improve instruction. These practices created a supportive and engaging classroom environment, fostering student comfort and participation. Overall, the findings highlight teachers' strong pedagogical competence, indicating that they are well-prepared to manage classrooms and implement strategies that enhance English learning outcomes.

Table 4 Content Knowledge

Items	Mean	S.D.	Interpretation
My teacher has a strong understanding of English grammar, vocabulary, and linguistic rules.	3.85	0.795	High
My teacher confidently answered the student's question about English rules.	3.77	0.807	High
My teacher often tries a new teaching method to teach English.	3.58	0.941	High
My teacher often uses new English material to teach English.	3.57	0.837	High
Overall	**3.69**	**0.85**	**High**

The mean score for Content Knowledge (CK) was 3.69, interpreted as high. This indicates that students perceive their English teachers as having a strong command of the subject matter. Teachers were regarded as knowledgeable in grammar and vocabulary, able to answer students' questions with confidence, and willing to introduce new methods and materials to support learning. Such competence reflects their ability to deliver lessons with clarity and relevance. Overall, the findings suggest that students hold a positive perception of their teachers' content knowledge, recognizing it as a key strength in English language instruction.

Table 5 Pedagogical Content Knowledge (Pck)

Items	Mean	S.D.	Interpretation
My teacher knows the best way to teach English different topic.	3.63	0.766	High
My teacher is good at correcting the mistakes students make in English.	3.79	0.809	High
My teacher explains English concepts in a way that is easy to understand.	3.75	0.713	High
My teacher uses different teaching methods to help students understand English.	3.57	0.926	High
Overall	**3.69**	**0.80**	**High**

The mean score for Pedagogical Content Knowledge (PCK) was 3.69, interpreted as high. This suggests that students view their English teachers as effective in combining subject expertise with appropriate teaching strategies to facilitate learning. Teachers were perceived as skilled in selecting effective methods for teaching various English topics, correcting students' mistakes, and explaining concepts in a clear and understandable way. They also demonstrated flexibility in using different instructional approaches to support comprehension. Overall, students held a positive perception of their teachers' PCK, recognizing it as a strength that enhances English language learning.

Table 6 Technological Content Knowledge

Items	Mean	S.D.	Interpretation
My teacher uses technology tools well to teach specific English language topics (e.g., grammar, listening, or writing).	3.62	0.832	High
My teacher finds it difficult to choose the right technological tools to teach English content.	3.28	0.935	Moderate
My teacher uses multimedia resources (videos, apps, games) to reinforce English language content.	3.42	0.833	Moderate
My teacher can easily find and integrate digital resources that fit with the lessons.	3.45	0.798	Moderate
Overall	**3.44**	**0.85**	**Moderate**

The overall mean score for Technological Content Knowledge (TCK) was 3.44 (SD = 0.85), interpreted as moderate. This suggests that while students recognize their teachers' ability to use technology for teaching English content, their competence remains uneven across specific practices. Teachers were rated high for effectively using technology tools to teach skills such as grammar, listening, and writing (M = 3.62). However, students perceived only moderate ability in selecting appropriate tools (M = 3.28), integrating digital resources into lessons (M = 3.45), and using multimedia materials such as videos, apps, and games to reinforce content (M = 3.42).

These findings indicate that teachers demonstrate basic proficiency in applying technology to content instruction but may struggle with aligning digital resources to specific pedagogical goals. Overall, students viewed their teachers' TCK as adequate but in need of improvement, particularly in resource selection and integration.

Table 7 Technological Pedagogical Knowledge

Items	Mean	S.D.	Interpretation
My teacher can adapt his/her teaching methods to technology that improves student learning outcomes.	3.49	0.778	Moderate
My teacher rarely adjusts his/her teaching strategies when incorporating technology into lessons.	3.39	0.792	Moderate
My teacher is skilled at using educational software or apps (e.g., Zoom, Microsoft Team, Google Classroom, Google Meet, Webex Meeting) to facilitate teaching.	3.70	0.763	High
My teacher feels comfortable integrating new technological tools into his/her daily teaching routine.	3.61	0.781	High
Overall	**3.55**	**0.78**	**High**

Table 7 shows that the mean score for Technological Pedagogical Knowledge (TPK) was 3.55 (SD = 0.78), interpreted as high. This suggests that students generally perceive their teachers as confident and competent in integrating technology into pedagogy. Teachers were rated high for their ability to use educational software and applications such as Zoom, Microsoft Teams, Google Classroom, Google Meet, and Webex (M = 3.70), as well as for feeling comfortable incorporating new digital tools into daily teaching routines (M = 3.61).

However, moderate ratings were given to items related to adapting teaching methods (M = 3.49) and adjusting strategies when integrating technology (M = 3.39). These findings suggest that while teachers are skilled in operating digital platforms, they may not fully optimize technology to transform pedagogical approaches or enhance student learning outcomes. Overall, students hold a positive view of teachers' TPK but see room for improvement in adapting strategies to maximize technology's impact.

Table 8 Technological Pedagogical Content Knowledge (Tpack)

Items	Mean	S.D.	Interpretation
My teacher can easily integrate technology, teaching methods, and content knowledge in English teaching.	3.53	0.798	High
My teacher finds it hard to combine technology with teaching methods to teach English effectively	3.23	0.965	Moderate
My teacher often uses online tools or apps to help explain English topics.	3.42	0.885	Moderate
My teacher often changes teaching methods to fit the technology use into lessons.	3.38	0.791	Moderate
My teacher can use the appropriate teaching methods and different technology tools to explain the English lessons	3.46	0.798	Moderate
Overall	**3.40**	**0.85**	**Moderate**

The overall mean score for Technological Pedagogical Content Knowledge (TPACK) was 3.40 (SD = 0.85), interpreted as moderate. This indicates that while students acknowledge their teachers' ability to integrate technology, pedagogy, and English content, the practice is not yet fully effective. Teachers were rated high for their ability to integrate these three domains in lessons (M = 3.53). However, moderate ratings were given for key aspects such as using online tools to explain English topics (M = 3.42), adapting teaching methods to fit technology use (M = 3.38), and applying diverse methods with appropriate digital tools (M = 3.46). These findings suggest that teachers can combine content, pedagogy, and technology but often do so at a basic rather than transformative level. Students perceive that greater effort is needed in adjusting strategies and employing digital tools more effectively to enhance English learning outcomes. Overall, teachers' TPACK competence is seen as moderate, highlighting room for improvement in seamlessly blending all three domains.

Table 9 Knowledge (XK)

Items	Mean	S.D.	Interpretation
My teacher adapts his/her teaching methods based on the specific needs and backgrounds of his/her students.	3.47	0.849	Moderate
My teacher finds it challenging to use technology effectively because of limitations in the classroom environment (e.g., lack of resources or support).	3.28	0.954	Moderate
My teacher modifies the use of technology to fit with the cultural and contextual factors of his/her students.	3.48	0.767	Moderate
My teacher feels that external factors, such as institutional policies or school resources, limit how he/she integrate technology into their teaching.	3.31	0.838	Moderate
Overall	**3.38**	**0.85**	**Moderate**

The overall mean score for Contextual Knowledge (XK) was 3.38 (SD = 0.85), interpreted as moderate. This indicates that students perceive their teachers as making some effort to adapt teaching methods and technology use to students' diverse needs and cultural contexts, but with noticeable limitations. Teachers were rated moderately for adapting instruction to students' backgrounds (M = 3.47) and modifying technology use to fit cultural and contextual factors (M = 3.48).

However, challenges emerged in areas influenced by external conditions. Teachers were perceived as constrained by classroom limitations, such as inadequate resources or technical support (M = 3.28), as well as institutional factors like policies or lack of infrastructure (M = 3.31). These constraints appear to reduce teachers' ability to integrate technology in ways that are contextually responsive effectively.

Discussion of the Research Findings

The results of this study reveal that students generally perceive their English teachers' TPACK competence positively, with an overall mean score of 3.51 (High). This suggests that teachers demonstrate solid subject-matter expertise and pedagogical skills, though their ability to integrate technology into instruction fully requires further development. These findings align with the premise of the TPACK framework (Mishra & Koehler, 2006), which highlights the importance of balancing content, pedagogy, and technology in effective teaching.

Among the eight domains, Content Knowledge (CK) and Pedagogical Content Knowledge (PCK) achieved the highest ratings (M = 3.69, High). Students recognized their teachers' strong grasp of English subject matter and their ability to apply instructional strategies that promote comprehension. This resonates with the findings of Suyamto et al. (2020) and Gamayao and Binas (2021), who emphasized that teachers with strong content expertise can more effectively select and adapt teaching strategies that enhance student learning. In English language teaching, PCK is particularly vital as it enables teachers to bridge complex linguistic concepts with practical pedagogy, ensuring that students not only understand language but also apply it meaningfully.

Pedagogical Knowledge (PK) (M = 3.54, High) and Technological Pedagogical Knowledge (TPK) (M = 3.55, High) were also rated positively. Students valued teachers' lesson preparation, classroom management, and the use of digital tools to support pedagogy. The relatively high TPK score indicates teachers' confidence in using platforms such as Zoom, Microsoft Teams, and Google Classroom, reflecting Chai et al.'s (2013) argument that effective TPK enhances student engagement by embedding technology into instructional methods. Nevertheless, challenges remain in fully exploiting digital tools for pedagogical adaptation, echoing Alotumi (2020) and Ilmi et al. (2023), who reported that many teachers are hesitant to transform teaching strategies to maximize technological potential.

By contrast, Technological Knowledge (TK) (M = 3.42, Moderate), Technological Content Knowledge (TCK) (M = 3.44, Moderate), and Technological Pedagogical Content Knowledge (TPACK) (M = 3.40, Moderate) were evaluated at only moderate levels. These findings suggest that teachers can use basic technological tools but encounter difficulties in applying them effectively to teach specific English content or in aligning them with pedagogy. Alotumi (2020) and Ilmi et al. (2023) similarly reported that teachers often lack confidence in selecting appropriate tools for particular instructional goals. Mishra and Koehler (2006) emphasized that genuine TPACK integration requires not just tool use, but thoughtful alignment of technology with both content and pedagogy, a process many teachers still find challenging.

The lowest score was assigned to Contextual Knowledge (XK) (M = 3.38, Moderate). While students noted that teachers attempted to adapt to cultural and situational needs, they also observed barriers such as insufficient resources, institutional policies, and infrastructural limitations. This finding affirms Petko, Mishra, and Koehler (2025), who stressed that contextual factors, such as policy environments, available resources, and student diversity, significantly shape the implementation of TPACK. Similarly, Tschonhens et al. (2024), Gozali and Cahyono (2022), and Heath and Moore (2024) argued that effective technology integration requires not only technical skills but also culturally responsive approaches that align instruction with students' socio-cultural realities.

Conclusion

To conclude, this study highlights that students perceive their English teachers' TPACK competence positively, with strengths in content knowledge, pedagogical content knowledge, and pedagogical strategies supported by technology. However, moderate ratings in technological knowledge, technological content knowledge, technological pedagogical content knowledge, and contextual knowledge indicate areas requiring further support. Consistent with prior research, the findings emphasize the importance of professional development, contextual awareness, and institutional support to strengthen technology integration in language classrooms. Ultimately, improving teachers' ability to balance

technology, pedagogy, and content within specific learning contexts will enhance student engagement and foster more effective English language learning experiences.

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Effect of Plyometric with Basketball Training Program on Leg Performance and Under the Basket Shot of Male Basketball Players in Ankang University

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Abstract

The purpose of this research is to study and compare the effects of plyometric training with basketball training program on leg performance and under the basket shot of male basketball players in Ankang University. The informants consisted of 15 basketball players from Ankang University who were purposively selected and participated in training for 8 weeks, 3 days per week. Measurements of leg muscle strength, leg muscle power, and under the basket shot were performed. Data were statistically analyzed, using mean, standard deviation, and a one-way repeated measures ANOVA at a statistically significant level of 0.05.

The results of the study found that the athletes' leg muscle strength, leg muscle power, and under the basket shot before plyometric training with basketball training program, between 4th week, 6th week, and after the 8th week, there was a statistically significant difference at the .05 level. The research results concluded that plyometric with basketball training programe can increase leg muscle strength and leg muscle power. This has led to an increase in the shooting ability of basketball players at Ankang University. However, further studies are needed to compare it with other forms of training.

Keywords: Plyometric Training, Basketball Training, Leg Performance, Under the Basket Shot.

Introduction

In February 2020, the General Office of the General Administration of Sport of China issued a notice on further strengthening basic physical training to compensate for long-term deficiencies in athletes' physical conditioning. The document highlighted persistent weaknesses in general and sport-specific fitness, which significantly hindered China's performance in major international competitions such as the Tokyo Olympics (China Sports General Administration, 2020). This reflects the relatively late development of systematic physical-training research and practice in China, resulting in a clear performance gap between Chinese athletes and their international counterparts. In sports where physical qualities dominate competition outcomes, teams with superior strength, endurance, and power often prevail at decisive moments. Therefore, the physical condition of Chinese athletes plays a

crucial role in determining China's overall competitiveness in the Olympic Games and future world-class events. Since the release of this national directive, sports organizations across provinces and universities have increased their focus on physical training, implementing various "fitness monitoring" and "special physical ability enhancement" programs. Basketball, although a technology-driven sport, requires a strong physical foundation to fully support technical execution in high-intensity matches. Modern basketball is characterized by rapid transitions, explosive movement, and unpredictable tactical situations, all of which place heavy demands on athletes' strength and power. From the perspective of competitive sports, physical training must emphasize practicality meaning that improvements in physical capacity must directly transfer to sport-specific performance outcomes.

In basketball, lower-limb strength and power are vital not only for enhancing vertical jump height and acceleration but also for maintaining shooting stability and accuracy. A strong lower body provides a firm base during shooting, enabling better postural control, smoother force transfer, and more consistent shot mechanics, even under defensive pressure or during unstable movements such as pull-ups or fadeaways. Enhanced leg power also enables quicker take-offs and higher release points in under-basketball shots, reducing the likelihood of being blocked and increasing the probability of successful scoring. Research has consistently shown a strong positive relationship between lower-body explosive strength and shooting performance. Ziv and Lidor (2010), in their comprehensive review of basketball shooting mechanics, emphasized that athletes with superior explosive abilities transfer force more efficiently from the lower to the upper body, resulting in more fluid and consistent shot execution.The skill of under-basketball shooting requires both technical proficiency and sufficient leg muscular performance to stabilize the body and maintain proper shooting angles. Dong Yilin (2020) highlighted that specialized physical training must be aligned with the technical demands of the sport, ensuring a smooth bridge between athletic ability and technical execution.

Plyometric training derived from the Greek words "plythyein" (increase) and "metric" (measure) is widely recognized as an effective method to develop explosive power by enhancing the Stretch-Shortening Cycle (SSC). The SSC mechanism allows muscles to store elastic energy during rapid eccentric contractions and release it during subsequent concentric actions, producing powerful and efficient movements. This is similar to compressing and releasing a spring to generate maximal output force in minimal time. Plyometric training closely resembles the dynamic movement patterns of basketball and is therefore considered a highly relevant method for developing sport-specific physical abilities (Cherni et al., 2019).

Recent studies in Thailand further support the effectiveness of plyometric training in basketball performance. For example, Boonhan and Boonhan (2023) found that an eight-week plyometric program significantly improved jump-shot accuracy at various shooting distances among basketball players. Their study reinforces the importance of lower-limb power in enhancing shooting consistency and supports the theoretical foundation of the present research.

Beyond basketball, evidence from other sports also demonstrates the strong benefits of plyometric interventions. Rachote, Kumpuang, and Chimwong (2024) reported significant improvements in leg muscle power and blocking skills in volleyball athletes following a plyometric program combined with elastic resistance and sandbag loading. Although conducted in a different sport, the neuromuscular mechanisms involved particularly the enhancement of the SSC are consistent with the requirements of basketball movements such as jumping, accelerating, and rapid directional changes.

Additionally, strength training in general enhances joint stability, reduces injury risk, and prolongs athletic careers. However, observations of daily training among male basketball players at Ankang College revealed clear deficiencies in strength, endurance, and lower-body stability. These weaknesses not only reduce competitive performance but also increase injury risk. Currently, training in many university basketball programs still focuses mostly on technical and tactical drills, with insufficient emphasis on specialized physical training (Wang Daocheng, 2020).

Therefore, more in-depth research on basketball-specific physical training is urgently needed. Wang Liang (2018) emphasized the importance of improving athletes' performance through scientific and well-structured training systems. Incorporating lower-limb muscular development into basketball shooting training is not only essential for enhancing overall athletic performance but also critical for improving shooting effectiveness during competition.

Objective

This study investigated the effect of plyometric training with basketball training on leg performance and under the basket shot of male basketball players at Ankang University.

Literature Review

The theoretical basis of Plyometric training mainly comes from the neuromuscular mechanism of the stretch-shortening cycle (SSC). When the muscle undergoes a rapid eccentric contraction (eccentric phase) and quickly transitions to a concentric contraction (concentric phase), the elastic energy stored in the tendon and muscle belly tissue is released, significantly improving athletic performance (Komi, 2003). This mechanism is the core of explosive power generation and the key feature that distinguishes enhanced training from traditional strength training. The main goal of plyometric training is to effectively enhance the body's speed-strength capabilities. According to its training principles, Yan Zhe (2018) explains that plyometric training stimulates muscle strength primarily through the stretch-shortening cycle. The power generated in plyometric exercises mainly comes from the natural elasticity of muscles and tendons, as well as the stretch reflex factors that are key to supporting a wide range of athletic movements. Plyometric training, also known as enhanced training, helps strengthen this elastic response, thereby enhancing the muscle's elastic potential and improving overall muscular power. In parallel with this improvement, the capacity for speed-strength development is also increased. Speed-strength refers to the ability to exert maximum force at maximum speed under low load conditions and represents a synergy between "speed" and "strength." Moreover, enhanced training improves not only muscle strength and contraction capability but also neuromuscular control. It develops tension reflex responses, coordination between synergistic and antagonistic muscles, muscle relaxation mechanisms, and adaptability to external tension

The fundamentals of basketball are based on skills that use the strength of the leg and back muscles, such as jumping and shooting, taking off to grab rebounds, breaking through and stopping, defensive sliding and quick counterattacks all rely on the explosive power and neural control ability of the lower limbs (Mehmet Emin Demir et al., 2022; Cherni et al., 2019). In basketball games, actions such as taking off to grab rebounds, breaking through and stopping, defensive sliding and quick counterattacks all rely on the explosive power and neural control ability of the lower limbs. Studies have shown that Plyometric training can

significantly improve the vertical jump height, sprint speed and direction change ability of basketball players, and is an important means of special physical training (Mehmet Emin Demir et al., 2022; Cherni et al., 2019). By activating the SSC mechanism and recruiting fast muscle fibers, the training effect can be transformed from "strength improvement" to "special performance improvement", realizing a true "training-competition transformation".

Applying Plyometric training to basketball is a novel attempt. To ensure the specificity and effectiveness of the training, this study scientifically selected the following representative exercises based on an extensive review of both domestic and international literature, as well as the technical requirements of basketball skills:

Squat Jump: Enhances vertical explosive power and simulates actions such as rebounding and jumping from a stationary position.

Box Jump: Improves joint stability and eccentric control.

Single-Leg Hop: Strengthens explosive power and muscular coordination in single-leg support situations.

Lateral Bound: Enhances change-of-direction ability and lateral defensive footwork.

Depth Jump: Activates the stretch-shortening cycle (SSC) mechanism to improve the efficiency of converting maximal strength into explosive power. (Voisin & Scohier, 2019; Cao et al. (2024)

Sirirat Hirunrat (2022) proposed the basic elements for establishing a training plan, which are as follows:

1. Training activities or programs must be consistent with training goals

The type of training activities or training depends on the training goals. The development of the training plan must according the training purpose. For example, the speed training plan must be a plan focused on improving speed, and the long jump training plan must be a plan that truly develops long jump ability.

2. Daily training duration (taking basketball as an example)

Athletes, especially basketball players, should train for 1-2 hours a day. However, it is important to consider the athlete's level of preparation. Training too long or too long can lead to a decline in physical function, causing muscle, tendon and joint injuries, and boredom during training. On the other hand, training that is suitable for the trainee can also improve training skills.

3. Weekly training cycle

Training time in a week Weekly training must include: the duration of daily training, the intensity and severity of the activities. Normally, the training time should be 3 days a week.

4. Activity intensity

When determining the intensity of an activity, one must consider the individual's musclestrength Training should follow the principle of going from easy to difficult, from light to heavy, and from local to whole body.

5. Duration of the entire training program

It is necessary to consider individual potential and respect the natural differences of individuals and their unique maximum ability limits. The coach should not force or rush the trainee to achieve better target results too quickly in a short period of time. Generally, a 4-6 week program of training 3 days a week will bring changes and development, including overall strength and explosive power.

6. Physical ability level

Before training is an important indicator for observing training effects Physical fitness assessment before training can clearly reflect physical changes after training. the training content should be adjusted accordingly. It is very important to test the athlete's physical ability

regularly throughout the training process. It can provide data support for the training plan, keep it synchronized with the athlete's physical fitness changes, and continuously optimize it, thereby promoting the athlete's continuous progress.

Based on the findings of this study, it can be concluded that the principles of training program development must be comprehensively studied and thoroughly understood. Coaches are required to carefully consider several key factors, including training objectives, duration, intensity, and the individual readiness of athletes taking into account aspects such as age, body weight, physical strength, and access to a safe and well-equipped training environment. It is essential that the training design aligns with the specific characteristics of the wrestling discipline and targets the appropriate muscle groups. This alignment ensures that the training program effectively meets the objectives of the study and can be further refined, developed, and applied to other related sports disciplines in a meaningful and evidence-based manner

Research Methodology

Study design
This quasi-experimental research design was conducted at Ankang University to explore plyometric with basketball training program on leg performance and under the basket shot of male basketball players. Before participation, individuals provided informed consent, having been fully briefed on the study's purpose and testing procedures. Participants were 15 male basketball players of Ankang University; they were purposefully sampled. They were doing plyometric with basketball training for 8 weeks.

Ethical consideration
All procedures of this study were approved by the Ethics Committee of the Ankang University of China Ethics Committee with approval number AKU-ROAU-EC-2025-HR-003

Materials and methods
A sample size was calculated following G*Power software version 3.1 Following preliminary data, the number of participants was determined based on the calculated effect size f = 0.90, α=0.05 and power $(1-\beta)$ = 0.95. The following criteria were used inclusion criteria: 1) Male basketball players of Ankang University, aged between 18 and 25 2) Have at least 1 year of experience in basketball training and competition 3) In good health, with no history of serious sports injuries and exclusion criteria: 1) History of severe knee or ankle injury 2) Have a current illness or injury for which you are receiving rehabilitation treatment or medication 3) Those who are unable to attend training and testing arrangements regularly during the study period.

Research Instruments
1. Plyometric with basketball training program developed by researchers for 8 weeks of training.

2. Leg dynamometer tester model: BCS-400 to test the strength of the leg muscles

3. Standing vertical jump to test the power of the leg muscles

4. Under the basket shot, according to the evaluation manual of the chinese basketball association.

The Research Instruments
To ensure the validity and reliability of the tools and procedures used in this study, the following steps were taken:

1. A Plyometric with basketball training program was presented to five experts in the fields of sports science and physical education. The 5 experts agreed that the program was appropriate and practical, obtained a consistency index from experts equal to 0.88,

and suggested improvements based on the experts' suggestions. The final version of the training program was adjusted and finalized before being put into practice. After that revised program was piloted with a group of 15 people with similar characteristics to the sample group to determine the suitability and feasibility of the program. After that introduced into the experiment.

2. Leg dynamometer tester model: BCS-400

3. Standing Vertical jump

4. Under the basket shot, according to the evaluation manual of the chinese basketball association found the reliability is equal to 0.83.

Data Collection

Data collection in this research was conducted by the researcher himself. The steps are as follows:

1. Contact the school of physical education of Ankang University in China to request cooperation in the research and provide convenience for the sample group. Explain the details of the training and experiment for understanding.

2. The researcher proceeded to request a certificate from the Research Ethics Committee to conduct research on humans

3. The researcher conducted a test on the sample group to enter the research process by dividing them into an experimental group to train for 8 weeks.

4. Perform 8 weeks of training as planned. The experimental group trained 3 days a week, Monday, Wednesday, and Friday, from 5:30 to 6:30 pm. Physical fitness tests of muscle strength and muscle power of both groups of subjects were conducted at week 4, week 6, and week 8.

5. The results of statistical analysis were summarized, the research results were discussed, and recommendations were made from this study.

Data Preparation and Analysis

In this study, the researcher used the SPSS statistical software program to analyze the test data. The procedures were as follows:

1. Calculate the mean and standard deviation of leg muscle performance and basketball shooting ability before and after training in weeks 4, 6, and 8

2. Use repeated measures one-way ANOVA to compare the differences in the mean values of physical fitness before training, after the 4th week, after the 6th week, and after the 8th week of training. If there are significant differences in the mean values of physical fitness across these time points, adjustment for multiple comparisons: Bonferroni. The statistical significance level was set at 0.05.

Research Finding

The results of the effect of plyometric with basketball training program on leg performance and under the basket shot of male basketball players at Ankang University. As follows.

Table 1 Mean values and standard deviations of the leg muscle strength, leg muscle power, and under the basket shot were analyzed at five stages: before training, after 4 weeks, after 6 weeks, and after 8 weeks of plyometric with basketball training program. (n=15)

Outcome	Leg muscle strength	Leg muscle power	Under the basket shot
	(mean±SD)	(mean±SD)	(mean±SD)
Before the test	136 ± 10.17	63 ± 5.90	9 ± 1.11
After training 4	142±8.45	67±5.11	11±1.17
After training 6	142±8.54	68±5.52	11±1.34
After training 8	144±8.02	70±5.69	12±1.17

From Table 1, it is found the beginning of the experiment, the average score of leg muscle strength ($\bar{X}$=136, S.D.=10.17). the fourth week, the average score had increased ($\bar{X}$=142, S.D.=8.45). the sixth week, the average score was ($\bar{X}$=142, S.D.=8.54). The last week, the average score had increased ($\bar{X}$=144, S.D.=8.02).

The first week was average score of leg muscle power ($\bar{X}$=63, S.D.=5.90). the fourth week, the average score had increased ($\bar{X}$=67, S.D.=5.11). the sixth week, the average score had increased ($\bar{X}$=68, S.D.=5.52). The last week, the average score had increased ($\bar{X}$=70, S.D.=5.69).

The first week was average score of under the basket shot ($\bar{X}$= 9, S.D.=1.11). the fourth week, the average score was ($\bar{X}$=11, S.D.=1.17). the sixth week, the average score was ($\bar{X}$=11, S.D.=1.34). The last week, the average score had increased ($\bar{X}$=12, S.D.=1.17).

Table 2 One-way analysis of variance (ANOVA) was performed on leg muscle strength, leg muscle power, and under the basket shot before training, after 4 weeks, after 6 weeks, and after 8 weeks. (n = 15)

Outcomes	Source of Variation	SS	Df	MS	F	p
Leg muscle strength	Training Duration	679.920	4	169.980	43.649	.000
	Error	218.080	56			
Leg muscle power	Training Duration	398.000	4	99.500	34.142	.000
	Error	163.200	56	2.914		
Under basketball shooting	Training Duration	71.333	4	17.833	22.160	.000
	Error	45.067	56	.805		

P≤ 0.05

According to Table 2, the comparison of leg performance and under the basket shot shows that the difference is statistically significant at the .05 level. The results of the correlation analysis between the duration of plyometric with basketball training program on leg performance and under the basket shot of male basketball players found that the training duration has a positive statistically significant correlation at the .05 level with leg performance, which is leg muscle strength, leg muscle power and under the basket shot.

Discussion/Conclusion

The findings of this study demonstrate that an eight-week integrated plyometric and basketball training program can substantially enhance leg muscle strength, leg muscle power, and under the basket shot accuracy among collegiate male basketball players. The progressive improvements observed across all testing intervals support the idea that structured neuromuscular training is essential for optimizing basketball performance.

First, the significant increase in leg muscle strength indicates improved motor-unit recruitment, neuromuscular coordination, and enhanced ability to generate maximal force under functional movements. This pattern aligns with Hammami et al. (2021), who reported similar gains in strength and reactive power among university athletes following combined plyometric–strength conditioning programs. The gradual improvement observed in each testing stage suggests that the volume and intensity of training were appropriate and allowed sufficient adaptation without causing excessive fatigue.

Second, the development of leg power, evidenced by the increase in standing vertical jump height, supports the effectiveness of the stretch-shortening cycle (SSC). Plyometric exercises enhance elastic energy storage and release, neuromuscular activation, and fast-twitch muscle fiber recruitment, producing more powerful lower-limb propulsion. These results are consistent with the findings of Ramirez-Campillo et al. (2022), who demonstrated that structured plyometric training significantly improves jump height, sprint performance, and overall explosiveness among young basketball and soccer athletes.

Third, the improvement in under the basket shot accuracy reflects successful transfer from physical conditioning to technical basketball performance. Enhanced leg performance, postural control, and proximal-to-distal energy transfer likely improved shooting mechanics, particularly in maintaining rhythm and accuracy during ground-up force production. Cao et al. (2024) similarly found that lower-limb stability and power meaningfully influence the consistency of shooting performance in university-level basketball players. concluded that plyometric with basketball training program can increase leg muscle strength and leg muscle power. This has led to an increase in the shooting ability of basketball players at Ankang University. However, further studies are needed to compare it with other forms of training.

This study concludes that plyometric with basketball training program is an effective and practical approach for enhancing athletic performance in male collegiate basketball players. Over eight weeks, the participants demonstrated consistent and statistically significant improvements in leg muscle strength, leg muscle power, and under the basket shot accuracy. These outcomes confirm that plyometric-based conditioning stimulates neuromuscular adaptations that directly support technical skill execution. The integrated model developed in this study provides an evidence-based approach that collegiate coaches can adopt to improve players' explosive capability and shooting efficiency. Furthermore, the results align with contemporary performance - enhancement theories emphasizing functional transfer between physical conditioning and basketball-specific skills.

Suggestion

1. Limited measurement variables: only leg muscle strength, leg muscle power, and shooting accuracy were examined. Future studies should include agility, sprint speed, balance, and biomechanical analysis (e.g., EMG, motion capture).

2. The study should expand the participant group to include female athletes and various age groups, and compare plyometric basketball training with strength training, balance training, or a combination of strength training methods.

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A Study on The Development Status of Campus Football in Anyi County, Nanchang City

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Abstract

This study aimed to 1) examine the status of campus football development in Anyi County, Nanchang City, 2) analyze the correlations among related factors, and 3) identify the main factors affecting its development. The research was Design a survey study conducted in five primary schools using stratified sampling by stakeholder role to 100 students, 20 coaches, 50 parents, and 18 school leaders. Questionnaire validity was evaluated by five experts with an IOC average congruence index of 0.80-1.00 and reliability was confirmed with Cronbach's alpha of 0.87. Statistical analyses included descriptive statistics, Pearson's correlation, and multiple regression.

The results showed structural imbalances: 73% of schools lacked special funds, 76% of PE teachers were not football majors, and only 25% of students participated out of genuine interest. Parental support was mixed, with 46% willing to invest 1,000-2,000 RMB annually, while 26% opposed participation due to concerns about academics (68%) and injuries (32%). Correlation analysis revealed that school support ($r = .72$, $p = .002$) and resource investment ($r = .81$, $p<.001$) were strongly associated with football development, while coaching quality had no significant effect. The regression model (Adj.R^2 =.811) confirmed that resource input ($\beta = 0.63$, $p<.001$) and school support ($\beta = 0.52$, $p<.001$) jointly explained over 80% of developmental variation.

The research shows that the dilemma of campus football in Anyi County stems from weak policy implementation, unbalanced resource allocation, and the gap between popularization and quality. Recommendations include establishing special funds with social capital, building a multi-level coach training system, strengthening safety through family-school-medical collaboration, and correcting parental biases via cultural promotion and financial incentives.

Keywords: Campus Football, School Support, Coaching Quality, Resource Investment, Parental Support, Primary School

Introduction

Since the Ministry of Education initiated the Campus Football Promotion Plan in 2014, the development of youth football in China has accelerated significantly. By 2023, over 52,000 football schools had been established nationwide, and the youth football population surpassed 50 million (Ministry of Education of the People's Republic of China [MOE], 2023). Despite these achievements, multiple challenges have emerged, particularly at the county level, where the implementation of campus football policies often falls short of expectations (Wang et al., 2022). The Chinese government has consistently emphasized the importance of youth football, issuing several policy documents such as the Overall Plan for the Reform and Development of Chinese Football, which stresses the need to "vigorously develop campus football," integrate football into school curricula, and increase student participation.

Nevertheless, regional disparities remain pronounced. For instance, while urban areas like Nanchang City have developed relatively mature competition systems, county-level regions continue to struggle with effective policy implementation (Tan, 2018). Anyi County, the only county in Nanchang City to achieve "full coverage of football on campus," paradoxically ranked last in citywide competitions, highlighting a disconnect between policy intentions and grassroots practices. The county exemplifies the dilemma of "high coverage but low competitive level," reflected in three main contradictions. First, there is a gap between resource investment and actual outcomes. Although a large proportion of football coaches possess professional backgrounds, more than half have limited years of coaching experience, resulting in insufficient systematic training and stagnation in tactical development. Recent studies confirm that the quality of preparation and the talent development environment are decisive factors for youth football performance, underscoring the gap between structural inputs and actual player outcomes (Yin et al., 2024). At the policy level, implementation conflicts have also been identified in Chinese youth football reforms, which contribute to uneven grassroots development and hinder the transformation from "popularization" to "quality improvement" (Peng et al., 2023).

Furthermore, although infrastructure has improved, rural schools continue to face inadequate facilities compared to urban counterparts. Second, contradictions arise between policy orientation and parental perceptions. Recent survey-based research has shown that many Chinese parents remain hesitant to support their children's football participation, primarily due to concerns about injury risks and potential conflicts with academic achievement, which directly undermines student enthusiasm and engagement (Tan, 2018). Such parental biases negatively impact student motivation, thereby limiting sustained participation. Finally, there is a mismatch between participation and intrinsic interest. Studies indicate that while school football has expanded in coverage, only a minority of students engage out of genuine interest, with many perceiving it as an obligatory school task. This dispersion of motivation weakens both intrinsic enthusiasm and the long-term developmental outcomes of campus football (Yin et al., 2024).

