

Exploring AI Literacy Self-Efficacy among Pre-Service EFL Teachers: A Case Study in the Vietnamese Context

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ABSTRACT

Keywords: pre-service teachers, AI literacy, EFL, teacher education

This case study aims to explore Vietnamese pre-service EFL teachers' awareness of AI literacy, their AI self-efficacy, and developmental needs. Using an explanatory mixed-methods approach, data were collected through a questionnaire administered to 85 pre-service EFL teachers and follow-up interviews with 08 of them at a public university offering initial teacher education in central Vietnam. The findings show that these pre-service teachers were generally familiar with the concept of AI literacy, well-aware of its role in EFL instruction, and strongly supported the inclusion of formal AI literacy training in teacher education programs. In addition, they perceived self-efficacy of AI literacy to be moderate, particularly in dimensions such as a human-centered mindset and AI application. However, these pre-service teachers still needed more structured, practice-oriented support to develop their AI competence, with a preferred mode of blended training. These findings can provide insights into pre-service teachers' perceptions of their self-efficacy in AI-assisted language education and inform the design and delivery of targeted AI literacy training for teacher education programs.

Introduction

Education is changing as a result of recent rapid technological advancement, particularly the rise of artificial intelligence (AI) (Ayanwale et al., 2024; Edmett et al., 2024). AI tools like ChatGPT have also become increasingly popular in Vietnamese contexts for English-language instruction (Pham & Cao, 2025). Although advances in AI technologies, especially generative AI, have greatly improved teaching and learning practices (Chapelle, 2025; Kohnke et al., 2025), there are unavoidable challenges associated with AI use that should not be disregarded (Chen et al., 2020; Zhai et al., 2021). Therefore, teachers and students need to be knowledgeable about and proficient in using AI to fully embrace its benefits and drawbacks in educational settings. According to Wu and Miller (2025), qualified educators will play a crucial role in transforming education and preparing the next generation for a technology-driven world. As aspiring educators, pre-service teachers have a significant influence on how AI is applied and used in the classroom (Kohnke et al., 2025). Thus, it is important to integrate AI training into

teacher education programs in order to equip pre-service teachers with AI literacy.

However, current research on teacher AI literacy is still in its infancy, with theoretical frameworks proposed (Cukurova & Miao, 2024; Ng et al., 2021), but empirical evidence remains limited, especially in the Vietnamese educational context. As Sperling et al. (2024) noted, teacher education has not yet given sufficient attention to the development of AI literacy among pre-service teachers. To identify gaps in current teacher training programs and make appropriate adjustments to better prepare future teachers for the fast-changing educational landscape of the AI era, it is crucial to understand pre-service teachers' perceptions of AI literacy (Ayanwale et al., 2024). The purpose of this study is to examine Vietnamese pre-service EFL teachers' awareness, self-efficacy, and developmental needs regarding AI literacy. To improve AI literacy among pre-service teachers and support more successful AI integration in English language instruction, this study aims to provide an overview of aspiring EFL teachers' current AI literacy levels and to inform curriculum design and teacher education programs.

Literature Review

AI in education

The twenty-first century is associated with rapid technological advancement, with artificial intelligence (AI) emerging as one of the most prominent innovations. AI is revolutionizing industries such as marketing, science, education, and entertainment, making it easier for people to live, learn, and work (Ng et al., 2021). One area where AI technologies are becoming increasingly widespread is education, leading to the emergence of the globally recognized field of AI in Education (AIED) (Ayanwale et al., 2024). AI technologies can provide students with intelligent personal tutors, tailored learning materials and feedback, and collaborative learning opportunities, enhancing students' learning experiences. They also support teachers by automating grading and feedback processes, identifying students' strengths and knowledge gaps, and offering pedagogical recommendations, thereby improving overall teaching efficiency (Zawacki-Richter et al., 2019). However, despite its many benefits, AI also presents significant risks. AI can threaten human agency, violate data privacy, and worsen existing inequalities and exclusion (Taşçı, & Tunaz, 2024; Wang et al., 2024). Moreover, the increasing automation of educational tasks risks diminishing teachers' roles and weakening student–teacher relationships (Cukurova & Miao, 2024). Therefore, effective and responsible AI use requires both teachers and students to equip themselves with the knowledge and skills necessary to navigate the AI-driven world.

AI literacy and its components

AI literacy refers to the essential abilities individuals need to develop and thrive in the digital world where AI technologies are integrated (Ng et al., 2021; Zhao et al., 2022). According to Long and Magerko (2020), “AI literacy is a set of competencies that enables individuals to evaluate AI technologies critically; communicate and collaborate effectively with AI; and use AI as a tool online, at home, and in the workplace” (p. 598). As a result, AI literacy includes not only the ability to use AI tools for both personal and professional objectives, but also the ability to determine which AI tools are appropriate and how to use them efficiently. AI literacy is considered among the most crucial skills for people to acquire in this AI-driven era (Ng et al., 2021; Yi, 2021).

In order to define what it means to be AI literate, Ng et al. (2021) conducted a systematic review of thirty peer-reviewed journal articles and proposed four interrelated dimensions of AI literacy.

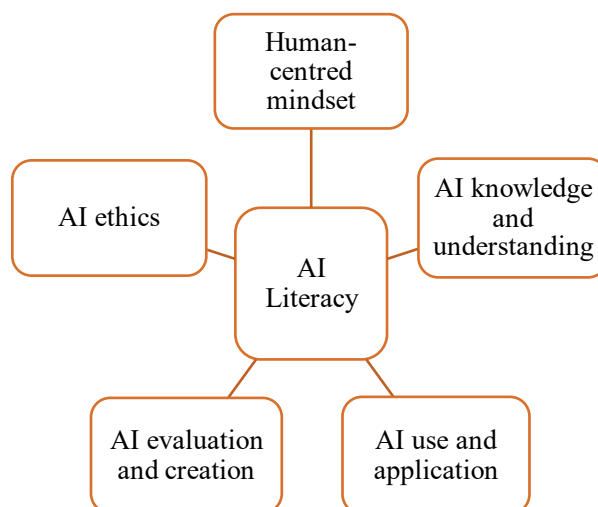
Understanding and knowing AI indicates that people need foundational knowledge about AI and how it works. For example, teachers and students should understand some AI-related terms such as machine learning, large language models, and so on. The second aspect of *AI use and application* is the capacity to employ AI tools successfully in practical settings. For teachers, this might mean including AI tools in lesson plans or using AI-powered platforms to help students learn. Third, *evaluating and creating with AI* requires teachers and students to have higher-order thinking skills to evaluate AI tools for bias, accuracy, and relevance. It also involves designing or customizing AI solutions, like building simple models or adapting AI tools for specific educational needs. Finally, *ethical issues* means being aware of the moral aspects of AI, including fairness, transparency, privacy, and accountability so that they can use AI responsibly and ethically.

