

Proposing an AI-Oriented EFL Teacher Education Model Based on ADDIE

Hussein Meihami^{1✉}  and Sina Omidvar² 

1. *Corresponding Author*, Department of English Language Teaching, Imam Khomeini International University, Qazvin, Iran. E-mail: meihami@hum.ikiu.ac.ir
2. Department of English Language Teaching, Imam Khomeini International University, Qazvin, Iran. E-mail: sinaomidvar707@gmail.com

ABSTRACT

Artificial intelligence (AI) has the potential to transform education by making learning more personalized, interactive, and effective. In the current study, we aimed to propose an AI-oriented English as a Foreign Language (EFL) teacher education model based on the Analyze, Design, Develop, Implement, and Evaluate (ADDIE) instructional design model. We employed descriptive narrative design and the ADDIE model to propose this framework. While trying to construct the qualitative model, we identified six core themes for an AI-oriented EFL teacher education model based on ADDIE: (a) identifying the professional, psychological, and technological needs of teachers; (b) equipping EFL teachers with AI literacy and pedagogical strategies for teaching in the AI era; (c) addressing professional and financial opportunities and challenges in AI-oriented teacher education for effective implementation; (d) addressing educational and social opportunities and challenges in AI-oriented teacher education for effective implementation; (e) implementing AI-oriented teacher education with AI support for effective training; and (f) evaluating the impact of AI-oriented EFL teacher education on teaching practices. We conclude that a systematic AI-oriented EFL teacher education program needs to address both a priori and a posteriori tasks to be effective, encompassing the phases of ADDIE.

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Introduction

The integration of Artificial Intelligence in Education (AIED) has received increasing attention, as technological advancements have significantly influenced both instructional methods and learning experiences (Alasgarova & Rzayev, 2025; Belda-Medina & Calvo-Ferrer, 2022; Karaduman, 2025; Laoha et al., 2025; Luckin et al., 2016; Pokrivcakova, 2019, 2023; Sumakul et al., 2022). Effectively incorporating such technologies into English as a foreign language (EFL) teaching and learning may offer a viable solution to alleviate the challenges associated with material design, enabling teachers to develop instructional resources and perform other pedagogical tasks with greater ease and efficiency (Koraishi, 2023). Therefore, EFL teachers worldwide need to keep up with emerging trends and innovations (Omidvar & Meihami, 2025).

Equipping teachers with the skills to competently employ such technologies has become an essential priority (Son, 2018). Educational psychology literature suggests that the incorporation of Artificial Intelligence (AI) technologies into learning environments has the potential to cultivate greater enthusiasm and preference among EFL learners (Chen, 2022). However, some research studies (e.g., Shen & Guo, 2024) showed that teachers often have negative attitudes toward the use of AI in EFL education. A primary concern is their perceived lack of technological pedagogical expertise necessary to effectively integrate AI into EFL classrooms (Omidvar & Meihami, 2025; Ong & Annamalai, 2024). Moreover, there is a concern among teachers that AI might lead to job loss in the teaching profession (Hopcan et al., 2024). Given the various positive and negative aspects of using AI in EFL teaching and learning, it is essential to develop a model to guide EFL teachers to use AI in their classes.

Analyze, Design, Develop, Implement, and Evaluate (ADDIE) is a widely accepted model for creating instructional materials (Dick & Carey, 2014; Gustafson & Branch, 2002; Magliaro & Shambaugh, 2006; Meihami & Malmir, 2024). ADDIE instructional design facilitates the creation of effective, efficient, and engaging learning experiences, ensuring that its various elements are logically and sequentially interconnected (Russell & Murphy-Judy, 2021). The phases of the ADDIE interact dynamically with each other, leading to the development of fully online, blended, or traditional physical classroom teaching (Molenda, 2003). The implementation of a structured design approach, such as ADDIE, can result in instruction that is more efficient, effective, and relevant than other planning instruction approaches (Omidvar & Meihami, 2025).

There is a practical research gap regarding the need for developing an AI-oriented model in the context of EFL teacher education (Edmett et al., 2023; Pokrivcakova, 2019). Literature on the topic, including the research conducted by Omidvar and Meihami (2025), is concerned with difficulties and possibilities ("what" and "how"). However, the existing literature still lacks systematic studies on how to operationalize the ADDIE model to establish the key elements in designing an AI-oriented EFL teacher education model. The lack of such a model leads to low levels of teacher AI literacy (Edmett et al., 2023). Therefore, further research is required to define these elements. Therefore, this study has a precedent (Omidvar & Meihami, 2025) in which we just outlined the opportunities and challenges of AI for EFL teacher education programs. In the current study, however, we used the ADDIE model to translate those opportunities and challenges into a model, called an AI-oriented EFL teacher education program.

