

EFL Instructors' AI Competency: Scale Development and Validation

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Abstract

The rapid integration of Artificial Intelligence (AI) into language education means that Teaching English as a Foreign Language (TEFL) instructors require specific competencies in AI in addition to generic digital literacy competencies. However, there is a significant gap with respect to validated tools that assess these AI competencies, especially in low-resource contexts. As such, the purpose of this study was to develop and validate a questionnaire to measure AI competencies in Iranian TEFL instructors. The item pool was developed with consideration of a comprehensive literature review. After a pilot study, a 24-item instrument was given to a sample of 265 instructors. Exploratory Factor Analysis (EFA) showed a solid five-factor structure comprised of Professional Development and Willingness to Learn, Ethical, Privacy and Bias Awareness, Technical Proficiency in AI Tools, AI Knowledge and Awareness, and Pedagogical Integration of AI, which explained 70.14% of total variance. The questionnaire demonstrated high reliability, with a Cronbach's alpha of .93 for the whole scale for the subscales. Overall, the results provide a sophisticated understanding of the construct, offering policymakers and teacher trainers a diagnostic tool that can lead to planned professional development to help effectively, ethically, and pedagogically integrate AI into English as a Foreign language (EFL) education practices.

1. INTRODUCTION

The use of technology in teaching TEFL has permeated every aspect of modern teaching and learning. Today's digital tools and platforms - computers, tablets, and smartphones - are embedded in our daily routines and fundamentally reshape the ways we conceive of language teaching and learning. However, having the tools to integrate technology into an EFL classroom is not enough; teachers also need to have the competencies to use them. Digital competencies refer to the collection of knowledge and skills, that are needed when using ICT and digital media to perform tasks, communicate, collaborate, solve problems, create and share content for leisure, work, participation, socializing, or learning (Ferrari, 2012).

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With many advances in digital learning, especially in AI powered language education, the landscape for teaching and learning is transforming. Digital competencies have been defined by [González-Prida \(2024\)](#) as a collection of integrated skills that encompass the development of information literacy, communicating and collaborating in digital environments, creating digital content, and resolving problems in ethical ways. For EFL teachers, the impact of these competencies is important for managing the demands related to education in post-pandemic settings ([Rosli et al., 2024](#)) in an environment that is basically shaped by technology and requiring the incorporation of a growing array of AI elements. While AI offers significant potential for personalizing learning pathways, providing immediate feedback, and tracking student progress, many teachers still lack a clear, practical understanding of how to effectively integrate these tools into their teaching ([Cioci, 2024](#)). A number of studies demonstrate that teachers lack technical proficiency and pedagogical knowledge for the implementation of AI applications (intelligent tutoring systems) or AI language-learning algorithms ([Chiu et al., 2024](#); [Ng et al., 2023](#); [Selwyn, 2021](#)). The risk is that the divide between the promises AI provides in classrooms and the capabilities of the instructors using it will become an irreconcilable gap that will prevent the transformative outcomes of AI for EFL learners.

This challenge is amplified in resource-poor contexts such as Iran, where limited infrastructure and training deepens disparities in AI utilization. Although recent efforts, such as the framework by [Chiu et al. \(2024\)](#), have begun to address AI-specific variables, there remains a scarcity of validated instruments that operationalize these constructs—particularly in the context of TEFL and in resource-constrained environments like Iran. Without standardized tools to assess readiness to utilize AI, educators are left with no means to identify gaps in these skills or tailor a program of professional development training. A strong theoretical foundation is required to describe and delineate the specific competencies of interest to systematically address this gap. Therefore, the present study is theoretically grounded in the Technological Pedagogical Content Knowledge (TPACK) framework ([Mishra & Koehler, 2006](#)). TPACK argues that effective technology integration involves the complex interplay of Content Knowledge (CK), Pedagogical Knowledge (PK), and Technological Knowledge (TK). While TPACK provides a robust basis for understanding general technology use, its Technological Knowledge (TK) construct is broad and does not explicitly encompass the unique competencies that are required for AI.

AI introduces new, specialized layers to teaching such as understanding machine learning algorithms, identifying and mitigating algorithmic bias, and managing student data privacy that general technological knowledge does not adequately address. Accordingly, this study aims to build upon and specialize the TPACK framework by identifying the specific competencies that are related to AI. The goal is to inform the construction of a specialized 'AI-TPACK' model for TEFL instructors, thereby filling the conceptual and practical gap left by more generic digital literacy frameworks. In this light, the developed questionnaire operationalizes this proposed 'AI-TPACK' construct and as such translates its theoretical dimensions into a measurable tool.

The initiative to establish specific competencies for teachers regarding AI aligns with a growing body of research that focuses on conceptualizing the integration of AI in educational settings. New frameworks that address the distinct aspects of AI have been developed to improve foundational models like TPACK. For example, the AI-TPACK framework clearly outlines the knowledge intersections among AI, pedagogy, and content and offers a structured approach for teacher development during the AI age ([Kohnke, 2023](#)). Likewise, other frameworks, including the AI Literacy Framework for Teachers ([Ng et al., 2023](#)) and the AI Competency Framework for Educators ([Chiu et al., 2024](#)), have identified key competency areas that cover a spectrum from technical knowledge to ethical considerations. Although these frameworks offer critical theoretical support, a persistent issue identified in the literature is the lack of validated, context-specific tools

to implement and gauge these competencies, especially in EFL settings and under-resourced environments (Yuliani et al., 2024). Thus, this study contributes to the theoretical conversation by creating and validating a quantifiable construct of AI competency. In doing so, it presents an empirical tool designed to connect high-level AI-TPACK frameworks with the practical assessment requirements in teacher professional development. By assessing a series of core dimensions of AI-related skills from implementation of technology to ethical decision-making, a standardized approach to assessing readiness will provide educators with measures of their competence and to inform the development of targeted professional learning. This study will ultimately inform policy and practice around integrating AI into EFL education ensuring use is pedagogically sound, contextually driven, and ethically responsible.

2. LITERATURE REVIEW

In education, many conversations are taking place about what AI can do. Some individuals appreciate the benefits of AI such as the ability to develop learning content that is ideal for each student, while others highlight the ethical concerns (Tenberga & Daniela, 2024). The application of AI tools to EFL programs provides innovative ways to address common barriers to learning. The benefit of AI tools is that they present a more enjoyable and personalized experience for students, which provides them with a safe and focused way to learn (Busso & Sanchez, 2024).

TEFL Instructors' AI Competency

The increasing prevalence of AI in TEFL cannot be overlooked as it applies to the enhancing capacities of teachers. In the first instance, how teachers can use AI tools is essential because how well AI can be embraced will inform the quality of classroom teaching and learning. AI tools foster a safe condition through practice, which can reduce the anxiety learners may be experiencing, and can help them be more fluent (Busso & Sanchez, 2024). This is particularly valuable in L2 contexts, where learners often face speaking anxiety; for instance, Jeon and Lee (2023) observed that chatbots can act as low-stakes interlocutors, allowing students to practice conversation without the fear of judgment. Furthermore, these tools enable a personalized approach to learning, allowing students to progress at their own pace (Eldin, 2024). Jeon and Lee's study also highlights the role of AI as a content provider, capable of generating and customizing materials to suit individual learner needs, thereby supporting personalized learning pathways. Specifically, AI implementation contributes to better teaching and learning by enabling personalized instruction and automating feedback. For example, AI can tailor vocabulary exercises to individual student levels and provide instant corrections on grammar, which is particularly valuable in contexts like Iran with large class sizes, as noted in studies on digital competency in similar post-pandemic settings (Rosli et al., 2024).

