

Influence of teacher dispositions on TPACK: Insights from pre-service EFL teacher education

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ABSTRACT

Developing Technological Pedagogical Content Knowledge (TPACK) in foreign language teachers is essential for fostering effective learning experiences. While various factors influence teachers' TPACK development, a significant gap remains in understanding how personal internal factors, specifically technological, pedagogical, and subject-matter dispositions, shape growth in TPACK domains during the preparatory stages of the EFL teaching profession. This study employed a mixed-methods approach to examine the manifestation of technological, pedagogical, and subject-matter dispositions in English language teaching and their impact on TPACK development among 29 Thai pre-service EFL teachers. Participants completed a 20-hour professional development workshop. Pre- and post-workshop self-evaluations were used to select ten participants, five with the highest and five with the lowest changes in self-evaluated TPACK scores, for classroom observations and interviews. Findings revealed significant development in technological content knowledge (TCK) (81.67%), while technological pedagogical knowledge (TPK) (24.67%) and overall TPACK (28.67%) were notably weaker. In addition, the study identified that a fixed mindset, limited subject-matter self-efficacy, and dependence on structured resources constrained pedagogical content knowledge (PCK); cautious attitudes toward technology for content delivery hindered TCK; a preference for simplicity and familiar materials, along with an underestimation of students' technological abilities, impeded TPK; and resistance to digital collaboration and reluctance to embrace technology for assessment and feedback limited overall TPACK development. Positive dispositions toward technology aided TPACK integration but did not necessarily predict classroom practices. This research highlights key dispositional strategies for enhancing TPACK development in pre-service teachers, including cultivating a growth mindset, fostering high expectations, acknowledging the value of technology, and balancing personal traits with professional competencies. To translate these strategies into practice, teacher education programs should embed positive dispositions into sustained, practice-based training that models adaptive material use and technology-supported pedagogy in authentic contexts.

Keywords: Dispositional factors; EFL teacher education; teacher dispositions; TPACK

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INTRODUCTION

In today's educational landscape, effective teachers require more than content knowledge and teaching skills; they must also demonstrate technological literacy and understand the interrelationship among technology, pedagogy, and content (Koehler et al., 2013). Research highlights that technology integration provides significant benefits for learners, including fostering learner autonomy (Liao, 2023;

Seyri & Rezaee, 2024), increasing student engagement (Ma, 2024; Shen et al., 2023), and promoting collaborative learning (Chanwaiwit & Inpin, 2021; Keramati et al., 2024). Therefore, applying the Technological Pedagogical Content Knowledge (TPACK) framework (Koehler & Mishra, 2009) is crucial for teachers, as it integrates three essential domains: technology, pedagogy, and content. However, incorporating technology into the

classroom poses considerable challenges due to additional variables introduced by technology and the rapid pace of technological change (Koehler et al., 2013). Moreover, Thai EFL teacher education faces significant challenges similar to those in neighboring countries such as Vietnam and Cambodia, where Pham et al. (2024) highlighted the growing demand for lifelong learning and the need to improve language education quality. These challenges underscore the critical role of technology integration in EFL education, as it enhances accessibility, personalization, and engagement. Additionally, in these educational and technological contexts, pre-service teachers require supportive mindsets rooted in intrinsic qualities and professional development, such as motivation to integrate technology effectively into the classroom (Boonmoh & Kulavichian, 2023) and informed intuition to make sound pedagogical decisions (Sun, 2024). These needs are particularly crucial in comparison to settings with greater institutional and technological support.

The expanding body of research on TPACK in English language teacher education reflects growing scholarly interest in the field. For example, Ali and Waer (2023) reported moderate technology use among 30 Egyptian pre-service teachers, with pedagogical content knowledge (PCK) as the dominant instructional method. Sari et al. (2021) identified technological content knowledge (TCK) as the primary knowledge aspect for two Indonesian in-service teachers utilizing reflective practices. Park and Mac Donald (2022) found greater critical reflection on technological pedagogical knowledge (TPK) among seven foreign language teachers after self-reflection activities. Similarly, Kaçar (2022) observed significant development in TCK and TPK among 24 Turkish pre-service teachers through a digital materials design project. Given these diverse findings, the present study investigates factors shaping TPACK development in Thai EFL contexts. Although conducted in Thailand, the findings offer insights applicable to other EFL settings globally, particularly in countries where teachers encounter similar intrinsic factors influencing TPACK development.

Many studies have examined the influence of environmental and contextual factors on teachers' TPACK (e.g., Abdelhalim & Aldaghri, 2024; Porras-Hernández & Salinas-Amescua, 2013; Visonà & Kurt, 2024), but comparatively fewer have focused on personal internal factors, such as beliefs, values, and attitudes (i.e., dispositions), that affect TPACK development (e.g., Trevisan & De Rossi, 2023). Saleh (2018) emphasized that while mastering subject matter and technical skills is essential, these are insufficient without appropriate dispositions, highlighting the necessity for a holistic approach to teacher development. Additionally, Huang et al. (2022) and Walker (2019) underscored

the importance of emotional support in teacher preparation. The present study examines how intrinsic factors shape pre-service teachers' TPACK development.

Teacher dispositions are intrinsic qualities that underpin professional behavior and ethical commitments, significantly influencing teaching practices. In this study, teacher dispositions refer to three interrelated types: technological, pedagogical, and subject-matter dispositions. Informed by humanism theory (McLeod, 2023), teacher dispositions encompass a range of personal characteristics, including "enthusiasm, professional esteem, and learning motivation" (Shao & Tamashiro, 2013, p. 2); "beliefs, values, and attitudes" toward education (Saultz et al., 2021, p. 8); and "behaviors, characteristics, and perceptions" aligned with well-established professional standards (van Boxtel & Chaney, 2023, p. 131). Most dispositions are character-based (Stephens, 2019), and positive dispositions are closely associated with successful technology integration in classroom settings (Ishak, 2024; Seufert et al., 2020; Stephens, 2019). Koehler et al. (2013) emphasized that successful technology integration in teaching depends on teachers' holistic knowledge, while Aloia and Bialka (2022) argued that knowledge does not develop in isolation but grows alongside dispositions and skills. Furthermore, Truscott and Stenhouse (2022) asserted that teacher dispositions directly shape both learning and teaching practices. Greene and Jones' (2020) review of TPACK research from 2009 to 2019 revealed that teacher dispositions are often excluded from the framework's operationalization, highlighting a significant research gap and a missing piece in understanding how teachers develop the capacity to integrate technology effectively. The present study expands the understanding of TPACK by integrating dispositions into the framework and offering actionable insights for teacher preparation programs.

