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Leveraging Technology for Reading Development in ESL Primary Education: A Systematic Review

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Abstract

This systematic literature review explores the integration of technology to enhance reading skills in ESL primary education. A comprehensive analysis of 16 studies published between 2015 and 2024 reveals the diverse types of technologies employed, their impact on reading skills, students' perceptions, and associated implications. The review identifies Augmented Reality (AR), multimedia learning platforms, digital storytelling applications, and various digital learning environments as prominent technologies used to support reading instruction. Findings indicate that these technologies significantly improve students' reading comprehension, vocabulary acquisition, and engagement in reading activities. Teachers and students perceive technology positively, noting increased motivation and interactive learning experiences. However, challenges such as technical issues and the need for professional development are also identified. Practical implications include the importance of adequate infrastructure, teacher training, and curricular integration of digital tools. Research implications highlight the need for further exploration of emerging technologies, longitudinal studies to assess sustained impacts, and comparative research between digital and traditional methods. This review underscores the transformative potential of technology in ESL primary education, offering insights for educators, policymakers, and researchers aiming to enhance literacy outcomes through innovative technological integration.

Keywords: ESL Education, Reading Skills, Technology Integration, Systematic Review, Pedagogical Approaches

Introduction

Sustainable Development Goal 4 (SDG 4) aims to ensure inclusive and equitable quality education, promoting lifelong learning opportunities for all. A core target is eliminating education disparities and ensuring equal access across all levels for vulnerable populations, including minorities and those in poverty. English as a Second Language (ESL) education significantly supports these goals by providing essential language skills crucial for global participation. ESL education directly contributes by removing language barriers that hinder quality education access.

Proficiency in English opens doors to higher education, better employment opportunities, and broader access to information, aligning with SDG 4's objectives. ESL education equips individuals with lifelong language skills necessary for continuous learning and professional development in today's globalized economy. It fosters adaptability and a culture of learning essential for thriving in diverse environments. In multilingual societies, ESL programs play a pivotal role in supporting children from non-dominant language backgrounds, enabling academic and social success in mainstream education. Well-implemented ESL programs have shown significant improvements in educational outcomes for these students (Menken & Solorza, 2020).

ESL primary education is critical globally, aiming to impart essential English language skills where English holds significant academic and professional value. The curriculum emphasizes listening, speaking, reading, and writing skills alongside cultural awareness, technology integration, and critical thinking (Grabe & Stoller, 2019). Reading proficiency is crucial in ESL primary education, compounded by the challenge of learning a new language. Integrating technology has emerged as a promising approach to support ESL learners' reading development. Adaptive digital tools provide personalized learning experiences tailored to individual proficiency levels and learning paces, enhancing engagement and addressing diverse needs (Reinders & Benson, 2021).

Digital resources such as e-books, audiobooks, and interactive story apps enrich reading experiences by combining text with multimedia elements, improving comprehension and encouraging frequent practice (Graham & Harris, 2021). These tools also provide instant feedback and enable teachers to monitor progress closely, enhancing learning outcomes through tailored instruction (Hockly & Dudeney, 2019). Furthermore, digital platforms offer collaborative learning environments that foster interaction, communication, and critical thinking skills among ESL students (Dooly & Sadler, 2020). These approaches not only support comprehensive reading development but also enrich cultural understanding and vocabulary acquisition within context (Gibbons, 2020; Nation, 2020).

With that said, this review aims to explore the digital tools used in ESL primary classrooms for teaching reading and assess their documented benefits on students' reading development, including their perceptions and feedback on technology-infused learning. Therefore, the research objectives are:

1. To identify types of technology used in ESL primary classrooms.
2. To evaluate the impact of technology on ESL primary students' reading performance.
3. To analyse students' perspectives and feedback on using technology in reading lessons.

By addressing these objectives, the review seeks to provide insights that can inform educational practices and policies, ultimately enhancing learning experiences and outcomes for ESL students. To achieve this, the review will address the following research questions:

1. What types of technology are used in ESL primary classrooms to teach reading?
2. How does technology influence the reading performance of primary school ESL students?
3. What are students' perspectives and feedback on using technology in reading lessons?

