

Transforming English Speaking Instruction Through Digital Technology Integration: A Systematic Literature Review

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Abstract

Speaking is one of the most challenging language skills for English as a foreign language (EFL) learners to master, while advances in digital technology have created new opportunities to address this challenge. This study aimed to identify the types of digital technologies used in English speaking instruction, analyze their effectiveness, and describe the challenges associated with their implementation. This study employed a Systematic Literature Review (SLR) method following the PRISMA 2020 protocol. Searches were conducted in the Google Scholar and ERIC databases, covering articles published between 2021 and 2026. Ten articles were selected for analysis using content analysis. The findings showed that the digital technologies applied were categorized into five groups: mobile-assisted language learning, short-video social media platforms, synchronous computer-mediated communication, artificial intelligence (AI), and immersive technologies. Among the ten reviewed articles, seven reported positive effects on speaking fluency, vocabulary use, self-confidence, and motivation; however, improvements in pronunciation and speaking anxiety were not consistently observed. The main challenges identified included technical issues, the need for user training, limited personalization of technological feedback, and students' preference for direct interaction. These findings indicate that technology selection should be aligned with specific learning objectives while maintaining the essential role of human interaction in language learning.

INTRODUCTION

Speaking is one of the four essential language skills in English learning, as it serves as a primary indicator of successful oral communication (Richards, 2018). In English as a foreign language (EFL) learning contexts, particularly in Indonesia, speaking has been widely documented as one of the most difficult skills for students to master. This finding is consistent with Abrar et al. (2022), who stated that speaking is among the most challenging skills in language learning, especially in EFL contexts. Common difficulties include a lack of self-confidence, speaking anxiety, limited vocabulary and grammatical competence, insufficient opportunities to practice speaking inside and outside the classroom, and learning environments that do not yet encourage active English use.

The findings of Meliyani et al. (2022) showed that speaking anxiety among Indonesian EFL students was triggered by factors originating from both teachers and learners, including negative self-perception and low self-confidence. Furthermore, a meta-synthesis conducted by Mustamir (2024) confirmed that speaking anxiety remains a

widespread issue among Indonesian EFL learners. In addition, traditional and teacher-centered instructional approaches often result in students becoming passive and less engaged in speaking activities. Although these challenges are particularly evident in Indonesian EFL contexts, empirical evidence suggests that speaking difficulties and instructional barriers are global phenomena experienced by EFL learners across various countries and educational settings (Derakhshan et al., 2016). Therefore, exploring solutions from a broader international perspective is essential to identify effective pedagogical frameworks.

On the other hand, the rapid advancement of digital technology has brought significant changes to education, including English language learning. Haleem et al. (2022) stated that digital technology has introduced a paradigm shift throughout education systems, and the COVID-19 pandemic further accelerated its integration into learning processes. Various digital platforms and applications, such as mobile-assisted language learning (MALL), artificial intelligence (AI)-based applications, video conferencing tools, podcasts, social media platforms, virtual reality (VR), and digital games, provide more interactive, flexible, and engaging learning opportunities that align with the principles of technology-enhanced language learning (TELL) frameworks (Stockwell, 2022).

The research conducted by Aliakbari and Mardani (2022) demonstrated that students who participated in mobile learning classes showed greater improvement in speaking skills and higher motivation to engage in learning activities compared with students in conventional face-to-face classes. Meanwhile, AI-based chatbots have also shown potential benefits by providing personalized learning experiences, ease of use, and immediate feedback for language learners (Huang et al., 2022). These tools can function as conversation partners that provide opportunities for authentic speaking practice (Jeon et al., 2023). Such technologies enable students to practice speaking anytime and anywhere, receive immediate feedback, and learn in a less stressful environment compared with speaking directly in front of the classroom (Zou et al., 2023).

