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REVIEW

Integrating AI into Asian Tertiary EFL Learners' Speaking Instruction: A Systematic Literature Review

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ABSTRACT

Few systematic review research specifically explores the integration of artificial intelligence (AI) in English as a Foreign Language (EFL) speaking instruction in Asian higher education. Given current research trends, AI-based instruction is receiving increasing attention for its potential to enhance language learning. Therefore, this review aims to trace the trend of empirical research on integrating AI in EFL speaking instruction between 2018 and 2024 in Asia. Using the PRISMA systematic review protocol, this paper analyzed 21 studies on AI-integrated EFL speaking instruction, exploring trends, AI tools, integrating instructional methods, and the challenges between 2018 and 2024. This research finds that since 2022, research on integrating AI in EFL speaking instruction in higher education has increased significantly, mainly in East Asia, and the research methods are primarily quantitative studies. AI chatbots, apps, and platforms are predominantly seen in EFL speaking instruction and AI virtual human teachers have the potential to be applied in oral English classrooms. Task-based learning shows the greatest potential method for integrating AI into English-speaking instruction. However, several challenges hinder the full adoption of AI in EFL curricula, highlighting gaps in empirical research. This review contributes to the discourse on AI-enhanced EFL instruction by offering new insights into existing practices, identifying research gaps, and emphasizing the need for more effective AI tools and instructional methods in Asian higher education. The study underscores the importance of experimental and qualitative research to refine AI-based pedagogical strategies and enhance EFL learners' speaking proficiency in tertiary education.

Keywords: Artificial Intelligence; EFL Speaking; Language Learning; Tertiary Education; AI-Integrated Instruction

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1. Introduction

English as a lingua franca plays an important role in promoting global communication and intercultural interaction, especially in commerce, academia, and diplomacy. The ability to speak English is beneficial to the prospects of people's careers and getting easy access to international information[1]. However, teaching English as a foreign language, especially in the aspects of spoken English, faced a variety of challenges. The EFL learners, with different language proficiency and motivation, are generally from various language and cultural backgrounds, whose individual demands are not perfectly satisfied by traditional teaching ways[2]. In addition, modern learners, especially those identified as "digital natives", prefer an interactive and multi-media learning environment to a traditional but lacking attractive and stimulative teaching and learning setting[3].

Since 2018, AI technology has rapidly developed in the educational field. This trend is highlighted in the 2018 Horizon Report in which AI is listed as the critical factor for the development of education in this report[4]. Also, this report predicts that the application of AI will increase 43% from 2018 to 2022, and the Educause (2019) report further points out that the range of AI usage in teaching and learning will be expanded. It cannot be denied that the appearing AI provides a brand-new opportunity for reforming language education. For example, technologies include adaptive learning systems and natural language processing (NLP), providing innovative solutions for educational problems with customized learning, immediate feedback, and personally adaptive teaching to individual learners[5]. These AI technologies are critical and useful for promoting students' oral communication ability because of the provided interactive and self-directed learning environment[6]. However, despite the application of AI in language education is overwhelmingly increasing, its exploration in teaching and learning spoken English in higher education is not flourishing yet[7]. While previous systematic literature reviews have explored the use of AI tools in language acquisition[8], few studies have concentrated on the effective instructional framework of integrating AI tools in promoting EFL speaking instruction.

Integrating AI into EFL speaking instruction is especially relevant in Asian universities, where English proficiency is increasingly emphasized for global communication and career opportunities. University students face unique challenges, such as higher academic demands, stricter competence standards, and the need for deeper engagement with interactive teaching tools. This highlights the necessity of further study on AI-integrated instructional frameworks in higher education. Therefore, this study aims to systematically review the existing literature, explore the integrated instructional methods of integrating AI in EFL speaking instruction in Asian tertiary education, identify the key trends, main integrated AI tools, effective instructional methods for integration, and the challenges for the integration, which provides insights for future study and pedagogical practice in EFL speaking instruction.

Previous systematic literature reviews mainly focus on the application of AI tools including chatbots, intelligent tutoring systems, and voice-activated AI applications in language acquisition. These literatures evaluate and highlight the potential of AI to improve students' English-speaking pronunciation, and fluency as well as the reduction of language anxiety, and the enhancement of learners' engagement and motivation. For instance, Koc and Sava (2024) did a systematic literature review that highlighted the phonetic function of voice-based AI chatbots in providing more natural conversations, simulating face-to-face interactions, and improving learners' speaking intonation and stress[9]. Studies have shown that the use of a chatbot-assisted learning mode can reduce learners' spoken anxiety, improve their speech accuracy, and cultivate learners' self-directed study and high engagement[10]. By providing immediate feedback, AI-driven chatbots enable to solve the common difficulties in oral practice, including limited opportunities for synchronous interaction and timely correction which are lacking in traditional class teaching[11].

Despite these contributions, the research gaps remain in the classification and context-specific analysis of the effective AI-integrated instructional methods with specific tools in EFL speaking instruction within Asian higher education. There is limited exploration of effective AI-integrated teaching methods tailored to tertiary EFL learners and insufficient examination of the challenges associated with such integration. This review seeks to address these gaps by synthesizing recent empirical research, offering technological insights and pedagogical implications for advancing AI-integrated spoken English instruction in Asian universities. Through this focus, the study uniquely contributes to the field by

bridging the existing research gap and providing actionable recommendations for future research and practice.

The purpose of this study is to clarify the key trends of AI integration, the main AI-integrated tools, effective instructional methods for integration, the challenges brought about by AI integration, and how AI applications can be improved to promote EFL speaking ability. To this end, the research will solve around the following research questions:

1. What are the key trends of integrating AI into EFL speaking instruction in Asian tertiary education?

2. What are the main AI tools used in EFL speaking instruction in Asian higher education?

3. What are the effective instructional methods for integrating AI into EFL speaking and which specific AI tools effectively support the corresponding instructional methods?

