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EXPLORING DIGITAL TECHNOLOGY INTEGRATION IN A TEACHER EDUCATION PROGRAM: EFL PRE-SERVICE TEACHERS' PERCEPTIONS AND PRACTICES

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Abstract

Digital technology is considered a crucial tool in education. However, integrating it effectively in English classes remains a challenge. The study aims to explore the EFL pre-service teachers' perceptions and practices of digital technology integration in a teacher education program under the TPACK framework. A qualitative design was employed, using semi-structured interviews with five groups of four EFL pre-service teachers at a university in the Mekong Delta. After that, classroom observations were conducted with six of these EFL pre-service teachers in their teaching practicum at two high schools. The findings indicate that the participants generally perceived digital technology as useful and expressed a moderate level of confidence in integrating it into their teaching. However, their digital integration in the real classroom context remained at a basic level and largely for presentation purposes, suggesting a gap between perceptions and actual practices. This study contributes to the development of a teacher education program for universities and promotes the quality of English teaching at universities in the Mekong Delta.

Keywords: *Digital technology integration, EFL pre-service teachers, teacher education program, TPACK.*

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KHÁM PHÁ VIỆC TÍCH HỢP CÔNG NGHỆ SỐ TRONG CHƯƠNG TRÌNH ĐÀO TẠO GIÁO VIÊN: NHẬN THỨC VÀ THỰC TIỄN CỦA GIÁO SINH TIẾNG ANH

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Tóm tắt

Công nghệ số được xem là công cụ đóng vai trò then chốt trong giáo dục. Tuy nhiên, việc tích hợp hiệu quả công nghệ này trong các lớp học tiếng Anh vẫn còn là một thách thức. Nghiên cứu này nhằm khám phá nhận thức và thực tiễn của giáo sinh tiếng Anh về việc tích hợp công nghệ số trong chương trình đào tạo giáo viên, dựa trên khung TPACK. Nghiên cứu sử dụng phương pháp định tính, với các cuộc phỏng vấn bán cấu trúc được thực hiện với năm nhóm, mỗi nhóm gồm bốn giáo sinh tiếng Anh tại một trường đại học ở Đồng bằng sông Cửu Long. Sau đó, quan sát lớp học được tiến hành với sáu giáo sinh trong số đó trong quá trình thực tập giảng dạy tại hai trường trung học phổ thông. Kết quả cho thấy giáo sinh tiếng Anh nhận thức tích cực về tính hữu ích của công nghệ số và có mức độ tự tin trung bình khi tích hợp công nghệ vào giảng dạy. Tuy nhiên, việc ứng dụng công nghệ trong bối cảnh lớp học thực tế vẫn còn ở mức cơ bản và chủ yếu phục vụ mục đích trình bày, cho thấy tồn tại khoảng cách giữa nhận thức và thực tiễn. Nghiên cứu này góp phần phát triển chương trình đào tạo giáo viên tại các trường đại học và nâng cao chất lượng giảng dạy tiếng Anh ở khu vực Đồng bằng sông Cửu Long.

Từ khóa: *Chương trình đào tạo giáo viên, giáo sinh tiếng Anh, tích hợp công nghệ số, TPACK.*

1. Introduction

English contributes to the development of a knowledge-based economy and enhances international integration. To meet the growing demand for English education, digital technology has become a crucial resource. Mobile social networks, cloud technologies, sensor networks, the Internet, and artificial intelligence are widely recognized as valuable digital technologies. National policies, such as Decision No. 131/QD-TTg (2022), were issued to enhance digital technology integration in teaching and promote a digitalized education environment. To implement these policies, the Mekong Delta region has also promoted the integration of digital technology in education through training workshops, such as the workshop organized by USAID WISE and NIC in August 2022 (NIC & USAID, 2022). Digital technology has been integrated into EFL pre-service teacher education programs to enhance English language competencies. It is used in education to organize English language teaching and learning activities, upload and download materials, and facilitate communication (Nguyen, 2021).

In the Mekong Delta, EFL pre-service teachers study three courses about digital technology: Application of Information Technology in English Language Teaching, Advanced Application of Information Technology in English Language Teaching, and Information Technology Applications (The University, 2022). However, pre-service teachers may have limited knowledge and skills, support from their university, or restricted access to a variety of technologies (Hung, 2023). In addition, EFL pre-service teachers at this university have limited studies on perceptions of the usefulness and confidence, and their practices of integrating it (Nguyen, 2021). Therefore, this study aims to explore EFL pre-service teachers' perceptions and practices of digital technology integration in a teacher education program through the TPACK framework, thereby examining the alignment between their beliefs and actual classroom applications. To achieve this, the study addresses two research questions: (1) What are the perceptions of EFL pre-service teachers regarding integrating digital technologies into learning and teaching practices? And (2) What are the EFL pre-service teachers' practices in their digital technology integration into learning and teaching practices? The findings may offer valuable insights into improving teacher education programs and suggest more guiding principles for digital technology integration in EFL teaching contexts.