Additionally, with developments in education and the increased use of AI in teaching, it is essential that teachers move beyond a theoretical comprehension of AI integration and develop a practical, functional understanding of how AI tools operate and can be applied in teaching. This transformation requires a teacher competency framework to guide the design of effective AI literacy training and workshops. These AI literacy frameworks are supposed to contain both technical and pedagogical components, where technology is a key to improving learning in deeper levels (Casal-Otero et al., 2023).

Crucially, this practical understanding must extend to the critical and ethical dimensions of AI use. Teachers' perceptions of AI feedback systems are shaped by their understanding of AI's capabilities. These various responses necessitate specific training and awareness-raising (Popenici

& Kerr, 2017). Educators should learn to critically review AI-determined input in order to implement it in service of a broader range of ethical objectives in educational practice. This can ensure a higher quality of education, where instead of just playing the role of provider of content, educators establish a value-driven pedagogy. Such a role includes a higher range of applications, such as: ensuring student autonomy by utilizing AI as a tool for consultation, not compliance; ensuring student data privacy in respect of their own interactions; fostering critical digital literacy by informing students to question AI-generated outputs. With such practice, L2 teachers' responsibility changes from a mere transmission of information to curation. Accordingly, technology implementation is consciously infused with ethical representation and produces greater levels of critically aware and empowered language learners.

Finally, teachers' perceptions of AI's role in the educational arena can greatly affect its adoption. Many teachers recognize that AI can improve their teaching but cannot replace some of the human aspects of teaching and learning. This displays the continuing relevance of a high level of AI proficiency for teachers to use AI effectively, while still maintain meaningful relationships with students (Patiño et al., 2024).

Key Components of AI Competency in TEFL Instructors

The components of knowledge of basic concepts of AI, familiarity with applying AI instruments, skills to incorporate AI into teaching practices, and familiarity with ethical issues are the most important facets of AI competency among TEFL teachers, which are important in making sure that AI becomes properly implemented into language teaching (Chiu et al., 2024; Ng et al., 2023; Selwyn, 2021; Tondeur et al., 2017).

The first component is AI knowledge. The modernization of language teaching and an improvement in the teaching results require TEFL instructors to have modern knowledge about their subject. As the use of AI technologies continues to grow in the educational context, educators should acquire a particular set of competencies regarding AI to be able to implement such tools in the delivery of classes.

The necessity of a thorough professional development program can also be considered as one of the principal themes in the improvement of AI competency among TEFL instructors. Research states that AI programs should also be practical in their coursework, in which instructors can learn how to apply AI tools in practice (Güneyli et al., 2024). This is pivotal because practical engagement with the AI applications can go a long way in enhancing the confidence and competence levels of the teachers towards using the technologies. As an example, professional training can include the use of AI in personalized learning, where educators will learn how to customize the learning experience on an individual basis because of assessment and performance data generated by AI (Alnasib, 2023; Güneyli et al., 2024).

The second component, technical knowledge of AI, is a key requirement for instructors in the field of TEFL especially with the recent developments associated with the education world. Expertise in these tools can create significant efficiencies in teaching, enable more personalized instruction, and streamline administrative tasks. It also could streamline the administrative aspects of teaching. This section is going to address the most significant areas where TEFL instructors have to be proficient in the technical aspect and the implications of skills of teaching to language education. The EFL teachers must prioritize acquisition of technical skills on different AI tools that can facilitate language acquisition. As an example, smart systems tutoring (ITS) and AI-based language learning tools (e.g., Duolingo or Rosetta Stone) provide individual feedback and adjustable learning plans to students (Güneyli et al., 2024). As Güneyli et al. claim, professional

learning focusing on these technologies may help a teacher deliver instruction that will address the needs of different students.

Additionally, proper use of writing-assistive technologies, like Grammarly, is also one of the situations in which technical competence is helpful to TEFL instructors (Alnasib, 2023). The programs can give instant results on grammar, style, and coherence so that the instructors can concentrate on the teaching of higher-order thinking skills and language structure. Liu (2023) notes that knowing how to use the tools is only part of effective writing instruction. Educators must also be able to interpret the AI-generated feedback to improve the writing process.

Another important part of technical competence is the ability to analyze and use data created by AI tools. AI applications can usually give instructors an understanding of student performance and learning patterns (Akgün & Greenhow, 2021). In particular, knowledge of data analytics enables instructors to track regions where students have performed poorly and revise their teaching methods in line with the scientific literature (Marković et al., 2022).

Pedagogical integration of AI is the third component. Integrating AI into TEFL classrooms can increase the efficiency and effectiveness of teaching and enhance student motivation. Educators should implement AI tools in a way that aligns with clear pedagogical objectives and creates an engaging and equitable learning environment for language learners. Among the foremost advantages of AI usage in the TEFL, one might note the possibility to customize learning experiences of students. Intelligent tutoring systems are AI driven and can enable instructors to adjust education material and assessment according to the needs and progresses of individual learners. Research has shown that the systems based on machine learning may in real-time adjust to the student contributions thus establishing a personalized learning path and maximizing interaction and memorability (Güneyli et al., 2024; Liu, 2023).

Application of AI in the process of assessment and feedback in the TEFL context has become essential to the teaching instructor and this is achieved through applying technology to streamline the teaching and learning process to maximize the learning outcomes. The fact that it processes data rather fast, its feedback systems can be personalized to fit the needs of the individual and that the system can offer real-time analysis can also be of good help in terms of monitoring a student and providing instructions which are personalized to them. It explains how TEFL instructors can take account of the utilization of AI tools in their assessment in relation to the available literature. The AI tools have revolutionized the traditional assessment because they are able to provide efficient assessment activities. In order to assess the writing, automated writing evaluation (AWE) systems are utilized as machine learning to determine the level of writing by the student on a grammar, syntax, and overall coherence (Li, 2024).

Moreover, AI assessment tools can adapt to the individual needs of the students as they can evaluate their performance over time. This can be done using AI which will allow it to identify the strengths and weaknesses and prescribe the assessment in a manner that challenges all the students (Yin et al., 2022). Besides developing language skills, such an individualized option also promotes students' engagement level since learners are more likely to receive their own kind of support which is associated with their needs.

With the rising trend of AI in the education sector, TEFL educators should be cautious of the ethical, privacy, and bias issues that are present or tied to the implementation of AI devices. Such awareness is needed to guarantee fair and effective language teaching procedures and keep student confident. The subject of AI ethics in education is multifaceted, and educators must address this issue using bias, transparency and accountability as the major points of their course of action. Most of the guidelines on AI that are available to date seem to consider ethical concepts like privacy and autonomy (Jobin et al., 2019). In addition, the majority of these guidelines fail to

address how to implement responsible innovation to promote these ethical values (Jobin et al., 2019).

Moreover, the use of AI tools should be implemented collaboratively by engaging various stakeholders, including teachers, students, and school administrators. As [Aldboush and Ferdous \(2023\)](#) suggest, the practices of responsible AI can be determined by actively engaging the community. However, a significant contradiction emerges in the literature between this ideal of collaborative, ethical implementation and the practical realities faced by educators. A major issue is the risk of data privacy breaches. Given that AI systems rely heavily on student data, the collection, storage, and use of this information are matters of serious concern. [Feretzakis and colleagues \(2024\)](#) state that ethical compliance requires the practical application of data protection technologies that safeguard student privacy without negating the usefulness of AI tools.

