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Exploring the Impact of an AI-Oriented Teacher Education Program on EFL Teachers' Professional Development

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Abstract

The present study sets out to explore the impact of a 12-session, AI-focused in-service teacher education program designed to enhance EFL teachers' professional development by integrating artificial intelligence (AI) tools into their teaching practices. Employing a qualitative research design, the study collected data through pre- and post-intervention questionnaires and semi-structured interviews with 18 teachers in a private language teaching institute. The findings reveal that the program significantly enhanced teachers' instructional practices by enabling them to create tailored materials, optimize teaching efficiency, and foster critical reflection. Participants reported improved confidence and the ability to provide more personalized and constructive feedback to students, thus strengthening teacher-student interactions. The findings are discussed in light of the available literature with special focus on Vygotsky's sociocultural theory, Schön's reflective practitioner model, and Bandura's self-efficacy theory. The findings of the study point to the transformative potential of AI tools in reshaping teaching practices and highlight avenues for future research in diverse educational settings.

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Introduction

The integration of artificial intelligence (AI) into educational practices has profoundly transformed various dimensions of teaching and learning, particularly in the domain of language education. AI technologies such as adaptive learning systems, automated feedback tools, and intelligent virtual tutors offer unprecedented opportunities to personalize instruction, enhance learner engagement, and facilitate administrative tasks (Hwang et al., 2020; Luckin & Holmes, 2016). For instance, tools like automated writing evaluators can provide immediate feedback and facilitate individualized learning paths for students (Holmes, 2020). Similarly, AI-powered applications for language learning, such as Duolingo, have become ubiquitous, reshaping learners' access to education outside the classroom (Zawacki-Richter et al., 2019).

The widely acknowledged potential of AI for transforming educational activities and its ubiquitous presence highlight the pressing need to enhance teachers' digital literacy and equip them with the competencies required to use AI technologies effectively in their classrooms. In fact, informal investigations show that the integration of AI into teaching practices is marked with various challenges. These challenges are not merely technological but involve pedagogical and ethical considerations, including data privacy, algorithmic bias, and the need to balance AI-driven efficiencies with human-centred teaching principles (Holmes et al., 2019). As AI continues to evolve, language educators and policymakers must consider its implications for the future of teaching, addressing not only how AI enhances learning but also how it reshapes teacher roles and educational objectives.

Digital literacy encompasses more than basic technological skills; it involves critical engagement with technology, including the ability to evaluate digital tools, adapt them to pedagogical goals, and address ethical considerations (Ilomäki et al., 2016). In the context of language teaching, this means helping educators utilize AI to support diverse learner needs while maintaining pedagogical integrity. However, research reveals that many teachers feel inadequately prepared to integrate advanced technologies into their practice (Howard et al., 2021). This gap between technological advancements and teacher preparedness imposes a significant barrier to realizing the potential benefits of AI in

education. To bridge this gap, targeted professional development programs are essential. Such initiatives should focus not only on skill development but also on fostering reflective practices that enable teachers to critically assess the capabilities and limitations of AI tools (Pedro et al., 2019). By empowering teachers with these competencies, educational institutions can ensure that AI serves as a catalyst for innovation rather than a source of disruption.

The present study is set out to examine the effects of an in-service language teacher education course aimed at developing English as a Foreign Language (EFL) teachers' competence in integrating AI into their teaching practices. Situated within the broader discourse on professional development and AI in education, the study intends to provide empirical insights into how targeted education programs can address gaps in teachers' preparedness and foster meaningful integration of AI technologies.

Literature review

The advent of AI in education has led to considerable discussions on its potential to enhance various aspects of teachers' professional development. AI tools have been shown to improve the effectiveness of instructional practices by enabling teachers to personalize learning experiences, automate repetitive tasks, and access advanced data analytics for informed decision-making (Holmes et al., 2019; Luckin & Holmes, 2016). Moreover, AI is believed to foster engaging and motivating educational contexts through interactive and adaptive platforms, which can meet diverse learner needs and preferences (Hwang et al., 2020). Teachers' ability to effectively use AI can also enhance their responsiveness to students' unique learning experiences, thereby promoting inclusivity in education (Howard et al., 2021). Furthermore, integrating AI tools can potentially encourage reflective teaching by providing teachers with real-time feedback and insights into their pedagogical strategies, enabling continuous professional growth (Zawacki-Richter et al., 2019). These potential benefits are reviewed in the following.