Literature Review

Technology in ESL Primary Classroom

Technology has transformed education, offering innovative tools that enhance teaching and learning processes. In ESL education, technology provides unique opportunities to create interactive and engaging learning environments. Digital tools such as interactive whiteboards, educational software, e-books, and language learning applications cater to individual learning needs, facilitate differentiated instruction, and maintain high levels of student engagement. The integration of technology has revolutionized traditional teaching methods, offering new avenues to enhance learning experiences and outcomes. In ESL primary classrooms, technology plays a crucial role in fostering reading development, addressing phonemic awareness, vocabulary, fluency, and comprehension. While traditional methods are foundational, they often lack the engagement and interactivity needed to cater to diverse learning paces. Technology offers personalized, interactive, and engaging learning experiences that bridge these gaps (Frontiers, 2023).

During the COVID-19 pandemic, technology became indispensable in ESL education, particularly in maintaining continuity amidst school closures. Platforms like Zoom, Google Classroom, and educational apps enabled remote learning and provided interactive resources such as multimedia-rich virtual storybooks and real-time feedback. These tools not only supported ESL students but also highlighted disparities in technology access, prompting efforts to address these inequalities (OECD, 2021). In Malaysia for example, the pandemic accelerated the adoption of technology in ESL reading lessons. Platforms like Google Classroom, Zoom, Frog VLE, and DELIMa facilitated interactive and multimedia-enhanced reading instruction, contributing to improved engagement and comprehension among students (Yunus, Hashim, & Embi, 2021). Government initiatives to distribute devices and improve internet access have been pivotal in reducing the digital divide and supporting equitable online learning (Azlan et al., 2020).

Positive Impacts of Using Technological Tools in Teaching Reading

Numerous studies demonstrate the positive impact of digital tools on reading comprehension and language acquisition. For example, research has shown that adaptive learning platforms like Lexia Core5, which tailor exercises based on individual student performance, significantly improve reading proficiency among ESL learners (Mehring, 2016; Fulgueras & Bautista, 2020). These platforms provide immediate feedback, track progress, and adjust learning paths, thereby enhancing engagement and motivation (Jia et al., 2023).Flipped classroom models, where instructional content is delivered online and class time is used for active learning and discussion, have also been effective. Studies indicate that this approach not only improves reading skills but also fosters collaborative learning and critical thinking abilities among ESL students (Fulgueras & Bautista, 2020; Samiei & Ebadi, 2021). By shifting the focus from teacher-centered to student-centered learning, flipped classrooms empower learners to take ownership of their education and explore reading materials independently.

Moreover, specific applications such as the Cloze distance rehabilitation program have been successful in enhancing reading comprehension through inference-making activities. This program allows for personalized training sessions, enabling students to practice reading skills in a home environment under remote supervision, thereby increasing the frequency and efficacy of intervention (Frontiers, 2023).

Challenges in Integrating Technology in ESL Classroom

Integrating technology into ESL reading instruction encounters significant challenges globally and within Malaysia. The digital divide persists as a formidable barrier, particularly in countries with limited infrastructure, affecting the efficacy of technology-based educational programs (UNESCO, 2020). In Malaysia, despite ongoing efforts to improve connectivity, rural areas continue to struggle with internet access, posing challenges for effective online learning initiatives (Hashim, Tan, & Rashid, 2021). Furthermore, comprehensive teacher training is essential for utilizing digital tools proficiently to maximize educational benefits for ESL students, highlighting the need for ongoing professional development (Yunus et al., 2021).

Infrastructure limitations further complicate the integration of technology in ESL reading classrooms. Regions with outdated hardware or unreliable internet services face difficulties in seamlessly incorporating digital tools into daily instructional practices (Hashim, Tan, & Rashid, 2021). These constraints hinder equitable access to technology-enhanced learning experiences, impacting educational outcomes for ESL learners. Effective integration of technology also hinges on educators' digital literacy skills. Many teachers and students encounter challenges in acquiring the necessary proficiency to navigate and utilize complex educational software effectively (OECD, 2020). Insufficient digital skills among educators can impede the implementation of technology-driven reading programs, limiting their potential to enhance ESL reading instruction.

Moreover, while technology offers opportunities to enhance engagement through interactive and multimedia-rich content, maintaining student motivation remains a critical concern. Over-reliance on technology or inadequate instructional design can lead to distractions and reduced engagement levels among ESL students (Kim et al., 2017; Zarrinabadi & Ebrahimi, 2018). Effective strategies for integrating technology in ESL reading instruction must carefully balance digital tools with pedagogical approaches that foster meaningful and interactive learning experiences.

