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Using AI-Based Applications in English Language Education: Exploring Saudi EFL Teachers' Awareness and Attitudes

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Abstract

The study aimed to explore Saudi English as a Foreign Language (EFL) teachers' awareness and attitudes toward the use of AI-based applications to support teaching practices. It adopted a systematic sequential mixed-method approach, triangulating the data to get a deeper investigation by collecting quantitative and qualitative analysis. Two study instruments were used: a questionnaire with a sample of 55 EFL teachers (38 females and 17 males) and semi-structured interviews with a sample of seven teachers (two males and five females). The quantitative data were analyzed statistically using SPSS. The interviews were transcribed using Readai software, which transforms audio into a writing form and then coded manually. Afterward, the researcher used thematic analysis to reveal emerging themes and findings. The

quantitative results showed that EFL teachers have high to moderate awareness and positive attitudes toward AI-based applications supporting their teaching practices. Moreover, teachers' high technological knowledge is the strongest indicator of their positive attitudes toward AI-based applications. However, teachers need to be more aware of the pedagogical contributions of AI and the strategies to apply them effectively in their teaching practices. In addition, the qualitative findings revealed that teachers fear overreliance, which might diminish the human factor in teaching. Also, teachers were concerned about the students' reliance on AI-based applications, which led to issues with academic integrity and misinformation. Based on the findings, the study has implications and suggestions for enhancing teachers' technological pedagogical awareness of AI-based applications in EFL education.

Keywords: AI-based applications, artificial intelligence, teaching practices, computer-assisted language learning (CALL), technological knowledge, and teachers' technological pedagogical awareness.

1. Introduction

1.1 Background

Technology is necessary for our modern society and has been integrated into various fields, including healthcare, business, and education. The growing availability of emerging technologies has influenced foreign language instruction. For instance, Artificial Intelligence (AI) has changed how learners, teachers, and researchers think about language acquisition and teaching. Language learners and teachers have adopted AI-based applications to improve language learning and teaching efficiency. Although technology has had a good influence, it has yet to be effectively implemented in many situations due to factors such as teachers' awareness of emerging technologies. For example, in Saudi Arabia, A study explored the difficulties teachers are likely to face while using computer-assisted language learning (CALL). The results demonstrated that instructors have technological proficiency gaps, and there is a great need for teacher training programs for all teachers to integrate CALL into teaching efficiently and effectively. Therefore, teachers must be provided with the necessary professional development programs. Likewise, previous studies have indicated that several reasons, including a lack of technology awareness, professional development and training opportunities, technical assistance, and institutional support, have contributed to the low to moderate level of technological pedagogical knowledge of emerging technologies among Saudi teachers (Alghamdi, 2018; Alhababi, 2017; Bingimlas, 2018). In light of these gaps, this study aims to investigate teachers' awareness and attitudes regarding using AI-based applications to support EFL teaching practices

1.2 Research Problem

The expanding influence of artificial intelligence (AI)-based applications in various fields, including English as a foreign language (EFL) classes in higher education, presents opportunities and challenges that necessitate in-depth research for informed decision-making. Incorporating AI solutions in formal education, specifically in the classroom, has recently been highlighted as a potential remedy for facilitating an automated assessment of students'

performance and progress (Luckin, 2017) and providing students with individualized scaffolding and recommendations (Albacete et al., 2019). However, the level of Saudi EFL teachers' awareness in higher education is important for the effective integration of AI-based applications. Teachers' pedagogical knowledge regarding the use of AI in teaching could shape their view of technology's usefulness and usability, which, in turn, could shape their intentions to use technology (An et al., 2023).

1.3 Research Questions

The study addresses these research questions:

- What is the relationship between teachers' technological, pedagogical, and content knowledge (TPACK) regarding the use of AI tools in EFL teaching and their teaching practices?
- What are the attitudes of Saudi EFL teachers towards the use of AI-based applications in English language education?

2. Literature Review

2.1 AI in Education

With the continuous development of artificial intelligence (AI), it is undeniably altering our personal and professional lives. As more AI-powered products and services become accessible, their application in society grows, particularly in education (Luckin et al., 2022). However, the traditional standardized educational system has come under intense criticism in recent years due to its inability to customize teaching to meet each student's needs (Bhutoria, 2022). Therefore, educational institutions are heading toward a more student-centered, customized, and technologically improved curriculum. AI is one of the newest technical advancements that has piqued the interest of teachers. Luckin et al. (2022) argue that teachers, in particular, see much promise in AI applications' capacity to provide them with an understanding of students' learning pathways through the produced data; in this way, they believe that AI will eventually improve the efficacy of academic systems and learning structures.

John McCarthy coined the term artificial intelligence in 1956 (Russell & Norvig, 2016). However, considerable disagreement exists about the universal definition of artificial intelligence (AI) and several modern interpretations appear. A standard definition of AI is complex to produce because of the continual changes in what AI involves and the multidisciplinary nature of its research (Pokrivcakova, 2019). While some academics describe artificial intelligence (AI) as machines replicating human cognitive skills, like computers or computer systems, others define AI as a specific set of computer operations related to learning and problem-solving (Russell & Norvig, 2016). Also, some authors have defined AI as applying technological advances, including machine learning and natural language processing, to make a computerized system mimic intelligent human behavior (Hamet & Tremblay, 2017).

Artificial Intelligence is used in education in several ways, primarily to enhance the learning process and assessment instruments. Michel (2019) argues that artificial intelligence (AI) can enhance learning and teaching by boosting creativity and productivity and streamlining

administrative procedures. It has required the creation of many online learning resources that promote learning while also being flexible, inclusive, personalized, engaging, and efficient (Michel, 2019). AI in education (AIED) integrates artificial intelligence with learning sciences, focusing on two major complementary strands: developing AI-based learning aids and using these aids to explain the learning process. In addition to being a handy tool for making engines smarter, AIED is also a powerful instrument for opening what is sometimes referred to as "the black box of learning," giving us a deeper and more comprehensive knowledge of how learning occurs (Luckin et al., 2022).