4. What are the challenges of integrating AI in EFL speaking instruction in Asian tertiary education, and how have these challenges been addressed in existing research?

2. Materials and Methods

2.1. Research Source and Selection

To do a comprehensive literature review on integrating AI into EFL speaking instruction in Asian higher education, this research selected the published articles between 2018 and 2024. This systematic search began on September 20th, 2024, collecting data across major academic databases. The search used several keywords to do the preliminary screening, including "AI in Asian higher education", "Artificial intelligence in language teaching", "AI-enhanced EFL speaking", "second language pedagogy", "language acquisition technology", "AI application in Asian education", and uses Boolean logic operators like "AND" and "OR" to ensure the systematic and comprehensive search. This literature review covers several key databases, including IEEE Xplore, Google Scholar, Scopus, and Web of Science, which provides a comprehensive screening for empirical studies. The preliminary screening generated 1093 articles of which 54 are from IEEE Xplore, 273 from Google Scholar, 460 from Scopus, and 306 from Web of Science. According to the researchers' pre-set inclusion and exclusion criteria (such as limiting search results to peer-reviewed journal articles published in English) 375 relevant articles were finally yielded.

Further screening was secondly done by selecting relevant titles and abstracts, and only the articles related to "English Language Education" and "AI in EFL Speaking Instruction in Asian Higher Education" remained, which got 46 articles in total. Then, after a manual screening and excluding non-empirical studies and the reduction of duplicated articles by the researchers, 25 articles were excluded resulting in 21 empirical articles being included for the researchers' detailed analysis. This rigorous screening process ensures a review of highly relevant and updated articles on AI-integrated EFL speaking teaching in Asian higher education. The specific search process is illustrated in the following **Figure 1**,

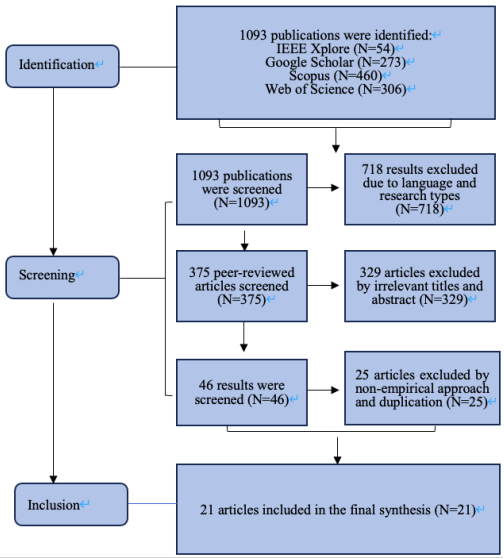

Figure 1. PRISMA flowchart for the review process.

2.2. Inclusion and Exclusion Criteria

The researchers of this study rigorously follow the inclusion and exclusion criteria in the process of this comprehensive systematic review to guarantee high relevance, quality, and consistency. By implementing these criteria, we ensure the validity and valuable insights of the selected articles on the study of AI-integrated instruction in an Asian tertiary EFL speaking context. The following criteria were put into practice in the process of the article selection (see **Table 1**):

2.3. Critical Appraisal of Selected Studies

Beyond meeting inclusion and exclusion criteria, the quality and relevance of the selected studies were assessed through a critical appraisal process to enhance transparency

Table 1. The Inclusion and Exclusion Criteria.

Inclusion Criteria	Exclusion Criteria
Must be peer-reviewed journal articles written in English from 2018–2024	The target foreign language is not English and not in the period between 2018–2024.
Must explicitly involve the application of AI in spoken English instruction	AI integration articles addressing vocabulary, grammar, or writing skills.
Must focus on EFL learners at the Asian tertiary level	Studies in tertiary EFL context rather than K12 or other educational settings.
Must be empirical studies (data-driven)	Literature reviews, theoretical discussions, conceptual papers, and conference papers were excluded

and rigor. The appraisal focused on evaluating the methodological robustness and contextual relevance of each study.

(a) Appraisal Framework

The researchers used the Critical Appraisal Skills Programme (CASP) checklist to assess the methodological quality of the studies. This framework evaluates key aspects such as:

Research design: Whether the study design (e.g., experimental, quasi-experimental, or qualitative) was appropriate for the research objectives.

Sampling and participants: The representativeness and adequacy of the sample size in reflecting Asian tertiary EFL learners.

Data collection and analysis: The reliability and validity of instruments used (e.g., surveys, interviews, or proficiency tests) and the rigor of the analysis.

(b) Relevance Assessment

The relevance of each study was examined in terms of:

Focus on spoken English: Ensuring the study directly addressed speaking skills in EFL classrooms.

AI technologies: Specific AI tools or systems (e.g., chatbots, NLP, or adaptive platforms) studied.

Asian higher education context: Applicability to the cultural, institutional, and pedagogical characteristics of Asian tertiary settings.

(c) Scoring System

Each study was scored on a three-point scale for quality (low, medium, high) based on its design, data collection, and relevance. Studies rated as "low" in quality were excluded from detailed analysis, while those with medium or high ratings were included with considerations noted during synthesis.

(d) Results of Critical Appraisal

Out of the 21 selected studies: 18 studies were rated as "high quality" due to their rigorous methods and clear alignment with the research focus. 3 studies were rated as "medium quality", with minor limitations in methodology but significant relevance to the research questions.

2.4. Methodological Transparency

By including a critical appraisal stage, this methodology ensures that the review synthesizes findings from high-quality and contextually relevant studies. This approach not only strengthens the credibility of the review but also addresses potential biases by transparently reporting the evaluation process and decisions.

