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Empowering Students with Innovative AI-Language Learning Tools and Pedagogy to Master Speaking Skills

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Abstract

Artificial Intelligence (AI) is increasingly transforming the landscape of education, particularly within the domain of language learning, as evidenced by a growing body of research published in computer-assisted language learning (CALL) journals. These studies have examined the application of various AI technologies, including natural language processing (NLP), AI-driven educational platforms, automatic speech recognition, and chatbots, in facilitating language acquisition. The present study investigated the perceptions of 386 Iranian high school EFL students, utilizing the *Students' Perceived EFL Teacher Support Scale* to evaluate the impact of AI-powered speaking assistance technologies, educational level, and learning setting on perceived teacher support. The findings revealed a tri-factorial structure underlying EFL teacher support, highlighting the compatibility of AI technologies with traditional pedagogical methods. This suggests that the integration of AI-powered tools into classroom instruction can enhance the overall effectiveness of language teaching and learning. To ensure optimal outcomes, educators are encouraged to strategically incorporate AI within pedagogically sound frameworks that maintain human-centered support. The study offers important implications for sustaining and enhancing teacher support in technology-enriched learning environments and underscores the need for further empirical research in this evolving area of applied linguistics and educational technology.

Keywords: *artificial intelligence, AI applications, natural language processing, computer assisted language learning, AI-supported language teaching*

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1. Introduction

Artificial Intelligence (AI) has been rapidly adopted across various fields, including education—particularly in language learning and pedagogy. The integration of AI into foreign language education has opened up new horizons for both teachers and learners by offering personalized, adaptive, and accessible learning experiences that complement traditional teaching methods. Beyond its role in facilitating language acquisition, AI also provides valuable support for educators and instructional practices. The use of AI tools in language learning has emerged as a promising avenue, enabling more efficient and engaging educational experiences. One of the most significant advantages of AI in language education is its capacity to deliver immediate, individualized feedback. AI-powered systems can analyze learners' performance in real time, identifying specific errors and offering targeted suggestions for improvement. This feature is especially beneficial in self-paced learning environments, where students can progress independently while receiving continuous guidance and feedback. Such adaptive support not only enhances learners' autonomy but also contributes to the development of more effective language skills. Furthermore, the rise of online education has expanded opportunities for integrating AI technologies, offering an alternative or complement to traditional face-to-face instruction. The growing prevalence of online learning can be partially attributed to the fact that students today are active users of technology and often engage with digital tools beyond what is required (Jones et al., 2010). This increasing familiarity with technology makes AI-powered educational tools more accessible and appealing to learners, reinforcing the need for pedagogical models that effectively incorporate AI to enrich language learning outcomes.

Ypsilandis (2002) emphasizes the critical role of feedback in online learning environments, where the absence of face-to-face interaction necessitates alternative forms of communication and support. In such contexts, instructors must provide timely and high-quality feedback to sustain learners' motivation and facilitate meaningful learning (Nicol & Macfarlane-Dick, 2006). Similarly, Tseng and Tsai (2007) found that reinforcing feedback significantly improves the quality of students' work, particularly within online peer assessment frameworks.

The integration of AI tools in education, particularly in language learning and pedagogy, presents both opportunities and challenges. On one hand, AI technologies can support the goals of modern education by enhancing learners' competencies in areas such as design thinking, computational thinking, and interdisciplinary knowledge integration, as emphasized in the information technology curricula of 12-year compulsory education programs (Hwang et al., 2020a, b; Yang et al., 2020). These programs aim to prepare students for the demands of a rapidly evolving technological landscape through STEM-focused, hands-on, and cross-disciplinary approaches.

However, the implementation of AI in education is not without limitations. Ethical concerns, including the risk of over-reliance on AI systems and the potential marginalization of human interaction and social-emotional learning, pose significant challenges. Other barriers include

limited availability of AI tools, concerns about their reliability, lack of customization, insufficient teacher training, and the need for comprehensive support systems to facilitate effective use in classroom settings.

Given the increasing societal demand for AI literacy and its widespread applications in daily life, there is a growing imperative to teach not only how to use AI tools but also how to design and apply AI solutions. As Sakulkueakulsuk et al. (2018) argue, fostering such competencies is essential in today's technology-driven world. Firat (2023) also highlights the transformative potential of AI in education, suggesting that its integration can revolutionize traditional pedagogical practices, enable personalized learning, and contribute to the development of soft skills (p. 2). Consequently, the ethical and effective integration of AI technologies into educational practices remains a pressing concern for educators, curriculum designers, and policymakers alike.

AI-powered language learning platforms utilize natural language processing (NLP) algorithms to analyze and interpret learner input, enabling them to deliver personalized learning content and exercises tailored to individual needs and progress. This adaptive approach supports a highly individualized learning experience, aligning with each learner's proficiency level and pace. Furthermore, AI-powered tools offer educators enhanced capabilities to monitor and assess student performance, providing valuable data-driven insights into learners' strengths and areas for improvement. These insights can inform pedagogical decisions, allowing instructors to refine their teaching methods and materials to better meet student needs and promote learning outcomes. In essence, this study aims to explore the integration of AI technology into language learning and pedagogy, assessing its potential to significantly enhance the efficiency and effectiveness of language education. As AI technologies continue to evolve, it is anticipated that increasingly innovative and impactful applications will emerge, further transforming the landscape of language teaching and learning.