2.2 AI Applications in EFL Education

In the research of AI in EFL education, most studies considered learning and how AI can support language self-learning and replace teachers with computer machines rather than supporting teaching and teachers' practices (Bin-Hady et al., 2023; De la Vall et al., 2023; Jia et al., 2022). Therefore, in order to clarify the focus of this study, three categories of AI tools are identified in Leaton Gray's (2020) study: a) learner-facing, b) teacher-facing, and c) system-facing.

a) Learner-facing tools: are educational programs that students utilize to acquire knowledge.

b) Teacher-facing tools: are employed to lessen their workload and increase the effectiveness of their output in some automated duties, such as administration, evaluation, feedback, and plagiarism detection.

c) System-facing tools: give institutional managers and administrators information; for instance, they assist in tracking attrition patterns among faculties or colleges.

This section's primary focus is to review teacher-facing applications in the context of EFL education. Recently, many AIED systems have been created to assist teachers in making data-driven decisions that will enhance their profession, lighten their burden, and better arrange their classrooms. These systems keep track of students' development and based on their forecasts, present teaching ideas to teachers, which they can choose to use. Similarly, numerous AI applications that incorporate analytical techniques—such as machine learning (ML), natural language processing (NLP), and artificial neural networks (ANNs)—have been extensively utilized in the context of English as a foreign language (EFL) and are having a significant impact.

2.3 Automatic Evaluation Systems

Automatic Evaluation Systems (AESs) are primarily used in EFL writing and speaking. They analyze the input data and offer automatic revision decisions based on big data and NLP technologies (e.g., automatic voice recognition and word meaning disambiguation). It has been demonstrated that the commercially available AESs for EFL writing, such as Criterion and Pigai, improve writing correctness and encourage students to write more and revise their work (Gao, 2021). AESs can also help with EFL instruction by combining automatic response and grading with online assessment (Zitouni, 2022). However, teachers may still feel pessimistic about the usage of AESs. Some emphasize that because of their poor accuracy, inadequate high-

quality feedback on syntactic use and collocation issues, weak recognition levels, and lack of convenience (Gao, 2021; Zitouni, 2022). Thus, many researchers argue that it failed to replace human raters in EFL writing. Additionally, since the efficacy and efficiency of AI determines instructors' acceptance of it (Du and Gao, 2022), from a technical standpoint, further work must be done to increase the assessment accuracy of AESs.

2.4 Neural Machine Translation

Another AI tool that can be used is an automatic translation application that uses end-to-end learning called neural machine translation (NMT). It seeks to solve the shortcomings of traditional phrase-based translation systems by constructing a single neural network that will maximize translation performance (Mohamed et al., 2021). NMT applications like Google Translate and Microsoft Translator (Bing) are often utilized in various language education settings. Their effectiveness is assessed and contrasted from many linguistics viewpoints (Mohamed et al., 2021;Vanjani and Aiken, 2020), which continues to highlight urgent issues such as being incapable of conveying the proper sense and implication at the discourse level, containing errors of discontinuous expressions, word orders, and requiring humans' intensive post-editing (Jeon, 2022; Mohamed et al., 2021). Nevertheless, a large body of research demonstrates that NMT tools can enhance the learning of EFL students: they encourage self-directed learning, enhance mastery of lexicon-grammatical knowledge, and foster the development of L2 writing and reading comprehension (Alhaisoni and Alhaysony, 2017). Therefore, using such applications can help teachers enhance students' autonomy while freeing their time to focus on the deeper meaning of students' writings.

2.5 Intelligent Tutoring Systems

Intelligent Tutoring Systems (ITSs) are computer-based learning systems that provide one-on-one tutoring and enable learning using learner models, algorithms, and neural networks. Several ITS applications, like Pigaiwang, Your Verbal Zone, and Robo-Sensei, are widely used in EFL fields through proper and timely feedback and customization of instructional materials. These efforts have produced effective learning outcomes, such as enhancing grammar learning and reading comprehension (Baker et al., 2020)**.** For ITSs to be as successful as possible, they may also be customized for different instructional scenarios. In a flipped classroom context, ITSs specifically support students in problem-solving and Self-Regulatory Learning (SRL)**.** They have also been shown to enhance speaking abilities (Baker et al., 2020). Moreover, ITS can complement teacher-led instruction, improving the whole educational process without substituting the teacher's role. Software for authoring, such as Tutor Assistant, enables teachers with minimal experience in Intelligent Tutoring Systems to produce high-quality material, diminishing the time and skill necessary for developing interactive learning environments (Baker et al., 2020).

2.6 Chatbots

Artificial intelligence chatbots are computer programs that employ AI to support intelligent human-language interaction in spoken or written form. By upgrading their knowledge and perception from prior discussions, AI chatbots may make the user experience smoother (Pillai

et al., 2023). Numerous empirical research (Hong et al., 2016; Jeon, 2022**;** Guo et al., 2022) have attested to the efficacy of AI chatbots in EFL education. Specifically, AI chatbots can help EFL learners become more proficient in grammar and new vocabulary while enhancing their application of English, which includes oral communication, reading, and listening comprehension, as well as producing well-written argumentative writing (Guo et al., 2022). Regardless, it is still debatable whether AI chatbots benefit students of all levels of English proficiency; some studies contend that chatbots are useless for novices, while others make this claim (Jeon, 2022). Therefore, Nazaretsky et al. (2021) emphasized that before AI diagnostic systems can function as real-life language instructors, they must fulfill a few crucial requirements, such as spontaneity, inventiveness, and shared knowledge.