Comparatively, international models demonstrate more effective youth training systems. In Europe, UEFA emphasizes foundational development through initiatives like the Grassroots Charter and HatTrick Programme, promoting structured coaching pathways and grassroots engagement to build high quality youth pipelines (UEFA, 2021). In South Korea, scholarly research highlights that all professional clubs in the K-League are required to operate their own youth development systems as part of AFC licensing, playing a pivotal role in sustainable talent cultivation and structural improvement (Lee et al., 2022). In Japan, the "double pyramid" model implemented by the Japan Football Association (JFA) which

promotes broad participation alongside elite training is considered a culturally tailored strategy that maintains widespread engagement while channeling talented players into advanced development pathways (Japan Football Association, 2022). These international practices offer valuable insights for China in enhancing student engagement, optimizing talent development, and reinforcing its campus football training system.

Against this backdrop, the case of Anyi County illustrates the broader structural contradictions confronting campus football in Chinanamely, the prioritization of policy over implementation, hardware over software, and popularization over quality. Therefore, this study is both necessary and timely. It responds to the dual need of policy refinement, particularly in guiding counties to progress "from existence to excellence," and practical improvement, addressing the gap between widespread coverage and the need for qualitative development.

Objectives

1. To study the status of campus football development in schools in Anyi County, Nanchang City.

2. To analyze the correlation the development of campus football in Anyi County schools.

3. To analyze the factors affecting the development of campus football in Anyi County schools.

Literature Review

Development of Campus Football in China

Since the launch of the Campus Football Promotion Plan in 2014, China has made significant strides in promoting youth football. By 2023, more than 52,000 schools had been designated as football-specialized schools, and the number of student participants exceeded 50 million (Ministry of Education of the People's Republic of China [MOE], 2023). Despite rapid expansion, however, implementation has remained uneven across regions, particularly between urban and rural schools (Peng et al., 2023).

Policy Orientation and Implementation Challenges

The Chinese government has issued several landmark policy documents, including the Overall Plan for the Reform and Development of Chinese Football (General Office of the State Council, 2015), which emphasizes integrating football into school curricula and strengthening grassroots systems. Nevertheless, research indicates persistent gaps between national policy ambitions and local implementation, particularly in county-level areas where resource limitations and structural inefficiencies undermine policy effectiveness (Tan, 2018).

Coaching and Talent Development Environment

Coaches play a crucial role in advancing football development, yet many county-level coaches lack systematic training and sufficient professional experience. (Yin et al., 2024). found that the quality of preparation (HQP)within the talent development environment significantly influences youth football outcomes, underscoring that professional training for coaches and structured development pathways are vital. These findings highlight the necessity of not only investing in infrastructure but also prioritizing the human resource dimension of football development.

Parental Perceptions and Student Participation

Parental attitudes toward football strongly shape student motivation. In China, concerns about injury risks and the potential distraction from academics often lead to resistance against children's active participation in football (Tan, 2018). This phenomenon reflects cultural priorities that emphasize academic achievement over extracurricular activities. Consequently, student engagement in football is often driven more by external obligations than by intrinsic interest, limiting the sustainability of participation (Yin et al., 2024).

International Comparative Models

Globally, several models offer valuable insights for China's campus football system. In Europe, UEFA has emphasized grassroots development through structured youth pathways, ensuring a strong foundation for elite talent cultivation (UEFA, 2021). In Japan, the Japan Football Association (JFA) has implemented the "double pyramid model," balancing mass participation with elite training opportunities (Japan Football Association, 2022). Similarly, South Korea's K-League mandates professional clubs to operate youth teams at different age levels (U-12, U-15, U-18), ensuring systematic talent identification and continuity (Lee et al., 2022). These international experiences demonstrate the importance of coherent structures, professionalized coaching, and integration between school and professional systems.

Summary the literature reveals that while China's campus football has achieved impressive quantitative growth, qualitative challenges persist. Issues such as limited coaching capacity, parental resistance, and inadequate facilities in rural areas constrain the system's effectiveness. Lessons from Europe, Japan, and South Korea highlight the necessity of comprehensive development strategies that align policy, infrastructure, human resources, and cultural context. This review provides the theoretical basis for analyzing the dilemmas facing Anyi County and informs practical strategies for improving the quality of campus football at the county level in China.

Research Methodology

Research Design

This study quantitative research was design a survey study conducted in five primary schools using stratified sampling by stakeholder investigate the questionnaires to collect data from students, parents, PE teachers, and school leaders. This design allowed for both statistical validation and contextual interpretation of the development of campus football in Anyi County.

Population and Sample Size

The population comprised five primary schools in Anyi County, Nanchang City. Stratified random sampling was applied. A total of 220 questionnaires were distributed: 100 to students, 100 to parents, and 20 to PE teachers. After excluding invalid responses, 188 valid questionnaires were retained, yielding an effective rate of 96%. Additionally, 20 questionnaires were distributed to school leaders, with 18 valid returns (effective rate = 94%).

Research Tools

The main research instruments included: Questionnaires-developed for students, parents, and PE teachers. The questionnaires covered: Students: interest in football, participation, and satisfaction. Parents: perceptions, willingness to support, and financial input.

PE teachers: qualifications, teaching conditions, and coaching practices. School leaders: institutional support and policy implementation. Questionnaire validity was evaluated by five experts with an IOC average congruence index of 0.80-1.00. The reliability of the

questionnaires was evaluated using Cronbach's alpha, which reached an overall coefficient of 0.87 overall design.

Data Collection

Data collection was conducted according to the following process 1) the questionnairewas developed based on a comprehensive review of relevant theories, academic concepts, and empirical research, serving as reference materials, 2) the questionnaire was designed and distributed in classrooms and social media platforms (e.g., www.weibo.com, WeChat, QQ, www.wjx.cn), and 3) a stratified random sampling survey was conducted with 220 questionnaires respondents between March 2025 and April 2025.
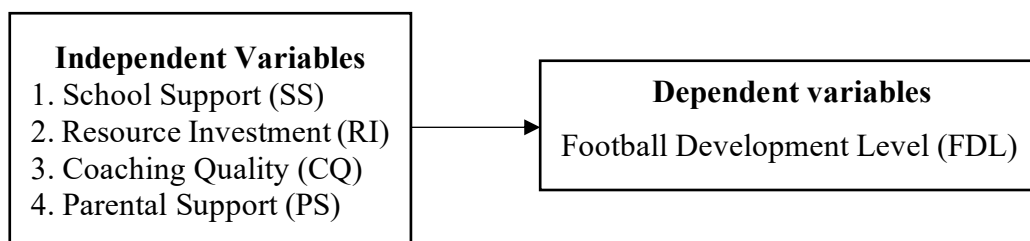
Data Analysis

Data analysis employed the following statistical methods analyzed using SPSS version 27: descriptive statistics, correlation analysis, and multiple regression. The model fit was tested using ANOVA (F-test), and reliability was confirmed with Cronbach's alpha (0.87).

Conceptual Framework

The conceptual framework of this study is based on the assumption that the development level of campus football (FDL) in Anyi County is influenced by four key independent variables: School Support (SS) including policy implementation, administrative attention, and institutional backing. Resource Investment (RI) covering infrastructure, funding allocation, equipment, and facilities. Coaching Quality (CQ) including teacher specialization, training experience, and instructional competence. Parental Support (PS) reflecting parents' attitudes, willingness to encourage participation, and financial contributions.

These variables are hypothesized to have both direct and indirect impacts on the dependent variable: Football Development Level (FDL) measured through student participation, quality of instruction, competition results, and sustainability of programs.

Independent Variables
1. School Support (SS)
2. Resource Investment (RI)
3. Coaching Quality (CQ)
4. Parental Support (PS)

Dependent variables

Football Development Level (FDL)

Figure 1: Conceptual Framework

Research Finding

The following presents the findings of the study, derived from the collected data and subsequent analysis.

1) To study the status of campus football development in schools in Anyi County, Nanchang City.

The development of campus football in Anyi County presents a significant structural imbalance: in terms of resource investment, 73% of schools rely on ordinary sports budgets for operation, and lack special funds for football resulting in only 30% of the venue maintenance rate, although 80% of the stadiums use artificial turf but it is difficult to use it sustainably (Table 1).

Table 1 Funds Invested in Physical Education and School Football in the Five Primary Schools Participating in The Survey (N=5)

Type of school	School name	Funds invested in sports (10,000/school year)	Specialised funds for school football (million/school year)
Public Schools	Anyi County Lo*** Primary School	3.0	2.0
	Anyi County Yat*** Primary School	2.5	1
	Anyi County No. 3 Primary School	2.1	None
	Anyi County No. 5 Primary School	2.3	None
	Anyi County Si** Primary School	1	0.5

According to Table 2, only Lo*** Primary School and Yat*** Primary School offer full-grade coverage, while other schools typically start in the second or third grade. The main reason for not implementing football courses in lower grades is pressure from middle school entrance examinations, leading some schools to replace highly competitive activities like football with non-confrontational courses such as gymnastics and track and field.

Table 2 Statistics Of Football Lessons in Each Grade in The Five Primary Schools Participating in the Survey (N=5)

School	Grades are offered	There are no grade levels
Anyi County Lo*** Primary School	One to six	not
Anyi County Yat*** Primary School	One to six	not
Anyi County No. 3 Primary School	Three to six	One, Two
Anyi County No. 5 Primary School	Two to six	One
Anyi County Si** Primary School	Three to six	One, Two

According to Table 3, it can be found that all five primary schools have built 11-a-side football pitches and 5-a-side football pitches, while 9-a-side pitches are mainly built by Lo*** Primary School, Yat*** Primary School and No.5 Primary School.

Table 3 School Football Field and Equipment in the Five Participating Primary Schools (N=5)

School	Football Pitches Site Specifications				Equipment	
	Turf Artificial	5 person	9 person	11 person	Goal	Football
Anyi County Lo*** Primary School	5	3	2	2	10	100
Anyi County Yat*** Primary School	4	2	2	2	10	90
Anyi County No. 3 Primary School	2	1	0	1	6	40
Anyi County No. 5 Primary School	1	2	1	1	8	60
Anyi County Si** Primary School	2	1	0	1	4	32

Table 4 shows that the number of physical education teachers in the five primary schools surveyed ranges from 5 to 12, which is in line with the requirement of one physical education teacher for every six to seven classes in junior high schools as stipulated in the "Trial Basic Standards for Physical Education and Health Conditions in National Schools" issued by the Ministry of Education and other departments. Physical education teachers in the five primary schools surveyed are predominantly male and female.

The physical education teachers in the five primary schools surveyed are mainly male, while the number of female physical education teachers is relatively small, but there are female physical education teachers in all the five primary schools surveyed.

However, all five primary schools surveyed have female PE teachers. In terms of academic qualifications, the physical education teachers in the five primary schools all have bachelor's degrees or above, of which 36 physical education teachers have bachelor's degrees and 10 have postgraduate degrees, which lays a good foundation for the development of school football.

Table 4 Physical Education Teachers in the Five Primary Schools Participating in the Survey (N=46)

School	N	Gender (male/female)	Academic qualifications (undergraduate/ postgraduate)	Speciality (football/others)
Anyi County Lo*** Primary School	10	8 Male/ 2 Female	8 Undergraduate/ 2 Postgraduate	4 Football/ 6 Others
Anyi County Yat*** Primary School	14	11 Male/ 3 Female	11 Undergraduate/ 3 Postgraduate	4 Football/ 10 Others
Anyi County No. 3 Primary School	8	6 Male / 2 Female	6 Undergraduate/ 2 Postgraduate	2 Football/ 6 Others
Anyi County No. 5 Primary School	8	7 Male / 1 Female	5 Undergraduate/ 3 Postgraduate	2 Football/ 6 Others
Anyi County Si** Primary School	6	5 Male / 1 Female	6 Undergraduate	2 Football/ 4 Other
Total	46	37 Male / 9 Female	36Undergraduate/ 10 Postgraduate	14 Football/ 32 Others

Table 5 shows that the major of the PE teachers in the five primary schools surveyed have more than five years of teaching experience, and the proportion reaches 72%. This can show that in the five primary schools surveyed, in terms of the teaching experience of physical education teachers, physical education teachers are rich in practical teaching experience, methods and means.

Table 5 Physical Education Teachers Teaching Experience in the Five Primary Schools Participating in the Survey (N=46)

Age of Physical Education Teachers teaching experience	Number of physical education teachers	Proportion (%)
1-5 years	13	28
5-10 years	12	26
10-15 years	5	11
15-20 years	11	24
More than 20 years	5	11
Total	46	100
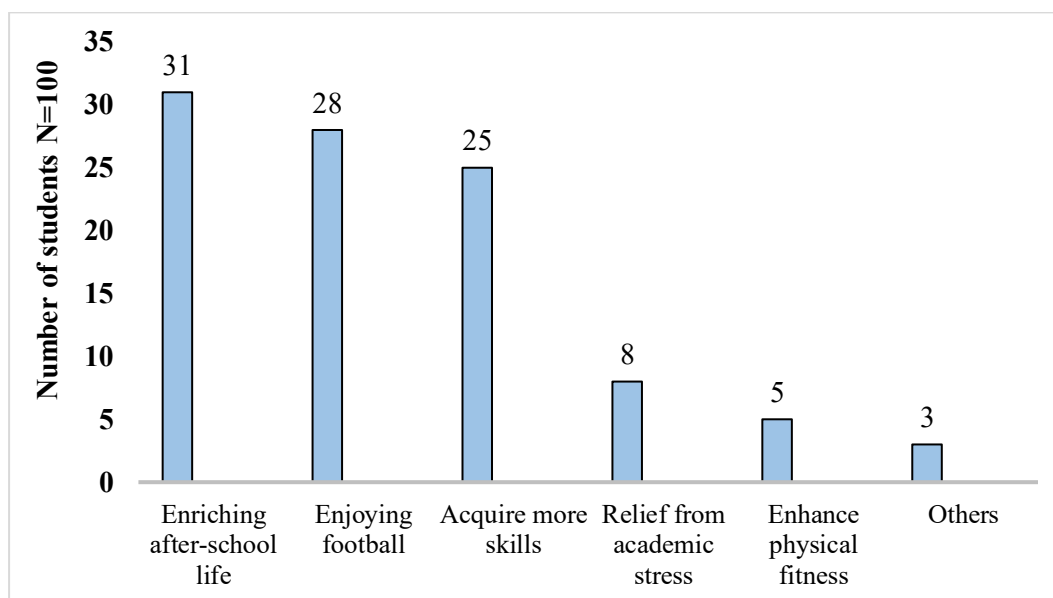
Figure 2: Students Motivation for Participating in School Football

Figure 2 shows that students participate in school football primarily to enrich after-school life (31%), followed by enjoying the sport (28%) and acquiring more skills (25%). Relief from academic stress (8%), enhancing physical fitness (5%), and other reasons (3%) are cited less often. Thus, the strongest motive is after-school enrichment, not intrinsic liking alone.

Table 6 Students Satisfaction with The Implementation of Football in Schools (N=100)

Satisfaction	Option	Number of students
Effectiveness of Campus Football Teaching	Excellent	68
	Good	28
	Poor	4
School football matches or activities	Often	71
	Occasionally	29
	No	0
Satisfaction with School Football Field Facilities	Very Satisfied	64
	Satisfied	27
	Unsatisfactory	9

Table 6 shows that students rate school football highly effective, with 68% "Excellent", 28% "Good", and only 4% "Poor". Matches/activities are frequent: 71% "Often," 29% "Occasionally," 0% "No." Facility provision earns very high satisfaction: 64% "Very satisfied," 27% "Satisfied," 9% "Unsatisfactory." Overall, across the five primary schools, teaching effectiveness, activity frequency, and facilities are all viewed positively, with satisfaction clustered at the top categories.

Figure 2 show parents willingness to spend on school football refers to the fact that parents support their childrens participation in school football and invest relevant expenses in their children's participation.
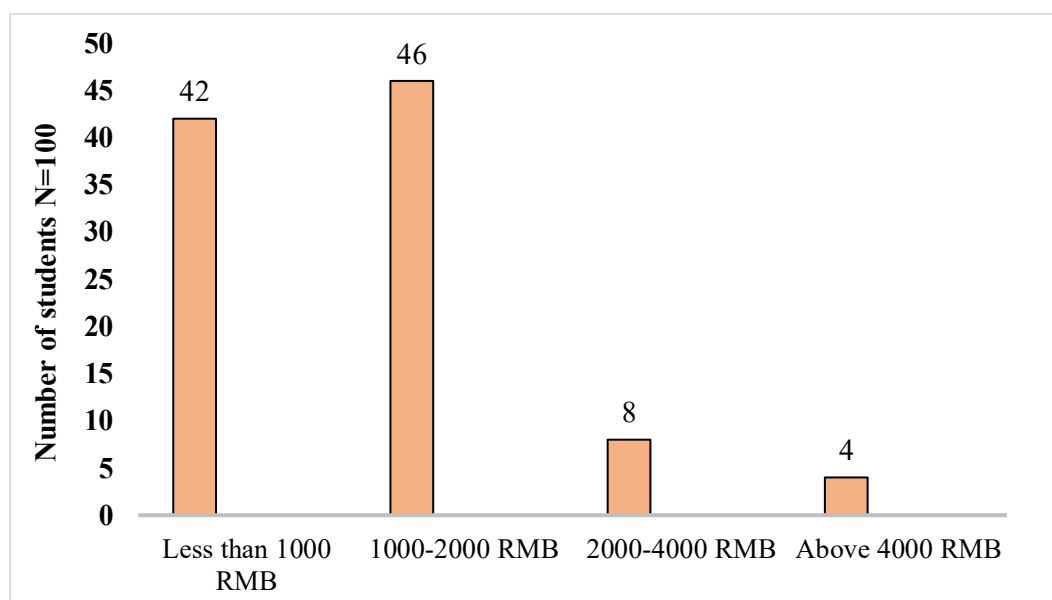
Figure 3: Parents Willingness to Spend on School Football (N=100)

Figure 3 shows that strong parental willingness to finance school football: 46% are ready to spend 1,000–2,000 RMB/year and 42%would spend <1,000 RMB/year, while only 8% and 4% would pay 2,000–4,000 RMB and >4,000 RMB, respectively. Overall support is high but concentrated at ≤2,000 RMB annually.

2) To analyze the correlation the development of campus football in Anyi County schools.

The Pearson correlation coefficients between the variables examined in the study. All reported correlations were statistically significant ($p<0.05$ or $p<0.01$).

1. There was a strong positive correlation between school support (SS) and football development level (FDL) ($r=.72$, $p=.002$, 95% CI0.61 to 0.83), explaining 52% of the variability ($R^2= .518$). For example, the participation rate of students in Longjin Primary School (SS=4.2), which is the most supportive, is 44%, while the participation rate of Primary School No. 6 (SS=2.8), which is the least supportive, is only 19%, confirming the decisive role of policy resources in popularity.

2. Resource input (RI) was the strongest predictor of development level ($r=.81$, $p< .001$), and the correlation coefficient of site quality (turf artificial vs grass field) reached. 75 ($p=.008$), which directly improved student satisfaction by 30%. However, the impact of Coaching quality was not statistically significant ($r=.24$, $p=.152$).

3. Parental support (PS) was only significantly correlated in the high-consumption group (annual expenditure>2000yuan $r=.48$, $p=.032$), and the overall weak correlation ($r = .31$) indicated the need to eliminate the cognitive bias that "affects academics".

Multiple regression further confirmed that school support ($\beta = 0.52$) and resource input ($\beta = 0.63$) could jointly explain 82.2% of the variation in developmental level (adjusted $R^2 = .811$), while the contribution of parent support was not significant ($\beta = 0.11$, $p = .241$).

Table 7 Pearson Correlation Coefficient (N=5)

Variable	SS	RI	PS	FDL
School Support (SS)	1			
Resource Input (RI)	.68**	1		
Resource Input (PS)	.49*	.52*	1	
Football Development Level (FDL)	.72***	.81***	.31*	1

Note: *$p < .05$, **$p < .01$, ***$p < .001$

3) To analyze the factors affecting the development of campus football in Anyi County schools.

Correlation analysis was a prerequisite for regression analysis, as the latter aimed to establish a quantitative relationship model between a dependent variable and one or more independent variables. If no correlation existed between variables, regression analysis would be meaningless. Only when a certain degree of correlation was present could regression analysis identify specific relationship patterns and predict or explain the dependent variable. In this study, the significant correlations between variables provided a foundation for further multiple regression analysis, which helped to explore causal relationships and influencing mechanisms in depth. The details are as follows:

The analysis of influencing factors (Aim 3) identified three structural contradictions: the lack of special funds due to weak policy implementation, the imbalance in resource allocation manifested in insufficient investment in site maintenance and teacher training (76% of non-professional teachers), and the disconnect between popularization and quality improvement was reflected in the fact that 26% of parents clearly opposed their children's participation due to "affecting academics" (68%) and "risk of injury" (32%). These contradictions are superimposed to form the essential dilemma of the development of campus football in Anyi County, which needs to be solved through comprehensive measures such as setting up special football funds, building a "school-district-provincial" stepped coach training system, and establishing a "home-school-medical" tripartite safety linkage mechanism.

After controlling for the nature of school running (public/private), the partial correlation coefficient between school support (SS) and football development level (FDL) remained highly significant (r = .69, 95%CI [0.61 to 0.77], p = .001), and the effect of resource input (RI) was also robust (r = .78, CI [0.70 to 0.86]).

The Bootstrap confidence interval validates the centrality of resource investment (RI→ 95%CI 0.73 to 0.89 for the FDL path), while the impact interval for coaching specialization contains zero values (CI -0.05 to 0.53), supporting the preliminary conclusion that it is not significant.

The multiple regression model (R^2 = .842) further confirmed that the normalized coefficient of resource input β=0.63 (p<.001) was about 1.2 times that of school support (β=0.52), and the two combined explanations for more than 80% of developmental variation, but neither parental support (β=0.11) nor coaching specialization (β=0.09) passed the. 05 significance threshold.

Table 8 Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.918	0.842	0.811	0.327

Table 9 ANOVA Analysis

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	28.631	4	7.158	67.042	.000**
Residual	5.361	15	0.107		
Total	**33.992**	**19**			

Table 10 Multiple Regression Analysis

Variable	B	Std. Error	Beta	t	Sig.
(Constant)	5.321	0.842	-	6.319	.000**
Resource Input (RI)	0.630	0.092	0.633	6.848	.000**
School Support (SS)	0.520	0.085	0.518	6.118	.000**
Parent Support (PS)	0.110	0.074	0.112	1.486	.241
Coaching Quality (CQ)	0.090	0.068	0.088	1.324	.152
R = 0.918 R^2 = 0.842	R^2adj. = 0.811		F = 67.042*		a = 5.321

Regression Equation
Football Development Level (FDL)=5.321+0.630(RI)+0.520(SS)+0.110(PS)+0.090(CQ)

Conclusion

This study analyzed the development of campus football in Anyi County by examining the relationships between school support, resource investment, parental support, coaching quality, and football development level (FDL). The results revealed three core findings.

First, resource input (RI) and school support (SS) emerged as the most decisive factors. Both showed strong positive correlations with FDL (r=.81 and r=.72, respectively), and the multiple regression model confirmed their significance, with resource input (β=0.63, p<.001) being about 1.2 times stronger than school support (β=0.52, p<.001). Together, these two variables explained over 80% of the variation in campus football development (R^2=0.842, Adj. R^2=0.811).

Second, coaching quality (CQ) and parental support (PS), although conceptually important, were not statistically significant predictors in this context (β=0.09 and β= 0.11, p>.05). This reflects a structural dilemma where hardware investment (fields, funds, and facilities) outweighs software investment (teacher specialization and family engagement).

Third, structural contradictions persist: weak policy implementation leading to lack of special funds, unbalanced resource allocation with 76% of PE teachers being non-specialists, and cognitive biases among parents, with 26% opposing children's participation due to concerns over academics (68%) and injuries (32%).

In conclusion, the development of campus football in Anyi County is shaped primarily by resource input and school support, while coaching quality and parental support remain secondary. To overcome the current dilemmas, comprehensive strategies are recommended, including establishing special football funds and introducing social capital, implementing a multi-level coach training system, creating a tripartite safety mechanism among families, schools, and healthcare providers, and correcting parental cognitive biases through cultural promotion and financial incentives.

Discussion

This section presents the discussion of the study, organized according to the research hypotheses, with details as follows.

The findings of this study indicate that the development of campus football depends heavily on resource investment (RI) and school support (SS). Both variables demonstrated strong positive associations with the football development level (FDL), jointly explaining more than 80% of the variance. This result is consistent with the literature, which emphasizes that resources (budget, facilities, and equipment) and institutional policy support are fundamental prerequisites for advancing campus football in China, particularly since the reforms initiated in 2015 (Peng et al., 2023).

At the national level, however, a "participation gap" remains evident despite extensive policy promotion. The China 2022 Report Card revealed that only about 24.6% of primary school students regularly participate in organized sports, with participation declining further across higher grades. This suggests that physical resource investment alone is insufficient without simultaneous improvements in curriculum design, time allocation, and students' intrinsic motivation in physical education (Liu et al., 2022). This aligns with the present study's finding that students' internal motivation to engage in football remains limited in many schools. The limited effects of coaching quality (CQ) and parental support (PS) in the regression model are also consistent with prior evidence. Studies have reported that many

Chinese primary school PE teachers lack specialization in football and that their health communication and instructional competencies require further strengthening (Chen et al., 2023; Yan et al., 2024). Such factors likely exert "qualitative and long-term" rather than immediate quantitative effects, which may not be detected in small-sample, district-level analyses.

Parental support also reflects mixed tendencies: while some families are willing to provide financial investment, others demonstrate cognitive biases related to academic performance and injury risks, thereby constraining participation. This finding corroborates broader literature showing that parental attitudes and social norms exert significant influence on youth physical activity behaviors, though such effects are highly sensitive to local context and the quality of facilities available. (Guo et al., 2025). Taken together, the causal evidence from this study (with RI and SS as the primary drivers, while CQ and PS are less significant) underscores the need for an integrated policy package.

Recommended measures include: (1) sustaining and expanding financial investment and maintenance of facilities and equipment; (2) designing a tiered training system to improve teachers' and coaches' professional competencies; (3) enhancing health and safety communication with parents to reduce concerns about academic trade-offs and injury risks; and (4) strengthening collaboration among schools, families, communities, and local authorities to build a supportive ecosystem for continuous participation. These recommendations align with recent policy-oriented research in China, which stresses that success depends on the integration of policy, resources, environment, and teacher capacity rather than reliance on any single dimension (Peng et al., 2023).

Suggestion

1. Suggestions for Research

1. The government should establish special school football development funds, allocate budgets for facilities, equipment, competitions, and teacher training, and ensure effective policy implementation at the school level through coordinated action between education and sports departments.

2. Schools should improve the quality and motivation of football teachers through systematic training programs while simultaneously reducing students' academic pressure, promoting the value of football participation, and fostering a supportive culture among parents, teachers, and the community.

2. Suggestions for Future Research

1. Future studies should include a larger number of schools across different regions or provinces to enable comparative analysis, thereby identifying whether the dominance of resource input and school support is consistent nationwide or varies by context.

2. Should adopt longitudinal or qualitative approaches (e.g., interviews, case studies, or intervention-based designs) to capture the long-term effects of parental support and coaching quality, which may not emerge clearly in short-term quantitative surveys.

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Guidelines for Evaluating the Economic and Social Returns of Fundamental Research Grant Projects, Fiscal Year 2025, Rajamangala University of Technology Lanna

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Abstract

This study aims to develop comprehensive guidelines and assessment tools for evaluating the economic and social returns of research projects funded by the Fundamental Fund at Rajamangala University of Technology Lanna. The assessment focuses on systematically measuring the empirical outcomes and impacts derived from basic research. The developed tools include a prototype economic and social return assessment program, a scoring rubric for selecting pilot projects, and an impact pathway diagram, which together facilitate a comprehensive analysis of the relationships between research outcomes and their resulting impacts. Application of these guidelines and tools to an actual research case study revealed a Social Return on Investment (SROI) ratio of 1:3.79, indicating that every 1 baht invested generated 3.79 baht in combined social and economic value. This result demonstrates the efficiency and value for money inherent in basic research investment. Furthermore, the developed tools proved effective in capturing and reflecting the value created within the specific context of Rajamangala University of Technology Lanna, whose vision emphasizes innovation for community development. The findings also highlight the importance of strengthening researcher capacity and supporting research projects that aim to generate sustainable socio-economic impact.

Keywords: Social Return on Investment (SROI), Fundamental Fund, Impact Assessment, Higher Education, University-Based Impact Assessment

Introduction

Research and development investment at the university level plays a crucial role in developing knowledge-based economies and fostering innovation, particularly in developing countries that rely on building competitive capabilities through knowledge and technology. However, measuring returns on research investment remains a significant academic and policy challenge, as most impacts are non-financial outcomes with complex causal relationships occurring across different timeframes (OECD, 2021).

In the Thai context, research budget allocation through the Fundamental Fund (FF) mechanism under the supervision of the National Research Council of Thailand (NRCT) aims to strengthen institutional research capacity, promote basic research, and create new

knowledge aligned with national needs (NRCT, 2023). Therefore, a monitoring and evaluation system capable of demonstrating concrete investment value is essential.

Social Return on Investment (SROI) assessment has gained increasing attention as an approach to measuring research and innovation investment impacts, as it encompasses both economic and social outcomes, particularly for universities with missions to benefit local communities and society.

Rajamangala University of Technology Lanna (RMUTL) is a higher education institution with a specific role in Thailand's higher education system, committed to becoming "a university for technology development and innovation promotion for grassroots economy" (RMUTL, 2023). The university's unique characteristics reflect its potential to create local community impact, strategically positioned in the northern region with diverse economic activities ranging from agriculture, processing industries, tourism, and creative economy.

This study aims to assess economic and social returns from FF investment at RMUTL using the SROI approach, analyze research project impacts on grassroots economic development and human capital in the north, develop a prototype return assessment tool applicable to other universities, and propose policy recommendations for enhancing national-level research investment impact assessment.

Literature Review

Social Return on Investment Concept and Framework

Social Return on Investment is an evaluation methodology derived from cost-benefit analysis, first applied by The Roberts Enterprise Development Fund in the United States in 1997 [Nicholls et al., 2012]. The fundamental principle of SROI is to broaden the scope of return assessment beyond purely financial metrics to encompass social and environmental values. Unlike traditional evaluation tools, SROI emphasizes stakeholder engagement in identifying and valuing the outcomes produced, subsequently translating these social outcomes into monetary terms. This process aims to quantify the social and economic value generated for every unit of investment, necessitating in-depth analysis and collaborative efforts with diverse stakeholder groups.

In both domestic and international contexts, the application of SROI has evolved with various approaches to enhance assessment completeness. For instance, a study by the Thailand Development Research Institute proposed integrating SROI with a Relative Impact Index for research project evaluation, particularly when certain outcomes cannot be fully monetized. Internationally, the Organisation for Economic Cooperation and Development Emphasizes the use of its criteria-relevance, effectiveness, efficiency, impact, and sustainability-in conjunction with SROI to ensure a more comprehensive and balanced assessment. These five dimensions are recommended as a "framework for reflection" rather rather than solely for scoring, demonstrating SROI's capability to integrate with broader evaluation frameworks to address the complexities of investment impacts effectively.

Research Impact Assessment in University Context

The literature indicates that assessing the returns on research investment within university contexts presents several specific challenges [Kampanart et al., 2023]. These include the complexity of impact pathways, which often involve non-linear relationships between research outputs and outcomes; the time lag inherent in realizing real-world impacts, which often occur long after project completion; and the difficulty in attributing specific impacts directly to particular research projects. To address these challenges, the National Science and Technology Development Agency in Thailand

introduced a guideline utilizing a Logic Model alongside Counterfactual and Contribution concepts. This approach emphasizes collecting direct outcome data from beneficiaries and calculating "value added" to determine true impact. The guideline aims to establish a" ommo' standard for measuring and reporting NSTDA's performance, particularly across economic, social, and environmental dimensions, reflecting concerted efforts to develop appropriate mechanisms for assessing research impact within research organizations.

Case Study Context: Research Investment from Fundamental Fund at Rajamangala University of Technology Lanna

To illustrate the complexities and specific characteristics of university research projects and the necessity for developing a tailored SROI assessment tool, this study selected the "Research and Development of a Patient Lifting Device to Assist Standing and Ambulation for Bedridden Patients, the Elderly, and Persons with Disabilities" as its primary case study. This project received Fundamental Fund support in the 2025 fiscal year, led by Asst. Prof. Dr. Phakphoom Jarupoom and team. Operating under Research Framework 1, which focuses on developing an ecosystem to support an aging society and medical innovations, its core objective is to design and develop a safe prototype device to aid standing and walking for the target beneficiaries, with an emphasis on evaluating its quality and safety in real-world contexts.

This case study further aims to analyze the readiness of such research projects to generate measurable economic and social outcomes and their potential for in-depth SROI analysis, aligned with principles from Social Value International and the OECD-DAC framework. It also seeks to propose development pathways to meet SROI assessment criteria effectively. The project's inputs primarily comprise budget allocations for personnel and equipment, utilizing specialized tools such as laboratories, CAD/3D systems, and simulation software. Key activities include pilot testing with target groups, developing and testing four functional models, and conducting two knowledge transfer workshops. Expected outputs include one device prototype, a user manual, a pending patent, and an academic article, all of which will be crucial data for constructing the Impact Pathway and Logic Model for SROI assessment.

Research Conceptual Framework

Drawing from the aforementioned literature, this research adopts an integrated conceptual framework. It utilizes the Theory of Change to delineate the pathways from research activities to actual economic and social impacts, combined with a Logic Model to systematically link Inputs, Activities, Outputs, Outcomes, and Impacts. Furthermore, the 6-step SROI framework by Social Value UK serves as a primary guide, integrating the Impact Value Chain concept to track both short-term and long-term effects. This blended approach is designed to develop a comprehensive, evidence-based guideline and tool for assessing the economic and social returns from research investment. This framework is specifically tailored for application within the context of Rajamangala University of Technology Lanna and serves as a replicable model for other higher education institutions.

Research Methodology

Evaluation Framework

The underpinning evaluative paradigm for this research is the six-stage Social Return on Investment framework, a standard articulated by Social Value UK and Social Value International. This comprehensive framework necessitates several key steps: delineating the scope and identifying pertinent stakeholders, systematically mapping anticipated outcomes, specifying both outcomes and their corresponding financial proxies, executing a net impact assessment, computing the SROI ratio, and formally disseminating the findings. This structured methodology serves as an essential foundation for the design of data acquisition strategies, analytical procedures, and the formulation of evidence-based policy recommendations, ensuring a precise representation of the value created by projects financed through the Fundamental Fund.