In addition, in UNESCO's AI competency frameworks for teachers, Cukurova and Miao (2024) identified five aspects of AI competency that teachers need to have. *A Human-Centered Mindset* means that teachers should see AI as a tool created by humans for humans to use in ways that promote fairness, inclusion, and social benefit, rather than focusing only on efficiency. With *AI Ethics*, similar to what Ng et al. (2021) mentioned regarding ethical issues, teachers need to understand the ethical principles behind AI, such as privacy, bias, and accountability, and apply them in their teaching practices. *AI understanding* includes knowing what AI is, how it works, and recognizing AI-powered tools compared to regular digital tools. Teachers also need *AI pedagogy*, which means using AI in their teaching. They should learn to use AI tools to support learning, such as personalized feedback systems and intelligent tutoring apps. They need to know when these tools are suitable for their teaching and learning goals. Finally, *AI for professional learning* shows that outside the classroom, teachers need to know how to use AI to grow professionally and improve their teaching practices.

To create a clear framework for AI literacy in initial teacher education, this study combines UNESCO's AI Competency Framework for Teachers (Cukurova & Miao, 2024) with Ng et al.'s (2021) model of AI literacy. Both frameworks include similar elements, such as basic knowledge, ethical awareness, and critical engagement. However, they also have unique strengths that can complement each other. UNESCO's model focuses on the relevance of teaching practices and the responsibility teachers have when using AI. In contrast, Ng et al.'s (2021) model offers a literacy-based approach that centers on teachers' cognitive growth. By merging these views, this study highlights five important aspects of AI literacy for teachers (as shown in Figure 1): a human-centered mindset, knowledge and understanding of AI, the use and application of AI, evaluation and creation of AI, and AI ethics. This combined framework can help teachers become informed, thoughtful, and responsible users of AI in their teaching and learning.

Figure 1

An integrated conceptual framework of AI Literacy for teachers in this study



AI literacy in teacher education

In education, AI literacy facilitates the development of new professional identities and the maintenance of role transformation, helping teachers adapt to changes in the era of AI (Zhao et al., 2022). AI-literate teachers are role models, fostering students' technological fluency and adaptability. For pre-service teachers, AI literacy is essential for preparing them for future opportunities and challenges. In the 21st century, it is crucial for teachers to integrate AI literacy into their teaching practices to equip students with the skills to navigate the digital world with AI-powered tools and to enhance innovation, collaboration, and personalized learning. Without AI literacy, teachers may struggle to integrate AI tools effectively, leading to missed opportunities for personalized learning, data-driven decision-making, and enhanced educational outcomes (Ayanwale et al., 2024).

Recently, research has shown growing interest in examining how pre-service teachers perceive the integration of AI into English language teaching in different contexts. For example, Taşçı and Tunaz (2024) investigated the opinions of 17 Turkish pre-service teachers regarding how AI tools can be applied to teaching practices. Their findings indicated that these teachers viewed AI as a helpful tool for teaching tasks like lesson planning, teaching material creation, and personalized learning. However, they recognized AI's role as a support rather than a substitute for teachers. Similarly, Pokrivcakova (2023) studied the views of 137 Slovak pre-service teachers on adopting AI. The study found that while these future teachers had a positive attitude towards AI's potential in language education, many still lacked basic knowledge of AI technologies. They also expressed concerns about the potential ethical misuse of AI and its potential impact on them. In Hong Kong, Kohnke et al. (2025) conducted a qualitative study with 15 pre-service teachers and examined both the benefits and challenges of AI integration for these future teachers. The pre-service teachers faced many obstacles in building their AI literacy due to a lack of training and institutional support. The study suggests providing pre-service teachers with more hands-on experience, ethical guidance, and ongoing professional development for better future readiness.

Moreover, recent studies have also focused on understanding pre-service teachers' readiness to integrate AI into teaching practices. For instance, in Bulgaria, Harakchiyska and Vassilev (2024) studied 52 pre-service teachers' willingness to use AI tools in language instruction. The

study showed that while the participating teachers lacked the necessary skills for using AI, they were open and eager to incorporate AI into their future teaching. The researchers recommended that teacher training programs and policymakers offer clearer guidelines to help pre-service teachers understand the AI knowledge and skills they need for better preparation. Meanwhile, using the TPACK framework, Hastomo et al. (2024) explored the technological knowledge of 55 Indonesian pre-service teachers and how to improve it. The findings showed that these teachers had moderate technology proficiency. They identified four key strategies that pre-service teachers often use to boost their technological skills: engaging in professional development, collaborating with tech-savvy peers, staying updated on AI trends, and trying out AI tools.

These recent studies indicate that while pre-service teachers generally hold positive views about using AI, their competence and preparedness for AI remain lacking, highlighting the need for extra support.

Research Gaps

Although the aforementioned prior studies have examined the role of AI in English education from the perspective of pre-service teachers, there remain important gaps that warrant further exploration. Recently developed AI literacy frameworks, like those from Ng et al. (2021) and UNESCO's AI competency framework for teachers (Cukurova & Miao, 2024), offer a thorough overview of the AI knowledge and skills teachers need. However, these theoretical frameworks lack sufficient empirical evidence, especially in the context of initial teacher education. A recent study by Wu and Miller (2025) examined teachers' AI literacy using UNESCO's framework, using a qualitative approach and only involving a small sample size of in-service teachers. Additionally, while some recent studies have looked into pre-service teachers' views on using AI in English language teaching (ELT) (Harakchiyska & Vassilev, 2024; Hastomo et al., 2024; Kohnke et al., 2025; Pokrivcakova, 2023; Taşçı & Tunaz, 2024), they often focus too narrowly on AI application in teaching practices. Other important aspects of AI literacy in teacher education, such as understanding AI, evaluating AI, or considering AI ethics, receive insufficient attention. Furthermore, while a few studies have started to address the AI literacy needs of pre-service EFL teachers, a detailed analysis of training types, preferred training modes, and specific training content from the perspective of pre-service teachers is still necessary. Geographically, studies on AI literacy in the Vietnamese initial teacher education context are also limited compared to research in other countries. To fill these gaps, this study aims to provide insights into Vietnamese pre-service EFL teachers' understanding of AI literacy, their AI literacy self-efficacy, and their support needs.