A key limitation in the current literature is the lack of studies investigating whether teachers are actually aware of these risks and feel equipped to handle them. This gap is critical because, in the absence of clear empirical guidance, the responsibility falls directly on educators. EFL teachers must safeguard learners' personal information and ensure that any AI-based assessment and feedback tools align with data protection rules like the General Data Protection Regulation (GDPR). Furthermore, it is necessary to monitor the evolving regulatory landscape, especially regarding AI-related and data security laws. [Al-Hwsali et al. \(2023\)](#) emphasize that educational institutions should ensure compliance with privacy regulations to prevent the violation of students' rights. Ultimately, TEFL instructors are positioned to create fair, lawful AI use policies that instill student confidence in the confidentiality of their data.

The Present Study

The growing presence of AI in education has intensively emphasized the need for teachers to develop specialized competencies rather than generic digital literacies ([Ng et al., 2023](#)). However, while documents like DigCompEdu attend to generalized technological competencies, they do not explicitly contain the AI-related capabilities that are necessary for TEFL ([Chiu et al., 2024](#)). As such, educators lack an agreed set of measures to evaluate their readiness for pedagogical innovations based upon AI, meaning they have little means to effectively incorporate these developments in the classroom ([Tenberga & Daniela, 2024](#)). EFL teachers are simultaneously facing multiple pressures as AI develops. They are expected to acquire technical know-how (e.g., how to implement AI language applications and intelligent tutoring systems), analyze learning analytics to provide personalized instruction ([Eldin, 2024](#)), and face consequential ethical dilemmas relating to algorithmic bias or data privacy ([Selwyn, 2023](#)). From a pedagogical perspective, using AI tools could ideally involve re-designing lessons to exploit the affordances of adaptive learning instruments while maintaining human-centered pedagogical practices ([Busso & Sanchez, 2024](#)), though such comprehensive integration may be aspirational in contexts with current infrastructural limitations.

This issue is compounded in under-resourced contexts like Iran, where TEFL instructors experience limited AI education and systems ([Rosli et al., 2024](#)). Tools that are developed globally often do not consider localized challenges due to assumptions about technology access ([Priyantini & Herawati, 2023](#)). If policymakers cannot develop contextually informed tools, they cannot target training or understand what AI actually means for the profession at the language education level ([Yuliani et al., 2024](#)). Accordingly, this study aims to address these gaps by producing a validated survey for measuring Iranian TEFL instructors' AI competencies. Therefore, this study is focused on two research questions:

RQ1. What are the main components of Iranian TEFL instructors' AI digital competency?

RQ2. Is the TEFL instructors' AI digital competency questionnaire developed in the present study a valid and reliable instrument?

3. METHODOLOGY AND DESIGN

Design

The present study aims to create an instrument for assessing Iranian TEFL instructors' views on their competency with AI, drawing on the existing literature in the field. Recognizing the growing importance of AI in education, this study employs a quantitative research design, which is particularly suited for the systematic development and validation of a questionnaire tailored to this purpose.

In addition, a pilot test was used to help develop the questionnaire framework and provide clarity in relation to the items of the scale. This pilot test phase provided the preliminary data to support any adjustments prior to finalizing delivery of the instrument. After developing the final questionnaire, detailed analysis of the data was undertaken to provide the psychometric properties of the instrument including reliability coefficients and validity evidence.

Participants

This study was conducted during the 2023–2024 academic year across a diverse array of state and private universities in Iran. A total of 265 TEFL instructors participated in the research, providing a robust sample size for analysis. Among the participants, there were 172 males (64.9%) and 93 females (35.1%). The researcher selected participants using convenience sampling, which allowed for sampling of teacher participants who were accessible and willing to be included in the study. Respondents had a significantly different amount of teaching experience from five to thirty years.

The sample size for the EFA was adequate based on established guidelines in the field. While recommendations are different, a commonly cited rule is a minimum of 10 participants per item (Nunnally, 1978). Our final instrument contained 24 items. This suggests a minimum sample of 240. Our final sample of 265 participants exceeds this threshold. Furthermore, the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was .871, which is classified as 'meritorious' (Kaiser, 1974), and Bartlett's test of sphericity was significant ($\chi^2 = 3930.044$, $*p* < .001$), both indicating that the data were highly suitable for factor analysis.

In terms of demographics, the ages of the participants varied from thirty-five to sixty-six years old, with various levels of teaching experiences. Among the participants, 192 held a Ph.D. degree (72.5%) and 73 held a Master's degree (M.A.) (27.5%).

Instrument

EFL Instructors' AI Competency Questionnaire (see [Appendix A](#)): A researcher-developed questionnaire, the AICQ, was designed to assess EFL instructors' AI competency. The questionnaire, written in English, consisted of three parts: demographic information, previous experience with AI, and 30 Likert-scale items (from strongly disagree [1] to strongly agree [5]) evaluating AI competency. The items were primarily developed based on an extensive review of the existing literature. The instrument was pilot tested with 30 EFL instructors to examine its clarity, validity, and reliability. After making minor revisions based on pilot feedback, the final version was distributed to all 265 participants. The Results section includes detailed findings on KMO measures, Bartlett's test, factor analysis, and Cronbach's alpha coefficients for internal consistency.

Scale Development Procedure

The study procedure began with a complete review of the relevant literature. The initial factor structure and item pool were generated deductively based on this comprehensive review of established AI competency and digital literacy frameworks (e.g., Chiu et al., 2024; Ng et al., 2023), as no prior validated instrument existed for this specific context. This review helped in drafting the first version of the questionnaire (61 items). Once the initial draft of items had been generated, the researchers sought feedback from a group of four applied linguistics experts to evaluate its clarity and correctness. We asked each of the experts rate each item on a 3-point scale for clarity, relevance, and appropriateness to the construct AI competency: (1) not essential, (2) helpful but not essential, (3) essential. We also computed the Content Validity Ratio (CVR) for each item (Lawshe, 1975). For a panel of 4 experts, the minimum acceptable CVR value for statistical significance ($p < 0.05$) is 0.99. This means that an item needs to receive a score of “essential” from all four panelists. Consequently, any items that did not reach that level of statistical rigor (31) were eliminated. The end result was that only items that were deemed critically essential by the entire expert panel were retained for the pilot study. The questionnaire was then pilot tested on a group of 30 instructors and offered beneficial feedback. The team revised the items based on the analysis of this feedback by paying attention to making them more explicit and covering the contents as comprehensive as possible. After these changes were made, the revised questionnaire was distributed to the greater population of 265 TEFL instructors. Because of certain access restrictions, the questionnaires were distributed in only two forms: some were distributed via Google Forms - allowing for larger number of participants as well as convenience - while others were collected face-to-face.

Finally, 233 valid replies were obtained which constituted a response rate of 87.9 percent. It is important to note that 14 responses were omitted from the analysis for being incomplete responses or inconsistency in the answers given. The participants were assured of confidentiality throughout the study and were fully voluntary participants, which should ensure that the study met ethical standards. The data collection phase lasted 30 days and efforts were made to maximize the collection of quality and relevant data. Following the conclusion of data collection, the gathered information was subjected to rigorous statistical analysis, including EFA and checks for internal consistency reliability, utilizing SPSS Version 26 to ensure the robustness of the findings.

