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Artificial Intelligence as an Assisted-Language Learning Tool: A Systematic Review of Its Efficacy in Enhancing Speaking Skills Among EFL Learners

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Abstract

This systematic literature review synthesizes empirical research from 2020 to 2025 to evaluate the efficacy of Artificial Intelligence (AI) as an assisted-language learning tool in enhancing the speaking skills of English as a Foreign Language (EFL) learners. Following the PRISMA framework, an analysis of 22 studies reveals that AI tools, categorized into speech recognition tutors, conversational chatbots, and comprehensive platforms, demonstrate significant potential in improving specific micro-skills. The evidence indicates that pronunciation is the most frequently enhanced aspect (cited in 19 out of 22 studies), followed by fluency (17 studies), vocabulary (14 studies), and grammar (13 studies). Key pedagogical drivers underpinning this efficacy are the provision of immediate, personalized feedback, adaptive learning paths, and the creation of low-anxiety practice environments, which also contribute to improved speaking confidence (noted in 12 studies). However, the review identifies persistent and significant challenges. These include technical limitations in processing non-native accents and spontaneous speech, a lack of human-like interaction for developing pragmatic and cultural competencies, and critical issues of equitable access and data privacy. Methodologically, the field is constrained by small-scale studies (samples of n=20 to n=93) and short intervention periods (4 to 14 weeks), which limit generalizability. The central conclusion is that successful outcomes are not dependent on the AI tools alone but hinge on their strategic, pedagogically-aligned integration within a blended learning ecosystem that complements human instruction. Consequently, this study provides practical implications for curriculum design and teacher training, emphasizing the need for pedagogical

integration over mere tool adoption. It recommends future research to pursue longitudinal studies, more robust methodological designs, and the development of more linguistically and culturally adaptive AI technologies to bridge the gap between technological potential and equitable, effective educational practice.

Keywords: Artificial Intelligence, Assisted-Language Learning, Blended Learning, EFL Speaking Skills

Introduction

In recent years, Artificial Intelligence (AI) has revolutionized the educational landscape, particularly in the domain of language learning and teaching (Kovalenko & Baranivska, 2024; Kuddus, 2022; Roy & Paul, 2023). The growing integration of AI-assisted technologies into English as a Foreign Language (EFL) education has opened new avenues for personalized, interactive, and data-driven learning experiences (Isotalus et al., 2025; Mohebbi, 2025). As communicative competence remains a central goal in language acquisition, speaking, often regarded as the most complex and anxiety-inducing skill for EFL learners, has attracted increasing scholarly and pedagogical attention (Hwang et al., 2024; Wu et al., 2025). Traditional classroom-based instruction, while valuable, often faces challenges such as limited speaking time, inadequate feedback, and a lack of authentic communicative contexts (Chen et al., 2020; Huang et al., 2022). Consequently, educators and researchers have sought innovative methods to bridge these gaps, with AI emerging as a promising solution (Aderibigbe et al., 2023).

AI-assisted language learning tools, such as AI chatbots, intelligent tutoring systems, automatic speech recognition (ASR) programs, and AI-driven pronunciation trainers, have been designed to simulate human-like interaction and provide instant, adaptive feedback (Aliakbari et al., 2025; Dennis, 2024; Kuddus, 2022; Rahman & Brime, 2025; Wiboolyasarin et al., 2025; Zou, et al., 2023). These systems leverage natural language processing (NLP) and machine learning to assess learner speech, detect errors, and offer corrective suggestions in real time, capabilities that can enhance fluency, pronunciation, accuracy, and confidence. Furthermore, the integration of AI in mobile and online platforms has expanded accessibility, enabling learners to practice speaking autonomously beyond classroom constraints (Akhter, 2025; Kooti et al., 2025; Kuddus, 2022).

However, the existing body of research presents a fragmented and often inconclusive picture of AI's efficacy, primarily due to two key limitations: first, a tendency to measure 'speaking proficiency' as a monolithic construct rather than examining its discrete components in the EFL context; and second, a predominance of short-term, small-scale studies that lack robust longitudinal data and standardized assessment frameworks (Rahman & Brime, 2025; Sun & Rui, 2025). Consequently, there is a pressing need for a systematic synthesis that not only consolidates empirical findings but also critically analyses how different AI tool modalities target and affect specific sub-skills of EFL speaking (Fathi et al., 2025; Rahman & Brime, 2025; Zou, et al., 2023). While previous reviews have cataloged

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AI tools or discussed general attitudes, this review distinguishes itself by providing a granular, sub-skill-focused analysis of efficacy. It uniquely maps empirical outcomes against specific pedagogical features of AI tools, while simultaneously constructing an integrated framework of implementation challenges and critical success factors essential for moving from potential to practice. Some studies have reported significant improvements in learners' oral performance, confidence, and engagement (Akhter, 2025; Aliakbari et al., 2025; Kooti et al., 2025; Nguyen, 2024; Shen et al., 2025; Sormin et al., 2025; Wu et al., 2025; Zou, et al., 2023), while others have highlighted concerns such as limited contextual adaptation, technological barriers, and insufficient pedagogical integration (Al-husban, 2025; Qiao & Zhao, 2023; Sormin et al., 2025; Zou, et al., 2023). Moreover, the rapid evolution of AI technologies between 2020 and 2025 necessitates a systematic synthesis to evaluate emerging trends, applications, and outcomes in this field.

Accordingly, this study adopts a Systematic Literature Review (SLR) approach guided by the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) framework (Page et al., 2021). By rigorously identifying and analyzing empirical studies published within the past six years, this review aims to provide a comprehensive understanding of AI's role as an assisted-language learning tool in developing speaking skills among EFL learners.