Research Questions

To fulfill these objectives, this study seeks to answer the following research questions:

1. *How are pre-service EFL teachers aware of the role of AI literacy?*
2. *How do pre-service EFL teachers perceive their self-efficacy in AI literacy?*
3. *What are pre-service EFL teachers' needs to develop AI literacy?*

Methods

Pedagogical Setting & Participants

This case study was conducted at a public university in central Vietnam that has offered an English language teacher education program since its establishment. Its initial teacher education

program is a four-year course designed to equip pre-service teachers with English language knowledge and skills, knowledge of culture and literature, as well as theoretical and practical principles of ELT. In their final year, student teachers have the opportunity to participate in a teaching internship at local schools or international institutions in ASEAN countries.

85 pre-service teachers agreed to participate in the data collection process. This sample accounted for over 50% of the total population at the studied institution (i.e., 150 final-year students majoring in ELT at the time of data collection), with most participants being female (92.9%). Regarding AI prior experience, most participants (70.5%) had received AI training, while 29.5% had not. Most participants reported using AI tools either often (48.2%) or very often (24.7%), which reflects a high frequency of AI integration into learning. Specific information about the research participants is summarized in Table 1.

Table 1

Demographic Information of the Participants

Demographic information		Number (N = 85)	Percentage %
Gender	Male	5	5.9%
	Female	79	92.9%
	Other	1	1.2%
AI training experience	Yes	60	70.5%
	No	25	29.5%
Frequency of AI use	Never	1	1.2%
	Rarely	1	1.2%
	Sometimes	21	24.7%
	Often	41	48.2%
	Very often	21	24.7%

To ensure ethical standards, both the departmental and institutional ethics committees approved this study before data collection began. The participants were fully informed about the purpose of the research, the nature of their voluntary participation, and their right to withdraw from the study at any time without consequences. Additionally, all personal information and identities were kept strictly confidential throughout data analysis and in the reporting of research findings to protect their privacy and anonymity.

Design of the Study

This study used a mixed-methods approach called Explanatory Design by first collecting and analyzing quantitative data and then gathering qualitative data to expand on the quantitative findings (Creswell & Plano Clark, 2018). By using this QUAN-qual approach, the study aimed to reduce the weaknesses of each method while highlighting their strengths. By doing so, the study could provide a clearer picture of the research problem (Creswell & Plano Clark, 2018).

Research Instruments

This study used two instruments to collect data: a web-based questionnaire and semi-structured follow-up interviews. The first part of the questionnaire gathered demographic information about participants, including their gender, AI experience, and previous AI training, as shown in Table 1. The main survey included 34 questions aimed at exploring three research questions: pre-service EFL teachers' awareness of the role of AI literacy in ELT, their current level of AI literacy, and their perceived needs for developing AI literacy. The survey items in Part 2 were designed based on adaptations of the AI competence frameworks by Ng et al. (2021) and

Cukurova and Miao (2024). Specifically, specifications in these original frameworks were turned into statements with the subject “I”. For example, in the human-centered mindset, one specification is “Teachers have a critical understanding that AI is human-led, and that corporate and individual decisions of AI creators have a profound impact on human autonomy and rights, and are aware of the importance of human agency when evaluating and using AI tools” (Cukurova & Miao, 2024, p. 28). This specification was adapted as “I understand that I have the right to decide on which AI tools to use for my teaching.”. This adaptation process ensured content validity, as items were grounded in established theoretical dimensions of AI literacy and contextualized for Vietnamese pre-service teachers. To further enhance clarity and appropriateness, the questionnaire was piloted with a small group of 08 teacher students prior to full administration. Feedback from the pilot was used to refine wording and item structure, ensuring that the instrument was comprehensible and culturally relevant. Pre-service teachers were required to self-assess their current AI literacy level using a five-point Likert scale, ranging from 1 (Strongly Disagree), 2 (Disagree), 3 (Neutral), 4 (Agree), to 5 (Strongly Agree). On this five-level scale, the higher the mean score, the greater participants’ agreement with the survey statements. There were 25 items in total, which are described in Table 2:

Table 2

Description of AI Literacy Clusters and Questionnaire Items

Clusters	Items	Cronbach’s Alpha (α)
Human-centred mindset	1, 2, 3, 4, 5	.870
Knowing and understanding AI	6, 7, 8, 9, 10	.877
Using and applying AI	11, 12, 13, 14, 15	.938
Evaluating and creating AI	16, 17, 18, 19, 20	.883
AI ethics	21, 22, 23, 24, 25	.922

To assess the reliability of the Likert-scale items in Section 2 of the questionnaire, this study used internal consistency reliability of Cronbach’s alpha coefficient (α) in SPSS. According to Lynch (2013), a Cronbach’s alpha coefficient above .70 is considered high. In this study, all clusters demonstrated high reliability with α above .80.

The follow-up interview includes six questions related to the survey content. Additionally, researchers added more questions during the interviews to encourage participants to share their views. The semi-structured format of the follow-up interviews allows researchers to guide the discussion with set questions while remaining flexible to gather additional insights from participants’ responses (Creswell & Plano Clark, 2018).

Data collection & analysis

Data were collected entirely online for convenience, as participants were engaged in their teaching internships and not attending classes on campus at the time the study was conducted. The questionnaire was distributed via a Google Form link to Zalo groups of pre-service teachers, a popular social media platform in Vietnam. After the questionnaire was administered, invitations for follow-up interviews were sent to the questionnaire participants via email. Among 85 questionnaire participants, 08 volunteered to participate in the interviews. Interviews were held on Zoom for ease of recording and transcription, with prior consent obtained from the pre-service teachers. To ensure participants’ identities remained anonymous, interviewees were labeled S1-S8 (i.e., S for students) in the order of the interviews. The interviews were conducted in Vietnamese to allow participants to express themselves more freely and accurately.

After data collection, the questionnaire data were analyzed using descriptive statistics. At the same time, responses to single- and multiple-choice questions in parts 1 and 3 of the questionnaire were calculated as percentages and visualized in charts. For Likert-scale items in part 2 of the questionnaire, the data were imported into SPSS so that descriptive statistics, including means (M) and standard deviations (SD), could be calculated to summarize pre-service teachers' responses and identify general trends.