Within the TPACK framework, this study examines the roles of three interrelated dispositions. Pedagogical dispositions (Smith, 2022) encompass beliefs, values, and attitudes related to effective student learning, classroom management, student engagement, and instructional adaptability for addressing diverse needs. Abdelhalim and Aldaghri (2024) emphasized that pedagogical dispositions are shaped by contextual factors, including institutional and classroom environments and language proficiency. Ferguson et al. (2023) highlighted the importance of developing trust in varied sources of teaching knowledge and understanding how to apply theories in practice to foster pedagogical self-learning. Additionally, Soleimani (2020) noted that teachers' belief in the value of effort influences their adoption of facilitative teaching styles, which promote student-centered learning environments. Smith (2022) also asserted that teachers who are

receptive to using research to inform their teaching develop stronger pedagogical competencies. Research indicates that pedagogical dispositions enable teachers to continuously acquire new knowledge, skills, and competencies, supporting adaptability in teaching practices. However, limited understanding remains regarding how intrinsic factors affect the formation and implementation of pedagogical dispositions in EFL teaching.

Technological dispositions encompass the beliefs, values, and attitudes that teachers hold regarding the integration of technology into instruction and assessment. Although the term is newly applied in the context of EFL teacher education, it builds on broader research demonstrating that dispositional factors play a crucial role in technology adoption (Ratchford & Ratchford, 2021). In this study, technological dispositions include openness to emerging technologies, proficiency with digital tools, and the capacity to adapt technology for educational purposes. Bon and Inpin (2024), Kohnke et al. (2024), and Atchley (2019) underscored the importance of expertise gained through professional development for successful technology integration, with Atchley (2019) further emphasizing that a willingness to engage in training without external incentives is essential. Seufert et al. (2020) highlighted the interconnectedness of attitudes, technology-related knowledge, and skills in predicting the actual use of information and communication technology (ICT) among pre-service teachers. Similarly, Tseng et al. (2019) concluded that teacher preparation programs play a key role in shaping teachers' knowledge, perspectives, and confidence in integrating technology into their teaching. These findings suggest that personal dispositions, beyond training and skills, may significantly influence TPACK development, yet this area remains underexplored.

In this study, subject-matter dispositions refer to attitudes toward the English language, including enthusiasm for the subject, a commitment to deepening one's knowledge, and a willingness to present content in an accessible and engaging manner for students. Mastering English as a foreign language is widely recognized as a process requiring significant time and effort. EFL pre-service teachers navigate dual roles as both learners and educators, often encountering stress during their training and experiencing potential emotional exhaustion as they transition into teaching (Voss & Kunter, 2019). Despite these challenges, the impact of emotional factors on English language development has received limited scholarly attention. Reynolds et al. (2021) reported that practicum experiences and targeted interventions within teacher education programs greatly influence pre-service teachers' perceptions of the importance of English. Similarly, Tajeddin and Alemi (2019) found that pre-service

EFL teachers often prioritize personal traits such as patience, kindness, and enthusiasm, whereas in-service teachers place greater emphasis on content knowledge and experience. This contrast underscores the increasing importance of content knowledge in effective teaching practices.

Previous research has extensively examined pre-service teachers' experiences with incorporating TPACK in foreign language teaching (Kuo & Kuo, 2024; Qiu et al., 2022) as well as the impact of interventions on TPACK development (Greene et al., 2023; Kaçar, 2022; Kulaksız, 2023; Sari et al., 2021). Additional research have explored methods for enhancing teacher dispositions (Jensen et al., 2023; Zhang et al., 2022), developing assessments for teaching dispositions (Byrd, 2023; Ronan et al., 2023; Walker, 2019), and investigating how teacher dispositions contribute to students' learning outcomes (Bradley et al., 2020; Stephens, 2019). However, research into how dispositions influence TPACK development among pre-service EFL teachers remains limited.

Although previous studies have examined the influences of technological, pedagogical, and subject-matter dispositions on teaching and learning outcomes, limited attention has been given to how their interplay enhances interconnected knowledge areas, such as TPACK, in technology-enhanced EFL settings. This study addresses this gap by investigating how personal dispositions manifest in classroom teaching and by offering practical strategies to strengthen EFL teacher education and instructional practices. Specifically, it explores the role of these dispositions in shaping English teaching practices and influencing TPACK development. Understanding how these dispositions affect technology integration is crucial for improving EFL teacher education and informing global conversations on teacher preparation in the digital age. By examining the relationship between dispositions and TPACK development, this research aims to inform the creation of more responsive teacher education models for technology-rich classrooms. This study is guided by the following research questions:

1. How do Thai pre-service EFL teachers' technological, pedagogical, and subject-matter dispositions manifest in their English language teaching?
2. In what ways do these dispositions contribute to or hinder Thai pre-service EFL teachers' TPACK development?
3. What dispositional strategies can EFL teacher preparation programs implement to address challenges and enhance pre-service EFL teachers' TPACK development?

METHOD

The research adopted an explanatory sequential mixed-methods design at a public teacher preparation university in Thailand. In this study, "disposition" refers to the beliefs, values, and attitudes (Saultz et al., 2021) that pre-service EFL teachers hold toward technology (technological disposition), pedagogy (pedagogical disposition), and the English language (subject-matter disposition). These dispositions are aligned with the TPACK framework (Koehler & Mishra, 2009) and support the aims of the EFL teacher education program.

The analysis of TPACK development centers on four key relationships within the Technological Pedagogical Content Knowledge (TPACK) framework (Ali & Waer, 2023; Kaçar, 2022; Park & Mac Donald, 2022; Sari et al., 2021): (1) Pedagogical Content Knowledge (PCK) pertains to understanding effective teaching strategies for conveying English content, such as grammar, vocabulary, language structure, communication skills, and literature, in ways that are understandable and meaningful to students; (2) Technological Content Knowledge (TCK) involves knowing how to select and apply appropriate technological tools to support and enhance students' comprehension of English content; (3) Technological Pedagogical Knowledge (TPK) refers to understanding how to integrate technology to enhance teaching methods effectively; and (4) Technological Pedagogical Content Knowledge (TPACK) encompasses the integrated use of technology, EFL pedagogy, and English content knowledge to deliver effective and engaging English instruction.