The purpose of this Systematic Literature Review (SLR) is to provide a comprehensive and evidence-based synthesis of how Artificial Intelligence (AI) is utilized as an assisted-language learning tool to enhance the speaking skills of EFL learners. Through a structured analysis of existing research, this SLR aims to establish a clear understanding of the current technological landscape, pedagogical applications, and learning outcomes. The findings are intended to inform future research, technological development, and practical pedagogical strategies for AI integration in EFL speaking instruction. Consequently, the specific objectives of this SLR are:

1. To identify the types of AI tools and their core pedagogical features employed to assist EFL learners in developing speaking skills.
2. To analyze the specific aspects of speaking skills that are most effectively enhanced through AI-assisted interventions.
3. To map the challenges, limitations, and critical success factors associated with the implementation of these AI tools in developing speaking skills of EFL learners.

Through these inquiries, the study seeks to contribute to both theoretical and practical insights into AI-assissted EFL speaking instruction, offering valuable implications for curriculum design, teacher training, and future technological innovation in the realm of intelligent language education.

Method

Research Design

This study employed a Systematic Literature Review (SLR) methodology guided by the PRISMA (Preferred Reporting Items for Systematic Reviews and

Meta-Analyses) framework (Page et al., 2021). The systematic approach was chosen to comprehensively identify, evaluate, and synthesize all relevant empirical research on the efficacy of Artificial Intelligence as an assisted-language learning tool in enhancing speaking skills among English as a Foreign Language (EFL) learners. The review specifically sought to answer three research questions: (1) the types of AI tools and pedagogical features employed, (2) the specific aspects of speaking skills these tools demonstrate efficacy in enhancing, and (3) the challenges, limitations, and critical success factors associated with their implementation.

Article Search Strategy

A systematic electronic search was performed to identify relevant literature published within a six-year period (2020–2025) to capture the evolving and rapidly expanding landscape of AI applications in language learning. The primary and sole database queried for this review was Google Scholar. This decision was strategically based on the review's specific interdisciplinary scope and the nature of the research field. Google Scholar was selected for its unparalleled breadth of coverage across disciplines and publication types. Unlike subscription-based databases such as Scopus, Eric, or Web of Science, which primarily index established, peer-reviewed journals, Google Scholar's algorithm also comprehensively retrieves conference proceedings, institutional repositories, preprints, and relevant "grey literature". This inclusivity is critical for a nascent and fast-moving field like AI in education, where significant empirical findings are often first disseminated at conferences or in open-access formats before formal journal publication. To capture the breadth of relevant studies, a comprehensive search string was constructed using Boolean operators, targeting the core concepts of the study: AI Tool, Speaking Skill, and EFL Context. The key terms were combined as follows:

> ("Artificial Intelligence" or "AI" or "chatbot" or "intelligent tutoring system" or "automatic speech recognition" or "speech recognition") and ("speaking skill" or "speaking profiency" or "oral competence" or "oral communication") and ("EFL" or "English as a Foreign Language").

The search was not limited by educational level to ensure comprehensiveness, allowing for the inclusion of studies conducted in secondary (SMP/SMA), tertiary (university), and other relevant educational contexts. The search was restricted to the title, abstract, and keywords of publications. Although no geographical limitations were imposed, only studies published in English were included to maintain linguistic consistency and ensure accessibility of analysis. The initial search results were exported and managed using a reference manager (Zotero) to facilitate efficient citation handling and the removal of duplicate records.

Article Selection Criteria

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The identified records were screened against predefined inclusion and exclusion criteria to determine their eligibility for the final synthesis. These criteria were established to ensure the selected studies were directly pertinent to the review's objectives and research questions. The specific criteria are delineated in Table 1.

Table 1. Inclusion and Exclusion Criteria

Criterion	Inclusion	Exclusion
Publication Period	2020 – 2025	Published before 2020
Population & Context	EFL (English as a Foreign Language) learners at any formal educational level (secondary/SMP/SMA, tertiary/university, or equivalent). Studies involving pre-service or in-service EFL teachers are included if they directly investigate AI tool use for speaking skill development.	Non-EFL learners (ESL in English-speaking countries), learners of languages other than English, or studies not focused on a defined educational context.
Intervention/Tool	Explicitly investigates the use of an Artificial Intelligence (AI) tool (AI chatbots, intelligent tutoring systems, automatic speech recognition software, AI-powered pronunciation tutors) as an assisted-learning tool for speaking practice or development	Studies on computer-assisted language learning (CALL) or technology-enhanced learning without a specific AI component; studies where AI is only used for assessment or research analysis, not as a learning tool for students.
Outcome	Empirically measures, assesses, or reports on the development, enhancement, or any aspect of speaking skills/proficiency (fluency, accuracy, pronunciation, complexity, coherence, interactional competence, or affective factors like confidence/anxiety in speaking).	Focuses solely on other language skills (writing, reading, listening) or general language proficiency without isolating speaking outcomes; studies that only discuss perceived usefulness or attitudes without empirical evidence on speaking skill efficacy.
Study Type	Empirical research (qualitative, quantitative, or mixed-methods) published as peer-reviewed journal articles or conference proceedings.	Systematic reviews, literature reviews, theoretical papers, opinion pieces, editorials, book chapters, theses, dissertations, or non-

		empirical articles.
Language	English.	Languages other than English.
Full Text Availability	Full text is accessible and retrievable through institutional subscriptions, open-access platforms, or by direct request to the author.	Full text is unavailable after exhaustive search attempts.

Article Selection Process

The selection process, adapted from the PRISMA flow diagram. The records were imported into Mendeley reference management software for systematic handling.