Particularly related to the focus of the present study, a growing body of research has explored the impact of AI-oriented teacher education programs on improving instructional effectiveness. For example, Luckin and Holmes (2016) emphasize that teachers equipped with a robust understanding of AI technologies are better positioned to

integrate these tools into their teaching and enhance their students' learning outcomes. Similarly, Holmes et al. (2019) report that participation in professional development programs focused on AI helps teachers develop the skills necessary to design and implement data-informed pedagogical interventions. Such training not only builds technical proficiency but also contributes to pedagogical innovation by encouraging teachers to experiment with new instructional strategies (Zawacki-Richter et al., 2019). In addition, a recently conducted study by Yang et al. (2024) revealed that the integration of AI-based technology in an English program increased EFL teachers' self-efficacy. Collectively, these findings highlight the critical role of teacher education programs in bridging the gap between technological advancements and instructional practices, ensuring that AI integration translates into tangible improvements in teaching and learning.

Teachers' digital literacy and their ability to incorporate AI tools into their teaching have also been linked to creating engaging and motivating learning environments. Research by Hwang et al. (2020) indicates that AI-powered platforms, such as gamified learning apps and adaptive tutoring systems, can significantly boost student engagement when integrated effectively into classroom activities. Studies have further shown that teachers who participate in AI-focused professional development are more likely to adopt these tools and adapt their teaching strategies to facilitate interactive and dynamic learning experiences (Pedro et al., 2019). For instance, Koehler et al. (2013) argue that teacher training programs that combine technological, pedagogical, and content knowledge frameworks empower educators to create motivational learning environments. Likewise, Jiang (2022) speculates that employing AI has the potential to empower EFL teachers. However, she argues against the current paucity of empirical investigations on applying AI to EFL contexts, particularly in teacher education programs. These findings and speculations suggest that teachers need to be equipped with the competencies to employ new technology to enhance learner engagement and motivation.

In addition to fostering motivation and engagement, the integration of AI in language education has been shown to help teachers respond more effectively to students' needs and priorities. AI tools such as learning analytics and adaptive assessment systems

enable teachers to identify individual learner profiles, track progress, and provide tailored feedback (Luckin & Holmes, 2016). Research by Howard et al. (2021) reveals that such technologies can promote inclusivity by addressing the diverse needs of students, including those with disabilities or language barriers. Furthermore, Zawacki-Richter et al. (2019) highlight that AI-powered platforms can support differentiated instruction, and allow teachers to adapt their approaches to accommodate varying levels of proficiency and learning styles. Thus, it seems that AI can play a significant role in making language education more inclusive and equitable.

Finally, participation in AI-oriented teacher education programs has been shown to foster reflective teaching practices. Reflective teaching involves critically analyzing one's instructional methods and their impact on student learning to facilitate continuous improvement (Farrell, 2022). Research by Zawacki-Richter et al. (2019) suggests that AI tools, such as automated feedback systems and classroom analytics, provide teachers with valuable insights into their teaching practices. Holmes et al. (2019) further argue that professional development programs focused on AI encourage teachers to engage in reflective practices by exposing them to new pedagogical possibilities and challenging them to rethink traditional approaches (Mehranirad, 2023). By fostering a culture of reflection, these programs enable teachers to adapt to the evolving demands of education and improve their professional development (Mehranirad & Behzadpoor, 2022). Considering all these potential benefits, one may speculate that AI holds a significant transformative potential to reshape the future of teacher education and professional development.

Despite the promising findings outlined above, several gaps in the literature remain. First, while some studies have examined the potential of AI to enhance instructional practices, very few studies have specifically focused on the ways in which AI-oriented teacher education programs influence the holistic professional development of teachers. The interplay between AI integration and aspects such as teachers' responsiveness to learner needs, inclusivity, and reflective practices remains relatively unexplored, particularly in non-western educational contexts. Moreover, limited attention has been paid to how in-service teacher education programs designed for EFL teachers address the unique challenges and opportunities posed by AI in language instruction.