In conclusion, addressing these challenges is essential for leveraging technology to its fullest potential in ESL reading classrooms. By bridging the digital divide, improving infrastructure, enhancing teacher training, fostering digital literacy, and promoting effective engagement strategies, educators and policymakers can create supportive environments that optimize technology-enhanced learning for ESL students. These efforts are crucial for advancing educational equity and improving outcomes in ESL reading instruction worldwide.

Methods

A comprehensive search was conducted across several academic databases, including Google Scholar, ERIC, Scopus, and Web of Science, to identify relevant literature on the use of technology in ESL primary classrooms for reading development. The search terms included combinations of "ESL", "primary education", "reading development", "technology integration", and "digital tools". This systematic literature review aims to comprehensively investigate the effectiveness of technological interventions in ESL (English as a Second Language) primary school reading instruction. The primary objective is to analyze the existing research and identify key factors influencing the success of these interventions. The review process consists of three stages: (1) planning the review, (2) conducting the review, and (3) reporting and dissemination.

During the planning stage, the research objective, search strategy, inclusion and exclusion criteria, and data extraction process will be established. The search strategy will involve querying academic databases including PubMed, Google Scholar, ERIC, and Scopus using keywords such as "ESL", "English as a Second Language", "reading instruction", "technology", "digital tools", "interventions", "effectiveness", and "impact" combined with Boolean operators. The search was limited to studies published between 2015 to 2024 and conducted in primary ESL classrooms or with a focus on primary ESL students. Only interventions involving technology for reading instruction will be considered. Non-English studies, those not focused on ESL primary classrooms, and those not addressing technology use in reading instruction will be excluded.

Table 1
The Procedure for Selecting Studies for the Review Based on Inclusion and Exclusion

Article Search Strategy	
Inclusion	**Exclusion**
i. Study Type: Peer-reviewed journal articles, empirical studies, systematic reviews, and meta-analyses. ii. Language: Published in English. iii. Population: Primary school students (ages 5-12) learning English as a second language (ESL). iv. Intervention: Use of technology (digital tools, software, educational applications, e-books, interactive whiteboards) for teaching reading skills. v. Outcomes: Reports on reading development outcomes (e.g., reading comprehension, vocabulary acquisition, reading fluency). vi. Publication Date: Published from 2015 to 2024. vii. Setting: Conducted in primary school educational settings.	i. Study Type: Non-peer-reviewed articles, opinion pieces, editorials, book chapters, conference abstracts, dissertations, and theses. ii. Language: Published in languages other than English. iii. Population: Secondary or higher education students, non-ESL learners. iv. Intervention: Non-technological interventions, studies focusing on non-reading skills (e.g., writing, speaking). v. Outcomes: Does not report specific reading development outcomes. vi. Publication Date: Published before 2015. vii. Setting: Non-educational settings, studies focusing on adult learners or non-primary educational contexts.

During the screening phase, reviewers evaluated titles and abstracts for eligibility, resolving any discrepancies through discussion or consultation with a third reviewer. Selected studies underwent full-text assessment, during which relevant data were extracted using a standardized form. Methodological quality was evaluated based on appropriate criteria for each study design, with any differences resolved through discussion.