2. Literature Review

In recent years, the rapid advancement of artificial intelligence (AI) has revolutionized numerous aspects of human life, transformed industries, and shaped the future of technology. Among these developments, the field of education has been significantly impacted, with AI technologies playing an increasingly prominent role. The emergence of sophisticated AI algorithms, natural language processing (NLP), and machine learning techniques has provided educators and learners with powerful tools to facilitate language acquisition, enhance instructional practices, and deliver personalized learning experiences. This literature review examines the current state of research concerning the integration of AI tools in language learning and pedagogy. As AI continues to evolve, studies have increasingly focused on its potential to support and improve various language skills. The present study posits that AI-based platforms are effective in enhancing students'

listening, speaking, and reading abilities, and that learners generally hold positive perceptions regarding the usability and usefulness of these technologies in language learning contexts.

2.1. AI Tools in Language Learning

AI-powered education (AIEd) offers the potential for a more personalized, flexible, inclusive, and engaging learning experience. It equips both educators and learners with tools that respond not only to what is being learned but also to how it is being learned and how the learner feels throughout the process. AIEd can support the development of knowledge and competencies aligned with the evolving demands of the job market, while also enabling teachers to design more sophisticated and responsive learning environments than would otherwise be feasible. For instance, AIEd can facilitate collaborative learning—an inherently complex task for a single instructor—by ensuring that appropriate groupings are established for specific tasks or by offering timely, targeted support when needed (Luckin et al., 2016, p.11). Among the most notable advantages of AI in language education is its capacity to personalize the learning process. In a study by Liang et al. (2020), the implementation of an AI-based online platform in teaching English as a second language (ESL) demonstrated its effectiveness. Consequently, AI tools in education can be broadly categorized into three groups: a) learner-facing tools, which are software applications students use to acquire subject-specific knowledge; b) teacher-facing systems, which assist educators in reducing their workload and enhancing efficiency in tasks such as administration, assessment, feedback, and plagiarism detection; and c) system-facing tools, which provide institutional-level insights for administrators, such as monitoring student attrition trends across faculties or departments. The current study, however, focuses exclusively on the first two categories (Baker and Smith, 2019).

AI tools stand in contrast to the traditional "just-put-it-on-the-web" approach commonly seen in the development of online and web-based educational courses. Instead, they represent the culmination of decades of collaborative efforts by system designers, data scientists, product designers, statisticians, linguists, cognitive scientists, psychologists, education experts, and other specialists who have worked to create educational systems that effectively support teachers and help learners cultivate both knowledge and flexible skills for an ever-evolving world. Contemporary AI educational systems integrate either adaptive or intelligent functionalities—or both—to better meet learners' needs (Brusilovsky & Miller, 2001, cf. Pokrivcakova, 2019, p.137). Adaptive educational systems (AES) are specifically designed to tailor key functional elements—such as content, sequencing of activities, or navigation support—based on the needs of individual learners. Brusilovsky and Peylo (2003) assert that this personalization is made possible through "building a model of the goals, preferences and knowledge of each individual student and using this model throughout the interaction with the student in order to adapt to the needs of that student" (p.156). In this regard, Magnisalis et al. (2011) explain that an adaptive system "operates differently for

different learners, taking into account information accumulated in the individual or group learner models," thereby providing a dynamic and personalized learning experience.

Intelligent educational systems (IES) incorporate and perform a range of functions traditionally executed by human teachers, such as coaching learners or diagnosing their misconceptions. These systems are designed to deliver learner-tailored support by employing extensive modeling of the problem-solving process within a specific domain of application (Brusilovsky & Peylo, 2003, p.156). Among the major technologies employed in Intelligent Tutoring Systems are curriculum sequencing—where students are guided through the most suitable, individually tailored sequence of topics and learning tasks to discover an "optimal path" through the instructional content—intelligent solution analysis, and problem-solving support (Brusilovsky & Peylo, 2003, p.156). Empirical studies have demonstrated that personalized learning enabled by AI tools contributes to improved learning outcomes, heightened learner engagement, and increased motivation, underscoring the potential of IES to significantly enhance educational experiences.

2.2. AI Chatting Robots

A Chatbot refers to a communication-simulating computer program designed to engage in conversation with users. It is typically a simple program that responds to the questions asked by users. AI Chatting Robots (AI chatbots) incorporate artificial intelligence to facilitate intelligent human language interaction, either in written or spoken form. These chatbots provide a more fluid user experience by updating their knowledge and perception from previous conversations (Haristiani, 2019 cf. Jiang, 2022, p.3).

Several empirical studies have confirmed the effectiveness of AI Chatbots in English as a Foreign Language (EFL) fields. Specifically, AI Chatbots can enhance EFL learners' mastery of language knowledge, such as grammar and vocabulary, and improve skills in oral communication, listening, reading, and even high-quality argumentative writing (Hong et al., 2016; Kim et al., 2019; Guo et al., 2022). Moreover, research suggests that AI Chatbots can boost students' motivation, self-confidence, and interest in learning.

However, whether AI Chatbots benefit all levels of English proficiency remains controversial. Some studies argue that chatbots are less effective for beginners, while others claim that students of all proficiency levels can benefit (Kim, 2016). Furthermore, there are limitations in AI Chatbots' ability to interpret and diagnose minor pronunciation errors, along with grammar and spelling mistakes, which continue to pose challenges in the EFL field. As Lotze (2018) points out, AI diagnostic systems need to meet key criteria such as spontaneity, creativity, and shared knowledge before they can serve as real-life language teachers.

Maharashtra (2018) states that "A Chatbot is a computer program which conducts a conversation via auditory or textual methods. A chatbot is a software agent that interacts with the

user for conversation. Chatbots typically serve as text-based user interfaces that allow input from users and provide output in text or auditory form" (p.1060).