These gaps reveal the need for empirical research that examines the effects of targeted teacher education interventions on professional development in diverse educational settings.

To address these gaps, the present study investigates the effects of an in-service language teacher education course designed to develop EFL teachers' competence in integrating AI into their teaching practices. Conducted in the Iranian context, this study explores how participation in such a program influences teachers' ability to personalize instruction, create engaging learning environments, respond to diverse learners' needs, and engage in reflective teaching. The research specifically focuses on the following question: How does participation in an in-service language teacher education course aimed at developing EFL teachers' competence in AI integration impact their professional teaching practices and overall professional development?

Studies of this type are both necessary and useful as they can inform policymaking by highlighting the professional development needs of language educators in an AI-driven educational landscape. Situated in the Iranian context, the present study contributes to the growing discourse on AI in education by providing empirical evidence from a non-western educational context, thereby broadening the scope of existing research.

Method

Design

The study employed a qualitative research design to explore the effects of an in-service teacher education program on participants' professional development. This design was selected for its suitability in capturing the nuanced and subjective experiences of participants (Creswell, 2015), allowing for a deep exploration of the ways in which the program influenced their teaching practices and professional growth. Data were collected through a combination of pre-and post-intervention questionnaires and semi-structured individual interviews. The integration of these data sources enabled the researcher to triangulate findings and develop a comprehensive understanding of the program's impact.

A key component of the research design was the intervention which was a 12-session teacher education program titled *Practical Applications of AI tools in EFL Teaching*.

Conducted over six weeks, the program combined in-person workshops with online follow-up activities to provide a blended learning experience. Sessions were held twice a week for 90 minutes each and were facilitated by two specialists with expertise in educational technology and language teaching.

The program began with a simple, orally conducted needs analysis to assess participants' technological skills and expectations. Based on the results, modifications were made on the initial outline of the program to accommodate teachers' demands, to provide hands-on practice and to ensure the inclusion of user-friendly tools in the final outline of the program. The sessions covered various aspects of AI integration from introduction to various tools to implementation of the AI-produced materials. Table 1 briefly summarizes the content of the program. This structured approach ensured that participants gained both theoretical knowledge and practical experience, developing confidence and competence in integrating AI tools into their teaching.

Table 1

Aspects of AI integration covered during the program.

Schedule	Covered contents
Week 1	Introduction to generative AI tools, including *ChatGPT* and *Canva* AI, and their potential applications in EFL teaching.
Week 2	Development of classroom materials, such as reading comprehension exercises, reading aloud, and grammar worksheets, using AI tools like *Twee* and *Natural Readers.*
Week 3	Practice using tools like *Owlift*, *PI* and *ELSA* Speak to simulate real classroom scenarios for oral and written feedback.
Week 4	Creation of gamified and interactive pedagogical activities using different platforms like *Kahoot* and *Quizlet*.
Week 5	Implementation of AI-generated materials in participants' classrooms, with teachers documenting their experiences, challenges, and successes.
Week 6	Reflective practices and capstone presentations, during which participants showcased AI-integrated lesson plans and activities.

Participants and settings

The study was conducted in a private language institute in Iran, where 18 practicing EFL teachers participated in the teacher education program. These teachers represented a diverse group in terms of age (ranging from 23 to 45 years) and teaching experience (spanning 2 to

18 years). The institute offers educational services to students with varying proficiency levels, from young learners to adults, and emphasizes proficiency-oriented instruction. Teachers were informed about the purpose of the research at the outset, and written consent forms were obtained. Participation in the research was voluntary, and all 18 teachers agreed to take part.