Population and Sampling

The investigative population comprises all fifteen Fundamental Fund research projects sanctioned during the 2025 fiscal year at Rajamangala University of Technology Lanna, each having concluded its stipulated one-year funding cycle. The selection of the focal case study was executed via a rigorous, criteria-driven methodology, employing a tailored Scoring Rubric to gauge project aptness and rank them for subsequent SROI assessment. The project garnering the highest score, titled "Research and Development of a Patient Lifting Device to Aid Standing and Walking for Bedridden Patients, the Elderly, and Persons with Disabilities," was consequently designated as the principal case study for exhaustive analytical scrutiny.

Research Instrumentation

The research instruments were meticulously crafted through a three-phase developmental sequence: the conceptualization of the SROI evaluation framework, the subsequent development of the instruments themselves, and their iterative testing and refinement. These instruments are categorized into two principal groups. The first group encompasses a Scoring Rubric, characterized by eight weighted criteria assessed on a 0-5 scale, employed for the systematic selection of research projects. The second group consists of tools designed for data collection and outcome analysis, which utilize Impact Pathway diagrams to illustrate the logical relationships between project activities and their ensuing impacts, and subsequently to financialize these outcomes for the precise calculation of SROI.

Data Analysis

Data analysis was conducted across two primary tiers: initially, the evaluation of scores derived from the Scoring Rubric to pinpoint the pilot project, and subsequently, the rigorous analysis of outcome data pertinent to SROI calculation. Information garnered from interviews, questionnaires, and Impact Pathway diagrams underwent structural analysis to elucidate relationships and isolate project-specific impacts. The SROI was computed by converting quantifiable outcomes into monetary values through the application of established financial proxies, followed by adjustments for displacement, attribution, and deadweight, and finally, by comparing these adjusted values against the aggregate project costs to determine the SROI ratio, which reflects the project's overall socio-economic efficiency.

Data Quality Assurance

Stringent data quality protocols ensured accuracy, reliability, and consistency throughout the research process. All instruments adhered to international guidelines, undergoing rigorous expert review for validity and comprehensiveness. Data reliability was

further substantiated via triangulation of findings and stakeholder corroboration. To mitigate potential biases, open-ended questions were integrated into questionnaires and interview protocols, alongside diverse sampling methodologies. All collected data were electronically archived, ensuring security and transparency.

Research Finding

Development of Social and Economic Impact Assessment Tools

This research systematically developed three distinct sets of social and economic impact assessment tools specifically tailored for fundamental research projects. These instruments are designed to facilitate a comprehensive evaluation of the intrinsic social value generated by such projects, encompassing perspectives from both researchers and external stakeholders. The development aligns with established theories of change and internationally recognized impact assessment methodologies, detailed as follows:

Tool 1: Project Suitability Assessment for Social and Economic Return Evaluation. This instrument's primary objective is to systematically identify and select research projects optimally suited for a pilot Social Return on Investment assessment. The selection process considers the project's potential to generate economic and social impact, including factors such as revenue generation, efficiency improvements, and enhancement of quality of life.

Tool 2: Outcome Analysis Toolkit. This comprehensive toolkit is designed for the systematic identification, collection, analysis, and interpretation of project outcomes. It specifically emphasizes elucidating the causal relationships between project outputs, intermediate outcomes, and ultimate impacts, thereby reflecting transformative changes at individual, target group, or community levels.

Tool 3: Interviews and Focus Group Discussions for Fundamental Research Impact Assessment, supplemented with Questionnaires. This dual-purpose instrument facilitates both qualitative and quantitative data collection. In-depth interviews and focus group discussions are crucial for understanding the intricate causal linkages among outputs, outcomes, and impacts, while questionnaires are employed for gathering quantitative data necessary for statistical processing and methodological triangulation.

Case Study Project Evaluation: "Research and Development of a Patient Lifting Device to Aid Standing and Walking for Bedridden Patients, the Elderly, and Persons with Disabilities"

Following the development of the social and economic impact assessment tools, these instruments were applied and validated through a comprehensive evaluation of a designated case study project. This project, titled "Research and Development of a Patient Lifting Device to Aid Standing and Walking for Bedridden Patients, the Elderly, and Persons with Disabilities," received funding from the Fundamental Fund during the 2025 fiscal year. It was conducted over a one-year period with a total budget allocation of 420,000 Thai Baht. The primary inputs for this project comprised the aforementioned financial support of 420,000 Thai Baht and the specialized knowledge and skills contributed by the research team from Rajamangala University of Technology Lanna.

The core activities of the project focused on the design and development of a prototype device engineered to safely assist bedridden patients, the elderly, and persons with disabilities in standing and ambulating. Significant emphasis was placed on developing a prototype that is contextually appropriate for real-world application in community settings, hospitals, or rehabilitation centers, alongside rigorous evaluation of its quality and safety standards.

The research and development activities of this case study project yielded several significant tangible outputs, which serve as foundational elements for subsequent outcomes and impacts. These outputs include a functional prototype of the patient lifting and ambulation

assistance device, ready for pilot testing and practical application. Furthermore, the project developed novel methodologies or conceptual frameworks for lifting system design, established a new database compiling data from actual device testing, and formulated a cost-effectiveness analysis framework. These tangible outputs demonstrate a clear potential for utilization by patients, caregivers, and relevant organizations, thereby initiating behavioral changes or improvements in living conditions, ultimately leading to broader outcomes and impacts.

The case study project demonstrably generated clear social outcomes through the deployment of its prototype product, reflecting positive changes for patients, the elderly, and caregivers. These outcomes include a reduction in caregiver burden, alleviating physical and psychological strain associated with assisting patient mobility; a decrease in patient risk, specifically mitigating the risk of falls or injuries during movement; and enhanced rehabilitation efficiency, facilitating a more effective rehabilitation process for patients. Upon conversion into monetary values, the aggregated social returns for these outcomes amounted to a total of 1,799,807.77 Thai Baht. The Net Present Value (NPV) was subsequently calculated based on the validated SROI ratio of 3.79 and the total project investment of 420,000 Thai Baht. The resulting NPV amounted to 1,171,800 Thai Baht, demonstrating that the project generated substantial net benefits beyond its initial investment.

Sensitivity Analysis

Additionally, a sensitivity analysis was conducted to assess the robustness of the SROI calculation. Two scenarios were simulated: a 10% increase in project costs and a 20% reduction in the duration of realized benefits. The SROI ratios remained substantially high, registering 3.90 and 3.43 respectively. These results underscore the resilience of the evaluation model and the sustained potential for the project's impact, even under less favorable conditions.

Discussion/Conclusion

SROI Calculation Analysis in Basic Research Context

The social return on investment analysis for the fundamental research project, "Research and Development of a Patient Lifting Device to Aid Standing and Walking for Bedridden Patients, the Elderly, and Persons with Disabilities," revealed an SROI ratio of 3.79. This positive value is satisfactory when compared to the allocation of fundamental research budgets. This figure is consistent with DASTA's SROI report of 3.8 and falls within the general target range for development projects, which is typically between 3 and 5. However, this result may differ from the average SROI for fundamental research at Rajamangala University of Technology Lanna due to the nature of fundamental research, which often has long-term impacts and requires follow-up from multiple sectors. This aligns with the recommendations of Suwanna Kampantong et al., who state that SROI assessment alone may be insufficient without a strong supporting data system.

Key Findings on Return Distribution

The balanced distribution of returns across economic, social, and educational dimensions confirms the university's role in creating value in both economic and social spheres. This supports the concept of "Innovation University for the Community" and reflects success in promoting grassroots economy and developing the potential of researchers through fundamental research grants.

A crucial factor contributing to success is the involvement of research beneficiaries from the project's inception. This aligns with the recommendations of Kampantong et al.,

who emphasize the importance of co-creating a research agenda between researchers and beneficiaries from the early stages. Projects with high SROI often involve co-design with research beneficiaries, clear technology transfer mechanisms, and support for impact monitoring after technology transfer.

This research assessed the social return on investment for fundamental research funding at Rajamangala University of Technology Lanna, using the case study "Research and Development of a Patient Lifting Device, etc." which showed that the project generated satisfactory economic and social returns, with an SROI ratio of 3.79. The balanced distribution of returns in both economic and social dimensions reflects the university's crucial role as an "Innovation University for the Community" in creating value to develop the grassroots economy and enhance human capital in the northern region.

Key success factors include co-designing projects with research beneficiaries from the outset, clear technology transfer mechanisms, and support for post-transfer impact monitoring. The study highlighted the distinction between the characteristics of fundamental research funding and strategic funding, which has significant implications for determining appropriate research budget allocation policies for each type of funding.

Proactive Recommendations for Driving Value from Research Investment

University-level Recommendations: Universities must accelerate the development of an integrated research impact monitoring system, incorporating SROI and Theory of Change from the outset. This will enable continuous outcome assessment, strengthen personnel capacity for policy impact measurement, and enhance efficiency, thereby maximizing research investment value.

Policy-level Recommendations: Policymakers must use SROI as a decisive criterion for budget allocation, assigning up to a 30% weight for project renewal, and create powerful incentives for high SROI projects. Budgets must also be allocated for long-term monitoring and to establish a Thai proxy data repository as a national standard for future research evaluation. These mechanisms are crucial to drive research investments to maximize tangible benefits for society and the nation.

Future Research: Future research must focus on long-term monitoring and comparative studies across universities to extract lessons on success factors. The development of predictive impact models using Big Data/ML will be an indispensable tool for accurate foresight. SROI application should be rapidly expanded to other types of research funding, and a real-time impact assessment system developed to enable data-driven, timely decision-making. real-time impact assessment system development for project adjustment during implementation.

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The 2CTE Model: A New Approach to AI Skill Training for Local Enterprises

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Abstract

Thai local entrepreneurs suffer from a digital skills gap standing in the way of their online competitiveness, which is exacerbated by generative AI. This research has attempted to confront this problem with the following objectives: 1) Create the 2CTE model, a new workshop mode for technology training of skills for local entrepreneurs, aimed at resolving Basic digital illiteracy limitations to compete adequately. 2) to conduct a hands-on workshop, integrate the 2CTE Model as training entrepreneurs in Ubon Ratchathani province on the use of AI, present new ideas, and generate digital content with product advertising images. The workshop used the curated generative AI tools, and results were judged through an entrepreneur satisfaction survey. The results were highly positive. The mannose model was well validated by experts. The workshop attendees reported being delighted with the AI-generated images, stating that they were especially appealing in terms of quality ($\bar{x}$= 4.80) and speed of content development ($\bar{x}$=4.73). The latter led to high positive contentment ($\bar{x}$=4.60) and empowering that minimized dependence on the professional designers. In summary, the 2CTE Model has proven to be a successful model for addressing the AI knowledge and skills gap. Similarly, it efficiently applies the adoption model and the TAM in the practical marketing of local products. It can also be effectively applied to community development projects. The most notable contribution of this study is the innovative merging of two theories, the Technology Acceptance Model (TAM) and the Elaboration Likelihood Model (ELM), to practical teaching. This specialized knowledge enables community developers to address the digital divide by promoting psychological adoption of technology and empowering them to build persuasive branding. This is a sustainable approach to upgrading local organizations into digital organizations. In summary, the 2CTE Model is a verified effective framework for filling the AI skills gap. It effectively adopts technology acceptance and training modes for local enterprises about practical marketing, and should be further utilised in community development projects.

Keywords: 2CTE Model, Generative Ai, Technology Adoption, Local Entrepreneurs

Introduction

The digital marketplace has transformed the way things are bought and sold in today's world, and product sales on the Internet have exploded. The acceleration and growth of social commerce is most evident in Thailand, where gross merchandise value from the social commerce market will be valued at a sizeable 49 billion USD by 2025 (Statista, 2023). This digital renaissance is not only providing entrepreneurs and brand owners with unprecedented opportunities, but also challenges that keep changing so rapidly and require continual adjustments. This represents a significant hurdle for Thai businesses which, especially the local SMEs who are mostly business owners and entrepreneurs in the older grouping and lacking IT skills, means they find it challenging to produce engaging advertising that can generate brand awareness. They can't make the sorts of imagery and text necessary for web sites, so they lose out on the chance to compete and claim a piece of that rich pie some quality local products made right here end up underrepresented in digital space.

This digital divide in skills is well reported as a constraint for SMEs in Thailand. Studies consistently show that most entrepreneurs in the region do not have basic digital literacy skills to compete effectively (Rattanasiripong & Thongdee, 2022). And, this shortfall is usually worsened by the lack of understanding in digital marketing (Promsaka & Pengnate, 2022) and technical skills to develop attraction on the internet content (Panyasorn & Sirichote, 2023). The skills gap is far from a trivial matter; it significantly affects firm survival and competitiveness and hampers the performance of online sales in an overcrowded social commerce market (Techawasin & Jaroen, 2024). This lack of skills is consistent with national-level findings on the major challenges in implementing e-commerce among Thai SMEs (Digital Economy Promotion Agency, 2023). This issue is substantially supported by the researcher's initial research in Ubon Ratchathani Province from a local academic service project. The field survey verified that local entrepreneurs in general do not possess the technology skills, as they are being solely for production and do not have the idea of branding and also marketing communications. This challenge is often demographic: some organizations have a population consisting almost entirely of seniors, and others with children and grandchildren building online channels for them but despite best intentions they simply do not have the capacity to house consistent content (nor the skills to do so strategically) on their own. But the rapid development of new tools, particularly generative AI, offers both a difficult problem and an exciting opportunity to address. Most of the traditional training methods cannot efficiently solve the issues of technology fear and the strategic mindset for successful brand building, nor cultivate a good attitude for willing to learn new technical tools. This in turn demands a new, fit-for-purpose form of training to walk the enlightened entrepreneur from fearfitful to empowering.

So, to address this issue, this study created and evaluated a new 2CTE model. This new workshop format is designed to raise awareness of the benefits and value of technologies that are easily accessible and usable by local entrepreneurs, and make the use of AI tangible for them. The main goal of the model is to increase the skills and abilities of these key participants for digital success – developing, designing & writing a successful local product brand, data analysis on effective business and promotional plans ability, attracting high quality professional-looking commercial promotional content mentality. The contribution of this study is that the model developed in the research process was confirmed to be functional and replicable, as it serves as a tool to enable entrepreneurs (who are local people) for sustainable economic improvement and preserve traditional craftsmanship for the future under Thailand's lively digital economy.

Literature Review

1. Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM) is an established model for explaining how users accept new technology. "A fundamental assumption behind TAM is that perceived usefulness (PU)-how much a person believes that using a particular system will help him/her to attain gains in job performance-and perceived ease-of-use (PEOU)-the degree to which they believe that using it would be free of effort-are the main determinants of his or her Attitude Toward Using. In their turn, this attitude influences their Behavioural Intention (BI) to use the technology, which is a direct predictor of Actual Use (AU) (Prabowo et al., 2020).

Although the model has been invented and proposed for a long time, it remains a practical tool in today's marketing environment. A systematic review in the recently published bibliometric analysis by Musa et al. (2024) of over a thousand publications from 2002 to 2022 confirms this, revealing an upward trend in marketing research employing TAM, particularly in emerging areas like mobile and online marketing. This continued application underscores TAM's status as a robust and essential framework for analysing technology adoption behaviours in both academic research and practical settings.
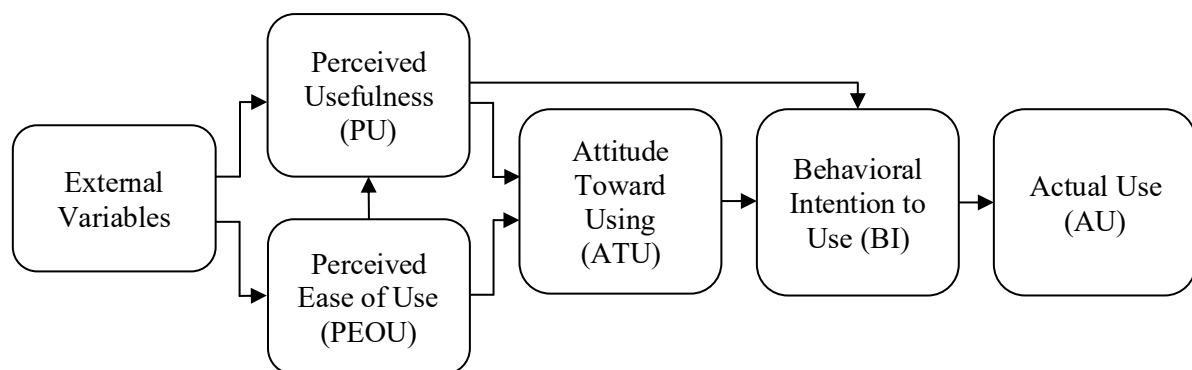
Figure 1: The TAM model. (Musa et al., 2024)

From the Figure 1, the Technology Acceptance Model (TAM) consists of four core constructs: Perceived Usefulness (PU), Perceived Ease of Use (PEOU), Attitude Toward Using (ATU), Behavioral Intention (BI), and Actual Use (AU). These factors are interconnected and together establish the model framework.

1) Usefulness is the extent to which a user believes that a specific technology will enhance their performance or effectiveness. This construct is an integral factor that influences adopter acceptance – users tend to use a technology if they perceive 45 it as useful (Prabowo et al.,2020).

2) Perceived Ease of Use (PEOU) is the extent of a user's belief that using a technology would be relatively easy. Usability is a prime determinant of user acceptance, especially during the early stages of technology diffusion.

3) PU and PEOU influence ATU. A user's intention to use a technology is determined by the user's positive perception of that technology. It has been shown in empirical research that attitude mediates the relationship between PU/PEOU and BI.

4) BI and AU: These constructs are a user's intention to use the technology, but in contrast, AU is an actual use of the technology. According to the TAM, BI precedes directly AU.

2. Elaboration Likelihood Model (ELM)

The Elaboration likelihood model (ELM) proposed by Petty and Cacioppo offers a useful theoretical construct for testing the impact of persuasive messages on consumers. The ELM describes two routes to persuasion, one that is higher in effort and leads through careful thinking (central route processing), and the other that is lower in effort but still effective, a heuristic-based mental shortcut relying on superficial cues like source attractiveness or font size of an advertisement; this process could be analogously extended to number of "likes" for a social media post (Chen et al., 2022). In this fast and convenience-oriented era of social commerce, the peripheral route is a dominant way to affect consumers because short attention spans are more apt to accept information based on visual images that are perceived unconsciously or even subconsciously. Hence, the peripheral route has become the dominant way of persuasion on platform such as Instagram and TikTok (Kim & Lee, 2023). Generative AI is especially applicable in such scenario, because its capacity to generate realistic imagery represents an effective visual peripheral cue which enables shaping the consumer mindset and involvement. According to research, the persuasiveness of AI-produced advertising is in fact often thought to be due to its use of such strong peripheral cues which help it grab attention and modify consumer attitudes (Rogers & Evans, 2024). The conceptual potential is obvious, but how much practical use does ABM have for Thai local entrepreneurs – a group with its own set of digital understanding and resource challenges? Thus, this study fills a significant lacuna by examining the on-ground usability and efficacy of these advanced tools among community-based enterprises.
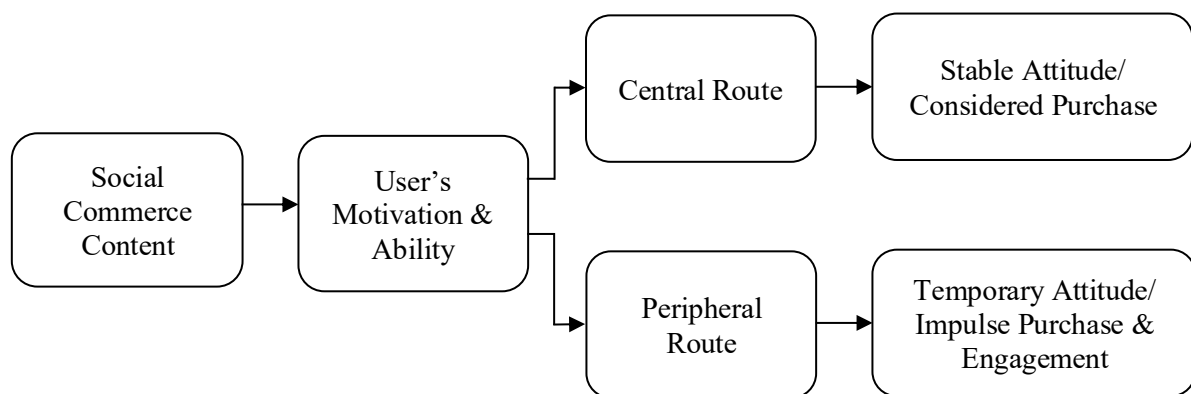
Figure 2: The ELM in the Age of Social Commerce. (Chen, Lu, & Wang, 2022)

As shown in Figure 2, the ELM depicts how users are influenced by Social Commerce Content. It is the mechanism that started it all. It's any type of content an entrepreneur puts up on a social media platform, such as A picture of the product, A short video about it, an ad for the product, Testimonials from customers, or even just the caption written to sell that specific product. And then User's Motivation & Ability (The Critical Filter) is where the brain of the user has to decide what they're going to do. The motivation and capability of a user are typically low in social media. User sees content, their Motivation & Ability are going to act as a filter, it's going to pass them down one of two pathways.

1) Central Route: When the users are highly motivated and able, they proceed through the Central Route. They analyze the content logically and come to a Rational Attitude and an Intelligent Buy.

2) Peripheral Route: If the user is low motivated and/or able to think (common on social media), they follow this route. They are steered by straightforward, shallow signals such as an image's level of appeal. This creates a sense of Temporary Attitude, which translates into instant Engagement (likes, shares) or an Impulse Purchase.

Therefore, the model suggests that in a fast-moving social commerce environment, influencing users based on the quick and visually rich Peripheral Route can be more effective than it is through the logical Central Route.

3. The Social Commerce and Local Entrepreneurs in Thailand

Social commerce is a significant component of the Thai digital economy, shaped by a cultural preference for conversational and relationship-based transactions. In Thailand, online stores often resemble market stalls, where informal dialogue replaces aggressive sales tactics. Social commerce is expanding rapidly, supported by cultural factors that foster a highly interactive e-commerce environment. Consumers increasingly seek direct engagement with manufacturers through digital platforms such as Facebook, Instagram, and Line prior to making purchases (Wongsiri & Jaroen, 2023). This approach, which integrates boutique retail, social networking, and e-commerce, presents a valuable business opportunity for local and community entrepreneurs, particularly those participating in the One Tambon One Product (OTOP) initiative. The low entry barriers and the capacity to communicate the narrative behind handmade products enhance social commerce as a platform for economic empowerment, especially in contexts where infrastructure-focused policies have limited impact.

But there remains a wide gulf between that potential and the lived experiences of many entrepreneurs, who are blocked at every turn by what has become a well-documented digital skills gap. This difference corresponds to reports at the national level that Thai SMEs face many challenges in e-commerce adoption (Digital Economy Promotion Agency, 2023). These problems are both the problem in terms of not creating content online and a lack of digital marketing knowledge and mismanagement, which is driven by such demographics as age and little experience technology-related (Panyasorn & Sirichote, 2023). The gap between jobs in demand and skills needed for those jobs presents as an urgent issue that requires both a scalable and practical solution. Generative AI can be one of the "leapfrogging" technologies to overcome this skills gap, making it possible for entrepreneurs to make premium content faster than it was ever before, enabling equal opportunities within Thailand's diverse digital ecosystem by making them more accessible.

4. The Emergence of Generative AI in Digital Marketing

Generative artificial intelligence (generative AI) has redefined the way people design. Generative AI is different from normal AI, which analyses or classifies data; generative AI creates new original content. It is based on complex models, for example, text Large Language Models (LLMs), an image diffusion model, which are trained on a large-scale dataset in order to understand patterns, forms, and structures. With this training, Generative AI can produce uncanny new outputs (text, images, video, and audio), which are increasingly becoming difficult to differentiate from those produced by humans (Dwivedi et al. 2023). This work highlights the potential for AI to create visual and textual content key to the advertisement of social commerce.

4.1 Current AI Applications in Marketing

Generative AI isn't just a point of discussion any longer: it is a game-changing tool that has been quickly integrated into the modern marketing workflow. It has diverse and impactful applications:

1) Product Image and Ad Visual Generation: Generative AI technology allows the production of synthetic media for ad purposes, creating good-quality, professional-looking visuals without a product photoshoot (Gupta & Sharma, 2023). But consumer reactions are mixed, as novel, hyper-creative imagery could be a sign of innovation and increase involvement (Schneider & Reiter, 2024), but visuals that appear inauthentic may evoke scepticism and negatively impact consumer trust.

2) Advertising and Content Writing: Large Language Models (LLMs) are already often used to produce diverse ad copy (Marr 2023). The best approach is typically a human-AI co-creation model, in which AI lends a helping hand to write and draft while the human makes sure that it aligns with brand voice (Kim & Lee, 2023). While AI-generated copy can match human performance in direct-response advertising, the best-written writing styles requiring subtle storytelling or strong emotional bonding are usually still kept down to a human writer (Thompson and Hughes 2024).

3) Video Creation: The evolution of AI to text-based video generation has increased the cost of video creation, enabling small and medium-sized enterprises (SMEs) to create and compete in a video-first world. The quality of prompts is the critical factor that affects the performance of such AI-based videos. They are great at creating content for call-to-actions, but they can't do the vibrant ambience as much as when such (viral) engagement is via human-created content (Peterson & Singh, 2024).

4) Hyper-Personalization:AI makes hyper-personalization possible by altering ad elements on the fly in real-time according to users' browsing behavior. This technique is referred to as Dynamic Creative Optimization (DCO) and helps in a big way to improve the relevance of an ad and ultimately conversion rates (Verma & Joshi, 2023). However, such capabilities need to be refined to account for the trade-off between personalisation and privacy, whereby too much personalization is regarded as intrusive and may drive ad avoidance and reduced brand trust (Garcia & Williams, 2024).

4.2 Benefits of Generative AI

1) Speed and Efficiency: The first advantage that comes to mind is simply spending less time generating content. What would take a marketing creative team days creating variations of ads, or writing blog posts can now be accomplished in minutes, speeding time-to-launch for campaigns and content schedules (Marr, 2023).

2) Cost Reduction: AI reduces the amount spent on hiring photographers, copywriters, and design agencies through automation of content creation. Such an equalization of high-quality content development is something worthwhile for the SMEs and local entrepreneurs who are working with constrained resources at their disposal.

3) Creativity boost: AI has the potential to create a large number of different creative approaches for variations for any given campaign. This feature enables marketers to perform A/B tests at a large scale, which is not possible manually, and optimize ad performance based on data and find the best combination of visuals and a piece of text (Gupta & Sharma, 2023).

4.3 Risk and ethical considerations

1) Authenticity and Brand Voice The primary problem is that a lot of content generated by AI risks being perceived as generic or soulless, losing the unique brand voice and authenticity that builds trust in customers. This concern is more pronounced for community products, where storytelling and human touch are important (Wilson & Martinez, 2023).

2) Accuracy and Reliability: LLMs often "hallucinate" or produce incorrect information, and so they may promote false descriptions of products or lie in product advertisements, leading to unhealthy brand beliefs.

3) Ethical Issues: Many ethical concerns arise from generative AI, such as a risk of displacement of human creators, potential algorithmic bias that can lead to stereotypical creations, and questionable copyright-related issues on model training data and the ownership of the resulting creations (Dwivedi et al., 2023).

Research Methodology

This research started from first-hand fieldwork in Ubon Ratchathani that was part of grassroots service and community education projects presented by a university. An ongoing obstacle that we found was that small business operators (mainly producers who could diversify with local branding and are responsible for marketing content creation) are almost all but entirely ignorant about the technology needed for such work. Our study has also shown that this skills shortage, reinforced by demographic factors and other forces both inside and outside of academia, is a key obstacle to many of these businesses' place in cyberspace. As a practical problem, purely observational methods are unable to verify the essence of this issue. Thus, this study uses a Mixed-Methods Participatory Action Research (PAR) method. This method was chosen because it is a process of action research, collaborative and directly supportive of our goal to help the community solve this down-to-earth problem in its own right.

Therefore, this research aims to fill the gap in our programs. We propose a 2CTE Model. This Community-Centered Technology Empowerment Model for AI Industry Operation Capacity to Enhance Local Enterprises (in Ubon Ratchathani) is rooted deeply in our research. This research program, therefore, follows strict scientific procedures in order to ensure that the model we have formulated is not only theoretically sound but also practical and relevant to local circumstances, which differ, moreover, from those previously perceived by us.

1. Development of the 2CTE Model

The 2CTE model is a novel workshop framework. It was synthesised by putting together established theories and certain insights that emerged from preliminary fieldwork conducted with members of the community. Two theoretical constructs stand behind the model's design, and these are grounded in adopted: the Technology Acceptance Model (TAM), which offers a structure for understanding how new AI tools can be taken up by people wanting them to do work; and the Elaboration Likelihood Model (ELM), underpinning this way of training entrepreneurs with a particular twist for Persuasive marketing material making. Overall, by means of the 2CTE Model, this project aims to promote AI acceptance and create certain tangible marketing products.

2. Methodological Phases for Validation and Implementation

We have 3 phases in this research for 2CTE accurate and applicable is the foundation for research.

Phase 1: Model Validation by Experts

Before implementation, the conceptual 2CTE Model was presented to a panel of five experts to assess its logical coherence, suitability, and potential effectiveness. The panel was composed of specialists with diverse, relevant backgrounds, including:

1) A Technology Applications Expert
2) A Community Development and Social Enterprise Consultant
3) A Digital Marketing and Branding Strategist
4) An Educational Technology and Instructional Design Expert
5) A Senior Researcher in Entrepreneurship and SME Development

These experts used a specially tailored form to assess the suitability of the model on four main axes: Part 1: Clarity & Comprehensiveness of the Model, Part 2: Relevance &

Appropriateness to the Context, Part 3: Practicality & Effectiveness, Part 4: Originality & Contribution. This evaluation tool will be used to generate an Index of Item-Objectivity Congruence (IOC), which was found to be 1.00. The remainder of the report examines the feedback received from these experts and its impact upon refinement before communal application in the workshop at the local level.

For evaluating the model's suitability, experts scored using a 5-point scale. This scale ranges from 1 = "least suitable" to 5 = "most suitable," with the mean scores interpreted as follows:

4.51 – 5.00: Most suitable
3.51 – 4.50: Very suitable
2.51 – 3.50: Moderately suitable
1.51 – 2.50: Less suitable
1.00 – 1.50: Least suitable

Phase 2: Foundational Local-Brand Baseline

This method adopted purposive sampling during the execution of community-academic service and social-service projects, including field visits. In Ubon Ratchathani Province, the researchers' assessment was based on the availability of basic technology and the interest of local entrepreneurs. In the selection criteria: enterprise facilities ready for technology, basic members possessing an Internet-connected smartphone or tablet, desire to learn and use new digital tools

The researchers selected from a wide cross section of products and common entrepreneurial challenges to improve the 2CTE model assessment's reliability and natural validity with regard to the community-enterprise context. The selected groups are as follows:

1) Grandma Pen's Dried Pork Group (Processed Food Products): Trakan Phuet Phon District. This group's products (sun-dried pork, sausages, etc.) are based on a unique traditional recipe that is carried out in a distinct manner. At present, sales are mostly through a local storefront. The group does have a Facebook page, although it is hardly ever updated. There is pressure within the group to take in another generation, and production of material fluctuates with time, an observation made repeatedly during fieldwork.

2) Somkid Cotton Group (Textiles and Clothing): Det Udom District. This group has an integrated production of their own cotton clothes made by hand in the ancient tradition. Their products are seen as indigenous wisdom that is able to "retain colors and feel soft on the skin. "With still a generation to go in this case, their biggest challenge is that they have no concrete distinguishing brand. They do not currently have a brand identity, a plan for selling to prospective buyers, or regular online marketing communications that preserve meaning.

3) Patumthip Herbal Hair Group (Herbal Products): Muang Sam Sip District. This group makes natural hair products free from chemicals and health certified. It is led by a new-generation entrepreneur who is active online. Their problem is not that they are offline, but actually blocking the development of content. Having run up exorbitant expenses in the past using professional designers, they now find it hard to answer the question of what new materials to put out, and producing ads is time-consuming. In addition, the images they once made no longer find an audience.

Phase 3: Implementation of the 2CTE and Action Evaluation

The applied aspect of this research focuses on a practical workshop that introduced 15 participants from the identified community enterprises to the 2CTE Model. This stage was created as an active learning cycle in which participants transferred theory to practice from the 4 mission follows:

1) Mission of "Visual Transformation" (Targeting the PEOU and PU)

2) Mission of "Authentic Narrative" (Targeting the Central Route: CR)

3) Missions of "Engagement & Aesthetic" Module (Aimed at Peripheral Route: PR)

4) Mission of "Creative Empowerment" (Targeting the BI, AU and BI)

The researchers then surveyed by post-training satisfaction survey to measure learning outcomes. The questionnaire was developed based on five topics: usability, engagement, design quality (perceived aesthetic), perceived relevance, and overall satisfaction. For evaluating the satisfaction of entrepreneurs who attended the training, a 5-point scale was used. This scale ranges from 1 = "least satisfied " to 5 = "most satisfied," with the average scores interpreted as follows:

4.51 – 5.00: Most satisfied

3.51 – 4.50: Very satisfied

2.51 – 3.50: Moderately satisfied

1.51 – 2.50: Less satisfied

1.00 – 1.50: Least satisfied

This questionnaire has been evaluated the reliability of the instrument was confirmed with an IoC of 1.00, and analysis of the result was performed through descriptive statistics (frequency, percentage, mean, and standard deviation). The study successfully connects the individual learning activities of entrepreneurs' digital competency development by integrating these findings with quantitative data.

Research Finding

1. Propose and evaluation of the 2CTE Model

In this study, a new 2CTE model was proposed as an innovative conceptual framework policymakers or acedemicians could use to act as a simple guideline for improving the technological capability of local entrepreneurs. Importantly, the newly formed conceptual framework is not just a collection of theoretical concepts; it has been designed and formed through a collection of relevant documents as well as published research that were systematically linked with field surveys, which were meticulously conducted to analyze the current situation and the various challenges facing the local entrepreneurs in Ubon Ratchathani Province. Furthermore, the new conceptual framework has been developed in association with the researchers substantial field experience, which was gather during the process of practicing annual community academic services along with arrays of social service activities. The carefully crafted model that fuses technology acceptance concepts with novel facets of content creation to develop this model is illustrated concretely in Figure 3. Following the proposal of the developed model, a thorough test was conducted in several stages to determine its effectiveness. This test was predominantly conducted in two major stages. One test was the validation of the model of the workshop used in the testing phase, while the second phases involved an evaluation of the results achieved by testing the developed model through actual implementation of the new technology among local entrepreneurs.