2. Literature Review

2.1. Digital Technology Integration

The term *digital technology* has been defined in many ways. It is generally understood as encompassing electronic devices, tools, resources, and systems for creating, receiving, storing, and transmitting information (Awidi & Paynter, 2024). In education, the integration of digital technology is promoted by educators and policymakers (Vo, 2020). Furthermore, technology in language education refers to the use of technology in the teaching and learning process to enhance learners' learning outcomes (Stojković, 2018).

There are many types of digital technology. These include hardware and software (Johnston et al., 2022). Specifically, digital technology encompasses "interactive whiteboards, desktop and mobile devices, digital recorders, data logging equipment and related probes, Web 2.0 technologies, other online resources, and a range of educational software applications" (Vo, 2023, p. 138). In addition, Vo (2020) classified digital technology into several categories, such as digital devices, presentation and management tools, and social networks.

In language teaching, digital technology offers numerous benefits to teachers and learners. First, digital tools and online materials help enhance student engagement in lessons (Parveen & Ramzan, 2024). Additionally, digital technology increases motivation through authentic learning experiences and improves students' learning performance (Jamal et al., 2025). Digital technology integration in education also provides students with engaging learning activities,

such as virtual problem-solving games, modeling software, and 3D printing (Taylor et al., 2021). Consequently, learners develop positive perceptions of digital technologies because they promote engagement and provide access to a wide range of learning resources (Nasution et al., 2025).

Conversely, educators and learners also face several challenges. First, the high cost of technology contributes to inequalities in digital literacy (Jamal et al., 2025; Parveen & Ramzan, 2024). In addition, these studies also highlight concerns about data privacy and security in the digital age (Parveen & Ramzan, 2024). Furthermore, over-reliance on digital devices may reduce the quality of learning (Jamal et al., 2025). Moreover, the integration of digital technology is limited due to poor infrastructure, insufficient school support, and teachers' limited digital literacy (Jamal et al., 2025). In summary, integrating digital technology into education requires careful consideration to maximize its benefits while mitigating its challenges.

2.2. TPACK Framework

Koehler et al. (2013) developed the technology pedagogical content knowledge (TPACK) framework. TPACK has three main knowledge areas: content, pedagogy, and technology (Wang et al., 2018). Building on this foundation, Koehler et al. (2013) developed the TPACK framework, including seven components (Figure 1.1).

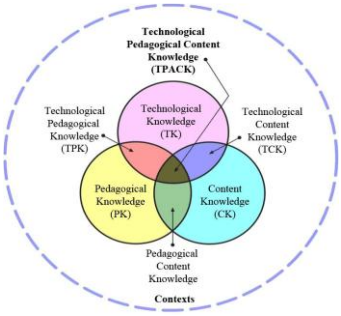

Figure 1.1. TPACK Competencies

(Koehler & Mishra, 2007)

In teaching, TPACK explains the core knowledge teachers need to effectively integrate technology. It emphasizes the interconnections between content, pedagogy, and technology (Table 1).

Table 1. EFL TPACK Components

Domains	Definition	Example in EFL classroom
CK	Teachers know the specialized subject	English language proficiency
PK	Teachers know methods and procedures for implementing lessons	Knowledge of generic teaching strategies (Organizing pair/group work)
PCK	Content knowledge combined with knowledge of the teaching process and methods	Teaching vocabulary through games or real-life situations
TK	Knowledge of various technologies	IT literacy; knowledge of applications
TPK	Knowledge of how to use technologies in teaching methods	Ability to use technologies to teach and interact with students
TCK	How teachers integrate technology knowledge to teach specific content	Knowledge of CALL at the level of technology use and content preparation

Domains	Definition	Example in EFL classroom
TPACK	The knowledge needed for teachers to integrate TK into CK and PK	Using multimedia software to teach language skills; technology with pedagogy and content

(Rahimi & Pourshahbaz, 2019; Schmidt et al., 2009)

In the classroom, TK was reflected in EFL pre-service teachers' ability to operate digital tools effectively. TPK was identified when technology was used to support instructional methods, classroom management, or assessment. Meanwhile, TCK was used to explain specific English language content, such as vocabulary, grammar, and pronunciation. TPACK was demonstrated when teachers integrated appropriate technologies with pedagogical strategies and English content to improve students' learning outcomes.