Data Analysis

For analyzing the data, SPSS Version 26.0 was utilized. The suitability of the data for factor analysis was assessed using the Kaiser–Meyer–Olkin (KMO) measure and Bartlett’s test of sphericity. Subsequently, an EFA using principal component analysis (PCA) was conducted. The number of factors was determined through eigenvalues and Cattell’s scree plot. Varimax rotation was applied to aid interpretation. Factor loadings were analyzed to evaluate the strength of the relationship between each item and the extracted factors. Lastly, the internal consistency of the questionnaire was assessed using Cronbach’s alpha, item-total correlations, and Pearson’s correlation coefficients.

Before conducting the EFA, we screened the data to make sure they meet the necessary assumptions. First, the normality of the 24 items was assessed by examining skewness and kurtosis statistics (see Table 1). The absolute values for skewness and kurtosis were all well below the thresholds of 2 and 7, respectively (Curran et al., 1996). This indicates no severe departures from univariate normality. Second, the data were checked for multicollinearity and singularity by inspecting the inter-item correlation matrix. No correlations above .90 were observed, indicating an absence of multicollinearity. The Kaiser-Meyer-Olkin (KMO) measure of .871 and the

significant Bartlett's test of sphericity ($\chi^2 = 3930.044$, $p < .001$) confirmed that the correlations between items were sufficiently large for factor analysis (Tabachnick & Fidell, 2013).

4. RESULTS

In accordance with the results of Table 1, the mean, standard deviation, skewness, and kurtosis of each indicator are shown.

Table 1: Descriptive statistics of indicators

Indicator	Mean	Std. Deviation	Skewness	Kurtosis
A1	3.86	1.086	-.926	.208
A2	3.88	1.034	-1.136	.965
A3	3.95	.994	-1.090	1.067
A4	3.79	.978	-.969	.798
A5	3.95	1.053	-1.348	1.616
A6	3.80	.989	-1.024	.913
A7	3.70	.975	-.896	.684
A8	3.83	1.040	-.994	.723
A9	4.06	1.051	-1.460	1.932
A10	3.83	.985	-.823	.492
A11	3.58	1.044	-.637	-.293
A12	3.48	1.000	-.443	-.462
A13	3.44	1.089	-.697	-.108
A14	3.60	1.029	-.955	.534
A15	3.65	1.040	-.865	.452
A16	3.70	1.015	-.467	-.464
A17	3.72	.999	-1.005	.843
A18	3.77	1.098	-.831	.079
A19	3.61	1.062	-.616	-.176
A20	3.36	1.000	-.627	-.190
A21	3.34	1.157	-.414	-.685
.				
A22	3.30	1.092	-.510	-.553
A23	3.30	1.143	-.593	-.533
A24	3.09	1.175	-.425	-.862

To examine the first research question, which inquired what the main components of Iranian TEFL instructors' AI digital competency are, an EFA was performed. The results are depicted in Tables 2 to 5.

The collected data from the 30 items of the developed inventory on Iranian TEFL instructors' AI digital competency were entered into SPSS software to run the EFA to establish

the validity of the questionnaire. The data showed that KMO was .81, and was sufficiently large to perform EFA. In addition, the results revealed that the Bartlett test significance level ($\text{sig} < .05$) for the research variable, which means the correlations between the data were satisfactory, and that the sample was adequate to undertake analysis. In examining the initial commonalities, the results showed that some items had a commonality value close to .4. The results of the parallel analysis for the questionnaire showed five factors with eigenvalues exceeding the corresponding criterion values for a randomly generated data matrix of the same size. The five-factor solution explained a total of 59.67% of the variance of the Iranian TEFL instructors' AI digital competency Inventory. According to the factor's rotating matrix, which establishes the relationship between the item (questions) and the factor, the primary results illustrated that among questions belonging to five factors, items 2, 9, 17, 18, 21, and 26 had a factor load (factor score) lower than .4, so these items were removed from the questionnaire, and once again the questionnaire and its dimensions were examined based on the remaining questions in terms of EFA.

The final version of the questionnaire consisted of 24 items. Data from these items were entered into SPSS software to conduct EFA to determine the validity of the questionnaire. The KMO measure used to estimate the sampling adequacy for the analysis. The data showed that KMO was .87, higher than the proposed minimum value of .6 (Tabachnick & Fidell, 2013), and was sufficiently large to perform EFA (Table 2). In addition, the Bartlett test was employed to confirm that the data were appropriate and that the correlation matrix adopted in the analysis was not zero in the population. The results (Table 2) revealed that the Bartlett test significance level ($\text{sig} < .05$) for the research variable, which means the correlations between the data were satisfactory, and that the sample was adequate to undertake analysis.

Table 2: KMO and Bartlett's test

	KMO	Bartlett	Sig.
		Chi-Square	
AI digital competency	.871	3930.044	.000

As shown in Table 3, the initial commonalities comprise two columns, namely initial and extraction, which reflect the degree of commonality between a variable (item) and the factors equal to the square of multiple correlations (R^2). The second column of this Table (initial) includes the commonalities that exist before the extraction of the factor(s), and all initial commonalities are equal to one; the higher the extraction commonality values (i.e., more than .4), the more accurately the factors are characterized. Therefore, Table 3 illustrates that all items in the factor analysis approach are appropriate, as the number of commonalities exceeds .4 (Hair et al., 2019, p. 129).

Table 3: The results of initial communalities

Indicators	Initial	Extraction
A1	1.000	.804
A2	1.000	.774
A3	1.000	.691
A4	1.000	.576
A5	1.000	.563
A6	1.000	.519
A7	1.000	.562
A8	1.000	.798
A9	1.000	.672
A10	1.000	.731
A11	1.000	.708
A12	1.000	.862
A13	1.000	.800
A14	1.000	.740
A15	1.000	.690
A16	1.000	.632
A17	1.000	.812
A18	1.000	.777
A19	1.000	.728
A20	1.000	.664
A21	1.000	.748
A22	1.000	.809
A23	1.000	.789
A24	1.000	.589

Moreover, the results of the parallel analysis for the questionnaire showed five factors with eigenvalues exceeding the corresponding criterion values for a randomly generated data matrix of the same size. The five-factor solution explained a total of 70.14% of the variance of AI digital competency (Table 4).

Table 4: Total variance explained

Components	Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %
1	9.322	38.841	38.841
2	2.483	10.346	49.187
3	2.385	9.935	59.123
4	1.443	6.011	65.134
5	1.202	5.010	70.144

The factor's rotating matrix is presented in Table 5. This matrix establishes the relationship between the item (questions or variables) and the factor, which will be explained in terms of the correlation coefficient. Each variable in this matrix has a factor load (factor score) greater than .4, and is classified under the umbrella of the desired factor. The larger this coefficient's value, the greater the contribution of the relevant factor to the overall variance of the target variable. Table 5 illustrates questions belonging to five factors. Generally speaking, in this study, the AI digital competency questionnaire has five factors. These factors include (1) Professional Development & Willingness to Learn; (2) Ethical, Privacy & Bias Awareness; (3) Technical Proficiency in AI Tools; (4) AI Knowledge & Awareness; and (5) Pedagogical Integration of AI.