Table 1
Pre-Service Teachers' Demographics and Professional Information (n=10)

Code	Scores	Sex	GPA (4.00)	School size	Class size	Teaching hours per week	Additional duties
01	High	Male	2.94	Small	20-30	9	Clubs
02	High	Female	2.89	Medium	25-30	10	Academic affairs and educational supervision
03	High	Female	3.71	Large	25-30	12	Library
04	High	Female	3.67	Extra large	38-40	9	Academic affairs
05	High	Female	2.46	Small	20-38	8	Class teacher assistant
06	Low	Female	3.61	Medium	20-25	8	Academic affairs, accreditation, and PR media design
07	Low	Male	3.00	Large	25-30	9	None
08	Low	Female	3.70	Medium	30-35	10	Substitute teacher
09	Low	Female	3.30	Medium	25-30	11	Class teacher assistant
10	Low	Female	3.20	Medium	28-30	12	Accreditation

Note: School size: Small : Not exceeding 499 students.
Medium : 500-1,499 students.
Large : 1,500-2,499 students.
Extra-large: 2,500 or more students

Research Instruments

A blended 20-hour workshop was developed and conducted over three days to ensure participants understood TPACK and its application. The

Participants

The study participants for the TPACK workshop and self-evaluations consisted of 29 Thai pre-service EFL teachers, aged 21–22, who were enrolled in a Teaching Practicum course during their final semester before graduation. Participation in data collection was voluntary, following the distribution of consent forms to 65 students who attended the TPACK workshop. Of the 29 participants, 13.8% were male and 86.2% were female. Overall, self-evaluation scores improved from 126.66 to 141.86. However, the increase in standard deviation from 17.14 to 21.52 indicates greater variability in participants' post-evaluation scores. The maximum improvement score of 59 demonstrates that some participants experienced significant positive changes in their self-evaluations.

The classroom observation and interview phase included ten participants selected from the highest and lowest fifths of the self-evaluation score distribution. This sampling strategy enabled the capture of contrasting cases, providing qualitative insights into dispositions that foster or hinder TPACK development. Selecting five participants per group, representing approximately 34% of the total sample, ensured a substantial proportion for in-depth classroom observations and interviews and allowed for sufficient variation to identify patterns in dispositions and contextual factors affecting TPACK growth. The pre-service teachers taught students in grades 7 to 10, aged 13 to 16 years. They were equipped with various technological devices, including smartphones, tablets, laptops, projectors, PCs, microphones, and audio-visual materials from the course book. The demographic information is as follows:

workshop included five supporting materials: a curriculum framework, a handout, classroom observation checklists, field notes (used as mock observation tools for the main study), and a

workshop evaluation form for participant feedback. The workshop content covered TPACK domains, their classroom application, the integration of TPACK in English language assessment, and classroom teaching demonstrations. Prior to implementation, the workshop and materials were evaluated by three experts in curriculum design and English language teaching. The experts agreed that the workshop would encourage pre-service EFL teachers to adopt a TPACK approach in lesson planning and delivery ($\bar{x} = 5.00$, S.D. = 0.00) and that the instructor was capable of delivering the workshop effectively ($\bar{x} = 5.00$, S.D. = 0.00). Although there was some uncertainty regarding the workshop's alignment with the specific needs of pre-service EFL teachers in integrating technology ($\bar{x} = 4.33$, S.D. = 0.58) and its ability to foster positive attitudes toward technology use in teaching ($\bar{x} = 4.33$, S.D. = 0.58), the average scores suggested that the workshop was sufficiently effective for use.

A TPACK-based self-evaluation form consisting of 37 rating-scale statements (5 = strongly agree to 1 = strongly disagree) was developed to assess participants' TPACK development. The form was reviewed by four experts in educational technology and English language teaching to establish content validity, employing the index of item-objective congruence (IOC) (Turner & Carlson, 2003). The minimum acceptable index value for each item was 0.75, and all statements met or exceeded this threshold. To improve clarity, one expert recommended repositioning the technological knowledge (TK) statements to the beginning of the form to prevent confusion with subsequent TPK statements. Additionally, one statement was divided into two separate items for greater precision.

A classroom observation checklist and field note form were developed to examine how dispositions manifested in participants' teaching practices, capturing instances across the integrated domains of Pedagogical Content Knowledge (PCK), Technological Content Knowledge (TCK), Technological Pedagogical Knowledge (TPK), and Technological Pedagogical Content Knowledge (TPACK). After development, four experts evaluated these tools using the IOC, with item index values ranging from 0.75 to 1.00, resulting in the retention of all items. Inter-rater reliability was assessed by training two raters on each checklist item and piloting the tools in a videotaped English class taught by a pre-service teacher not included in the study. The raters independently observed the same video, compared their results, and discussed discrepancies to clarify misunderstandings. The item "Setting goals/objectives for students to achieve high performance in English learning" was clarified to ensure consistent interpretation. To address similar issues that might arise in the future,

descriptions and examples of each expected practice were provided as guidelines for the observers.

Eight semi-structured interview questions were developed based on key observation results. The questions were reviewed by four experts in educational technology and English language teaching, receiving an index of item-objective congruence (IOC) score of 1.00, indicating acceptability. The questions were piloted with five pre-service teachers not involved in the study, who confirmed their clarity, relevance, and comprehensiveness. After incorporating all refinements, the revised TPACK workshop materials and data collection tools were submitted to the Institutional Review Board (IRB) for ethical approval. A literature review was conducted to identify practical strategies for addressing challenges and improving TPACK among EFL teachers.

Data Collection and Analysis

Twenty-nine pre-service teachers completed a self-evaluation before the TPACK workshop and again one month after returning to their teaching practicum. The mean and standard deviation were used to analyze the pre- and post-evaluation data. Improvement scores were ranked and divided into high and low groups by selecting the top and bottom fifth of the list.

These ten participants were observed teaching three times to capture a broad range of practices. Videotaped sessions enabled two observers to discuss any rating discrepancies. Lesson plans submitted for each session were also evaluated for effective classroom implementation. After the observations, each participant was interviewed to gain deeper insights into how specific dispositions influenced their TPACK development.