Qualitative data from interviews were analyzed using Braun and Clarke's (2006) six-step thematic analysis. The first author transcribed and translated interview recordings verbatim into English, and the second author double-checked them. Interview data were then coded, grouped into themes and subthemes in relation to the research questions, and relevant quotes were extracted to exemplify each theme and subtheme.

Findings

RQ1: Pre-service EFL teachers' awareness of the role of AI literacy

This section examines pre-service EFL teachers' awareness of the role by gathering their insights into their familiarity with the concept of AI literacy, their views on its importance for teachers, and their desire to include AI literacy training in teacher education programs.

Figure 2

The Familiarity of Pre-service EFL Teachers with the Concept of AI Literacy

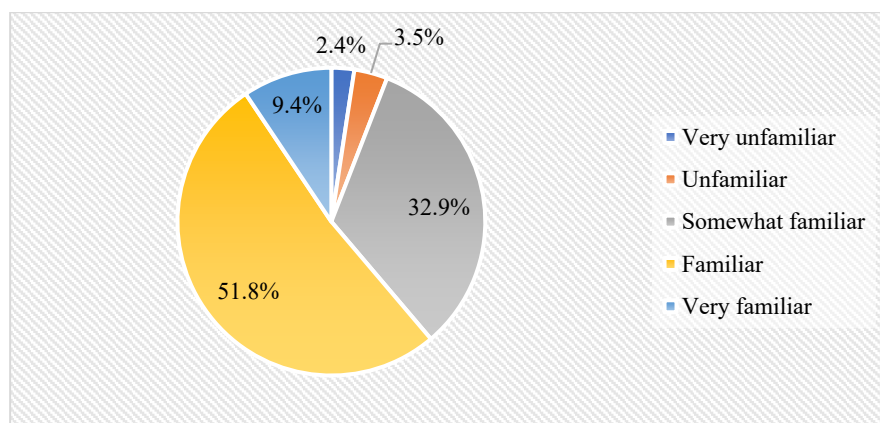


Figure 2 describes the level of familiarity with the AI literacy concept among pre-service EFL teachers. Over half of the participants (51.8%) reported being familiar with AI literacy, followed by 32.9% who considered themselves somewhat familiar with this concept. Notably, 9.4% of pre-service EFL teachers were very familiar with the concept of AI literacy. In contrast, only a small proportion of respondents were either unfamiliar (3.5%) or very unfamiliar (2.4%) with the concept.

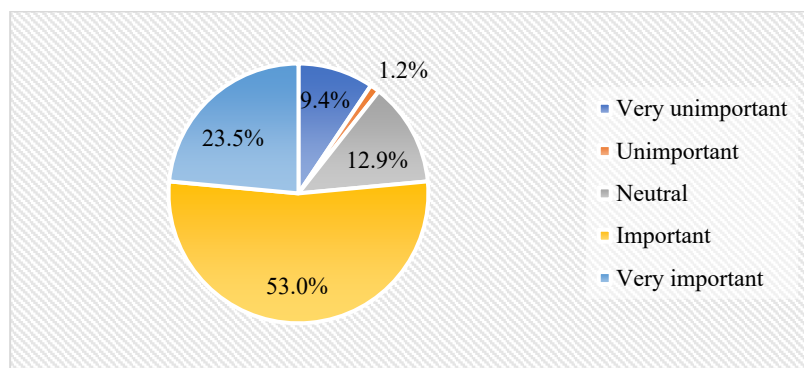
Figure 3*The Importance of AI Literacy for Pre-service EFL Teachers*

Figure 3 shows pre-service EFL teachers' opinions on the importance of AI literacy to them. As shown in Figure 3, a substantial proportion of respondents (76.5%) rated AI literacy as either important or very important for pre-service EFL teachers. In contrast, a minority regarded AI literacy as unimportant (9.4%) or very unimportant (1.2%). Besides, a relatively small group (12.9%) remained neutral on this question.

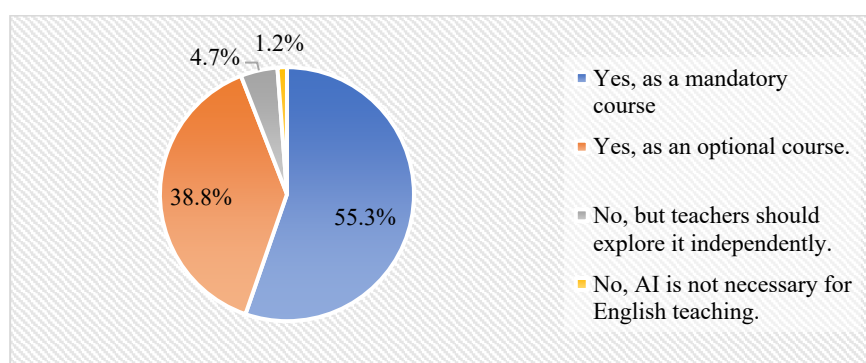
Figure 4*Pre-service EFL Teachers' Opinions on the Role of Formal Training in AI Literacy*

Figure 4 demonstrates pre-service EFL teachers' opinions on whether they should receive formal training in AI literacy. Figure 4 clearly shows that a substantial proportion of participants (94.1%) supported the inclusion of such training. Specifically, 55.3% believed AI literacy should be mandatory in teacher education programs, while 38.8% preferred it as an optional course. In contrast, only a small percentage (4.7%) believed that teachers should explore AI literacy on their own, without formal training. Meanwhile, only 1.2% thought that AI is unnecessary for English language teaching. These results show that pre-service EFL teachers in this study strongly recognized the importance of AI literacy. They also emphasized the need for formal training in teacher education.

The interview data clearly showed that pre-service teachers understood the importance of AI literacy. Nearly all the interviewees described it as “very important,” “crucial,” or “essential” for language teachers. They shared several common reasons in the interviews. AI helps future teachers remain relevant in classrooms driven by AI. It improves teaching efficiency through lesson planning and preparing materials. It also supports both student learning and their professional development over time. For example, S8 noted that AI is now a global trend. As a result, everyone is using or will use AI. In education, especially language teaching, AI is “becoming more and more involved” (S3). AI literacy will assist future teachers not only in

“using modern tools in the classroom” but also in “integrating technology into their teaching practices effectively” (S6). S4 also mentioned, “As future teachers, we need to understand how these tools work, not just to use them, but also to guide our students in using them responsibly.”

RQ2: Pre-service EFL teachers' AI literacy self-efficacy

This section presents data on pre-service EFL teachers' AI literacy self-efficacy, as assessed through five key AI literacy aspects: a human-centered mindset, knowing and understanding AI, using and applying AI, evaluating and creating AI, and AI ethics.