2.5. Data Analysis and Coding

The methodology applied in the data analysis phase is meticulously designed by the researchers to ensure reliability and consistency when evaluating and censoring this review. The authors of this study jointly reviewed and selected these articles from the identified databases, ensuring the dependability of the screening process. After the selection of articles according to preset inclusion and exclusion criteria and the CASP checklist, the key findings are identified and consolidated utilizing inductive thematic analysis. This method is often used in qualitative research to help recognize patterns from data as well as avoid the pre-established code framework [12]. Themes are directly extracted from data with the main point revealing explicit and meaningful trends. Each academic article is carefully categorized to generalize relevant information, including published years, adopted research methodology (qualitative, quantitative, or mixed), geographic context, and the different research results observed.

The data is organized into Excel spreadsheets for thorough examination. Then the thematic analysis was used to

determine the relevant main trends and sub-themes related to AI's role in instruction of EFL-speaking classrooms. The key themes include "the Research Trends", "Mainly Used AI Tools", "Effectively Integrated Instructional Methods", and "Challenges of Integration". Through deep text reading and content analysis of Excel spreadsheets, the sub-themes were meticulously cataloged. By ongoing analysis, all themes were further refined, and overlapping subthemes were re-classified to ensure clarity and consistency in the results (see **Tables 2–4**). All the selected 21 articles were coded as JA01, JA02…to JA21. 4 mainly used AI tools are themed as T1, T2, T3, and T4. 5 effective instructional methods were marked as IM1…IM5. 10 challenges were coded as C1, Ć2…C10. The coding process provides convenience for the thematic analysis and the final addressing of the research questions.

Table 2. The main AI-integrated tools.

Coding Theme Number	Themes	Example Studies (Code Number)
T1	AI Chatbot	JA03; JA07; JA09; JA17; JA18; JA20
T2	AI Learning App	JA01; JA02; JA10; JA11; JA12; JA13; JA19
T3	AI Learning Platform	JA05; JA06; JA08; JA14; JA15; JA16; JA21
T4	AI Virtual Human	JA04

Table 3. Effective instructional methods for integration.

Coding Theme Number	Themes	Example Studies (Code Number)
IM1	Peer Learning	JA01
IM2	Contextualized Learning	JA01
IM3	Flipped Classroom	JA03
IM4	Task-Based Learning	JA03; JA04; JA05; JA07; JA08; JA09;JA10; JA11; JA13; JA14; JA15; JA16; JA17; JA18; JA19; JA20; JA21
IM5	Gamification	JA02; JA12

Table 4. Challenges of AI integration.

Coding	Themes	Example Studies (Code Number)
C1	Teaching Issues	JA01; JA04; JA05; JA06; JA07; JA08; JA09; JA12; JA13; JA14; JA15; JA16; JA17; JA18; JA19; JA20
C2	Learner Variables	JA01; JA02; JA03; JA04; JA05; JA06; JA08; JA09; JA10; JA11; JA13; JA16; JA17; JA18; JA20
C3	Technological Deficiency	JA01; JA06; JA07; JA08; JA09; JA12; JA13; JA14; JA15; JA16; JA17; JA18; JA20; JA21
C4	Overreliance on AI	JA01; JA07; JA08; JA09; JA10; JA12; JA14; JA15; JA16; JA18
C5	Emotional Demotivation	JA01; JA04; JA05; JA08; JA09; JA13; JA14; JA21
C6	Lack of AI Literacy	JA10; JA11; JA14; JA15; JA16; JA17; JA18; JA19
C7	Ethical Concerns	JA01; JA07; JA15
C8	Teacher Training	JA15; JA17; JA18
C9	Cost	JA04; JA16
C10	Data Privacy	JA07

2.6. Data Distribution

Firstly, all reviewed 21 articles were analyzed according to the publication years. **Figure 2** shows the trend of AI integration in EFL teaching from 2018 to 2024. The illustration indicates that from the year 2018 (n = 1) to 2020 (n = 1), the number of published articles was relatively rare and stable with a minor variation, which shows that scholars have low interest in this topic. However, the publication has notably increased in 2021 (n = 2). There is a prominent surging trend in 2023 (n = 7), especially from the year 2023 to 2024, the number of publications rapidly increased and reached its peak in the year 2024 (n = 11).

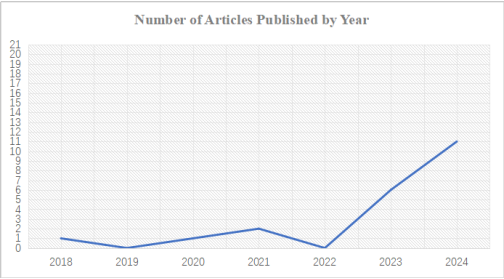

Figure 2. Number of articles published by year.

The following figure (**Figure 3**) shows that the Chinese Mainland has a high concentration of research in this field, with a total of 11 articles, accounting for the majority of publications in this field (see **Figure 3**).

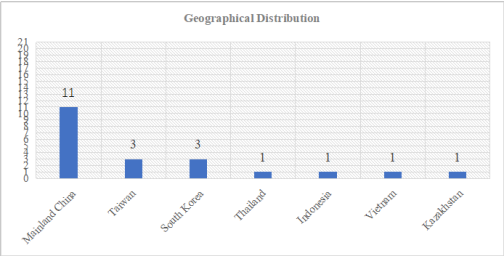

Figure 3. Geographical distribution of articles.

The following figure (**Figure 4**) shows the distribution of research methods, highlighting the predominance of quantitative research in the study of the effectiveness of AI-integrated instruction for EFL speaking classes. Specifically, 62% of the study (n = 13) adopts the quantitative research methods, which indicates the emphasis on numerical data and statistical estimation in this research field. Then the study of mixed method takes up 33% (n = 7), which combines the quantitative data and qualitative data and provides more comprehensive research insights. By contrast, only 5% of the study (n = 1) utilizes pure qualitative research, which indicates qualitative research is rare and underrepresented in this domain.