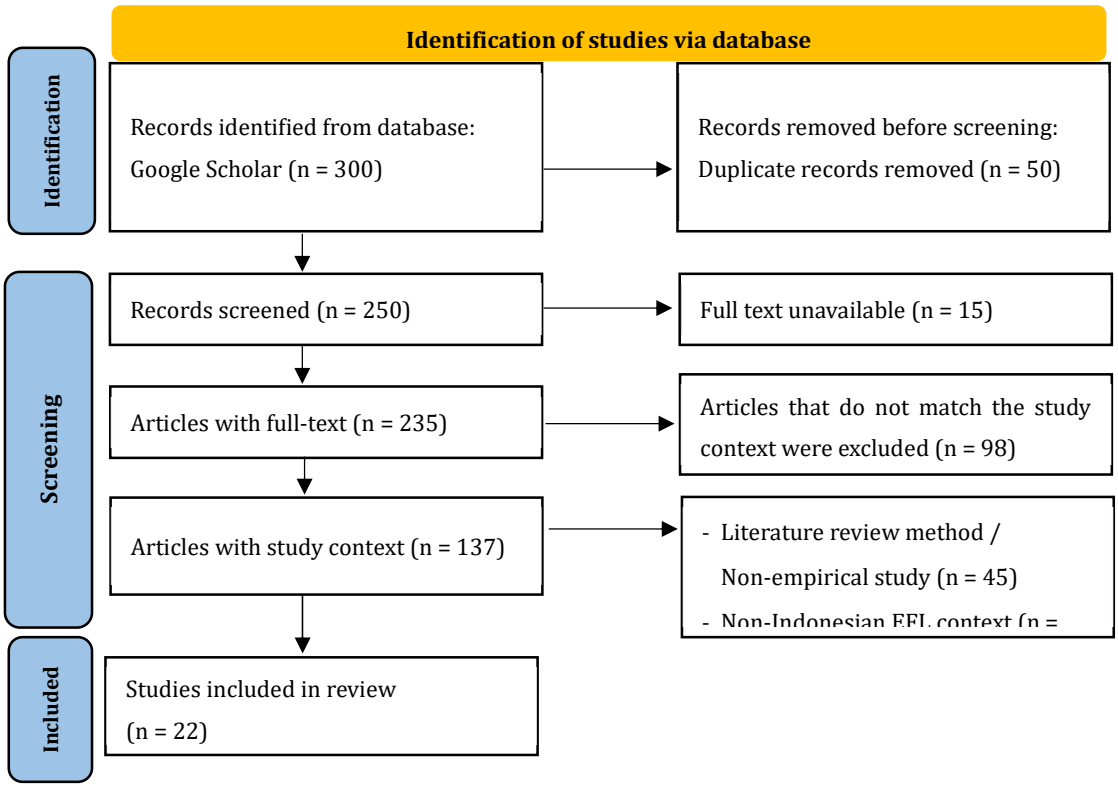

Figure 1. PRISMA flow diagram of article selection (Source: PRISMA 2020 Flow Diagram)

Data Collection and Data Analysis

Data from the included studies were extracted and systematized into a standardized matrix to facilitate a coherent synthesis. The primary data extraction table was designed to align with the specific objectives of this review, capturing the following dimensions from each study:

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Table 2. Data Extraction from 22 journal articles

	Artificial Intelligence as an Assisted-Language Learning Tool			
Num.	**Research Topic and Author**	**AI Assissted Tools and Pedagogical Features**	**Aspects of Speaking Skills**	**Challenges, Limitations, and Critical Success Factors**
1.	The impact of AI- assisted language learning tools on augmenting university EFL students' speaking skills in Jordan (Al-husban, 2025)	Tools: ELSA Speech Analyzer (AI-driven feedback on pronunciation, intonation, fluency, grammar, vocabulary) **Features:** **Pe**rsonalized learning paths; mobile & web access; real-time transcription & analysis; interactive speaking tasks aligned with IELTS/TOEFL standards.	Pronunciation, Intonation, Fluency, Vocabulary, Grammar	Challenges: AI may be overly sensitive to native-speaker accents. Limitations: Quasi-experimental design limits generalizability; small sample (n=34). Critical Success Factors: Teacher training in AI tool usage; integration into course descriptions; student motivation through personalized feedback.
2.	Empowering Students with Innovative AI-Language Learning Tools and Pedagogy to Master Speaking Skills (Fathi et al., 2025)	Tools: AI chatbots (ChatGPT, virtual assistants) **Features:** Speech recognition; adaptive learning systems; NLP-based tutoring; gamification; teacher-facing analytics tools; student-facing interactive platforms.	Pronunciation, Fluency, Vocabulary, Grammar, Conversational Skills	Challenges: Lack of human interaction; limited error recognition for beginners; dependence on large datasets; teachers' low AI literacy; ethical concerns. Limitations: Focus on perceptions rather than longitudinal skill development. Critical Success Factors: Pedagogically sound integration; teacher

				training; maintaining human-centered support; addressing equity in access.
3.	Artificial intelligence-based language learning: illuminating the impact on speaking skills and self-regulation in Chinese EFL context (Qiao & Zhao, 2023)	Tools: Duolingo (AI chatbot) Features: Speech recognition, personalized feedback, adaptive exercises, gamification, interactive group activities).	Fluency, Vocabulary, Accuracy, Pronunciation, Self-regulation	Challenges: Speaking anxiety persists despite AI use; limited long-term effect data. Limitations: May not fully replace human interaction for cultural and pragmatic skills; small sample size (n=93) Critical Success Factors: Personalized and adaptive feedback; engagement through gamification; fostering self-regulated learning.
4.	Implications of AI Based as Learning Media to Improve the Speaking Skill From Perspective Students at STIKOM Tunas Bangsa; Trough Mobile Assisted Language Learning (Sormin et al., 2025)	Tools: CAKE app (speech recognition, real-time pronunciation feedback, interactive videos, dialogue practice) Feature: Mobile-Assisted Language Learning (MALL) integration.	Pronunciation, Fluency, Confidence, Vocabulary	Challenges: Students still face difficulties in oral expression; app may not address all phonetic nuances. Limitations: Qualitative focus; small sample (n=40); limited generalizability. Critical Success Factors: Accessibility and convenience of mobile learning; engaging and interactive content; integration into formal curriculum.