Yes/no responses from the observation checklist were analyzed using frequency and percentage analysis to identify common classroom dispositions. Field notes and interview transcripts were thematically analyzed to uncover recurring themes and patterns in how dispositions influenced TPACK development.

FINDINGS AND DISCUSSION

This section presents the findings on how technological, pedagogical, and subject-matter dispositions manifested in the participants' classroom teaching and how these dispositions influenced their TPACK development.

Manifestation of Technological, Pedagogical, and Subject-Matter Dispositions

Details of the manifestation of technological, pedagogical, and subject-matter dispositions are presented in Table 2.

Table 2
Frequency Analysis of Observation Checklist (n=10)

TPACK Domains	Teaching Practice	Frequency		Percentage	
		Yes	No	Yes	No
PCK	Setting goals for students to achieve high-performance.	3	27	10	90
PCK	Using English as the medium of instruction.	9	21	30	70
PCK	Connecting English to daily lives.	24	6	80	20
PCK	Employing various teaching methods.	27	3	90	10
	Total	63	57	52.50	47.50
TCK	Using digital tools for interactive content.	30	0	100	0
TCK	Creating materials matching proficiency levels.	19	11	63.33	36.67
	Total	35	25	81.67	18.33
TPK	Adapting tasks with technology.	1	29	3.33	96.67
TPK	Using digital tools for classroom management.	0	30	0	100
TPK	Selecting diverse materials and multimedia matching students' experiences.	3	27	10	90
TPK	Troubleshooting technical problems.	30	0	100	0
	Total	37	113	24.67	75.33
TPACK	Integrating technology into the lesson design to enhance English skills.	27	3	90	10
TPACK	Using technology for communication and collaboration to enhance English language learning.	0	30	0	100
TPACK	Incorporating interactive and multimedia elements to boost student engagement.	13	17	43.33	56.67
TPACK	Using technology for assessing English performance.	3	27	10	90
TPACK	Using technology for providing feedback on English language performance.	0	30	0	100
	Total	43	107	28.67	71.33

Table 2 indicates that, among the four domains, participants demonstrated the greatest development in Technological Content Knowledge (TCK; 81.67%) during their classroom teaching. The lowest development was observed in Technological Pedagogical Knowledge (TPK; 24.67%) and Technological Pedagogical Content Knowledge (TPACK; 28.67%). In Pedagogical Content Knowledge (PCK), most participants showed strong capabilities in employing various teaching methods (90%) and connecting English to students' daily lives (80%), but few succeeded in setting high-performance goals (10%) or maintaining consistent use of English as the instructional medium (30%). In TCK, participants were effective in using digital tools to create interactive content (100%) and in developing materials suited to students' proficiency levels (63.33%). In TPK, only a few participants successfully adapted tasks using technology (3.33%), and none used digital tools for classroom management. Although the use of diverse materials and multimedia was limited (10%), troubleshooting skills were high (100%). Finally, in TPACK, most participants integrated technology to enhance English skills (90%), and some engaged students with interactive elements (43.33%), but none used

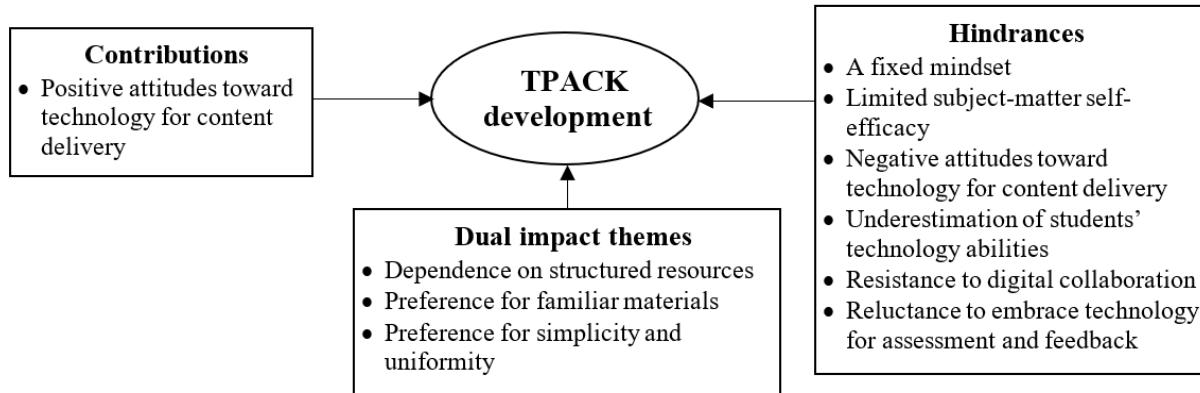
technology for communication, collaboration, or providing feedback. Additionally, technology was rarely used for assessing student performance (10%).

The findings indicate the strongest development in TCK, with substantially lower growth in TPK and TPACK. This pattern contrasts with previous studies (e.g., Kaçar, 2022; Park & Mac Donald, 2022; Sari et al., 2021), which reported greater gains in technology integration following professional development activities. Although this study focused on intrinsic factors, the findings suggest that limited infrastructure and resources, along with additional duties during the teaching practicum, may have contributed to reduced motivation and increased reliance on familiar technologies among both teachers and students, thereby limiting full technology integration.

Impact of Teacher Dispositions on TPACK Development

The results of a thematic analysis of qualitative data from observation field notes and interview transcripts are presented as key themes illustrating how specific dispositions contribute to or hinder TPACK development.

Figure 1
Teacher Dispositions Impacting Pre-Service Teachers' TPACK Development



Theme 1. A Fixed Mindset

The observations indicated that the pre-service teachers tended to set low-level learning objectives focused on basic language skills. These objectives included tasks such as pronouncing words, spelling, providing vocabulary meanings, explaining language structures, constructing sentences using the taught structure, and answering questions after listening or reading. This reflects a basic approach to language instruction, emphasizing foundational skills rather than higher-order competencies, such as critical thinking and real-world communication. The interviews revealed the pre-service teachers' skepticism regarding the feasibility of setting high expectations for students to achieve strong performance in English learning. For instance, "My highest expectation from them is making a correct sentence" (Interviewee 03). Setting low-level objectives centered on basic English skills may hinder PCK development by limiting teachers' exploration of advanced teaching strategies and deeper engagement with the full scope of English content.