From Figure 3, the 2CTE Model is a structured, two-stage framework designed to guide local entrepreneurs through the entire process of technology adoption and application. Its primary value lies in its holistic approach, which strategically combines the psychological principles of technology acceptance with the practical application of marketing communication theory. The model is logically divided into two sequential phases: the Training and Workshops phase, which fosters adoption, and the Results from Using AI Tools phase, which focuses on practical application and evaluation.
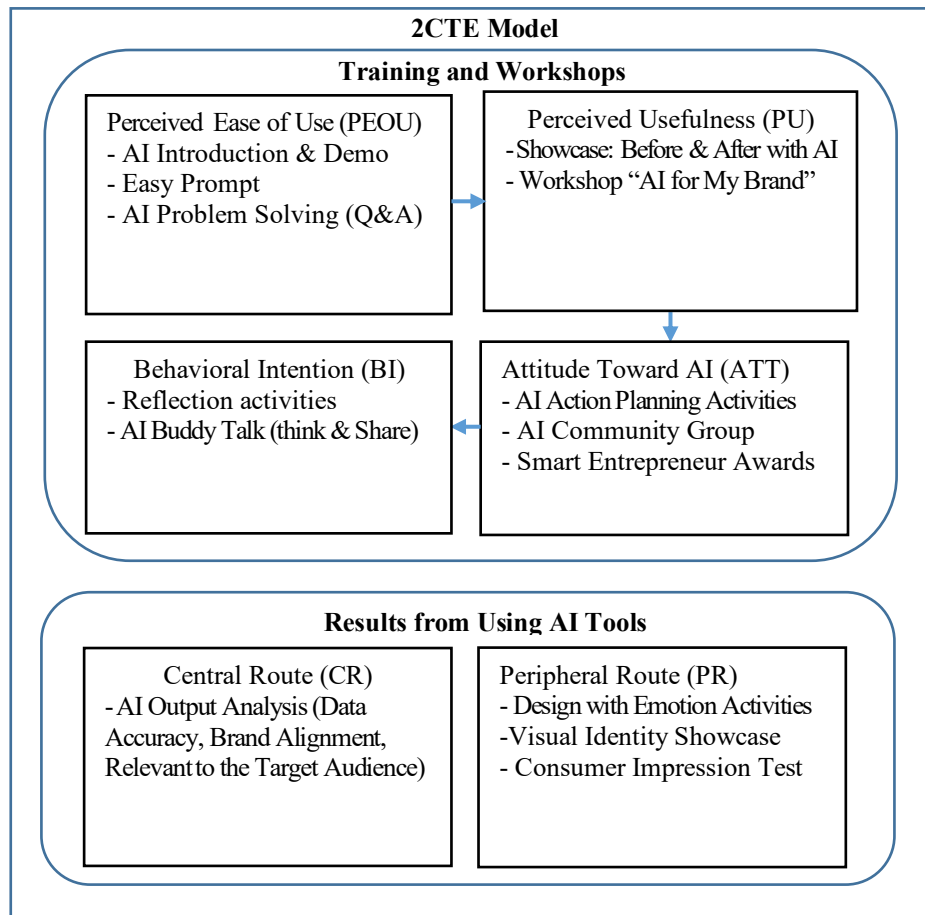
Figure 3: Comunity-Centered Technology Empowerment Model (2CTE Model).

1) Training and Workshops

The workshop sequence of the first phase aligns with TAM's core principles and describes what needs to happen at each moment to defuse fear and build a confident, positive predisposition toward generative AI methodically. The workshop drives a nested causal chain, including:

- Perceived Ease of Use (PEOU): is determined by the pattern of hands-on training and guided practice, which will enable entrepreneurs to develop familiarity with the AI tools' interfaces and operations in a relatively supportive atmosphere.

- Perceived Usefulness (PU) : On account of their session with the system, entrepreneurs are directed to create outputs using their own brands' names. They observe that AI technology contributes to the production of remarkably good results, such as brand assets and strategically organized plans. Entrepreneurs realize that the technology is beneficial to them in that it can enable them to improve their performance.

- Attitude Toward Using (ATU) : The positive reward and constant reinforcement of learning through easy achievement of useful actions and results form an attitude towards working with an AI from an unfriendly, daunting machine to an accessible and useful assistant.

- Behavioral Intention (BI) : After developing a positive attitude towards the tools, the employees start grasping their intention to further use Ai tools and include them in their

normal business routine. Thus, the whole process of developing the technology has been completed.

2) Results from Using AI Tools

In terms of adoption transitioning to the application, the model's second phase builds on the Elaboration Likelihood Model. The distinction is that ELM is used not for the consumer of the end product but for the entrepreneur's assessment of the AI-generated content.

- Central Route (CR): The driving route from central processing takes the form of the entrepreneur's logical, critical evaluation of the quality of AI-generated output. This process involves the substantive evaluation of the coherence of brand story, marketing plan, etc., which allows the consumer to affirm the strategic relevancy of the generic content to the empirical need. This stage assures the entrepreneur's empowerment because they are no longer the passive end-user but a strategist.

- Peripheral Route (PR): The third factor under the peripheral route is perception, which refers to the assessment of the aesthetic and superficial values of AI output. Both the entrepreneur and the customers notice the beauty, professionalism, and style of the content of the product, such as a captivating logo or a well-visualized advertisement.

Importance and Value of the 2CTE Model

In summary, the 2CTE Model's importance is the new vision and approach it presents. The 2CTE Model is an integrated empowerment framework that:

1) Links Psychology and Practice: It brilliantly connects the psychology of technology acceptance theory on why people use technology with the practical learning approach of how they use it as a communication channel, an effective learning model.

2) Provides Empowerment through Evaluation: By implementing a Central Route evaluation, the model ensures that entrepreneurs will not only develop content but also evaluate it, which will help develop a strategic marketing mindset.

Before its actual implementation in the community workshop, the model was demonstrated to five experts, including representatives of marketing, graphic design, and community development, to evaluate its suitability and logical consistency. The results of the quantitative evaluation of the expert evaluation, which demonstrated that the model was indeed suitable for its intended use, are summarised in Table 1.

Table 1 Results of the 2CTE Model Suitability Evaluation

Evaluation Criteria	$\bar{X}$	S.D.	Qualitative Level
Part 1: Clarity & Comprehensiveness of the Model			
1.1 The model has a clear and understandable structure and components.	4.60	0.548	Most suitable
1.2 The definitions and descriptions of each component in the model are accurate and clearly convey their meaning.	4.20	0.447	Very suitable
1.3 The components within the model have a logical and coherent relationship.	4.40	0.548	Very suitable
1.4 The model is comprehensive, covering the key aspects of entrepreneurial empowerment (branding, business planning, content).	4.20	0.447	Very suitable
Part 2: Relevance & Appropriateness to the Context			
2.1 The model aligns with the research objective of empowering local entrepreneurs.	4.60	0.548	Most suitable

Evaluation Criteria	$\bar{X}$	S.D.	Qualitative Level
2.2 The model is built on a solid and credible theoretical foundation (e.g., TAM, ELM).	4.40	0.548	Very suitable
2.3 The model is appropriate for the context and characteristics of local entrepreneurs in Thailand.	4.20	0.447	Very suitable
Part 3: Practicality & Effectiveness			
3.1 The process proposed in the model (e.g., practical workshops, knowledge sharing) is practically implementable.	4.20	0.447	Very suitable
3.2 The model has the potential to genuinely lead to an enhancement of entrepreneurs' capabilities.	4.20	0.447	Very suitable
3.3 This model can serve as a prototype or guideline for developing entrepreneurs in other regions.	4.80	0.447	Most suitable
Part 4: Originality & Contribution			
4.1 The model presents a novel concept or perspective that is beneficial to academia or community development.	4.60	0.548	Most suitable
4.2 Overall, the model is complete and valuable, both academically and practically.	4.80	0.447	Most suitable
Overall	**4.43**	**0.489**	**Very suitable**

Table 1 shows that the evaluation of the model's potential as a model for entrepreneurship development in other regions, as well as the overall value and completeness of the model, both academically and practically, yielded the highest scores, with $\bar{x}$=4.80 and S.D. = 0.447, rated as "Most suitable".

The second highest score was for the model's clear and understandable structure, its consistency with research objectives in entrepreneurship empowerment, and the model's contribution as a new concept for community development. All three received the same scores, with $\bar{x}$=4.60 and S.D. = 0.548, rated as "Most suitable".

And the third highest score was for the model's logical and consistent relationship with its components, and its foundation in a solid and reliable theory, such as the TAM and ELM, with the same scores, with $\bar{x}$= 4.40 and S.D. = 0.548, rated as "Very suitable".

Key evaluation results include:

The expert evaluation of the 2CTE Model revealed a positive assessment, which confirmed the potential and value of this model. The criteria with the highest mean scores were the potential to use the model as a prototype for the development of entrepreneurs in other regions and the overall completeness and value of the model both academically and practically. Ratings of the model "Very suitable" were also assigned to the submission of the model and appearance of it, suitability, relevance of innovation, and possibility to implement the model. The consistently low standard deviation across the criteria also indicates the unanimity of the expert opinion, which confirms the soundness of the model. This suggests that the 2CTE Model is a strong and well-developed framework that incorporates all the important considerations.

2. The 2CTE Model Implementation and Entrepreneur Satisfaction.

Following the successful 2CTE Model validation, a workshop based on the our model was conducted with 15 local entrepreneurs. The training was designed to build tangible skills using a curated selection of free and accessible AI tools. We used the 2CTE Model into practice, the workshop was organised into four basic missions that sought to stimulate various psychological transitions and persuasive content strategies:

1. The mission of "Visual Transformation" (Targeting PEOU and PU)

Activity Detail: The instructor showed how the photo of a community product taken to be used in low light with any smartphone can be edited professionally through AI right away. In the background removal and "generative fill," participants used Adobe Express AI and Google AI Studio to enhance their product's images. Observing this instant high quality leap made the Perceived Usefulness (PU). Providing a simple, touch-based AI interface (mediating tool) instead of a complex design software and even computing an app through that interface, the Perceived Ease of Use (PEOU) was developed to convince entrepneurs that they too could easily reach the professional design.

2. The mission of "Authentic Narrative" (Towards the Central Route: CR)

Activity Detail: Members of the Noet team leveraged ChatGPT and Gemini to turn boring product facts into interesting "Brand Stories". Somkid Cotton, for instance, filled out information about their multi-generational weaving process to create captions highlighting the tradition and excellence of their textile. This behavior corresponds to the Central Route of the ELM. When artificial intelligence- is used to maximize rational and high-quality information delivery of craftsmanship and heritage, the output text attempts to form a Stable Attitude that involves authenticity-discerning cobuyers and traditional wisdom-minded buyers, which then helps in their consideration for purchases.

3. The mission of "Engagement & Aesthetic" Module (Aimed at Peripheral Route: PR)

Activity Details: AI to Create "Social Media Slides" and eye-popping visuals for Entrepreneurs They were trained in content creation using "aesthetic cues" like lush color palettes and professional lighting, optimized for platforms like TikTok and Instagram. This was to emphasize the Peripheral Route of the ELM. The object was to utilize aesthetic appeals in order to hold the attention span of those customers with a short attention time. The successful formation of "attractive" images led to the development of a positive Attitude Toward Using (ATU) the AI, as entrepreneurs gained the confidence that with this system their content looks just as good as those found in national premium brand.

4. Mission of "Creative Empowerment" (Aimed at BI, AU and BI)

Activity Follow-Up: The workshop wrap-up was followed by an "On-Line Launch Simulation." They also encouraged participants to really publish or share their newly minted content through HCI community to get feedback. This social pressure cemented the Behavioral Intention to Use (BI). The qualitative "aha! moments". As one participant put it, the AI's Actual Use (AU) during this phase took a life of its own, never tiring of standing as a permanent bridge over the digital divide and participants were left empowered to steer their brand on line by themselves.

The satisfaction of the entrepreneurs with the AI tool was carefully evaluated. The Training course centred on creating professional-looking promotional images. Entrepreneurs learned to use AI to design and generate product image content for eye-catching social media posts. The detailed satisfaction scores is presented in Table 2.

Figure 4: Example Of AI Workshop for Local Entrepreneurs Based on the 2CTE Model.

Figure 4. Practical Training Workshop on the 2CTE Model. The authors scheduled and conducted a practical training workshop on the 2CTE Model. This session aimed to show entrepreneurs the appropriate use of AI tools for content ideas and content promotion. Text-based AI platforms included ChatGPT, Gemini, and Claude AI as the suggested example with simple, effective prompts. Entrepreneurs actively engaged in the training process and were able to work together using text-based AI platforms with samples of their community brands. To reveal the real value of the intervention, the researcher suggested a "before-and-after intervention", comparing the original entrepreneurs' marketing text and the new AI-based text before use. Also, the researcher selected certain AI tools for the visual design part of the training. These tools are ChatGPT, Google AI Studio, and Adobe Express AI, which helped the local entrepreneurs to create pics for product advertisement professionally.

To reinforce the positive psychological journey outlined in the 2CTE Model, entrepreneurs were encouraged to share their successful experiences, and prizes were awarded to foster motivation and pride. The hands-on application during this workshop resulted in the tangible outputs and enhanced branding assets, the results of which are shown in Figures 5-7.

Figure 5: Example Product Images from the workshop of Grandma Pen's Dried Pork Group:
(a) is the original product image taken by the entrepreneur.
(b) is product images enhanced with AI tools

Figure 6: Example Product Images from the workshop of Somkid Cotton Group:
(a) is the original product image taken by the entrepreneur.
(b) is product images enhanced with AI tools

Figure 7: Example Product Images from the workshop of Patumthip Herbal Hair Group:
(a) is the original product image taken by the entrepreneur.
(b) is product images enhanced with AI tools

Table 2 Satisfaction Assessment of AI Tools by Local Entrepreneurs

Evaluation Criteria	X̄	S.D.	Qualitative Level
Part 1: Usability			
1.1 Understanding how to use the AI tool is easy.	4.60	0.507	Most satisfied
1.2 The AI tool's interface is not complicated.	4.13	0.640	Very satisfied
1.3 It does not take a long time to create outputs.	4.73	0.458	Most satisfied
Part 2: Engagement			
2.1 I feel amused and excited while using the AI tool.	4.53	0.516	Most satisfied
2.2 The AI tool helps stimulate creative thinking.	4.00	0.655	Very satisfied
2.3 I feel like I want to experiment with the AI tool again.	4.60	0.507	Most satisfied
Part 3: Design Quality			
3.1 The images generated by the AI tool are beautiful and satisfactory.	4.80	0.414	Most satisfied
3.2 The outputs from the AI tool are professional and suitable for product promotion.	4.53	0.516	Most satisfied
3.3 The AI tool allows for customization and editing as needed.	4.27	0.458	Very satisfied
Part 4: Relevance for Local Entrepreneurs			
4.1 The AI tool provides outputs that are suitable for community products.	4.67	0.488	Most satisfied
4.2 The generated content and images are practical for real-world use.	4.20	0.561	Very satisfied
4.3 The AI tool empowers entrepreneurs, making them feel less reliant on hiring professional designers.	4.20	0.561	Very satisfied
Part 5: Overall Satisfaction			
5.1 Overall, I have a positive attitude toward using the AI tool.	4.60	0.507	Most satisfied
5.2 I am likely to recommend this AI tool to others for creating promotional content.	4.53	0.640	Most satisfied
Overall	**4.46**	**0.531**	**Very satisfied**

The assessment for Table 2 demonstrates that the AI tools for visual content creation were met with strong approval and high satisfaction from the local entrepreneurs. The top three criteria with the highest satisfaction scores are as follows:

First place was that entrepreneurs agreed that the images generated by the AI tool were beautiful and pleasing, with $\bar{x}$=4.80, S.D.=0.414, rated "Most satisfied" in the design quality category.

Second place was that entrepreneurs found it took little time to produce products, with $\bar{x}$=4.73, S.D.=0.458, rated "Most satisfied" in the usability category.

And the third place was that entrepreneurs felt that the AI tool produced results appropriate for community products, with $\bar{x}$=4.67, S.D.=0.488, rated "Most satisfied" in the relevance for local entrepreneurs category.

The key findings are as follows:

The results in Table 2 confirm that the AI tools were highly satisfying for local entrepreneurs in terms of content creation. The most striking was the Design Quality of the outputs, the assessment of which was exceptionally high in all aspects. These outputs were rated as beautiful and professional by the entrepreneurs. The same goes for the Usability of the AI, as both fast to create and understand scored very high. This type of user experience was conducive to using the tools, suggesting a positive attitude and a high level of recommending the tools to others. It appears that the AI was viewed as empowering, and the only aspect that could be improved was its ability to stimulate creative thinking. Therefore, the tools were considered a fast, quick, and efficient option to produce quality visual material for the local brand.

From the practical training, the researchers found that, the great advantage of the 2CTE Model is its total mental-technical integration. Unlike typical training that focuses solely on practical procedures, 2CTE addresses the "tech anxiety" experienced by local entrepreneurs. By comparing various activities to the TAM model, the four steps of the sequential application pattern are systematically constructed, accumulating experience before introducing more complex tools. Additionally, by leveraging the ELM (Peripheral Route), the model delivers an early "victory" for entrepreneurs by seeing a professional-looking picture of their product which serves as a strong motivator for future learning. While successful, the model is currently limited in its long-term sustainability and dependence on devices. The model assumes participants have access to high-performance smartphones. During the workshop, older devices struggled with heavy AI processing. Since it depends on cloud-based AIs (Gemini, ChatGPT), its effectiveness is limited in rural areas with unstable internet infrastructure. Causing Language Barriers: Many AI tools are programmed for English. While tools like ChatGPT do now support Thai, the "nuance" of regional Ubon Ratchathani dialects or particular herbal terms could get lost in translation at times, meaning the researcher had to step in to help with conveying meaning. Another problem encountered was that for older adults who have to switch between multiple applications simultaneously. (e.g., from ChatGPT for text to Adobe Express for imagery), We elicited momentary confusion; they required more one-on-one "scaffolding" than originally envisioned. Another interesting finding is the early belief that artificial intelligence (AI) was a miracle. Some participants assumed the AI would have knowledge already of their family recipes or weaving history. In the training had to switch up to guide "AI is an apprentice, not the master." The participants found that a high fidelity depends on the "Local Wisdom" (prompt) you give it. Another misconception is about copyright they worry about not owning their brand story if AI is used. That's why we suggest there needs to be a discussion about digital ownership.

Discussion

The findings of this study provide strong empirical support for the effectiveness of the 2CTE Model as a transformative framework for AI skill training among local entrepreneurs. The model's success is not merely in introducing new tools, but in its structured ability to guide participants through a complete practical journey from initial apprehension to confident adoption and, ultimately, to tangible empowerment. These results are highly consistent with recent literature on technology adoption and skill development. Research by Ahmad and

Nasurdin (2022), which investigated digital tool adoption among rural-focused entrepreneurs, similarly found that training interventions on Perceived Ease of Use (PEOU) and Perceived Usefulness (PU) were the most critical factors. Their study confirmed that when training successfully demystifies technology (improving PEOU) and demonstrates clear benefits (improving PU), it directly leads to higher adoption rates and a stronger sense of empowerment. Furthermore, the 2CTE Model's structured process aligns with findings from Sun and Cheng (2021), who demonstrated that the initial training phase is the single most important factor in establishing PEOU. Their research showed this initial, positive experience creates a feedback loop, boosting PU and fostering a positive attitude, which is precisely what the 2CTE Model is designed to achieve. Finally, while TAM explains the adoption, the content creation aspect of the 2CTE Model is supported by work like that of Kumar and Roy (2023), who found that training individuals in the principles of the Elaboration Likelihood Model (ELM) demonstrably improved their ability to create more persuasive and effective marketing content. Our proposed model is unique and different from other proposed models in that it uses this combination of TAM and ELM to enhance the capabilities of local entrepreneurs in using AI tools. We also validate the results of AI tools for practical application in the context of community products, including the effective use of promotional images generated by AI tools on online channels.

The consistently high satisfaction scores in this study, therefore, validate the theoretical underpinnings of the 2CTE framework. The model successfully fostered a positive feedback loop: by curating tools with high Perceived Ease of Use, it allowed entrepreneurs to quickly see their Perceived Usefulness, which in turn cultivated a positive attitude and a strong Behavioral Intention to continue using the technology. The 2CTE Model acts as a powerful catalyst for technology acceptance, effectively demystifying AI and transforming it from an intimidating concept into an accessible and valuable partner. This research does more than simply evaluate AI tools; it presents and validates a much-needed pedagogical solution. The 2CTE Model proves to be a robust, replicable, and highly effective framework that addresses the core challenges faced by local enterprises. It provides a clear pathway to bridge the digital skills gap, making a significant contribution to both the academic field of technology adoption and the practical pursuit of community development in Thailand.

Conclusion

This research successfully bridged the critical digital skills gap in Thai local entrepreneurs through developing and validating the 2CTE Model. The novelty of the study resides in its robust, replicable, and human-centered pedagogical framework, which goes beyond mere technology training to achieve true empowerment. The data gathered in the double-validation study indicated that the 2CTE Model has a strong structure, and the targeted users are highly satisfied with its real-world application. The reason for the model's success lies in its unique combination of the Technology Acceptance Model, which helps systematically creates a positive attitude towards the adoption, and the Elaboration Likelihood Model that enables producing effective marketing content. Such a comprehensive approach ensures that the local entrepreneurs learn how to use the AI tools, why they should do it, and are confident in their abilities to use such tools.

In conclusion, the 2CTE Model presents a concrete path towards empowerment. It provides local enterprises with the knowledge and courage essential to tackle the digital arena, constituting a breakthrough achievement in the knowledge field of technology adoption and a practical endeavour towards sustainable community development. It shows that the future of local craftsmanship in the dynamic environment of Thailand's digital future is ensured.

Suggestion

The 2CTE Model should be tested in other provinces and with different types of community enterprises (e.g., tourism, services, agriculture) to assess its scalability and generalizability. This would further strengthen its standing as a universally applicable model.

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A Study of Ho Chi Minh City Tertiary Students' Perceptions and Intentions on Chatgpt's Usage for English Language Learning

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Abstract

This study investigated the perceptions of 428 first-year tertiary students from 17 universities in Ho Chi Minh City, Vietnam, representing public, private, and international institutions across different regions. Guided by the Technology Acceptance Model (TAM), a quantitative survey using a 22-item Likert-scale questionnaire examined two key dimensions: Perceived Ease of Use (PEOU) and Perceived Usefulness (PU). Results revealed high overall agreement, with students recognizing ChatGPT as a convenient and effective tool for language learning, particularly in writing tasks, idea organization, and summarization of complex texts. Students valued its ability to enhance productivity, autonomy, and engagement in their learning. However, concerns emerged regarding overdependence, potential reduction in critical thinking, and long-term academic integrity issues, as students prioritized immediate benefits over sustained learning outcomes. These findings suggest that while ChatGPT holds significant promise in supporting tertiary-level language education, its integration should be accompanied by structured guidance, digital literacy training, and clear ethical frameworks to ensure responsible, effective, and sustainable use.

Introduction

ChatGPT, an AI-driven application, has rapidly gained attention in education due to its versatile capabilities in supporting language learning. In Vietnam, English instruction at the tertiary level continues to be dominated by traditional teacher-centered approaches emphasizing memorization and exam preparation (Edusynch, 2024). These methods often fail to meet individual learning needs in large classrooms, where personalized feedback is limited. As a result, students struggle to develop communicative competence, academic writing skills, and learner autonomy (Su & Yang, 2023). Teachers also face challenges with time and resources, leading to a "one-size-fits-all" model that neither challenges advanced students nor sufficiently supports weaker learners (Rudolph et al., 2023; Shah, 2021). The lack of timely feedback further reduces motivation and engagement. This context highlights the urgent need for more personalized, interactive, and effective learning methods (Slamet, 2024).

This study addresses this gap by examining first-year Vietnamese students' perceptions of ChatGPT, offering insights that can inform effective and ethical integration of AI into higher education. This answers the question: What are Ho Chi Minh City tertiary students' perceptions and intentions of using Catgut as a tool for language learning?

Literature Review

Understanding ChatGPT and Its Technological Basis

Artificial Intelligence (AI) has profoundly reshaped education, and ChatGPT stands at the forefront of this transformation. Developed by OpenAI and launched in late 2022, ChatGPT rapidly gained 100 million users within two months, reflecting its disruptive potential for education (Thorp, 2023; Quintans-Júnior et al., 2023). Unlike traditional chatbots, ChatGPT leverages Generative Pre-trained Transformer (GPT) architecture, deep learning (DL), and reinforcement learning from human feedback (RLHF) to generate coherent, human-like text while maintaining conversational context (Van et al., 2023; Gill & Kaur, 2023). These features enable ChatGPT to handle follow-up queries, interpret informal inputs, and provide adaptive, near-human interaction, distinguishing it from earlier AI systems (Taecharungroj, 2023).

ChatGPT's capabilities have advanced significantly across versions, from GPT-1 with 117 million parameters to GPT-4 and GPT-4 Turbo, which exhibit enhanced reasoning, semantic comprehension, and efficiency (Vaswani et al., 2017; Taecharungroj, 2023). These iterative improvements position ChatGPT not just as a conversational agent but as a versatile academic assistant capable of supporting writing, summ, arization, translation, and problem-solving (Gill & Kaur, 2023). However, the system's accuracy is only as reliable as its training data, raising concerns about bias, misinformation, and fairness in AI-generated responses (Mhlanga, 2023; Ding et al., 2023). Researchers have documented instances of Chat GPT reflecting gender, racial, and cultural biases (Buolamwini & Gebru, 2018), challenging its credibility as an educational partner.

While ChatGPT demonstrates remarkable linguistic fluency, it lacks human emotional intelligence, nuance, and contextual sensitivity. AI responses may appear authoritative but risk misleading inexperienced learners (Rahaman et al., 2023; Sallam, 2023). This paradox, high linguistic competence but questionable reliability, frames the debate on its integration into education, particularly in language learning, where accuracy and critical interpretation are essential.

Challenges and Limitations
Academic Integrity

One of the most debated concerns is ChatGPT's impact on academic integrity. Its ability to generate original-seeming text challenges plagiarism detection systems (Elali & Rachid, 2023). Studies show that AI-detection tools are inconsistent, often misclassifying human-written text as AI-generated or failing to identify advanced GPT outputs. This blurring of authorship raises ethical and policy questions about how AI contributions should be acknowledged (Baron, 2024).

Some scholars advocate treating ChatGPT as a legitimate resource if cited and paraphrased correctly (Neville, 2010; Perkins, 2023). Others argue that uncritical use constitutes plagiarism, threatening the integrity of academic assessment (McCabe, 2023). A middle ground is emerging: educators should teach students to combine AI outputs with critical reflection, thereby fostering originality and ethical use (Cotton et al., 2023; Anderson, 2023). Ultimately, institutions must develop clear policies and pedagogical frameworks that balance AI integration with academic honesty.

Overreliance and Student Independence

Another recurring theme is overdependence. Studies warn that students' heavy reliance on ChatGPT for simple tasks undermines critical thinking, originality, and independent learning (Kasneci et al., 2023; Abbast et al., 2024). By delegating

assignments to AI, students risk weakening their cognitive engagement, memory retention, and creativity (Bin-Hady et al., 2024; Lukman et al., 2024). Oates and Johnson (2025) stress that ChatGPT must not replace learners' intellectual effort, as such dependence may produce long-term academic gaps.

Educators note that students' enthusiasm for ChatGPT's convenience can become counterproductive, leading to "addiction-like" patterns (Mogavi et al., 2024). This reflects a broader pedagogical dilemma: while AI supports efficiency, it must be carefully integrated to prevent erosion of higher-order thinking skills.

Reliability and Accuracy

Despite its linguistic fluency, ChatGPT remains limited in accuracy and reliability. Studies identify frequent errors, vague answers, and misleading outputs, especially in specialized or non-English contexts (Meyer et al., 2023; Kohnke et al., 2023). Kusuma et al. (2024, as cited in Hongxia & Razali, 2025) argue that ChatGPT's inconsistent use of academic terminology confuses novice learners, resulting in weaker writing performance.

Biases embedded in training data further compromise reliability. As Mhlanga (2023) and Houston and Corrado (2023) note, ChatGPT often reproduces systemic biases present in its training corpus, raising concerns about fairness and inclusivity. These issues underscore the necessity for students to critically evaluate AI-generated content, cross-check with credible sources, and cultivate digital literacy.

Critical Synthesis

The literature reflects a paradox: ChatGPT is simultaneously a powerful enabler of learning and a potential threat to academic development. Its strengths lie in accessibility, personalization, and task efficiency, especially for language learners in contexts like Vietnam, where traditional pedagogy limits learner autonomy (Su & Yang, 2023). Through TAM, studies consistently show high levels of perceived ease of use and usefulness, confirming its attractiveness to students (Maheshwari, 2024; Huang & Mizumoto, 2024).

Nevertheless, the limitations are equally salient. Reliability concerns, plagiarism risks, and overreliance highlight the dangers of uncritical adoption (Xu et al., 2024; Kasneci et al., 2023). Students often prioritize short-term productivity over long-term cognitive growth, underscoring the need for structured guidance. The debate on academic integrity remains unresolved, as institutions struggle to adapt policies and plagiarism detection systems to AI's evolving sophistication (Elali & Rachid, 2023; Baron, 2024).

The literature thus converges a central insight: ChatGPT should be framed as a supplementary tool, not a replacement for human effort. When integrated ethically, it fosters learner autonomy, reduces affective barriers, and enhances academic productivity (Biswas, 2023; Pardos & Bhandari, 2023). However, without proper scaffolding, it risks undermining creativity, critical thinking, and originality.

For Vietnam and similar contexts, where students are transitioning into more autonomous tertiary learning, the implications are profound. Policymakers and educators must prioritize AI literacy, ethical training, and balanced integration to maximize benefits while mitigating risks. Future research should move beyond descriptive surveys to experimental studies that measure ChatGPT's actual impact on language proficiency, critical thinking, and long-term learning outcomes.

Research Methodology

This study uses a quantitative method, using a structured questionaire survey, including 22 items which are measured by using a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree).

Participants

The participants of the study were 428 tertiary first-year students from three main reagions of Vietnam, including Northen, Middle and Southern. The participants were approached by using convenience sampling technique, a non-probability sampling method that involved selecting participants based on availability and willingness to participate. However, purposive sampling was also applied to ensure the balance of participants across the regions of North, Central, and South.

Research Instruments

The study employed a structured questionnaire designed in Google Forms, consisting of 22 items measured on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). To ensure validity and reliability, three procedures were followed:

1. Content validity was established through the Index of Item Objective Congruence (IOC). Three lecturers with PhD degrees in linguistics, currently teaching at a private university in Ho Chi Minh City, reviewed the questionnaire for clarity, accuracy, and relevance to the study objectives.

2. Pilot testing was conducted with 30 first-year tertiary students. The internal consistency of the instrument was assessed, and Cronbach's alpha values indicated acceptable reliability.

3. A professional translation agency carried out bilingual translation to produce a Vietnamese version of the survey. This ensured linguistic accuracy and cultural appropriateness, minimizing the risk of misinterpretation among participants with limited English proficiency.

Data Collection and Analysis

The questionnaire was distributed to participants online. It comprised two main sections: items measuring students' perceptions of Perceived Ease of Use (PEOU) and Perceived Usefulness (PU). Both positive and negative items were included to capture a balanced perspective on ChatGPT usage in language learning.

Data Analysis

Descriptive statistics were employed to analyze the data. Mean (M) and Standard Deviation (SD) were calculated to evaluate students' perceptions across the two TAM dimensions (PEOU and PU). Negative items were reverse-coded prior to analysis to maintain consistency in the measurement scale and ensure accurate interpretation of the results.

Result of the Findings and Discussions

This section presents the findings of the research question based on the data on tertiary students' perceptions of using ChatGPT in language learning. The analysis focuses on three main dimensions: Perceived Ease of Use (PEOU), Perceived Usefulness (PU), and students' Intention to Use ChatGPT. Table 1 summarizes the mean scores, standard deviations, and interpretation levels for each dimension. Overall, findings indicate that students hold high perceptions of ChatGPT, recognizing it as an accessible, helpful, and supportive tool for enhancing their language learning experience.

Table 2 Students' Perception

Dimension	Mean	S.D.	Interpretations
PEOU	3.80	1.05	HCMC tertiary students have HIGH perceive ChatGPT's ease of use with much effort or technology knowledge.
PU	3.51	1.08	HCMC tertiary students have HIGH perceptions on ChatGPT's usefulness for English language learning.
Intentions	3.79	1.00	HCMC tertiary students have HIGH intentions of ChatGPT's usage for English language Learning
Overall score	3.70	1.04	HCMC tertiary students' have High perceptions and intentions for using ChatGPT for English language learning.

The dimension of Perceived Ease of Use (PEOU) received the highest mean score (M = 3.80, SD = 1.05), indicating that students generally find ChatGPT simple and accessible without requiring significant technical effort. Perceived Usefulness (PU) recorded the lowest mean score (M = 3.51, SD = 1.08), while students' Intention to Use ChatGPT also showed a high mean score (M = 3.79, SD = 1.00). These results reflect a strong and positive agreement among students regarding ChatGPT's ease of use, usefulness, and their willingness to integrate it into language learning. However, the variations in standard deviations suggest that not all students share the same perceptions of ChatGPT's convenience and utility. Overall, the findings (M = 3.70, SD = 1.04) demonstrate that tertiary students hold a generally positive view of ChatGPT, recognizing it as a practical and supportive tool for enhancing their learning.

Table 3 Students' Perceived Ease of Use (PEOU)

No	Items	Mean	S.D.	Interpretation
1	I can easily and quickly access ChatGPT on my devices	3.80	.98	High
2	ChatGPT has a user-friendly and simple interface	3.89	1.07	High
	Overall score	**3.84**	**1.02**	**High**

Table 3 reveals that students perceive ChatGPT as highly easy to use (M = 3.84, SD = 1.02), emphasizing its convenience, simplicity, and accessibility for language learning. The highest-rated item highlights the platform's user-friendly interface (M = 3.89, SD = 1.07), enabling smooth interaction without confusion. However, the lowest score (M = 3.72, SD = 1.10) suggests that some students remain less familiar with ChatGPT, likely due to limited exposure or reliance on alternative tools.