Data collection instruments

In this study, a modified version of the questionnaire developed by Moorhouse et al. (2024) was employed to collect data regarding teachers' perceptions of their competence in using AI technology in teaching. While the original questionnaire included two closed-ended items and eight open-ended questions, the closed-ended questions were adapted into open-ended questions to elicit more detailed and comprehensive responses from the participants. In addition, some wording modifications were made on other items. The goal of these modifications was to capture a richer description of teachers' perceptions of AI and the impact of the program on their professional development. The modified questionnaire was administered at the end of the program to capture teachers' perceptions of the use of AI in language teaching and their experiences throughout the program. Table 2 shows the modified questionnaire items used in this study.

Table 2

Items of the modified version of the questionnaire, originally developed by Moorhouse et al. (2024)

1.	Can you describe your level of familiarity with different generative AI tools?
2.	How would you describe your competence in using technology for teaching?
3.	Have you used any generative AI tools in your teaching?
4.	If yes, what are the names of tools, and how do you use them? If not, why not use them?
5.	Do you think generative AI tools can help you be a more effective EFL teacher?
6.	If yes, how can they help you? If not, why do you think they cannot help you?
7.	Do you have any concerns or worries about the use of generative AI tools in teaching English?
8.	If yes, what are your concerns or worries? If not, why do you not have any concerns or worries?
9.	What would you like to know about the use of generative AI and the teaching of English?
10.	What have you learnt from this course about the use of generative AI and the teaching of English?

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In addition to the questionnaire, semi-structured interviews were conducted individually with the participants to gain deeper insights into their beliefs, experiences, and reflections on AI integration in teaching. Designed as a complementary data collection tool, the interview guide built on participants' questionnaire responses, allowing for a more in-depth exploration of key themes. Before the interviews began, participants were asked whether they preferred to respond in English or Persian, with the majority (N = 11) choosing English and the remaining participants opting for Persian. The interviews focused on their experiences in the course, their impact on their professional development, and their intentions to incorporate AI into their future teaching practices. Participants were also encouraged to elaborate on their questionnaire responses to provide a richer and more detailed understanding of their perspectives. Each interview lasted between 15 and 35 minutes, with an average duration of 20 minutes. All interviews were audio-recorded and subsequently transcribed and translated for analysis, ensuring accuracy in representing participants' views. A copy of the interview questions is provided in the appendix.

Data analysis

The data collected through the open-ended questionnaire and the semi-structured interviews were analyzed systematically using thematic analysis, as outlined in the literature (Richards, 2003). To ensure coherence and depth, each participant's responses to the questionnaires and interview questions were analyzed together, enabling the identification of patterns and themes within individual cases. Following this, a cross-case analysis was conducted to extract final themes that represented shared and contrasting experiences among the participants.

Thematic analysis was chosen for its flexibility and suitability for exploring qualitative data, particularly in educational research. This approach allowed for the identification of key themes that aligned with the research objectives and provided insights into how the teacher education program influenced participants' professional development. In the subsequent sections, the main themes extracted from the data are presented, accompanied by illustrative quotes from participants to support and enrich the presentation of the findings. To enhance the reliability of the thematic analysis, the

researcher cross-checked approximately 15% of the codes with a second coder and revisited the data to ensure consistency in theme identification.

Findings

The themes that emerged from the data analysis can be categorized into four overarching domains: *enhancing instructional practices and classroom materials*, *optimizing teaching efficiency and professional development*, *fostering reflective and critical thinking*, and *boosting teacher confidence and student support*. Each category includes a set of interrelated themes that together illustrate the comprehensive impact of the program on the participants' professional development. In the following, I present the findings in these categories.

Enhancing instructional practices and classroom materials

One of the most prominent impacts of the program was its ability to help teachers enhance their instructional practices by creating customized teaching materials. Participants emphasized that generative AI tools enabled them to produce high-quality materials tailored to their students' specific needs. For example, Karim[1] stated, *"I did not know of them, but I can now use Twee to create authentic texts for reading...texts for which I can easily design various types of comprehension check questions... texts with new words that I teach to my students in the class. To me it's just like having a personal servant that understands exactly what I need for my class, you just need to order what you want."* Amin commented *"I could generate questions and prompts for oral discussions, I could do that before, but now I am using Owlift... and why not? [I] have done that a couple of times recently, it works really well, and much faster than me."* This ability to create and customize materials allowed teachers to diversify their instructional resources, making lessons more engaging and contextually relevant.