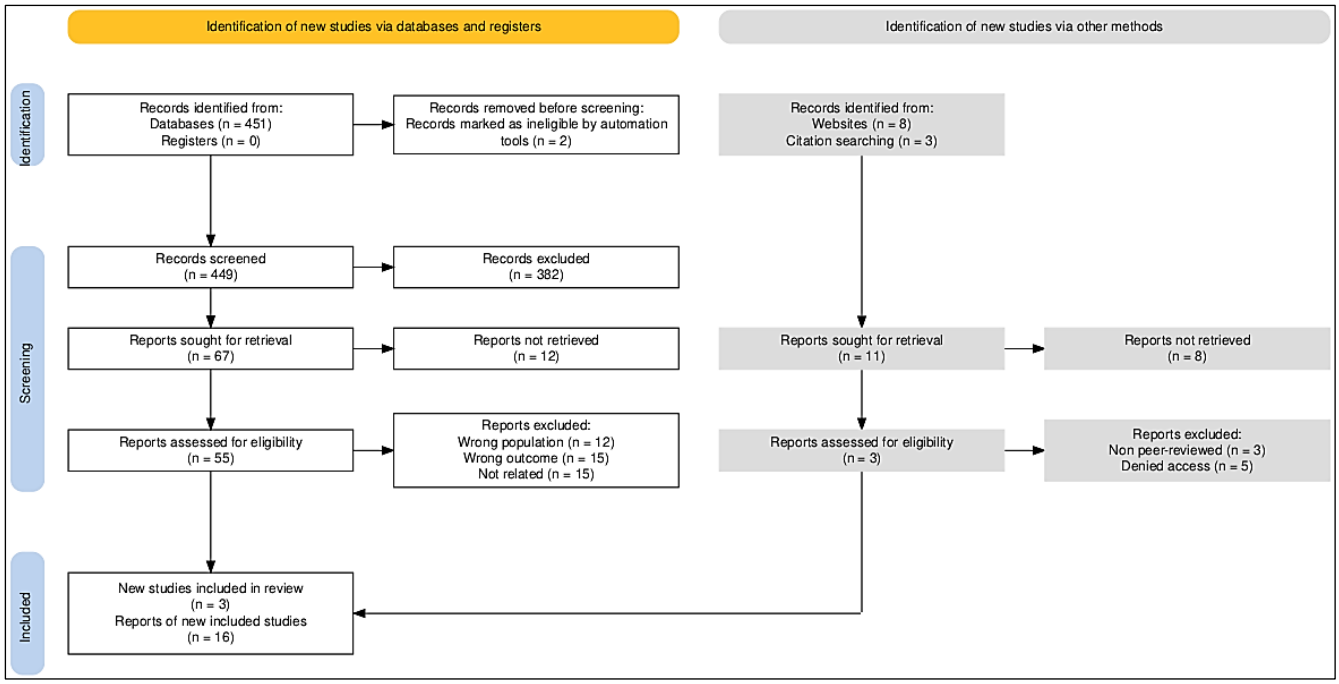

Figure 1 PRISMA Flow Diagram

During the reporting and dissemination stage, findings from the included studies were synthesized narratively, with the possibility of conducting meta-analysis where applicable. Assessment of publication bias and other sources of bias was carried out, adhering to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. Limitations, including language and publication biases, were duly acknowledged. The review results were disseminated through publication in a peer-reviewed journal and presentation at pertinent conferences.

Findings

Sixteen articles meeting the selection criteria were identified for inclusion in this literature review. These articles employed rigorous research methodologies and underwent peer-review. A summary of their findings is presented in Table 2.

Table 2
Summary of Findings

No.	Author/Year	Research Design	Aims of study	Participants	Technology applied	Result
1.	(Nasongkhla & Sujiva, 2023)	Design-based Research (R&D)	The study aims to develop an AR platform to improve reading skills and evaluate its effectiveness.	32 third-grade students from central and north-eastern Thailand	Augmented Reality (AR)	A statistically significant improvement in students' reading aloud and comprehension skills after using the AR-reading platform.
2.	Abdul Samat & Abdul Aziz,2020)	Action Research	Investigate the effectiveness of multimedia learning in helping indigenous pupils learn comprehension.	20 indigenous pupils in a primary school in Kluang, Malaysia,	Multimedia Learning	-Significant increase in pupils' comprehension skills after the intervention. -Pupils felt more comfortable and were able to associate information better using multimedia.
3.	(Pragasam & Sulaiman, 2023)	Survey Research Design	The research aims to investigate the pupils' attitudes towards technology use in language learning and its impact on improving reading skills	70 Year 6 primary school pupils in Malaysia	Television, Smartboard, and Liquid Crystal Display (LCD) Youtube, Whatsapp, and Telegram Frog Virtual Learning Environment (Frog VLE) and DidikTV educational videos and online games,	-Pupils have positive perceptions towards the integration of technology in reading classrooms. -Pupils expressed confidence and a strong intention to use technology in reading classrooms, underscoring the potential