2.7 Virtual Reality

Virtual reality (VR) technologies, such as Google Earth, Google Tour Creator, and Google Expeditions, have become widely used in foreign language instruction over the last twenty years (Wang et al., 2019)**.** The use of VR technologies in the context of EFL has also been shown to have several confirmed benefits. To illustrate, it alleviates anxiety, promotes vocabulary learning and retention, improves English speaking and communication willingness, and increases learning motivation (Chien et al., 2020; Lai and Chen, 2021; Tai et al., 2022). One common IVE usage is virtual agents, or avatars, which can improve user presence in the virtual world and foster cooperation (Yin, 2022). IVR may also be a valuable tool for digitally involving EFL students in Zoom virtual classroom instruction. Nevertheless, technical issues like interacting with avatars outside of scripted application areas, the acceptability of virtual avatars, and the cost and restricted access to networks continue to hinder the implementation of IVE in the EFL context (Lai & Chen, 2021).

3. Theoretical Framework: TPACK

Scholars argue that teachers' technological and pedagogical knowledge of AI is essential to predict their willingness to integrate AI-based applications successfully (Özgür, 2020 & Jin & Harp, 2020). Thus, the framework of technical, pedagogical, and content knowledge (TPACK) can clarify instructors' understanding and predict their tendency toward integrating AI-based applications into their educational practices. According to Mishra and Koehler (2006), TPACK is the professional knowledge that teachers require in order to use technology for education in an efficient manner.

Figure 1 below illustrates the seven knowledge domains that comprise the TPACK framework. They are Content knowledge, Pedagogical knowledge, technological knowledge, Pedagogical content knowledge, technological content knowledge, technological pedagogical knowledge, and technological pedagogical content knowledge. The following sections provide a detailed description of these sub-components relevant to language instruction.

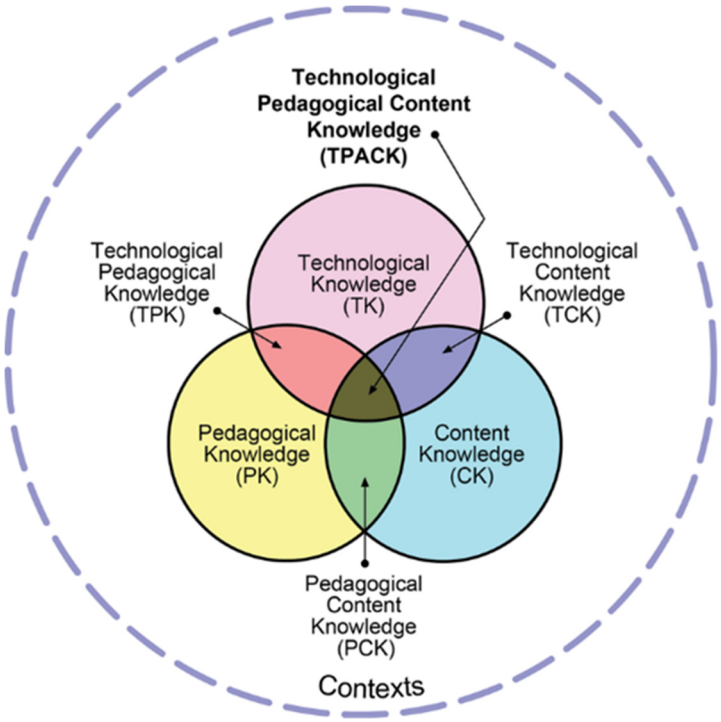


Figure 1. TPACK Framework

(Adopted from: http://tpack.org/)

3.1 Content knowledge (CK)

Curriculum subjects that need to be learned or taught are called content knowledge. According to Misra and Koehler (2006), educators must be knowledgeable about the subject, including its theories, conceptions, and practices. Unlike other subjects, CK in language refers to knowledge about the language (SLA theories) and linguistic proficiency, accuracy, and cultural awareness (Oliver, 2011). Oliver (2011) asserted that language competency is the most crucial component of CK because teachers must model and utilize the language throughout education.

3.2 Pedagogical knowledge (PK)

According to Mishra and Koehler (2006), pedagogical knowledge (PK) is the comprehension of theories about classroom behavior, management strategies, theories, and practices, as well as teaching and learning strategies, principles, and learning. A teacher with extensive PK knowledge understands how students build information, and this kind of expertise necessitates knowledge of different learning theories and how they are used in the classroom (Oliver, 2011). This is general information on educational ideas; thus, it may be used to teach any topic, even EFL.

3.3 Technology knowledge (TK)

Technology knowledge (TK) is defined by Mishra and Koehler (2006) as knowledge of modern and conventional technologies, such as digital video and the Internet, and standard and

traditional technologies, such as books, chalk, and blackboards. Celik (2023) proposed an alternative definition of TK, defining it as the ability to employ new technologies, such as AI-based applications. Teachers who possess TK are better equipped to comprehend information technology, use it correctly for optimal learning, recognize practical technologies, and continuously adjust to technological advancements (Mishra & Koehler, 2006). According to Celik (2023), knowledge in TK serves as a basis for confidence in TPK, TCK, and TPACK, the other three types of knowledge that interact with this section of the TPACK framework.

3.4 Pedagogical Content Knowledge (PCK)

Shulman's (1986, 1987) theory of pedagogical content knowledge (PCK) is the basis of the TPACK framework. According to Shulman (1986), PCK is the understanding of how specific subject matter is organized, changed, and transformed to improve student learning. However, in teaching languages, as Oliver (2011) stated, the term PCK describes what educators are aware of when teaching the target language to enable learners to communicate across linguistic and cultural barriers. It refers to the techniques educators use to teach second languages, including communicative language education and audio-lingual instruction. It has been discovered that educational experiences, teacher education programs, and teaching experiences are the three essential resources instructors may use to build their PCK (Oliver, 2011).