Literature Review

Artificial Intelligence in L2 Education

AI is increasingly transforming second language (L2) education (Zhou & Hou, 2024) by enabling teachers to create dynamic learning environments and automate time-consuming tasks such as assessment, feedback, and course material design (Luckin et al., 2022; Pokrivcakova, 2019). These innovations reduce teacher workload, allowing focus on complex instructional tasks beyond routine grammar and pronunciation exercises (Bayne, 2015; Cooper et al., 2019; Heffernan & Heffernan, 2014). AI algorithms can track learners' progress, analyze errors, and adapt content for personalized practice (Pack & Maloney, 2023). Furthermore, in assessment, AI evaluates grammar, meaning, and discourse structure, providing objective feedback and freeing teachers to offer targeted support (Jeon, 2021; Joo, 2024).

One critical aspect addressed in studies related to AI and L2 pedagogy was the opinions of stakeholders. Aljohani (2021) established an initial positive attitude from both learner and teacher groups toward the integration of AI, though limitations in terms of generalizability were acknowledged. This was corroborated by Sumakul et al. (2022), who conducted qualitative research that found teachers viewed AI as a means to enhance creativity and motivation, with a strong emphasis on the need for adequate teacher preparation. The research then progressed from broad hypotheses to proposing concrete models for implementation, as seen in the instance of Bin-Hady et al. (2023), with the artificial intelligence assisted language learning

model based on grounded theory, to illustrate how ChatGPT actually facilitated language practice and feedback.

The effectiveness of using AI in L2 pedagogy has been the subject of some studies. For instance, Rusmiyanto et al. (2023) reaffirmed through a literature review that chatbots and AI software improve speaking ability through learner autonomy and feedback. Jafarnia et al. (2023), using a mixed-methods design, provided strong evidence that AI usage yields better linguistic capabilities and cultural flexibility, but raised significant ethical concerns regarding students' privacy.

Teacher preparedness was the subject of a revived focus with Pokrivcakova (2023), whose pre-service teacher cross-sectional survey indicated that high support was being expressed for embedding AI, but there was an enormous gap between support being expressed and being delivered in current training, and hence a call was made for an intervention to get curricula up to speed.

Yang (2024) qualitatively noted the positive influence of ChatGPT on some of the writing sub-skills like organization and grammar, and Duong & Suppasetserree (2024) employed quasi-experimentation to demonstrate that AI chatbots could affect significant improvement in speaking ability and motivation. Recently, Omidvar and Meihami (2025) provided a qualitative report on the opportunities and challenges of AI in EFL teacher education programs. Their analysis outlined AI's strengths in individualization, motivation, and efficiency, while systematically examining the accompanying challenges, including gaps in training, ethical dilemmas, and infrastructural issues.

Previous studies have investigated the role of AI in EFL teaching and learning from various perspectives, including teachers' perceptions, students' experiences, and, in some cases, both. Nevertheless, integrating AI into language programs requires comprehensive collaboration among EFL teachers, EFL teacher educators, computer engineers, and AI experts. Despite these findings, there remains a gap in collaboration among these groups in terms of creating an efficient AI-oriented EFL teacher education model. Such a model could lead to an optimal language learning environment in which AI is both beneficial and helpful for facilitating learning.

ADDIE in Teacher Education

The ADDIE model consists of five phases: Analysis, Design, Development, Implementation, and Evaluation. The letter "A" in this model stands for a meticulous analysis. This step involves asking important questions such as

who is leading the project, what the institutional rules are, which technologies will be used, who the learners are, and what the learning objectives and strategies are (Russell & Murphy-Judy, 2021). The first "D" stands for design, which aims to authenticate the expected performances and identify suitable testing procedures (Branch & Varank, 2009). The second "D" in the ADDIE model stands for design, which involves creating a detailed plan for the learning experience (Omidvar & Meihami, 2025). The designer must develop learning objectives that adhere to professional standards and then break them down into unit objectives (Russell & Murphy-Judy, 2021). The implementation phase aims to establish the learning environment and prepare both teachers and learners. The final phase is evaluation, which involves assessing the quality of instructional products and processes both prior to and after implementation (Branch & Varank, 2009).

The ADDIE model of instructional design has been demonstrated to be enduringly useful and adaptable in varied learning environments, as suggested by a temporal literature review of empirical studies from 2010 to 2024 (e.g., Güler & Altun, 2010; Trust & Pektas, 2018). A common refrain from this body of literature is that ADDIE is not employed as an inflexible, linear recipe but rather as a very flexible and robust framework. This adaptability is apparent from the study by Güler and Altun (2010), who added two phases to the simple model to accommodate their specific purpose of identifying learning object design challenges within the framework. This flexibility in addressing ADDIE as a malleable foundation was also noted by Trust and Pektas (2018), who successfully merged it with the principles of Universal Design for Learning to create inclusive online courses. This capacity for integration suggests that ADDIE is effectively an organizational framework that underpins and enhances other pedagogical designs.