A human-centered mindset

Table 3

Level of Pre-service EFL Teachers' AI Literacy Self-Efficacy in Terms of a Human-centered Mindset

Items	N	Mean (M)	Std. Deviation (SD)
1. I understand that I have the right to decide on which AI tools to use for my teaching.	85	4.16	.829
2. I believe that AI should be designed to enhance, not replace, human teaching.	85	4.40	.876
3. I understand that it is the teachers' responsibility to select appropriate AI tools for teaching.	85	4.38	.786
4. I educate students on the role of humans in AI development.	85	4.02	.786
5. I actively engage in discussions or policies related to the rights, obligations, and responsibilities of citizens in the AI era.	85	3.86	.875
Valid N (listwise)	85	4.2	.830

Table 3 presents data on EFL teachers' level of a human-centered mindset. The table shows that most participants demonstrated a high level of a human-centered mindset. Most pre-service EFL teachers agreed that AI should be designed to enhance, rather than replace, human teaching ($M = 4.40$, $SD = .876$). Participants also strongly agreed that it is their responsibility to select appropriate AI tools for teaching ($M = 4.38$, $SD = .786$). Besides, many participants agreed in recognizing their right to decide on the AI tools for their teaching ($M = 4.16$, $SD = .829$). Participants also reported educating their students about the human role in AI development ($M = 4.02$, $SD = .786$). In addition, pre-service EFL teachers agreed that they actively engage in discussions or policies related to the rights, obligations, and responsibilities of citizens in the AI era ($M = 3.86$, $SD = .875$).

The interview data reveal that pre-service EFL teachers value a human-centered approach to AI integration in education. While they recognize AI's usefulness in enhancing their teaching, they consistently emphasize the irreplaceable role of human teachers in providing emotional support, motivation, and cultural sensitivity. S5 explained that “Since teachers are the ones directly in the classroom, I think it is important to understand which tools are useful and safe for students. We cannot just use things carelessly”. S6 also emphasized that “As a teacher, I need to have a certain level of understanding so I can filter and evaluate which tools are suitable for my students' abilities and learning goals, rather than just following trends”. S2 concluded that “I think AI is very useful, but we need to use it wisely and not forget the human side of teaching”.

*AI knowledge and understanding***Table 4**

Level of Pre-service EFL Teachers' AI Literacy Self-Efficacy in Terms of AI Knowledge and Understanding

Items	N	Mean (M)	Std. Deviation (SD)
6. I know the definition of AI.	85	3.86	.875
7. I can recognize which tools use AI and which ones do not.	85	3.84	.843
8. I know categories of AI technologies.	85	3.66	.795
9. I understand basic techniques and concepts behind AI (e.g., deep learning, blockchains, machine learning).	85	3.60	.848
10. I know how an educational AI tool works.	85	3.72	.854
Valid N (listwise)	85	3.73	.843

Table 4 demonstrates that pre-service EFL teachers have modest knowledge and understanding of AI. Table 5 clearly shows that the item with the highest mean score is "I know the definition of AI" (M = 3.86, SD = .875). Closely following that, most participants agreed that they could recognize whether a tool used AI (M = 3.84). Participants also reported a fair understanding of how an educational AI tool works (M = 3.72, SD = .854). Meanwhile, knowledge of AI technology categories scored slightly lower (M = 3.66, SD = .795). The lowest mean score (M = 3.60, SD = .848) was obtained for the item focused on understanding the techniques and concepts behind AI.

This limited depth of pre-service teachers' AI knowledge and understanding was echoed in the interviews, as the participants did not mention this aspect in their sharing. Most participants did not explicitly discuss foundational AI concepts or demonstrate a detailed understanding in their responses. This absence suggests that, while these pre-service teachers are generally familiar with AI tools, their understanding of AI mechanisms and categories remains underdeveloped.

*AI use and application***Table 5**

Level of Pre-service EFL Teachers' AI Literacy Self-Efficacy in Terms of AI Use and Application

Items	N	Mean (M)	Std. Deviation (SD)
11. I can operate validated educational AI tools.	85	3.73	.878
12. I know when and how to use AI tools in class appropriately.	85	3.94	.746
13. I can effectively integrate AI tools in my teaching to enhance student learning.	85	3.98	.845
14. I can use educational AI products to improve my work efficiency.	85	3.95	.815
15. I can use AI tools to support my own professional development.	85	4.00	.859
Valid N (listwise)	85	3.92	.829

Table 5 illustrates pre-service EFL teachers' moderate level of using and applying AI. The highest level of agreement was found in "using AI tools for their own professional development" ($M = 4.00$, $SD = .859$). Likewise, they expressed confidence in their ability to integrate AI effectively into teaching to enhance student learning ($M = 3.98$, $SD = .845$). Pre-service EFL teachers also expressed confidence in using AI tools appropriately in class ($M = 3.94$, $SD = .746$). Although lower, the score for operating validated educational AI tools ($M = 3.73$, $SD = .878$) still indicated agreement among participants. Most participants agreed that they can use educational AI products to improve their work efficiency ($M = 3.95$, $SD = .815$).

In the interviews, some pre-service EFL teachers demonstrated modest confidence in their knowledge of AI tools and their ability to use them for teaching and learning. The interviewees actively used AI in their learning practices, employing tools like ChatGPT, Grammarly, Quillbot, and ELSA Speak to improve lesson planning, personalize learning, and enhance their teaching practicum. For example, S2 said, "I can use ChatGPT to tailor lessons that match each student's level, needs, and learning pace. This helps students engage more deeply with the content and make progress at their own speed." Several participants also noted the use of AI tools to adapt content to individual student needs and increase their own teaching efficiency. The interviewed pre-service teachers also emphasized AI's role in helping them save time, increase creativity, and support learner engagement. As S4 reflected on their experience: "I use tools like ChatGPT to brainstorm lesson ideas or get help with writing tasks. Sometimes I also use Quillbot for paraphrasing and Grammarly to check grammar. They really save time and help me improve my work quality".

These qualitative insights clarify the quantitative findings, reinforcing pre-service teachers' positive perception of the role of AI literacy.