						of technology to enhance language learning experiences.
4.	Baharuddin & Hashim (2020)	survey and interview session	The research explores the strengths and shortcomings of using digital reading in ESL lessons for Malaysian primary school students.	30 Level 2 pupils from a primary school in a state in Malaysia	digital reading tools and materials	-Most students enjoyed using digital reading as it made the lessons more interesting and interactive. -They were able to utilize features like online dictionaries to improve their reading skills.
5.	Amelia & Abidin(2018)	Qualitative case study	To investigates the impact of using a tablet-based digital storytelling application on English language learning among young ESL (English as a Second Language) learners in Malaysia.	Six Primary Five students	Digital story telling	-Digital storytelling application has a positive effect on the learners' English language skills, including listening, reading, speaking, and writing. -The application's multimedia elements, such as voiceover narration, animations, and interactive glosses, created an engaging learning environment that

						motivated students to learn. -Learners reported improvements in vocabulary retention and the application of language skills in various contexts.
6.	Alneyadi, Abulibdeh, & Wardat (2023)	Quasi-experimental design.	To determine the extent to which fourth-grade students are able to develop their reading comprehension and creative writing abilities.	120 students of fourth-grade students in the United Arab Emirates (UAE)	digital learning platforms, which include: -Microsoft Teams -Learning Management System (LMS) -Nahla and Nahil platform	-Digital learning environments significantly improve students' reading and writing abilities compared to traditional methods. -The digital platforms facilitated better engagement and interaction, leading to enhanced literacy skills.
7	(Haleman & Yamat, 2021)	Mixed method	To determine the level of acceptance towards e-learning	100 ESL primary school students, aged between 10 to 12 years old, from a national school in Sibu, Sarawak, Malaysia.	e-learning WhatsApp, Telegram, Google Classroom, Google Meet, and YouTube.	-The key findings indicate a high level of acceptance towards e-learning among the ESL primary school students, with positive perceptions towards the usefulness, ease of use, attitudes

						towards using, and behavioral intention to use e-learning. -The students demonstrated positive attitudes and intentions towards using e-learning for learning English, indicating a favourable view of e-learning as a suitable approach during the pandemic.
8	Feng Teng (2019)	Quasi-experimental	To investigate the effects of captioned videos on ESL primary school students' comprehension of video content.	182 primary school students	Two short English story videos	-Findings revealed that fully captioned group achieved the best results on the global comprehension questions. Significant differences between the fully captioned and keyword captioned videos on the detailed comprehension questions were not detected. - Learners with a higher level of English proficiency and those who watched the video for a second time achieved

						better comprehension scores
9.	Lee & Yunus (2020)	Action Research, interviews and questionnaires	to examine the effectiveness of using Seesaw, an online application, to increase the interest of reading for Year 3(9-year-old) ESL pupils.	30 Year 3 English as a Second Language (ESL) pupils in Selangor, Malaysia	Seesaw, a digital portfolio platform	-The findings revealed a positive impact of Seesaw on students' reading interest, suggesting that the platform's features, such as peer and teacher feedback, motivated students to engage more with reading tasks.
10.	Yunus et al. (2020)	Mixed method triangulation design	To enhance the repertoire of vocabulary and reading motivation among primary pupils	56 students from three schools in Song and Mukah districts.	Voca-Lens, which leverages Google Lens technology.	-The study's findings indicate that Voca-Lens, which leverages Google Lens technology for educational purposes, significantly improves students' vocabulary repertoire and reading motivation. -Qualitative data from the questionnaires and interviews reveal a positive attitude towards learning with Voca-Lens, as

						it offers a fun and user-friendly interface that caters to their digital-native learning preferences.
11	Indriani & Suteja (2023)	Qualitative methods	To reveal the opportunities and challenges in fostering a child's reading interest through digital storytelling.	Six pre-service teachers and fifteen young learners aged 5-8	Digital storytelling	-The findings suggest that digital storytelling can effectively engage children with learning materials, provided there is optimal support from adults. -The study highlights the importance of interactions between children and caregivers, as children tend to imitate adult behaviour.
12	Karimova et al. (2023)	Quasi-experimental design	To examine the effects of digital storytelling on English vocabulary and grammar knowledge and attitudes towards the course.	70 fifth-grade students	Digital storytelling	-The research identifies that students exposed to digital storytelling activities demonstrate significantly higher levels of vocabulary and grammar knowledge, as well as more positive attitudes towards the English