The findings of the previous studies also confirm the model's proven effectiveness across a wide range of educational disciplines. Research indicates that its application leads to tangible improvements in learning outcomes, as evidenced by Almelhi (2021), who confirmed a substantive improvement in the creative writing skills of students in an online environment. Moreover, numerous studies have identified that ADDIE-based training maximizes teacher ability. Baldiris-Navarro et al. (2016) and Trust & Pektas (2018) have reported that it effectively boosts teachers' competencies for developing technology-enhanced and inclusive lessons. The model has also been effective in developing specific learning tools, as demonstrated by Eryılmaz Toksoy and Bulut (2022), who utilized the model to create effective physics simulations.

Underlying all of these effective applications is the central importance of the original Analysis phase. The work of Bamrara and Chauhan (2018) highlighted its preeminent importance, recognizing this stage as very useful in establishing true teaching requirements. It is used to establish an important principle of the model: subsequent design, development, and implementation stages rely on a proper and comprehensive needs analysis. A flawed analysis can lead to high-quality instruction that ultimately solves the wrong issue, so this stage is the key building block for any successful instructional endeavor.

Despite its advantages, research does not paint ADDIE as an instructional “cure-all”. The primary issue found by Güler and Altun (2010) was the resource-intensive nature of the content development stage, acknowledging that time and effort are required for quality design. Studies like Almelhi (2021) also caution against environmental constraints, quoting that successful outcomes have low generalizability due to small sample sizes and specific cultural or institutional contexts. Most notably, Bamrara and Chauhan (2018) observed no notable variation in teaching and learning practices after a successful needs analysis, suggesting a potential gap between the identification of needs and the successful modification of practice.

The series of studies also demonstrates a shift in methodological strategies toward measuring the model. Methodologically, studies have shifted from a purely qualitative or quantitative design to a recognized need for the application of a mixed-methods approach. This shift is illustrated by Baldiris-Navarro et al. (2016), who, despite their quantitative positive results, firmly recommended the inclusion of qualitative research in subsequent studies to gain a better understanding. This suggestion highlights that statistics alone cannot tell the entire story of the instructional design process and its impact on both instructors and learners.

The most recent review by Adeoye et al. (2024) provided a fitting macro-level overview of this series of studies. Their comprehensive review confirms that the ADDIE model remains a leading framework for enhancing learning experiences and transforming education in the digital age. However, they noted that its success is not guaranteed, but rather centers solely on adequate resources and facilitation. This conclusion integrates evidence over the last fifteen years, placing the successful use of the model as more than a matter of following procedures—it is a reflective, flexible, and well-documented process that starts with careful analysis and considers the development and practical implementation challenges. The long-term success of ADDIE will therefore depend upon sustained adaptive application, the establishment of robust support infrastructures for implementers, and methodologically sound yet practically oriented research.

Purpose of the Study

A critical issue in EFL teacher education is the absence of a structured model for integrating AI into EFL teacher education programs. Without a rigorous framework, teachers may remain unaware of AI's significant role in education, limiting their ability to adapt to its transformative impact. Consequently, they may be inadequately prepared for future educational contexts and hesitant to incorporate AI into their classrooms (Edmett et al., 2023). The lack of a model to guide the development of EFL teachers' professional competencies in AI usage can contribute to apprehension and reluctance toward adopting AI-oriented tools. Accordingly, identifying the key principles for designing AI-oriented teacher education programs is essential to equip teachers for the evolving demands of EFL education (Pokrivcakova, 2019). Failure to establish such a model impedes the improvement of teachers' AI literacy and undermines efforts to effectively integrate AI into teaching practices. In our previous study (Omidvar & Meihami, 2025), we explored the “what” and “how” of challenges and opportunities of using AI in EFL teacher education programs. As a continuation of this research, we aimed to propose a qualitative AI-oriented model for EFL teacher education. Our objective, thus, was to determine what elements should be included in an AI-oriented EFL teacher education program based on the ADDIE model. Thus, our study builds on earlier work (Omidvar & Meihami, 2025) that outlined the “how and what” of opportunities and challenges of AI for EFL teacher education programs. In contrast, the present study employs the ADDIE model to transform those opportunities and challenges into a proposed model referred to as an AI-oriented EFL teacher education program. Therefore, this study was an attempt to deal with the following research question:

What are the different dimensions of an AI-oriented model of EFL teacher education based on ADDIE?

Method

Research Design

To propose a qualitative model for implementing AI in EFL teacher education, we required the narratives of stakeholders involved in this area, including EFL teachers, teacher educators, and computer engineers. It is critical to mention that the term qualitative in qualitative model means that

the model is based on an exploratory study and needs to be dealt with in quantitative studies to be validated.