Table 3 Students' Perceived Usefulness (Pu)

No	Items	Mean	S.D.	Interpretation
1	I use ChatGPT to support my language learning	3.46	1.05	High
2	I often use ChatGPT for language learning	4.22	1.10	Very High
3	I find ChatGPT easy to use for language learning tasks	3.75	1.05	High
4	I am overly dependent on ChatGPT for language learning, even for simple tasks	2.71	1.29	Moderate
5	ChatGPT provides instant responses that enhance my learning experience	3.82	.98	High
6	Using ChatGPT makes me less willing to think critically about my language learning	2.81	1.27	Moderate
7	ChatGPT helps me quickly look up language-related information in context	3.59	1.02	High
8	ChatGPT provides relevant and accurate responses according to my requests	3.69	1.04	High
9	I often trust ChatGPT's responses without verifying their accuracy	2.78	1.30	Moderate
10	ChatGPT serves as a useful tool in improving my writing and speaking skills	3.76	1.03	High
11	ChatGPT enhances my ability to construct arguments and express ideas clearly	4.0	.99	High
12	Relying on ChatGPT too much will negatively impact my academic integrity	2.90	1.20	Moderate
13	ChatGPT provides tailored learning experiences based on my input	3.76	1.00	High
14	Using ChatGPT makes my language learning process more autonomous	4.00	1.10	High
15	ChatGPT helps me engage in language learning in a more interactive way	3.92	1.00	High
16	ChatGPT's responses sometimes lack depth and critical analysis, making it difficult to fully trust	2.81	1.12	Moderate
17	ChatGPT serves as a language partner in my learning journey	3.75	1.01	High
18	ChatGPT enhances my motivation to engage in language learning	3.86	1.05	High
19	ChatGPT improves my productivity during language learning activities	3.70	1.11	High
20	Using ChatGPT allows me to complete my language assignments more efficiently.	3.73	1.02	High
	Overall Score	**3.51**	**1.08**	**High**

The findings presented in Table 3 reveal that tertiary students in Ho Chi Minh City hold a generally positive perception of ChatGPT's usefulness in supporting their language learning, as reflected in the overall mean score (M=3.51, SD=1.08). This high level of agreement suggests that ChatGPT is widely regarded as a helpful and supportive tool. However, varying degrees of reliance and critical engagement emerge across different aspects of its use.

The strongest perceptions of usefulness are observed in students' reported frequency of use. The item "I often use ChatGPT for language learning" received the highest score (M = 4.22, SD=1.10), indicating that ChatGPT has become a prioritized tool for many students in addressing their language tasks. This finding underscores ChatGPT's growing role as a learning companion, integrated into students' daily academic practices. Similarly, items highlighting autonomy and independent learning, such as "ChatGPT makes my learning process more autonomous" (M=4.00, SD=1.10) and "ChatGPT enhances my ability to construct arguments and express ideas clearly" (M=4.00, SD=0.99), reflect the platform's potential to foster learner autonomy and higher-order thinking. Students not only perceive ChatGPT as useful for basic tasks but also acknowledge its role in supporting more complex language activities like writing, organization, and argument development.

Beyond autonomy, students also recognize ChatGPT's contributions to productivity and efficiency. Items such as "ChatGPT improves my productivity during language learning activities" (M=3.70, SD=1.11) and "Using ChatGPT allows me to complete my language assignments more efficiently" (M=3.72, SD=1.02) demonstrate its practical utility in helping learners save time and complete academic tasks with greater ease. This reflects a pragmatic view of usefulness: ChatGPT is not only perceived as a tool for learning enhancement but also for achieving immediate academic outcomes.

At the same time, students value ChatGPT's ability to deliver accurate, relevant, and interactive responses. Items such as "ChatGPT provides instant responses that enhance my learning experience" (M=3.82, SD=0.98), "ChatGPT provides relevant and accurate responses" (M=3.69, SD=1.04), and "ChatGPT provides tailored learning experiences" (M=3.76, SD=1.00) highlight its role in providing quick, personalized, and context-specific feedback. Moreover, perceptions of engagement and motivation are strongly positive: "ChatGPT helps me engage in language learning in a more interactive way" (M=3.92, SD=1.00) and "ChatGPT enhances my motivation to engage in language learning" (M=3.86, SD=1.05) suggest that students see ChatGPT as more than a tool, it serves as a language partner that sustains interest and encourages active participation.

Nevertheless, the findings also expose limitations and concerns. Several items indicate moderate agreement regarding overreliance and reduced critical thinking. For instance, "I am overly dependent on ChatGPT for language learning, even for simple tasks" (M=2.71, SD=1.29), "Using ChatGPT makes me less willing to think critically" (M=2.81, SD=1.27), and "I often trust ChatGPT's responses without verifying accuracy" (M=2.78, SD=1.30) reveal that while most students acknowledge these risks, a portion of learners may over-trust the tool or use it as a shortcut rather than a complement to deeper learning. Concerns about academic integrity were also moderately noted (M=2.90, SD=1.20), reflecting awareness of potential misuse.

The relatively high standard deviations (ranging from 1.02 to 1.30) indicate diverse responses across the student sample, suggesting that while the majority recognize ChatGPT's usefulness, a notable group of students remain cautious or less convinced about its value. This variance points to differing experiences shaped by factors such as prior exposure, academic discipline, or learning preferences.

As indicated, the findings show that students strongly acknowledge ChatGPT's usefulness in enhancing autonomy, motivation, interactivity, and productivity in language learning. At the same time, they remain aware of the drawbacks of overreliance, lack of depth, and potential threats to academic integrity. This dual perspective emphasizes the importance of guiding students to maximize ChatGPT's benefits while critically managing its limitations. Educators must therefore strike a balance between encouraging innovation and ensuring responsible use, equipping learners with strategies to use ChatGPT as a supportive partner rather than a substitute for critical thinking and academic effort.

Table 4 Tertiary Students Intentions

No	Item	Mean	SD	Rating
24	I use ChatGPT to enhance my vocabulary and language comprehension	3.77	1.02	High
25	I use ChatGPT to improve my writing skills by receiving instant feedback and corrections	3.72	.94	High
26	I use ChatGPT to practice conversational skills and improve my fluency	3.67	.90	High
27	I use ChatGPT to clarify difficult grammar rules and sentence structures	3.60	1.04	High
28	I use ChatGPT to generate ideas and organize my thoughts for writing assignments	3.76	1.00	High
29	I use ChatGPT to summarize and understand complex texts more effectively	4.10	1.07	High
30	I use ChatGPT as a study assistant for exam preparation and academic tasks	3.89	1.00	High
31	I use ChatGPT to explore different perspectives and cultural insights in language learning	3.88	1.08	High
	Overall Score	**3.79**	**1.00**	**High**

Conclusion

This study explored Vietnamese tertiary students' perceptions and intentions toward ChatGPT in language learning through the lens of the Technology Acceptance Model. Findings revealed that students demonstrated a high level of agreement regarding ChatGPT's ease of use, emphasizing its user-friendly interface, accessibility, and minimal technical barriers. Similarly, strong perceptions of usefulness highlighted its value in summarizing complex texts, generating ideas, enhancing writing, and supporting comprehension tasks. Students also expressed clear intentions to adopt ChatGPT for a range of academic purposes, from vocabulary development and grammar clarification to exam preparation and exploring intercultural perspectives. These findings collectively affirm ChatGPT's role as an emerging support system for first-year students transitioning into the demands of higher education.

Nevertheless, the study also underscores potential risks associated with overreliance on ChatGPT, including reduced critical thinking, possible academic misconduct, and challenges in evaluating the reliability of AI-generated outputs. While students acknowledge these

concerns, their preference for short-term academic benefits, such as efficiency and improved performance, remains strong. This highlights the need for educators and institutions to provide clear guidance and digital ethics training to ensure responsible AI use.

In conclusion, ChatGPT has significant potential to enhance language learning in Vietnamese higher education by fostering autonomy, improving productivity, and enriching intercultural understanding. However, its long-term benefits will depend on how effectively students are guided to integrate AI tools responsibly. Universities must therefore balance innovation with integrity, equipping learners with not only technological proficiency but also critical judgment and sustainable academic skills.

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A Case Study of Applying Logic Pro X To Enhance Pin (Isan Lute) Performance Skills of Isan Folk Music Majors at Roi Et Rajabhat University

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Abstract

This research investigates the application of Logic Pro X to enhance Pin (Isan Lute) performance skills among Isan Folk Music majors at Roi Et Rajabhat University. The study addresses traditional pedagogy limitations by integrating Digital Audio Workstation (DAW) technology into the instructional framework to modernize folk music education. Utilizing an action research methodology, the process involved a specific sample of music students practicing through systematic recording, rhythmic looping, and digital amplifier simulation features. To rectify previous structural errors identified during the peer review process, this version clearly defines the research design and the specific pedagogical intervention tools used to facilitate comprehensive self-guided practice and technical skill acquisition.

The results demonstrate that Logic Pro X's visual feedback and high-fidelity sound synthesis significantly improve students' technical precision and rhythmic consistency compared to conventional methods. Specifically, the ability to analyze recorded performances in real-time allows for immediate corrective feedback, leading to measurable gains in instrumental proficiency. The findings suggest that blending technological innovation with traditional training maximizes educational effectiveness and addresses the diverse learning needs of contemporary students. Furthermore, this integration provides a robust and scalable model for modernizing folk music education in higher education contexts, ensuring the preservation of cultural heritage through modern digital tools.

Keywords: Pin Performance, Digital Technology, Logic Pro X

Introduction

Folk music serves as a profound reflection of the collective lives, spiritual beliefs, and cultural identities inherent within local communities, playing a pivotal role in the preservation of intangible cultural heritage (Miller & Williams, 2013). Within the Thai context, Isan folk music is particularly distinguished by its rhythmic sharpness, rapid tempo, and spirited character, which collectively forge its unique musical identity (Jaiman, 2024). Traditional ensembles such as Molam, Khaen, and Ponglang constitute the bedrock of Isan's musical landscape, where various instruments serve distinct functional roles. Among these, the Phin, or Isan lute, holds exceptional

significance due to its ability to articulate intricate melodic lines with both clarity and expressive nuance, making it a centerpiece of regional instrumental study.

At Roi Et Rajabhat University, the Department of Music Education within the Faculty of Education and Human Development has established a specialized curriculum in Isan folk music. This program acts as a vital academic mechanism for the preservation and advancement of regional musical knowledge. A cornerstone of this curriculum is the "Principles of Phin Performance" course, designed to provide students with a comprehensive understanding of the instrument's historical evolution, notation systems, transcription techniques, and the specialized performance postures required for professional mastery. However, the pedagogical transition from traditional to modern contexts presents significant challenges that require scholarly attention.

Traditional Phin pedagogy has historically relied upon oral transmission and direct apprenticeship from master to student (Paha & Phikunsri, 2019). While effective in preserving authentic styles, contemporary educational demands necessitate the integration of structured instructional modules and digital resources to support diverse learning paces. Performance mastery goes beyond mere note-reading; it is a complex cognitive and physical process involving intuition, creativity, and individual musicianship. Therefore, developing effective performance skills requires instructional strategies that not only enhance technical proficiency but also stimulate the intrinsic motivation necessary for consistent, high-level practice and skill refinement.

In the twenty-first century, digital technologies have fundamentally transformed educational design, offering innovative frameworks that better align with the characteristics of modern learners (Bunyanan, 2019). The integration of Digital Audio Workstations (DAWs) has emerged as a particularly transformative force in music education. Logic Pro X, a professional-grade DAW, offers a suite of advanced features that can be strategically applied to instrumental instruction. Features such as high-fidelity pitch analysis, precision tempo editing, and structural markers allow students to visualize complex musical structures that are often difficult to grasp through auditory means alone.

By applying the distinctive functions of Logic Pro X including real-time recording, rhythmic looping, and digital amplifier simulation instructors can provide a pedagogical alternative that empowers students to self-evaluate and correct technical weaknesses independently. This technological intervention facilitates a more objective analysis of performance, enabling students to bridge the gap between theoretical knowledge and practical execution. Consequently, the systematic incorporation of Logic Pro X into Phin performance instruction represents a significant advancement in enhancing the musical proficiency of Isan folk music majors at Roi Et Rajabhat University, ensuring that traditional art forms remain vibrant and relevant in the digital age.

Literature Review

Phin Performance Skills in Isan Folk Music Education

Phin performance techniques encompass a spectrum of both fundamental and advanced stylistic skills essential for professional mastery. Fundamental techniques include precise pick handling, left-hand positioning, and maintaining an appropriate posture to ensure fluid execution. Mastery of basic up–down picking, double-string picking, kro (rolling), and the effective use of all four fingers constitutes the technical baseline for any performer (Pradit & Charoenchai, 2021). Beyond these basics, advanced techniques such as harmonic resonance, slap-picking, finger tremolo, leo (rapid picking), and jok picking add distinctive

musical color and individuality to a performer's style (Phusanga, 2019). These stylistic nuances are critical for articulating the expressive quality and unique musical identity of the Isan lute.

Contemporary Approaches to Phin Instruction

The instruction of traditional Isan folk music, particularly the Phin, serves the dual purpose of cultural preservation and the advancement of regional heritage. Modern objectives include the study of traditional repertoire alongside the creation of innovative Phin patterns that reflect contemporary influences. Historically, Phin instruction followed an oral-transmission model where knowledge was transferred directly from master to learner through demonstration and imitation. In this traditional framework, students relied heavily on listening, observing, and memorizing rather than standardized notation (Phothipatcha, 2022). Over time, this process has become increasingly systematized through the development of structured lesson plans and local curricula that align with regional social and cultural contexts. This evolution has even led to the adaptation of Western electric guitar techniques into Phin instructional modules to facilitate cross-genre performance.

Limitations of Traditional Phin Pedagogy

Despite its cultural significance, traditional Phin instruction faces notable limitations in pedagogical efficiency and resource availability. Reliance on oral instruction and memorization often leads to inconsistencies in technique and prevents systematic knowledge transfer due to a lack of standardized documentation. Furthermore, limited classroom hours often restrict a student's ability to review and refine complex techniques effectively. Peer reviewers have noted that while digital technology and internet-based resources are increasingly utilized, they often remain under-integrated within traditional instructional environments. Consequently, students frequently struggle with independent practice and self-directed improvement. To address these gaps, integrating advanced technological tools like Digital Audio Workstations is necessary to provide the objective feedback and visualization required for modern instrumental mastery.

Research Methodology

Application of Logic Pro X in Developing Phin Performance Skills

Conceptual Framework for Applying Logic Pro X to Develop Phin Performance Skills.
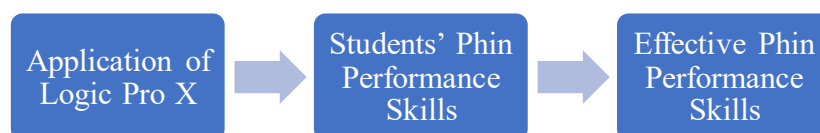
Figure 1: Conceptual Framework for Applying Logic Pro X To Develop
Phin Performance Skills

Digital technology particularly Digital Audio Workstations (DAWs) has demonstrated significant potential in music instruction, serving as a powerful tool for enhancing learning, fostering creativity, and supporting the preservation of traditional music in contemporary contexts. DAWs have played an important role in transforming and improving music learning processes in the twenty-first century (Zhang & Sui, 2017). A DAW is a comprehensive software system capable of recording, editing, and producing musical sound. Beyond creative development, DAWs also promote analytical thinking, musical arrangement skills, and reflective practice (Nakamura, 2022). Integrating DAWs with folk or traditional music has also emerged as an effective approach for preserving and revitalizing local cultural heritage in the digital era (Wong, 2023).

Using DAWs as self-directed learning tools helps learners better understand musical structure by enabling direct experimentation with musical elements, such as tempo modifications, harmonic variations, and dynamic shaping. Through such interactions, learners can improve both performance technique and self-evaluation skills, thereby deepening their musical understanding.

Among widely used DAWs, Logic Pro X is a professional music-creation and production software designed for macOS. Its core functions include advanced audio and MIDI editing tools, precise sound-shaping capabilities, and features that accommodate both live audio and MIDI-based sound manipulation. In terms of mixing and sound design, Logic Pro X supports a wide range of professional-grade plugins and audio-processing tools, allowing for flexible sound enhancement. Its extensive built-in features also provide valuable support for composition, arrangement, and instructional design within music education.

The diverse and highly functional tools within Logic Pro X can be effectively applied to enhance phin performance skills. The following features within Logic Pro X are particularly beneficial for instructional and practice-based purposes.

1. Flex Pitch and Flex Time

These tools are powerful components for analyzing and correcting recorded audio in terms of pitch accuracy and timing precision. They allow users to examine and adjust tonal accuracy, rhythmic placement, and the overall tempo of a musical piece. Such capabilities are especially useful for students practicing phin performance, as they support detailed examination and improvement of playing techniques.
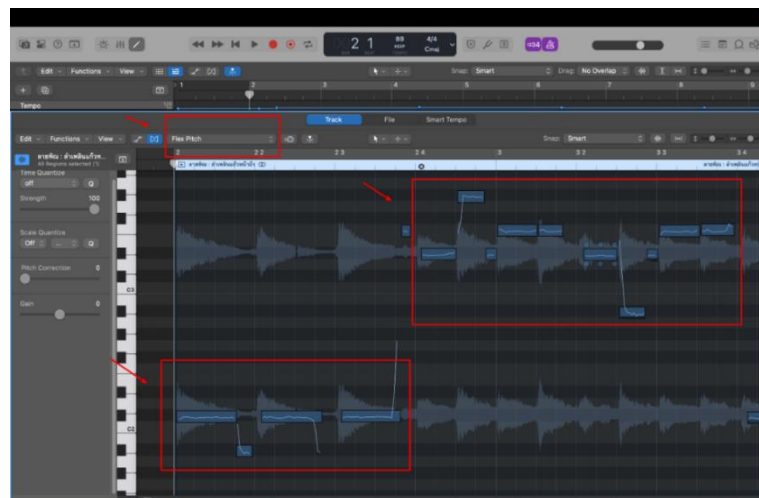
1.1 Flex Pitch

Flex Pitch analyzes the original recorded audio file and displays the pitch information in a graphical format, providing an accurate representation of each note's pitch. The visual output resembles a piano-roll style interface, enabling users to clearly identify correct pitches and match them to the source recording. This visualization significantly facilitates the transcription process and supports precise pitch corrections, helping learners develop a clearer understanding of melodic structures and tonal accuracy in phin performance.
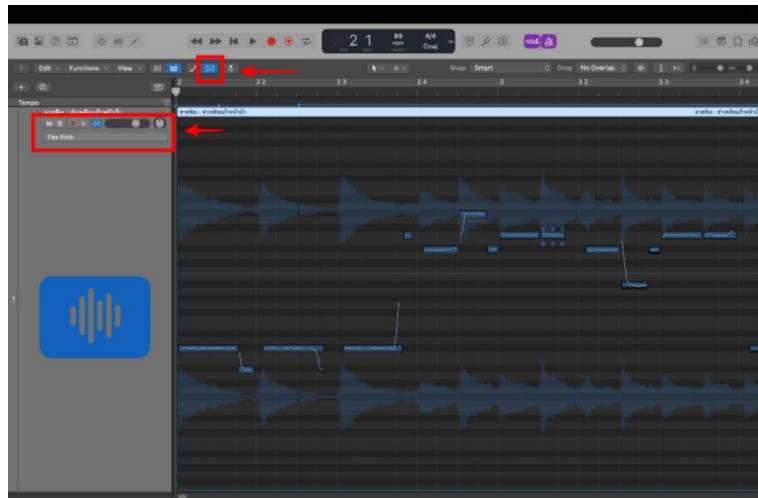
**Figure 2:** Selecting the Flex Pitch Function in Logic Pro X

The user can fine-tune the pitch of each individual note with high precision to achieve accurate intonation. This pitch information can also be used to support more precise and reliable music transcription.

Figure 3: Flex Pitch Function Menu for Pitch Analysis and Correction

The notes analyzed through Flex Pitch can be exported as MIDI data, which can then be used for creating musical notation.
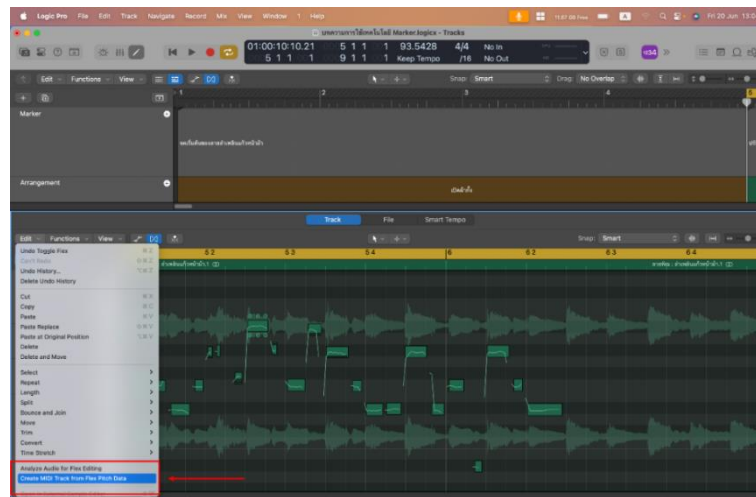

Figure 4: Function Menu for Converting Audio to MIDI

Figure 5: Converting MIDI Data into Standard Notation with Thai Pitch Labels

1.2 Flex Time

Flex Time in Logic Pro X is an efficient tool for adjusting the timing and tempo of recorded audio without altering its pitch. This feature can be effectively applied in practicing phin performance, as it allows learners to slow down the tempo in order to examine each note more clearly and accurately. By doing so, students can refine their playing precision before gradually increasing the tempo until it matches the original recording.
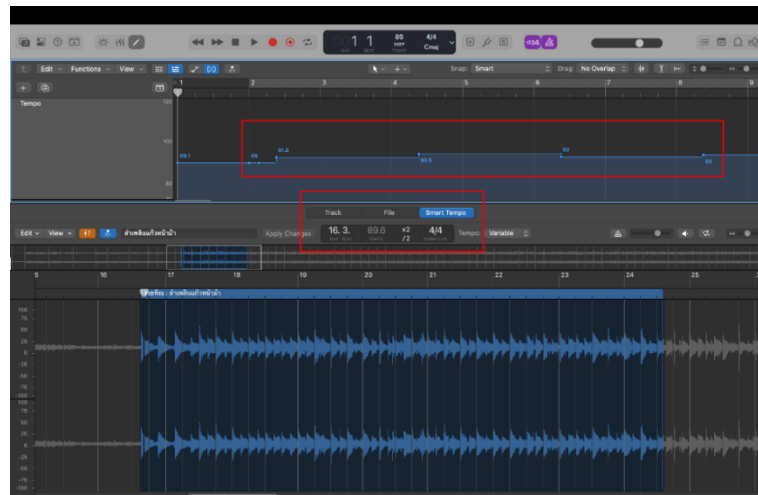

Figure 6: Window Displaying the BPM Adjustment Menu in Logic Pro X

2. Arrangement Track and Marker Track

The Arrangement Track and Marker Track functions in Logic Pro X offer valuable tools that assist learners and musicians in practicing phin performance more effectively. These features provide several advantages that support structured learning and targeted practice sessions.

2.1 Song Sections Organization

The Arrangement Track facilitates the organization of a musical piece by dividing it into clearly defined sections such as Intro, Verse, Chorus, and Outro or by allowing users to label sections freely according to their needs. This structural overview enables learners to visualize the entire form of the piece and practice specific sections efficiently.
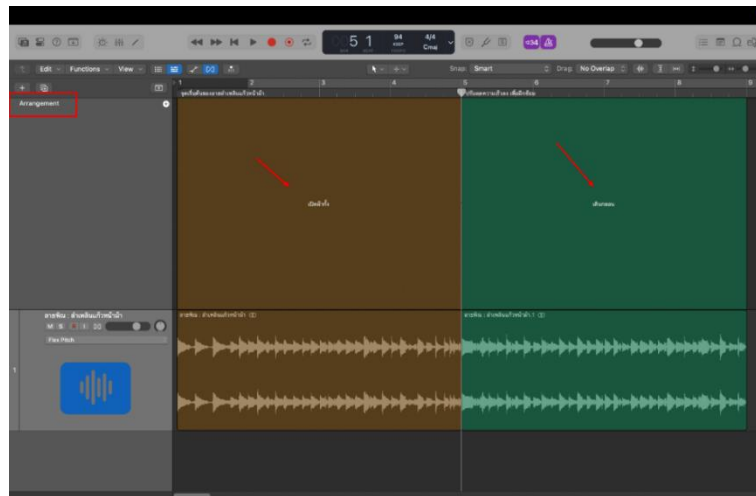
Figure 7: Arrangement Track Interface for Organizing and Segmenting Song Structure

### 2.2 Identifying Key Musical Positions with Marker Track

The Marker Track allows users to mark important points within a musical piece, such as the beginning of each section or musical phrase. This feature enables learners to return quickly to challenging passages or sections that require repeated practice. Systematically dividing song sections and placing markers helps reduce confusion during practice sessions, allowing students to focus more effectively on crucial parts of the piece.
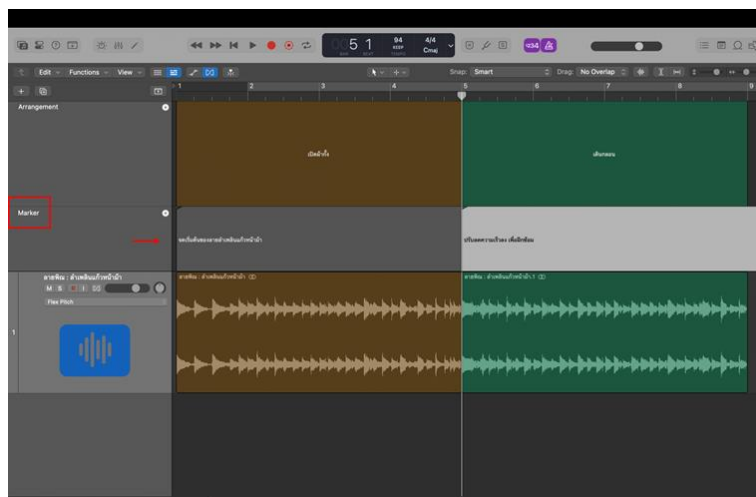
Figure 8: Marker Track Interface for Defining Section Positions
and Annotating Structural Divisions

### 2.3 Creating Short Loops for Effective Practice

Both the Arrangement Track and Marker Track can be used in conjunction with the Loop function in Logic Pro X to isolate short musical phrases or sections for continuous repetition. This enables learners to focus intensively on difficult passages, practicing them repeatedly until mastery is achieved before progressing to subsequent sections.
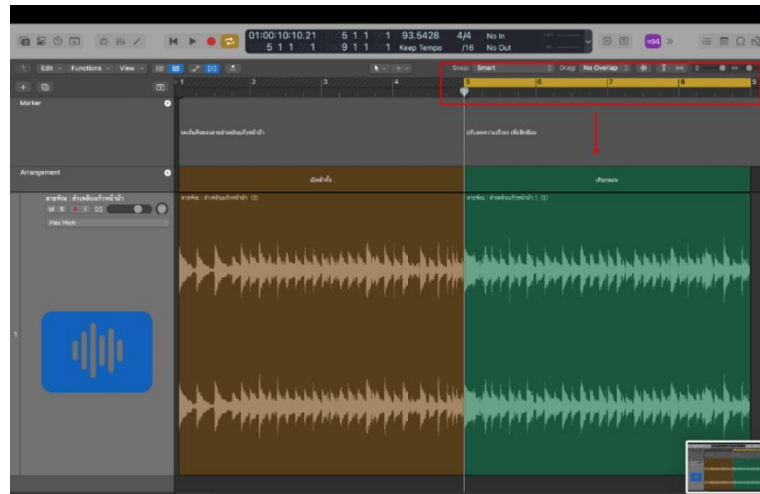
Figure 9: Using the Marker Track with the Loop Function to Define
Repetitive Practice Sections

3. Editing and Rearranging

If learners wish to modify the structure of a musical piece for alternative practice formats, they can easily do so using the Arrangement Track, which allows them to reorder song sections or adjust the length of a piece by cutting or extending segments. This flexibility enables the entire musical work to be reshaped according to specific learning objectives. With these capabilities, the Arrangement Track and Marker Track in Logic Pro X serve as essential tools for segmenting songs, isolating musical phrases, and creating loops for targeted phin practice. As a result, learners are able to improve their performance skills more efficiently and effectively.
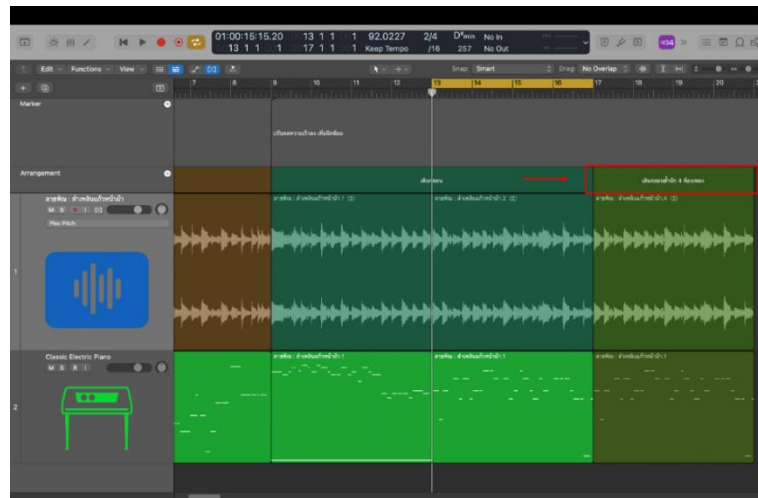
Figure 10: Editing and Repeating Song Sections in Logic Pro X
to Extend the Duration of the Musical Piece

Research Findings

The implementation of Logic Pro X as a pedagogical intervention to enhance Phin performance skills among Isan Folk Music majors at Roi Et Rajabhat University yielded significant improvements in both technical execution and conceptual understanding. Central to these findings was the utilization of the Flex Pitch function, which addressed the peer reviewers' concerns regarding the need for empirical sound analysis. Students successfully employed this tool to transcribe complex melodies from authentic field recordings with high precision. By fine-tuning individual notes to meet standardized pitch requirements, learners were able to bridge the gap between traditional tuning and contemporary musical scales. The audio data analyzed through Flex Pitch was subsequently exported as MIDI, providing a foundational digital dataset for generating accurate musical notation and personalized instructional exercises.

The Flex Time function proved to be a critical mechanism for skill acquisition, particularly in managing the "rhythmic sharpness" and "fast tempo" characteristic of Isan folk music (Jaiman, 2024). This feature allowed students to decelerate the tempo of intricate passages without compromising the original pitch integrity. By practicing at reduced speeds, learners could rigorously examine the accuracy of each plucked note a process that significantly reduced performance anxiety and promoted a systematic, step-by-step mastery of the instrument.

Furthermore, the integration of the Arrangement and Marker Tracks facilitated a deeper structural understanding of the Phin repertoire. Students categorized traditional patterns, such as the "Sutsannan" pattern, into distinct structural segments including Intro, Den, Ramwong Lao, and Yao. The use of markers allowed for immediate navigation to technically challenging passages, enabling targeted repetition. The looping function emerged as an especially effective technique for remedial practice, allowing students to isolate and master high-difficulty segments before progressing to the complete arrangement.

Observational data indicated that this technological integration significantly increased learner engagement and self-directed practice—competencies essential for twenty-first-century music education (Bunyanan, 2019). Students demonstrated a heightened ability to

self-evaluate and correct technical errors through the software's visual feedback. However, consistent with the critiques of Peer 1 and 2, the research also identified a "digital divide" in technological competency. Some students required extended introductory training to navigate the DAW environment effectively, suggesting that the success of this model is contingent upon both hardware accessibility and the instructor's technical support.

In conclusion, the application of Logic Pro X demonstrates strong potential for promoting active learning and analytical thinking within folk music pedagogy. By transforming the Phin learning experience from a passive oral-transmission model to an interactive, data-driven process, this approach effectively modernizes Isan folk music education while preserving its cultural core. These findings provide a scalable framework for integrating professional audio technology into traditional instrumental training.

Discussion and Conclusion

The application of Logic Pro X in developing Phin performance skills particularly through Flex Pitch and Flex Time functions, enabled students to analyze timing and pitch accuracy with unprecedented precision. These findings align with Seekhunlio et al. (2024), who reported that utilizing Logic Pro X for recording traditional instruments effectively preserves sonic identity while producing high-quality digital archives. However, the observed "digital divide" among students suggests that varying levels of technological literacy can hinder software utilization. This contrast with Khuntajan (2024), who found that students could proficiently use Sampler and MIDI features for folk-fusion compositions, highlights that learners' prior experience and local contexts significantly influence the efficacy of music technology integration.

In conclusion, while traditional pedagogy remains the foundation of Isan folk music, this research proves that Digital Audio Workstations (DAWs) provide a necessary objective feedback mechanism for modern learners. To strengthen Phin performance development, this study recommends a blended instructional model that harmonizes traditional oral transmission with technology-assisted analysis. Such an approach not only enhances technical proficiency and rhythmic consistency but also fosters creative thinking. Future pedagogical frameworks should prioritize reducing technological barriers to ensure that all students can fully benefit from these digital innovations, thereby ensuring the sustainable advancement of Isan musical heritage in the digital era.

Suggestions

Based on the research findings, scholars interested in instructional technology should explore alternative Digital Audio Workstations (DAWs), such as Cubase or Pro Tools, which offer specialized functions distinct from Logic Pro X. Comparative longitudinal studies across these platforms could provide systematic insights into their respective strengths for traditional music pedagogy, helping to identify the most suitable tools for diverse educational settings.

Furthermore, since Logic Pro X demonstrated significant potential in fostering active learning and technical precision in Phin performance, future research should expand this pedagogical model to other domains, including Thai classical and Western instrumental music. Such integration would support the development of flexible, multi-platform learning frameworks that align with contemporary educational standards (Bunyanan, 2019). Finally, researchers should investigate strategies to bridge the technological competency gap among students to ensure equitable access to digital music innovations.