3.5 Technological Content Knowledge (TCK)

Knowledge of the reciprocal relationships between technology and content is known as technological content knowledge (TCK) (Mishra & Koehler, 2006). TCK in language teaching refers to the instructors' technological representations of their knowledge of the target language and its culture (Wu & Wang, 2015). However, the research on EFL does not always clearly distinguish between TCK and TPACK since pedagogical issues arise almost immediately when teachers view the language of technologies as possible linguistic and cultural input for their learners (Wu & Wang, 2015).

3.6 Technological Pedagogical Knowledge (TPK)

TPK is the term for understanding the presence, features, and applications of different technologies in educational contexts and how the employment of certain technologies may affect teaching (Mishra & Koehler, 2006). In order to develop their TPK, educators must comprehend the benefits and constraints of using technology to teach certain subjects. Thus, EFL teachers must recognize the relationship between their pedagogical techniques and the capabilities of technology (Wu & Wang, 2015).

3.7 Technological Pedagogical and Content Knowledge (TPACK)

TPACK was coined by adding Technological knowledge (TK) to PCK by Mishra and Koehler (2006) to comprehend instructors' understanding of effective technology integration. The outcomes of the extension included technical pedagogical content knowledge (TPACK), technological content knowledge (TCK), and technological pedagogical knowledge (TPK). Nevertheless, in an attempt to connect the elements of TPACK to EFL education, Wu & Wang (2015) stated that TPACK refers to an awareness of how technology may be used to

express linguistic and cultural ideas, as well as what helps and does not help students acquire language and become proficient in it, and how technology can be used to solve common issues in the classroom.

Many researchers have applied TPACK for various technology tools and investigated its association with predicting effective technology integration since it is an adaptable framework (Mishra et al., 2010). For example, Raygan and Moradkhani's (2022) study investigates the relationship between EFL instructors' TPACK and attitudes and their ability to successfully integrate technology into their teaching practices. The study's key finding indicated that technological-aware teachers might feel more equipped and self-assured when employing digital tools. Thus, instructors' familiarity with teaching tools and sufficient technological understanding are essential for successful technology integration. Hence, pedagogical and technological knowledge should interact with each other to possess complete awareness of AI in education. Another study by Sofwan et al. (2023) aimed to determine how Indonesian preservice teachers' use of technology was predicted by their combined knowledge of technology, pedagogy, and content. The results indicated that the strongest predictor of technology integration is technological pedagogy and content knowledge, followed by TPK. This disparity may have resulted from TPACK's function as a mediator in the indirect relationships between PCK, TCK, TPK, and technological integration. The significance of these indirect correlations suggests that TPK most strongly predicts technology integration mediated by TPACK. These results validate the functions of TPACK elements (direct or mediated) in technology integration, supporting the findings of earlier research on the link between TPACK and technology integration (Lavidas, 2024; Jin & Harp, 2020; Özgür, 2020).

4. Methodology

4.1 Research Paradigm

A research paradigm is the theoretical or philosophical foundation of the study. It is thought of as a research theory. In 1962, American philosopher Thomas Kuhn became the first researcher to use the term "paradigm" to refer to a philosophical way of thinking (Khatri, 2020). The four components of a paradigm are methodology, axiology, ontology, and epistemology. The research paradigm's viewpoints declare ontology to be the nature of reality, methodology is the proper method for systematic investigation, Axiology is the nature of ethics, and Epistemology is the knowledge and the connection between the knower and what would be known (Khatri, 2020). Furthermore, social research is arranged and structured according to several paradigms, including post-positivism, positivism, interpretivism, and pragmatism (Creswell, 2020). The pragmatic paradigm, which incorporates elements of the positivist and interpretivist paradigms, is used in the current study. The researcher uses a Likert scale to determine the relationship between teachers' awareness of AI-based applications and their educational practices (attitudes) and getting an in-depth analysis of teachers' attitudes by triangulating the data collection and conducting follow-up interviews regarding their responses to the questionnaire focusing on teachers' attitudes items. In pragmatism research, the value of practicality and utility in research and permit flexibility in research methodologies are emphasized. Thus, researchers are encouraged to employ the most suitable strategy or method for answering their research

questions. Another reason is that the researcher sought to explore teachers' experiences by investigating their awareness and attitudes so as to suggest real-world solutions and practical outcomes.

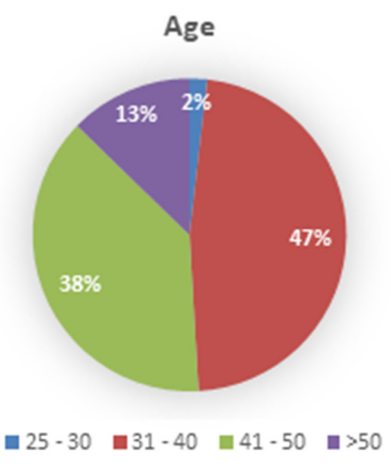
4.2 Research Design

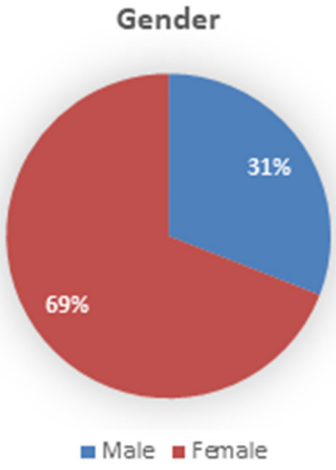
A mixed-methods approach is used in this study, such approach combines both quantitative and qualitative methodologies in a single research. Mixed-methods design can encourage collaboration across the antagonistic relationship between quantitative and qualitative researchers, offers strengths that counterbalance the weaknesses of both types of research, and gives researchers the freedom to use any method to address a research problem (Creamer, 2017). A mixed-methods approach can have different research designs depending on when the methods are mixed, how the data are collected (sequentially or concurrently), how much weight is given to one set of data over another, and how much of the research design is guided by a theoretical perspective (Creamer, 2017). Therefore, a systematic sequential mixed-method design will be used in this research to validate and triangulate the data. This method aims to systematically collect quantitative and qualitative data, combine the data, and use the findings to comprehend the study topic.