The objectives of this study pushed us to conduct a narrative inquiry, as one of the typologies of qualitative methodology. Narrative inquiry involves collecting individuals' stories to analyze and better understand their experiences (Ary et al., 2018). It is a systematic research procedure to help researchers obtain a comprehensive overview of the determining factors in a specific topic. As a design for narrative inquiry, we followed a descriptive narrative design that specifically explores a phenomenon by eliciting detailed accounts of participants and their surrounding context (Edmonds & Kennedy, 2016). It highlights the various challenges and successes within people's stories related to that phenomenon; in this method, participants share their narratives, which the researchers then gather to gain deeper insight (Edmonds & Kennedy, 2016). Since descriptive narrative design revealed the turning points regarding the use of AI in EFL teacher education programs, including the challenges and opportunities (Omidvar & Meihami, 2025), we could identify the main themes to be included in a model for AI-oriented EFL teacher education programs based on ADDIE.

Participants

The participants of this study were the same as the ones participated in the study done by Omidvar and Meihami (2025); however, the purposes of the two studies were different. There were three groups of participants involved in this study. There were 35 EFL teachers, four EFL teacher educators, and four computer engineers. The EFL teachers were selected purposefully, and there were TEFL MA students ($N = 22$), PhD students ($N = 11$), and Ph.D. holders ($N = 2$) that knew about AI and used it both in their classrooms and for the development of their own skills. These teachers were teaching English language in private and public sectors. It is important to mention that the duration of the AI use was less than one year since AI was a recent phenomenon in L2 pedagogy at the time of doing this study. EFL teacher educators were university professors with PhD in TEFL and were familiar with AI; they tried to incorporate the instructions of using AI in TEFL teacher education syllabi. Computer engineers were computer programmers with a profound background knowledge in the area of computers that helped the researcher to obtain further insights and refine the findings. It is also critical to mention that having participants of different jargons helped us obtain multidimensional data about the association between ADDIE and AI, making the final model more robust.

We complied with the rule of data saturation when no new findings would be revealed by adding another participant (Ary et al., 2018). However, when the research had not reached data saturation, new participants were recruited. In case of EFL teachers, the researcher reached data saturation with 30 and yet the researcher continued collecting narratives up to 35 to confirm the trustworthiness. No additional computer engineers and teacher educators would participate in the study due to lack of interest, so this was added as a limitation of the study.

Data Sources

Autobiographical Narratives

Autobiographical narratives are among the most personal methods of gathering information. They allow individuals to describe how specific events or circumstances have shaped their personal lives (Clandinin, 2006). In this study, participants were invited to share their accounts on topics including AI, its educational applications, and its incorporation into EFL teacher education. Contributions were submitted either as voice recordings or written texts. All EFL teachers contributed both spoken and written accounts. Moreover, three EFL teacher educators provided spoken narratives, while one of them also submitted a written piece. In addition, all computer engineers submitted written accounts. It is important to mention that we created a narrative framework and asked the participants to follow it. This framework adhered to Riessman's (2008) fully formed narrative model. According to this framework, we asked the participants to share their experiences in several steps. First, they provided an abstract; then, they identified the setting and clarified their experiences. Third, we asked them to evaluate their experiences and provide results and conclusions through comments.

Semi-Structured Interviews

Semi-structured interviews, which combine prepared and open-ended questions, allow researchers to explore participants' views in depth (Ary et al., 2018). In this study, the interviews explored topics such as integrating AI into EFL teacher education and strategies for enhancing its use in language teaching. They were conducted online via *Telegram* immediately after narrative submission. The reason we used semi-structured interviews was that they helped us clarify the ambiguous aspects of autobiographical narratives. Moreover, it revealed previously unseen aspects in the narratives, contributing to our increased prudence regarding the data. The interviews were held online through *Telegram* right after participants shared their

narratives, lasting between ten and twenty minutes to obtain more in-depth insights.

Data Analysis: Deductive Thematic Analysis

Although the data analysis of our Study 1 (Omidvar & Meihami, 2025) and this one was thematic analysis, we followed different orientations in each. Our analysis orientation in Study 1 was inductive in which we delve into the data to obtain the opportunities and challenges. However, in the current one since we used ADDIE model, we followed a deductive orientation of data analysis.