EFL education, effective language teaching using technology requires an understanding of how using technology presents linguistic and cultural concepts, pedagogical approaches to enhance learners' linguistic and cultural competence, and awareness of what facilitates or hinders language acquisition (Olphen, 2008). In this article, TPACK was chosen because it fully integrates three main aspects: content knowledge, pedagogical knowledge, and technological knowledge. TPACK showed a more comprehensive view of the challenges that pre-service teachers faced in developing 21st-century teaching methods (Koehler et al., 2007). Therefore, further research using the TPACK framework is needed to investigate it in a real-world classroom context in Vietnam.

2.3. Perceptions and Practices of Digital Technology Integration

Pre-service teachers generally report positive perceptions of digital technology integration around the world. Regarding its usefulness, participants perceived digital technology as enhancing learning motivation, facilitating monitoring, and providing immediate feedback and assessment through tools such as ChatGPT, Perplexity AI, and Grammarly (Canbulat, 2022; Jabu & Asriati, 2024; Lu et al., 2025). AI has also been perceived as useful for supporting feedback and creating engaging learning experiences (Panagou et al., 2025). Some pre-service teachers demonstrated confidence in using basic digital tools (Limbong et al., 2024). However, digital technology integration requires significant preparation time and adequate infrastructure (Ridha & Fithriani, 2023). Other studies have reported limited confidence due to insufficient training and a lack of pedagogical knowledge, particularly when integrating multiple components of TPACK (Ali & Waer, 2023; Arek-Bawa & Reddy, 2025). Furthermore, limited training and restricted opportunities have been found to reduce teachers' confidence, particularly when they are required to use more complex technological applications (Arek-Bawa & Reddy, 2025).

In practice, digital technology is often used for basic purposes, especially for assessment, selecting learning activities, and enhancing lesson engagement through digital tools, including Kahoot, Quizizz, interactive PowerPoint presentations, multimedia songs and videos, and Google Forms (Ali & Waer, 2023). In addition, laptops, projectors, and smartphones are frequently employed to support student collaboration (Ridha & Fithriani, 2023). However, participants also encountered several challenges during implementation. They reported inadequate pedagogical knowledge, inadequate infrastructure, limited access to digital devices, time constraints, and insufficient institutional support (Canbulat, 2022; Limbong et al., 2024). Moreover, unstable internet connections, inappropriate technology selection, and increased workload may hinder the effective integration of digital technology (Ali & Waer, 2023; Lu et al., 2025). In the case of AI, one notable limitation is its restricted capacity to facilitate authentic classroom communication (Panagou et al., 2025). For instance, AI provides instant feedback and performs tasks independently, so students may become

overly dependent on technology rather than communicating directly with their teachers or peers. Furthermore, Limbong et al. (2024) found a gap between theoretical knowledge and classroom practice. Similarly, teachers reported that although they perceived digital technology integration as beneficial, these positive perceptions did not always translate into effective classroom implementation (Suwarni & Natsir, 2024).

In the Vietnamese context, digital technology integration is affected by policies, facilities, and teaching approaches (Le & Song, 2018). Although pre-service teachers have acknowledged the usefulness of digital tools (Vo et al., 2020; Giang, 2023; Pham & Nguyen, 2025), they often lack confidence and pedagogical knowledge and face infrastructural limitations. In addition, Google Docs and ChatGPT were reported to enhance connectivity, motivation, and efficiency, but participants also expressed concerns about accuracy, technical issues, and over-reliance on technology (Giang, 2023; Pham & Nguyen, 2025).

To sum up, most previous studies reported positive perceptions regarding the usefulness of digital technology integration. However, their findings vary. While some studies showed that participants were confident in using digital technology effectively, others highlighted limited confidence, insufficient pedagogical knowledge, and various practical challenges. These previous studies also revealed several research gaps. First, the majority of studies were conducted in developed countries or urban areas, while research in the Mekong Delta region of Vietnam remains limited. Second, many previous studies have focused on self-reported perceptions through questionnaires or interviews, with limited use of classroom observation. Finally, previous studies have been inconsistent in their application of the TPACK framework. Some studies focused on specific domains (e.g., TK or PK), while others examined general perceptions and practices without an in-depth analysis of the TPACK domains. Therefore, this study aims to explore EFL pre-service teachers' perceptions and practices regarding digital technology integration in a teacher education program in the Mekong Delta region, using a qualitative design and the TPACK framework.

3. Methodology

3.1. Research Design

This study examines EFL pre-service teachers' perceptions and practices of digital technology integration. To achieve this objective, a qualitative research design with frequency counts was employed to facilitate an in-depth understanding of the information (Creswell, 2021). Five focus group interviews were conducted using purposive sampling to explore participants' perceptions and practices of digital technology integration. Semi-structured interviews allow for flexible, focused probing based on participants' responses (Trepper et al., 2022). Consequently, observation was implemented with six EFL pre-service teachers during their teaching practicum, also using convenience sampling based on availability and access to the participants. According to Kumar and Sharma (2023), data observation in the natural classroom environment is reliable.