Table 5: Rotated component matrix

AI digital competency	Components				
	1	2	3	4	5
1 I have a solid knowledge of the educational aspects of artificial intelligence.	.018	.075	.228	.863	.015
2 I understand the meanings of terms such as “machine learning” and “natural language processing.”	-.005	.172	.167	.838	.117
3 I can identify a variety of AI-powered applications currently used in language teaching.	.160	.403	.055	.690	.155
4 I have used AI-based writing tools, such as Grammarly or Quillbot	.064	.217	.788	.421	.210
5 I have talked to students about responsible AI use.	.164	.680	.143	.477	.241
6 I consider possible bias in AI-generated results.	.255	.521	.098	.361	.207
7 I acknowledge that discussions about AI in education are currently trending.	.361	.413	.059	.506	.046
8 I make it a habit to critically review AI tools before using them in teaching.	.152	.836	.086	.121	.233
9 I am unaware of privacy issues with AI in the classroom.	.273	.732	.183	.164	-.033
10 I reflect on how AI accessibility impacts educational equality and opportunities.	.102	.741	.345	.224	.059
11 I know how to use AI-powered chatbots (e.g., ChatGPT) to support teaching.	.318	.264	.700	.134	.170
12 I know how to use speech recognition tools for language learning.	.252	.141	.876	.098	.044
13 I rarely check for updates or new features of AI tools.	.227	.129	.852	.078	.028
14 I can troubleshoot technical issues when using AI tools.	.317	.232	.719	.169	.201
15 I actively seek out resources or training to improve my AI knowledge and skills.	.689	.195	.321	.163	.219
16 I use online courses or tutorials to learn about AI tools.	.739	.161	.119	.151	.150
17 I am not motivated to improve my competency in AI.	.815	.157	.288	.178	.094
18 I believe AI-related knowledge is important for my career as an educator.	.823	.084	.222	.047	.203
19 I set personal goals for improving AI-related teaching practices.	.737	.241	.352	.034	.036
20 I design lessons using AI-based processes.	.075	.134	.180	.142	.766
21 I adapt educational materials based on AI-generated suggestions.	.085	.221	-.003	.047	.830
22 I create learning tasks that require students to use AI for language practice.	.240	.084	.026	.077	.859
23 I personalize my instruction using AI-based feedback.	.129	.003	.121	.097	.865
24 I find it difficult to distinguish between AI and non-AI educational technologies.	.320	.113	-.111	.509	.045

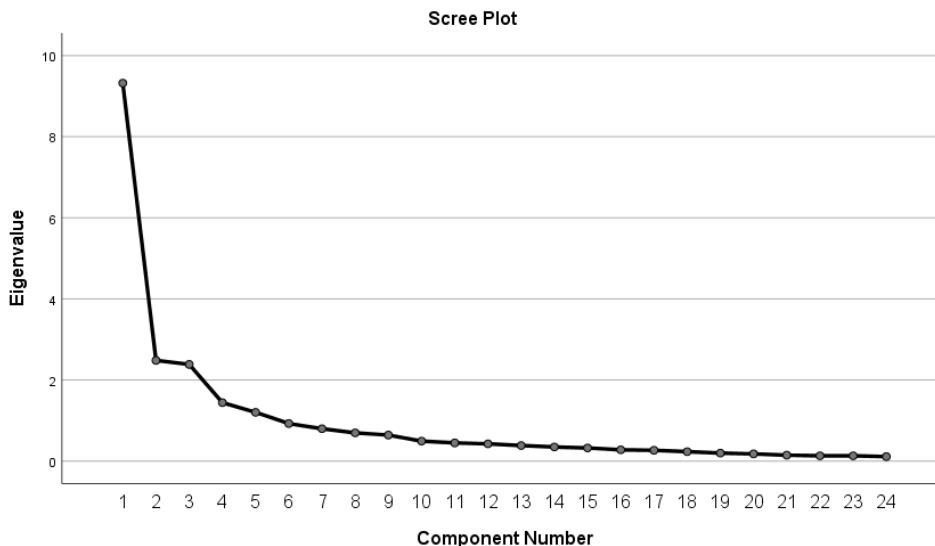


Figure 1: Scree plot of eigenvalues for principal component analysis

The Scree Plot (Figure 1) displays the eigenvalues for each component extracted from the Principal Component Analysis. The plot shows a sharp decline in eigenvalues from the first component (approximately 10) to the fourth component, with a noticeable "elbow" occurring between the fourth and fifth components. This suggests that the first four or five components account for the majority of the variance. Consistent with the Total Variance Explained Table, which identified five components with eigenvalues greater than 1 (collectively explaining 70.14% of the variance), and supported by the Varimax rotation, the analysis supports retaining five components as the optimal number for further interpretation.

The second research question inquired if the TEFL instructors' AI digital competency questionnaire is a valid and reliable instrument. To assess this, a reliability test by Cronbach's alpha, item-total correlations, and Pearson's correlation coefficients was performed. The results appear in Table 6.

We estimated the overall internal consistency of the scale using Cronbach's alpha, which was .93 (Table 6). This test affirms the internal consistency of a measurement device used to assess various questionnaire characteristics. Cronbach's alpha coefficient is a numerical value between 0 and 1, representing the correlation coefficient of data collected over time. The closer Cronbach's alpha coefficient is to 1, the higher the reliability of the variable would be. Additionally, a Cronbach's alpha coefficient greater than .7 illustrates that the questionnaire is reliable (Taber, 2018).

Table 6: Assessment of second research question. results of the Cronbach's alpha coefficient

Row	Variables	Components	Items	Cronbach's alpha ($\alpha > 0.7$)	
				Sample Size (30)	Sample Size (233)
1		Professional Development & Willingness to Learn;	5	-	.904
2		Ethical, Privacy & Bias Awareness	5	-	.844
3	AI digital competency	Technical Proficiency in AI Tools	5	-	.876
4		AI Knowledge & Awareness	5	-	.815
5		Pedagogical Integration of AI	4	-	.883
		Total	24	.916	.928

As shown in [Table 6](#), the Cronbach's alpha coefficient for the study's primary variable and its components is greater than 0.7, signifying that each structure is sufficiently reliable.

The Item-Total Statistics in [Table 7](#) is provided to assess the internal consistency of the questionnaire using Cronbach's alpha and item-total correlations. This Table includes the scale mean, variance, corrected item-total correlation (Corrected Item-Total Correlation), and Cronbach's alpha if each item is deleted.