The tendency of pre-service teachers to focus on basic language skills rather than higher-order competencies may stem from assumptions that students' current proficiency imposes a ceiling on their potential, leading to objectives that maintain rather than extend existing levels. Their emphasis on basic skills appears to be influenced by perceived low student proficiency, which can lead to less challenging learning goals. As Soleimani (2020) observes, limited belief in the value of effort often leads to less facilitative, student-centered teaching. Given that teachers' attitudes strongly influence learner outcomes (Bradley et al., 2020; Shao & Tamashiro, 2013; Truscott & Stenhouse, 2022), such negative beliefs risk hindering both student progress and the adoption of more effective pedagogical practices. In many EFL contexts, where students have limited exposure to English beyond the classroom, low expectations can perpetuate a cycle of minimal progress by denying them the

opportunity to engage with more complex language use.

Theme 2. Limited Subject-Matter Self-Efficacy

Most pre-service teachers (70%) used Thai as the primary medium of instruction, while the 30% who incorporated English did so only about 50% of the time. The English used was primarily limited to basic classroom expressions, with the majority of teaching content explained in Thai. All pre-service teachers relied on the grammar-translation method, assessing students based on correct grammar and vocabulary use rather than on communication skills. Interviews revealed that while pre-service teachers supported using English as a medium of instruction, they expressed concerns about its practicality in their specific contexts and lacked confidence in their own English proficiency. Interviewee 06 stated, "I barely used English in my teaching because I am not proficient myself, and I lack the confidence to speak English." This view was supported by Interviewee 08, who explained, "They (students) don't like it when teachers speak English all the time. I don't want to encourage negative attitudes toward English class, so I have decided to speak Thai." Concerns about students' comfort and their own language proficiency led to the continued use of outdated, teacher-centered methods like grammar-translation, impeding the adoption of communicative, student-centered approaches. These factors seems to impact their PCK development.

Theme 2 indicates that low self-efficacy in English proficiency discouraged consistent use of the target language for instruction. Such tendencies, common in many EFL contexts, often reinforce reliance on traditional, accuracy-focused methods rather than communicative approaches. This reliance likely stems from limited exposure to English-speaking environments. Another possible explanation is that pre-service teachers may place greater value on interpersonal traits such as patience, kindness, and friendliness over the pursuit of advanced English teaching competence (Tajeddin

& Alemi, 2019), placing less emphasis on academic excellence than on personality.

In addition, doubts about students' capacity to improve through sustained effort (Soleimani, 2020) and fear of deviating from cultural and institutional norms (Abdelhalim & Aldaghri, 2024) may encourage continued preference for grammar-translation methods over student-centered approaches. The tendency to prioritize assessment of grammatical accuracy and vocabulary over communicative competence may reflect the perceived importance of grammar and vocabulary knowledge as foundational for passing examinations. Speaking anxiety and low oral proficiency among pre-service teachers may also undermine their confidence in assessing complex, interactive communicative skills, leading them to favor evaluating discrete, objective elements, such as grammar rules and vocabulary knowledge, rather than the multifaceted nature of effective communication.

These findings underscore the need for teacher education programs to cultivate positive beliefs about the use of the target language (Reynolds et al., 2021). Given the substantial influence of teacher attitudes on learner outcomes (Bradley et al., 2020; Shao & Tamashiro, 2013; Truscott & Stenhouse, 2022), negative or limiting beliefs about language use risk constraining both student progress and the adoption of more effective, communicative teaching practices.

Theme 3. Dependence on Structured Resources

The teachers' teaching methods were predominantly vocabulary-oriented. They did relate English language skills to real-life contexts, such as food and drinks, hobbies, and personal information. However, interview results revealed that the connection to real-life contexts was provided by the coursebooks rather than adapted by the teachers themselves. Interviewee 03 stated, "I strictly follow the content in the coursebook provided by the school. Occasionally, I add games to make the lessons more enjoyable for the students." This may not fully reflect a strong pedagogical disposition towards contextualizing content on their own initiative, likely influenced by institutional and contextual factors. Their reliance on structured resources played a significant role in shaping their PCK development.

Theme 3 reveals a strong reliance on coursebook content to connect lessons to real-life contexts, limiting opportunities for adaptation to learner needs. This reliance may stem from the cognitive and emotional comfort it provides; using well-established materials can reduce anxiety and boost pre-service teachers' confidence. It may also result from school mandates requiring the use of standard textbooks; however, pre-service teachers who hold strong beliefs in student-centered

approaches may adapt the mandated materials to create lessons that best meet students' needs. While structured materials can support novice teachers (Koehler et al., 2013), over-reliance can hinder the development of adaptive pedagogical skills and the adoption of a facilitative teaching style, which Soleimani (2020) identifies as essential for fostering student-centered learning environments. Such dependence may also indicate limited engagement with research to inform teaching (Smith, 2022), which could offer alternative strategies for contextualizing content beyond the coursebook.

Theme 4. Attitudes Towards Technology for Content Delivery

All pre-service teachers prioritized PowerPoint for presenting content. To facilitate active participation, they incorporated online games and YouTube videos. The interviews revealed two points of view. Firstly, most teachers (80%) viewed technology as crucial due to its interactive elements and cost and time-saving benefits. The second view, held by 20% of the teachers, acknowledged the importance of technology but did not see it as essential. For example, Interviewee 09 stated, "Technology is essential because it saves both cost and time and is easily accessible. ... technology enables the creation of games and media with more features than handmade materials." While Interviewee 07 stated, "Technology is good. ... But it is additional, just a small part. The teacher plays the biggest role. ... Technology can be complicated and arouse only temporary interest." The findings suggest that while there is a general acknowledgment of technology's value in facilitating active student participation and enhancing lesson delivery efficiency, this likely supports more robust TCK development. Nevertheless, skepticism and viewing technology as merely a supplementary tool may hinder the full development of TCK.