3.2. Participants

In the first stage, 20 EFL pre-service teachers participated in focus group interviews. All of them were enrolled in three technology-related courses in their teacher education program. They were purposively selected based on differences in gender, hometown, and ICT grades across the three ICT courses. Purposive sampling was chosen because it focuses on participants with characteristics or knowledge relevant to the research objectives (Palinkas et al., 2015). A group of four participants was considered the ideal size for a focus group interview because larger groups are more difficult to manage (Arocho et al., 2023). *In the second stage,* six of the 20 EFL pre-service teachers were observed during their teaching

practicum at high schools. These EFL pre-service teachers were selected using convenience sampling through their internship schools, as they were readily accessible for observing their digital technology integration practices in an actual classroom context. Memon et al. (2025) stated that convenience sampling provides easy access to participants and is relatively inexpensive to implement.

3.3. Research Instruments

3.3.1. Focus Group Interview

In this study, semi-structured group interviews as the primary data collection method to explore perceptions and practices for better digital technology integration in a teacher education program. The semi-structured interview questions were adapted from Vo (2019) to address two research questions: *(1) What are the perceptions of EFL pre-service teachers regarding integrating digital technologies into learning and teaching practices?* And *(2) What are the EFL pre-service teachers' practices in their digital technology integration into learning and teaching practices?* The focus group interview was a chosen approach for this study because it allows the interviewer to follow up on participants' responses flexibly and explore participants' deep responses (Cohen et al., 2013).

The interview protocol was structured into four main sections. *The first section* focused on participants' demographics to explore their foundational technology knowledge that can influence their perceptions and practices. *The second section* explored the EFL pre-service teachers' perceptions of digital technology integration into learning and teaching practices. *The third section* examined participants' integration of digital technology into learning and teaching. *The last section* provided recommendations for improving digital technology integration in a teacher education program. The perceptions and practices questions were designed to explore participants' self-evaluation of technological knowledge (TK) and their ability to integrate digital technology with content knowledge and pedagogical activities (TPK, TCK, and TPACK). In addition, the Vietnamese version was used to ensure participants clearly understood the questions and could express their ideas clearly. Each focus group interview lasted approximately 45 minutes and was audio-recorded with the participants' consent.

Table 2. Interview Questions

Demographics:
1. Please describe your experiences with digital technology devices before starting university.
Perceptions:
2. What courses have you taken related to digital technology? How have these courses been useful in your learning process?
3. Do the courses help you feel confident in integrating digital technology? Why or why not?
Practices:
4. What types of digital technology do you usually employ? Can you give an example of digital technology use in your learning and classroom teaching practice?
5. What are the benefits of digital technology integration?
6. What are the challenges of digital technology integration?
Recommendations:
7. What are your suggestions for better digital technology integration?

3.3.2. Observation Sheets

This method aimed to verify the interview data and gain deeper insights into EFL pre-service teachers' perceptions and practices of digital technology integration. *First,* lesson plans were used to analyze how EFL pre-service teachers integrated pedagogical,

content, and technological knowledge into their lesson plans. *Moreover,* the observation sheets were used in the actual classroom context, which were designed based on the responses from the interview. It consisted of three main criteria: (1) the usefulness of digital technology integration, including indicators related to content delivery, learning activities, assessment, and classroom interaction, (2) confidence in using digital technology consists of ability to operate digital tools, handle technical issues, and integrate technology appropriately into teaching, and (3) their tools of digital technology integration in the classroom through the digital devices and software used for each teaching activity. Each observation session lasted approximately 45 minutes. *Overall,* the observation provided an in-depth understanding of EFL pre-service teachers' perceptions and practices regarding digital technology integration within the TPACK framework (see Appendix).

3.4. Data Collection and Analysis

3.4.1. Data Collection Procedures

Before data collection, semi-structured interview questions were piloted on one group of four EFL pre-service teachers to evaluate the validity, clarity, and relevance. These participants did not participate in official research. Each 45-minute interview was audio-recorded and analyzed. The interview questions were adjusted to be well-designed, clear, and effective in eliciting meaningful responses. For the official study, focus group face-to-face interviews were implemented with five groups of four. Each group lasted about 45 minutes. Audio recording ensured that no information was missed. All recordings were made with participants' permission for research purposes. After each interview, the audio recordings were transcribed and sent to the participants for confirmation; they could adjust the transcript if the information was inaccurate before the data were officially coded. The final stage for data collection was observation. During classroom observation, each lesson was recorded to capture the entire teaching activity and process. In addition, structured observation sheets were used to take notes on the teaching process in 45-minute intervals. Video recording helped to collect more accurate data because it could be reviewed multiple times during the analysis process (Wragg, 2011).