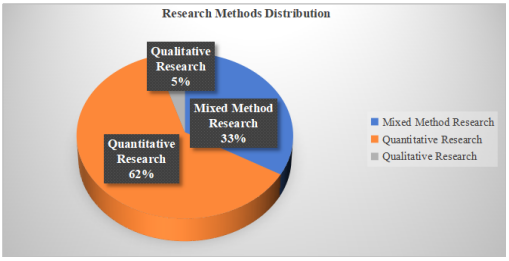

Figure 4. Research methods distribution.

The detailed analysis of the reviewed 21 articles on AI-integrated instruction in tertiary EFL speaking classes reveals several key thematic areas. Firstly, the main AI tools in this research are AI Chatbots, AI Learning Apps, AI Learning Platforms, and AI Virtual Humans, such as Youdao Dictionary, Baidu Map, Duolingo, Replika, Synthesia, Liulishuo, EAP Talk, and various others, which are considered as the crucial supporting technology in enhancing EFL speaking instruction (see **Table 2**). Besides, **Table 3** lists instructional methods that have been proven effective with AI integration in EFL speaking instruction, including Peer Learning, Contextualized Learning, Flipped Classroom, Task-Based Learning, and Gamification. Moreover, as outlined in **Table 4**, the challenges of AI in EFL speaking instruction encompass various aspects including technological deficiencies, emotional demotivation, learner variability, lack of AI literacy, teaching-related issues, and overreliance on AI.

3. Results and Discussion

According to the data distribution in the above figures and tables, this study reviews the literature on AI integration in tertiary EFL speaking instruction. After the evaluation and classification of the reviewed literature, the authors of this research try to address the research questions proposed in this study.

3.1. The Research Trend of Integrating AI in EFL Speaking Instruction in Asian Higher Education

From the analysis of **Figure 2–4**, it is shown in recent years that the research on AI-integrated instruction in tertiary EFL speaking has gained great momentum. As for the publication trend, the number of relevant articles marks an escalation on this subject especially from the year 2023 to 2024 (see **Figure 2**). The increased research production indicates that scholars have paid more attention and recognition to the potential of AI in enhancing language instruction, especially in developing EFL speaking skills. The early research contributions are limited, however, the rapid increase in publications in the last two years suggests a surge of interest, which is likely influenced by rapid advancements in AI technology and its educational applications.

Seen from geographical distribution, Mainland China has its leading role with 11 publications. While Taiwan and

Korea follow subsequently with 3 publications each (see **Figure 3**). Mainland China's dominance in the research indicates its high concern for EFL teaching and innovation on the integration with AI technology in this field. Taiwan and Korea also made great contributions, reflecting their engagement in AI-integrated pedagogical practices. This distribution shows that East Asia is the major hub of AI research in language education, even though countries like Thailand, Indonesia, Vietnam, and Kazakhstan are gradually becoming the new research contributors.

Regarding research designs, quantitative research dominates this field, taking up 62% of the studies (see **Figure 4**). The highlight of this quantitative method, for instance, the design of surveys and experiments, indicates that researchers tend to evaluate the effectiveness of AI tools objectively. Quantitative data are often collected by pre-and post-tests and 9 of 21 articles adopted this method. This 11 research articles evaluate learners speaking performance through the results of pre-and post-tests [13–23]. Besides, one study adopts pre- and post-intervention surveys to collect quantitative data on reducing foreign language anxiety (FLA), increasing foreign language enjoyment (FLE), and improving willingness to communicate (WTC). Also, another study used an online survey based on the Technology Acceptance Model (TAM) to collect quantitative data [24]. Mixed-method studies, accounting for 33%, provide a more detailed understanding for researchers to explore the attitude and experience of learners towards AI with the combination of quantitative data and qualitative insights. Frequently used research methodology includes pre-and post-tests and semi-structured interviews for a comprehensive mixed study [25–27]. Otherwise, quantitative questionnaires and semi-structured interviews are also accessible to collect mixed data [28]. Other studies evaluate the effectiveness of AI tools, for instance, the effects of Google Assistant and Liulishuo on speaking skills through questionnaires and interviews. Only 5% of the studies adopt a purely qualitative approach, for example, Chen (2018) employed a qualitative research method on 12 Taiwanese EFL learners by using semi-structured interviews and heart rate measurements to collect data on their speaking anxiety [29]. The used AI tool is an Interactive Holographic Learning Support System, which allows learners to control virtual learning content by hand gestures. The proportion of adopting the qualitative method is relatively small, which indicates that it is still necessary to explore more learners' subjective experiences in future studies.

Overall, the research trend of AI integration with tertiary EFL speaking instruction is still rapidly increasing in this field, with the characteristics of higher publication rates, a strong regional focus in East Asia, and quantitative methodology dominance. However, future study still needs to adopt diverse methodologies with broader geographical distribution to deepen the understanding and expand the applicability of AI integration in EFL speaking instruction.

3.2. The Main AI-Integrated Tools in EFL Speaking Instruction

According to **Table 2**, the main used AI tools in EFL speaking instruction can be classified into four types, AI chatbot, AI learning app, AI learning platform, and AI virtual human. Each of these four types of tools exerts its unique influence in improving language acquisition, intensifying interactivity, and providing personalization in speaking instruction.