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5.	Enhancing EFL Learners' Speaking Skills through AI-Powered Tools: A Quantitative Approach (Rahman & Brime, 2025)	**Tools:** ChatGPT, Duolingo, ELSA Speak, Natural Reader, Chatbots **Features:** Real-time feedback, simulated conversations, personalized learning, pronunciation analysis, interactive dialogues, automated error identification	Pronunciation, fluency, confidence, motivation, vocabulary, grammar, intonation, speaking in different contexts (formal/informal)	**Challenges: AI tools may misinterpret accents or dialects; lack of emotional and cultural nuance in interactions.** **Limitations: Study conducted only in one university context; reliance on self-reported data via questionnaire.** **Critical Success Factors: Personalized and adaptive feedback; ease of use; integration with traditional teaching methods; addressing learner anxiety through low-pressure practice environments.**
6.	An Investigation Into Artificial Intelligence Speech Evaluation Programs With Automatic Feedback for Developing EFL Learners' Speaking Skills (Zou, et al., 2023)	**Tools:** Liulishuo, IELTS Liulishuo, EAP Talk, Shanbay, Duolingo, Babbel, Rosetta Stone, ELAi **Features:** Speech recognition, automatic scoring, textual feedback, practice suggestions, sample answers, highlighted colors, adaptive tasks, reading aloud & spontaneous	Oral fluency, pronunciation, grammar, vocabulary, intonation, idea organization, reading aloud, spontaneous speaking	**Challenges: AI scoring systems may lack accuracy and fail to reflect learner progress over time; detailed feedback for spontaneous speech is technically challenging.** **Limitations: No control group; short study duration (1 month); small sample size (n=40).** **Critical Success**

		speaking tasks		**Factors: Intuitive and immediate feedback (scores, colors); alignment of feedback type with task (pronunciation for reading aloud, content for spontaneous speech); affordability and accessibility of tools.**
7.	The Function of Artificial Intelligence (AI) In Developing English Language Learner's Speaking Performance (Leba & Butar-Butar, 2024)	**Tools:** Speech recognition systems, chatbots, virtual tutors, language learning apps **Features:** Real-time feedback, adaptive assessments, personalized content, immersive learning experiences, learner autonomy support	Speaking, listening, reading, writing (integrated communication skills), pronunciation, fluency, accuracy, confidence	**Challenges: Algorithmic bias may disadvantage certain learner groups; privacy concerns regarding data collection.** **Limitations: Limited exploration of long-term effectiveness and optimal integration strategies.** **Critical Success Factors: Personalization and adaptability of AI systems; ethical design and implementation; teacher involvement as facilitators; alignment with pedagogical goals.**
8.	Effect of Artificial Intelligence-Based Application on Saudi Preparatory -	**Tool:** ELSA Speak **Features:** Pronunciation scoring, vocabulary building, grammar practice through	Fluency (confidence, content, comprehension), accuracy (vocabulary, grammar,	**Challenges: Students may become overly dependent on app feedback.** **Limitations: Quasi-experimental one-**

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	Year Students' EFL Speaking Skills at Albaha University (Makhlouf, 2021)	conversations, real-time feedback, authentic task-based learning	pronunciation)	**group design; very small sample (n=20); limited to one AI application (ELSA Speak).** **Critical Success Factors: Safe and non-threatening practice environment; gamified and motivating design; flexibility for self-paced learning; provision of immediate and personalized corrective feedback.**
9.	Improving EFL speaking performance among undergraduate students with an AI-powered mobile app in after-class assignments: an empirical investigation (Mingyan et al., 2025)	Tool: Liulishuo Features: AI-powered app with automatic speech recognition, natural language processing, text-to-speech; provides automatic feedback, process-oriented monitoring, tailored instructions, ZPD-oriented assistance; integrated with WeChat for sharing progress	Overall speaking performance, Pronunciation, Fluency, Vocabulary, Grammar (all assessed via IELTS speaking criteria).	Challenges: AI feedback focuses more on pronunciation and fluency, less on vocabulary and grammar. Limitations: Quasi-experimental design; only one AI app tested; sample limited to Chinese undergraduates. Critical Success Factors: Integration with existing MALL environment (WeChat); personalized, ZPD-oriented feedback.
10.	Developing Learners' English-Speaking Skills using ICT and AI	Tools: Duolingo, ELSA Speak, Kahoot, YouTube/Netflix with subtitles, speech recognition apps	Vocabulary, Fluency, Grammar, Pronunciation, Expressions.	Challenges: Affective barriers such as anxiety, low motivation, and fear of failure persist despite technology use; digital divide may limit access.

	Tools (Madhavi et al., 2023)	Features: ICT and AI tools such as automatic speech recognition (ASR) for pronunciation practice, gamified learning platforms (Kahoot), multimedia content (films, videos with subtitles), and social media integration (WhatsApp, Facebook) for collaborative speaking practice and feedback.		Limitations: Experimental study with possible selection bias; focus on short-term performance improvement rather than long-term proficiency. Critical Success Factors: Multimodal and engaging content (videos with subtitles); use of familiar social platforms for communication; teacher training in ICT/AI integration; addressing both linguistic and affective barriers.
11.	Harnessing AI-Based Tools for Enhancing English Speaking Proficiency: Impacts, Challenges, and Long-Term Engagement (Nguyen, 2024)	Tools: ELSA Speak, Duolingo, AI Chatbots (ChatGPT, MissionFluent) Features: Speech recognition systems and conversational AI provide real-time pronunciation feedback, fluency practice, and adaptive learning paths; chatbots offer low-anxiety conversational practice and personalized guidance; tools support self-regulated learning	Pronunciation, Fluency, Autonomy, Self-regulation, Critical communication skills.	Challenges: AI may lack cultural and linguistic sensitivity; data privacy concerns. Limitations: Literature review; lacks focus on long-term learning and advanced learners. Critical Success Factors: Instant feedback reduces anxiety; content adapts to individual needs.