To propose a model based on ADDIE, showcasing the critical components of an AI-oriented EFL teacher education program, we followed a deductive thematic analysis (Braun & Clarck, 2006, 2023). The reason we chose deductive thematic analysis was that we employed ADDIE phases as the basis for codifying the data sources. Therefore, we defined and described the stages of ADDIE both theoretically and operationally to codify the data. Then, by following the phases of thematic analysis, we constructed the main aspects of an AI-oriented EFL teacher education program in terms of themes. We utilized the ADDIE framework for several theoretical and practical reasons. First, ADDIE is theoretically robust, effectively illustrating the essential stages involved in the design and development of educational online environments. Second, the framework provides clear delineations through the detailed descriptions of each stage, which can significantly aid in the data analysis process. Finally, from a practical standpoint, ADDIE equips us with the necessary evaluative tools to create a practical model for AI-oriented EFL teacher education programs.

Analysis. It enables the designer to understand participants, technological tools, and any other necessary elements for running the project (Russell & Murphy-Judy, 2021). This stage aims to articulate the project's requirements and identify its limitations. Its main objective is to clarify informational challenges and identify objectives, learners' knowledge, abilities, and skills (Szabo, 2022). In the analysis phase, we reviewed the obtained data, identifying opportunities and challenges (Omidvar & Meihami, 2025), and attempted to determine the primary needs and requirements of teachers related to an AI-oriented EFL teacher education model.

Design. This stage is crucial for fulfilling the training goals (Szabo, 2022). In the design phase, a specific plan for instruction, including instructional

methods, activities, and media, will be developed (Allen, 2006). This phase aims to ensure that learning objectives are achievable (Arkün & Akkoyunlu, 2008). In the design phase of the ADDIE, creativity is essential (Omidvar & Meihami, 2025). In the design phase, we reviewed the obtained data, identifying opportunities and challenges, and, based on the analysis phase, attempted to pinpoint areas where teachers should be trained using an AI-oriented EFL teacher education model.

Development. The content and materials, which were a prototype in the previous phase, will be further developed during this phase (Yeh & Tseng, 2019). At this stage, the primary focus is on organizing the gathered learning materials and technological tools. The instructional designers examine ways to incorporate these supporting materials and tools into instructional activities, ensuring alignment with instructional objectives (Yeh & Tseng, 2019). In the development phase, we reviewed the obtained data, identifying opportunities and challenges, and, based on the analysis and design phases, attempted to identify factors that could contribute to or hinder the implementation of an AI-oriented EFL teacher education program.

Implementation. In this phase, the provided lesson will be delivered to actual learners (Yeh & Tseng, 2019). This stage allows the instructional designer to evaluate the entire process more precisely (Yeh & Tseng, 2019). This phase aims to ensure that learners understand the instruction. Subsequently, participants' performance provides feedback for the instructional designer (Allen, 2006). In the implementation phase, the researcher reviewed the obtained data, identifying opportunities and challenges. Based on the analysis, design, and development phases, it was proposed that implementing AI-oriented EFL teacher education programs with AI support is necessary for successful training.

Evaluation. Evaluation is an ongoing process that begins during the analysis phase and continues throughout the entire instructional system cycle (Allen, 2006). Formative and summative evaluations play distinct roles in the instructional design process. Formative evaluation occurs at each stage to ensure that instructional designers thoroughly address the needs of each stage (Allen, 2006). On the other hand, summative evaluation occurs at the end of the program to assess its overall effectiveness (Allen, 2006). In the evaluation phase, we recommended that evaluating the impact of AI-oriented EFL teacher education on teaching practices is necessary for further reforms, encompassing the design, development, and implementation phases.

Findings

What are the Different Themes of an AI-Oriented Model of EFL Teacher Education Based on ADDIE?

We used MAXQDA 24 to analyze the data sources and linked them to the stages of ADDIE. To this end, after codifying the data, we utilized Code Map to obtain a comprehensive overview of the challenges and opportunities associated with AI and the ADDIE stages. The proximity of two items on the Code Map associates with their data usage; consequently, the closer the items are on the map, the more similar they are in terms of their data characteristics. To obtain the Code Map, we activated documents from the three groups, EFL teachers, EFL teacher educators, and computer engineers, along with codes related to challenges, opportunities, and the phases of the ADDIE model. This process aimed to establish a connection between the identified challenges and opportunities and the phases of the ADDIE model.

We derived six themes corresponding to the five phases of the ADDIE model (Figure 1). The themes were assigned based on insights derived from narratives, semi-structured interviews, and theoretical and empirical studies. Themes are as follows: (a) identifying the professional, psychological, and technological needs of teachers; (b) equipping EFL teachers with AI literacy and pedagogical strategies for teaching in the AI era; (c) addressing professional and financial opportunities and challenges in AI-oriented teacher education for effective implementation; (d) addressing educational and social opportunities and challenges in AI-oriented teacher education for effective implementation; (e) implementing AI-oriented teacher education with AI support for effective training; and (f) evaluating the impact of AI-oriented EFL teacher education on teaching practices.