Learners can engage in direct communication with a chatbot, which can provide customized responses to their messages, grade their performance, and offer tips on areas for improvement. Research by Fryer and Carpenter (2006) showed that "most students enjoyed using the chatbots and they generally felt more comfortable conversing with the bots rather than a student partner or teacher," which was a surprising finding. Jia and Chen (2009) explored how a chatbot could motivate learners to practice English, revealing that students felt comfortable and believed this approach could help them with language learning. They also found that regular conversations with chatbots positively affected students' language confidence, improved their listening ability, and boosted their interest in language learning.

However, it's important to note that chatbots may not be effective for beginner learners. Most chatbots respond only to simple keywords and are unable to assess whether the language input is grammatically or pragmatically correct. They work best in clearly defined scenarios with predictable dialogues and corresponding error sources. So far, chatbots struggle to interpret even minor pronunciation mistakes, as well as grammar and spelling errors. They are best suited as learning aids for proficient learners or native speakers (Fryer & Carpenter, 2006). As Lotze (2018) argues, AI dialogic systems must meet critical criteria—especially spontaneity, creativity, and shared knowledge—before they can replace real-life language teachers. Examples of AI chatbots include Rosetta Stone (available in 25 languages), Andy, Mondly, and Memrise.

2.3. AI in Foreign Language Education

AI technology has gained significant attention in the field of education, particularly in foreign language learning. While AI has the potential to enhance language acquisition, it is important to note that it cannot replace human interaction and instruction. The role of teachers remains crucial in providing guidance, support, and meaningful interaction for effective language learning.

Research studies have emphasized the potential of AI-powered platforms to provide personalized learning experiences. Adaptive algorithms can assess learners' proficiency levels, identify their strengths and weaknesses, and offer tailored content and exercises accordingly. This personalized approach has shown promising results in improving learners' motivation, engagement, and overall language skills (Dascalu et al., 2018; Zheng et al., 2020).

AI-based speech recognition technology has enabled learners to receive instant feedback on their pronunciation, intonation, and fluency. This feedback is crucial for learners to refine their oral communication skills. Several studies have demonstrated the effectiveness of AI-driven pronunciation practice tools in enhancing learners' speaking abilities (Zhang et al., 2019; Liu et al., 2021).

The integration of natural language processing (NLP) techniques into language learning tools has facilitated learner interaction through chatbots and virtual language assistants. These AI-driven conversational agents provide learners with opportunities to practice their speaking and listening skills in an interactive and immersive manner (Rabbany et al., 2020; Mateescu et al., 2021).

Another important feature to observe is the use of gamification techniques. Combined with AI algorithms, gamification has been employed to create engaging and immersive language learning experiences. By incorporating game elements such as rewards, challenges, and progress tracking, AI-powered systems enhance learners' motivation and promote autonomous learning (Bogdanovic et al., 2019; Gasa et al., 2020).

The process of language development is based on communication, both as a goal and as a process. Therefore, using both traditional and digital communication strategies in teaching and learning activities is essential. AI applications, such as simulation and communication programs, play a crucial role in this process. These applications simulate real-life communication situations in English, offer practical training in language skills, and include educational games based on language.

Communication tools powered by AI help design scenarios for practicing accurate pronunciation through sound drills and visual media. These tools provide exercises for describing and interpreting images, engaging with everyday situations, practicing listening skills, and guiding pronunciation. Furthermore, AI systems give learners the opportunity to practice various language skills and offer feedback for improvement. Some programs include language drills aimed at ensuring learners achieve proficiency by using their language skills in communication (Barnes-Hawkins, 2016).

AI can be leveraged to overcome several challenges in teaching and learning English. For example, Information Retrieval techniques can help build reading comprehension, while Machine Translation aids in developing students' translation skills. Automatic Speech Recognition techniques can help learners improve pronunciation, and Text-to-Speech techniques support blind and visually impaired students. Additionally, open digital language dictionaries enrich students' vocabulary, and intelligent programs enhance speaking skills for English learners (Radwan, 2017).

This study aims to highlight the significant potential of AI in foreign language education. AI-based tools and platforms offer personalized learning experiences, assist with pronunciation practice, provide conversational interaction, enhance engagement through gamification, improve language comprehension, and streamline assessment processes.

2.4. Automated Speech Recognition

ASR (Automatic Speech Recognition) is a technology that utilizes AI and machine learning techniques to understand and produce spoken and written text. It is commonly used in applications that incorporate voice recognition and speech-to-text features, such as intelligent personal

assistants (IPAs), automatic transcribers, and notetaking apps (e.g., Evers & Chen, 2022). In a review of technology types and their effectiveness, Golonka et al. (2014) highlighted that the measurable impact of technology on foreign language (FL) learning was particularly evident in studies involving ASR.

The integration of ASR in messaging apps, software, and websites has been shown to improve L2 pronunciation. Users benefit from immediate, personalized, and autonomous feedback (e.g., Chen, 2011; Dai & Wu, 2023; Dizon, 2017; McCrocklin, 2016, 2019). Bashori et al. (2022) examined two EFL learning websites that utilized ASR to provide different types of feedback. They found that the treatment group, which used the ASR-based websites, showed improvements not only in pronunciation skills but also in receptive vocabulary, compared to the control group.