6 of 21 studies discussed that AI chatbots are vital tools for the elevation of English speaking due to their high interactivity, personalization, and authentic situation of dialogue. All six research indicate that AI chatbots effectively improve learners' speaking on the aspects of fluency, accuracy, grammar, vocabulary, motivation, and self-efficacy. A study conducted by Lin & Mubarok in Taiwan explored mind map-guided AI chatbot (MM-AI) and found it more effective in promoting speakers' interaction, speaking performance, and learning motivation [14]. Chen (2024) in his study presented the influence of AI chatbots and collaborative note-taking (CNT) on college EFL learners' semantic learning, and found that the group of AI-CNT group performed better in semantic learning, self-efficacy, anxiety reduction, and metacognition [16]. Kim et al. (2021) conducted a study in Korea and made a comparison of face-to-face communication, AI text chatbot, and AI voice chatbot and found that AI voice chatbot did a better job on college learners' fluency, speaking performance, and confidence [23]. A study made in Vietnam found that twice oral practice through AI voice chatbots significantly improved college students' speaking in grammar, vocabulary, pronunciation, and fluency [26]. Kemelbekova et al (2024) got the same result that AI chatbot exerts great influence on speakers' vocabulary, pronunciation, intonation,

and grammar accuracy in Kazakhstan higher education [22]. AI chatbot exerts a multi-dimensional influence on tertiary EFL learners' speaking proficiency in speaking fluency, vocabulary, grammar, accuracy, pronunciation, and anxiety reduction. Future research can be conducted on the adaptivity of AI chatbots in different contexts, the support of low-level speakers, and their accuracy in feedback.

7 of the studies explored the use of AI learning apps and found that they can provide personalized learning with speech recognition technology, pronunciation analysis, and adaptivity. Also, the flexibility made it highly available for learners to log in and practice their oral English. Qiao & Zhao (2023) studied the effectiveness of the AI learning app Duolingo on the enhancement of Chinese EFL learners' speaking proficiency and self-regulated learning (SRL) [13]. A study by Ouyang et al (2024) also explored the enhancement of Duolingo made on speakers' engagement and WTC [18]. Huang & Zou (2024) explored that EPA Talk improved Chinese college students' willingness to communicate (WTC), foreign language enjoyment (FLE), and speaking performance [30]. A study made by Zhang et al (2024) analyzed the improvement of Lora AI-Speaking Assistant made in Foreign Language Anxiety (FLA), Foreign Language Enjoyment (FLE), and Willingness to Communicate (WTC) [31]. In the study of Zou et al (2023), AI learning apps based on social media elevated learners' interactive learning [16]. Chen (2024) conducted a study in Taiwan to prove that AI learning apps did a great job in reducing learners' Public Speaking Anxiety (PSA) [16].

7 of the selected studies analyzed the instructional function of comprehensive AI platforms including automatic feedback, speech recognition evaluation, and interactive learning. These platforms can increase learners' engagement by providing structured and immersive oral practice. Zou et al (2023) conducted a study using the AI Speech Evaluation Platform (ASEP) to improve Chinese EFL learners' speaking proficiency in fluency, grammar, and vocabulary [27] and in another study, they evaluated the platform's technology acceptance from EFL learners [32]. Zou et al (2024) also studied the EPA Talk platform in elevating Chinese EFL learners' academic speaking performance [33]. Chen (2018) in his study employed a 3D Interactive Holographic Learning Support System (IHLS) to reduce Taiwanese college students' Foreign Language Anxiety (FLA) [29]. Darmawansah et al (2024) conducted a study on ChatGPT-Supported Collaborative Argumentation (ChatGPT-CA) and got the results that this AI platform made great progress in Indonesian EFL learners' argumentative speaking [21]. Based on the reviewed studies, AI learning platforms play a crucial role in enhancing EFL speaking proficiency through various mechanisms. Future research should further explore the adaptability of AI learning platforms for lower-proficiency learners, their long-term effectiveness, and the role of instructors in AI-assisted EFL instruction. Such investigations will contribute to optimizing the pedagogical integration of AI technology in language learning.

One study explored the effectiveness of an AI virtual human as an innovative tool in EFL speaking instruction. Based on the social presence theory, AI virtual instructors can increase students' engagement and teacher credibility, offering a more engaging and immersive environment for language learners. The study shows that the AI virtual human in EFL speaking instruction plays a vital role in improving students' interaction, speaking confidence, language expression, and active learning [15]. The findings indicate that when students consider the AI virtual instructors reliable, they are more likely to engage in language learning, which highlights the great potential of AI virtual humans in EFL speaking instruction.

3.3. The Effective Instructional Methods of Integrating AI into Tertiary EFL Speaking Instruction

As seen in **Table 3**, there are several identified instructional methods for AI integration. These methods correspond with language acquisition theories and technology, indicating their potential to improve students' speaking proficiency.

Task-based learning, an important teaching method, is widely applied in AI-integrated instruction. Of the 23 reviewed articles, 20 of them combine AI with task-based learning methods in instruction to improve the speaking performance of tertiary EFL students. With the help of AI tools like Liulishuo, IELTS, EAP Talk, and Yidian English, this teaching method aims to provide support for realizing students' specific learning objectives, such as the improvement of fluency, pronunciation, and vocabulary [27]. Task-based learning encourages students to complete language-related tasks with the help of AI, providing a more interactive and

outcome-oriented study method. Students can get immediate feedback and personalized learning experiences through integrating AI into their learning tasks, which proves to be particularly advantageous in such a classroom setting of big class sizes and limited personalized attention.

Peer learning [25] can foster collaborative language practice by utilizing AI tools. In this teaching method, AI-based mobile apps, such as those integrating speaking recognition technology (SRT) and cloud-based platforms, allow learners to engage in peer feedback, content sharing, and social interactions. In this context, students receive immediate AI feedback on pronunciation, fluency, and grammar, and subsequently share their work with peers.

Contextualized learning, as shown in the research done by Shadiev et al. (2023), indicates that leveraging AI to simulate real-world context involves students in meaningful language practice. In this methodology, artificial intelligence instruments such as the Youdao Dictionary, Baidu Map, and Speech Recognition Technology (SRT) were used to promote immediate, contextualized language acquisition. For instance, students photographed pictures and videos related to the assigned topics with the description of English and then shared them on social learning platforms [25]. The interactive activity mirrors real-world scenarios in which students are required to deal with real-life issues like explaining directions with Baidu maps or discussing cultural artifacts. Combined with AI tools, contextualized learning offers a robust instructional method to improve EFL learners' language practice in real-world contexts and help them to gain both progress in language and culture through immersive and interactive practice.