Table 7: Assessment of second research question: Results of the item-total statistics

Row	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
A1	83.72	221.928	.477	.683	.927
A2	83.70	221.566	.517	.676	.926
A3	83.63	219.501	.612	.750	.924
A4	83.79	219.428	.626	.627	.924
A5	83.63	217.984	.625	.635	.924
A6	83.78	219.553	.614	.582	.924
A7	83.88	220.153	.602	.540	.925
A8	83.75	218.705	.609	.693	.925
A9	83.52	219.561	.574	.618	.925
A10	83.75	219.102	.633	.676	.924
A11	84.00	216.961	.666	.704	.924
A12	84.10	220.239	.582	.786	.925
A13	84.14	220.036	.535	.729	.926
A14	83.98	216.633	.688	.761	.923
A15	83.93	216.447	.686	.661	.923
A16	83.88	220.210	.574	.545	.925
A17	83.86	217.567	.678	.775	.923
A18	83.81	218.007	.596	.721	.925
A19	83.97	218.111	.615	.702	.924
A20	84.21	222.799	.493	.561	.926
A21	84.24	221.931	.443	.656	.927
A22	84.28	221.307	.493	.752	.926
A23	84.28	221.892	.450	.737	.927
A24	84.49	224.406	.362	.358	.929

The results indicate that Cronbach's alpha, if each item is deleted, varies between .923 and .929, reflecting the very high reliability of the questionnaire (close to .92-.93). The corrected item-total correlations for most items (ranging from .443 to .688) are acceptable, and for some (such as A14, A15, and A17), they are excellent. Item A24, with a correlation of .362 and an increase in alpha to .929 if deleted, shows the lowest correlation; however, given the overall high reliability, its deletion does not seem necessary unless further improvement is required.

The Pearson's Correlation Coefficients Table is provided to assess the relationships between the total score (Total) and individual items (A1 to A 24), as well as the inter-item correlations, to evaluate the internal consistency of the questionnaire. This Table includes Pearson correlation coefficients and their two-tailed significance levels.

Table 8: Assessment of second research question: Results of Pearson's correlation coefficients

Item	Pearson's Correlation with Total	Sig. (2-tailed)	N
A1	.530****	.000	233
A2	.565****	.000	233
A3	.652****	.000	233
A4	.664****	.000	233
A5	.666****	.000	233
A6	.653****	.000	233
A7	.642****	.000	233
A8	.651****	.000	233
A9	.618****	.000	233
A10	.670****	.000	233
A11	.703****	.000	233
A12	.624****	.000	233
A13	.585****	.000	233
A14	.722****	.000	233
A15	.721****	.000	233
A16	.617****	.000	233
A17	.712****	.000	233
A18	.641****	.000	233
A19	.657****	.000	233
A20	.542****	.000	233
A21	.502****	.000	233
A22	.546****	.000	233
A23	.508****	.000	233
A24	.427****	.000	233

Note: *p < .1; **p < .05; *p < .01; ****p < .001 (Hair et al., 2014; Ravand and Baghaei, 2016), n.s. not significant.**

Noteworthy, item A24 shows weaker correlations with some items (e.g., 0.098 with A20, $p = 0.136$, and 0.119 with A23, $p = 0.070$), suggesting a relatively lower contribution to the overall scale. Additionally, A20 (0.542) and A21 (0.502) exhibit moderate correlations with the total score, which may warrant further investigation. Despite these variations, the overall pattern across all 24 items, with an approximate average correlation of 0.61, supports a reliable questionnaire structure. An important observation is that while most items show strong correlations, A20, A21, and A24 have weaker but still statistically significant correlations. Further review of these items could be considered for potential refinement.

5. DISCUSSION AND CONCLUSION

The aim of this research was to produce an instrument to measure the AI digital competency of Iranian TEFL instructors. The EFA and reliability analysis confirm that the results reveal a multidimensional structure of AI competency. The EFA produced a solution of five factors

explaining 70.14% of the total variance and an evolving understanding of the construct of AI competency in this context. The five factors were (1) Professional Development and Willingness to Learn; (2) Ethical, Privacy and Bias Awareness; (3) Technical Proficiency in AI Tools; (4) AI Knowledge and Awareness; and (5) Pedagogical Integration of AI. These findings resonate with [Busso and Sanchez \(2024\)](#) who claimed that key features of AI tools should be used to develop communicative competence by developing increased dynamic and personalized learning environments. These findings also support [Strasser's \(2023\)](#) encouraging educators to shift to a 'creative engineering' perspective, where educators use AI to generate and analyze text to advance the pedagogical process. For classroom practice, this factor underscores that the ultimate goal is not using AI for its own sake, but for pedagogical transformation. It implies teachers must develop the ability to redesign lesson plans and assessments where AI acts as a co-pilot to enable personalized learning pathways, rather than merely a substitute for traditional tools.

Moreover, we found that Ethical, Privacy and Bias Awareness (Factor 2) encompasses an essential aspect, that is often overlooked in general frameworks of digital literacy. The high loading of items that refer to critiquing tools, bias considerations, reflection on accessibility, and privacy concerns supports emergent concerns in the literature. As has been emphasized by [Selwyn \(2023\)](#) and [Tenberga and Daniela \(2024\)](#), whatever the purpose, the integration of AI is value-laden and involves ethics of data privacy, algorithmic bias, and structural inequality in education. As a result, the importance of this factor in our model shows that Iranian TEFL teachers are aware of these obstacles that is indispensable for the responsible implementation of AI in their teaching practices. This directly translates to a practical need in teacher training: moving beyond abstract ethical principles to skill-building in concrete actions such as conducting bias audits of AI tools or designing lessons that teach students to critically interrogate AI-generated content.

Factors 3 and 4, Technical Proficiency in AI Tools, and AI Knowledge and Awareness, capture the primary skills required for the integration of AI into practice. Identifying these as separate skills was important. While it is important to be knowledgeable about concepts such as "machine learning" and be aware of AI-powered applications, there is a distinctly hands-on competence to actually use chatbots and speech recognition tools and to troubleshoot problems (Factor 3). This aligns with the framework developed by [Chiu et al., \(2024\)](#), which separates understanding AI concepts from operating AI applications. We know that the absence of these competencies has been pointed to as a key barrier to the adoption of AI ([Ng et al., 2023](#)). The separation of these two factors in our model offers a practical blueprint for PD: foundational workshops must first build conceptual understanding (Factor 4) to demystify AI, followed by hands-on labs focused on operational skills (Factor 3) with specific tools like chatbots or AWE systems, thereby addressing both cognitive and practical barriers.

Ultimately, the factor of Professional Development and Willingness to Learn (Factor 1) represents the affective and continuous developmental aspect of an AI competency. Factor 1 represents the proactive approach to engaging with resources, setting personal targets, and also, just the act of perceiving AI as important for their career brings attention to the reality that intrinsic motivation and self-directed learning to address AI competency in a context of limited resources like Iran, in which formal training is scarce ([Priyantini & Herawati, 2023](#); [Rosli et al., 2024](#)), becomes even more necessary to close the gap in one's AI competency. This finding extends literature on teacher self-efficacy and motivation by highlighting that in the absence of systemic support, a teacher's propensity to learn about AI becomes a foundational competency itself, crucial for initiating any form of integration.

The entire scale had a high reliability, and similarly, each subscale also had a reliability in an acceptable range. Likewise, the strong and significant correlations of all items to the total score

and across all items complement the factor analysis. This indicates that the items cohesively reflect the overall construct. It is worth mentioning that items A20, A21, and A24 had lower correlations with the total score and other items as well. This can happen because of different reasons including the item wording, the conceptual complexity of the item for respondents, and the context in which the survey was given (i.e. teaching in the Iranian context) which could affect the participants' competency. Though all of the items were retained in the final instrument for their theoretical relevance to the factors and overall reliability of the scale, their performance indicates that they may be candidates for future revisions of the questionnaire. Regardless, their inclusion did not compromise the overall acceptability of the scale which was strongly demonstrated by the high total reliability, strong factor structure, and strong performance of the majority of the items.