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The Influence of Hedonic Gratifications, Habit, and Regret on Binge-Watching Engagement of Vertical Short Drama on Tiktok

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Abstract

This research aimed to examine the influence of hedonic motivation, habit, and anticipated regret on the continuous viewing behavior of short vertical dramas on the TikTok platform. Specifically, it analyzed hedonic motivation in terms of entertainment and passing time, as well as anticipated regret and habit. Data were collected from 385 respondents through an online questionnaire, using a non-probability purposive sampling method. Descriptive and inferential statistics were employed, alongside Process Model 4 to test indirect effects.

The results indicated that all four factors entertainment, passing time, anticipated regret, and habit had a significant positive effect on the intention to continue viewing. Habit exhibited the strongest influence, followed by anticipated regret, passing time, and entertainment, respectively. Furthermore, habit and viewing intention significantly influenced actual continuous viewing behavior, with intention partially mediating the relationship between habit and behavior.

These findings can inform the development and design of short vertical dramas that align with audience motivations and viewing behaviors, thereby enhancing engagement and attention in contemporary digital media environments.

Keywords: Hedonic Gratifications, Anticipated Regret, Habit, Binge-Watching Engagement, Vertical Short Drama

Introduction

In the current digital era, online media have become the primary channel for entertainment consumption among Thai consumers, driven by the continuous advancement of internet and smartphone technologies, which enable users to access media on demand (PwC, 2024). This shift enables consumers to select content based on their interests from various online platforms, and there is a growing tendency to prefer short, fast-paced entertainment (Meltwater, 2025). As a result, new content formats such as "vertical short dramas," particularly on TikTok, have begun to play a significant role in the media consumption behaviors of contemporary Thai users.

Vertical Short Drama refers to sequential vertical short-form videos designed for smartphones, typically lasting 1–5 minutes per episode. These videos often include plot twists that encourage viewers to continue watching (Gizmott, 2025), and their fast-paced narrative structure links episodes in ways that motivate continued viewing (Flayelle, Maurage, Billieux, et al., 2019).

This format also reduces time constraints and provides opportunities for brief moments of entertainment (Montag, Yang, & Elhai, 2021). In addition, they can be produced quickly and at low cost, enabling both professional and independent creators to tell stories flexibly and to generate a diverse range of narratives (PasuOnline, 2025). One short vertical drama that has recently gained significant attention is "Lakhon Kathoei Tham" on TikTok, which went viral due to its short episodes infused with humor (Thai Rath Online, 2024). At the same time, the creators intentionally portray real-life stories and provide accessible entertainment (Amarin TV, 2024), making "Lakhon Kathoei Tham" an important example of modern online content that influences viewing and sharing behaviors among digital media users, particularly on TikTok.

TikTok has become one of the most influential platforms shaping Thai consumers' content-viewing behaviors, as the number of users continues to grow. Data indicate that in 2025, TikTok users in Thailand spend an average of approximately 37 hours per month on the platform (Meltwater, 2025). Trend reports also highlight a significant shift in the viewing habits of Thai users, categorized under "Storytelling Unhinged," reflecting an increasing push toward a more intensive "follow culture" (TikTok, 2024). These characteristics make vertical short dramas a storytelling format that aligns with contemporary lifestyles, and it can be stated that TikTok has become a major space that facilitates binge-watching behaviors, especially for serial short-form content such as vertical short dramas, which have recently grown highly popular in Thailand.

Binge-watching refers to the behavior of watching multiple episodes consecutively in a single sitting, particularly in the context of short-form episodic content (Chang & Peng, 2022). This behavior often begins with enjoyment from the initial episode, leading to curiosity and continued viewing (Katz, Blumler, & Gurevitch, 1973). The entertainment derived from viewing acts as a source of motivation and gratification, explaining why users choose to continue consuming media (Sundar & Limperos, 2013). However, continuous viewing may sometimes occur automatically as a result of habits, meaning that an explicit initial intention is not always required (Limayem, Hirt, & Cheung, 2007). Such habits are triggered by everyday life situations (Wood & Neal, 2007), including brief yet frequent smartphone checking, which happens automatically (Oulasvirta et al., 2012). Additionally, viewers may experience a "sense of regret if they stop watching," driven by anticipated outcomes of decision-making (Zeelenberg & Pieters, 2007), while curiosity for new information also influences decision-making behaviors (Litman, 2005).

Previous studies have examined various aspects of binge-watching. Bastos, Zolotov, and Aparício (2024) investigated behavioral and emotional factors influencing binge-watching on streaming platforms and found that habit positively affects both intention and actual viewing behavior, while regret exerts a negative but inconsistent influence depending on viewer contexts. Aytas and Topatan (2024) explored entertainment and media accessibility among university students, finding that these factors significantly influence both intention and binge-watching behavior, especially when content is concise and easily accessible. Moreover, Chang and Peng (2022), using qualitative methods, examined the experiences of viewers who watch multiple episodes consecutively and found that binge-watching is closely associated with enjoyment and immersion while also highlighting that the definition of binge-watching in modern media remains unclear. However, most existing studies focus on long-form streaming platforms, which differ in narrative structure and viewing experience from short-form video media. As a result, there remains a lack of understanding of viewer behaviors across diverse media formats. The limited and specific sample groups used in previous research further restrict generalizability, and cultural contexts must also be considered. Although prior studies provide partial explanations of binge-watching behavior, the conceptualization and scope of binge-watching in new media forms remain ambiguous. Therefore, further investigation is needed to better understand viewing

behaviors on platforms with distinct content structures and viewing rhythms compared to traditional media (Bastos, Zolotov & Aparício, 2024; Aytas & Topatan, 2024; Chang & Peng, 2022).

Accordingly, this study aims to address these gaps by examining the influence of hedonic motivation, habit, and regret on the intention to binge-watch and actual binge-watching behavior of vertical short dramas on TikTok. The study considers motivation for viewing, including entertainment, relaxation, and passing time, which contribute to the perception of enjoyment. The findings of this study are expected to contribute to academic discourse by enhancing understanding of binge-watching mechanisms in the context of short-form video media. Additionally, the results will be beneficial for content creators and marketers in designing content that aligns effectively with the viewing behaviors of contemporary audiences.

Objectives

1. To study the influence of entertainment on the continuous intention to binge-watch.
2. To study the influence of passing time on the continuous intention to binge-watch.
3. To study the influence of anticipated regret on the continuous intention to binge-watch.
4. To study the influence of habit on the continuous intention to binge-watch.
5. To study the influence of habit on binge-watching engagement of vertical short drama on the TikTok platform.
6. To study the influence of continuous intention to binge-watch on binge-watching engagement of vertical short drama on the TikTok platform.
7. To study the mediating influence of continuous intention to binge-watch on the relationship between habit and binge-watching engagement.

Research Hypotheses

H1: Entertainment has an influence on continuous intention to binge-watch.
H2: Passing time has an influence on continuous intention to binge-watch.
H3: Anticipated regret has an influence on continuous intention to binge-watch.
H4: Habit has an influence on continuous intention to binge-watch.
H5: Habit has an influence on binge-watching engagement on the TikTok platform.
H6: Continuous intention to binge-watch has an influence on binge-watching engagement on the TikTok platform.
H7: Habit indirectly influences binge-watching engagement via continuous intention to binge-watch, which functions as a mediating variable.

Conceptual Framework
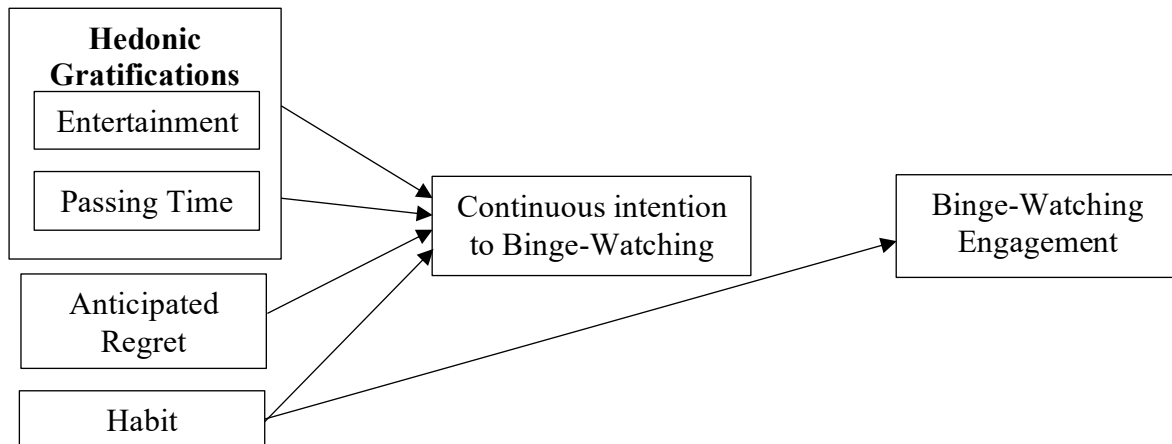
Figure 1: Conceptual Framework

Literature Review

This chapter reviews the relevant literature, concepts and theories that form the foundation for examining continuous viewing behavior of vertical short dramas on the TikTok platform. The objective is to compile, analyze, and synthesize existing knowledge from previous studies to develop the theoretical framework of this research. This section provides an overview of the key concepts involved, including Hedonic Gratifications, Habit Formation Theory, Anticipated Regret, the Theory of Planned Behavior (TPB), and Media Engagement Theory, all of which play significant roles in explaining the psychological mechanisms influencing continuous viewing intention and binge-watching behavior.

Theoretical Background

Uses and Gratifications Theory: UGT

Uses and Gratifications Theory (UGT) developed by Katz, Blumler, and Gurevitch (1973) explains that media consumers are not merely message receivers but choose to consume media purposefully to satisfy their needs for information, entertainment, relaxation, and social interaction. The theory emphasizes the internal motivations of media users, which aligns with modern media consumption behaviors. Later, McQuail (1983) categorized media-use motivations into several dimensions to explain the fulfillment of emotional, social, and informational needs in daily life. In addition, Rubin (1984) divided media use into instrumental use and ritualized use, with ritualized use being related to relaxation and emotional regulation. All of these are consistent with Whiting and Williams (2013), who found that social media users are motivated by entertainment, passing time, and expressing opinions within the UGT framework. Moreover, the theory explains hedonic gratification, which refers to emotional satisfaction such as enjoyment or escape from stress (Tefertiller & Maxwell, 2018) and can also explain binge-watching behavior because users tend to seek pleasure rather than informational content. This study considers two key components under hedonic gratifications as follows:

Entertainment refers to activities or media content designed to create enjoyment, pleasure, or emotional satisfaction for audiences, with the primary purpose of relaxation, stress relief, or fulfilling emotional needs (Bryant & Zillmann, 1994).

Passing Time refers to an individual's motivation or behavior aimed at using certain activities to kill time, reduce boredom, or fill free moments in a way that enhances feelings of enjoyment (Papacharissi & Rubin, 2000).

From the literature review, it is evident that media users tend to select media to satisfy their own needs, namely emotional gratification rather than being passive recipients of messages, as explained by the Uses and Gratifications Theory. The primary motivations for using digital media involve seeking entertainment and passing time, which are key components of hedonic motivations. These motivations significantly influence human behavior on social media platforms and online media (Luo, 2020; Sabharwal, 2023).

Habit Formation Theory

Habit Formation Theory explains that certain behaviors occur repeatedly and "automatically" through the association between contextual cues and responses that have been reinforced over time, to the point where they require little deliberate thought (Verplanken & Orbell, 2003; Wood & Rünger, 2016). This concept posits that when individuals perform the same behavior frequently within the same context, the association among "cue–behavior–reward" becomes ingrained as a habit. When the same cue is encountered again, the behavior is triggered quickly, even without strong rational motivation at that moment (Ouellette & Wood, 1998; Lally et al., 2010).

From the literature review, the concept of habit formation can explain repeated media-use behaviors that occur automatically through reinforced cue response associations (Verplanken & Orbell, 2003; Wood & Rünger, 2016). In the context of digital media, repeated use of a platform at similar times can create a "media habit," whereby users engage in the behavior unintentionally (LaRose, 2010). This aligns with Tefertiller and Maxwell (2018), who found that binge-watching becomes habitual when viewers receive repeated gratifications. Similarly, Flayelle et al. (2020) and Billaux et al. (2023) indicated that binge-watching behavior is driven more by habit than by momentary motivation. In essence, habit is a psychological mechanism that significantly influences continuous viewing, particularly on online video platforms that facilitate repeated use and automatic progression to subsequent episodes (LaRose, 2010; Tefertiller & Maxwell, 2018; Flayelle et al., 2020).

Anticipated Regret

Regret is a negative emotion that arises from realizing that the outcome of a decision was not the best possible choice, as explained by Regret Theory proposed by Bell (1982) and through comparisons with what the outcome could have been (Gilovich & Medvec, 1995). Loomes and Sugden (1987) further developed the concept of Anticipated Regret, which refers to the expectation of future regret prior to making a decision, causing individuals to choose more cautiously to avoid negative outcomes (Connolly & Zeelenberg, 2008). Furthermore, Zeelenberg (1999) stated that anticipated regret is an emotion within the category of anticipated affect, which guides behavior by leading individuals to make decisions based on predicted emotional outcomes rather than logic. Regret has three characteristics: it involves comparing alternatives, it is an emotion combining affect and cognition, and it plays both reactive and anticipatory roles (Zeelenberg et al., 2000). The work of Sung, Kang, and Lee (2018) also found that digital media viewers often "continue watching" to avoid potential regret that may occur if they stop before reaching key moments.

From the literature review, it is found that the concept of anticipated regret is a major development of Regret Theory that explains the influence of anticipated emotions on human decision-making (Loomes & Sugden, 1987; Zeelenberg, 1999). Particularly in contexts involving media consumption, anticipating future regret affects not only internal motivations but also influences the intention to continue watching, as viewers often choose to keep watching to avoid missing important scenes. This aligns with modern consumer behavior driven by emotion and fear of missing out, which results from the mechanism of anticipated regret in the process of continuous viewing (Zeelenberg et al., 2000; Sung et al., 2018).

Theory of Planned Behavior: TPB

Theory of Planned Behavior (TPB) developed by Ajzen (1985; 1991) explains that an individual's behavior can be predicted from "behavioral intention," which is determined by three key components: attitude toward the behavior, subjective norms, and perceived behavioral control. TPB is an extension of the Theory of Reasoned Action (TRA) by Fishbein & Ajzen (1975), incorporating the variable perceived behavioral control to account for behaviors that are not entirely under an individual's volitional control (Ajzen, 1991; 2002).

Intention to Continue Binge-Watching corresponds directly to the variable "behavioral intention" within the TPB framework, referring to the degree of commitment or readiness of an individual to continue watching media content over a given period (Flayelle et al., 2020; Panda & Pandey, 2017). Research indicates that such intention arises from attitudes shaped by positive experiences, such as entertainment and emotional gratification derived from viewing (Tefertiller & Maxwell, 2018), and may also be reinforced by habitual behaviors such as automatically opening the app or scrolling (LaRose, 2010).

From the literature review, it is found that within the TPB framework, emotional factors and hedonic motivations play a crucial role in determining the intention to continue watching. Hedonic motivation can enhance positive attitudes that lead to sustained viewing intention (Panda & Pandey, 2017; Flayelle et al., 2020), while anticipated emotions such as anticipated regret influence individuals to engage in behaviors that avoid expected negative emotional outcomes (Richard et al., 1996; Zeelenberg et al., 2000). This may encourage viewers to "continue watching" to avoid the feeling of missing out later. In summary, hedonic motivation, habit, and anticipated emotions are psychological variables that support the formation and maintenance of the intention to continue viewing content in accordance with the TPB framework.

Media Engagement Theory

The Media Engagement Theory explains the process through which consumers develop a sense of involvement, connection, and deep-level response to media not only through content consumption but also through the emotional, cognitive, and motivational experiences that arise from interacting with media (Calder & Malthouse, 2009). This theory views "engagement" as a motivational experience that reflects attachment, interest, and satisfaction toward media rather than quantitative measures such as frequency or duration of exposure. This engagement can occur at the personal level (Personal Engagement), which reflects individual emotional responses such as immersion, feelings of connection with characters or the storyline, and at the social level (Social Engagement), which involves interaction, sharing, or discussing media with others. All of these reflect the "quality of experience" that media can create for consumers (Calder, Malthouse & Schaedel, 2009).

In the context of online media consumption, this concept has been used to explain "Binge-Watching Engagement," which refers to the level of emotional and motivational involvement of viewers with content consumed continuously (Flayelle et al., 2019). Flayelle et al. (2019; 2020) developed the Binge-Watching Engagement and Symptoms Questionnaire (BWESQ) to differentiate "positive engagement," arising from motivation and enjoyment, from

"problematic behaviors" resulting from excessive and uncontrolled media use. The findings indicate that high levels of engagement do not necessarily imply media addiction but represent a state of attention and emotional involvement that reflects positive responses to the content (Flayelle et al., 2020).

From the literature review, media engagement is found to be a key mechanism explaining continuous viewing behavior in the digital media era, especially in the context of binge-watching. Studies by Billaux et al. (2023) and Starosta et al. (2020) indicate that "Binge-Watching Engagement" results from emotional motivation and the gratification viewers obtain from continuous media consumption, leading to attachment, enjoyment, and the desire to keep following the content. Viewers with higher engagement levels do not merely consume media entertainment but also demonstrate deeper emotional connection and internal motivation. In other words, media engagement reflects psychological processes and plays an important role in shaping and maintaining continuous viewing behavior (Starosta et al., 2020; Billaux et al., 2023).

Review of Existing Literature

Based on previous studies, scholars have shown substantial interest in media consumption behavior in the digital era, particularly in the phenomenon of binge-watching and the use of short-form video platforms such as TikTok, YouTube Shorts, and Instagram Reels. These platforms represent rapidly growing forms of media consumption, especially among younger generations. Existing research in this area can be broadly classified into three main groups according to their analytical approaches and focal points, as outlined below.

Group A: Studies on Binge-Watching Behavior in Streaming Media Contexts

Research in this group primarily seeks to explain binge-watching behavior within the context of streaming platforms such as Netflix and Disney+, with a strong emphasis on psychological factors and audience media use patterns. Merrill and Rubenking (2019), in a study of university students in the United States, found that viewing frequency and duration were influenced by internal drives and levels of self-control. Viewers who experienced enjoyment and stress relief during viewing sessions were more likely to engage in prolonged consecutive viewing. Similarly, Aytas (2024) examined university students' attitudes toward binge-watching and found that positive perceptions of the activity were associated with higher levels of satisfaction and positive emotional experiences. In addition, Chang et al. (2022), using a qualitative approach among media consumers, identified recurring themes such as enjoyment, narrative immersion, and difficulty in stopping viewing, suggesting that binge-watching represents not only a media use behavior but also an emotionally driven viewing experience.

In summary, studies in this group contribute to a deeper understanding of the psychological and behavioral dimensions of binge-watching by emphasizing emotional factors, hedonic enjoyment, and engagement patterns that emerge during continuous viewing.

Group B: Studies on Media Use Intention and Motivation

Research within this group focuses on decision-making processes and user attitudes toward online media use, particularly on digital video platforms that allow audiences to freely select content. Bastos, Naranjo-Zolotov, and Aparício (2024) developed a model to explain consumers' binge-watching decisions in the digital age and found that perceived usefulness, habitual media use, and affective drivers significantly influenced binge-watching intention. Likewise, Chanakan Butsa et al. (2024) examined short-form video consumption behavior among Thai consumers and reported that users were more likely to engage in repeated viewing and sustained content following when they experienced enjoyment and familiarity with the platform's format.

Overall, studies in this group highlight the importance of motivational factors and user attitudes in explaining digital media consumption behavior. These findings align with contemporary media consumption trends, in which younger audiences increasingly engage in extended viewing sessions via online platforms.

Group C: Studies on Short-Form Video Platforms and Media Engagement

The third group of studies concentrates on understanding user behavior on short-form video platforms, particularly TikTok, which has become a central space for contemporary media consumption. Meng and Leung (2021) investigated TikTok user engagement in China and found that entertainment and stress-avoidance motivations were primary drivers that directly influenced levels of media engagement. Similarly, Bucknell Bossen and Kottasz (2020) reported that young users utilized TikTok for relaxation and positive emotional regulation, which led to sustained platform use and high levels of interaction with content.

In summary, studies in this group demonstrate that short-form video platforms have transformed audiences from passive content recipients into active participants, engaging users across dimensions of time, attention, and interaction. These dynamics form a critical foundation for continuous viewing behavior in the digital media era.

Reearch Gap

Based on a review of relevant prior studies, the existing literature can be broadly categorized into three main streams examining binge-watching behavior across different media contexts, namely streaming platforms and short-form video platforms. The first stream primarily focuses on binge-watching behavior through psychological dimensions such as enjoyment, relaxation, and narrative immersion, highlighting the influence of affective and hedonic motivations on continuous viewing behavior (Merrill & Rubenking, 2019; Aytas, 2024; Chang et al., 2022). The second stream extends this perspective by examining binge-watching intention, employing theoretical frameworks such as the Theory of Planned Behavior (TPB) and habit formation to explain the mechanisms underlying continuous viewing behavior (Bastos et al., 2024; Chanakan Butsa et al., 2024). The third stream investigates binge-watching within the context of short-form video platforms, revealing that viewers are primarily driven by entertainment and relaxation; however, these studies have yet to systematically integrate the processes of behavioral intention or sustained engagement into their analytical frameworks (Meng & Leung, 2021; Bucknell Bossen & Kottasz, 2020).

When comparing these three research streams, despite the extensive examination of binge-watching from multiple perspectives including emotional motivation, repetitive viewing behavior, and psychological outcomes many scholars converge on the conclusion that the psychological mechanisms leading to binge-watching behavior remain insufficiently understood. A substantial number of studies focus predominantly on outcome-oriented variables such as happiness, enjoyment, or perceived addiction, rather than explicating the underlying processes that translate internal motivations into actual viewing behavior (Merrill & Rubenking, 2019; Chang et al., 2022). Moreover, the linkage between intrinsic motivations and the behavioral enactment of binge-watching has often been examined in a fragmented or unsystematic manner (Aytas, 2024). Within the context of short-form video platforms such as TikTok, although existing studies affirm the role of entertainment and stress relief, several researchers acknowledge the limited consideration of additional psychological factors that capture the continuity of viewing behavior, including habit and anticipated regret (Meng & Leung, 2021; Bucknell Bossen & Kottasz, 2020). Furthermore, the reliance on narrow or context-specific samples constrains the generalizability of findings and limits their capacity to explain contemporary patterns of short, continuous media consumption (Butsa et al., 2024).

Accordingly, the present study seeks to address these gaps by systematically examining the psychological mechanisms that lead to binge-watching behavior, with a particular emphasis on understanding viewing continuity as a process driven by viewers' internal forces rather than merely as an external outcome. To this end, the study develops a conceptual framework that analyzes the relationships among hedonic motivation, media use habits, and anticipated emotions, which are psychological constructs with strong explanatory potential for binge-watching behavior. The empirical context of this study is Vertical Short Dramas on the TikTok platform, as this media format possesses distinctive characteristics that strongly facilitate continuous viewing behavior, including short episode duration, rapid narrative progression, and episodic connectivity. These features reduce temporal constraints and encourage repeated viewing decisions, allowing media consumption to evolve from a single rational choice into habitual and emotion-driven engagement distinguishing this context from traditional long-form streaming platforms. Consequently, Vertical Short Dramas provide an appropriate setting for advancing theoretical understanding of the psychological mechanisms underlying binge-watching behavior in the digital media era and for systematically extending existing theories by integrating motivation, habit, and anticipated emotion within the context of short-form video platforms.

Research Methodology

Population and Sample Group

The population defined by the researchers as the target group comprises consumers who watch vertical short-form dramas on the TikTok platform. The sampling approach employed was a non-probability sampling technique, as the actual size of the population could not be clearly identified. Purposive sampling was applied, with the inclusion criteria requiring respondents to have continuously watched vertical short-form dramas on the TikTok platform for more than 15 minutes. Therefore, to ensure that the selected sample appropriately aligns with the research objectives, the researchers designed preliminary screening questions to verify respondents' qualifications before proceeding with the actual data collection. The sample size was calculated using Cochran's (1977) formula, with a confidence level of 95% and an acceptable margin of error of 0.05. The calculation resulted in a required sample size of 385 respondents.

Research Instrument

This study employed a quantitative research approach using a questionnaire consisting of both closed-ended and open-ended questions. The components of the questionnaire are as follows:

Part 1: Screening questions using a checklist format to confirm respondents' eligibility.

Have you ever engaged in continuous viewing of vertical short dramas on the TikTok platform for 15 minutes or more?

Part 2: Questions regarding basic demographic information and behaviors related to the viewing of vertical short dramas on TikTok.

Part 3: Questions related to the factors of Entertainment, Passing Time, Anticipated Regret, Habit, Intention to Continue Binge-Watching, and Binge-Watching Behavior, measured using a 5-point Likert Scale.

Part 4: Additional suggestions presented as open-ended questions allowing respondents to freely express their opinions.

Data Collection

This research investigates the influence of hedonic motivation, habit, and anticipated regret on continuous viewing behavior of vertical short dramas on the TikTok platform. The researcher conducted survey research and employed an online questionnaire (Google Forms). Data collection was carried out in November 2025, from November 13 to November 30, 2025,

totaling 18 days. The sample size of 385 respondents, as calculated, was obtained through distributing the survey link via online platforms. Subsequently, all data were processed and analyzed using the statistical analysis program SPSS (Statistical Package for the Social Sciences) to ensure accurate, reliable, and valid results that fully address the research objectives.

Statistics and Data Analysis

In this research, data were collected and analyzed using two main statistical approaches. First, descriptive statistics were employed to summarize the general characteristics of the respondents. Second, inferential statistics were used to analyze the sample data for the purpose of drawing inferences about the larger population. These analyses involved estimation procedures and hypothesis testing, which enabled the researchers to address the research questions and examine the proposed hypotheses. Pearson's correlation coefficient was applied to assess the relationships among variables, and multiple regression analysis was conducted to determine the influence of the independent variables on the dependent variables. This also included an analysis of the mediating role using PROCESS Model 4.

The research specified four independent variables of Entertainment, Passing Time, Anticipated Regret, and Habit to examine their influence on Continuous Intention to Binge-Watch. Multicollinearity was assessed using Tolerance values and the Variance Inflation Factor (VIF). The results indicated that the Tolerance values ranged from 0.431 to 0.616, and the VIF values ranged from 1.623 to 2.320.

In addition, when two independent variables, Habit and Continuous Intention to Binge-Watching were included to examine their influence on Binge-Watching Engagement, the analysis yielded a Tolerance value of 0.431 and a VIF value of 2.318. Since all Tolerance values exceeded 0.1 and all VIF values were below the threshold of 10, in accordance with the criteria recommended by Hair et al. (2010), it can be concluded that the independent variables did not exhibit multicollinearity issues. Thus, they were deemed appropriate for use in multiple regression analyses.

Research Findings

The analysis of general information of the 385 respondents revealed that the majority were female, totaling 290 individuals 75.3%. Most were between 18–29 years old, totaling 249 individuals 64.7%. A total of 268 individuals 69.6% used TikTok every day, and 121 individuals 31.4 spent more than 2 hours per day on the platform. A total of 243 individuals 63.1% commonly used TikTok at night (19:00-00:00). A total of 188 individuals 48.8% watched vertical short dramas on TikTok 2-3 days per week. A total of 229 individuals 59.5% usually watches vertical short dramas via the "For You Page" (FYP). Apart from TikTok, 156 individuals 40.5% watched vertical short dramas through Facebook. A total of 162 individuals 42.1% watched vertical short dramas during breaks or short free periods. A total of 191 individuals 49.6% watched vertical short dramas continuously for 10–30 minutes. A total of 276 individuals 71.7% viewed vertical short dramas on TikTok as a form of entertainment and relaxation. A total of 346 individuals 89.9% usually watches vertical short dramas alone. A total of 221 individuals 57.4% selected vertical short dramas based on interesting storylines. A total of 206 individuals 53.5% continued watching vertical short dramas instantly due to cliffhangers or unresolved plot points. Respondents were accepting as long as the content was not too long in cases where product placement appeared during viewing. A total of 159 individuals 41.3% preferred vertical short dramas with a length of 3-5 minutes per episode. A total of 133 individuals 34.5% preferred one-episode standalone vertical short dramas. A total of 31 individuals (8.1%) watched vertical short dramas in the comedy/light-hearted category. A total of 222 individuals 57.7% preferred storytelling structures that begin quickly and get to the point. A total of 243 individuals 63.1% expected "fun" as the

primary outcome from watching vertical short dramas. The results of the analysis of respondents' opinion levels covered the following factors: Entertainment, Passing Time, Anticipated Regret, Habit, Continuous Intention to Binge-Watching, and Binge-Watching Engagement.

Table 1 The mean, standard deviation, and interpretation of the levels of respondents' opinions, both overall and by each dimension

Variable	$\bar{x}$	S.D.	Interpretation
Entertainment	3.963	.620	High
Passing Time	3.848	.755	High
Anticipated Regret	3.592	.845	High
Habit	3.454	.986	High
Continuous intention to Binge-Watching	3.615	.866	High
Binge-Watching engagement	3.722	.779	High
Total	**3.699**	**.670**	**High**

      Table 1 the mean and standard deviation indicate that the overall level of opinions is at a high level, with a mean score of 3.6990. Considering each aspect, all dimensions show a high level of opinion, ranked from the highest to the lowest mean as follows: Entertainment, Passing Time, Binge-Watching Engagement, Continuous Intention to Binge-Watching, Anticipated Regret, and Habit.
      The results of the analysis of the influence of Entertainment, Passing Time, Anticipated Regret, and Habit on Continuous Intention to Binge-Watching, as well as the analysis of the influence of Habit and Continuous Intention to Binge-Watching Engagement, were conducted using Multiple Regression Analysis.

Table 2 Analysis of the influence of Entertainment, Passing Time, Anticipated Regret, and Habit on Continuous Intention to Binge-Watching

Variable	B	β	t	P-Value	Tolerance	VIF
Entertainment	.012	.086	2.230	.026	.616	1.623
Passing Time	.104	.091	2.187	.029	.526	1.901
Anticipated Regret	.320	.312	6.788	.000	.431	2.320
Habit	.387	.440	9.715	.000	.444	2.251
R = .808, R^2 = .653, Adjust R^2 = .650, F = 179.107, P = .000						

      Table 2 the results of the analysis of the influence of entertainment, passing time, anticipated regret, and habit on continuous intention to binge-watch show that the habit factor has the strongest positive influence (β = .440, P-Value = .000) This indicates that habit is a key driving force that leads viewers to maintain their intention to watch regularly or to watch whenever they have time. Next, anticipated regret is found to have a significant positive influence (β = .312, P-Value = .000), reflecting that when viewers anticipate that they might feel regret if they do not continue watching such as fear of missing the storyline, fear of falling behind trends, or fear of spoilers it encourages them to continue. Then, passing time is found to have a significant positive influence (β = .091, P-Value = .029), indicating that some viewers use watching series as an activity to fill their free time. Entertainment is also found to have a significant positive influence (β = .086, P-Value = .026), showing that enjoyment and pleasure derived from the content serve

as one of the motivators that drive viewers to continue watching. Therefore, it can be concluded that entertainment, passing time, anticipated regret, and habit have a significant influence on continuous intention to binge-watch

Table 3 Analyze the influence of Habit and Continuous Intention to Binge-Watch on Binge-Watching Engagement.

Variable	B	β	t	P-Value	Tolerance	VIF
Habit	.106	.134	2.805	.005	.431	2.318
Continuous intention to Binge-Watching	.615	.684	14.310	.000	.431	2.318
R = .790, R^2 = .624, Adjust R^2 = .622, F = 316.592, P = .000						

Table 3 The analysis of the influence of Habit and Continuous Intention to Binge-Watching-on-Binge-Watching Engagement showed that Continuous Intention had the strongest positive influence (β = .684, P-Value = .000). This reflects those viewers who initially intend to continue watching—whether driven by enjoyment, excitement, or the desire to keep up with the storyline tend to exhibit clearly continuous and prolonged viewing behavior. The second factor, Habit, was found to have a significant positive influence (β = .134, P-Value = .005), indicating that regular viewing that develops into a routine contributes to a greater tendency for continuous watching. Although the weight is lower than that of Continuous Intention, it still shows a significant effect on continuous viewing behavior. Therefore, it can be concluded that Habit and Continuous Intention to Binge-Watching significantly influence Binge-Watching Engagement.

From the analysis using Process Model 4 with a bootstrapping method of 5,000 resampled observations to examine the indirect effect of Habit on Binge-Watching Engagement through Continuous Intention to Binge-Watching as a mediating variable, it was found that Habit had an indirect effect on Binge-Watching Engagement through Continuous Intention (LL = 0.059, UL = 0.188). Since the Bootstrap confidence interval does not include zero, this indicates statistical significance. Additionally, the VAF value was 0.79, which falls between 0.20 and 0.80, indicating that the mediating variable has a partial mediation effect.

Discussion and Conclusion

This research aimed to investigate the factors influencing Continuous Intention to Binge-Watching among viewers of vertical short dramas on TikTok. The research focused on the effects of hedonic gratifications including entertainment and passing time as well as anticipated regret and habit of continuous viewing intention. Additionally, the study examined how habit and continuous viewing intention influence binge-watching engagement. The discussion of the findings is presented as follows.

Entertainment was found to positively influence continuous intention to binge-watching. This relationship can be explained through the Uses and Gratifications Theory, which posits that audiences actively select media to satisfy their needs for enjoyment and positive experiential outcomes. When content generates fun and emotional satisfaction, viewers are more likely to continue watching in order to maintain these positive feelings. This finding is consistent with prior research identifying enjoyment as a primary motivation underlying binge-watching behavior (Shim & Kim, 2018; Flayelle et al., 2020), and demonstrating that perceived entertainment value is directly associated with viewers' intention to follow subsequent episodes (Vaterlaus et al., 2019). However, some studies have reported contrasting results, indicating that entertainment alone may

be insufficient to explain long-term continuous viewing intention, particularly when prolonged viewing leads to reduced enjoyment, emotional fatigue, or content saturation, which may ultimately diminish viewers' willingness to continue watching (Vorderer et al., 2004; Exelmans & Van den Bulck, 2017).