The flipped classroom model involves students in preclass learning with AI chatbots like Replika. In flipped classrooms, students practiced their English-speaking skills with chatbots outside of class, which helped them to do good preparation for more interactive in-class activities [14]. AI chatbots offer immediate feedback on students' pronunciation, grammatical accuracy, and fluency, which thereby enables learners to elevate their speaking ability at their own pace before participating in a physical class. Combining personalized and real-time AI feedback with classroom interactive activities, the AI-integrate flipped classroom approach provides a supportive learning environment for students. It has been demonstrated that this method prominently improved students' speaking fluency, articulation, and confidence, whilst simultaneously fostering autonomous learning.

Gamification is also an engaging instructional method to inspire learners' motivation through game-like activities provided by AI tools like Duolingo [13, 14]. This method turns language learning into an interactive and enjoyable experience and tries to arouse students' interest through earning points, passing levels, or completing challenges. Gamification increases students' engagement and promotes consistent practice, both of which are key factors in promoting students' speaking proficiency.

All these reviewed effective AI-integrated instructional methods possibly have some implications for college English teachers in their classroom pedagogical design. For instance, by integrating more advanced speech recognition technologies with alignment of task-based approaches into real context tasks and meaningful communication, task-based learning (TBL)with the help of AI tools like EAP Talk and iFlytek, can provide learners with strong interactive, personalized, and immediate feedback. AI technologies, including conversational agents and intelligent tutoring systems, are capable of simulating real-life language scenarios to promote students' participation in task-oriented activities that reflect authentic communication in real-world situations. This integration is not only capable of fostering students' speaking production but also provides customized learning experiences tailored to individual learner needs, making task-based learning a highly effective teaching method in an AI-integrated instructional context. AI integration in EFL speaking instruction offers substantial opportunities for transforming EFL speaking instruction, particularly in higher education. Future study and teaching practice ought to concentrate on optimizing these methodologies, to comprehensively satisfy language learners' diverse needs and ensure the consistency between AI tools and educational objectives.

3.4. The Challenges of Integrating AI in Tertiary EFL Speaking Instruction

The integration of AI in tertiary EFL speaking instruction brings a lot of benefits, but there are also obvious challenges existing for educators and learners. According to the related research analysis and the organization of coded themes in **Table 4**, several key themes of challenges are seen, which possibly influence the effective application of AI in

elevating English-speaking skills.

3.4.1. Teaching Issues (n = 16)

The AI-integrated teaching issue is an obvious challenge. Sixteen of the studies highlight those challenges formed in EFL instruction due to the lack of consistency between AI systems and academic curricula. AI tools, such as speech evaluation apps, cannot provide consistent feedback with specific curriculum goals or evaluation standards. For example, Zou in his study found that although AI applications like EPA Talk could improve speaking skills, learners still felt dissatisfied when the provided feedback was of no relevance to their academic tasks or exams [27]. In the context of AI media, human teachers' supervision was limited, which also restricted human teachers' offer of real-time instruction and adjustment of teaching strategy according to individual learners [15]. In addition, Zou in another study observed that the feedback on AI usually involved superficial content including pronunciation and grammar accuracy but was unable to offer textual or argumentized insights that advanced learners need [33].

To address these challenges, it is necessary to strengthen the fit between AI teaching tools and academic courses and develop AI systems that can provide feedback based on specific learning objectives and assessment criteria. In addition, combining human teacher supervision with AI feedback mechanisms can help achieve real-time teaching adjustments and personalized support. At the same time, AI applications should be further optimized, not limited to surface assessments of pronunciation and grammar, but to provide more in-depth text and argumentative feedback to meet the needs of advanced learners.

3.4.2. Learner Variables (n = 15)

The reviewed studies also showed the challenge of learner variables in AI-integrated instruction that lack adaptability to individual differences among learners. Cognitive abilities, cultural backgrounds, learning preferences, and language proficiency, all of these are factors that have an impact on the interaction between students and artificial intelligence. Zou observed in his study that even though speech recognition technologies had a positive influence on improving pronunciation and fluency, their effectiveness was reduced due to unsatisfying individual learners' needs for more personalized feedback [28]. Huang and Zou found in their study that learners' emotional status including anxiety and sense of failure greatly influenced their interaction with AI. The majority of the applications of AI adopted unified technology, which led to more dissatisfaction among students who should have gained more benefits from personalized feedback [30]. It is also hard for AI systems to satisfy learners' changing needs with time, which only provide superficial correction feedback with a lack of further development of advanced skills like textual structure and deep insights into specific situations. Future AI development should mainly focus on the elevation of the adaptability of different learners and make a proper adjustment of feedback to support more personalized and inclusive language learning.

3.4.3. Technological Deficiency (n = 14)

Fourteen of the reviewed studies highlighted technical deficiency as one of the key barriers to the effective use of AI in language acquisition. Automatic Speech Recognition (ASR) systems, as the core technology of artificial intelligence speaking agents, often had the problem of accurately recognizing non-English native speakers' accents, therefore, leading to confused feedback that possibly weakened their study motivation [20]. Also, many AI chatbots were designed for English native speakers, which made the use complicated for non-English native speakers who had non-standard accents [34]. Besides, AI often showed its defects when dealing with spontaneous speaking and long sentences, leading to the low quality of feedback [29]. There was also possibly a lack of detailedness, and depth provided by human teachers from AI feedback, especially in sentence structure and textual coherence, resulting in the dissatisfaction of the learners when the systems were unable to accurately understand learners' input [35].