The first theme is identifying teachers' professional, psychological, and technological needs. In the analysis phase, gathering information helps designers design a program that addresses gaps. Accordingly, conducting surveys, interviews, and contextual analyses is important. Designers should identify teachers' diverse needs, such as their professional development goals, psychological readiness to adopt new technologies, and the current levels of technological proficiency.

Moreover, the second theme is equipping EFL teachers with AI literacy and pedagogical strategies for effective teaching in the era of AI. In the design phase, the objective is to develop a curriculum that encompasses both pedagogical materials and theoretical knowledge, as well as practical skills for utilizing AI efficiently.

We identified two themes related to the development phase, primarily due to the high density of the codes. During the development phase, resources and materials are created to address professional growth opportunities and financial challenges associated with adopting AI. This includes designing cost-effective training modules and developing strategies to maximize teachers' professional benefits while minimizing financial barriers. Addressing these aspects ensures that AI-oriented EFL teacher education is both accessible and sustainable, which can lead to widespread adoption. Moreover, in the development phase, emphasis is placed on creating resources that maximize educational and social opportunities while addressing challenges. This involves designing comprehensive content that ensures equitable access to AI tools and incorporates ethical considerations into its development. By addressing these social and educational factors, this phase ensures that AI adoption generates positive outcomes for teachers and learners across diverse settings.

The fifth theme is the implementation of AI-oriented teacher education with AI support for effective training. The implementation phase is where the developed resources and strategies are put into practice. AI-oriented teacher education programs are employed with support systems to ensure effective training. This includes practical workshops, virtual training sessions, and real-time assistance using AI tools. Effective implementation ensures that teachers can apply their knowledge in practical scenarios, thereby bridging the gap between theoretical understanding and classroom application.

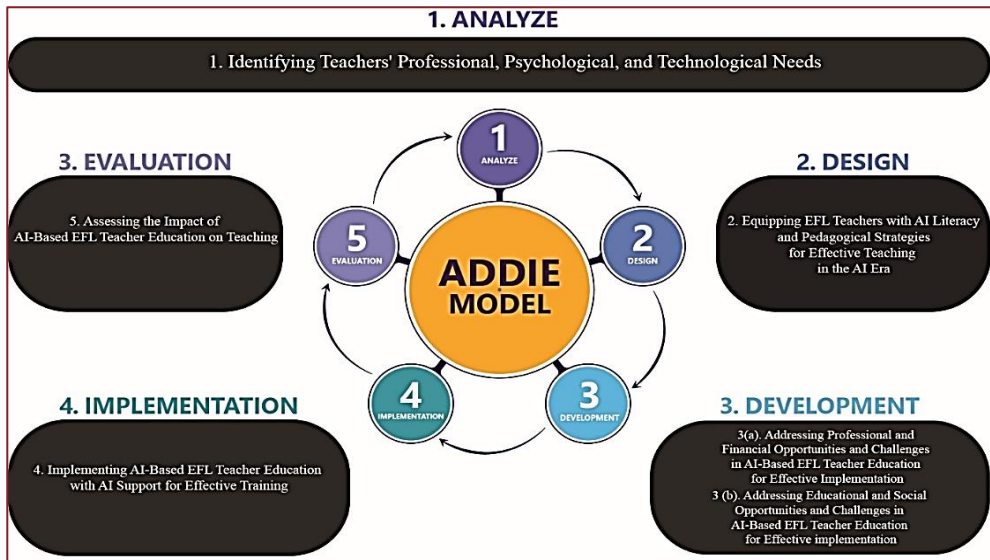
Figure 1:

Extracting themes for an AI-oriented EFL teacher education model through code map



Figure 2.

An AI-oriented EFL teacher education model based on ADDIE



The sixth theme is evaluating the impact of AI-oriented EFL teacher education on teaching practices. The evaluation phase measures the outcomes of the AI-oriented EFL teacher education program. This involves assessing its impact on teachers' instructional practices, students' learning outcomes, and overall teaching efficiency. Feedback is collected through performance evaluations, surveys, and classroom observations to identify areas for improvement. A thorough evaluation ensures that the program not only meets its objectives but also evolves to meet future opportunities and challenges.

By identifying the correspondences between the six extracted themes and the stages of ADDIE, we proposed a qualitative model for AI-oriented EFL teacher education (Figure 2). In the analysis phase, the model focuses on identifying teachers' professional, psychological, and technological needs, ensuring that the program addresses specific gaps and prepares teachers for the effective integration of AI tools in their teaching practices. The design phase emphasizes equipping EFL teachers with AI literacy and modern pedagogical strategies, facilitating the development of AI competencies alongside contemporary teaching methodologies. In the development phase, the model addresses professional, financial, educational, and social opportunities and challenges by creating resources that provide effective access to AI tools while considering ethical implications. The Implementation phase involves delivering the program with AI support to ensure effective

training and the application of AI tools in classroom settings. Finally, the evaluation phase focuses on assessing the impact of AI-oriented teacher education, measuring its effectiveness in enhancing teaching practices and improving learning outcomes. This systematic AI-oriented EFL teacher education model offers a comprehensive framework for preparing teachers to effectively navigate the AI era.