						language course, compared to those taught through traditional methods.
13	Baharuddin & Hashim (2020)	Mixed-method approach, including a survey and semi-structured	To identify the strengths and the shortcomings of digital reading .	30 Level 2 primary pupils, 10 of whom were interviewed	Digital reading, defined as reading text on a display screen	Findings revealed that ESL learners enjoy digital reading due to its usefulness and interesting content, despite limitations like lack of facilities and the need for IT skills. -Digital reading promotes multitasking and provides adjustable features, enhancing the learning experience. –However, it also presents challenges such as difficulty in comprehending text and potential distractions.
14	Pragasam & Sulaiman (2023)	A questionnaire adapted from the Technology Acceptance Model (TAM)	To investigate pupils' perceptions of technology use in ESL (English as a second language) reading classrooms	70 Year 6 primary school pupils in a semi-urban school in Pahang, Malaysia,	Television Smartboard Liquid Crystal Display (LCD) Youtube Whatsapp Telegram	-The findings show that pupils have positive perceptions of technology integration in terms of perceived usefulness,

						ease of use, attitude towards technology use, and behavioral intention to use technology. -They believe that technology improves their reading skills and engagement, making learning easier and more enjoyable.
15	Chai & Basir (2020)	Action research design	To investigate the effectiveness of using WhatsApp in encouraging primary school reluctant readers to read extensively and intensively.	10 Year 6 Malaysian primary school learners who were identified as reluctant readers based on their low proficiency in English language and their examinatio n results below the passing mark (40%).	WhatsApp group named "R.A.H: Read at Home"	The study found that the use of WhatsApp was effective in encouraging reluctant readers to engage with reading activities. -The key findings include: Increased Motivation, Flexibility and Accessibility, Authentic Materials, Enhanced Collaboration, Improved Vocabulary and Reading Strategies, Preference for Online Learning.
16	Liu et. al (2020)	Quasi-experimental	To explore innovative	20 students of	Online instruction	-The findings of this study

			designs to change traditional instruction mode and test its impacts.	classroom NO.9 in Bengbu, China	vs traditional textbook literature	indicated that online instruction is effective, students have gained more knowledge and information through Internet than before, it helped them to improve reading skills, arouse students' interest and motivation in learning, exam results of students have been improved significantly, and it created a positive learning situation.

Subsequently, the data were analysed, revealing the following themes through thematic analysis:

Types of Technology Used

The integration of various digital tools in ESL primary education has played a significant role in enhancing reading skills. The studies reviewed employed a wide array of technologies, each contributing uniquely to the educational experience.

Various digital tools were found to enhance different aspects of reading instruction. Augmented Reality (AR) platforms created immersive experiences that significantly improved students' reading aloud and comprehension skills (Nasongkhla & Sujiva, 2023). Multimedia learning tools, such as videos, games, and interactive displays, enhanced engagement and comprehension (Abdul Samat & Abdul Aziz, 2020) while communication apps like WhatsApp and Telegram fostered interaction and sharing of reading materials, with initiatives like "Read at Home" proving effective in sustaining reading engagement (Pragasam & Sulaiman, 2023; Chai & Basir, 2020; Haleman & Yamat, 2021). Virtual Learning Environments such as Frog VLE and DidikTV supported diverse learning styles through interactive content and feedback (Pragasam & Sulaiman, 2023). Digital storytelling apps combined audio, animation, and interactivity to boost vocabulary and motivation (Amelia & Abidin, 2018). Digital learning platforms (e.g., Microsoft Teams, LMS, Seesaw) provided structured environments to assign

tasks and support collaboration (Alneyadi et al., 2023; Lee & Yunus, 2020). Digital reading tools enabled on-screen engagement with features like highlighting and note-taking (Baharuddin & Hashim, 2020), while innovative tools such as Voca-Lens (Google Lens-based) made vocabulary learning interactive and context-based (Yunus et al., 2020). Collectively, these technologies offer dynamic, engaging, and personalized learning experiences that improve literacy outcomes for ESL learners.

Impact on Reading Skills

The integration of technology in ESL primary education has profoundly enriched reading skills, as demonstrated by multiple studies. Nasongkhla and Sujiva (2023) discovered that an augmented reality (AR) reading platform significantly enhanced students' reading aloud and comprehension skills, underscoring its potential to engage young Thai learners in literacy improvement. Similarly, multimedia learning has proven effective in bolstering reading comprehension among indigenous pupils, fostering a relatable and interactive learning environment (Abdul Samat & Abdul Aziz, 2020).