These developments have encouraged researchers worldwide to investigate the use of digital technology in speaking instruction from various perspectives. However, although extensive research has been conducted on this topic, findings remain dispersed across international journals with diverse contexts, educational levels, and technological applications. As Rajendran and Yunus (2021) noted, studies that systematically examine the use of technology specifically for speaking skills remain limited compared with the growing number of individual empirical studies. These diverse findings have not been sufficiently synthesized and examined systematically, making it difficult for teachers and researchers to obtain a comprehensive understanding of the field. Therefore, a systematic literature review following standardized, rigorous, and transparent procedures (Gough et al., 2017; Page et al., 2021) is required to synthesize findings from previous studies and provide a comprehensive, cross-contextual overview of digital technology integration in English speaking instruction.

Based on the background described above, this study addressed the following research questions: (1) What types of digital technology are used in English speaking instruction? (2) How effective is the use of digital technology in improving students' English speaking skills? and (3) What challenges or obstacles arise in the implementation

of digital technology in English speaking instruction? Accordingly, this study aimed to identify the types of digital technologies used in English speaking instruction, analyze their effectiveness in improving students' speaking skills, and describe the challenges associated with their implementation.

This study is expected to provide both theoretical and practical contributions. Theoretically, it contributes to the development of knowledge in English language teaching, particularly regarding the integration of digital technology to support speaking skills, and may serve as a reference for future researchers investigating similar topics. Practically, the findings may assist English teachers and lecturers in selecting effective and appropriate digital technologies for speaking instruction, provide insights for policymakers in designing educational digitalization programs, and help students identify independent learning resources to improve their English speaking abilities.

The novelty of this study lies in three aspects. First, this study specifically focuses on speaking skills, whereas many previous reviews have examined technology integration in English language teaching more generally without emphasizing a particular language skill. Second, this study analyzes various categories of digital technology within a single comprehensive framework, including mobile applications, social media platforms, and emerging AI-based innovations, thereby providing a broader synthesis than studies focusing on a single technology type, such as the review by Rajendran and Yunus (2021), which focused on MALL, or the review by Jeon et al. (2023), which examined speech-recognition chatbots. Finally, this study not only classifies technologies and evaluates their effectiveness but also explores implementation challenges across different national contexts, providing broader and more practical recommendations for English speaking instruction.

METHOD

This study employed the Systematic Literature Review (SLR) method to identify, evaluate, and synthesize research findings relevant to the research questions through systematic and replicable procedures (Kitchenham & Pfleeger, 2008). The article search and selection process followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidelines proposed by Page et al. (2021), consisting of four stages: identification, screening, eligibility assessment, and inclusion.

During the identification stage, article searches were conducted using two academic databases: ERIC (Education Resources Information Center) and Google Scholar. The search strategy employed combinations of keywords, including "digital technology", "technology-enhanced language learning", "mobile-assisted language learning", "artificial intelligence", "speaking skill", "speaking ability", "oral proficiency", and "EFL", combined using Boolean operators AND and OR (e.g., "digital technology" AND "speaking skill" AND "EFL"). Indonesian keywords, such as "teknologi digital", "pembelajaran speaking", and "keterampilan berbicara bahasa Inggris", were also used to identify relevant national publications.

During the screening stage, identified articles were reviewed to remove duplicates, and titles and abstracts were assessed according to the predetermined inclusion and exclusion criteria presented in Table 1. Articles that met the initial criteria were further

evaluated through full-text assessment to determine their relevance to the research questions, including the types of digital technology used, their effectiveness in improving speaking skills, and the challenges associated with their implementation.

Table 1. Inclusion and Exclusion Criteria

Inclusion Criteria	Exclusion Criteria
Articles published between 2021 and 2026	Articles published before 2021
Peer-reviewed journal articles	Books, book chapters, conference proceedings, undergraduate/master's/doctoral theses, and opinion pieces
Discussing the use of digital technology in English speaking instruction	Discussing other language skills (listening, reading, writing) without any connection to speaking
Empirical research (experimental, quasi-experimental, mixed-method, or qualitative)	Conceptual papers or literature reviews without empirical data
Written in English or Indonesian	Written in languages other than English or Indonesian
Full text is accessible	Only the abstract is available, or the full text is behind an inaccessible paywall

Articles that met all the criteria were then designated as the final research sample and analyzed using qualitative content analysis framework (Srnka & Koeszegi, 2007). Data from each article were extracted into a table containing information on the author names and publication year, the country or research context, the participants' educational level, the type of digital technology used, the research design, the main findings on effectiveness, and the reported challenges. The extraction results were then synthesized thematically to answer the three research questions. To maintain the validity of the selection and analysis process, article assessment was carried out iteratively, and the results at each PRISMA stage were documented in a flow diagram.