4.3 Research Context

4.3.1 Participants and Sampling

A convenient sampling technique is used to recruit Saudi EFL teachers from the ELI institution. This technique is used as the researcher was familiar with the institution from her experience as a graduate student in the TESOL program at the ELI. It has been argued that convenience sampling is the most prevalent technique, which is quicker, simpler, and less costly (Creamer, 2017). Moreover, the sample was not skewed towards any particular gender as it included instructors from both genders who work at one of the Saudi universities. The sample size for the quantitative phase of the current study was 55 EFL teachers, whereas for the qualitative phase 7 EFL teachers. The participants varied in age, academic degrees, and teaching experiences.





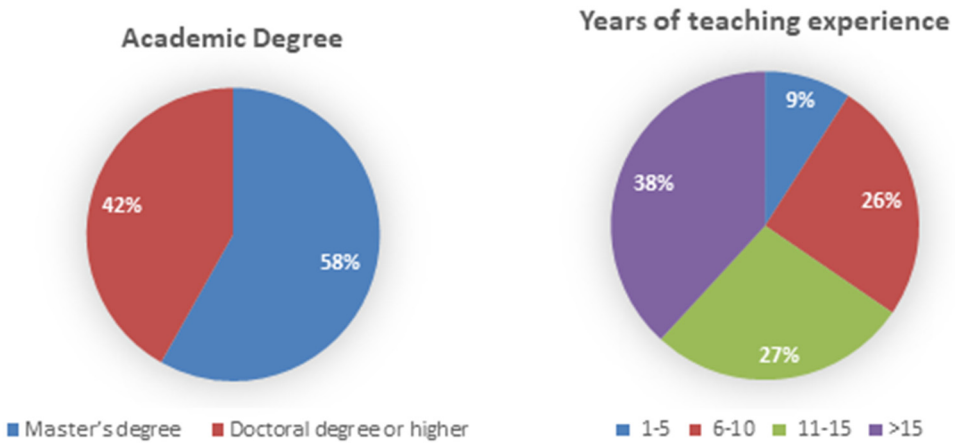


Figure 2. EFL Teachers' Demographic Data

4.3.2 Data Collection

Quantitative Data: TPACK-scale Questionnaire

The questionnaire consists of three parts. The first part provokes demographic information such as age, accumulated degree, other certificates (ex: CELTA, DELTA), and years of teaching experience. The second part covers the four variables of this study, consisting of 24 items (TK, TPK, TPACK, Teachers' attitudes) to identify teachers' knowledge and willingness for AI integration. The five-point Likert scale, which ranges from strongly disagree to strongly agree, is used to show participants' levels of agreement or disagreement with each item. Lastly, a box with optional contact information was added in the fourth section for instructors who agreed to participate in the follow-up interviews.

Piloting the Questionnaire

Although the survey was adapted from a previous Chinese researcher, it is important to conduct a pilot survey as the country and culture differ. Therefore, prior to the distribution of the online questionnaire, a pilot survey was conducted with 5 EFL teachers from the same sample. Pilot testing is a crucial stage in the validation process. The six elements proposed by De Vaus (2002) were used to assess the questionnaire.

- Meaning: can the responders comprehend the questions on the questionnaire and provide suitable answers?
- Variance: do the answers differ enough to provide the research with meaningful data?
- Scalability: If the purpose of a series of questions is to create a scale or index
- Redundancy: Do the questions repeat themselves? Are there two items that pose the same query?

- Acquiescent response set**:** Does the current rating system work or require modification?
- Non-response: Why are the respondents declining to respond to any questions?

This process helped improve the questionnaire overall and guided changing a few items to make the questionnaire easier to read and comprehend.

Qualitative Data

Semi-structured Interviews

Semi-structured interviews were used to acquire a complete understanding of Saudi EFL teacher's attitudes. Preplanned questions to get an in-depth analysis of teachers' responses to the questionnaire are asked in semi-structured interviews. This is beneficial since the interviewer may go further into an answer by expanding on any question (Roulston, 2017). Furthermore, the semi-structured interview is valuable for gathering data because it allows participants to share their viewpoints, clarify complicated interactions, and provide insight into the study subject (Roulston, 2017). Seven volunteer EFL instructors who expressed interest in participating in the study and supplied their contact information in the questionnaire participated in the online semi-structured interviews. The researcher developed six questions following the questionnaire to elicit information about EFL teachers' attitudes. Prior to the interviews, pilot interviews were conducted with two EFL teachers to test for validity.

4.3.3 Data Analysis

This study's data was analyzed qualitatively and quantitatively. Two data analysis approaches were used to analyze the questionnaire and interview data. The questionnaire data was provided in SPSS file format. The normality of the distribution of the data was checked and a descriptive and correlational statistical analysis were conducted, including means, frequencies, percentages, and standard deviations to explain demographic information and identify the relationship between teachers' levels of awareness (TPACK and its components) of AI-based applications and their attitudes. In addition, to examine the qualitative data, the interview recordings were initially transcribed using Read.ai software, which transformed the audio into written transcripts. The written transcripts were then carefully studied and reread in order to establish initial codes. Next, similar codes were combined to create significant themes. Finally, the themes were interpreted in the results chapter based on the study questions.