It seems that this special capacity of generative AI tools can lead to a sense of autonomy and resourcefulness among participants because some teachers reported that they no longer relied solely on pre-made materials or outdated textbooks. Instead, they could craft materials that were not only aligned with their lesson objectives but also personalized to their students' interests and proficiency levels. Sarah wrote, *"It feels like*

[1] Pseudo names are used throughout the paper to preserve participants' identities.

you are really in control of what you are teaching. The AI tools give [me] the freedom to design lessons that matched my students' exact needs." This newfound sense of autonomy was seen as a critical step in elevating their teaching practice to a more learner-centered model.

In relation to the above impact, another significant outcome was the empowerment teachers felt in exploring new instructional strategies that complemented traditional methods. Through using AI tools, participants reported that they had gained the confidence and courage required to implement innovative teaching techniques in their classroom instruction. In response to an interview question, Hellen explained, *"I am not sure if others have the same impression, but I personally think that this technology is a must; it encouraged me to think outside the box and combine these tools with my personal teaching approaches. This has opened up new possibilities for me to teach grammar and vocabulary in ways I hadn't considered before because it was too time-consuming."* Such reflections point to the potential of AI tools to enable teachers to upgrade their instructional approaches while also enhancing their educational creativity and effectiveness.

Moreover, the program enabled teachers to expose their students to a broader range of English varieties, enriching their linguistic and cultural awareness. In the follow-up interview, Ali highlighted, *"AI tools helped me introduce my students to different varieties of English, something that is often hard to access in our context. You know, YouTube is filtered, but they told us to use Natural Readers... [by using this AI] we can simply compare and contrast different people with accents reading the same text. This is especially beneficial for helping them become familiar with different dialects and with English as an international language and its practical use."* Teachers found this feature invaluable in preparing students for real-world communication in a globalized context. Several teachers commented on the capacity of AI tools to integrate diverse linguistic inputs, which, in turn, contributes to the development of students' cultural competence.

In summary, participation in the program equipped teachers with the tools and confidence to revolutionize their instructional practices. From creating more engaging and customized materials to broadening students' exposure to different varieties of English, the program seemed to have a profound impact on teachers' educational

approaches. These effects collectively highlight the transformative potential of integrating AI into teaching, laying a strong foundation for the other domains of professional growth explored in this study.

Optimizing teaching efficiency and professional development

The second category of themes revealed how the program optimized participants' teaching efficiency and contributed to their ongoing professional development. A recurring theme in the data was the extent to which generative AI tools alleviated the time-consuming burden of out-of-class teaching tasks, leading teachers toward more creative and impactful aspects of their profession. Many participants expressed that the automation and streamlining of routine tasks such as lesson preparation, grading, and providing feedback can significantly reduce their workload. As Zahra wrote, *"AI saved me hours every week by removing and reducing repetitive tasks like scoring exams and preparing lesson plans."* This reduction in workload not only improved efficiency but also provided teachers with the mental liberation to engage more deeply with their instructional strategies.

Some of the teachers indicated that they could spend that saved time on reflective practices, collaborative learning with colleagues, and exploring new pedagogical frameworks. Mina succinctly summarized this impact in her response to the questionnaire items: *"When I don't have to spend hours grading papers or preparing lessons, I can take time to become a better teacher."* This aspect of the program implies to the connection between increased efficiency and continuous professional growth, as the reduced workload created space for self-improvement and innovation.

The program also proved to contribute to professional growth, as it equipped teachers with tools and strategies to improve their teaching practices. Some participants described how the integration of AI into their teaching practice enhanced their ability to design effective, innovative instructional strategies. For example, in answering the questionnaire items, Reza noted, *"They didn't just teach me how to use AI tools, but helped me see how easily I can change my instruction. I feel like I've gained a new perspective on how to engage students and make my lessons more enjoyable."* This sentiment was also shared by Amir, who wrote, *"AI has pushed me to rethink the whole profession of teaching. I am*

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not so sure about the future of language teaching, but for now, I can say it has opened new ways to teach."