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		and gamified engagement.		
12.	Exploring EFL Learners' Perceptions on the Use of AI-Powered Conversational Tools to Improve Speaking Fluency: A Case Study at MajmaahUniversity (Mudawy, 2025)	Tools: AI-powered conversational tools (chatbots, conversational agents) Features: Instant feedback; adaptive dialogue; personalized content; self-paced practice; low-pressure environment.	Speaking fluency, pronunciation, confidence, oral proficiency, listening comprehension.	Challenges: Technical glitches, pronunciation recognition errors, cultural misinterpretations, lack of personalized feedback. Limitations: Small sample size (40 quantitative, 6 qualitative); limited to one university. Critical Success Factors: Ease of use, perceived usefulness, learner motivation, availability of tools, integration with curriculum.
13.	Leveraging Artificial Intelegence Technology: Introducing Speak. Google as a Digital Speaking Asisstant for EFL Students (Nurmayasari, 2024)	Speak.google (AI-powered speaking assistant) Features: Interactive speaking practice; instant feedback; grammar and semantic feedback; sample responses at different complexity levels; vocabulary definitions in context; progress tracking.	Speaking fluency, pronunciation, grammar, vocabulary, semantic clarity.	Challenges: Limited availability (only in certain countries); reliance on internet and smartphones. Limitations: Descriptive qualitative study; no experimental validation. Critical Success Factors: Accessibility, ease of use, real-time feedback, adaptability to learner's level, integration into self-directed learning.
14.	Using AI-Powered Speech Recognition	Tools: Speechling (AI-powered speech recognition)	Pronunciation accuracy, speaking fluency,	Challenges: Limited sample size (n=25); homogeneity of participants; reliance on

	Technology to Improve English Pronunciation and Speaking Skills (Dennis, 2024)	Features: Real-time pronunciation feedback; spaced repetition; personalized practice; adaptive difficulty; progress tracking; human-like speech modeling.	vocabulary acquisition, confidence, oral communication.	self-reported data. Limitations: Short-term intervention; no long-term effect measurement. Critical Success Factors: Quality of feedback, learner motivation, integration into curriculum, teacher training, technological accessibility.
15.	Integrating AI-Based Tools to Enhance Speaking Fluency in EFL Classrooms in Labuhanbatu Utara (Anh et al., 2025)	ELSA Speak (pronunciation training), Google Speech-to-Text (real-time transcription) Features: Instant feedback; gamified learning; progress tracking; self-paced practice; classroom integration.	Pronunciation, fluency, vocabulary use, coherence, speaking confidence, learner autonomy.	Challenges: Limited digital infrastructure, unstable internet, device availability, teacher training gaps. Limitations: Small sample (30 students, 2 teachers); rural context may limit generalizability. Critical Success Factors: Institutional support, teacher training, alignment with curriculum, learner motivation, blended learning approach.
16.	Exploring the Impact of AI-Assisted Speaking Practice on EFL Learners' Speaking Proficiency and	Tool: EAP Talk AI app Features: AI-driven evaluation of academic English speaking; combines speech recognition, language analysis,	Pronunciation, Fluency, Grammar, Vocabulary, Overall Speaking Performance	Challenges: AI tools may not fully address the unique cultural psychology (classroom silence tendencies) of Chinese students. Limitations: Quasi-experimental design

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	Motivation: A Mixed-Method Study (Shen et al., 2025)	and data processing; provides real-time feedback on pronunciation, fluency, and completeness; scenario-based speaking tasks; flexible, self-paced practice.		with short-term intervention (4 weeks); lacks long-term tracking. Critical Success Factors: Flexibility and non-judgmental environment of AI tool; immediate feedback; enhancement of intrinsic motivation and confidence through personalized, interactive practice.
17.	Supporting Speaking Practice by Social Network-Based Interaction in Artificial Intelligence (AI)-Assisted Language Learning (Zou, Guan, et al., 2023)	Tools: Multiple AI apps (English Liulishuo, IELTS Liulishuo, EAP Talk, Yidian English) Features: Speech evaluation systems; integrated with WeChat-based interaction (punch cards, feedback sharing, collaborative documents, teacher–student/peer interaction); real-time feedback and social engagement.	Oral Fluency, Grammatical Range & Accuracy, Pronunciation, Oral Rhythm, Idea Organization, Reading Aloud, Presentation Skills	Challenges: Asynchronous communication (message delay) can discourage practice; some students prefer independent learning over social interaction. Limitations: Short duration (5 weeks); online-only format may reduce engagement and familiarity; sample recruited via snowball sampling. Critical Success Factors: Social network-based interaction enhances motivation and habit formation; teacher guidance and timely feedback; task-based activities within a learning community.
18.	AI-enhanced	Tool: Talkpal.AI	Pronunciation,	Challenges: AI may

	language learning: The impact of Talkpal.AI on EFL undergraduate students' English-speaking skills (Torkhani, 2025)	Features: AI-powered voice chatbot for conversational practice; real-time feedback on pronunciation, fluency, vocabulary, and grammar; structured speaking tasks aligned with instructor topics; mobile-assisted practice.	Fluency, Vocabulary, Grammar	struggle with regional accents or provide culturally irrelevant feedback. Limitations: Small sample size (n=40); lacks diversity; pre-experimental design limits causal inference. Critical Success Factors: Provides a low-anxiety, stress-free practice environment; immediate and contextual feedback; easy integration into curricula for large classes; promotes learner autonomy.
19.	Integrating automatic speech recognition and automated writing evaluation to reduce speaking anxiety and enhance speaking competence among Chinese EFL learners (Li et al., 2025)	Tool: NetEase Youdao Dictionary Features: ASR (real-time pronunciation feedback) and AWE (grammar and syntax correction); iterative practice cycle: speak → transcribe → correct → respeak; reflective journals and screenshot annotations used for self-monitoring.	Pronunciation, Grammatical Accuracy, Interactive Communication, Discourse Management, Vocabulary	Challenges: ASR accuracy can be affected by background noise and distance from microphone; AWE requires stable internet for real-time feedback. Limitations: Sample limited to first-year English students at one Chinese university; 14-week intervention may not reveal long-term effects. Critical Success Factors: Combined ASR+AWE provides comprehensive linguistic feedback; promotes self-regulated,