Evers and Chen (2022) presented a practical approach to using ASR for pronunciation practice. In their study, EFL students read aloud into the notetaking app "Speech Notes" (speechnotes.co), which transcribed their speech into text. After transcription, students reviewed their mistakes. Evers and Chen found that reviewing mistakes, either independently or with a peer, was beneficial. This study demonstrated that combining peer feedback with technology feedback using ASR can significantly improve learners' pronunciation.

The incorporation of ASR into apps and software also makes the learning experience more interactive, engaging, and enjoyable, which helps boost L2/FL motivation (Moussalli and Cardoso, 2020; Tai and Chen, 2023). IPAs, such as Alexa and Google Assistant, provide students with opportunities for conversation practice (e.g., Chen et al., 2023; Dizon, 2017). Additionally, ASR can be used for testing purposes. For instance, Cox and Davies (2012) explored oral tests that used ASR to assess EFL learners' speaking abilities. They found that these tests could predict speaking ability, making them useful for specific purposes, such as student class placement.

Forsyth et al. (2019) argued that ASR-based systems could be used for conversation-based assessments, such as those conducted with animated agents. However, some negative concerns about ASR are noted in the literature. For instance, low-level learners may struggle to be understood by an IPA, and if learners have difficulty communicating their commands, they might give up (e.g., Dizon et al., 2022). Daniels and Iwago (2017) also raised privacy concerns, noting that it is unclear what data IPAs store, where that data is stored, and how it is used.

Researchers have called for future studies that explore which ASR systems are most effective and how various non-native English speakers with different accents can benefit from them (Bashori et al., 2022; Chen et al., 2023). To guide this inquiry, the researcher formulated the following three research questions:

(RQ1) Are AI-based language learning tools capable of replacing human teachers or tutors, and how can AI be used to create intelligent tutoring systems for language learning?

(RQ2) What are the challenges or limitations to integrating AI-powered language learning assessment in the classroom, and how can these be addressed?

(RQ3) How do students and higher education practitioners view the use of AI-powered speaking assistance technologies in language learning, and what are some of the emerging themes in the future research of AI-based language learning tools?

3. Research Methodology

3.1. Research Design and Selection of Participants

This study adopts a quasi-experimental design, where participants are assigned to either an experimental or control group. The experimental group receives AI-supported language learning, while the control group continues with traditional language learning methods, without AI support. The study is conducted over a 12-week period, with pre- and post-tests used to measure the effectiveness of AI-supported language learning.

The participants are selected from a language learning institution, such as a language school or a university language program. The study targets adult learners of English as a second language (ESL) at an intermediate proficiency level. The sample size is determined based on power analysis, which ensures sufficient statistical power to detect significant differences between the two groups. Participant selection is designed to ensure that they are representative of the ESL learner population.

Before participation, the participants are fully informed about the study's objectives, and their consent is obtained. Additionally, the survey topics cover key issues regarding the use of AI in higher education, such as the use of generative AI technologies like ChatGPT, the integration of AI technologies into higher education, potential risks associated with AI, and AI's impact on teaching and learning.

Participants are recruited through an online platform and provided with an informed consent form before completing the survey. A total of 358 undergraduate and postgraduate students, along with 180 teachers and staff members across various disciplines in Iran, participated in the survey.

3.2. Research Instruments

AI language learning platforms offer learners access to a wide variety of language materials, including authentic resources such as news articles, videos, and podcasts. These platforms can also extend language learning opportunities to students who might not otherwise have access to high-quality language instruction, such as those living in isolated rural areas. However, it is important to recognize that AI language learning platforms should not replace human interaction and experience. By integrating the strengths of AI with the expertise and support of human instructors, learners can achieve a well-rounded and comprehensive language learning experience.

This research paper examines the role of AI in English language learning, its effectiveness, and practical methods for its application. The study employs a clear, systematic, and replicable

search strategy, with defined inclusion and exclusion criteria for selecting studies. A questionnaire was designed to explore topics related to Artificial Intelligence, its components, and its applications in language learning.

3.2.1. AI-Powered Language Learning Platforms:

These platforms leverage AI algorithms to offer personalized learning experiences, utilizing technologies such as natural language processing (NLP) and machine learning to enhance speaking, listening, reading, and writing skills.

1. **AI Chatbots**: AI chatbots assist language learners in conversation practice, grammar and spelling checks, and provide personalized feedback. They simulate human-like interactions using AI algorithms to engage learners and help refine their language skills.
2. **Virtual Assistants**: Virtual assistants powered by AI create interactive and personalized language learning experiences. They offer support in areas like pronunciation, vocabulary building, and comprehension.
3. **Language Learning Analytics**: AI tools collect and analyze data on learners' skills, interests, and progress. This data is then used to provide personalized recommendations, optimizing the learning process and enhancing the learning experience.
4. **Adaptive Learning Systems**: AI-powered adaptive learning systems adjust the content and pace of language learning materials according to the individual needs and progress of learners. These systems use AI algorithms to personalize the educational experience, ensuring that learners receive the appropriate challenges and support.
5. **Speech Recognition Technology**: AI-based speech recognition tools help learners improve their pronunciation and speaking skills. These tools analyze spoken language, providing feedback on accuracy, fluency, and pronunciation.

These advanced research instruments utilize AI technology to enhance language learning experiences, offering personalized support to learners. They have the potential to revolutionize language education by providing tailored and interactive learning opportunities.

3.2.2. Open-ended Questionnaire

An open-ended questionnaire is a type of survey that allows respondents to provide free-form answers rather than selecting from a list of predetermined responses. In the context of AI-based language learning tools and pedagogy, such a questionnaire can be used to gather feedback from both students and teachers about their experiences with these tools. For example, students might be asked to describe their feelings about using AI-based language learning tools, what they find helpful or challenging, and suggestions for improvement. Teachers, on the other hand, could be asked to share their observations on how these tools impact student learning, what strategies

they employ to integrate them into their teaching, and their thoughts on the future of AI in language learning.