In addition to its impact on teaching strategies, the program encouraged participants to use AI tools for their own linguistic and pedagogical advancement. Several teachers remarked that AI applications provided valuable resources for refining their English language skills, an outcome they viewed as a crucial byproduct of the program. Susan wrote, *"I've started using AI tools to improve my own English, especially my academic writing. It's like having a tutor available 24/7, giving me instant feedback and helping me correct my mistakes."* This dual-purpose utility of AI tools – benefiting both their professional work and personal development – was seen as a significant advantage of the program.

In essence, the themes discussed within this category illustrate the dual benefits of AI integration: optimizing efficiency and fostering professional development. By reducing the burden of routine tasks, the program allowed teachers to redirect their time and energy towards activities that enriched their teaching and personal growth.

Promoting reflective and critical thinking

The third category of findings showed how the program promoted reflective and critical thinking among participants. Teachers frequently reported that their exposure to generative AI tools provided a broader perspective on language education, as they enabled them to critically evaluate their instructional methods. This metacognitive shift allowed a few participants to reassess their practices and consider more innovative approaches. As Ali said, *"The program encouraged me to step back and view my teaching methods over again... I think it normally happens when you take part in a training program."* This critical awareness seems to have marked a pivotal change in their professional outlook, and it offers the skills to continuously refine their teaching practices.

Central to this reflective journey was the development of what a participant referred to as an "eagle-eye perspective" on their teaching. This metaphor captures how the program enabled teachers to view their instructional strategies holistically, identifying strengths and areas for improvement. In response to the questionnaire prompts, Mohsen shared, *"Well, I learned how to analyze my teaching practices from a higher perspective."*

This reflective stance not only enhanced their ability to adapt their teaching but also instilled a sense of confidence in their professional growth.

In addition to the above comments, some teachers emphasized that the program encouraged them to challenge their existing methods of instruction, promoting a more dynamic and flexible approach. Ehsan elaborated on his answers by saying, "The program revealed that the future of teaching can be a hybrid job, both on-site and on*line. They implied that we need to think more seriously and critically about how to prepare ourselves for the future."* This shift towards a more questioning and analytical mindset allowed teachers to embrace change and experiment with innovative pedagogical techniques.

Overall, the program's emphasis on reflective and critical thinking stands out as a key contributor to teachers' professional development. By encouraging participants to view their teaching practices through a metacognitive and critical lens, the program enabled them to embrace continuous learning and improvement.

Boosting teacher confidence and student support

The fourth category of themes illustrates how participation in the program enhanced teachers' self-confidence and strengthened their ability to support students effectively. Many participants noted that the AI tools enabled them to go beyond local corrections, fostering deeper learning experiences for their students. Fatima wrote, *"Without AI, my feedback is mostly about grammar or vocabulary mistakes. Now, I can point out issues with coherence and argumentation."* This transition to more comprehensive feedback reflects a significant impact of AI on teaching practices. It demonstrates how technology can complement teachers' expertise and allow them to address more complex aspects of language learning.

Another significant outcome of the program was the marked improvement in teachers' self-confidence. Many participants expressed that learning to use cutting-edge AI tools made them feel more competent and relevant in their profession. For example, Karim explained how the use of AI has fostered his confidence,, *"[The fact] that I use AI in my teaching has made me feel like I'm not different from other professional teachers, even those teaching in more prestigious centres... You know, when I talk to my colleagues, I think we [younger teachers] know more and work better than what more experienced*

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teachers do [because they don't use AI technology in their classes]. They belong to a generation who is unfamiliar with digital technology." This sense of empowerment was particularly important for less experienced teachers who had previously felt overwhelmed by the demands of modern teaching or uncertain about their ability to teach as effectively as more experienced instructors.

Several teachers also remarked on how this confidence extended beyond the use of AI tools, influencing their overall approach to instruction. Hamid wrote, *"I believe that it [the use of AI] is not just limited to language teaching; everything is now facilitated."* This broader impact on professional identity highlights the importance of ongoing teacher education in cultivating a positive and resilient mindset.