This challenge implies that several strategic improvements are necessary. First, ASR technology should incorporate advanced acoustic modeling techniques and deep learning algorithms trained on diverse non-native English speaker datasets to enhance accent recognition and minimize misinterpretations. Additionally, AI-driven language learning tools should integrate adaptive learning mechanisms that personalize feedback based on learners' proficiency levels and pronunciation patterns, ensuring more accurate and context-sensitive responses. To overcome AI's limitations in processing spontaneous speech and long utterances, incorporating natural language understanding (NLU) models with contex-

tualized embedding techniques, such as transformer-based architectures, can improve feedback accuracy and coherence. Moreover, hybrid AI-human approaches, where AI-generated feedback is supplemented with teacher intervention, could mitigate deficiencies in syntactic and textual coherence evaluation, ensuring that learners receive comprehensive and pedagogically sound guidance. These advancements would significantly enhance the reliability and efficacy of AI-assisted language learning for non-native speakers.

3.4.4. Overreliance on AI (n = 10)

Overreliance on AI is also a key challenge in EFL instruction. Ten of the reviewed studies indicate that overreliance on AI has the possibility of weakening learners' critical thinking and independent learning abilities. Although AI provided adaptive feedback, its easy accessibility made it possible for students to overly rely on the given answers rather than practicing their problem-solving ability [29]. Overreliance on AI could also hinder a deeper engagement of one's cognition needed for mastering complicated language skills [25]. Besides, students who had overreliance on AI feedback faced difficulties in traditional human-centered evaluating contexts, in which judgment and nuance were needed [15].

To deal with this problem, educators should highlight the demand for a balance between AI and human teaching, encouraging students to cultivate both their technology skills and critical thinking. Future development of AI-integrated instruction should highlight promoting learner autonomy, and incorporating reflective learning, rather than substituting the important position of human teachers in instruction.

3.4.5. Emotional Demotivation (n = 8)

The lack of motivation is another important defect of integrating AI in EFL instruction. Eight of the studies had shown that even though AI could effectively provide technology feedback, they were short of emotional intelligence in that they could not provide personalized and motivational interaction, which often made learners isolated and helpless [17]. For instance, Zou (2023) observed in his research that when the feedback from AI showed its characteristics of lacking motivation that human teachers had, students felt depressed with low engagement though they had obvious improvement in language accuracy. Additionally, the lack of social presence in the AI-integrated media teaching environment exacerbated the emotional demotivation, because only when learners could feel their contact with the community, did they tend to keep engaged in the study [23].

To solve the problem of demotivation in the design of AI-integrated instruction, it is necessary to incorporate features that simulate emotional intelligence into the design. For instance, providing learners personalized inspiration for calling back their emotional motivation. This evolution is critical to maintaining motivation and improving the effectiveness of AI in language learning.

3.4.6. Lack of AI Literacy (n = 8)

Learner's lack of AI literacy hinders their effective interaction with AI-driven tools, which is highlighted in eight of the reviewed studies. Many learners are not able to be trained with AI technology, resulting in their sense of confusion and depression when using it. The limited comprehension of AI largely impacted students' full utilization of adaptive learning ability, therefore weakening the promotion of AI on language proficiency [31]. Besides, a lack of AI literacy also led to blind reliance on AI's advice, which often made them confused by incorrect feedback from AI without correct evaluation of themselves.

To broaden the benefits of AI, future teaching design should incorporate AI literacy training into the course to make learners use AI with critical thinking as well as with a good understanding of its limitations.

3.4.7. Ethical Concerns (n = 3)

AI-driven speaking tools require collecting and processing learners' speech data, which can pose risks if not properly managed. Without clear data protection policies, students may be reluctant to engage fully with AI-based speaking practice, potentially limiting the effectiveness of such tools [16]. Another ethical concern issue is the bias of AI-generated feedback and its speech recognition system. Study shows that AI chatbots and ASR systems find it hard to correctly deal with non-standard accents from non-native speakers, leading to incorrect or misleading feedback, which makes learners depressed and impacts their learning motivation. Besides, AI lacks contextual understanding and human critical thinking, bringing challenges to EFL speaking instruction. Unlike human teachers, AI chatbots and their ASR systems have difficulty offering detailed feedback on dialogue consistency, intonation, and pragmatic appropriateness. This limitation is possibly leading to the fact that the feedback

received from students lacks depth or is too rigid, unable to fully reflect the complexity of real human communication.

Facing these ethical challenges, educators, researchers, and developers should cooperatively work and design safe, unbiased, meaningful, and human-computer interactive AI-integrated instruction. By solving these problems, AI could be a meaningful tool in language education with an ethical standard that supports the various needs and experiences of learners.

3.4.8. Teacher Training (n = 3)

Integrating AI in EFL speaking instruction presents important challenges related to teacher training. One is that there is a lack of adequate training opportunities for teachers to develop their ability in AI. Many teachers are unfamiliar with some basic AI tools, limiting their potential to fully use the technology[22]. The other challenge is how to effectively adapt traditional teaching methods to AI-assisted learning environments. Teachers who are accustomed to traditional teaching methods would find it hard to transform to AI-driven instruction, which often needs specific training on new classroom management, assessment, and student interaction strategies[26]. Besides, the reliability and validity of AI-generated feedback also bring challenges to teachers. They must arm themselves with the ability to critically evaluate the not-always-correct feedback, offering supplementary guidance and ensuring meaningful learning support for students[21].

Therefore, educational institutions should give priority to making comprehensive teacher training plans, offering training on practical experience with AI tools, collaborative learning, and continuing professional development. At the same time, providing teachers with the necessary resources and support, helps them effectively integrate AI into English-speaking instruction while maintaining high teaching standards.