3.4.2. Data Analysis

For interviews, TurboScribe (https://turboscribe.ai) was used to transcribe the audio recordings into text. After that, the interview data were analyzed using thematic analysis (Braun & Clarke, 2006). A deductive coding approach guided by the TPACK framework was employed. Initial codes were generated based on the TPACK domains. These codes were then grouped into categories and developed into themes. The themes were reviewed through repeated comparison with the interview transcripts to ensure consistency. Finally, the interview transcripts were translated from Vietnamese into English.

For the classroom observations, the observation data were analyzed systematically. The six participants were assigned pseudonyms/codes to ensure confidentiality. The first step involved analyzing six lesson plans to identify the types of digital devices, tools, and applications planned for use and their intended pedagogical purposes (e.g., content presentation, activity design, and assessment). In the second step, the observation protocol focused on three analytical domains: usefulness, confidence, and practices. These observation criteria were derived from the interview findings, with each criterion representing an aspect that required further verification through classroom observation. The observation findings were then compared with the interview data and lesson plans to triangulate the data and enhance the trustworthiness of the findings.

3.5. Ethical Considerations

All research procedures were conducted in accordance with ethical principles for educational research. Approval was granted by the university, the Faculty of Foreign Languages, and the principals of the participating high schools before data collection. In addition, written informed consent was obtained from all participants to inform them of the purpose of the study, the research procedures, and their right to withdraw at any time without penalty (Do & Pham, 2026). To ensure anonymity and confidentiality, all interview participants were assigned identification codes: 1A-1D (Group 1), 2A-2D (Group 2), 3A-3D (Group 3), 4A-4D (Group 4), and 5A-5D (Group 5). Furthermore, the classroom observation participants were assigned the codes P1, P2, P3, P4, P5, and P6.

4. Results and Discussion

4.1. Results

4.1.1. Digital Technology Perceptions

In the interview data, Table 3 presents the highlighted perceptions of EFL pre-service teachers regarding the most useful and confident aspects at the CK, PK, TK, and TCK levels.

Table 3. Pre-service Teachers' Perceptions in Using Digital Technology

Usefulness	**Subcategories**	**EFL pre-service teachers (N=20)**
TPK	- Make interesting and visual lessons	6
	- Increase interaction	9
	- Support in designing tests, activities	5
TCK	- Present language content	15
Confidence	**Subcategories**	**EFL pre-service teachers (N=20)**
CK and PK	- Be at an average level of language proficiency	5
	- Be effective in teaching	7
TK and TPK	- Be confident with digital technology skills	11
	- Be confident in combining TK and PK	8
TCK	- Be satisfied with designing various activities combining digital technology	5
	- Design visuals and engage in lessons with suitable digital technology	12
	- Be limited knowledge of how to apply AI or advanced digital tools to design content	11

The findings from the interview stated that five groups of four participants had perceptions of the usefulness of digital technology in assisting EFL learning and teaching practices. Digital technology made lessons interesting (N=6). Besides, technology supports increased interaction in the classroom through interactive games (N=9). Participant 3A shared: *"Technology helps me save time and makes lessons more engaging than traditional teaching methods that only use blackboards and textbooks. Furthermore, it enhances interaction between teachers and students during the learning process, thereby helping students understand the content more deeply."*

Furthermore, participants indicated that digital technology supported assessment and organized classroom activities (N=5). Participant 3D shared: *"I found that applying technology greatly supported my learning and teaching practice, making the process of accessing and organizing classroom activities more effective." In addition,* presenting

language content was reported to be useful (N=15). *"I used PowerPoint to present new language structures, which makes the lesson clearer."*

When asked about perceptions of the level of confidence in CK and PCK. Three participants believed that they had good English proficiency (N=3) and had an average level of language proficiency (N=5). Furthermore, participants were confident in the teaching practice through the traditional teaching method, and they could make more interesting lessons in teaching practices, which encouraged their students' engagement and absorbed the lessons more quickly (N=7). Participant 4A said:

"I hope technology will help me implement teaching methods more effectively, especially by increasing opportunities for students to communicate and interact. For example, I can create hypothetical situations or role-playing activities with visual and video support. Currently, I am quite confident that using technology makes the classroom livelier"

Conversely, when referring to CK and PK components, participants stated that it was hard to remember the methodological theory (N=2), as well as being limited to organising various activities and assigning assessment exercises in their practice teaching (N=2). Overall, although they perceived confidence about CK and PK, they had a small number of challenges. Participant 3B explained:

"Learning theory from textbooks can be quite boring and difficult to capture students' attention. Therefore, when I integrate information technology into my lessons, students feel more interested. For example, in long lessons, I can incorporate games or introduce new software that can be used in learning and teaching practices. As a result, students understand the lesson better."