Finally, the AI-oriented program helped some teachers build stronger relationships with their students. By using AI to provide timely and constructive feedback, participants reported that they could better address students' individual needs and develop a more supportive relationship with their students. In an interview session, Reza stated, *"I have created telegram groups for all my classes to share the comments and feedback with the students... My students appreciate the feedback they get now. They feel like I'm paying closer attention to their progress."* These improvements in teacher-student interactions demonstrate the multidimensional benefits of the program in enhancing both instructional quality and the classroom experience. It seems, then, that the program not only improved teachers' confidence but also provided the participants with the skills to give meaningful feedback to their students, thereby developing student-teacher relationships in and out of the classroom.

Discussion

The findings presented above revealed that participation in the AI-oriented teacher education program significantly influenced various aspects of the participants' professional activities. Teachers reported that the program not only equipped them with the practical skills to integrate generative AI tools into their instruction but also transformed their perspectives on teaching, learning, and professional growth. The impact of the program was evident in their reflections, which highlighted improvements in their instructional practices, efficiency, self-confidence, and reflective thinking. By integrating

AI into their teaching practices, participants reported that they could decrease their workflows, enhance the quality of instruction, and provide more engaging and inclusive learning experiences for their students. These findings highlight the multifaceted influence of the program on teachers' professional development.

The study's findings provide empirical support for the speculations that emphasize the potential of AI to enhance instructional quality. For instance, Holmes et al. (2019) reported that AI-supported tools would enable teachers to create differentiated materials, accommodating diverse learner needs. Similar to the current study, their study highlighted the adaptability AI offers for designing engaging and context-specific lessons. However, this study extends the literature by demonstrating how AI integration fosters exposure to different varieties of English, a novel contribution that highlights the role of AI in promoting cultural and linguistic diversity in language education.

The optimization of teaching efficiency observed in this study corroborates findings by Hashem et al. (2024) and Goldman et al. (2024), who documented significant time savings in lesson planning and grading due to AI integration. Participants in both studies noted that these efficiencies allowed greater focus on creativity and individualized instruction. Nonetheless, the current study uniquely reveals how these time savings translate into opportunities for reflective and collaborative professional growth, an area underexplored in existing research.

Reflective and critical thinking emerged as another critical outcome of this program, and it goes in line with Dewey's (1933) foundational theories on reflective practice, which stress the importance of analyzing teaching methods for continuous improvement. Unlike earlier studies that primarily emphasize the technical benefits of AI tools (e.g., Luckin & Holmes, 2016), this study sheds light on how AI can promote a holistic, critical perspective on pedagogy and how it can enable teachers to identify and address gaps in their strategies dynamically.

Finally, the program's influence on teacher confidence echoes the findings reported by Ertmer and Ottenbreit-Leftwich (2010) and Sapkota (2022), who observed that technology integration boosts educators' sense of competence and professional identity. The current study takes this a step further by illustrating how AI-driven feedback strengthens teacher-student relationships. Participants noted that personalized feedback

mechanisms not only improved student outcomes but also deepened classroom rapport, a dimension less frequently addressed in AI education literature.

In contrast to the findings of the present study, conflicting findings have been reported in other research. For example, Henderson and Corry (2021) reviewed several empirical studies that reported integrating AI tools led to increased teacher anxiety and reliance on technology, which, in turn, hindered the development of pedagogical autonomy. Similarly, Wang and Cheng (2021) and Muranga et al. (2023) reported minimal impact of AI tools on teachers' instructional practices, attributing this to a lack of sufficient training and technical support. These discrepancies could be explained by contextual factors such as program design and duration. The present study's focus on practical aspects of teaching may account for the positive outcomes observed here.

Theoretically, the findings can be discussed in light of Vygotsky's (1978) sociocultural theory, which emphasizes the role of tools and mediated learning in professional development. A central concept in this framework is the Zone of Proximal Development (ZPD), which refers to the range of tasks that individuals can perform with guidance but not yet independently. In this study, AI tools acted as mediators, expanding teachers' ZPD by providing real-time support and scaffolding, enabling them to experiment with novel instructional strategies and gain confidence in their application. However, as highlighted by Henderson and Corry (2021), the absence of sufficient scaffolding can present challenges in integrating technology effectively, underscoring the need for structured training programs.