AI evaluation and creation

Table 6

Level of Pre-service EFL Teachers' AI Literacy Self-Efficacy in Terms of AI Evaluation and Creation

Items	N	Mean (M)	Std. Deviation (SD)
16. After using educational AI tools, I can evaluate their appropriateness and limitations.	85	3.82	.819
17. I can select the most appropriate solution from the various options offered by the educational AI tools.	85	3.95	.722
18. I can select appropriate AI tools according to the specific educational tasks.	85	4.01	.664
19. I can evaluate the ethics of educational AI tools based on knowledge and skills related to AI.	85	3.78	.697
20. I can customize educational AI tools to meet my students' and my own specific needs and requirements.	85	3.86	.726
Valid N (listwise)	85	3.89	.726

Table 6 outlines pre-service EFL teachers' self-efficacy in evaluating and creating AI tools. The highest-rated skill was the ability to select appropriate AI tools for specific educational tasks ($M = 4.01$, $SD = .664$). The majority of participants expressed fair confidence in selecting the most appropriate solution from the various options offered by the educational AI tools ($M =$

3.95, SD = .722). In addition, most participants reported being able to customize educational AI tools to meet their students' and their own specific needs and requirements (M = 3.86, SD = .726). Participants also demonstrated the ability to evaluate the appropriateness and limitations of AI tools they used (M = 3.82, SD = .819). Although participants agreed that they can evaluate the ethics of educational AI tools based on knowledge and skills related to AI, it was rated the lowest among all items (M = 3.78, SD = .697).

The interviews showed that pre-service EFL teachers have a sufficient understanding of AI. They can evaluate and tailor AI tools for their learning and teaching goals. The teachers who were interviewed felt confident in picking the right tools based on their lesson goals, student needs, and the classroom environment. Some highlighted the need to customize AI applications to improve learning results. They also recognized the importance of critically assessing AI-generated content for accuracy and relevance. S7 shared:

I feel confident in trying out different platforms and evaluating which one suits my learners' needs, learning styles, and the classroom context. For example, if I have a class of students struggling with pronunciation, I would choose a tool like Elsa Speak. If I am helping them with writing, Grammarly or Quillbot might be better.

These quantitative and qualitative insights show that participants possess sound evaluative judgment and decision-making skills when applying AI in their teaching practices.

AI ethics

Table 7

Level of Pre-service EFL Teachers' AI Literacy Self-Efficacy in Terms of AI Ethics

Items	N	Mean (M)	Std. Deviation (SD)
21. I always select educational AI tools for my teaching that do not violate or abuse human rights.	85	3.87	.961
22. I incorporate ethical considerations when using AI tools and AI-generated content in my teaching.	85	3.75	.912
23. I am aware of ethical issues such as biases, data security, and privacy issues when using educational AI tools.	85	3.95	.885
24. I can ensure that my use of AI respects intellectual property rights.	85	3.99	.919
25. I can ensure that educational AI tools used in my teaching benefit all my students.	85	3.89	.939
Valid N (listwise)	85	3.89	.923

Table 7 shows that pre-service EFL teachers demonstrated good awareness of AI ethics. The highest mean score (M = 3.99, SD = .919) was seen in the ability to respect intellectual property rights. Closely following this is their awareness of ethical issues, such as biases, data security, and privacy, when using educational AI tools (M = 3.95, SD = .885). Besides, most participants reported that they ensure their use of educational AI tools in their teaching benefits all their students (M = 3.89, SD = .939), particularly through the personalized learning features of AI tools. Many claimed that they intentionally choose AI tools that do not violate or abuse human rights in their teaching practices (M = 3.87, SD = .961). Compared to other items, incorporating ethical considerations into the actual use of AI and AI-generated content received the least agreement among participants (M = 3.75, SD = .912).

During the follow-up interviews, pre-service EFL teachers also show ethical awareness when using AI tools in education. They raised concerns about ethical issues such as data privacy and algorithmic bias; therefore, they emphasized the need for pre-service teachers to protect their personal information when interacting with AI and to ensure responsible AI use. As S3 shared, “there are also concerns about data privacy and whether these tools really understand context or culture in language use”. They also emphasized the need to choose AI tools that respect human rights and intellectual property. Personalized learning was seen as a major advantage. However, the interviews showed a careful approach, as teachers actively considered the ethical implications before using AI in their work.

RQ3: Pre-service EFL teachers' needs for AI literacy development

This section presents the findings on pre-service ELT teachers' needs to develop their own AI literacy. In the questionnaire, participating pre-service teachers were asked to answer multiple-choice questions about the types of support, modes of training, and specific knowledge or skills related to AI they would like to develop.

Figure 5

Types of AI Literacy Training Needed for Pre-service EFL Teachers

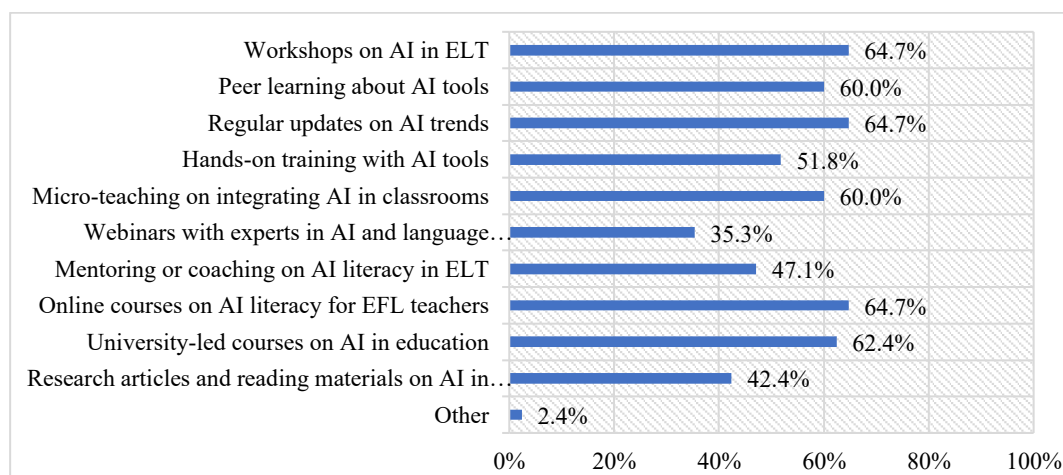


Figure 5 shows that pre-service EFL teachers strongly preferred structured, interactive training formats to help them develop their AI literacy. The most preferred training activities were workshops and online courses (both at 64.7%), followed closely by university-led courses (62.4%) and peer learning, micro-teaching, and regular updates on AI trends (each at 60.0%). These findings suggest an apparent demand for practical, collaborative, and curriculum-integrated approaches to enhance pre-service teachers' AI competence. In contrast, fewer participants showed interest in joining webinars with experts (35.3%) or reading research articles (42.4%). This suggests that passive or self-directed formats are less popular than other active, collaborative, and practical activities.