Theme 4 indicates that while most pre-service teachers valued technology for its efficiency and interactive potential, they only partially integrated it into their teaching. These findings contrast with those of Ishak (2024) and Seufert et al. (2020), who reported that positive attitudes toward technology are associated with effective classroom practices. The gap between attitude and practice in this study may be attributed to low self-efficacy in using technology (Kohnke et al., 2024; Kuo & Kuo, 2024) and limited experience with digital tools. The results also differ from previous studies that documented significant progress in technology integration following professional development programs (Kaçar, 2022; Park & Mac Donald, 2022; Sari et al., 2021). In this study, the TPACK workshop included hands-on activities such as designing technology-enhanced lesson plans, exploring digital tools for language teaching, and practicing integration through microteaching sessions. These activities

aimed to strengthen competence and confidence in aligning technology with pedagogy and content. The findings suggest that while professional development is essential, its benefits may not be fully realized without supportive dispositions (Saleh, 2018). Moreover, they highlight the need for sustained follow-up and triangulated assessments to capture long-term TPACK growth rather than relying solely on immediate post-training gains.

Theme 5. Preference for Simplicity and Uniformity
There was minimal use of technology to adapt learning tasks (3.33%). Individual needs were not focused on. Basic, frequently used technology was repeatedly employed, so difficulties that require troubleshooting skills were not revealed. The 100% score in troubleshooting does not provide a meaningful assessment of the participants' technical troubleshooting abilities. The interviews indicate that the pre-service teachers tended to approach teaching with a uniform strategy, rather than adapting to individual student needs. While Interviewee 07 pointed out that "technology can promote inclusivity for students with special needs, such as those who frequently miss classes due to doctor appointments", and Interviewee 02 highlighted its potential to "bridge learning gaps between boys and girls", these insights reveal a lack of awareness among teachers about the broader diversity of learners that technology could support. This lack of deeper engagement with technology integration hinders the development of TPK.

The findings indicate that although some participants recognized technology's potential to support inclusivity, the overall lack of differentiated instruction reflects Kohnke et al.'s (2024) observation that teachers often remain unaware of the full range of learner diversity that technology can address. This pattern aligns with Seufert et al.'s (2020) view that attitudes, technology-related knowledge, and skills are interdependent, and that limited synergy among these elements can result in minimal technology use. Teacher preparation programs play a pivotal role in shaping knowledge, perspectives, and confidence (Tseng et al., 2019); therefore, the persistence of uniform, basic technology use may result from insufficiently targeted preparation. Although participation in initiatives such as the TPACK workshop demonstrates a willingness to develop skills (Bon & Inpin, 2024; Kohnke et al., 2024; Atchley, 2019), professional development alone did not break the pattern of repetitive technology use. This limited application points to the need for greater self-directed learning and creativity in leveraging technology effectively.

Theme 6. Underestimation of Students' Technology Abilities

Technology was not used to manage classrooms digitally. The interviews indicate that while the teachers acknowledged the potential benefits of digital tools and resources for classroom management, 50% expressed concerns about students' readiness for such systems. Simple group chats, such as Messenger and Line, were chosen to facilitate class announcements and reminders. For example, Interviewee 02 commented, "I think the management tools might be too complicated for them to learn. It might work better with grade 12." By opting for simpler classroom management methods, teachers miss opportunities to integrate technology more deeply into their pedagogy. This approach hinders the full development of their TPK.

The underestimation of students' technological abilities may stem from pre-service teachers' limited digital skills and a lack of strategies and knowledge, which discourage them from using technology beyond superficial applications. As Seufert et al. (2020) emphasize, without the combination of positive attitudes and sufficient skills, teachers are unlikely to attempt more complex forms of technology integration. This perception may also be reinforced by technological and infrastructure constraints, such as poor internet connectivity, limited access to appropriate devices or software, and inadequate technical support, which contribute to the belief that digital classroom management is not feasible. By avoiding experimentation with digital tools and resources for classroom management, teachers forfeit numerous potential benefits, including flexibility, automated support for time-consuming administrative tasks, efficient tracking of student progress, and personalized learning opportunities. This reflects Tseng et al.'s (2019) view that insufficient action leads to missed opportunities for more meaningful integration of technology into pedagogy. Most importantly, such avoidance limits students' growth in digital competence.

Theme 7. Preference for Familiar Materials

PowerPoint slides, audio recordings from the coursebook, worksheets, YouTube videos, and Kahoot were used repeatedly to facilitate students' learning, reflecting a reliance on specific tools and resources. The primary focus was on enhancing students' understanding of new words. In addition, 40% of pre-service teachers believed that a diversity of materials and multimedia enhances student learning, while 60% felt that integrating diverse materials and multimedia could be ineffective, potentially causing difficulties for students. Furthermore, the study found that "If we provide multiple materials and multimedia, students will get confused or overwhelmed" (Interviewee 07). The reluctance to diversify instructional materials

ultimately limits the teachers' ability to effectively adapt their teaching strategies to meet diverse student needs, thereby restricting the potential for TPK development.

Theme 7 highlights a reliance on familiar tools and materials, likely driven by the belief that familiarity reduces anxiety and enables pre-service teachers, who are still developing their teaching skills and technology integration abilities, to manage lessons with greater confidence. Such tools are widely accessible, user-friendly, and require relatively low technical skill, allowing teachers to prepare and implement them efficiently without extensive training or troubleshooting. Limited time and resources may further discourage experimentation with diverse or complex digital tools, as relying on familiar materials saves preparation time and minimizes the risk of technical difficulties. Addressing these challenges requires fostering motivation (Boonmoh & Kulavichian, 2023), particularly intrinsic motivation, which Atchley (2019) identifies as critical for promoting technology integration in the classroom.

Theme 8. Resistance to Digital Collaboration

There was no use of technology to facilitate group work, peer interactions, or collaborative projects. The interviews revealed that pre-service teachers did not recognize the necessity of digital tools to facilitate student collaboration, preferring face-to-face communication because of concerns about student autonomy. For example, Interviewee 04 stated, "Without close guidance, I don't think my students could control their use of computers for academic purposes. So physical collaborative activities would be more effective." By favoring face-to-face communication and traditional collaborative methods, the teachers are not fully integrating technology into their pedagogical and content practices, which limits the comprehensive development of TPACK.