Furthermore, the findings resonate with Schön's (2017) concept of the reflective practitioner, which describes how professionals engage in continuous cycles of action and reflection to refine their practices. In particular, Schön distinguishes between "reflection-in-action," which occurs during an activity, and "reflection-on-action," which happens after an activity has been completed. In this study, AI tools facilitated real-time feedback and analysis, aligning with Schön's model of reflection-in-action. By receiving immediate insights into instructional outcomes, teachers were able to adapt and refine their teaching approaches dynamically, reinforcing a deeper integration of reflective practice into their pedagogy.

Finally, the emphasis on fostering teacher confidence and autonomy can be interpreted in light of self-efficacy theory (Bandura, 1997), which refers to an individual's belief in their ability to succeed in specific tasks. The program's design supported mastery experiences, which are direct experiences of success that strengthen self-efficacy by allowing teachers to engage hands-on with AI tools and explore their applications in teaching. Additionally, the constructive feedback they received aligns with verbal persuasion, another key source of self-efficacy, as encouragement from peers and facilitators reinforced their belief in their ability to integrate AI effectively. As teachers observed tangible improvements in their practices and received encouragement, their self-efficacy was strengthened, promoting sustained engagement with innovative teaching methods. This points to the importance of providing adequate training and support to ensure that AI serves as an enabler rather than a barrier to teacher autonomy and confidence.

Conclusion

The findings of this study suggest that the integration of AI into language teaching can have a significant impact on teacher education. The findings also highlight its potential to improve instructional practices, enhance professional development, promote reflective practices, and improve teacher confidence. By integrating AI tools into a structured, practice-driven program, the study demonstrates the multifaceted benefits of technology in addressing the evolving demands of modern classrooms. This work contributes to the growing body of literature on AI in education and provides insights into how sustained and well-scaffolded professional development programs can maximize the potential of AI tools for educators.

The findings carry implications for the design and implementation of teacher education programs. Institutions should prioritize incorporating generative AI tools into their curricula, ensuring that teachers receive both technical training and theoretical grounding. Emphasis should be placed on promoting reflective practices, collaborative learning, and the integration of cultural and linguistic diversity into lesson planning. Additionally, the study highlights the importance of scaffolding and ongoing

technological support to help teachers confidently navigate the complexities of AI integration, paving the way for more inclusive and effective teaching strategies.

While this study provides valuable insights, certain limitations must be acknowledged. First, the sample size was relatively small, and thus, the results are only suggestive. Future research could explore the effects of AI-focused teacher education programs across diverse educational contexts and larger participant groups. Additionally, this study primarily relied on self-reported data, which may be subject to bias. Incorporating classroom observations and longitudinal designs in future studies would provide a more comprehensive understanding of AI's impact on teaching practices. Finally, further research should investigate the long-term sustainability of the observed changes and explore how advancements in AI technologies continue to shape teacher education in the future.

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Appendix

Follow-up semi-structured interview questions

1. In your questionnaire responses, you described your familiarity with generative AI tools and your competence in using technology for teaching. Can you elaborate on your experiences with AI tools and how comfortable you feel integrating them into your teaching practices?
2. How has your participation in this course influenced your understanding of AI in language teaching? What aspects of the course were most beneficial or challenging for you?
3. In your questionnaire responses, you shared the concerns or challenges you had about using AI in teaching. Could you elaborate on these concerns?
4. How do you see AI contributing to your professional growth as an educator? Do you feel additional training or support is necessary to enhance your ability to integrate AI into your teaching?
5. You reflected on whether generative AI tools can help you become a more effective EFL teacher. Could you expand on your views? In what specific ways do you think AI can (or cannot) improve your teaching?
6. Based on your learning in this course, how has your perspective on AI in language teaching evolved? Do you plan to incorporate AI into your teaching practices? Why or why not?