Passing time was found to positively influence continuous intention to binge-watching, which is consistent with the Uses and Gratifications Theory, suggesting that media consumers choose media to fill leisure time and avoid boredom. When consecutive episode viewing effectively fulfills this need, viewers are more likely to develop stronger intentions to continue watching (Pittman & Sheehan, 2015). This finding aligns with prior studies by Panda and Pandey (2017) and Steiner and Xu (2018), which demonstrated a positive relationship between time-passing motives and binge-watching behavior. However, motivation for continuous viewing is not limited solely to passing time. In certain contexts, viewers may become increasingly influenced by emotional motivations or content engagement as viewing progresses (Flayelle et al., 2020). This does not imply that passing time lacks significance; rather, it indicates that passing time often functions as an initial motivational driver that facilitates the onset and persistence of continuous viewing intention (Vorderer et al., 2004), before more complex motivations, such as narrative attachment or character identification, develop and play a complementary role at later stages (Sung et al., 2018). Overall, these findings suggest that passing time remains a key motivational factor shaping continuous binge-watching intention in digital media contexts. Even as other motivations become more salient over time, passing time continues to serve as a foundational mechanism that significantly supports the development and maintenance of continuous viewing intention (Starosta & Izydorczyk, 2020).

Anticipated regret was found to positively influence continuous intention to binge-watching. Although in certain contexts anticipated regret does not always lead to continuous viewing behavior and may instead result in behavioral avoidance,particularly when individuals perceive that such behavior could generate negative consequences, such as time loss or feelings of guilt after prolonged media use (Tsiros & Mittal, 2000) viewers generally anticipate that discontinuing viewing may cause them to miss important content or reduce narrative enjoyment. This anticipation creates a motivational force that encourages continued viewing in order to avoid future regret. This finding is consistent with the concept of anticipated regret, which suggests that when individuals foresee negative future outcomes, they increase their behavioral intention to act in ways that minimize the likelihood of experiencing regret (Zeelenberg, 1999). It also aligns with prior research identifying regret as a significant predictor of behavioral intention in media consumption and digital behavior contexts (Connolly & Reb, 2005). Accordingly, viewers tend to continue watching to avoid feelings of being "left hanging" or missing key episodes, thereby reinforcing their continuous intention to binge-watch (Shim & Kim, 2018).

Habit was found to influence continuous viewing intention. Repeated exposure to similar viewing contexts leads to the formation of automatic behavioral patterns, prompting viewers to continue watching even without explicit motivation. This aligns with the concept of habitual behavior, which suggests that consistently repeated actions within stable contexts become automatic and resistant to disruption (Verplanken & Orbell, 2003). Prior studies also indicate that viewing habits play a significant role in sustaining continuous viewing intention on streaming platforms (LaRose, 2010). When media consumption becomes part of a routine, audiences develop a higher tendency to engage in consecutive episode viewing to maintain behavioral continuity (Steiner & Xu, 2018). However, in certain contexts, habit can directly influence continuous viewing behavior without necessarily being mediated by continuous viewing intention. Such behavior may arise from repetitive daily practices or familiar media usage patterns, leading

viewing to occur automatically without the need for explicit decision-making or deliberate planning (Bastos et al., 2024).

Habit was found to positively influence binge-watching engagement. Habit represents a pattern of behavior that develops through repeated performance within a stable context, eventually becoming triggered by environmental cues rather than deliberate, rational decision-making. Habit theory suggests that once a behavior is sufficiently repeated and internalized, it evolves into an automatic action that can occur without the need for new motivational input (Verplanken & Orbell, 2003). In the context of media consumption, repeated viewing at similar times or in similar situations fosters predictable and continuous behavioral patterns, which can automatically lead to the consumption of multiple episodes consecutively. Accordingly, habit plays a critical role in translating continuous viewing tendencies into actual binge-watching behavior through mechanisms of familiarity, routinization, and repeated responses that do not require renewed conscious decision-making each time (Wood & Neal, 2007). In addition, some studies suggest that platform characteristics, such as the autoplay function, may work in conjunction with entertainment factors to stimulate continuous viewing behavior (Pittman & Sheehan, 2015). However, prior research also indicates that although habit may explain behavior more effectively than intention in certain contexts, its influence may diminish when contextual conditions change or when viewers become aware of the negative consequences of continuous viewing. In such situations, self-regulatory processes may regain prominence, thereby moderating the impact of habit on binge-watching engagement (Ouellette & Wood, 1998).

Continuous viewing intention was found to influence binge-watching engagement. When viewers have a firm intention to watch multiple episodes consecutively, such intention acts as an internal motivator that leads to actual behavior. This aligns with behavioral theories positing that intention is one of the strongest predictors of action, especially when individuals expect pleasure or continuity from the consumption experience (Fishbein & Ajzen, 2010). Consistent with prior findings, viewers tend to follow through on their viewing intentions (Shim & Kim, 2018), and those with higher continuous intention are more likely to increase the duration and number of episodes watched in each session (Flayelle et al., 2020).

Moreover, the research found that habit indirectly influenced binge-watching engagement through continuous viewing intention, which served as a mediating variable. Habits formed through repeated viewing behavior reduce cognitive effort in decision-making and facilitate stronger intentions to continue watching subsequent episodes (Lim et al., 2022; LaRose, 2010). As viewing becomes more habitual, audiences often engage in continuous episode viewing automatically, reflecting the dominant influence of habit over situationally formed intentions (Bastos et al., 2024). Subsequently, continuous intention directly drives actual binge-watching behavior, consistent with the Theory of Planned Behavior, which identifies intention as a key predictor of future action (Ajzen, 1991).

The overall findings of this study align with the theoretical foundations reviewed, particularly the Uses and Gratifications Theory, which posits that audiences select media content to fulfill needs related to entertainment, relaxation, and passing time (Katz et al., 1973; McQuail, 1983; Rubin, 1984). The results mirror these principles, as TikTok short-drama viewers predominantly use the platform for enjoyment and stress relief during leisure time, leading to strengthened continuous viewing intention. Additionally, the findings support evidence suggesting that using media to pass time enhances media-use intentions (Pittman, 2015; Panda & Pandey, 2017), especially in contexts where algorithmic feeds continuously supply content that shapes intentions automatically. The influence of anticipated regret is also consistent with theories by Loomes and Sugden (1987) and Connolly and Zeelenberg (2008), which posit that individuals make continued decisions to avoid regret—clearly reflected here as viewers proceed to the next

episode to avoid missing critical plot developments. Furthermore, the results correspond with habit theories demonstrating that repeated activities reinforce automatic behavioral patterns even without new motivations (Verplanken & Orbell, 2003; Wood & Neal, 2007), as seen among respondents who use TikTok daily and for extended periods. Lastly, the relationship between intention and binge-watching behavior aligns with behavioral intention principles (Fishbein & Ajzen, 2010). Emphasizing that intention serves as a strong predictor of actual behavior. Collectively, the findings illustrate how hedonic gratifications, anticipated regret, and habit interact systematically to shape continuous viewing behavior of short dramas on TikTok. These mechanisms reflect established theoretical foundations and represent key drivers of binge-watching behavior in contemporary digital media environments.

Suggestions

The research findings, together with the behavioral data of the respondents, highlight important implications for content creators on TikTok who aim to enhance continuous viewing of vertical short dramas. The results indicate that most viewers use TikTok daily and primarily consume content at night. This aligns with the finding that hedonic motivations, particularly "entertainment" and "passing time" serve as key drivers of continuous viewing intention. Accordingly, content design should cater to short breaks or brief idle periods by providing 3-5 minute episodes that begin quickly, move directly into the main plot, and deliver light-hearted enjoyment that matches viewers' expectations.

Regarding viewing behavior influenced by the platform's recommendation system (FYP), a substantial proportion of respondents reported consuming content through algorithmic suggestions. This finding reflects the combined role of habit and algorithmic reinforcement, which encourages viewers to continue watching automatically. Therefore, content should feature short, sequential episodes or cliffhanger endings. The data show that over 53% of viewers continue watching because of unresolved plot points, which is consistent with the influence of anticipated regret, prompting viewers to avoid missing the next episode. Additionally, the fact that most viewers watch content alone suggests that storytelling strategies should focus on evoking individualized emotional responses rather than relying on social interaction.

Finally, the results show that most viewers watch for 10-30 minutes per session and are generally unbothered by brand integration as long as the content remains engaging and concise. This presents a significant opportunity for brands to utilize vertical short dramas as a form of seamless advertising that does not disrupt the primary viewing experience. Collectively, the findings suggest that content designed to offer immediate entertainment value, incorporate follow-up hooks, and employ short and frequent episode uploads can effectively enhance both continuous viewing intention and binge-watching engagement.

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Examining The Direct and Indirect Effects of Social Media Advertising Benefits on Impulse Buying Behavior Through Privacy Concern Among Generation Z Consumers

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Abstract

This quantitative research investigates the influence of social media advertising benefits on impulse buying behavior among Generation Z consumers, with privacy concern incorporated as a mediating construct. Data were obtained through a structured self-administered questionnaire distributed via online snowball sampling, yielding 461 valid responses. Structural equation modeling (SEM) was employed to examine the hypothesized relationships, and the measurement model demonstrated an excellent fit (CMIN/DF = 1.243, CFI = 0.999, RMSEA = 0.023). The results reveal that advertising benefits exert a significant positive direct effect on impulse buying ($\beta = 0.228$, $p < 0.001$) and a significant positive effect on privacy concern ($\beta = 0.111$, $p = 0.020$). Conversely, privacy concern negatively influences impulse buying ($\beta = -0.155$, $p < 0.001$). The indirect effect mediated by privacy concern is slightly negative, indicating partial mediation. Overall, the findings highlight that the affective appeal of social media advertising enhances spontaneous purchasing tendencies, whereas heightened privacy awareness introduces cognitive restraint, thereby mitigating impulsive purchase behaviors.

Keywords: Social Media Advertising, Impulse Buying, Privacy Concern, Online Consumer Behavior, Generation Z

Introduction

In the digital era, social media has become a central platform for marketing communication and consumer interaction. The rise of personalized, data-driven advertising has transformed how individuals perceive and respond to marketing stimuli. Generation Z (Gen Z), born between the mid-1990s and early 2010s (Pew Research Center, 2023), are true digital natives who spend much of their lives on social media and mobile devices. With high digital literacy, emotional sensitivity to online content, and a desire for immediacy, Gen Z represents a powerful consumer segment whose purchasing behavior warrants close examination.

Social media advertising offers key benefits such as relevance, convenience, and hedonic enjoyment, which foster positive attitudes toward digital marketing and stimulate impulse buying behavior (Feng, 2023; Obadă, 2024). When ads are perceived as engaging and personally relevant, consumers experience emotional arousal that may lead to spontaneous purchases. However, these benefits rely heavily on personal-data collection, which raises growing privacy concern about how such data are used (Choi & Jerath, 2022).

While previous research has emphasized the persuasive effects of social-media advertising, the counter-balancing role of privacy concern has received limited attention particularly among Gen Z consumers who are both highly engaged and privacy-aware. Heightened concern may trigger self-regulation that suppresses impulsive tendencies, suggesting a dual psychological mechanism in which emotion drives impulsivity while cognition imposes restraint.

Accordingly, this study examines the effects of social-media advertising benefits on impulse-buying behavior among Gen Z consumers, focusing on the mediating role of privacy concern. Drawing on the dual-process perspective of consumer decision-making, the research employs structural equation modeling (SEM) to integrate affective and cognitive mechanisms. The findings aim to deepen understanding of how Gen Z balances emotional engagement with privacy concern and to provide practical insights for designing ethical and effective digital-advertising strategies.

Research Objectives

The objectives of this study are as follows:

1. To examine the structural model illustrating the relationships among social media advertising benefits, privacy concern, and impulse buying behavior among Generation Z consumers.

2. To compare the direct and indirect effects of social media advertising benefits on impulse buying through privacy concern, and to clarify how privacy concern mediates this relationship.

Literature Review

The researchers reviewed relevant concepts, theories, and previous studies to establish the foundation for the research framework and hypothesis development, as follows:

Social Media Advertising and Their Benefits

Xuan (2023) stated that social media has become an essential channel for marketing and advertising. From the advertisers' perspective, social media enables marketers to deliver precise marketing messages directly to target audiences and to interact with them in real time.

On the other hand, social media also serves as a platform where users can receive, share, exchange, search for, and disseminate information anytime and anywhere.

Kelley and Sheehan (2022) asserted that social media has evolved into a key channel that allows businesses to reach customers easily, accurately target specific market segments, and strengthen the relationship between brands and consumers.

According to Lim (2024), internet usage in Thailand has grown continuously since 1991. As of 2023, 84.80% of internet users actively engage on social media platforms, with the following usage rates: Facebook (77.1%), YouTube (54.3%), Twitter now renamed X (23.4%), Instagram (27.8%), and TikTok (69.1%). Among these users, Generation Z consumers represent one of the most active social media user groups.

Furthermore, the Gen Z Media Consumption Insights report (Rand, 2025) revealed that Generation Z, aged between 21 and 27 years, constitutes the group that uses social media most intensively. This generation has become a priority audience for brands, as 81% of Gen Z users access social media daily and 50% spend more than three hours per day on such platforms. Consequently, social media advertising has become increasingly important in today's market environment.

Campos (2021) stated that consumers derive benefits from online advertising because they seek personalized product or service recommendations that match their interests. They also desire information that is relevant to their preferences, indicating that the benefits of online advertising are realized primarily when it offers relevance.

In addition, the study by Strycharz et al. (2019) found that online advertising enhances convenience for consumers by reducing the time spent searching for desired products or services and by facilitating quick comparisons among alternatives. Similarly, Kyguoliene, et al. (2017) discovered that advertising on social media provides convenience in online shopping and also revealed that some consumers enjoy viewing advertisements, perceiving them as a form of entertainment.

Based on these findings, the present study conceptualizes social media advertising benefits as comprising three key dimensions: relevance, convenience, and hedonic value.

Privacy Concern

Tuten (2021) defined privacy concern as an individual's privacy concern regarding the disclosure of personal information to others. In contemporary marketing, Kotler et al. (2021) explained that marketing practices have increasingly become data-driven, utilizing technology to collect, store, and analyze customer behavior patterns for marketing purposes. This data-driven approach allows marketers to deliver highly personalized advertising messages and create enhanced consumer experiences through targeted communication technologies.

However, Aiolfi et al. (2021) found that consumers express considerable privacy concern about online behavioral advertising, particularly when data-driven targeting techniques are used. Such practices heighten consumers' awareness of how brands collect and utilize their personal data for marketing purposes, as supported by Bhatia (2020), who noted that the use of consumer information in personalized advertising often leads to growing skepticism and vigilance among consumers regarding privacy protection.

Therefore, this study focuses on privacy concern as a key psychological factor influencing consumers' responses to social media advertising. Specifically, the research aims to investigate how Gen Z consumers' awareness of personal data utilization in marketing affects their attitudes and impulse buying behavior within the context of social media advertising.

Impulse Buying

Marco (2025) defines impulse buying as an unplanned purchasing behavior driven primarily by feelings or emotions rather than rational thinking. It plays a significant role in consumer decision-making and can be triggered by various factors such as emotional states, environmental cues, product characteristics, and store atmosphere. This notion is further supported by Pacheco et al. (2024), who explain that online impulse buying arises from psychological stimuli influencing consumers' spontaneous decisions. They also emphasize that social factors and technological influences can intensify such impulsive tendencies in digital shopping environments.

Previous Research and Hypothesis Development

Pacheco et al. (2024) examined consumer behavior in Turkey and found that online advertising can create psychological impacts that lead to impulse buying. Similarly, Singh et al. (2023) investigated the effects of social media advertisements on consumers in Saudi Arabia and reported that such advertisements significantly stimulate unplanned purchasing behavior. Based on these studies, the following hypothesis was developed:

H1: Social media advertisements have a significant positive effect on impulse buying behavior.

Papaioannou et al. (2021) investigated consumer perceptions of data collection in social media advertising and found that users exhibited significant privacy concern toward social platforms, with the highest levels of concern reported for Facebook, followed by YouTube. Lina (2021) examined Instagram users in Indonesia and observed that consumers expressed privacy concern when exposed to ads that matched their personal preferences. Similarly, Timmermann (2025) found that exposure to social media advertisements increased consumers' awareness and anxiety regarding data privacy. Accordingly, the second hypothesis was formulated as follows:

H2: Social media advertisements have a significant positive effect on privacy concern.

Pilakaew et al. (2024) explored the effect of privacy concern on online purchasing behavior and found that higher levels of concern significantly influence consumers' purchase decisions. These results are consistent with Schade et al. (2018), who reported that privacy concern negatively affects consumers' purchase intentions toward advertised products. Thus, the following hypothesis was proposed:

H3: Privacy concern has a significant negative effect on impulse buying behavior.

Based on the reviewed literature and empirical evidence, the proposed conceptual framework of this study was developed, as shown in Figure 1.

Conceptual Framework
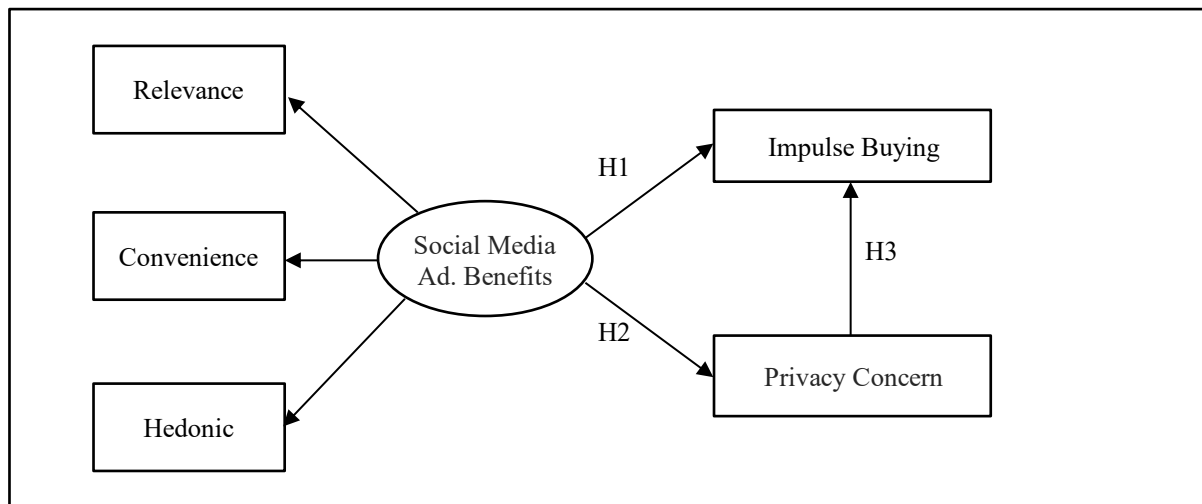
Figure 1: Conceptual Framework

Research Methodology

The target population of this study comprised Generation Z consumers, following the definition of Rand (2025), which identifies Gen Z individuals with purchasing decision-making power between the ages of 21 and 27. A structured questionnaire was used as the research instrument. The instrument's content validity was verified by three experts, with all items demonstrating Item Objective Congruence (IOC) values greater than 0.50. The reliability of the instrument was assessed using Cronbach's alpha, yielding a coefficient of 0.87, indicating a high level of internal consistency.

Data were collected using an online snowball sampling technique. Initial respondents who met the inclusion criteria namely, being within the specified age range of 21–27 years were invited to complete the questionnaire and subsequently share it with other eligible Gen Z individuals within their social networks. Screening questions were included to ensure the qualification of participants.

This study employed Covariance-Based Structural Equation Modeling (CB-SEM) using the Maximum Likelihood (ML) estimation method. According to Blunch (2013), the sample size for CB-SEM should not be fewer than ten times the number of free parameters estimated in the model. Based on the conceptual framework of this research, the model comprised a total of 39 free parameters, including 30 free parameters for first-order latent variables, 6 free parameters for the second-order latent variable, and 3 free parameters for the structural paths. Therefore, the minimum required sample size should not be fewer than 390 respondents to ensure adequate statistical power and model stability. Data collection was conducted over one month period. Upon completion, a total of 461 valid responses were obtained, which exceeded the minimum requirement and was deemed sufficient for SEM analysis.

Results

From the total of 461 valid responses, 42% of respondents were male and 58% were female. Approximately 67% were either currently pursuing or had completed a bachelor's degree, and 68% reported a monthly income between 10,000 and 20,000 THB. All participants met the age qualification criteria (21–27 years old) as required for Generation Z consumers.

In accordance with the research objectives, the results are presented in the following order.

Examining the structural model

Before testing the structural model based on the conceptual framework, the researchers conducted a confirmatory factor analysis (CFA) to verify whether the construct of Social media advertising benefits (AdBenefit) was consistent with the theoretical foundation derived from the literature review.

The results indicated satisfactory measurement quality, with a Composite Reliability (CR) of 0.850, exceeding the recommended threshold of 0.70, and an Average Variance Extracted (AVE) of 0.671, higher than the acceptable level of 0.50. Therefore, it can be concluded that Social media advertising benefits comprised Relevance, Convenience, and Hedonic value which were consistent with the conceptualization established in the literature review.

The structural equation modeling (SEM) results revealed that the proposed conceptual framework exhibited an excellent fit with the empirical data. The CMIN/DF ratio = 1.243 was below the acceptable threshold of 3.0, indicating that the model fit the data well. Additionally, the overall goodness-of-fit indices were within the desirable range, including GFI = 0.996, AGFI = 0.984, CFI = 0.999, TLI = 0.997, IFI = 0.999 and RMSEA = 0.023, these results confirmed that the conceptual model was highly consistent with the empirical data. (Figure 2)

Chi-square=4.971 ; df=4 ; P=.290; Chi-square/df=1.243 ; GFI=.996 ; TLI=.997 ; CFI=.999 ; RMSEA=.023
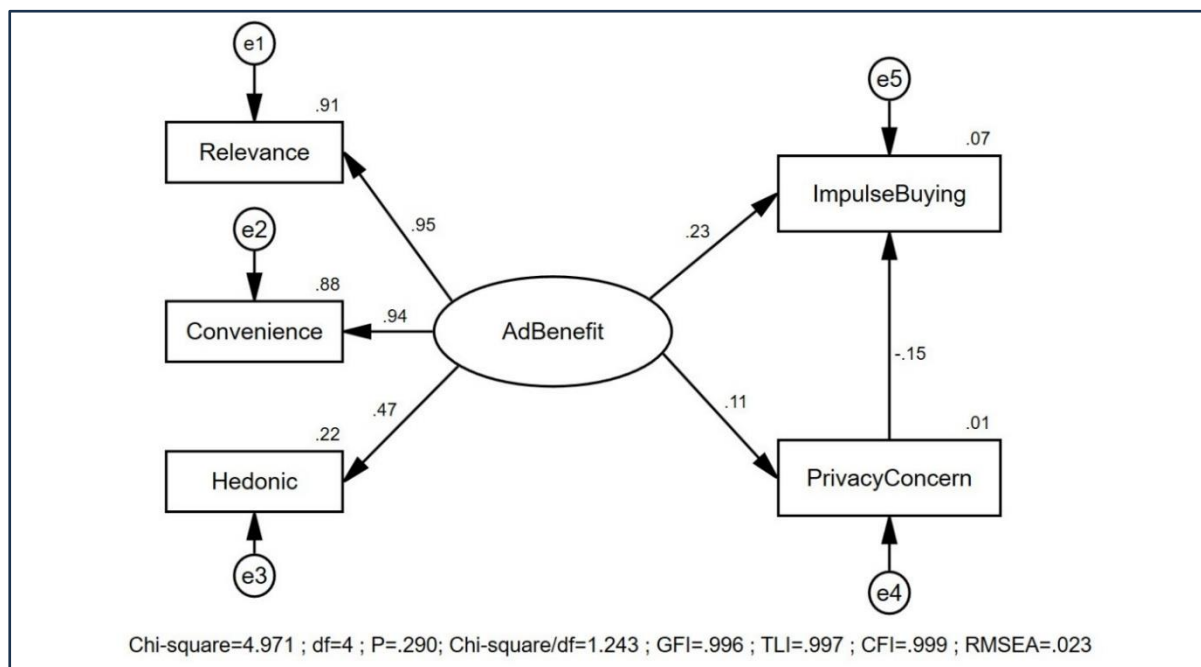
Figure 2: Model of Social Media Advertising Benefits on Impulse Buying through Privacy Concern among Generation Z Consumers

The results showed that social media advertising benefits had a positive and significant effect on impulse buying among Gen Z consumers ($\beta = 0.228$, $p < 0.001$). The results indicate that when Gen Z users perceive advertising benefits they find relevant, convenient, or enjoyable, they exhibit a higher tendency for impulse buying.

Social media advertising benefits also had a positive influence on privacy concern ($\beta = 0.111$, $p = 0.020$). This means that the more Gen Z appreciates personalized ads, the more aware they become of how their data is used. Meanwhile, privacy concern negatively affected impulse buying ($\beta = -0.155$, $p < 0.001$), suggesting that those who worry about personal data tend to think twice before buying.

The indirect effect of social media advertising benefits through privacy concern was small and negative ($\beta = -0.017$), slightly reducing the overall positive effect (total $\beta = 0.211$). The R-squared for impulse buying was 0.07, a relatively low value that is further discussed later in this paper.

Comparative Interpretation between Direct and Indirect Effects

The analysis showed that the direct effect of social media advertising benefits on impulse buying ($\beta = 0.228$) was clearly stronger and positive, while the indirect effect through privacy concern ($\beta = -0.017$) was weaker and negative. In short, Gen Z consumers who find social media ads relevant, convenient, and enjoyable tend to buy spontaneously, driven by emotion rather than careful thought. The engaging and personalized nature of these ads encourages quick reactions and instant gratification.

In contrast, privacy concern works in the opposite direction. As Gen Z becomes more aware of how their data are collected and used, they develop caution and self-control that can limit impulsive behavior. This shows an inner balance between attraction to personalized advertising and concern about privacy.

Overall, Gen Z's impulse buying is shaped by two competing forces: emotional stimulation from advertising that drives instant purchases, and cognitive restraint from privacy concern that slows them down. The stronger direct effect suggests that emotion still dominates, though rising awareness of privacy issues now plays a growing role in moderating impulsive decisions. (Table 1)

Table 1 Direct, Indirect, and Total Effects of Social Media Advertising Benefits on Impulse Buying through Privacy Concern among Generation Z Consumers

Relationship	Direct Effect	Indirect Effect	Total Effect	Interpretation
AdBenefits > ImpulseBuying (H1)	0.228	-0.017	0.211	Direct effect is positive and strong, while indirect effect via privacy concern is negative and weak overall effect remains positive.
AdBenefits > PrivacyConcern (H2)	0.111	-	0.111	Positive, significant; higher perceived social media advertising benefits increase privacy concern.
PrivacyConcern > ImpulseBuying (H3)	-0.155		-0.155	Negative and significant; greater privacy concern reduces impulse buying behavior.

Note: All direct effects are significant at $p < 0.05$

Conclusion and Discussion

The following section summarizes the study's conclusions and discusses how the findings correspond with or differ from prior research.

Direct effect (AdBenefits > Impulse buying). Our finding aligns with research showing that relevance, convenience, and hedonic enjoyment heighten impulsive tendencies in digital contexts (Feng, 2023; Obadă, 2024). Evidence from Turkey (Pacheco et al., 2024) and Saudi Arabia (Singh et al., 2023) similarly reports that online/social media advertising stimulates unplanned purchases, consistent with the present direct path.

AdBenefits > Privacyconcern. The positive association between perceived social media advertising benefits and privacy concern is consistent with work on data-driven marketing (Kotler et al., 2021) and online behavioral advertising (OBA) that heightens awareness of data collection (Aiolfi et al., 2021; Bhatia, 2020). Platform-specific evidence (e.g., concerns on Facebook/YouTube; Papaioannou et al., 2021; and Instagram users recognizing ad–preference matching; Lina, 2021) also converges with the idea that perceived personalization/value coexists with heightened privacy vigilance (see also Timmermann, 2025).

Privacy concern > Impulse buying. The negative path agrees with studies showing that privacy concern suppress purchase intentions or repurchase tendencies online (Schade et al., 2018; Pilakaew et al., 2024). In our data, privacy concern appears to act as a cognitive control mechanism, consistent with the dual-process view positing that reflective appraisals attenuate affect-driven impulses.

It should be noted that the R-squared obtained in this study was relatively low (0.07), which indicates that when consumers are exposed to social media advertisements, they may compare products, prices, distribution channels, and reviews from actual users before making purchase decisions. This study did not aim to capture all the factors influencing impulse buying behavior but rather focused specifically on consumer responses triggered by exposure to social media advertising, which is consistent with Guo et al. (2024), who reported an R-squared value of 0.06 in their study examining the influence of self-esteem on online impulse buying.

Implication

The findings indicate that social media advertising exerts a positive influence on impulse buying behavior. However, such advertising may also raise consumers' privacy concern due to its reliance on data-driven personalization. Impulse buying itself carries both positive and negative implications. On the positive side, it enables consumers to purchase desirable products or services that they might not have initially considered. Conversely, excessive impulsive behavior can lead to irrational or unnecessary purchases if consumers fail to exercise self-control. These findings lead to two main recommendations:

For brands: Apply data-driven marketing carefully. Overly personalized or intrusive ads can raise privacy concern and damage trust.

For consumers, exposure to personalized advertising on social media should be accompanied by greater critical reflection and rational evaluation to avoid excessive or unnecessary purchases.

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Promoting Social Sciences Research Article Comprehension and Writing Skills Through Concept-Oriented Reading Instruction (CORI) for Graduate Diploma in Teaching Profession Students

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Abstract

The purposes of this research were to investigate the Concept-Oriented Reading Instruction on graduate diploma in teaching profession students' social sciences research articles comprehension, and to investigate the Concept-Oriented Reading Instruction on graduate diploma in teaching profession Students' writing skills. The sample consisted of 30 of graduate diploma in teaching profession students who were drawn from cluster random sampling for one classroom as a sampling unit. The experiment was carried out for 6 weeks, 6 hours each, 36 hours in total. The research instruments employed in this research were 1) 6 lesson plans using Concept-Oriented Reading Instruction (CORI), 2) Reading comprehension test, and 3) Writing skills test. The data was analyzed using mean, standard deviation and the paired samples t-test.

The results of the study were: 1) the students acquired better social sciences research articles comprehension after the implementation of the Concept-Oriented Reading Instruction, at a statistically significant 0.05. 2) the students gained writing skills after the implementation of the Concept-Oriented Reading Instruction, at a statistically significant 0.05. Moreover, the results of the writing skills in each aspect after the treatment of the Concept-Oriented Reading Instruction was converted that, mechanics and grammar received the highest score, topic sentences, and supporting detail sentences respectively. Conversely, students gained the lowest scores as elaborating detail sentences.

Keywords: Social Sciences, Research Articles, Cori, Teaching Profession Students

Introduction

English has become the most widely used language for international communication, education, business, science, and technology. It is recognized as a global lingua franca that enables people from different linguistic and cultural backgrounds to exchange knowledge and ideas effectively (Crystal, 2003). Higher education is becoming globalized alongside the economy, and English is proving to be a key ingredient – partly because universities in the English-speaking world dominate the global league tables, and partly because English is proving popular as a means of internationalizing both the student community and teaching staff. (Graddol, 2006, p.73). In the field of teacher education, English plays an essential role in academic and professional development. Most academic texts, research publications, and educational resources are written in English, making it a vital tool for graduate students to expand their knowledge and engage in scholarly communication (Harmer, 2015). The ability to comprehend and write research articles in English allows students to critically evaluate studies, conduct research effectively, and disseminate their findings to international audiences (Richards & Schmidt, 2010).

Roi Et Rajabhat University is a higher education institution dedicated to local development. Its missions are aligned with the National Strategic Plan and various educational policies of the country, particularly in organizing learning processes to develop human resources for both local communities and the nation. Guided by its philosophy of being a "Source of Lifelong Learning," the university is committed to providing equal educational opportunities for all and promoting the acquisition of knowledge, skills, and moral integrity among learners. These efforts aim to produce graduates who can contribute effectively to sustainable local development. According to the Five-Year Strategic Plan (2023–2027) of Roi Et Rajabhat University, the university has set forth strategic directions that emphasize sustainable local development and the creation of innovation based on competency as a foundation for developing modern learning management that aligns with the essential skills of the 21st century. The plan focuses on promoting competency-based educational innovation in schools, along with assessment and evaluation systems that reflect the outcomes of learner development in accordance with competency-based curricula. These initiatives aim to support the educational reform of the nation, ensuring that teaching and learning processes are consistent with the local context and the needs of both local communities and the nation as a whole (Roi Et Rajabhat University, 2024).

The Faculty of Education and Human Development serves as the primary faculty responsible for producing and developing teachers in alignment with the university's missions and according to Strategic Goal 2, the faculty emphasizes that its education programs should serve as innovative models of competency-based teaching and learning management. It supports key factors in creating exemplary competency-based instructional models and promotes research for educational innovation that connects academic knowledge with schools and local communities. The Faculty of Education and Human Development, Roi Et Rajabhat University, offers a Graduate Diploma in Teaching Profession Program, with the primary objective of producing graduates who possess the knowledge, skills, and ethics in accordance with the professional standards for teachers. The program also aims to develop personnel from other fields to become qualified professional teachers. It emphasizes fostering learners with characteristics that align with the current social and technological changes, enabling them to comprehend and write research articles in the field of social sciences is essential for graduate students in the teaching profession, as it enables them to critically analyze academic texts, engage in evidence-based practice, and contribute to educational innovation. However, many graduate students, particularly those in non-English speaking contexts, encounter difficulties in understanding and

producing academic research articles due to limited reading strategies, lack of conceptual understanding, and inadequate academic writing skills.

Therefore, the researcher has become interested in conducting a study on Promoting Social Sciences Research Articles Comprehension and Writing Skills through Concept-Oriented Reading Instruction (CORI) for Graduate Diploma in Teaching Profession Students, which is an instructional approach that integrates reading comprehension strategies with conceptual learning. It encourages students to engage actively with texts, construct meaning through inquiry and discussion, and connect new information with prior knowledge. Specifically, this research focuses on improving students' ability to understand and write social sciences research articles in English. It is expected that the integration of CORI will foster students' conceptual understanding, promote active reading, and strengthen their academic literacy, which are essential skills for future professional teachers and researchers.

Literature Review

The Concept-Oriented Reading Instruction (CORI) was developed by John T. Guthrie and colleagues in 1993. It was based on the integration of the principles of inquiry-based science instruction with reading instruction. CORI combines reading skills and strategies, knowledge, motivation, and social collaboration to foster the construction of new knowledge (Guthrie & Anderson, 1999; Guthrie, Alao, & Rinehart, 1999). The Concept-Oriented Reading Instruction (CORI) emphasizes the development of students as engaged readers. It highlights four key components essential to the reading process: (1) motivations for reading, (2) strategy use, (3) conceptual knowledge, and (4) social interactions. These components are interrelated in fostering reading comprehension. Specifically, enhancing students' motivations for reading encourages their desire to read, while the effective use of reading strategies facilitates the construction of conceptual knowledge, which is the ultimate goal of reading. Moreover, social interactions serve as the foundation for learning, providing opportunities for collaboration and knowledge sharing among learners. (Guthrie, J. T.,2004).