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				iterative practice; reduces anxiety through private, low-pressure rehearsal; intuitive and flexible tool design.
20.	The Impact of AI-Integrated Language Instruction on EFL Learners' Speaking Proficiency, Speaking Anxiety, and Foreign Language Motivation (Kooti et al., 2025)	**Tool:** ChatGPT **Features:** Real-time conversational practice; adaptive speaking tasks; immediate error correction (pronunciation, grammar, vocabulary); motivational support; gamified tasks (timed challenges, storytelling); homework practice with asynchronous feedback.	Fluency, Accuracy, Pronunciation, Vocabulary, Speaking Confidence, Willingness to Communicate	**Challenges:** Potential anxiety due to technological novelty; perceived evaluation pressure. **Limitations:** Small sample (n=60, female only); short intervention (8 weeks); single AI tool (ChatGPT); quasi-experimental design. **Critical Success Factors:** Low-pressure, non-judgmental environment; personalized and adaptive tasks; integration with pedagogical goals.
21.	Exploring The Impact of Artificial Intelligence on Language Learning and English Communication Skills (Khan et al., 2025)	**Tools:** Automated Writing Evaluation (AWE), Chatbots, Automatic Speech Recognition (ASR), Learning Analytics Dashboards **Features:** Immediate feedback on writing/speaking; personalized and adaptive learning; low-stakes conversational practice;	Writing Quality, Pronunciation, Speaking Fluency, Communication Confidence, Speaking Anxiety	**Challenges:** Algorithmic bias; privacy concerns; digital divide; need for teacher mediation. **Limitations:** Cross-sectional design (no causality); self-reported data; potential overestimation of gains. **Critical Success Factors:** Teacher scaffolding; equitable access; pedagogical alignment; learner

		pronunciation training with segmental/suprasegmental feedback; engagement tracking.		engagement and digital literacy.
22.	AI-Powered Chatbots for English Conversation Practice: Impact on Speaking Proficiency (Aliakbari et al., 2025)	**Tool:** Elsa AI **Features:** Real-time feedback on pronunciation, vocabulary, grammar, fluency; NLP and ASR capabilities; 24/7 availability; tailored interactions; IELTS-aligned speaking tasks.	Pronunciation, Vocabulary, Grammar, Fluency, Speaking Proficiency (IELTS-based)	**Challenges:** Technical limitations in handling nuanced language; high development cost; digital divide. **Limitations:** Small sample (n=60); limited to university EFL context; short-term intervention (12 weeks). **Critical Success Factors:** Immediate and consistent feedback; low-anxiety practice environment; integration with human instruction in hybrid models.

Findings and Discussion

The Identification of Types of AI Tools and Key Pedagogical Features as Tools for Enhancing Speaking Skills in EFL Learning

AI-assisted tools for enhancing speaking skills in EFL learning can be broadly categorized into several types, each with distinct pedagogical features. As illustrated in the table below, these tools can be mapped by their primary function and target skill.

Table 3. A Functional Taxonomy of AI Tools for EFL Speaking

Tool Category	Primary Function	Target Speaking Skills	Example Applications
Speech Recognition & Pronunciation Tutors	Provides granular, real-time feedback on phonetic accuracy and prosody.	Pronunciation, Intonation, Rhythm, Fluency (mechanical)	ELSA Speak, Speechling, CAKE app
Conversational	Simulates interactive	Fluency, Turn-taking,	ChatGPT, Talkpal.

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Agents & Chatbots	dialogue for practice in sustained conversation.	Vocabulary in context, Grammatical Accuracy	AI, Custom Dialog Bots
Comprehensive Language Platforms	Integrates AI for adaptive learning paths, gamification, and multi-skill practice.	Integrated Skills: Pronunciation, Fluency, Vocabulary, Grammar, Confidence	Duolingo, Liulishuo, Babbel

The most prevalent type is AI-powered speech recognition and pronunciation tutors, such as ELSA Speak, Speechling, and CAKE app, which provide real-time, granular feedback on segmental (phonemes) and suprasegmental (intonation, stress) aspects of pronunciation (Al-husban, 2025; Dennis, 2024; Sormin et al., 2025). Another significant category is AI-driven conversational agents and chatbots, including ChatGPT, Talkpal.AI, and various custom bots, which simulate human-like dialogue to practice fluency, vocabulary, and grammar in interactive, often low-anxiety environments (Fathi et al., 2025; Kooti et al., 2025; Torkhani, 2025). Furthermore, comprehensive language learning platforms like Duolingo, Liulishuo, and Babbel integrate AI to offer adaptive learning paths, gamified tasks, and combined practice in reading aloud and spontaneous speaking, thereby targeting multiple speaking sub-skills simultaneously (Mingyan et al., 2025; Qiao & Zhao, 2023; Zou, et al., 2023).

The key pedagogical features that underpin these tools' effectiveness are centered on immediacy, personalization, and integration. A critical feature is the provision of instantaneous and detailed feedback, which allows learners to correct errors immediately, a factor consistently linked to improved pronunciation and fluency (Aliakbari et al., 2025; Shen et al., 2025). Pedagogically, this aligns with the principles of formative assessment. Secondly, adaptive and personalized learning is facilitated through algorithms that tailor content difficulty, suggest personalized practice, and monitor progress, supporting learner autonomy and addressing individual ZPDs (Nguyen, 2024; Zou, Guan, et al., 2023).

Thirdly, gamification and interactive task design, including points, levels, and scenario-based speaking tasks, are employed to boost motivation and engagement (Anh et al., 2025; Rahman & Brime, 2025). Finally, the integration capability of these tools, either with social networks (WeChat) for collaborative learning or within formal curricula as blended learning components, emerges as a vital feature for sustaining practice and embedding AI support into broader pedagogical ecosystems (Leba & Butar-Butar, 2024; Madhavi et al., 2023).

In summary, the identified AI tools for EFL speaking enhancement range from focused pronunciation aids to versatile conversational platforms, all leveraging core pedagogical features like real-time feedback, adaptive personalization, and motivational design. Their potential is maximized not in isolation but when strategically integrated into instructional designs, providing

scalable, practice-intensive opportunities that complement traditional human-led instruction (Khan et al., 2025; Mudawy, 2025).

The Analysis of the Improvement of Specific Speaking Skills Through AI Intervention in Enhancing EFL Learners' Speaking Skills

AI-assisted language learning tools significantly target and enhance several discrete components of EFL learners' speaking skills. Figure 1 summarizes the frequency with which specific skill improvements were reported across the reviewed studies.