RESULTS AND DISCUSSION

Article Selection Results

Article searches were conducted in the Google Scholar and ERIC databases using the keyword combinations specified in the method section, limited to publications from 2021 to 2026. The initial search yielded 340 articles. After 45 duplicate articles were removed and 260 articles were eliminated at the title and abstract screening stage for not meeting the inclusion criteria, 35 articles were assessed for eligibility through full-text reading. This process resulted in 10 articles that met all the criteria and were designated as the final sample of this review. The complete selection process is presented in the PRISMA flow diagram (Table 2).

Table 1. PRISMA 2020 Flow Diagram for the Systematic Review

Prisma Stage	Identification	Screening	Eligibility	Included
Literature Selection Process & Number Of	Records Identified From Databases (Google Scholar & Eric):	Duplicate Records Removed: N = 45 Records Screened	Full-Text Articles Assessed For Eligibility: N = 35 Full-Text Articles	Studies Included In The Systematic

Prisma Stage	Identification	Screening	Eligibility	Included
Articles (N)	N = 340	Based On Title And Abstract: N = 295 Records Excluded For Not Meeting Basic Inclusion Criteria: N = 260	Excluded With Specific Reasons: N = 25 <i>Reasons For Exclusion:</i> • Lack Of Empirical Data (N=12) • Restricted Paywall Access (N=8) • Focused On Non-Speaking Skills (N=5)	Literature Review: N = 10

Table 3. Data Extraction Results of the Reviewed Articles

No.	Author(s) (Year)	Country	Technology	Design	Main Findings
1	Zaitun et al., (2021)	Indonesia	Social media (TikTok)	Classroom research	TikTok improved secondary school students' speaking skills and self-confidence
2	Durán-Bautista & Huertas-Malagón, (2021)	Colombia	Mobile phones (oral practice & note-taking)	Mixed-method	Mobile phone-assisted practice supported university students' foreign language oral production
3	Chen & Chew (2021)	China	Synchronous voice chat (WeChat)	Mixed-method (40 students, 4 weeks)	Speaking performance (pronunciation, grammar, vocabulary, fluency, comprehension) was better in online voice chat than face-to-face; anxiety was slightly higher face-to-face; yet students still preferred face-to-face interaction
4	Aliakbari & Mardani (2022)	Iran	MALL (WhatsApp class)	Experimental (60 students)	The mobile learning group outperformed the face-to-face class in speaking, with higher motivation and satisfaction
5	Cakmak (2022)	Turkey	AI chatbot (Replika)	Mixed-method (89 students, 12 weeks)	Speaking performance with the chatbot was better than peer interaction, but speaking anxiety was not reduced and students' attitudes tended to be negative
6	Sally Wu & Alan Hung (2022)	Taiwan	Virtual reality (CoSpaces)	Experimental (56 elementary students)	VR improved the grammatical and lexical aspects of speaking performance but did not improve pronunciation
7	Zou et al. (2023)	China	AI (automatic speech evaluation)	Mixed-method	AI-based automatic feedback helped learners develop their speaking skills independently
8	Tsai (2023)	Taiwan	Mobile AR + automatic speech recognition (ASR)	Quasi experimental	AR- and ASR-based materials were effective for the listening and speaking skills of non English major students
9	Gao et al., (2023)	Taiwan	Social media (TikTok)	Experimental	TikTok developed vocational students' learning motivation and oral proficiency