The interview results supported these findings. The interviewees also suggested that the university should organize training workshops and courses that combine AI theory with hands-on classroom applications. They highlighted the importance of learning from teachers who are experienced in both AI and ELT. They also expressed a desire for help in writing effective prompts, choosing AI tools, and using AI ethically. For instance, S5 suggested that “Universities can organize workshops on using AI tools in English Language Teaching”. This is because, as S2 stated:

At university, I can be trained by lecturers with strong experience in both AI and English

language teaching. They can introduce key terms and concepts related to AI in education, and more importantly, they know what is useful in real teaching practice.

S1 also expected that:

These courses should teach us how to use AI tools in real classroom situations. They should also help us write good prompts and avoid mistakes. Teachers should show examples of how to use AI in lesson planning or in giving feedback. This can help us become more confident and ready for the future.

Besides, peer learning was seen as essential and useful for helping pre-service teachers improve their AI knowledge and skills. While webinars were briefly mentioned, their lower engagement may explain their limited popularity in the interviews. Additionally, pre-service teachers acknowledge the usefulness of informal channels, such as social media, as supplementary sources of AI awareness. However, these digital platforms cannot be a substitute for formal training.

Figure 6

Preferred Modes of Training for AI Literacy Development in English Language Teaching

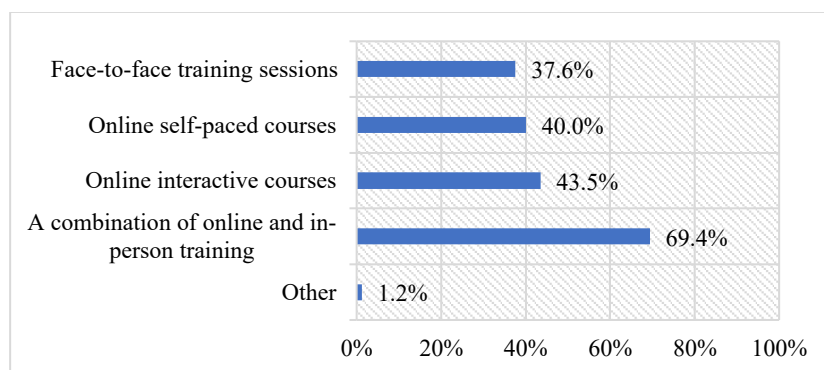
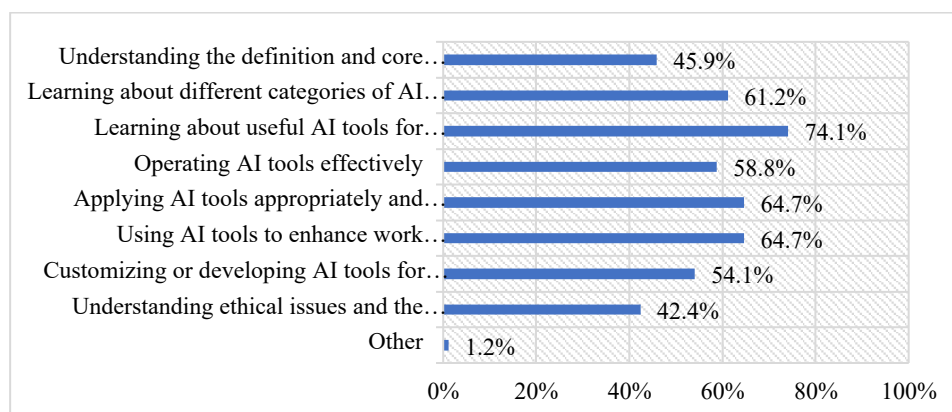


Figure 6 shows the preferred modes of training for pre-service teachers' AI literacy development. The findings indicated a clear preference for blended learning, with 69.4% favoring a combination of online and in-person training. Furthermore, online interactive courses (43.5%) were slightly more favored than online self-paced courses (40.0%). This shows that pre-service EFL teachers still prefer engaging and collaborative learning environments. They want to interact with teachers or classmates to gain more knowledge and improve their skills.

Figure 7

Aspects of AI-related Knowledge and Skills for Improvement



Different AI-related knowledge and skills were identified as areas that pre-service EFL teachers want to improve. Figure 7 shows that the top priority was learning about different useful AI tools for English classrooms, reported by 74.1% of participants. The next priorities were applying AI tools effectively in teaching and using AI tools to improve work efficiency and professional development, both at 64.7%. This shows that pre-service teachers want not only more practical knowledge of AI tools but also strategies for integrating AI effectively. Other, slightly less prioritized areas included learning about different categories of AI technologies (61.2%), operating AI tools effectively (58.8%), and customizing or developing AI tools for educational purposes (54.1%). Lower percentages were reported for understanding the basic concepts of AI (45.9%) and understanding ethical issues and the regulatory framework of AI (42.4%).

Surprisingly, the preferences for training formats and content were not clearly reflected in the interview data. None of the interviewees discussed specific training modes or detailed areas of AI knowledge they wanted to improve. Instead, they focused more broadly on the need for practical, university-led training, workshops, and peer learning without providing details on delivery formats or specific skill areas. This gap suggests that while structured and formal training is valued, more exploration is needed to ensure that courses match learners' preferred formats and content priorities.

Discussion

This study examines how pre-service teachers in an initial English teacher training program in Vietnam perceive the roles of AI literacy for teachers, their AI literacy self-efficacy, and their needs for AI literacy development. It is revealed that most pre-service teachers in this study demonstrated a strong awareness of the role of AI literacy in English language teaching and teacher education. They recognized the benefits of AI for EFL classrooms and the advantages of being AI-literate teachers. Therefore, they strongly supported the provision of formal AI literacy training in teacher education programs. These findings are consistent with those of studies by Pokrivcakova (2023), Harakchiyska and Vassilev (2024), and Taşçı and Tunaz (2024). In previous studies, pre-service EFL teachers in other educational contexts generally hold positive attitudes toward AI integration into language education, as this is an inevitable trend in the AI-driven world. Zhao et al. (2022) also recognized the importance of AI literacy for teachers in modern teaching environments, noting that teachers need to adapt to the AI era. Harakchiyska and Vassilev (2024) found that pre-service teachers in their study clearly need structured training to effectively integrate AI into ELT practices. Similarly, Pokrivcakova (2023) noted that pre-service EFL teachers want to include AI training in university curricula. Ayanwale et al. (2024) emphasized the importance of preparing students for success in a digital world by using AI effectively. This requires support from teachers who understand AI. Thus, formal AI literacy training in teacher education is very important (Frimpong, 2022; Kohnke et al., 2025).