Regarding perceiving confidence in TK and TPK, participants generally expressed different perceptions. First, participants reported that they strongly believed in their digital skills and could use many technological tools in their learning and teaching practice, such as AI and other websites instead of Word and PowerPoint, or make some of his/her own products (N=11). Nevertheless, only half of them stated that they had an average confidence in digital technology skills for several reasons. *First*, they perceived confidence in the traditional method (N=4). *Second*, they needed additional self-practice to improve in using digital technology effectively (N=3). Furthermore, participants were confident in TPK because they can organise various activities effectively with digital technology (N=8). *Overall,* the results showed that over half of the participants were satisfied with their digital competencies, but half of them struggled with more advanced technologies without specific guidance. Participant 5A revealed:

"I feel I'm still not confident when using technology in teaching, so I often prioritize traditional teaching methods to ensure effectiveness. Although I recognize the many benefits of technology, I need more time to adapt and use it more confidently"

When referring to confidence in TCK, participants demonstrated different levels of confidence. *First,* participants reported using AI tools and digital technology to design various activities (N=5). *In addition,* they were perceived as confident in designing visual and interesting lessons (N=12). *By contrast*, they had limited knowledge of how to apply AI or advanced digital tools in design content (N=11). *Overall,* the findings showed that participants had limited confidence in using technology to support learning and teaching practice because almost all participants needed to practice more in integrating digital technology. Participant 2D revealed:

"I am confident. Instead of making posters, I can design my lesson plan on PowerPoint, which will make preparing the lesson much easier. Besides, during the assessment process, I can create questions using digital tools or AI"

From observation, six participants indicated that they designed lessons more visually and engagingly through digital technology. For example, presenting PowerPoint helped their students more easily follow the lessons (P1–P6). In particular, students' listening skills could be improved through audio-based listening activities (P1, P4, P5, P6). For engagement and participation, digital tools increased student engagement. However, EFL pre-service teachers were challenged with controlling the class; they focused only on a few or a small group of students. Regarding interaction, technology supports communication. Most students in the class were enthusiastic about answering the questions. In contrast, interaction among students using technology was limited (P1-P6). Students just used smartphones to participate in individual activities or pair and group activities. In addition, technology-supported explanations, especially through visual aids and context (P2, P3, P4, P5, P6). In addition, saving time was inefficient in some activities (P4, P5). Overall, digital technology has usefulness in the classroom, although some statements were ineffective.

In terms of confidence, half of the participants were able to operate basic digital devices and tools and integrate audio-visuals into their teaching activities smoothly (P4, P5, P6). Conversely, some others showed lower levels of confidence (P1, P2, P3). For example, the laptop could not connect to the TV, so they needed assistance (P1) or revealed answers too early while playing audio (P3). In addition, TCK (Technology Content Knowledge) was clearly demonstrated when participants used PowerPoint to present new language structures, employing color-coding to make grammar rules more visual (P1-P6). Furthermore, basic TPK and TPACK were reflected in the use of Kahoot (P3, P4). The participants used it as a pedagogical tool to quickly check students' vocabulary retention in class. These technologies contributed to diversifying classroom activities and increasing student engagement. This finding clarified that participants still lack confidence in applying advanced digital technologies to teaching because they need more time and opportunities for practice to use them effectively.

4.1.2. Practice of Digital Technology Integration into EFL Teacher Education

From the interview, most participants reported that various digital technologies are used to support their own learning and teaching practices (Table 4).

Table 4. Pre-service Teachers' Practices with Digital Technology

	Types	Purposes	EFL pre-service teachers (N=20)
In learning	Laptop with Internet Smartphone and Tablet	- Search for learning materials	7
	Software	- Create lively and interesting content or an assignment	8
In teaching practice	Laptop with Internet Smartphone and Tablet	- Search for learning materials	4
	Software	- Design lesson plans	4
		- Create lively and interesting content	5
		- Design tests or games, and manage, evaluate grades	6
		- Expect to increase excitement and interaction	5

In learning, participants used laptops, smartphones, and tablets to search for learning materials (N=7). Various digital platforms were reported, such as Word, PowerPoint,

Canva AI, Slide Go, and Kahoot for assessment, presentations, and learning activities (N=8). They used Google Docs for taking notes and correcting spelling (N=3). These findings indicate that participants use a range of digital technologies to support their own learning, showing the development of TK. Participant 1D said:

"I usually use my laptop and phone. Besides, I use tools like PowerPoint, Google Docs, and Word to prepare lessons and take notes, and some apps to create learning activities like Quizlet and Kahoot. I often use apps like Duolingo and podcasts to practice my English skills and Canva, Quizlet, and Quizizz to create engaging learning activities. Furthermore, I also use AI tools to ask questions and search for information. I usually use Google Docs together with AI tools such as Grammarly and QuillBot to automatically check grammar and structure. This helps me save time and improve the accuracy of my writing"