No.	Author(s) (Year)	Country	Technology	Design	Main Findings
10	Ironsi (2023)	Northern Cyprus	Virtual reality	Mixed-method (85 participants)	VR did not improve speaking skills; students found it enjoyable but challenging; usage difficulties, distraction, and training needs were reported

Types of Digital Technology Used in Speaking Instruction

Based on the data extraction results, the digital technologies used in speaking instruction can be grouped into five categories. First, mobile-assisted language learning, which includes the use of WhatsApp classes (Aliakbari & Mardani, 2022) and mobile phone-assisted oral practice and note-taking (Durán-Bautista & Huertas-Malagón, 2021). Second, short-video based social media, particularly TikTok, which was studied at the secondary school level in Indonesia (Zaitun et al., 2021) and in vocational education in Taiwan (Gao et al., 2023). Third, synchronous computer-mediated communication in the form of online voice chat through instant messaging applications (Chen & Chew, 2021). Fourth, artificial intelligence-based technology, which includes conversational chatbots (Cakmak, 2022) and automatic speech evaluation programs with immediate feedback (Zou et al., 2023). Fifth, immersive technology, which includes virtual reality (Ironsi, 2023; Sally Wu & Alan Hung, 2022) and the combination of mobile augmented reality with automatic speech recognition (Tsai, 2023).

This distribution reveals an interesting shift in the research landscape: whereas the review by Rajendran and Yunus (2021) was still dominated by conventional mobile applications, the findings of this review confirm the trend identified by Jeon et al. (2023) that artificial intelligence-based and immersive technologies have increasingly taken on an important role in speaking instruction in recent years. This shift reflects broader trends in educational technology where static tools are replaced by adaptive learning environments (Chassignol et al., 2018).

The Effectiveness of Digital Technology on Speaking Skills

Of the ten articles analyzed, seven articles (70%) reported consistently positive impacts, two articles (20%) reported mixed findings, and one article (10%) reported no improvement. In the positive findings group, Aliakbari and Mardani (2022) experimentally proved that students in mobile learning classes outperformed those in face-to-face classes while also showing higher motivation; Chen and Chew (2021) found that students' speaking performance in five aspects at once — pronunciation, grammar, vocabulary, fluency, and comprehension — was better in online voice chat than face-to-face, which was related to lower anxiety levels in the online mode; TikTok was proven to improve students' speaking skills and self-confidence (Zaitun et al., 2021) as well as motivation and oral proficiency (Gao et al., 2023); meanwhile, artificial intelligence-based automatic feedback (Zou et al., 2023), mobile phone-assisted oral practice (Durán-Bautista & Huertas-Malagón, 2021), and augmented reality materials with speech recognition (Tsai, 2023) also proved to support the development of speaking skills. These findings reinforce the synthesis of Huang et al., (2022) that the main advantages of digital technology lie in personalization, flexibility of practice time, and immediate feedback.

Nevertheless, the mixed and negative findings in three articles provide important

caveats. Sally Wu and Alan Hung (2022) found that virtual reality only improved the grammatical and lexical aspects but did not improve the pronunciation of elementary school students. (Cakmak, 2022) reported an interesting paradox: the speaking performance of students who practiced with the Replika chatbot was indeed better than that of those who practiced with peers, but their speaking anxiety did not decrease — in fact, it tended to increase — and their attitudes toward the chatbot tended to be negative. Furthermore, (Ironsi, 2023) found that virtual reality did not improve speaking skills at all, even though students found the experience enjoyable.

The stagnation of pronunciation improvement in these studies warrants a deeper pedagogical examination through cognitive lens. In immersive environments like Virtual Reality (VR), learners are often cognitively overwhelmed by visual stimuli and task navigation, a phenomenon linked to high cognitive load, which diverts their focus away from phonetic precision (Sweller, 2011). Furthermore, the reliance on Automatic Speech Recognition (ASR) and AI conversational bots introduces a technological limitation. While these tools excel at semantic and lexical processing, their algorithmic feedback mechanisms frequently fail to capture the subtle nuances of human articulation, native-like intonation, and phonological stress (Levis, 2005). Consequently, if an AI or VR system operates on a high tolerance for non-native accents to maintain interaction flow, it inadvertently reinforces fossilized pronunciation errors rather than correcting them. This underscores the reality that digital technology, in its current state, cannot entirely replicate the immediate, adaptive phonetic scaffolding provided by a proficient human instructor. Therefore, claims about the effectiveness of technology need to be read more carefully and specifically.