Discussion

The thrust of this study was to develop a qualitative model of an AI-oriented EFL teacher education program based on the ADDIE model. This model is a systematic framework that encompasses six themes and five phases, corresponding to the five stages of the ADDIE model, to ensure the effective and proper utilization of AI in teacher education (Jamal, 2023). Teachers should not be AI experts to use AI tools such as chatbots in their classrooms; they only require basic ICT skills and reliable access to technology. Furthermore, the computer-assisted language learning teacher training aims to familiarize teachers with the latest AI tools and equip them with the knowledge and skills to effectively integrate these tools into their teaching (Pokrivčáková, 2019).

We found that a model of AI-oriented EFL teacher education programs should address the needs of EFL teachers in terms of professional, psychological, and technological aspects. Peters (2006) proposed integrating the technological and teaching aspects throughout training programs rather than separating them into distinct modules. Similarly, Kessler (2006) emphasized that fundamental technical skills should be taught instead of training teachers for specific applications or programs, as these may quickly become outdated. According to Abdelhalim (2016), teachers only use technology for simple tasks such as sending and receiving emails or conducting internet searches.

Subsequently, teachers need to receive training facilitated by AI, comprehend the structure of such training, and assess their own performance (Deng et al., 2022). Huang et al.'s (2024) findings demonstrate that the acceptance of generative AI serves as a positive predictor of EFL learners' well-being in digital EFL learning. Huang et al. (2024) emphasize the crucial role of generative AI in enhancing the well-being of learners, advocating for its integration into education. AI tools have the potential to enhance personalized learning, boost confidence, and foster autonomy. Therefore, teachers should enhance their AI literacy through professional development

for effective implementation (Belda-Medina & Calvo-Ferrer, 2022; Pokrivčáková, 2019, 2023).

Regarding the design stage of ADDIE, we found that to have an effective design of an AI-oriented EFL teacher education program, instructional designers need to consider the importance of EFL teachers' AI literacy and pedagogical strategies. According to Hubbard and Levy (2006), a proficient CALL teacher must possess both educational and technical competencies. EFL teachers should be prepared to use AI efficiently (Pokrivčáková, 2019, 2023). Moreover, the proposed professional development programs should provide teachers with a fundamental understanding of common AI procedures and practices (Nazaretsky et al., 2022). Teachers should be trained to effectively use chatbots and to recognize both their opportunities and challenges in language learning (Belda-Medina & Calvo-Ferrer, 2022). The findings of Omidvar and Meihami's (2025) study, particularly in the opportunities section, emphasize the importance of enhancing EFL teachers' professional knowledge to effectively integrate AI. This includes training on how to design AI-oriented lesson plans, create personalized learning experiences, and enhance language skills. (Bin-Hady et al., 2023; De La Vall & Araya, 2023; Pokrivčáková, 2019, 2023; Wang et al., 2023).

When it comes to the development stage of an AI-oriented EFL teacher education program, we found that the professional and financial opportunities and challenges have to be critically dealt with. Nazaretsky et al. (2022) suggest that professional development can be enhanced through workshops, seminars, and courses, where teachers are introduced to various AI-oriented tools and techniques and learn how to effectively integrate them into their teaching practices. Furthermore, teachers should gather together for collaborative learning to share their knowledge and learn from the experiences of other teachers (De La Vall & Araya, 2023). Moreover, several AI language learning tools offer free or low-cost options, making them more budget-friendly compared to traditional methods, such as in-person classes or private tutoring (De La Vall & Araya, 2023). Remarkably, as discussed previously, the integration of AI into education requires adequate infrastructure (Nye, 2015). Subsequently, governments and decision-makers should prepare the ground for applying technology in education (Demetriadis et al., 2003).

In addition to the professional and financial opportunities and challenges that should be addressed during the development stage, educational and social opportunities and challenges require critical attention when modeling an AI-oriented EFL teacher education program. In the context of AI-oriented teacher education, it is essential to address both educational and social

opportunities and challenges to ensure the effective implementation of this approach. One significant concern is the protection of language learners' personal data, which should be treated with caution and only shared with their explicit consent. This includes sensitive information, such as learners' proficiency levels, learning styles, and their progress. Additionally, human interaction plays a crucial role in language learning, and AI-oriented tools should not replace or diminish interpersonal connections between teachers and students (De La Vall & Araya, 2023).