As shown in Theme 8, teachers resisted using technology for collaborative learning, favoring face-to-face interaction due to doubts about students' autonomy in digital spaces. While Chanwaiwit and Inpin (2021) and Keramati et al. (2024) reported that technology integration enhances collaborative learning, this study's findings contrast with those results, revealing reluctance to implement such tools. Similarly, although Liao (2023) affirmed that technology fosters learner autonomy, participants here expressed skepticism about students' ability to work independently in digital contexts. This concern may stem from limited confidence in both students' capacity for self-regulation and their own ability to monitor and manage digital collaboration remotely or asynchronously. Face-to-face interaction was

perceived as more effective for maintaining academic rigor and engagement, as it minimizes the risk of distraction, misuse, or off-task behavior in less supervised digital environments. This reluctance suggests a shortfall in training, in which the value and strategies for the effective use of digital collaboration tools may not have been sufficiently emphasized (Reynolds et al., 2021).

Theme 9. Reluctance to Embrace Technology for Assessment and Feedback

Technology was primarily used to support teaching activities (90%), with minimal emphasis on assessment (10%). Pre-service teachers occasionally used tools such as Kahoot and Wordwall to create custom quizzes; however, technology was not used to provide immediate feedback on students' English language performance. Interviews revealed that while 60% recognized the benefits of technology in assessment, they had not implemented it, 30% were unaware of its role in providing feedback, and 10% preferred face-to-face feedback, viewing technology as unnecessary. The study further revealed, "I don't know the role of technology in giving feedback to students. I have never thought about it." (Interviewee 06). This suggests that although positive attitudes toward technology in assessment can enhance TPACK, insufficient knowledge of digital assessment tools, limited awareness of technology's feedback potential, a preference for face-to-face feedback, and the perception of technology as unnecessary create significant barriers to TPACK development.

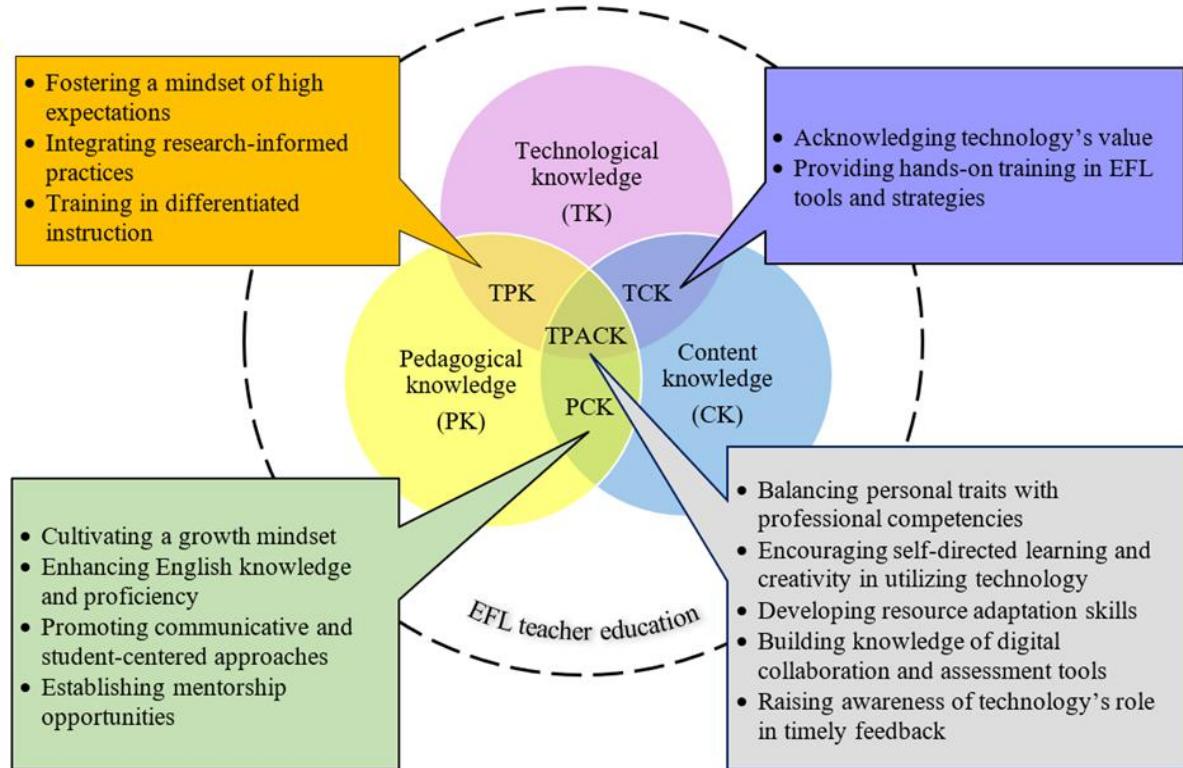
Theme 9 highlights the minimal use of technology for assessment and feedback, with most pre-service teachers relying on traditional face-to-face methods. Although some acknowledged the potential benefits of digital assessment tools, they did not apply them in practice. This reflects Reynolds et al.'s (2021) finding that positive attitudes toward technology often fail to translate into practice when awareness and skills are lacking. The limited adoption observed here may be attributed to insufficient knowledge, low confidence, and limited experience in using technology for assessment, coupled with underdeveloped TPACK in this area. Continued reliance on traditional approaches also suggests both cultural preferences for direct interaction and a limited understanding of the pedagogical advantages that digital assessment tools can offer.

Strategies For Overcoming Dispositional Challenges and Enhancing TPACK Development

To address dispositional challenges and enhance pre-service EFL teachers' TPACK, this study suggests that EFL teacher preparation programs employ the following strategies:

Figure 2

Dispositional Strategies for Promoting TPACK Development Among Pre-Service EFL Teachers



To support the development of pedagogical content knowledge (PCK) in pre-service EFL teachers, teacher preparation programs should focus on fostering a growth mindset, as suggested by Bardach et al. (2024). This can increase motivation, self-efficacy, and mastery-oriented instructional practices, which are foundational for building PCK. Moreover, they will be better able to tackle pedagogical challenges (Salamanca González & Herreño-Contreras, 2023). In addition, these programs should prioritize enhancing pre-service teachers' English knowledge and proficiency. As Wang (2021) found, teaching self-efficacy is closely linked to the language used for instruction and interaction; thus, pre-service teachers with limited English proficiency require strategic training on instructional language to confidently use English in the classroom. Furthermore, these programs should emphasize communicative and student-centered approaches. This approach will enable pre-service teachers to actively involve students, adapt their teaching to accommodate diverse learning needs, and design interactive learning environments that enhance both engagement and motivation (Moorhouse et al., 2023). These approaches can also promote collaboration among them, fostering their willingness to learn, share, and cultivate a mindset of mutual exchange within a community of practice (Jiang, 2022). Finally, these programs should include mentorship opportunities, as they can help pre-service teachers develop expertise in providing

detailed feedback, enhance their teaching confidence, reduce teaching-related anxiety, and gain valuable insights into their career paths (Kaçar & Baltacı, 2023).