3.4.9. Cost (n = 2)

The integration of AI in speaking instruction also faces a challenge which is cost, which influences educational institutions and individual learners. One big problem is the high cost of AI-driven tools and their infrastructures, which limit the accessibility of these tools in resource-poor educational settings. Schools and universities need to invest in AI speech recognition software, hardware equipment, and regular updates, which creates financial pressure and may be difficult to maintain for institutions with limited budgets[26]. Otherwise, students from low-income families may find it hard to afford high-end AI language learning apps or visit necessary digital resources, therefore, exacerbating the issue of educational inequality[22].

To solve this financial limitation, educational institutions should explore a more cost-effective solution, such as open-source AI speech recognition tools and government-funded AI integration projects. The cooperation of educational policymakers and technological developers helps subsidize fees, ensuring equitable provision of AI-enhanced speaking instruction, and maintaining financial sustainability.

3.4.10. Data Privacy (n = 1)

The integration of AI into EFL speaking instruction also involves an issue of data privacy, especially in the collection, saving, and use of data on students' personal information and language. First, there is a lack of transparency in AI-driven systems when it deals with students' private data, and it is also not clear whether the data is safely saved. Many AI chatbots and speech recognition systems need constant input data to improve accuracy and performance, but students and teachers may be unclear about how their information is used without a clear privacy policy[16]. Second, AI-based oral teaching tools often require students to provide voice recordings and interaction logs, therefore, the data may be vulnerable to cyberattacks or unauthorized third-party access. If there is not enough protection, the data is possibly used for business purposes, even leaking students' privacy, raising concerns about the ethical implementation of AI in education[16].

To mitigate the risk, educational institutions must make powerful data privacy policies to clarify the collection, saving, and use of students' data. Otherwise, incorporating AI with secure encryption methods and anonymization techniques is helpful for students to protect data and, at the same time to ensure compliance with ethical and legal standards in AI-assisted language learning.

4. Conclusions and Implication

4.1. Summary of Findings

This study systematically reviewed the integration of AI into EFL speaking instruction in Asian higher education,

revealing several key research trends, including the main used AI tools, effective instructional methods, and the existing challenges. First, research momentum in this field has increased significantly in recent years, especially since the year 2023, when scholars showed great interest in AI's role in language acquisition. From geographical distribution, east Asia leading its way in this research field with the most abundant research results in mainland China, Taiwan, and Korea. In terms of research methods, quantitative research is dominant, the most frequently used instruments are pre-and post-tests and questionnaires which are used to evaluate the influence of AI on speaking skills. As for the main used AI tools in EFL speaking instruction, this study categorizes them into AI chatbots, AI learning applications, AI learning platforms, and AI virtual humans. Studies highlight the effectiveness of AI chatbots in enhancing speaking fluency, accuracy, grammar, and vocabulary, while AI learning apps offer personalized practice through speech recognition and pronunciation analysis. AI learning platforms provide structured and immersive speaking exercises, and AI virtual humans promote engagement and interaction through social presence and credibility. The study also classified effective instructional methods integrating AI into EFL speaking instruction, including Peer Learning, Contextualized Learning, Flipped Classroom, Task-Based Learning, and Gamification. These methods leverage AI's interactivity and personalization to create engaging and student-centered learning experiences. However, challenges remain, including misalignment between AI feedback and academic curricula, technological deficiencies in speech recognition, ethical concerns, teacher training gaps, high costs, and data privacy risks.

4.2. Implications for Future Research

To ensure the continuous development and effectiveness of AI integration in EFL speaking instruction, future research should focus on the following aspects:

1. Increasing Qualitative Study: at present, the study in this field is mainly quantitative, and more qualitative research needs to be done to explore the perception of learners and teachers towards AI, including the motivation of study, classroom engagement, and affective factors of integrating AI into speaking instruction.
2. Expand the Research Areas: now existing research mainly focuses on East Asia, especially mainland China, Taiwan, and Korea. Future research should focus on the application of AI in other areas to ensure the full understanding of AI in different educational contexts.
3. Addressing AI bias and Ethical Concerns: there is bias in AI-driven speech recognition and feedback systems when dealing with non-native English accents, which can lead to unfair feedback. Future studies should focus on developing a more inclusive AI model, utilizing diverse language data for training, therefore, improving recognition accuracy and feedback fairness.
4. Exploring the Long-term Impact of AI-assisted Learning: existing research mainly focuses on improving speaking skills in a short period, future research should explore the impact of AI-integrated instruction on long-term language retention, fluency, and sustainability of AI-integrated teaching.

4.3. Practical Recommendations for Integrating AI in EFL Speaking Instruction

1. Optimize AI-driven feedback mechanisms should go beyond simple pronunciation and grammar correction to provide more comprehensive, contextual feedback, including discourse structure, coherence, and the use of pragmatic competence. AI developers should integrate natural language understanding (NLU) models to improve the depth and accuracy of feedback.
2. Strengthen teacher training and AI literacy: educational institutions should carry out professional development training to help teachers master the necessary AI-related skills, including AI literacy, feedback and evaluation capabilities, and AI teaching integration strategies, to improve teachers' ability to apply AI in the classroom.
3. Improve the accessibility and cost-effectiveness of AI: Governments and educational institutions should support open-source AI solutions to lower economic barriers and ensure that learners from different socioeconomic backgrounds have equitable access to AI-assisted learning tools.
4. Build an AI-enhanced collaborative learning environment: AI should be used to promote collaborative learning, allowing students to participate in AI-

assisted group discussions, peer feedback, and communication tasks that simulate real communication scenarios, thereby improving the authenticity and interactivity of oral practice.

5. Ensure data privacy and AI ethical implementation: Strict data protection policies should be formulated to ensure the security of students' voice data. AI systems should use encryption and anonymization technologies to protect learner privacy while ensuring the transparency and credibility of AI-generated feedback.

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The authors declare no conflict of interest.

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