Challenges in the Use of Digital Technology

The reviewed articles reveal at least four main challenges. First, technical challenges and user readiness, which include difficulties operating devices, distraction during learning, and the need for training before use, as reported in the implementation of virtual reality (Ironsi, 2023). Second, the limited quality of technological interaction, particularly chatbot feedback that is impersonal and not yet able to imitate human empathy, which can actually trigger learner anxiety (Cakmak, 2022). Third, the gap between effectiveness and user preference: Chen and Chew (2021) found that although students' performance was better in online voice chat, the majority of students still preferred face-to-face interaction because it was considered more practical. Fourth, uneven impacts on certain skill aspects, such as pronunciation, which did not improve in virtual reality-based learning (Sally Wu & Alan Hung, 2022).

These findings confirm that technology is not a stand-alone solution; its effectiveness depends heavily on user readiness, the accompanying pedagogical design, and the suitability of the technology for the targeted skill aspect, in line with the assertion of Haleem et al. (2022) that successful technology integration requires the readiness of all components of the learning system. This challenge resonates with the Technology Acceptance Model (TAM), which argues that perceived usefulness and perceived ease of use are major determinants of technology adoption (Davis, 1989).

Synthesis and Implications

Overall, this review produces three main conclusions. First, the landscape of digital technology for speaking instruction has developed from the dominance of mobile

applications toward a diversity that includes social media, artificial intelligence, and immersive technology. Second, the majority of empirical evidence (70%) supports the effectiveness of digital technology in improving speaking skills, especially in the aspects of fluency, self-confidence, and motivation; however, the evidence is not uniform, as the aspects of pronunciation and speaking anxiety do not always improve. Third, implementation challenges stem more from human factors and learning design than from the technology itself.

For teachers and lecturers, these findings imply the importance of selecting technology according to specific objectives: social media for building self-confidence and speaking habits, mobile applications for expanding practice time, and artificial intelligence for individual feedback — while maintaining human interaction, which cannot be replaced by technology. For policymakers, these results emphasize the urgency of digital literacy training for educators before the widespread adoption of technology (Seenivasan, 2024). This review is limited by the number of articles and databases used, so future research is recommended to expand the database coverage and to specifically examine the primary and secondary education contexts, which remain underrepresented.

CONCLUSION

Based on a systematic analysis of ten studies published between 2021 and 2026, three conclusions were drawn in response to the research questions of this study. First, the digital technologies used in English speaking instruction were categorized into five groups: mobile-assisted language learning, short-video social media platforms, synchronous computer-mediated communication, artificial intelligence (AI)-based technologies, and immersive technologies, including virtual reality and augmented reality. The research mapping indicated a shift from the initial dominance of traditional mobile applications toward the increasing adoption of AI and immersive technologies in recent years.

Second, most empirical evidence (seven of the ten studies) demonstrated that digital technology effectively improved students' speaking skills, particularly in terms of fluency, vocabulary, grammar, self-confidence, and learning motivation. However, this effectiveness was not consistently observed across all aspects of speaking ability. Pronunciation improvement was not always evident, and speaking anxiety did not necessarily decrease even when students' speaking performance improved. Therefore, digital technology has demonstrated significant potential as a learning support tool but should not be considered a universal solution for all dimensions of speaking skills.

Third, the main challenges in implementing digital technology were associated more with human factors and instructional arrangements than with the technology itself. These challenges included technical issues and users' training needs, limited personalization of technological feedback, differences between technological effectiveness and students' preference for direct interaction, and uneven impacts on specific language skills. These findings are consistent with established literature on educational technology integration, which emphasizes that pedagogy should guide technology use rather than technology determining pedagogical practices (Fullan, 2013).

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