The findings of this study also show that pre-service EFL teachers have promising but uneven levels of AI literacy across five areas. Among the five dimensions of AI literacy, they showed the highest level of self-efficacy in the human-centered mindset, which indicates their awareness of human agency in AI use. This viewpoint, which emphasizes human responsibility and the need for control, is a key part of AI literacy, according to Cukurova and Miao (2024) and Ng et al. (2021). However, this aspect of AI literacy is often overlooked in past research. This study emphasizes the importance of increasing pre-service teachers' understanding of human agency in AI literacy training. Another well-evaluated area was pre-service teachers'

ability to use and apply AI tools, as most participants felt quite confident using tools such as ChatGPT, Grammarly, QuillBot, and ELSA Speak to improve their teaching and learning. This digital skill among pre-service teachers likely comes from their Gen Z background. It supports Kim's (2025) findings, which observed that Gen Z teachers tend to be more open to and skilled with AI. To build on this strength, teacher education programs should provide pre-service teachers with more hands-on experiences that enhance their teaching skills. The findings also showed their moderate self-efficacy in evaluating AI-generated output and creating AI tools. This demonstrates that pre-service EFL teachers understood both the benefits and limitations of AI tools. According to Long and Magerko (2020) and Cukurova and Miao (2024), users need to constantly evaluate AI-generated content and be selective about what AI can offer. To effectively evaluate AI content, pre-service teachers must combine technological, content, and teaching knowledge (Hastomo et al., 2024). Therefore, AI training courses should go beyond simply operating AI tools. They should encourage trainees to make informed, ethical, and context-sensitive decisions. Regarding AI ethics, the findings indicate that pre-service teachers recognized key ethical concerns. However, their lower confidence in applying ethical principles in practice reveals a gap between understanding and implementation. Therefore, training should connect theory with real classroom situations to improve pre-service teachers' ability to use AI ethically and responsibly (Frimpong, 2022). Notably, the weakest area in pre-service teachers' current AI literacy was their knowledge and understanding of AI. Participants could identify AI tools but lacked a deeper understanding of how they work, including their categories and underlying mechanisms. This aligns with Pokrivcakova's (2023) findings and underscores a gap in teacher education programs that often overlook technical AI concepts. To address this, AI literacy courses in teacher education programs should introduce basic AI knowledge to help students understand what AI is and how it works, enabling them to use it more effectively.

This study shows that pre-service EFL teachers have a positive awareness of AI and rate their AI literacy self-efficacy at moderate levels based on the proposed framework. However, they need more organized, accessible, and practice-focused training to improve their skills. The study identified various types of support needed to boost AI literacy among pre-service teachers. Formal courses and workshops are the most preferred options, especially those that cover the latest AI trends and applications. These preferences align with earlier studies (Frimpong, 2022; Hastomo et al., 2024), which emphasize the importance of regular exposure to new AI tools for future teachers to build their AI skills. Practical training methods, such as hands-on activities and micro-teaching, are also crucial for applying knowledge in the classroom. As Wu and Miller (2025) noted, a supportive learning environment is vital for helping teachers keep up with AI advancements while maintaining pedagogical standards and ethical awareness.

Regarding training modes, the study supports a hybrid approach that combines face-to-face sessions with online self-paced learning. This blended model offers flexibility, meets different learning needs, and encourages collaborative inquiry, ethical reflection, and independent exploration of AI concepts (Le & Pham, 2021). Additionally, concerning training content, pre-service teachers showed interest in developing all five aspects of the AI competency framework (Cukurova & Miao, 2024; Ng et al., 2021). Consistent with Pokrivcakova (2023), this study highlights the need to develop training programs that blend conceptual and technical instruction to provide pre-service teachers with a solid foundation in AI. Training activities should also focus on integrating AI tools into English classrooms in practice (Harakchiyska & Vassilev, 2024; Kohnke et al., 2025), as well as on building critical evaluation skills (Long & Magerko, 2020). Finally, AI ethics must be strengthened through clear guidelines and reflective practice

to help pre-service teachers use AI responsibly (Kohnke et al., 2025).

Conclusion

This study examined Vietnamese pre-service EFL teachers' awareness, self-efficacy, and development needs regarding AI literacy. The findings showed that most participants recognized the importance of AI literacy and strongly supported including it in teacher education programs. They generally rated their AI skills as high, especially in having a human-centered mindset and applying AI. However, they had moderate skills in evaluating, creating, and handling ethical issues, with their weakest area being understanding AI concepts and technologies. Pre-service teachers in this study preferred blended training formats for developing AI literacy. They would like to participate in activities like workshops, online modules, peer collaboration, and hands-on practice. Their main interests were learning to use AI tools effectively, deepening their understanding of concepts, and managing ethical and regulatory issues.

Based on the findings, there are several important implications for teacher education institutions, teacher educators, and pre-service EFL teachers. Institutions should officially include AI literacy in their teacher education curriculum through required courses or flexible workshops. The training content should cover all aspects of AI literacy, including basic concepts, human-centered approaches, ethics, and teaching methods. It should also include hands-on activities, such as microteaching. Additionally, teacher educators have a key role in demonstrating ethical AI use and emphasizing the vital role teachers play. They should guide pre-service teachers to see AI as a helpful tool instead of relying on it too much. Teacher trainers should keep up with new AI trends to provide relevant instruction and create a learning environment that encourages pre-service teachers to work together in exploring AI. Importantly, pre-service EFL teachers should deepen their foundational knowledge of AI and ethics through independent learning, such as online courses, blogs, and academic articles. They should actively use AI tools and engage in professional communities through social media, podcasts, and webinars to improve both their theoretical and practical skills.

This study has some limitations that should be noted. First, the findings are based on a relatively small sample size of pre-service teachers at a single institution. This may limit the generalization of the study findings to the larger group of Vietnamese pre-service EFL teachers in other settings. Future research should include larger and more diverse samples along with comparisons between different teacher training institutions nationwide and worldwide. Additionally, relying on participants' self-reported data may have resulted in overestimating or underestimating their actual AI literacy levels, especially in areas like ethics, technical knowledge, and classroom use. To address this issue, future studies should include classroom observations and performance-based assessments for a more accurate evaluation of AI literacy among pre-service teachers.

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