In teaching practice, laptops, smartphones, and tablets were used to find teaching materials (N=4) and design lesson plans (N=4). Furthermore, to take notes and create exciting lesson content, they used Canva, PowerPoint, Padlet, Word, and Google Docs (N=5). Lastly, some participants used Azota and Wordwall for assessment (N=6). These findings suggest that participants were able to select appropriate digital tools to support teaching tasks and assessment, reflecting the development of TK, TPK, TCK, and TPACK. However, the reported practices mostly focused on content presentation and assessment. Participant 2A explained:

"For me, Canva is a great help in learning and teaching because of its images, stickers, and diverse functions. It is suitable for secondary school students, which makes them more engaged. In addition, Wordwall is also a useful tool for creating and using games in teaching, making lessons more effective and flexible"

From observation, participants revealed an adequate level of digital technology integration in the lesson plans and classroom observation. Laptops and TVs with internet connectivity were used to show the activities by six participants. Although smartphones were used for a random selection wheel (P2), the small screen size led to limited students' attention. In terms of tools and software, PowerPoint was the primary platform used by all participants to present lesson content. On the one hand, Kahoot was used to assess vocabulary retention and increase student engagement (P3, P4), with students enthusiastic about participating. On the other hand, some students were unable to access Kahoot. Visual pictures were designed by P3, P4, P5, and P6 to elicit vocabulary. Furthermore, P6 used video to grasp the lessons more easily. Finally, although some lesson plans mentioned that Google Docs were used for group work, these were not actually integrated into these activities (P1). Overall, these results indicate that the pre-service teachers' TPACK competence is demonstrated by their ability to use digital technologies appropriate for specific teaching purposes. Meanwhile, technology integration remains primarily focused on content presentation and formative assessment.

4.2. Discussion

4.2.1. What are the perceptions of EFL pre-service teachers regarding integrating digital technologies into learning and teaching practices?

EFL pre-service teachers perceived digital technology as useful for both learning and teaching. Digital technology enhanced lesson engagement, interaction, and assessment activities. Participants' perceptions were partially reflected in classroom observations. This indicates that pre-service EFL teachers generally had a positive perception of the pedagogical value of digital technology. Devices such as PowerPoint, videos, audio, and Kahoot increased students' participation and supported presentations. This finding is consistent with previous studies that highlighted the role of digital technology in promoting student engagement and

learning effectiveness (Ali & Waer 2023). Furthermore, enhancing the interaction between teachers and students, contrasted with the findings of Panagou et al. (2025), who stated that digital technology reduced communication. However, some benefits perceived in the interviews, such as classroom management and time-saving, were ineffective during observations, which aligns with the findings of Canbulat (2022). Overall, although participants perceived digital technology as highly useful, they limited its potential in actual teaching practice, as in the findings of Suwarni and Natsir (2024).

In terms of confidence, participants generally reported confidence in TK, TCK, TPK, and TPACK. In TK, participants demonstrated that they used basic digital tools, which is consistent with Limbong et al. (2024). Nevertheless, several participants experienced technical challenges during teaching and mainly relied on familiar technologies, which was similar to the findings of Limbong et al. (2024). In TPK, participants self-reported that they were confident in using digital technology to enhance engagement, interaction, and assessment activities, which was consistent with Ridha and Fithriani (2023). Regarding TCK, while participants felt confident in using online resources to find English materials, actual observations revealed a lack of deeper TCK competence. Their technology use was heavily limited to content presentation rather than utilizing language-specific software or interactive digital tools designed to clarify complex linguistic features. This indicates that their TCK remains at a surface level, aligning with the findings of Vo et al. (2020). With reference to TPACK, although participants expressed moderate confidence in integrating technology in teaching practices, a gap between self-reported and observed remained, which is consistent with the findings of Suwarni and Natsir (2024). Overall, the insight of these findings was that participants' confidence was stronger in basic than in more advanced digital technology. This study contributes by highlighting the discrepancy between self-reporting perceptions and actual classroom implementation. Previous research has primarily emphasized that positive perceptions of digital technology were limited in translating effectively into classroom practice, particularly regarding higher-level TPACK components. This explains why technology integration frequently remains at a basic level.

4.2.2. What are the EFL pre-service teachers' practices in their digital technology integration into learning and teaching practices?