Moreover, AI tools often struggle to comprehend human creative works, such as poetry, and may encounter challenges with tasks that require advanced language skills, including complex grammar and sophisticated vocabulary (De La Vall & Araya, 2023). Accordingly, the professional development programs should enable teachers to accurately assess the reliability of automated results and provide insight into the types of errors the system may produce (Nazaretsky et al., 2022). To effectively integrate AI into the classroom, teachers need to be equipped with the right mindset, skills, vision, and ethical understanding regarding the use of AI in education (Luckin et al., 2022). Teachers should develop their own inner ethical criteria rather than merely applying external ethical guidelines. Therefore, if teachers are informed of how AI operates and how to use it effectively, as well as its strengths and limitations, they can manage challenges more effectively (Wang et al., 2023). Addressing these concerns requires a balanced approach that ensures AI complements human teaching while safeguarding privacy and promoting meaningful teacher-student interactions.

We found that during the implementation stage of AI-oriented EFL teacher education programs, educators should consider AI support to be very critical. It is important to note that while AI tools can complement traditional language learning methods, they cannot fully replace teachers or tutors (Følstad & Brandtzaeg, 2020). To alleviate EFL teachers' concerns, it is crucial to provide ongoing support and guidance as they integrate AI tools into their teaching practices. This support should be both technical, answering their questions, and pedagogical, offering feedback and guidance on how to effectively use AI tools in the classroom (De La Vall & Araya, 2023).

Ultimately, we concluded that evaluation should be an integral part of AI-oriented EFL teacher education programs. This can be achieved through ongoing evaluation of the impact of AI on teaching outcomes and processes. As the proposed model is systematic, due to its roots in ADDIE, assessing the impact of AI-oriented EFL teacher education on teaching requires evaluating both the enhancement of teaching practices and the overall effectiveness of integrating AI into the classroom. A comprehensive evaluation, incorporating

both qualitative and quantitative data, is essential to determine how AI-oriented teacher education influences EFL teaching practices and contributes to improved teaching and learning outcomes.

Conclusion and Implications

This study aimed to propose a qualitative model of AI-oriented EFL teacher education based on ADDIE. In other words, we wanted to know what is critical to be taken into account in each stage of ADDIE when EFL teacher educators try to pursue an AI-oriented EFL teacher education program. The analysis of data led us to conclude that a systematic AI-oriented EFL teacher education program needs to deal with some a priori and a posteriori tasks to be effective. The a priori tasks, mainly related to the first three phases of ADDIE, include exploring the current status of professional, psychological, and technological needs, highlighting pedagogical strategies in educational programs, and addressing the opportunities related to professional, financial, social, and educational aspects brought about by AI. Such a priori tasks enhance the systematicity of AI-oriented EFL teacher education in that they lead to correspondence between the audiences and the programs. Regarding a posteriori tasks, which are primarily associated with the last two phases of ADDIE, they will enhance the consistency of the programs by providing critical lenses to assess the program's appropriateness for new challenges.

The qualitative model proposed in this study can contribute to enhancing EFL teacher educators' comprehensive understanding of how to administer their AI-oriented EFL teacher education programs. Having a rigorous model to utilize AI in EFL teacher education programs might help teachers become informed about the significant role of AI in education. Therefore, they can prepare themselves properly for the future of education and the transformative effects of AI. Having a model to develop EFL teachers' professionalism in using AI in their teaching might remove their fear of using AI in their classes (Edmett et al., 2023). Therefore, we need to understand the main points concerning the development of a model for AI-oriented teacher education programs (Pokrivčáková, 2019). However, the AI-oriented EFL teacher education model proposed in this study remains theoretical and has yet to be empirically tested. Future research should focus on applying and evaluating this model in real-world EFL teacher education programs to assess its effectiveness and inform further refinements. Moreover, future research studies can focus on how to deal with different typologies of AI when it comes to be used in different aspects of L2 pedagogy, including materials

development and evaluation, assessment and feedback, and skills and subskills.

The current research took place within a specific EFL context in Iran, which restricts how broadly the results can be applied beyond Iranian learners and educators. As a result, the findings may not capture viewpoints from other cultural or instructional environments. To gain a fuller picture of how AI can be incorporated into EFL teacher preparation, subsequent studies ought to involve participants from a wider range of cultural and educational backgrounds. Additionally, the sample size was limited, only four EFL teacher educators and four computer engineers took part, and this proved too small to reach data saturation, the same limitation existed in Omidvar and Meihami (2025).

Declaration of Generative AI and AI-Assisted Technologies in the Writing Process

No AI or AI-assisted technologies were used in the writing process (Just Grammarly, for checking the structures).

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ORCID

Hussein Meihami  <https://orcid.org/0000-0003-4680-9860>
Sina Omidvar  <https://orcid.org/0009-0002-9305-8393>

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