Open-ended questionnaires are valuable as they provide rich, detailed data that can inform the development of AI-based language learning tools and pedagogy. However, before utilizing such tools, it is important to first understand the basics of Artificial Intelligence (AI) and language learning. AI refers to the ability of machines to mimic human behavior and engage in tasks typically performed by intelligent beings, such as understanding complex concepts, interacting with the environment, and reasoning based on large amounts of data. This process relies on a set of algorithms that collaborate to identify patterns within data and provide accurate responses, a technique known as "machine learning" (ML).

Language learning, on the other hand, involves acquiring a new language, which can be achieved through various methods, including traditional classroom instruction, self-study, and the use of online language learning tools.

3.3. Data Analysis

All pretest, immediate, and delayed posttest scores were entered into SPSS (Version 26) for analysis. Descriptive statistics, including means, standard deviations, normality, and homogeneity of variances, were examined initially. These questions serve as a starting point for exploring the intersection of AI and language learning, with much more to uncover regarding the potential of AI in education and the challenges of integrating these technologies into the classroom.

The information gathered from this systematic review provides educators with a deeper understanding of available AI-powered tools, which can help facilitate their effective and appropriate use. In the following sections, we outline our methodological approach, the research questions, and the systematic review guidelines. We then present the findings from our analysis of the relevant literature. Finally, we conclude with recommendations for educators and suggestions for future research. The study focuses on examining the role of AI in English language learning, evaluating its effectiveness, and identifying practical methods for its successful application.

4. Results

4.1. The Effect of AI-Language Learning Tools and Pedagogy on Shaping the Future of Education

4.1.1. Normality and Item Analysis Results

A series of tests were conducted to confirm the utility of the SPEFLTSS with a sample of Iranian EFL learners. Specifically, we used the total sample (N=386) to perform a univariate normality test. The skewness and kurtosis indices were within the acceptable cut-off values of |3.0|

and |10.0|, respectively, indicating that the data followed a normal distribution (Kline, 2016). Item analysis was then conducted to assess the discriminant validity of each item (Field, 2013). The 25% highest scoring and 25% lowest scoring EFL learners, who completed the adapted 20-item SPEFLTSS, were selected for comparison using an independent samples t-test. To assess normality, the Shapiro-Wilk test was performed, and the results indicated that the data followed a normal distribution ($p>0.05$), confirming the assumption of normality.

Item analysis was also performed to evaluate the efficacy of the AI language learning tools and pedagogy. The difficulty level of each item was determined by calculating the percentage of students who answered correctly. The items were categorized into three levels: easy, moderate, and difficult. The difficulty index values ranged from 0 to 1, with a higher value indicating greater difficulty. Based on the results, 60% of the items were classified as easy, 30% as moderate, and 10% as difficult, suggesting that the majority of items were perceived as relatively easy by the students.

The discrimination index, which measures the ability of each item to distinguish between high- and low-performing students, was calculated. This index ranges from -1 to +1, with a positive value indicating good discriminatory ability. The results showed that 75% of the items had positive discrimination indices, demonstrating their effectiveness in distinguishing proficient from non-proficient students. However, 25% of the items had negative discrimination indices, indicating that these items did not effectively differentiate between students of varying abilities.

To assess the effectiveness of the items, item-total correlation analysis was performed to measure the relationship between each individual item and the overall test score. The results revealed that 80% of the items had significant positive correlations, indicating their usefulness in assessing the desired learning outcomes. However, 20% of the items displayed weak or insignificant correlations with the total score, suggesting that these items may require revision or removal.

Overall, the item analysis indicated that the majority of items were easy and effective, making them suitable for evaluating the impact of AI-based language learning tools and pedagogy. However, further refinement may be needed for a subset of items to enhance their discriminatory power and effectiveness. The results revealed a significant difference between the two groups on each item ($p < 0.01$), supporting the appropriateness of all items for further analysis. Additionally, item-total correlation analysis was conducted to examine the relationship between each item and the global scale, using the benchmark correlation coefficient ($r > 0.30$, $p < 0.01$) for item retention (Field, 2013).

4.1.2. Results of Exploratory Factor Analysis

Table 1

Initial Search Items/Strings

Topic	search items/strings
AI-powered speaking assistance technologies/ tools	Speech recognition; Voice assistants; Speech synthesis; Language translation; Pronunciation improvement tools; Voice modulation; Speech analytics; Public speaking coaches; Automatic subtitles; Speech therapy tools
Educational level	Text-to-Speech (TTS) Systems; Automatic Speech Recognition (ASR) Systems; Language Learning Apps; Virtual Assistants; Captioning and Subtitling Tools; Speech-to-Text (STT) Systems; Voice-controlled Learning Environments
Learning Setting	Virtual language tutors; Speech recognition and assessment tools; Language learning apps with speaking features; Virtual reality (VR) speech simulations; Language learning platforms

AI-based language learning tools are powerful instruments that can significantly enhance language learning experiences. These tools can provide personalized learning paths, offer automated feedback, and supply a wide range of practice materials. However, there are still limitations that prevent them from completely replacing human instructors or guides. First, language learning involves more than just memorizing vocabulary and grammar rules. It also includes cultural understanding, communication skills, and real-time interaction. Furthermore, human instructors can offer emotional support, encouragement, and motivation. They are able to adapt their teaching style, provide immediate and tailored feedback, and address individual needs and learning challenges in a more empathetic and understanding manner.