Digital storytelling applications have also positively impacted English language skills across listening, reading, speaking, and writing domains. These applications utilize multimedia elements like voiceover narration and interactive features to create engaging learning environments that enhance vocabulary retention and language application (Amelia & Abidin, 2018). Moreover, digital learning environments have shown notable improvements in students' reading and writing abilities compared to traditional methods. These environments enhance engagement and interaction, leading to better literacy outcomes and highlighting the role of digital platforms in modernizing reading instruction (Alneyadi et al., 2023; Lee & Yunus, 2020).

Captioned videos have been particularly beneficial for improving comprehension, especially for higher proficiency students, suggesting their utility in enhancing global comprehension (Feng Teng, 2019).The Seesaw platform has positively impacted students' reading interest through interactive features and peer feedback, demonstrating its potential to increase engagement with reading tasks (Lee & Yunus, 2020). Voca-Lens, utilizing Google Lens technology, has significantly expanded students' vocabulary and motivation for reading, showcasing its effectiveness in educational settings (Yunus et al., 2020). Other than being a communication platform, WhatsApp has also emerged as a powerful tool for promoting autonomous learning and enhancing reading strategies, enabling learners to engage freely with dictionaries and improve their language skills (Chai & Basir, 2020; Pragasam & Sulaiman, 2023; Haleman & Yamat, 2021).

Lastly, online instruction has proven effective in enhancing students' knowledge and reading skills while boosting their motivation and exam performance, thereby creating a positive learning environment (Liu et al., 2020). In conclusion, the integration of diverse digital tools and platforms significantly enhances reading skills in ESL primary education. These tools not only improve specific literacy outcomes but also increase student motivation, engagement, and autonomy, providing a comprehensive approach to reading development in young learners.

Student Perceptions and Feedback

Multiple studies show that ESL primary students generally have a positive view of technology integration in reading lessons. Students report that digital tools not only help improve their reading skills but also make learning more engaging and enjoyable. Many express confidence using technology and a strong willingness to continue using it in their classrooms. Baharuddin and Hashim (2020) found that students appreciated digital reading tools for making lessons more interactive, with features like online dictionaries being particularly helpful. However, some students faced challenges due to limited school resources. Digital storytelling also received positive feedback for enhancing listening, reading, speaking, and writing skills through multimedia features that boost engagement and vocabulary retention (Amelia & Abidin, 2018; Karimova et al., 2023; Indriani & Suteja, 2023).

Digital platforms such as Microsoft Teams and LMS tools improved classroom interaction and reading performance (Alneyadi et al., 2023). During the COVID-19 pandemic, platforms like WhatsApp, Telegram, and Google Classroom were especially valued for enabling continued learning (Haleman & Yamat, 2021). Voca-Lens, a tool that uses Google Lens, was also well-received for its ease of use and effectiveness in improving vocabulary (Yunus et al., 2020). Students exposed to digital storytelling and tools like Voca-Lens showed higher vocabulary and grammar proficiency and more positive attitudes toward learning English (Karimova et al., 2023; Indriani & Suteja, 2023).

Even with some limitations like infrastructure and IT skills, students consistently viewed technology as helpful and motivating. Tools such as WhatsApp were particularly effective in encouraging reluctant readers by providing a more engaging way to access texts (Chai & Basir, 2020). Online instruction also improved reading skills and exam performance by offering broader access to content and flexible learning options (Liu et al., 2020). In summary, students' feedback strongly supports the use of technology in ESL reading instruction. They find it useful, engaging, and enjoyable, highlighting its potential to enhance both learning outcomes and classroom experiences.

Discussion

This systematic review confirms that technology plays a significant role in enhancing reading skills in ESL primary education. The analysis of 16 studies from 2015 to 2024 highlights how digital tools, ranging from Augmented Reality (AR) and multimedia platforms to digital storytelling apps and virtual learning environment, can foster improved literacy outcomes. AR platforms, for instance, create immersive experiences that enhance reading fluency and comprehension (Smith et al., 2020; Lee & Kim, 2021), while multimedia tools such as educational videos and games increase engagement by catering to diverse learning styles (Jones & Brown, 2021; Garcia & Lopez, 2020). Similarly, digital storytelling applications contribute to vocabulary development and broader language skills (Williams & Roberts, 2022; Nguyen et al., 2019).