Although the tool was created and validated with Iranian TEFL instructors, it could easily be adapted and implemented in other educational contexts. The five dimensions of AI competency we discussed are dimensions that are universal across teachers and have applicability to individuals in a multitude of contexts. Moving forward, AI researchers and policy makers will need to take into consideration contextual factors such as local technological conditions, cultural perspectives on AI and data privacy, and any existing digital literacy policies to further adapt the tool outside of Iran. For example, for contexts in which there are advanced established AI conditions, the items under Technical Proficiency may need to be revised to account for more sophisticated tools, and conversely, in contexts with restrictions on data regulation, it would suffice to elaborate the subscale Ethical Privacy & Bias Awareness.

The limitations of this study indicate future research directions. The most significant limitation is the potential for selection bias since our sample was heavily weighted towards PhD holders. Moreover, the validation of the instrument relied primarily on internal consistency and structural validity from the EFA. The absence of additional validation methods, such as a multi-trait multi-matrix (MTMM) analysis or correlation with other established scales, means that claims regarding other forms of validity (e.g., convergent, discriminant) cannot be made at this stage. Another limitation is the lack of a confirmatory factor analysis on a holdout sample and the absence of evidence for convergent and discriminant validity. Finally, the very focused lens on the Iranian situation, limits the potential for generalizing the findings. This also implies that future research would need to assess our findings across different cultural contexts.

Conclusive Implications and Suggestions for Further Studies

Through the findings in this research, we have developed a multifaceted framework for professional development, policies, and procedures. These five dimensions enable stakeholders to develop AI competencies without relying on one-size-fits-all methods. For those engaged in education policy and teacher development, the framework provides a means for diagnosing AI competency gaps. Educational organizations can use this questionnaire to assess areas of significant deficiency, such as whether teachers are underdeveloped in Technical Proficiency compared to Ethical Awareness, and design targeted interventions to resolve these issues.

Findings of the study inform teacher educators to raise the teachers' awareness of their AI competency by organizing consistent training sessions that can improve their theoretical and practical comprehension of this specific competency. One practical recommendation is to structure professional development in a staged sequence. The first stage would consist of basic workshops introducing AI and its core concepts to build AI Knowledge & Awareness. The second stage would include hands-on work with AI tools (e.g., ChatGPT or automated writing evaluation systems) to develop Technical Proficiency. The final stage would involve scenario-based activities focused on

bias and privacy in curriculum design. This stage aims to develop Ethical, Privacy & Bias Awareness and Pedagogical Integration.

As a result of this initial validation, the next important step for research is to administer this questionnaire to a much larger, stratified, and representative group of Iranian TEFL educators. Due to the need to confirm the factor structure via Confirmatory Factor Analysis (CFA) and to establish population norms, it is critical to find a larger, more representative TEFL teacher population. Researchers can also conduct intervention studies, to evaluate the effectiveness of teacher development programs based on the five constructs, and use the survey as a pre-test/post-test measure of growth in specific areas of competency so that they should establish convergent and discriminative validity between scores from this instrument and other established instruments such as the TPACK scale and the DigCompEdu framework, to clarify how AI-related competency relates to technology-enhanced digital or pedagogical knowledge.

Before adapting this instrument cross-culturally, researchers should first validate the five-factor structure on local samples and then contextualize the items. For instance, localizing the Technical Proficiency items with AI tools prevalent in the region or changing the Ethical Awareness items to reflect local data protection laws. Longitudinal research is needed to see how these competencies change over time and the impact of the rapid growth of technology on them. This may provide information on the sustainability of continuous teacher development in relation to AI.

References

- Akgün, S. and Greenhow, C. (2021). Artificial intelligence in education: addressing ethical challenges in k-12 settings. *AI and Ethics*, 2(3), 431-440. <https://doi.org/10.1007/s43681-021-00096-7>
- Aldboush, H. and Ferdous, M. (2023). Building trust in fintech: an analysis of ethical and privacy considerations in the intersection of big data, AI, and customer trust. *International Journal of Financial Studies*, 11(3), 90. <https://doi.org/10.3390/ijfs11030090>
- Al-Hwsali, A., Alsaadi, B., Abdi, N., Khatab, S., Alzubaidi, M., Solaiman, B., & Househ, M. (2023). Scoping review: Legal and ethical principles of artificial intelligence in public health. *Studies in Health Technology and Informatics*, 302, 97–106. <https://doi.org/10.3233/shti230579>
- Alnasib, B. (2023). Factors affecting faculty members' readiness to integrate artificial intelligence into their teaching practices: a study from the Saudi higher education context. *International Journal of Learning Teaching and Educational Research*, 22(8), 465-491. <https://doi.org/10.26803/ijlter.22.8.24>
- Busso, A., & Sanchez, B. (2024). Advancing communicative competence in the digital age: A case for AI tools in Japanese university EFL programs. *Technology in Language Teaching & Learning*, 6(3), 1–17. <https://doi.org/10.29140/tl.v6n3.1211>
- Casal-Otero, L., Català, A., Fernández-Morante, C., Taberna, J., García-Soidán, P., & Rodríguez-Malvar, M. (2023). AI literacy in K-12: A systematic literature review. *International Journal of STEM Education*, 10(1), 29. <https://doi.org/10.1186/s40594-023-00418-7>
- Chen, X., Zou, D., Xie, H., & Wang, F. L. (2023). Past, present, and future of smart learning: A topic-based bibliometric analysis. *International Journal of Educational Technology in Higher Education*, 20(1), 15. <https://doi.org/10.1186/s41239-023-00384-8>

- Chiu, T. K. F., Ahmad, Z., Ismailov, M., & Sanusi, I. T. (2024). What are artificial intelligence literacy and competency? A comprehensive framework to support them. *Computers and Education Open*, 6, 100171.
- Cioci, G. (2024). AI in the class: Uses, doubts, challenges and perceptions of a sample of teachers from different nationalities. *Education Sciences and Society*, (2), 38-55. <https://doi.org/10.3280/css2-2024oa18439>
- Curran, P. J., West, S. G., & Finch, J. F. (1996). The robustness of test statistics to nonnormality and specification error in confirmatory factor analysis. *Psychological Methods*, 1(1), 16–29.
- Eldin, A. H. (2024). Using artificial intelligence in EFL teacher education programs. *Sustainability Education Globe*, 2(1), 26–35. <https://doi.org/10.21608/seg.2024.272816.1004>
- Er, E., Akçapınar, G., Khalil, M., Noroozi, O., & Banihashem, S. K. (2024). Assessing student perceptions and use of instructor versus ai-generated feedback. *British Journal of Educational Technology*, 56(3), 1074-1091.
- Feretzakis, G., Anastasiou, A., Pitoglou, S., Paxinou, E., Gkoulalas-Divanis, A., Kalodanis, K., & Verykios, V. (2024). Securing a generative ai-powered healthcare chatbot. *Studies in Health Technology and Informatics*, 302, 97-106.
- Ferrari, A. (2012). *Digital competence in practice: An analysis of frameworks*. Publications Office of the European Union. <https://data.europa.eu/doi/10.2791/82116>
- González-Prida, V., Chuquin-Berrios, J. G., Moreno Menéndez, F. M., Sandoval-Trigos, J. C., Pariona-Amaya, D., & Gómez-Bernaola, K. O. (2024). Digital competencies as predictors of academic self-efficacy: Correlations and implications for educational development. *Societies*, 14(11), 226. <https://doi.org/10.3390/soc14110226>
- Güneyli, A., Burgul, N., Dericioğlu, S., Cenkova, N., Becan, S., Şimşek, Ş., & Güneralp, H. (2024). Exploring teacher awareness of artificial intelligence in education: a case study from northern Cyprus. *European Journal of Investigation in Health Psychology and Education*, 14(8), 2358-2376.
- Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2019). *Multivariate data analysis* (8th ed.). Cengage Learning.
- Jeon, J., & Lee, S. (2023). Large language models in education: A focus on the complementary relationship between human teachers and ChatGPT. *Education and Information Technologies*, 28(12), 15873–15892. <https://doi.org/10.1007/s10639-023-11834-1>
- Jobin, A., Ienca, M., & Vayena, E. (2019). The global landscape of ai ethics guidelines. *Nature Machine Intelligence*, 1(9), 389-399. <https://doi.org/10.1038/s42256-019-0088-2>
- Kaiser, H. F. (1974). An index of factorial simplicity. *Psychometrika*, 39(1), 31–36. <https://doi.org/10.1007/BF02291575>
- Kohnke, L. (2023). A pedagogical chatbot: A supplemental language learning tool. *RELC Journal*, 54 (3), 828–838. <https://doi.org/10.1177/00336882231162844>
- Lawshe, C. H. (1975). A quantitative approach to content validity. *Personnel Psychology*, 28(4), 563–575.
- Liu, M. (2023). Exploring the application of artificial intelligence in foreign language teaching: challenges and future development. *SHS Web of Conferences*, 168, 03025. <https://doi.org/10.1051/shsconf/202316803025>
- Marković, L., Živković, E., & Paunović, T. (2022). Pre-service EFL teachers as reflective practitioners: student portfolios as evidence of emerging professional identities. *Journal of Contemporary Philology*, 5(2), 65-76.

- Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. *Teachers College Record*, 108(6), 1017–1054. <https://doi.org/10.1111/j.1467-9620.2006.00684.x>
- Ng, D. T. K., Leung, J. K. L., Su, J., Ng, R. C. W., & Chu, S. K. W. (2023). Teachers' AI digital competencies and twenty-first century skills in the post-pandemic world. *Educational Technology Research and Development*, 71(1), 137–161. <https://doi.org/10.1007/s11423-023-10203-6>
- Nunnally, J. C. (1978). *Psychometric theory* (2nd ed.). McGraw-Hill.
- Patiño, A., Montaña, V., Buri, P., Rojas, M., & González, A. (2024). The improvement of oral communicative competence in English through the artificial intelligence. *Latam Revista Latinoamericana De Ciencias Sociales Y Humanidades*, 5(1). <https://doi.org/10.56712/latam.v5i1.1850>
- Popenici, S.A.D., Kerr, S. (2017). Exploring the impact of artificial intelligence on teaching and learning in higher education. *Research and Practice in Technology Enhanced Learning*, 12. <https://doi.org/10.1186/s41039-017-0062-8>
- Priyantini, T., & Herawati, A. (2023). EFL teachers' strategies and challenges in developing digital competency: A narrative inquiry. *Pedagogy: Journal of English Language Teaching*, 11(1), 01.
- Rosli, N. D. M., Khambari, M. N. Md., Wong, S. L., Zakaria, N. S., Abdullah, K., Hamzah, S. R., Moses, P., & Abdrahim, N. A. (2024). A scientometric review of digital competency among educators during the past 10 years. *International Journal of Evaluation and Research in Education*, 14(1), 74.
- Selwyn, N. (2021). Ed-Tech Within Limits: Anticipating educational technology in times of environmental crisis. *E- Learning and Digital Media*, 18(5), 496–510.
- Selwyn, N. (2023). *Should robots replace teachers? AI and the future of education* (2nd ed.). Polity Press.
- Strasser, T. A. (2023). ELT in the digital age: We have come a long way. *Aaa-Arbeiten Aus Anglistik Und Amerikanistik*, 48(1), 121–136. <https://doi.org/10.24053/aaa-2023-0006>
- Tabachnick, B. G., & Fidell, L. S. (2013). *Using multivariate statistics* (6th ed.). Pearson.
- Taber, K.S. (2018). The Use of Cronbach's alpha when developing and reporting research instruments in science education. *Research in Science Education*, 48, 1273–1296. <https://doi.org/10.1007/s11165-016-9602-2>
- Tenberga, I., & Daniela, L. (2024). Artificial intelligence literacy competencies for teachers through self-assessment tools. *Sustainability*, 16(23), 10386. <https://doi.org/103390/su162310386>
- Tondeur, J., Aesaert, K., Prestridge, S., & Consuegra, E. (2017). A multilevel analysis of what matters in the training of pre-service teacher's ICT competencies. *Computers & Education*, 122, 32–42.
- Yin, H., Khan, S., Alharbi, A., & Nazir, S. (2022). Assessing English teaching linguistic and artificial intelligence for efficient learning using analytical hierarchy process and technique for order of preference by similarity to ideal solution. *Journal of Software Evolution and Process*, 36(2). <https://doi.org/10.1002/smr.2462>
- Yuliani, S., Mukhibbah, T. L., & Agustina, E. (2024). Artificial intelligence usage in higher education: EFL students' view. *ELTR Journal*, 8(2), 119–129.

Appendices

Appendix A: AI Competency Questionnaire for TEFL Instructors

For all items in this questionnaire, please respond using the following Likert scale:

- **Strongly Disagree (1)**
- **Disagree (2)**
- **Neutral (3)**
- **Agree (4)**
- **Strongly Agree (5)**

Please indicate your level of agreement with each statement by selecting the appropriate number.

Subscales	Items	1	2	3	4	5
AI Knowledge & Awareness	1. I have a solid knowledge of the educational aspects of artificial intelligence.					
	2. I understand the meanings of terms such as “machine learning” and “natural language processing.”					
	3. I can identify a variety of AI-powered applications currently used in language teaching.					
	4. I acknowledge that discussions about AI in education are currently trending.					
	5. I find it difficult to distinguish between AI and non-AI educational technologies.					
Technical Proficiency in AI Tools	6. I have used AI-based writing tools, such as Grammarly or Quillbot.					
	7. I know how to use AI-powered chatbots (e.g., ChatGPT) to support teaching.					
	8. I know how to use speech recognition tools for language learning.					
	9. I rarely check for updates or new features of AI tools.					
Pedagogical Integration of AI	10. I can troubleshoot technical issues when using AI tools.					
	11. I design lessons using AI-based processes.					
	12. I adapt educational materials based on AI-generated suggestions.					
	13. I create learning tasks that require students to use AI for language practice.					
Ethical, Privacy & Bias Awareness	14. I personalize my instruction using AI-based feedback.					
	15. I have talked to students about responsible AI use.					
	16. I consider possible bias in AI-generated results.					
	17. I make it a habit to critically review AI tools before using them in teaching.					
Professional Development & Willingness to Learn	18. I am unaware of privacy issues with AI in the classroom.					
	19. I reflect on how AI accessibility impacts educational equality and opportunities.					
	20. I actively seek out resources or training to improve my AI knowledge and skills.					
	21. I use online courses or tutorials to learn about AI tools.					
	22. I am not motivated to improve my competency in AI.					
	23. I believe AI-related knowledge is important for my career as an educator.					
	24. I set personal goals for improving AI-related teaching practices.					