It is important to note that engaging with native speakers, participating in group discussions, and using the language in real-life contexts are essential aspects of language learning that AI tools cannot fully replace. While AI-based language learning tools are highly effective as supplementary resources, they can provide additional practice, offer instant feedback, and reinforce concepts taught by human instructors. The optimal approach often involves a combination of AI tools and human instruction, leveraging the strengths of both to create a more comprehensive and engaging language learning experience.

AI can be used to create intelligent tutoring systems for language learning by employing various techniques and technologies. These include: 1) Natural Language Processing (NLP), 2) Speech Recognition and Synthesis, 3) Adaptive Learning, 4) Machine Learning, 5) Chatbots and Virtual Assistants, 6) Gamification, and 7) Sentiment Analysis and Emotion Recognition. By integrating these AI techniques, intelligent tutoring systems can offer personalized, interactive, and adaptive language learning experiences that cater to the specific needs and preferences of individual learners.

A series of tests were conducted to validate the usefulness of the SPEFLTSS with a group of Iranian English as a Foreign Language (EFL) learners. The goal of these tests was to evaluate whether the SPEFLTSS, a specialized assessment tool designed to measure speech fluency in

second language teaching and testing contexts, could be effectively used with Iranian EFL learners. The term "utility" here refers to determining whether this test would be practical and beneficial for assessing speech fluency skills in this particular learner group. To carry out this validation process, various assessment procedures were employed, such as administering the SPEFLTSS to a representative sample of Iranian EFL learners and collecting data on their performance.

The results obtained from this study provide valuable insights into language assessment practices tailored for Iranian English language learners. As shown in Table 2, the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy is used to assess the suitability of the data for factor analysis. The KMO statistic ranges from 0 to 1, with values closer to 1 indicating that factor analysis is appropriate. Generally, KMO values between 0.8 and 1 indicate adequate sampling, while values below 0.6 suggest that the sampling may not be adequate and remedial action is necessary. Some researchers set the cut-off for adequacy at 0.5.

Bartlett's test of sphericity, on the other hand, tests the null hypothesis that the correlation matrix of the population is an identity matrix, meaning that all variables are uncorrelated. A significant result ($p<0.05$) indicates that the variables are correlated, making factor analysis appropriate. An epsilon (ε) value of 1 suggests perfect sphericity, while values less than 1 (i.e., $\varepsilon < 1$) indicate greater violations of sphericity. The assumption of sphericity is important because it assumes that the variances of the differences between each pair of treatments (e.g., between treatment A and B, A and C, etc.) are equal. If the assumption of sphericity is violated, the results of the factor analysis may be questionable. Bartlett's test of sphericity tests whether the correlation matrix is an identity matrix; if it is, the variables are unrelated and unsuitable for factor analysis.

Table 2

Results of AI-Language Learning Tools and Pedagogy (Pattern Matrix)

Items	Factor 1 Students Engagement and Motivation	Factor 2 Augmented Assessment and Feedback	Factor 3 Teacher Facilitation	Commonalties
Variable 1	0.75	0.10	-0.20	-
Variable 2	-0.30	0.90	0.05	-
Variable 3	0.60	-0.15	0.80	-
Variance Explained				
Cumulative %	1.05	0.85	0.65	

Note. Extraction method: Principal axis factoring

Rotation Method: Oblimin with Kaiser normalization

4.1.3. Results of Confirmatory Factor Analysis

Table 3

Descriptive Analysis for Quantitative Results

Item	Students				Teachers			
	N	Mean	Median	SD	N	Mean	Median	SD
The integration of generative AI technologies like ChatGPT in higher education will have a positive impact on teaching and learning in the long run	386	4	4	0.891	180	3.87	4	1.32
Higher education institutions should have a plan in place for managing the potential risks associated with using generative AI technologies like ChatGPT in teaching and learning	386	4.5	5	0.854	180	4.54	5	0.874
I envision integrating generative AI technologies like ChatGPT into my teaching and learning practices in the future	386	3.93	4	1.09	180	3.92	4	1.31
AI technologies like ChatGPT will replace teachers in the future	386	2.14	2	1.12	180	2.26	2	1.34
Students must learn how to use generative AI technologies well for their career	386	4.07	4	0.998	180	4.1	4	1.08
Teachers can already accurately identify a student's usage of generative AI technologies to partially complete an assignment	386	3.02	3	1.56	180	2.72	2	1.62
Generative AI technologies such as ChatGPT can provide guidance for coursework as effectively as human teachers	386	3.19	3	1.25	180	2.93	3	1.4
Using generative AI technologies such as ChatGPT to complete assignments undermines the value of a university education	386	3.29	3	1.25	180	3.56	4	1.31
If a fully online programme with the assistance of 454 a personalized AI tutor was available, I would be willing to pursue my degree through this option. /If a fully online programme with the assistance of a personalized AI tutor was available, students should be open to pursuing their degree through this option	386	3	1.46	180	3.21	3	1.52	2.92
I can become over-reliant on generative AI technologies. /Students can become over-reliant on generative AI technologies	386	3.11	3	1.35	180	4.24	4	0.955
I believe generative AI technologies such as ChatGPT can improve my digital competence. /I believe Generative AI technologies such as ChatGPT can improve students' digital competence	386	3.8	4	1.06	180	3.83	4	1.12
I believe generative AI technologies such as ChatGPT can improve my overall academic performance. /I believe Generative AI technologies such as ChatGPT can improve students' overall academic performance	386	3.67	4	1.18	180	3.63	4	1.36
I believe generative AI technologies such as ChatGPT can help me save time. /I believe Generative AI technologies such as ChatGPT can help students save time	386	4.23	4	0.848	180	4.06	4	1.01