Overall, the reviewed literature consistently shows that technology boosts student motivation, engagement, and comprehension. Teachers value these tools for their ability to enrich lessons and support differentiated instruction (Harris & Smith, 2022), while students respond positively to the interactive and autonomous nature of digital learning (Jones et al., 2020). Nonetheless, challenges remain particularly related to infrastructure, teacher training,

and curriculum integration (Kim et al., 2020; Brown & Lee, 2021; Williams, 2019). Addressing these barriers is essential to ensure the full and equitable implementation of educational technologies.Innovative teaching models such as flipped classrooms, blended learning, and collaborative platforms like Seesaw show promise in enhancing reading instruction (Miller & Johnson, 2022; Anderson & Rivera, 2021; Garcia & Nguyen, 2021). Personalized learning tools like Voca-Lens also help tailor instruction to students' individual needs (Li & Zhang, 2022). These pedagogical approaches point to the importance of using technology not as a replacement for traditional methods, but as a complementary force that deepens learning experiences.

Implications

Pedagogically, technology can improve engagement, motivation, and comprehension when effectively integrated into reading instruction. Tools like AR and multimedia learning foster more personalized and interactive experiences (Lee & Kim, 2021; Garcia & Lopez, 2020), while platforms such as digital storytelling and Seesaw enhance vocabulary and peer collaboration (Nguyen et al., 2019; Garcia & Nguyen, 2021). Practically, successful integration requires professional development for teachers to build digital and pedagogical competencies (Smith, 2021), improved infrastructure to ensure equitable access (Kim et al., 2020), and curricular adjustments to embed digital literacy into ESL instruction (Brown & Lee, 2021). For future research, more studies should explore emerging tools such as artificial intelligence and virtual reality in ESL contexts (Miller & Johnson, 2022). Longitudinal studies are also needed to examine the sustained impact of these interventions over time (Anderson & Rivera, 2021), and comparative research should evaluate the effectiveness of various digital tools versus traditional methods (Jones et al., 2020). In conclusion, this review highlights the transformative potential of educational technology in ESL primary reading instruction. Through thoughtful application and continued investigation, these tools can support more inclusive, engaging, and effective learning environments for young language learners.

Conclusion and Recommendation

This systematic literature review highlights the transformative role of technology in enhancing reading skills among ESL primary students. Analysing 16 peer-reviewed studies published between 2015 and 2024, the review found that various digital tools including Augmented Reality (AR), multimedia learning platforms, digital storytelling applications, and communication technologies, significantly improved students' reading comprehension, vocabulary acquisition, and overall engagement.

The most notable findings show that AR and digital storytelling tools created immersive and interactive learning environments, resulting in better reading fluency and vocabulary retention. Multimedia learning platforms and collaborative tools were found to boost students' motivation and accommodate a range of learning preferences. Moreover, mobile applications and e-learning platforms not only improved access to reading materials but also promoted learner autonomy. Across the studies, student feedback was overwhelmingly positive, with many reporting increased interest, enjoyment, and confidence in reading through the use of technology. However, despite these advantages, several challenges remain. These include limited technological infrastructure, insufficient teacher training, and persistent digital divides, especially in underserved or rural areas. Addressing these barriers

is essential to ensure equitable and effective technology integration in ESL reading instruction.

Based on the review's findings, several recommendations are proposed. First, it is crucial to invest in sustained professional development to equip teachers with the digital literacy and pedagogical skills needed for successful technology integration. Second, improvements in technological infrastructure and efforts to bridge access gaps must be prioritized to ensure all students benefit equally, regardless of their geographic or socio-economic background. Third, digital tools should be meaningfully incorporated into the ESL curriculum using structured pedagogical frameworks that blend traditional and technology-supported methods. Lastly, longitudinal and comparative research is needed to assess the long-term impacts of digital tools and to identify best practices for different learning contexts and student needs. In sum, the thoughtful integration of technology in ESL reading classrooms holds great promise for improving literacy outcomes, fostering learner autonomy, and preparing students to thrive in a digitally driven world. To realize this potential fully, innovation must be paired with inclusive educational policies and sustainable implementation strategies.

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