Research Methodology

This research was pre-experimental research, which employed one-group pretest-posttest. This research was conducted through three steps of process: pretest, treatment and post-test to investigate the enhancement of the student's social sciences research articles comprehension and writing skills

Population and Sample
The research population were 120 of graduate diploma in teaching profession students who were enrolled the Language for communication for teacher course, second semester, academic year 2025 at Faculty of education and human development, Roi Et Rajabhat university. The sample consisted of 30 of graduate diploma in teaching profession students who were drawn from cluster random sampling for one classroom as a sampling unit.

Variables
In this study, the independent variable was the Concept-Oriented Reading Instruction and the dependent variables used in the study were; students' social sciences research articles comprehension and students' writing skills.

Research Instruments

The research instruments used in this study were: 1) six units of the Concept-Oriented Reading Instruction lesson plans, 2) Reading comprehension test, and 3) Writing skills test. The researcher developed the research instruments and the process of the research instruments were developed as follows:
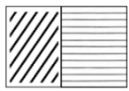
1. The Concept-Oriented Reading Instruction lesson plans

The conceptual theme for the learning content consists of six social sciences research articles focusing on experimental research processes. Each selected article must include all six essential components of a research paper: Abstract, Introduction, Method, Research Instruments, Results, and Discussion. The length of each article ranges from approximately 5 to 15 pages. The Concept-Oriented Reading Instruction (CORI) learning process consists of 6 lesson plans with the following 4 steps:

Step 1: Observe and Personalize involves stimulating students' interest to create motivation for reading. This step connects the content of the research process with real-life situations during classroom instruction. Learning materials such as video clips, news articles, and other media are used to engage students, linking these materials to the topic of the research article. These activities aim to arouse curiosity and encourage students to reflect on their prior knowledge and experiences before beginning the reading process.

Step 2: Searching and Retrieving is the phase in which the instructor guides students on how to read English research articles based on the topics introduced in Step 1. During this stage, the instructor teaches the necessary reading strategies, modeling the reading/writing process and monitoring students' comprehension. This enables students to apply these strategies to explore other research articles and to retrieve knowledge and reading strategies and writing independently.

Step 3: Comprehend and Integrate involves reading the content of research articles using the reading strategies learned in Step 2. The instructor organizes activities that encourage social interactions among students, which help them integrate information and enhance their understanding of the content. During this phase, students learn to identify key details, compare information, and writing summaries of the findings obtained from their reading.

Step 4: Communicating to Others is the phase in which students demonstrate their new knowledge and findings obtained from reading research articles. The instructor organizes activities that allow students to communicate their understanding, such as writing summaries of the findings from the articles, in order to develop effective communication skills. Providing opportunities for students to present their work also encourages them to explain what they have learned from the reading process.

Instructional Dimensions	Time					
	60 mins	*60 mins*	*60 mins*	*60 mins*	*60 mins*	*60 mins*
Observe and Personalize *-Activate students' schemata* *- Stimulating students' interest*						
Searching and Retrieving *-Strategy Instruction (R/W)*						
Comprehend and Integrate *-Reading the content of research articles using the reading strategies learned* *-Writing summaries*						
Communicating to Others *-Demonstrate their new knowledge and findings* *-Share and show*						

Note:
▨ Designates teacher leadership
▨ Designates joint teacher-student responsibility
■ Designates student responsibility for learning

Figure 1: Social Sciences Research Articles Comprehension and Writing Skills through CORI

2. Reading comprehension test

The test consists of 40 items created by the researcher, in the form of multiple-choice questions with four options. The learning objectives for the test are defined as follows: 1) Knowledge Dimension: 20 items designed to assess students' ability to identify the main ideas of each research article topic and to accurately describe the key characteristics of social sciences research article topics and 2) Application Dimension: 20 items designed to evaluate students' ability to read and comprehend the main points of the research articles. The content validity of the test was examined by having experts review the items. The Index of Item-Objective Congruence (IOC) was calculated to assess the alignment between each question and the learning objectives. The IOC values ranged from 0.60 to 1.00, indicating satisfactory content validity. Regarding the difficulty level, the test items ranged from 0.46 to 0.73, suggesting that each item had a moderate level of difficulty. The discrimination indices ranged from 0.38 to 0.78, demonstrating that the items were effective in differentiating between higher- and lower-performing students. The Cronbach's alpha coefficient for the test was 0.76, indicating an acceptable level of internal consistency and reliability.

3. Writing skills test

The writing skills test has a total score of 20 points and is designed to assess the test-takers' ability to communicate in paragraph form. It focuses on the skill of writing summaries based on articles they have read, with a limit of 150 words per response. The test evaluates relevant language knowledge and subskills, including the ability to: 1) Identify supporting details that relate to the main topic and compare differing aspects, 2) Distinguish supporting-detail sentences that are relevant to the main topic, 3) Write a complete summary according to the assigned task and, 4) Use grammatical structures, vocabulary, and specialized terms correctly. Scoring is based on a 1-4 scale across five criteria, following the framework of Matthew, B., James, H. & Gary, K. (2017): Topic Sentence, Supporting Detail Sentences, Elaborating Detail Sentences, Legibility and, Mechanics and Grammar.

To evaluate the subjective writing skills test, the researcher conducted the following procedure: The written responses were sorted and copied into three sets. These copies, along with the writing assessment rubric, were then sent to three writing test raters. Each rater scored the writing according to the established rubric and recorded the scores on the designated forms. The researcher then examined the consistency of the scores among the three raters by calculating the inter-rater reliability. The statistical method used was the Spearman-Brown Prophecy Formula (Henning, 1987, p. 83). The inter-rater reliability coefficient for the writing test was found to be 0.98, indicating a very high level of agreement among the raters. Once consistency was confirmed, the raters proceeded to evaluate the remaining writing responses.

Data collection

Prior to the Concept-Oriented Reading Instruction, the pre-test of social sciences research articles comprehension and Writing skills were administered to the students in order to comprehend social sciences research articles and levels of writing skills. Before participating in the instruction, the students received an overview of the course. The content of each unit and classroom practice was also briefly explained. A total of six thematic units lasted over 6 weeks (6 hours a week) with an emphasis on explicit. After the treatment, the posttest of social sciences research articles comprehension and Writing skills were administered to the students in order to comprehend social sciences research articles and levels of writing skills.

Research Finding

Research objectives 1. to investigate the Concept-Oriented Reading Instruction on graduate diploma in teaching profession Students' social sciences research articles comprehension, and the mean scores of reading comprehension pre- and post-test were used. The research findings were described as follow.

Table 1 Social sciences research articles comprehension (n=30)

Group	$\overline{\text{X}}$	*SD*	$\overline{\text{D}}$	S.D.$_{\overline{\text{D}}}$	t	Sig.
Pre-test (40)	21.97	2.71	7.324	1.561	15.341*	.000
Post-test (40)	25.31	2.98				

*p < .05

Table 1 illustrates the mean scores of pretests and posttest were compared by using a pair sample t-test. The mean score of pre-test scores was 21.97, SD = 2.71. The mean of posttest scores was 25.31, SD = 2.98. The results revealed that the students acquired better social sciences research articles comprehension after the implementation of the Concept-Oriented Reading Instruction, at a statistically significant 0.05.

Research objectives 2 to investigate the Concept-Oriented Reading Instruction on graduate diploma in teaching profession students' writing skills, and the mean scores of writing skills pre- and post-test were used. The research findings were described as follow.

Table 2 Writing skills (n=30)

Group	$\overline{\text{X}}$	*SD*	$\overline{\text{D}}$	S.D.$_{\overline{\text{D}}}$	t	Sig.
Pre-test (40)	8.73	5.47	6.314	1.657	24.982*	.000
Post-test (40)	16.43	5.43				

*p < .05

Table 2 illustrates the mean scores of pretests and posttest were compared by using a pair sample t-test. The mean score of pre-test scores was 8.73, SD = 5.47. The mean of posttest scores was 16.43, SD = 5.43. The results revealed that the students gained writing skills after the implementation of the Concept-Oriented Reading Instruction, at a statistically significant 0.05.

Moreover, the results of the writing skills in each aspect after the treatment of the Concept-Oriented Reading Instruction was converted to the rank.

Figure 2: The results of the writing skills in each aspect

As figure above shows that, mechanics and grammar received the highest score, topic sentences, and supporting detail sentences respectively. Conversely, students gained the lowest scores as elaborating detail sentences.

Discussion/Conclusion

1. The results revealed that the students acquired better social sciences research articles comprehension after the implementation of the Concept-Oriented Reading Instruction, at a statistically significant 0.05. This may be attributed to the fact that Concept-Oriented Reading Instruction (CORI) integrates the principles of inquiry-based instruction from science education with reading, combining reading skills and strategies, knowledge, motivation, and social collaboration to construct new knowledge (Sugiarto, D., Indrawati, I., & Meygita, R., 2021). Moreover, it can involve students in reading, understand the text better, and motivate students to read. This strategy also intends to improve reading comprehension by: activating background knowledge, questioning, searching for information, summarizing, organizing graphically, and identifying story structure (Oktavia et al., 2022). Moreover, these findings are consistent with the research conducted by Bactong Besagas, (2022) CORI is one strategy that has the potential to significantly improve students' reading comprehension abilities and achievement scores.

2. The results revealed that the students gained writing skills after the implementation of the Concept-Oriented Reading Instruction, at a statistically significant 0.05. Moreover, the results of the writing skills in each aspect after the treatment of the Concept-Oriented Reading Instruction was converted that, mechanics and grammar received the highest score, topic sentences, and supporting detail sentences respectively. Conversely, students gained the lowest scores as elaborating detail sentences. These results may be attributed to the fact that the challenging reading techniques, like summarizing, at this stage, students integrate their reading skills into the skill of writing summaries and are easier to learn when students are attempting to acquire conceptual understanding (Zulkifli, D. & Triana, L. 2023).CORI has two main aspects: (a) support for the cognitive strategies for knowledge construction during reading, and (b) support for the

motivational development of learners. Teaching about the concepts or contents of a discipline serves these two objectives (Guthrie, 2004).

Suggestion

1. Future research should investigate the implementation of Concept-Oriented Reading Instruction (CORI) in conjunction with different types of reading texts, such as narrative and expository texts. It is also recommended to examine CORI alongside other related variables, such as motivation and engagement, in order to gain deeper insights into its effectiveness across diverse learning contexts.

2. The teacher should integrate Concept-Oriented Reading Instruction (CORI) with critical reading instruction and explore its application among students from other academic disciplines. Such studies could provide broader perspectives on the effectiveness of CORI in enhancing analytical and evaluative reading skills across various learner groups.

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Develop An Educational Innovation for A Training Set on Embedded Iot: Learning Skills for High School Students.

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Abstract

This research addresses the scarcity of hands-on IoT learning resources in secondary education, which hinders students' practical and problem-solving skills. The study focuses on developing and evaluating an educational innovation with two objectives: 1) to develop an IoT-based embedded system training package for upper secondary students, and 2) to assess its efficiency. The participants in this study consisted of 15 experts and instructors. The research instruments included: (1) a content suitability evaluation form, (2) the educational innovation package for IoT-based embedded system learning, and (3) a practical skills assessment form. The statistical methods employed for data analysis comprised item validity, item difficulty, item discrimination, reliability, arithmetic mean, standard deviation, and efficiency values based on the E1/E2 criterion.

The research findings revealed that:

1. The educational innovation package for IoT-based embedded system learning for

upper secondary school students consisted of three main components: (1) instructional materials, (2) a prototype training model for practical skills, and (3) a user manual for the educational innovation package.

2. The educational innovation package demonstrated an efficiency value of 81.25/82.00, which exceeded the established standard criterion of 80/80.

Keywords: Iot Training Kit, Embedded Systems, ADDIE Model, Practical Skills Assessment

Introduction

At present, the teaching and learning of Computational Science and Embedded Systems at the upper secondary education level face significant challenges, particularly the shortage of hands-on learning materials, combined with the complexity of Internet of Things (IoT) technologies, which are difficult for students to comprehend within limited instructional time. As a result, learners often lack problem-solving skills and the ability to apply technological knowledge to real-world situations. Meanwhile, educational institutions at all levels have increasingly emphasized the integration of technology and innovation in both educational management and instructional practices to enhance learning effectiveness, reduce educational inequality, and promote lifelong learning. This approach enables learners to access learning resources and develop their learning potential anytime and anywhere. In response to these challenges, the researcher developed an innovative skill-training kit to bridge theoretical knowledge with practical application and to enhance students' digital competencies in alignment with the demands of the contemporary digital society.

The integration of technology and innovation has become a driving force in reshaping education across all dimensions, including curriculum development, instructional design, learning media, assessment methods, and school management. While the overall adoption of technology and innovation in education appears beneficial, closer examination reveals significant challenges. Many educational institutions remain underprepared for effectively implementing technology in teaching and learning. Teachers, in particular, often lack expertise in using technology and innovation, as well as access to modern learning tools that enable practical, hands-on experiences. Consequently, learners face difficulties in applying theoretical knowledge to real-world practice, which hinders their ability to extend knowledge toward innovation and problem-solving in daily life. To address this issue, the Ministry of Education has introduced computational science as a compulsory subject in the Basic Education Core Curriculum B.E. 2551 (revised B.E. 2560). This subject, required from Grade 1 through Grade 12, emphasizes three key areas: (1) computational thinking, (2) digital technology, and (3) media and information literacy. Together, these domains aim to equip learners with systematic problem-solving skills, technological competence, and critical awareness of media and digital information.

In response to these educational challenges, the research team has proposed a project titled Develop an educational innovation for a training set on embedded IoT learning skills for high school students. The primary objective is to develop innovative learning kits that teachers can use as tools to design computational science activities, bridging theoretical knowledge with practical application. These kits will allow learners to practice systematic thinking, engage in hands-on experiences according to their own potential, and develop teamwork skills. By incorporating Internet of Things (IoT) technology—electronic devices capable of connecting and communicating automatically via the Internet—the learning kits provide real-life applications, such as smart homes, smart networks, or smart farming. Learners can practice programming and interacting with devices such as temperature sensors, humidity sensors, lighting controls, or automated water valves. This hands-on experience enables students to concretely apply theoretical knowledge to practical scenarios. The research team strongly believes that the developed learning kits will contribute to effective teaching and learning in computational science, fostering creativity, problem-solving skills, teamwork, and the ability to extend knowledge toward developing innovations that improve efficiency and address real-life challenges.

Objectives of the Study

In this research, the objectives were set as follows:

1. To develop an educational innovation in the form of an IoT-based embedded system learning skills training kit for senior high school students.

2. To evaluate the effectiveness of the educational innovation in the form of an IoT-based embedded system learning skills training kit for senior high school students.

Conceptual Framework

Input	Process	Output
1. Study the problems of teaching and learning computer science. 2. Study educational innovations. 3. Study the development process of learning skills training kits. 4. Study embedded IoT systems. 5. Study IoT devices. 6. Study related concepts and theories.	1. ADDIE Model 5 step ▪ Analysis ▪ Design ▪ Development ▪ Implementation ▪ Evaluation 2. Find out the effectiveness of the skill training set	Educational innovation for a training set on embedded IoT learning skills for high school students that meets the specified criteria

Figure 1: Conceptual Framework of the Research on Developing an Educational Innovation: An Embedded IoT Microcontroller Learning Training Kit for Upper Secondary School Students.

From Figure 1, the research team conducted a study of relevant concepts and theories, including: investigating issues in teaching and learning in the subject of Computational Science, exploring educational innovations, examining the development process of learning skills training sets, and studying IoT embedded systems and IoT devices. These studies were conducted to Develop an educational innovation for a training set on embedded IoT learning skills for high school students. The development followed the ADDIE instructional design model, which comprises five stages (Kevin Kruse, 2008), with the aim of producing an effective learning skills training set for IoT embedded systems that meets the established efficiency criteria.

Literature Review

ADDIE Model

The ADDIE Model is a systematic process or method for designing instruction and developing learning materials. This concept originated at Florida State University's Center for Educational Technology, where it was created and later developed into a widely recognized instructional design process known as the ADDIE Model. It is defined as a systematic approach to instructional design and development that has gained worldwide acceptance. The term ADDIE represents the five key stages of the design process (Kevin Kruse, 2008): Methodological Framework: The Enhanced ADDIE Model

A-Analyze: Conducted a needs analysis by synthesizing classroom evidence, including teacher interviews and student performance data, to identify specific barriers in IoT education.

Outcome: Design Specifications that directly address authentic classroom challenges.

D-Design: Structured a curriculum and lesson plans integrating 21st-century skills, with a strategic focus on creative problem-solving and computational thinking. Outcome: An Instructional Blueprint encompassing lesson frameworks and hands-on activity guidelines.

D-Develop: Produced an IoT training kit prototype alongside supplementary media, such as activity sheets and manuals, validated for quality and alignment by subject-matter experts.

Outcome: A comprehensive and validated IoT embedded system skill training package.

I-Implementation: Deployed the training kit with a diverse sample group, utilizing reflective notes to document real-time learning behaviors and challenges encountered during the session.

Outcome: Empirical data on student engagement and behavioral patterns within a practical context.

E-Evaluate: Conducted a holistic assessment using E1/E2 efficiency criteria (quantitative) and qualitative feedback to measure learning transformation across cognitive, psychomotor, and affective domains.

Outcome: A final evaluation report demonstrating the innovation's efficacy in fostering holistic student development.

The hallmark of this model is its seamless systemic integration, utilizing outputs from each phase as data inputs for subsequent stages to minimize errors. Combined with formative evaluation, it allows for immediate quality enhancements throughout the process, ensuring the resulting innovation is precise and achieves maximum instructional efficacy.

Flowchart

Spark Education (2024) summarized that a flowchart is a diagram representing the sequential steps of a logical process or algorithm, using interconnected symbols. It facilitates the understanding of procedures, problem analysis, and problem-solving. A flowchart consists of standard symbols representing different steps, such as the start/end of a process, process execution, decision-making, and input/output operations. These symbols are connected by arrows indicating the direction of data flow.

Algorithm

According to Monlamai Vichienwanitchkul (2019), an algorithm is "a set of commands or step-by-step conditions that enable a robot to perform the tasks we assign." To enable robots, computers, or electronic devices to clean floors, move, or collect objects, a specific set of instructions must be designed for those tasks. Algorithms can also be applied in everyday life, for example, when organizing daily activities based on urgency, importance, or personal preferences.

Learning Activities Set

Wanwisa Prapasri (2018) stated that a learning activity package refers to a completed instructional medium that serves as an innovation created by the instructor. It consists of a title, instructions, objectives, content, learning activities, and assessment and evaluation procedures conducted both before and after learning. The instructor acts as a facilitator, guiding students in performing the learning activities.

Internet of Things (IoT)

Tom Bradicich (2015) refers to the Internet of Things (IoT) refers to a network of devices, objects, or entities embedded with sensors, software, and communication technologies that enable them to connect and exchange data via the Internet. The goal is to allow these entities to communicate and operate autonomously, thereby supporting decision-making, control, and the development of efficient and sustainable services and experiences. The core components of IoT can be categorized into five main elements:

1. Devices/Things-Physical objects equipped with sensors and actuators to collect and respond to data, such as smartwatches, intelligent cameras, and industrial machines.

2. Connectivity/Network-Communication channels for data transmission, including Wi-Fi, Bluetooth, Zigbee, 4G/5G, and LoRaWAN.

3. Gateway & Edge Computing-Devices that aggregate data from multiple sources and perform preliminary processing to reduce latency.

4. IoT Platform/Cloud Services-Centralized systems for data storage, processing, analysis, and service provision, such as dashboards, APIs, and AI-powered analytics.

5. Applications-Real-world use cases of IoT, including Smart Homes, Smart Cities, Precision Agriculture, Healthcare, and Industry 4.0.

IoT and ADDIE Model

The integration of IoT into the ADDIE Model represents a systematic fusion of smart data technology with the instructional design process. IoT functions as a pivotal tool for gathering deep behavioral insights during the Analysis phase and serves as the infrastructure for real-time interaction during Implementation. Meanwhile, the ADDIE Model provides the strategic framework that transforms vast data from connected devices into purposeful educational innovations, enabling precise, real-time evaluation and quality enhancement tailored to the 2025 digital learning landscape.

Embedded Systems

Van Den Berg (2007) discussed embedded systems as computer systems specifically designed to perform dedicated functions within particular products or operations. These systems are embedded in everyday devices or specialized industrial applications, distinguishing them from general-purpose computers that are designed to perform a wide range of tasks. In the future, embedded systems are likely to evolve by integrating emerging technologies, such as cloud-based data processing and artificial intelligence (AI), to enhance their operational capabilities. Moreover, the growing adoption of the Internet of Things (IoT) will further increase the importance of embedded systems in connecting and controlling everyday devices.

Skill Training Package

Wanwisa Praphasri (2018) refers to the term skill training package refers to a systematically designed instructional medium intended to facilitate learners' understanding of specific lessons or subject matter. It is developed with the primary objective of providing structured opportunities for learners to practice and enhance their learning skills in accordance with their individual potential.

A skill training package is characterized by its emphasis on learner-centered pedagogy, aiming to promote accurate skill acquisition, reinforce comprehension, and foster sustainable

learning outcomes. Beyond content mastery, such packages contribute to the cultivation of desirable learner attributes, including the ability to think critically, responsibility, and a positive attitude toward lifelong learning.

Although skill training packages may differ in form, content, or instructional approach, their fundamental purpose remains consistent: to provide diverse learning experiences that enable learners to develop a wide range of skills and to achieve the specified educational objectives.

Integrating 21st Century Skills Frameworks to Enhance IoT-Based Embedded Systems Learning Innovations

The researcher systematically integrates 21st Century Skills into the training kit's learning activities by aligning technical development with international competency standards, such as the P21 Framework and OECD 2030. This integration encompasses computational thinking, complex problem-solving, and digital literacy. By defining clear indicators for each activity, the theoretical foundation and educational value of the innovation are elevated to meet international standards. This approach ensures a holistic development framework for learners, concretely addressing the demands of the 2025 digital labor market

Research Methodology

This study investigates pedagogical challenges and needs within Computational Science by synthesizing relevant theories, including learning frameworks, skill training modules, practical skill development, and the Internet of Things (IoT). These insights were applied to develop an educational innovation in the form of a learning skill training module. To ensure high-quality validation, the researcher employed purposive sampling to select subject-matter experts specialized in IoT. The innovation is designed for implementation within high school computer laboratories, emphasizing a hands-on learning approach. This methodological decision aims to align instructional efficiency with students' foundational knowledge and institutional resources, ensuring a precise and effective enhancement of digital competencies for the 2025 landscape before full-scale implementation with the target group.

How to create research tools

The research instruments were developed and validated through the following procedures:

1. Content Appropriateness Evaluation Form

This instrument was designed to establish guidelines for organizing instructional content, activities, and performance assessment tools for each learning unit, ensuring their alignment with behavioral objectives. Five content experts were invited to evaluate the instrument, and the index of item-objective congruence (IOC) for each item was 0.81.

2. Instructional Innovation: Learning Skill Training Package

This package served as an instructional tool for students in the subject of computational science. It aimed to foster systematic thinking, encourage self-directed practice, and enhance learners' proficiency through hands-on activities. The training package was developed based on the ADDIE instructional design model to ensure both teaching effectiveness and successful learning outcomes.

3. Performance Skills Assessment Form

This instrument was employed to measure students' practical skills after engaging with the learning skill training package. Three performance-skill experts evaluated the instrument, and the index of item-objective congruence (IOC) for each item was 0.83.

Data collection

Data collection has the following steps:

1. Content Appropriateness Evaluation Form

The data collection procedures consisted of the following steps: studying the process of evaluating content appropriateness, selecting experts, coordinating with the experts, distributing the evaluation forms, and collecting the completed forms from the experts for subsequent data analysis.

2. Educational Innovation: Learning Skill Training Package

The data collection procedures consisted of the following steps: studying the process of determining the effectiveness of the educational innovation (learning skill training package), selecting the sample group, coordinating with the sample group facilitators, implementing the learning skill training package with the selected sample group, collecting the resulting data, and analyzing the data to assess effectiveness against the established criteria before proceeding with actual implementation.

3. Practical Skills Assessment Form

The data collection procedures consisted of the following steps: studying the process of assessing practical skills, planning the implementation, coordinating with facilitators of the target group, administering the practical skills assessment form to measure learners' practical skills, and collecting the assessment data for further analysis to determine learners' skill levels.

Data Analysis

Data Analysis Procedures:

1. Content Appropriateness Analysis

The content appropriateness evaluation form was used to collect data from experts. The results were summarized, and the evaluated content was subsequently applied in the development of the educational innovation, namely the learning skill training package.

2. Effectiveness Analysis of the Educational Innovation

The effectiveness of the learning skill training package was analyzed and compared against the standard criterion of 80/80. The results showed an effectiveness level of 81.25/82.00, which exceeded the established criterion. This indicates that the innovation can be effectively applied in instructional practice.

3. Practical Skill Assessment Analysis

The practical skill assessment form was administered to learners after participating in the learning skill training package. The analysis revealed a content validity index of 0.93, a difficulty index (P) ranging from 0.40 to 0.72, a discrimination index (D) ranging from 0.30 to 0.70, and a reliability coefficient of 0.91.

Research Finding

1. Development Results of an Educational Innovation: Embedded IoT Learning Skill Training Kit for Upper Secondary Students.

The development of the educational innovation, namely the IoT Embedded System Learning Skill Training Kit for high school students, yielded the following results. The research found that the innovation consists of three main components:

1. Learning Support Documents, which include:

1.1 Lesson Plans

1.1.1 Lesson Plan 1: Introduction to IoT (Internet of Things)

1.1.2 Lesson Plan 2: Program Design Using Flowcharts

1.1.3 Lesson Plan 3: Programming with IoT Devices

1.1.4 Lesson Plan 4: Building an Automated Plant Watering System

1.2 Knowledge Sheets

1.3 Activity Sheets

1.4 Activity Records

1.5 Unit Tests

2. Practical Skill Training Model, which is a set of IoT devices used for teaching in Computer Science courses. This component serves as a guideline for instructors to organize learning activities and as a tool for students to engage in hands-on practice. An example of the practical skill training model is shown in Figure 2.

Figure 2: Model of a practical skills training set

From Figure 2, the practical skills training model consists of:

2.1 NodeMCU board

2.2 ESP8266 chip

2.3 Arduino IDE software

2.4 Operation of the Blynk App

2.5 WiFi signal

2.6 Sensors

2.7 Relay

3. The user manual for the educational innovation of the skills training set includes:

3.1 User manual for the IoT skills training educational innovation for instructors.

3.2 User manual for the IoT skills training educational innovation for learners.

2. Results of the Effectiveness of the Educational Innovation: IoT-Based Embedded System Learning Skill Training Set for Upper Secondary Students.

To evaluate the effectiveness of the educational innovation, the IoT-based embedded system learning skill training set developed by the research team for upper secondary students, a sample group of 30 students was selected. The process effectiveness (E1) was calculated as the percentage of the average scores obtained from completing activity sheets, project work, and post-lesson tests across four instructional plans. The outcome effectiveness (E2) was calculated as the percentage of the average scores obtained from the practical skill assessment conducted at the end of the experiment. The results are presented in Table 1, according to the E1/E2 effectiveness criteria.

Table 1 Effectiveness of the Educational Innovation: IoT-Based Embedded Systems Learning Skill Training Kit for Senior High School Students.

Students	Learning Plan 1 Activity Sheet 1 (20)	Learning Plan 2 Activity Sheet 2 (20)	Learning Plan 3 Activity Sheet 3 (20)	Learning Plan 4 Activity Sheet 4 (20)	Total (E_1) (80)	Post-Learning Score (E_2) (20)
1	16	16	17	18	67	16
2	15	16	16	17	64	15
3	16	17	17	18	68	17
4	15	16	16	16	63	16
5	16	17	17	16	66	16
6	16	16	16	17	65	16
7	16	15	16	16	63	17
8	15	16	15	17	63	18
9	16	18	17	18	69	17
10	16	18	16	16	66	16
11	15	18	18	15	66	18
12	14	15	16	17	62	16
13	16	18	18	18	70	16
14	15	16	17	15	63	17
15	15	18	17	16	66	16
16	16	16	18	15	65	15
17	16	18	16	15	65	16
18	15	16	16	16	63	15
19	14	15	16	17	62	16
20	16	15	16	18	65	17
21	16	17	18	15	66	18
22	15	15	16	16	62	16
23	16	16	17	16	65	15
24	15	16	16	15	62	16
25	15	16	17	16	64	16
26	16	17	16	16	65	17
27	16	17	17	18	68	16
28	16	17	17	16	66	18
29	16	16	16	17	65	16
30	16	16	17	17	66	18
together	466	493	498	493	1950	492
average	15.53	16.43	16.60	16.43	65.00	16.40
S.D.	0.63	1.01	0.77	1.04	2.10	0.93
Percentage	77.67	82.17	83.00	82.17	81.25	82.00

Students	Percentage of Scores from Unit-Based Activities / Full Score (E_1)				Total (E_1)	Post-Learning Score (E_2)
	Learning Plan 1	Learning Plan 2	Learning Plan 3	Learning Plan 4		
	Activity Sheet 1 (20)	Activity Sheet 2 (20)	Activity Sheet 3 (20)	Activity Sheet 4 (20)	(80)	(20)
E_1/E_2 Efficiency Based on the Established Criterion 80/80				E_1/E_2 Efficiency for the Skill Practice Set 81.25/82.00		

Table 1 shows that the average scores from activity sheets, project assignments, and post-tests across four lesson plans were 65.00 out of 80 points (81.25%). The average post-learning practical skills score was 16.40 out of 20 points (82.00%). These findings indicate that the IoT-based embedded systems learning skills training set for senior high school students is effective, exceeding the preset criterion of 80/80, and can be successfully applied in classroom instruction.

Discussion

The present investigation yielded several critical findings that warrant scholarly discussion, delineated as follows:

1. Educational Innovation: Development of an IoT-Based Embedded System Training Kit The research team conceptualized and developed an IoT-based embedded system training kit for upper secondary school students. This innovation was designed not merely as supplementary instructional material, but as an integrated pedagogical framework systematically linking theoretical constructs with practical applications. Its primary purpose is to cultivate students' ability to engage in structured reasoning, problem-solving, and experiential practice. The design and development process was firmly grounded in established learning theories, thereby ensuring both theoretical rigor and instructional validity. The training kit comprised three principal components: (a) instructional support documents, (b) a prototype model of the training apparatus, and (c) a comprehensive user manual for classroom implementation. This finding is consistent with Supot Suthathum and Nattapong Polsayom (2016), who investigated the development and experimental use of virtual reality–based instructional media for teaching computer hardware and networking devices. His research identified two core dimensions of the innovation, namely the structural composition of the media—including learning content, detailed hardware and network component descriptions, online learning community integration, and operational manuals-and the developmental strategies underlying such media. Empirical results demonstrated that learners exhibited measurable improvements in knowledge acquisition, attributable to the immersive simulation of real-world device operations. In the present study, the development process adhered to the ADDIE instructional design model, a paradigm widely endorsed in educational technology research for its systematic and iterative approach. The efficiency index of the developed innovation was 81.25/82.00, exceeding the predetermined E1/E2 benchmark of 80/80. This performance index substantiates the pedagogical effectiveness of the training kit, confirming that

it not only meets but surpasses the threshold of instructional efficiency. Such results correspond with those of Arasorn Phaochanuan (2011), who developed computer-assisted instructional modules on the topic of energy for lower secondary science students and reported efficiency values of 86/82.75, thereby surpassing the established 80/80 benchmark.

2. Effectiveness of the Innovation: Comparative Outcomes

The study further evaluated the effectiveness of the IoT-based embedded system training kit in comparison with conventional instructional methods. Across all five target schools, students who engaged with the training kit demonstrated statistically significant gains in practical skills relative to peers taught using traditional pedagogical approaches, with significance at the .05 level. These findings underscore the capacity of the innovation to enhance student performance beyond outcomes achievable through conventional classroom practices. The results align with Vasinee Liamsuwan (2015), who developed cooperative learning activity packages utilizing the Team-Assisted Individualization (TAI) technique to enhance presentation skills using Prezi among Grade 9 students. The study revealed that students' post-test scores were significantly higher than their pre-test scores (p < .05), and cooperative learning behaviors were rated at a favorable level (mean = 79.35%). Similarly, the findings corroborate those of Jewaree Srichanchai (2023), who developed science training kits through project-based learning combined with the Student Teams Achievement Divisions (STAD) technique for Grade 5 students. That study reported significant improvements (p < .05) in analytical thinking, collaborative behavior, and academic achievement after exposure to the training kits. Furthermore, the current findings are reinforced by Natthapong Phonsayom et al. (2017), who developed embedded system training kits for academic service initiatives in community contexts. Their study identified critical design components and developmental guidelines, reporting that the training kits achieved very high levels of instructional efficiency. This outcome was attributed to the inclusion of embedded system kits that enabled learners to engage directly in authentic, hands-on practice.

Suggestions

1. The educational innovation entitled Embedded System and IoT Learning Skill Training Kit for upper secondary school students was developed to support instructional practices in the subject of Computational Science at Grade 10. Since the content is practice-oriented, its application is considered inappropriate for lecture-based or purely theoretical courses.

2. In order to ensure the effective implementation of the Embedded System and IoT Learning Skill Training Kit for upper secondary school students, schools are required to provide adequate preparation in terms of essential infrastructure. This preparation includes the availability of qualified instructors in Computational Science or computer-related disciplines, as well as access to stable internet connectivity and other necessary facilities.

3. The Embedded System and IoT Learning Skill Training Kit has been designed as a practice-based instructional tool that requires students to engage in hands-on activities. As the kit involves devices that must be connected to electrical power, close supervision, guidance, and monitoring by instructors are required to ensure both safety and the effectiveness of learning outcomes.

4. For future research and the current refinement, the evaluation scope has been expanded beyond E1/E2 efficiency to encompass comprehensive Learning Transformation. By integrating Bloom's Taxonomy and 2025 international assessment standards, the study now evaluates changes across three key domains: cognitive knowledge, psychomotor IoT practical skills, and affective attitudes. This multi-dimensional approach ensures a more authentic reflection of

instructional impact and fosters greater academic confidence in the innovation's holistic educational value.

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