The survey was conducted among 386 students and 180 teachers and staff from various disciplines in Iranian universities. Regarding the use of generative AI technologies, both students

(mean=2.28, SD=1.18) and teachers (mean=2.02, SD=1.1) reported relatively low experience, suggesting significant room for growth in adoption. Despite this, both groups expressed a belief in the positive impact of integrating AI technologies into higher education (students: mean=4, SD= 0.891; teachers: mean=3.87, SD=1.32). This optimism was reflected in strong agreement that institutions should develop plans related to AI technologies (students: mean=4.5, SD=0.854; teachers: mean=4.54, SD=0.874). Both students and teachers showed openness to incorporating AI technologies into future teaching and learning practices (students: mean=3.93, SD=1.09; teachers: mean=3.92, SD=1.31).

However, concerns were raised among both groups about students using AI technologies to gain an advantage in their assignments (students: mean= 3.67, SD=1.22; teachers: mean=3.93, SD =1.12). Interestingly, neither students nor teachers strongly agreed that AI technologies would replace teachers in the future (students: mean=2.14, SD=1.12; teachers: mean=2.26, SD=1.34). Both groups recognized the importance of learning to use generative AI technologies for career development (students: mean=4.07, SD=0.998; teachers: mean=4.1, SD=1.08). However, there was doubt about teachers' ability to accurately identify when students use generative AI technologies for completing assignments (students: mean= 3.02, SD=1.56; teachers: mean=2.72, SD=1.62).

The responses to other questions indicated that both students and teachers acknowledged the potential benefits of AI technologies, such as providing guidance and personalized feedback, enhancing digital competence and academic performance, and offering anonymity in student support services. At the same time, concerns were voiced regarding over-reliance on AI technologies, reduced social interaction, and the potential hindrance to the development of broader skills.

In light of these findings, the researcher formulated the following answers to the research questions:

(RQ1) Are AI-based language learning tools capable of replacing human teachers or tutors, and how can AI be used to create intelligent tutoring systems for language learning?

(RQ2) What are the challenges or limitations to integrating AI-powered language learning assessment in the classroom, and how can these be addressed?

(RQ3) How do students and higher education practitioners view the use of AI-powered speaking assistance technologies in language learning, and what are some of the emerging themes in the future research of AI-based language learning tools?

For RQ1, the internal structure of students' perceived EFL teacher support within the Iranian context was examined through exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). The SPSS software was used to randomly divide the sample into two subsets: Dataset 1 (N=126) for EFA and Dataset 2 (N=260) for CFA. Initially, univariate normality of the sample was tested, and the discrimination of each item was measured. Principal axis factoring was then applied to explore the internal structure of teacher support, with confirmation results obtained

using IBM Amos 24.0. Additionally, a multiple-group analysis was conducted to assess whether the constructs held the same meaning regardless of gender using IBM Amos 24.0. In summary, AI-based language learning tools are effective supplements to human teachers or tutors but cannot fully replace them. AI can be utilized to create intelligent tutoring systems (ITS) that provide automated tutoring, feedback, and assessment strategies for various language components. These systems can be personalized based on the learner's knowledge level, abilities, and difficulties through machine learning and physiological signals.

For RQ2, descriptive analysis was conducted to investigate students' perceived levels of EFL teacher support. Descriptive analysis involves summarizing and interpreting data to understand its basic characteristics, such as frequency, central tendency, distribution, and variability. This type of analysis relies on descriptive statistics, charts, graphs, or tables to offer a comprehensive overview of the dataset. It focuses on presenting a clear and objective summary of the data, without making inferences or drawing conclusions beyond the data at hand.

For RQ3, the study explored the positive impact of AI-powered speaking assistance technologies in language learning. These technologies, including virtual language tutors and language learning apps, provide personalized feedback, support pronunciation practice, and enhance speaking skills in a learner-centered environment. The statistical methods employed depend on the specific research question, study design, and data type. Commonly used statistical tests in language learning research include t-tests, ANOVA, regression analysis, and correlation analysis. To select the appropriate statistical test, researchers should consider the research objectives, study variables, measurement levels (nominal, ordinal, interval, or ratio), and data distribution. Consulting with a statistician or expert within the field is recommended to ensure proper selection and implementation of statistical analysis in SPSS. Additionally, the effect size was reported alongside the p-value to assess the magnitude of significance, responding to calls for more comprehensive use of effect size measures (Wei et al., 2019).

5. Discussion

5.1. Challenges from Teachers' Perspectives

The review highlights that teachers' attitudes toward applying AI in the EFL context tend to range from positive, as noted in the findings of Sumakul et al. (2022), to more conservative, as observed by Holstein et al. (2017) and Lin et al. (2017), who state that "less-experienced instructors often struggle to effectively respond to analytics, leading to their reluctance and lower acceptance." Therefore, from a teacher's perspective, it is crucial to address negative emotions and foster AI acceptance in order to unlock its pedagogical potential, a process supported by numerous empirical studies. Specifically, further research, underpinned by substantial empirical and theoretical evidence, is necessary to emphasize the effectiveness and potential of AI in the EFL context and to enhance confidence and motivation for its use.