4.4 Ethical Consideration

The current study took ethical concerns about collecting data into account. First, King Abdulaziz University (KAU) approved the data collection. Second, upon being informed of the study's aims, procedures, and objectives, each participant was requested to sign a consent form granting permission to complete the questionnaire and perform the interview, as indicated by the KAU framework for social research. Additionally, the researcher informed the participants that we would protect their privacy during the data collection process and that they could leave the study at any time without facing any repercussions. The researcher also used anonymous identities instead of the participants' names to report the qualitative data. After transcribing and

analyzing the interviews, the researcher removed the records.

5. Data Analysis & Discussion

5.1 Quantitative Phase: Descriptive Statistics

This section starts with descriptive statistics by computing the mean and standard deviation of the variables to reveal teachers' level of awareness and attitudes towards AI-based applications. This stage is important for summarizing the data set and laying the foundation for the coming correlational analysis. Table 1 below shows the mean and the standard deviation of the four variables. The highest mean among the variables is for Attitudes then TK with 4.42 and 4.04. This indicates that most participants have positive attitudes towards AI-based applications for supporting EFL teachers' practices and strong technology knowledge of AI- based applications in EFL education. On the other hand, the lowest mean is for TPACK then TPK with 3.27 and 3.30 indicating that teachers have weak to moderate awareness of the pedagogical contribution of AI, how to apply it in their teaching practices, and the strategies to apply it effectively into teaching such as instant feedback or personalized teaching.

Table 1. The Mean and Standard Deviation of the Study Variables

Variables	N	Mean	Std. Deviation
Average TK	55	4.04	.706
Average TPK	55	3.30	1.097
Average TPACK	55	3.27	1.074
Average Attitudes	55	4.42	.569

Table 2 shows statistically significant positive correlations at a significant level of 0.05 between teachers' attitudes and all dimensions of knowledge. The strongest correlation is between TPK and TPACK with a value of 0.959 ($p < 0.001$). This indicates that teachers who are not aware of the pedagogical contributions of AI-based applications to EFL teaching are also not aware of the effective strategies to apply it into their teaching practices. Oppositely, the weakest correlation is between TK and TPK with the value of 0.464 ($p < 0.001$). This suggests that teachers' who have a high level of technology knowledge are not necessarily aware of the pedagogical impacts of applying AI into teaching practices.

Table 2. Pearson Correlations Among all Variables

Correlations	Average TK	Average TPK	Average TPACK	Average Attitudes
Average TK	1	.464**	.470**	.539**
		.000	.000	.000
	55	55	55	55
Average TPK	.464**	1	.959**	.450**
	.000		.000	.001
	55	55	55	55
Average TPACK	.470**	.959**	1	.434**
	.000	.000		.001
	55	55	55	55
Average Attitudes	.539**	.450**	.434**	1
	.000	.001	.001	
	55	55	55	55

Multiple regression was used for determining if TK, TPK, and TPACK predicted teachers' attitudes. Table 3 shows a correlation between TK and attitudes with a correlation coefficient of 0.585 indicating a positive relationship. The coefficient of determination (R2) at 0.342 suggests that TK accounts for 34.2% of the variation in attitudes. Moreover, the F value of 8.840 with a significance level of 0.000 confirms the reliability of the model in predicting attitudes. This underscores the importance of TK on teachers' attitudes. Additionally, TK was found to be statistically significant at the 0.05 level with a p value of 0.002 signifying its impact on teachers' attitudes. The regression coefficient B value of 0.342 indicates how attitudes increase when TK increases by one unit. This suggests that the strongest indicator of teachers' attitudes among other dimensions of knowledge is technological knowledge.

Table 3. Multiple Regression Analysis

Sig.	T	B	Sig. F	F	R Square	R	Dependent Variable	Independent Variable
.0020	3.286	.342						TK
.3890	.8690	.181	0.000	.8408	.342	.585	Attitudes	TPK
.8060	.2470	.053						TPACK

5.2 Qualitative Phase

Thematic analysis revealed five major themes regarding EFL teachers' attitudes and awareness of AI-based applications. These themes include positive attitudes toward using AI-based applications, overreliance on AI-based applications, AI-based applications can assist EFL teachers in their teaching practices, and willingness to keep using and exploring AI-based applications. Table 4 shows the themes, findings, and parts of the interviews' transcripts.

Table 4. Themes, Subthemes, and related transcripts

Themes	**Findings**	**Excerpts**
Positive attitudes toward using AI-based applications	EFL Teachers have positive attitudes toward using AI-based applications to support teaching practices.	"I attended a training course to teach me how to use AI as a teacher. So I think it's a helpful tool. For both the teachers and the students in the EFL field" (T5)
Overreliance on AI-based applications	Teachers fear overreliance on AI-based applications as this might take over their role and affect students' learning.	"It's helping a lot. Does it have an output and an input? It does to a certain extent. But can I rely on it? No. No, of course." (T4) "Students, especially these days, A lot of them are depending on AI in terms of writing." (T1)

AI-based applications can assist EFL teachers in their teaching practices	- Personalized learning	"In writing. I feel additionally teacher can use the AI tools for essay scoring and feedback to save time" (T1) "AI-based application and EFL education is generally positive. There is a potential for improved learning outcome. The efficiency and administrative task are also great. The ability of the AI to offer personalized learning experience is great" (T1)
Willingness to keep using and exploring AI-based applications	EFL Teachers tend to use AI-based applications to cope with the needs of the new generation.	"AI has this kind of promise to enhance students' engagement and success" (T1) "I want to learn more because we have to cope with the new generation to cope with the new ideas and factors and the things that we are facing in our everyday life. New generations mean new styles of teaching" (T4)

5.3 Finding 1: EFL Teachers Have Positive Attitudes Toward Using AI-Based Applications to Support Teaching Practices

As shown in the quantitative phase, all of the participants believed in the importance of integrating AI-based applications to help them with their educational duties. Similarly, the interviewed teachers held an optimistic view of AI, as the quantitative phase showed TK to be the strongest indicator of teachers' positive attitudes. Therefore, so as to conduct an in-depth analysis and confirm the importance of TK for positive attitudes toward AI, the participants were asked about the factors that impacted their attitudes. The majority stated that, due to their technological backgrounds in AI, they believed in its positive impact on EFL education. One teacher stated:

"I am very optimistic about what AI could give teachers in the future and how it can be of great

assistance to English language teachers in general. And I think this all comes from my, I don't want to say my "good," but my basic technological background." (T3)

Moreover, one participant stated that other factors could impact teachers' positive attitudes, such as AI's ability to save time and be a personal assistant.