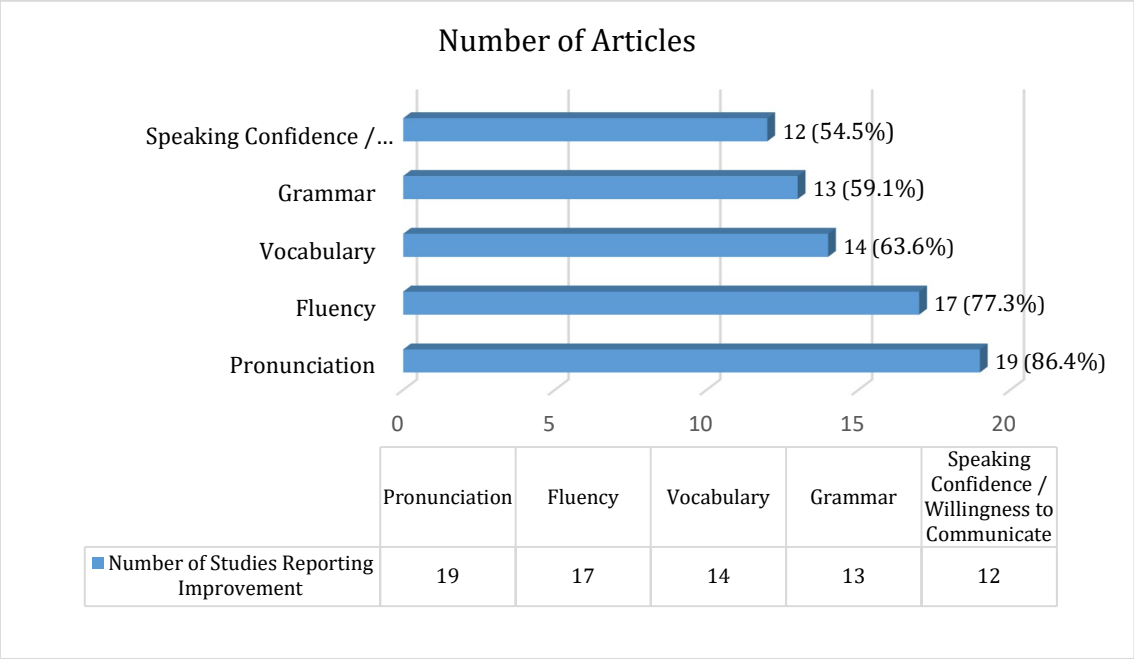

Figure 1. Frequency of Speaking Skill Improvement Reported in AI-Assisted EFL Studies (n=22)

Pronunciation emerged as the most frequently addressed aspect, cited in 19 out of 22 studies (Al-husban, 2025; Dennis, 2024; Makhlouf, 2021). This is primarily due to the core functionality of Automatic Speech Recognition (ASR) systems embedded in tools like ELSA Speak, Speechling, and Liulishuo, which provide immediate, granular feedback on phonetic accuracy, intonation, and oral rhythm. The second most prominently improved skill is fluency, referenced in 17 studies (Anh et al., 2025; Mudawy, 2025; Qiao & Zhao, 2023). AI tools foster fluency through features like conversational practice with chatbots (ChatGPT, Talkpal.AI), timed speaking tasks, and real-time transcription, which encourage more continuous and paced speech output by reducing cognitive load and anxiety associated with real-time human evaluation (Kooti et al., 2025; Li et al., 2025).

Beyond pronunciation and fluency, vocabulary and grammar are also consistently noted as improved areas, mentioned in 14 and 13 studies respectively (Mingyan et al., 2025; Rahman & Brime, 2025; Zou et al., 2023). AI tools enhance

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these aspects through contextualized practice in dialogues, automated error identification, and vocabulary-building exercises integrated within speaking tasks. Furthermore, several studies highlight the growth of broader, psycho-affective competencies. Speaking confidence or willingness to communicate is a notable outcome in 12 studies (Shen et al., 2025; Sormin et al., 2025), often attributed to the low-pressure, private, and non-judgmental practice environment that AI provides. Additionally, self-regulated learning and learner autonomy are fostered through features like progress tracking, personalized learning paths, and ZPD-oriented assistance (Mingyan et al., 2025; Nguyen, 2024). This pattern indicates that AI intervention supports not only the mechanical and linguistic sub-skills of speaking but also the critical affective and metacognitive dimensions that underpin communicative proficiency.

The synthesis of empirical studies demonstrates that AI-assisted interventions effectively enhance multiple facets of EFL speaking proficiency, with a pronounced and most frequent impact on pronunciation and fluency, followed by vocabulary, grammar, and crucially, learners' speaking confidence. The success across these domains is largely driven by AI's capacity to deliver instantaneous, personalized, and repetitive feedback within a low-anxiety environment, which addresses both skill-based and affective barriers to speaking (Al-husban, 2025; Kooti et al., 2025; Shen et al., 2025). However, the extent of improvement is often mediated by the tool's design, the pedagogical context of integration, and the support of teacher facilitation.

Therefore, while AI proves to be a potent supplementary tool for structured practice on specific speaking sub-skills, its optimal efficacy in developing comprehensive communicative competence is achieved through a blended, pedagogically-sound approach that complements, rather than replaces, human interaction and instructional guidance (Fathi et al., 2025; Khan et al., 2025; Leba & Butar-Butar, 2024). This blended approach is essential precisely because it can integrate AI's strengths in foundational skill-building with the human teacher's irreplaceable role in modeling and facilitating the complex, adaptive, and socially-grounded aspects of communication that AI currently cannot.