To foster technological content knowledge (TCK), teacher preparation programs should emphasize the value of technology in supporting and enriching students' understanding of English content. As noted by Moorhouse et al. (2023), technology offers diverse learning modalities and resources to enhance the learning experience. These programs should also provide hands-on training in EFL tools and strategies, such as AI-powered tools (Hastomo et al., 2024) and AI-assisted language-learning strategies (Feng, 2025), to optimize language-learning experiences, improve language-acquisition processes, and inform instructional design practices.

To develop technological pedagogical knowledge (TPK), teacher preparation programs should cultivate a mindset of high expectations among pre-service teachers. This is crucial because pre-service teachers' beliefs are strongly shaped by how they perceive their own teaching skills and outcome expectations (Siwatu, 2007). These expectations are linked to factors such as openness to innovation, supportive learning conditions, and self-efficacy in integrating technology (Perkmen et al., 2023). Therefore, this approach can prepare them for their roles as technology-oriented EFL educators. Furthermore, these programs should

emphasize integrating research-informed practices, enabling pre-service teachers to ground their instructional strategies in evidence-based educational research. This approach will foster critical engagement with educational tools and prepare pre-service teachers to adapt to the complexities of modern classrooms (Smith, 2022). Additionally, it will cultivate a sense of ownership over their professional development, empowering them to meet the dynamic demands of the teaching profession (Cochran-Smith, 2021). These programs should also equip pre-service teachers with technological skills to tailor lessons to accommodate varying language proficiency levels, learning styles, and cultural backgrounds by incorporating assistive technologies such as speech-to-text tools and language translation apps, ensuring equitable learning opportunities for all students.

To enhance overall TPACK, teacher preparation programs should employ several key strategies. First, these programs should guide pre-service teachers to maintain a balance between personal traits and professional competencies, rather than prioritizing either. Developing strong professional competencies can significantly boost their confidence and self-efficacy in delivering effective instruction (Wang, 2021). Second, given the rapid pace of technological advancements, pre-service teachers must adopt self-directed learning to foster lifelong professional development (Irgatoglu, 2021). Third, fostering creativity in technology use is crucial, as teachers' digital creativity can be closely linked to their instructional creativity (Mulyono et al., 2023). Creativity enables them to bring ideas to life, design more engaging and realistic activities, and incorporate a wider variety of teaching materials (Fitriah, 2018). Fourth, teacher preparation programs should emphasize adapting resources to address diverse student needs. Doing so can enhance teaching quality and promote lifelong learning (Pham et al., 2024). Beyond content adaptation, preparing pre-service teachers for both traditional and virtual environments is essential. These programs should focus on building knowledge of digital collaboration and assessment tools. Online collaboration can promote classroom interaction, encourage active student participation, and facilitate self-directed learning (Panpittharwee & Suwanarak, 2024). Likewise, digital assessment tools, especially for formative assessment, offer EFL teachers diverse opportunities for pedagogy, management, assessment, social interaction, and professional growth (Huang et al., 2021). Additionally, it can improve EFL learners' language proficiency by fostering interactive learning, providing effective feedback, and supporting personalized learning experiences (Xu et al., 2024). Finally, raising pre-service teachers' awareness of technology's role in providing timely feedback is essential. AI-powered feedback, for instance, serves

as a valuable supplementary resource, enhancing various aspects of language learning, such as translation (Cao et al., 2022), speaking (Shadiev et al., 2024), and writing (Hojej & Ayber, 2022).

CONCLUSION

This study provides a deeper understanding of how teacher dispositions influence technology integration in an EFL classroom and contributes to the existing literature on the use of the TPACK framework in specific teacher education contexts. The findings reveal that, despite contextual variables (e.g., GPA, class size, teaching load, additional school duties, and professional training), negative dispositions toward oneself and students hinder technology integration in teaching (TPK and TPACK) among pre-service EFL teachers. While pre-service teachers' positive dispositions toward technology facilitate TPACK integration, they do not always translate into effective classroom practices in the EFL context. Moreover, the complex relationship between dispositions and TPACK development suggests integrating teacher dispositions into the TPACK framework to support pre-service EFL teachers with low efficacy in subject-matter knowledge and technology, thereby fostering growth across the three primary knowledge domains. To translate these dispositions into classroom impact, teacher education programs should embed them into sustained, practice-based professional development that models adaptive material use and technology-supported pedagogy in authentic contexts, preparing teachers to apply TPACK effectively in diverse educational settings.

This study highlights the importance of teacher dispositions in understanding and advancing TPACK development. To promote the effective use of technology in EFL teaching, teacher preparation programs should address negative dispositions such as skepticism toward technology, a preference for simplicity and uniformity, underestimating students' abilities, reliance on familiar materials, resistance to digital collaboration, and limited use of technology for assessment and feedback. Additionally, teacher preparation programs should help pre-service teachers move from having positive attitudes toward technology to actively applying those attitudes in classroom practice, and should prioritize developing technical skills alongside those positive attitudes. EFL teacher education, practical experience, and mentorship should emphasize the importance of English knowledge and experience, in addition to personal traits, to ensure sufficient proficiency for teaching the language.

The limitations of this study involve a relatively small number of participants and its focus on Thai pre-service EFL teachers, which may restrict the applicability of the findings to broader educational contexts. Future studies could develop

and test an extended version of the TPACK framework that explicitly incorporates teacher dispositions as a core component, examining its applicability and effectiveness in teacher education programs. Additionally, future research could develop tools to evaluate both the knowledge components of TPACK and the associated dispositional elements. Moreover, it could explore the components of teacher preparation programs that build confidence and competence in effectively using digital tools for English teaching and assessment. Future studies could also investigate the effectiveness of strategies like mentorship programs, hands-on workshops, and reflective practices in transforming attitudes toward technology into actionable teaching practices.

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