5.4 Finding 2: Teachers Fear Overreliance on AI-Based Applications as They Might Take Over Their Role and Affect Students' Learning

The participants feared an overreliance on using AI-based applications and reported feeling a need to reduce their usage. Most of the participants emphasized the importance of reducing and monitoring the use of AI-based applications to support their teaching practices. This suggests that the majority were aware of the risks of relying too heavily on AI. Moreover, most of the participants expressed a fear of the possibility of AI taking over the teacher role if they overused it. Teachers play a crucial role in language education. They are responsible for many tasks that require high-order thinking, such as assessing and correcting assignments and designing lessons, all while considering their students' diverse abilities. Depending on AI too heavily could weaken teachers' capacity to perform these tasks and diminish their roles. Further, the participants believed that AI-based applications can carry risks over misinformation and declining academic integrity. They believed that students' reliance on AI-based applications for assignments could lead to cheating. Moreover, they expressed that AI should be used thoughtfully and with high consideration for its machine-based responses, as it sometimes produces inaccurate output. This could affect students' learning by weakening their ability to conduct their assignments independently. These findings indicate that teachers are cautious about overstating the benefits of AI in the educational sector, considering the potential issues of its misuse. Indeed, the participants stated that:

"I do recommend it. But again, to a certain extent, because at some point, when you rely on AI-based applications completely and thoroughly, at some point, there is no use of the teacher inside the class." (T4)

"When it comes to the integrity of research, this is one major issue. But we can use plagiarism devices. We can use some rules to inform students that we are aware of their usage of AI, and this will affect their learning." (T5)

"The sad thing is that the students sometimes rely on AI completely to write their assignments, especially the written ones. It's just a machine. It is going to generate the same answer for everyone. And this is what I found, that when the student enters the same prompt, they come up with the same answer and I receive the same writing paragraph from everyone." (T7)

5.5 Finding 3: AI-Based Applications can Assist EFL Teachers in Their Teaching Practices

This finding reveals teachers' positive attitudes toward AI, as most of the participants considered it to be their personal machine assistant and co-worker. In higher education, teachers face various challenges, such as heavy workloads and a lack of personal assistants. Consequently, the development of AI has various implications to aid teaching practices. AI-based applications are useful assistants for teachers, as most of the participants confirmed their

ability to save time and perform various tasks, such as planning lessons, generating questions, administrative work, and correcting writing assessments. For example, the participants pointed out that correcting writing assessments is the most challenging task they face. Therefore, many teachers expressed the need to integrate automated essay scoring to help reduce their workload:

"So, I believe AI generally can save time for our routine tasks, allowing us to focus more on personalized teaching."(T1)

"So, an AI-based application can do a lot of lesson planning, actually, and administrative tasks." (T2)

"In the writing skill, teachers might take a long time grading the students' work and also some teachers might not use proper reporting on the students' writing because of the lack of time." (T3)

However, other participants argued that AI cannot help with such routine tasks as administrative work, and that AI-based applications need to be monitored by their users. Some teachers stated that:

"Well, when it comes to administrative work, I don't think I can depend on AI. It could help me in framework and theoretical work and planning the overall hierarchy or something. But [you have to give it] the smallest details, because when it comes to administrative work, it depends on where you're working, what type of work you do, or the job status you have. This is in terms of the administration." (T4)

5.5 Personalized Learning

Another important role of AI is its ability to provide personalized learning to large and diverse classes. Many of the participants highlighted the power of AI-based applications in generating personalized activities and materials for mixed-level classes. Teachers often struggle to address the diverse needs of their students in the classroom, requiring them to create different activities and materials for each lesson. According to many of the teachers interviewed in this study, AI-based applications can provide efficient, accurate, and (almost) immediate solutions to this challenge. This result confirms the participants' TPK as they were aware of the pedagogical contributions of AI for their teaching practices. Some confirmed that:

"It can also analyze students' language skills, provide personalized feedback, and adapt the learning materials to actually suit the individual or students' needs." (T1)

"It gives me ideas, creating many practices and personalized learning." (T3)

5.6 Finding 4: EFL Teachers Tend to Use AI-based Applications to Cope with the Needs of the New Generation

One of the factors that prompted the participants to keep learning about AI was the aim of coping with the needs of the new generation. Many of them mentioned that technology forms part of our daily practices, and should thus not be separated from education. The characteristics

of the new generation differ from those of the old. Indeed, they spend significant amounts of time scrolling through their phones and searching for answers to their questions or concerns. As such, they are accustomed to learning and acquiring new information through visual and auditory means. Their brains function differently from the older generation, who are more accustomed to using paper and pens. Therefore, the education system should adapt to these changes. Consequently, almost all of the participants believed that AI could be a solution for those students who do not respond well to traditional teaching methods. Accordingly, teachers should learn where and when to integrate AI-based applications to solve educational issues. One of the teachers said:

"So, in complicated cases where they students who might not be able to just learn in the traditional way, this [conventional] was is not working anymore with this generation. They have to get some AI, they have to use some applications, they have to use some [… to engage some of those applications in their classes." (T6)

6. Conclusion & Recommendations

This research explores teachers' awareness and attitudes towards AI-based applications to support teaching practices in EFL education. Therefore, the first research question asked about the relationship between teachers' TPACK and teaching practices. The quantitative results showed that teachers' high technological knowledge impacted their positive attitudes toward AI-based applications. Teachers with high TK believe AI can enhance teaching practices by supporting teachers' tasks and innovating solutions to educational issues. On the other hand, their high TK did not influence their TPACK. This suggests that teachers must be more aware of effective strategies for integrating AI-based applications into their teaching practices. For instance, how and when should it be applied to solve certain issues during the teaching process? Moreover, to get an in-depth analysis of teachers' attitudes and awareness. The second research question asked about teachers' attitudes toward AI-based applications to support EFL teaching practices. The qualitative results showed that teachers believe that AI-based applications can support generating personalized learning, doing routine tasks, and correcting writing assignments. Also, teachers integrate those applications into their teaching practices to cope with the needs of the new generation and engage them more in the teaching process. However, overreliance appeared to be the teachers' biggest fear, as they believe monitoring AI's output is necessary to keep the human factor active in the teaching process. Further findings showed that student overreliance is another major fear, as it can lead to issues with academic integrity and misinformation. Overall, most findings suggest that teachers have intermediate to high levels of awareness towards AI-based applications and an optimistic view of AI's contributions to EFL education.

7. Pedagogical Implementations for EFL Teaching

In light of the findings, EFL teachers should aim to enhance their awareness of AI-based applications and be acquainted with the strategies required to successfully implement AI-based applications in education. Using AI in education requires a complete understanding of its applications, as well as familiarity with how and when to implement it to address educational challenges. Hence, AI-based applications in EFL education differ from other those in other

disciplines as they require a combination of pedagogical and technological awareness. For instance, teachers should know when to use AI to correct writing assessments to save time, help students receive immediate feedback, and enhance students' autonomy. Thus, higher education institutions should allow teachers to access certification programs focused on AI integration in EFL education, enabling them to acquire official qualifications and enhance their proficiency in using these applications. Moreover, teachers must make well-informed choices on whether to employ AI and when to refer to traditional methods.

Second, teachers should consider enhancing their knowledge of AI applications that can support the teaching process. Indeed, AI can simplify teachers' lives, allowing them to focus on creativity and teaching, including creating extra activities, monitoring students' progress, and supporting language learning. Therefore, focusing on the TK of AI is highly important, as it can shape teachers' attitudes toward integrating AI applications. Teachers' training plays a crucial role in supporting them with up-to-date strategies and knowledge in using new technologies. Thus, teachers should stay updated on emerging technologies in education by attending workshops and conferences to enhance their TK.

Third, EFL teachers should monitor their use of AI-based applications to prevent overreliance and preserve the human factor in the educational process. Teachers' overreliance can lead to minimizing the teacher's role in the classroom, leading to the dehumanization of language learning. Moreover, in the education process, teachers must use high order thinking to analyze, evaluate, and create. However, the use of AI may diminish these cognitive abilities. Therefore, higher education institutions should offer teachers the opportunity to engage in peer review sessions, which involve receiving feedback from their peers regarding the use of AI. Teachers should also encourage their peers to manually analyze tests that call for deeper levels of understanding, such as essay grading or oral presentations, to guarantee a comprehensive evaluation instead of depending solely on AI feedback.

Fourth, teachers should encourage students to limit their use of AI-based applications when completing assignments. AI has the potential to generate identical responses for multiple users, which could result in dishonesty and subsequent penalties. Students should be taught about the limitations of AI resources by their teachers. It is important to understand that, while AI can help with language learning and grammar, true human communication is essential for grasping deeper meanings, context, and cultural nuances. Teachers should also encourage student participation in group projects, classroom discussions, and creative activities that AI-based applications are unable to generate.

Finally, universities should take responsibility for their staff, teachers, and students, and ensure that they have a high level of awareness of the effective use of AI-based applications. They can offer various workshops, certifications, and bonuses to encourage teachers to incorporate emerging technologies to support their practices and enhance educational quality. Moreover, managers and policymakers should ensure that teachers have access to licensed AI resources, including language-learning platforms, assessment tools, interactive apps designed for language instruction, and provide sufficient technological pedagogical training.

8. Limitations of the Study

While the study provided promising results and useful recommendations for language teachers and other policymakers, some limitations need to be recognized to maximize the potential for further research or replication. First, this study investigates the relationship between teachers' knowledge of AI-based applications and their willingness to use them. Hence, this research focuses on one aspect (teachers' technological and pedagogical knowledge) to predict EFL teachers' attitudes and tendencies to use AI. Future experiments are required to determine other factors potentially impacting instructors' attitudes. Second, the findings cannot be generalized, as the sample was small and convenient. Finally, the interviews were conducted virtually. Therefore, the researcher missed eye contact and body language with the teachers to get deeper meanings.

9. Recommendations for Future Research

This research study presented various recommendations for future research, considering all the limits and consequences discussed this far. It indicated that teachers need to be more aware of strategies for incorporating AI-based applications into their teaching practices. Thus, future researchers need to consider the training and professional development needs of Saudi EFL teachers to use AI-based applications effectively. For instance, looking at what assistance or materials are required to incorporate AI into their teaching practices. Also, other methods can be interpreted to explore teachers' use of AI-based applications, such as peer and self-reflection. Moreover, additional studies with a wider scope are necessary to explain the influence of teachers' awareness on the integration of AI-based applications and to compare results from different universities. Finally, future research should investigate students' awareness of AI applications and propose solutions to prevent reliance on AI outputs.

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