The Mapping of Implementation Challenges, Limitations, and Key Success Factors of AI Tools in Enhancing EFL Learners' Speaking Skill

The implementation of AI-assisted tools in enhancing EFL learners' speaking skills presents a distinct set of challenges and limitations that must be navigated to achieve success. The most frequently cited challenges revolve around the technical and pedagogical limitations of AI systems. A predominant issue is the lack of nuanced feedback, where AI tools may misinterpret regional accents or dialects, leading to inequitable or inaccurate scoring for non-native speakers (Al-husban, 2025; Rahman & Brime, 2025; Torkhani, 2025). Furthermore, a significant constraint is the lack of human interaction, which limits the development of cultural, pragmatic, and conversational skills that require authentic social exchange (Fathi et al., 2025; Leba & Butar-Butar, 2024; Qiao & Zhao, 2023). Persistent

affective barriers, such as speaking anxiety and low motivation, also endure despite AI use (Kooti et al., 2025; Madhavi et al., 2023; Qiao & Zhao, 2023), alongside concerns over algorithmic bias, data privacy, and the digital divide in access to technology (Aliakbari et al., 2025; Khan et al., 2025; Leba & Butar-Butar, 2024).

Regarding limitations in the research body itself, methodological weaknesses are prominent, restricting the generalizability and robustness of findings. The most common limitation is the small sample size and short-term intervention duration, which preclude conclusions about long-term proficiency gains (Aliakbari et al., 2025; Makhlouf, 2021; Shen et al., 2025; Sormin et al., 2025). Many studies also employed quasi-experimental or pre-experimental designs without control groups, limiting causal inference (Torkhani, 2025; Zou, et al., 2023). Furthermore, research is often context-bound, focusing on single universities, specific cultural groups, or a single AI application, which narrows the scope of applicability (Mingyan et al., 2025; Rahman & Brime, 2025; Torkhani, 2025).

The synthesis reveals consistent critical success factors that are essential for effective AI integration. Foremost among these is the provision of personalized, immediate, and adaptive feedback, which is crucial for learner motivation and targeted improvement (Kooti et al., 2025; Nguyen, 2024; Zou, et al., 2023). Creating a low-anxiety, non-judgmental practice environment is another key factor for encouraging trial and error, thereby reducing speaking apprehension (Aliakbari et al., 2025; Li et al., 2025; Torkhani, 2025). Successful implementation also hinges on sound pedagogical integration, which includes teacher training in AI tool usage, alignment with curriculum goals, and a blended or hybrid approach that combines AI practice with human instruction and social interaction (Al-husban, 2025; Anh et al., 2025; Khan et al., 2025). Finally, ensuring the accessibility, ease of use, and motivational design of tools is vital for sustaining learner engagement and autonomy (Makhlouf, 2021; Mudawy, 2025; Nurmayasari, 2024).

The mapping of AI tool implementation for EFL speaking skills reveals a landscape where significant promise is tempered by persistent technical, pedagogical, and methodological hurdles. While challenges such as algorithmic bias, lack of human nuance, and enduring learner anxiety are prevalent, and studies are often limited by scale and design, the pathway to success is clearly delineated. Effective integration is not merely a technological exercise but a pedagogical one, contingent upon providing personalized, low-pressure feedback, ensuring robust teacher training and curricular alignment, and fostering a blended learning ecosystem. Ultimately, the critical success factors underscore that AI tools serve best as powerful complements within a human-centered pedagogical framework, rather than as standalone solutions, to sustainably enhance speaking proficiency (Al-husban, 2025; Fathi et al., 2025; Khan et al., 2025).

Implications for Pedagogical Practices and Recommendations for Future

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Research

The synthesis of findings yields critical implications for pedagogical practices and directs future scholarly inquiry. Pedagogically, educators are advised to move beyond ad hoc tool adoption and instead strategically integrate AI, such as speech recognition tutors and conversational agents, into blended learning designs that complement human instruction, ensuring tools are selected for their capacity to deliver immediate, personalized feedback and create low-anxiety practice environments, thereby fostering pronunciation, fluency, and learner autonomy. For sustainable implementation, institutional support must prioritize teacher training in AI literacy and address access disparities to ensure equitable use.

Regarding future research, longitudinal and mixed-methods studies are needed to examine long-term skill retention and the socio-affective dimensions of AI-mediated speaking practice, while further investigation is required to develop AI that better accommodates diverse accents and pragmatic competencies. The study presents evidence-based strategies grounded in practical application to optimize AI integration in EFL speaking instruction. These findings contribute to the discourse on technology-enhanced language learning by delineating effective pedagogical blends of human and artificial tutoring.

The study advances the field by proposing frameworks for ethically sound, pedagogically aligned implementation to enhance speaking proficiency while underscoring the necessity for more robust, context-sensitive research in overcoming current technical and methodological limitations.

Conclusion

This systematic literature review synthesizes empirical evidence from 2020 to 2025 to critically evaluate the role of Artificial Intelligence as an assisted-language learning tool in enhancing the speaking skills of EFL learners. The analysis of 22 studies demonstrates that AI tools, particularly speech recognition tutors, conversational chatbots, and adaptive language platforms, show significant efficacy in improving specific micro-skills such as pronunciation, fluency, and vocabulary. Key pedagogical strengths include the provision of immediate, personalized feedback and the creation of low-anxiety practice environments that foster learner confidence and autonomy.

However, the review also identifies substantial challenges, including technical limitations in accent recognition, a lack of human-like interaction for pragmatic skill development, and persistent issues related to equitable access and data privacy. It is important to generalize these findings cautiously, as the majority of the reviewed studies are constrained by small sample sizes, short intervention durations, and context-specific designs, which may limit the broad applicability of the results. The overarching implication is that AI tools are not standalone solutions but are most effective when integrated strategically within a blended learning ecosystem that complements human instruction and pedagogical guidance.

Based on the identified gaps and limitations, several directions for future

research are recommended. First, there is a pressing need for longitudinal and mixed-methods studies to investigate the long-term impact of AI tools on speaking proficiency retention and the socio-affective dimensions of learning, such as sustained motivation and anxiety reduction. Second, future research should pursue more robust methodological designs, including randomized controlled trials with larger and more diverse participant pools, to enhance the generalizability and causal validity of findings.

Additionally, scholars and developers should prioritize the creation of more linguistically and culturally adaptive AI technologies capable of accurately processing diverse accents and providing contextually relevant feedback. Finally, further inquiry is needed into effective models for teacher training and curricular integration, ensuring that AI implementation is pedagogically sound, ethically guided, and accessible to all learners, thereby bridging the gap between technological potential and equitable educational practice.

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