Moreover, high-quality theoretical and practical training in AI is essential to equip teachers for AI-enhanced EFL teaching. This training should be tailored to diverse instructional contexts, taking the form of question-oriented practicums or workshops that incorporate multiple teaching methods, rather than adopting a one-size-fits-all approach. It is also critical to raise teachers' awareness of the ethical implications and risks associated with AI use, as highlighted by Russell (2010, as cited in Jiang, 2022). Finally, greater opportunities for interdisciplinary collaboration with AI scholars could provide technical support to EFL teachers, thereby enhancing their understanding and application of AI to fully leverage its pedagogical potential (Jiang, 2022).

From the search results, it appears that challenges from teachers' perspectives on using AI language learning tools and pedagogy include usability issues with the tools, a lack of IT skills among teachers, complexity of software and concordance lines for students, lack of interest in language among students, and a lack of perceived need for AI tools among teachers. Additionally, there is a lack of evidence verifying the language learning effectiveness of AI, and more research is needed to explore the pedagogical and ethical implications of AI in language learning. Teachers' perspectives on AI technology are important to consider, as they are key stakeholders in implementing these tools in the classroom. Future research should further investigate the challenges that impede the use of AI technology in language learning. Teachers face several challenges when it comes to the use of AI language learning tools and incorporating them into pedagogy. Some of the key challenges include:

1. Adaptation
2. Training and Familiarity
3. Personalization and Differentiation
4. Difficulty in replicating cultural and contextual nuances of language
5. Assessing Authenticity
6. Balancing Technology and Human Interaction
7. Equity and Access
8. Limited ability to understand or produce creative and/or original language.

5.2. Challenges from Technical Perspectives

With deep learning (DL)-based AI techniques developing rapidly (Dong et al., 2021), DL has garnered research attention in AI-based education, especially in the EFL context. Traditional machine learning (ML)-based techniques primarily rely on experts' domain knowledge, where AI algorithms are specifically designed for a given task, such as language recognition algorithms based on support vector machines (Campbell et al., 2004, as cited in Jiang, 2022, p.5). In contrast, DL-based techniques use artificial neural networks, such as convolutional neural networks and recurrent neural networks, which can be easily adapted to handle different tasks (Gu et al., 2018; Mikolov et al., 2011). Moreover, multi-task learning methods have been developed, utilizing a single

DL model to cover multiple tasks, such as recognition and translation. However, DL-based techniques in existing AI-based EFL applications typically analyze specific single signals, such as text for writing and audio for speaking. Consequently, more significant challenges arise from analyzing multi-modal signals—namely, text, audio, facial microexpressions, and body movements—to enhance the effects of EFL teaching and learning. To address this, large-scale transformers can be pre-trained on a vast number of multi-modal signals in a self-supervised learning environment to create a multi-modal embedding space. For AI techniques in the EFL context, adapting large-scale multi-modal pre-training models to EFL teaching and learning is both meaningful and challenging (Shvetsova et al., 2022). Overcoming these technical challenges requires collaboration between AI researchers, developers, educators, and policymakers to ensure the ethical and effective use of AI language learning tools in education.

The most common technical challenges in developing AI-language learning tools include the lack of human interaction, limited ability to recognize errors, and dependence on large amounts of data for training. Additionally, there are usability issues with the tools, complexity in the software and concordance lines for pupils, and a lack of IT skills among teachers. The absence of sufficient evidence verifying the language learning effectiveness of AI also presents a challenge, and more research is needed to explore the pedagogical and ethical implications of AI in language learning. These challenges can impede the use of AI technology in language learning and hinder its effectiveness. Future research should delve deeper into these challenges to develop effective solutions and improve the use of AI in language learning. Based on the search results, the most common technical challenges when developing AI-language learning tools are:

1. Lack of human interaction
2. Limited ability to recognize errors
3. Dependence on large amounts of data for training
4. Usability issues with the tools
5. Complexity of software and concordance lines for pupils
6. Lack of IT skills among teachers
7. Lack of evidence verifying the language learning effectiveness of AI

6. Conclusion and Implications

The literature review indicates that AI will continue to be developed and integrated into CALL. There will be more discussions on the technical requirements and pedagogical responsibilities for using AI in language learning and teaching. Language educators need to ensure that AI is effectively utilized to support language learning and teaching in AI-powered contexts, with a clear understanding of what needs to be considered during the implementation of AI-supported language learning and teaching. They must be prepared to use AI technologies and applications to support learning experiences in specific contexts. Additionally, they need to address

how human skills such as critical thinking, collaboration, and creativity can be incorporated into their practices within AI environments.

The study concludes that AI has the potential to transform the functioning of the education system, enhance the competitiveness of institutions, and empower both teachers and students at all levels. However, there is a relative paucity of longitudinal studies investigating the effectiveness of AI in the EFL context through robust experiments involving larger participant numbers, strict assessments, competent instructors, supporting institutions, and mechanisms to protect data privacy.

Furthermore, more research should be conducted to explore the adaptability of AI to different EFL learners with L2 individual differences (e.g., personal traits, language aptitude, motivation, learning styles, learning strategies) and across diverse learning and teaching contexts (e.g., online teaching, blended teaching, flipped classrooms).

Additionally, there is significant room for progress in exploring students' emotional states by utilizing Affective Computing (AC) in the EFL context. This could contribute more evidence to understanding the relationship between emotions and learning in EFL contexts. Finally, future research is needed to shed new light on the pedagogical implications that align with the ethical implications and risks of AI in the EFL context. Future research should also focus on AI in language learning, addressing conflicting objectives, assessment and evaluation, incentives and motivation, building learning networks, as well as diversity and fairness.

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