In terms of practices, both interview and observation data demonstrate that participants integrated digital technology. However, there was a discrepancy between self-reported and observed practices. In TK, participants reported using a wide range of digital tools, such as Google Drive, Google Docs, Wordwall, AI, and Azota, which was consistent with the findings of Panagou et al. (2025). Classroom observations revealed that technology integration was limited to the actual classroom context, with PowerPoint as the dominant tool. Furthermore, some technologies mentioned in interviews and lesson plans were not implemented during actual teaching. In TPK, some participants were able to operate digital technology to organise activities smoothly, aligning with the findings of Jabu and Asriati (2024), while others showed a lack of TPK. This finding is partially supported by Canbulat (2022). In TCK, participants reported using multimedia resources to design English-language content. Whereas technology was primarily used for content presentation rather than language-learning activities in the classroom observations. This is consistent with the findings of Ali and Waer (2023).

Besides, this finding is similar to Limbong et al. (2024), who reported a gap between theories and practices. The results suggest that although participants had positive perceptions and reported diversity in using digital technology, their actual classroom practices remained basic. This revealed that participants need more hands-on practice to meet the learning outcome of the Advanced Application of Information Technology in English Language

Teaching course. Furthermore, this study offers a contextual explanation by highlighting potential barriers, such as reliance on familiar tools and a lack of confidence in digital technology in an authentic classroom setting, which affected higher-level technology integration. Overall, this section offers a comprehensive look at actual teaching practices. Unlike previous studies that relied primarily on self-reported data, the findings of this study shed light on the gap between reported data and what actually takes place in the classroom. This provides evidence that technology integration remains at a basic level and identifies potential barriers within the real-world classroom context.

5. Conclusion, Implications and Limitations

The study found that EFL pre-service teachers perceived digital technology integration as useful and were moderately confident in their ability to integrate it into a teacher education program. However, classroom observations revealed that technology integration remained basic in authentic classroom settings. A gap was identified between self-reported and observed practices. Furthermore, this study contributes to the literature on TPACK by demonstrating that, while pre-service teachers possess adequate TK, they still struggle to integrate technology into actual classroom instruction. This highlights the need for more opportunities for EFL pre-service teachers to develop TPACK competencies in authentic classroom contexts.

The findings suggest that digital technology courses should be designed with a focus on hands-on practical application. EFL pre-service teachers need to enhance their TPACK by designing and implementing interactive technology-integrated lessons instead of using PowerPoint to present content. Furthermore, lectures should provide more opportunities for them to practise integrating digital tools for collaborative learning, classroom interaction, and communicative language teaching activities during microteaching and teaching practicum. Besides, Pre-service teachers should be encouraged to connect between TPK, TCK, PCK, and TPACK through digital technology-integrated lessons, their lesson plans, and teaching practices. Additionally, lecturers teaching digital technology courses and supervising teachers in high schools can support EFL pre-service teachers by modeling digital technology-integrated activities and providing feedback on their use of digital tools. These measures may also help bridge the gap between perceived competence and actual classroom implementation. Finally, lectures should be encouraged in continuous digital technology knowledge and teaching methods from previous teaching experience, workshops, and references.

This study was limited by a small sample size and was conducted at a university in the Mekong Delta. In addition, the study was conducted within a short period and used a qualitative approach. Therefore, future research should include larger samples, multiple institutions, and longitudinal designs, and a combination of quantitative and qualitative methods to provide a more comprehensive understanding of digital technology integration among EFL pre-service teachers.

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APPENDIX

Part A. Usefulness of Digital Technology Integration

OBSERVATION ITEMS	YES	NO	NOTES
A. Supporting EFL Pre-service Teachers' Instructional Delivery			
1. Technology supports presenting			
2. Technology supports efficient use of class time			
B. Promoting Learning Activities and Assessment			
4. Technology supports organizing learning activities			
6. Technology supports assessment			
7. Technology supports eliciting and immediate feedback			
C. Facilitating Classroom Interaction and Engagement			
8. Technology leads to increased engagement and participation of learners			
9. Technology supports student-student interaction			
10. Technology supports teacher-student interaction			

Part B. Confidence in Using Digital Technology

OBSERVATION ITEMS	YES	NO	NOTES
A. Confidence in Operating Digital Technology			
1. Participant uses digital tools smoothly			
2. Participant handles technical issues confidently			
B. Confidence in Integrating Digital Technology into Teaching			
3. Participant integrates technology appropriately into activities			
4. Participant combines technology with teaching methods effectively			

Part C. Tools for Digital Technology Integration

DIGITAL TECHNOLOGY		USED	PURPOSES
Device	Laptop	☐	
	Smartphone	☐	
	Tablet	☐	
	Interactive TV	☐	
Software/ Platform	PowerPoint/Canva	☐	
	Kahoot	☐	
	Quizizz	☐	
	Wordwall	☐	
	Padlet	☐	
	Google Docs	☐	
	Google Slides	☐	
	AI tools (e.g., ChatGPT)	☐	