ENHANCING ENGLISH READING SKILLS THROUGH AI-BASED TOOLS: A SYSTEMATIC REVIEW

QI, A. Y.[1*] – YUNUS, M. M.[1] – LUN, C. W. W.[1]

[1] *Faculty of Education, Universiti Kebangsaan Malaysia, Selangor, Malaysia.*

**Corresponding author*
e-mail: aikqi98[at]gmail.com

(Received 03rd October 2025; revised 28th November 2025; accepted 05th December 2025)

Abstract. Many learners of ESL and EFL struggle with reading proficiency due to limitations in vocabulary, fluency, comprehension strategies, and confidence, while traditional reading instruction often lacks the flexibility to meet diverse learner needs. This study reviews research published between 2021 and 2025 on the use of artificial intelligence–powered tools to support English reading development, with the aim of identifying the types of tools being used, evaluating their effectiveness, and examining implementation challenges. Ten empirical studies were synthesised, revealing six categories of AI tools, chatbot systems, intelligent tutoring systems (ITS), adaptive reading platforms, speech-based reading applications, multimodal AI tools, and natural language processing (NLP) applications, each supporting different aspects of reading, such as comprehension, fluency, and motivation. Across contexts, AI interventions demonstrated significant gains in comprehension, reading fluency, reduced reading anxiety, and improved self-regulated learning. However, challenges such as technical and infrastructural limitations, teacher readiness and pedagogical alignment, data privacy and ethical considerations, adaptive limitations, contextual and content suitability of AI-powered reading tools and learner over-reliance on automated feedback were also reported. The review underscores the potential of AI tools as effective supplements to traditional instruction, while emphasising the need for robust infrastructure, teacher training, and ethical safeguards to maximize their impact.
Keywords: *artificial intelligence, AI-powered reading tools, ESL/EFL reading instruction, intelligent tutoring systems, chatbot system*

Introduction

In the digital era, education systems worldwide are undergoing profound transformations driven by rapid advancements in artificial intelligence (AI). Artificial intelligence technologies have permeated multiple industries, including healthcare, business, and education, where they foster innovation in instructional design, personalised learning, assessment, and learner support (Zawacki-Richter et al., 2019; Luckin et al., 2016). Among language education domains, reading instruction stands out as particularly conducive to AI-driven interventions due to its interactive, sequential, and multidimensional nature (Shafiee Rad, 2025). AI can facilitate personalised reading experiences, provide immediate feedback, and automate the adaptation of texts to meet individual learners' needs. Reading is fundamental to language development and is closely linked to academic success and social integration. For English learners, especially those learning English as a Second Language (ESL) or English as a Foreign Language (EFL), reading serves as a crucial gateway to vocabulary acquisition, syntactic awareness, and comprehension across subject areas (Nation, 2013; Grabe 2009). Proficient reading skills also support critical thinking and independent learning, both of which are essential for lifelong literacy development. However, learners in ESL/EFL and other English language learning contexts frequently face significant barriers to reading proficiency. These include linguistic challenges, such as limited

vocabulary and unfamiliar syntactic constructions, as well as cognitive demands associated with text complexity and comprehension strategies (Wiyaka et al., 2024; Grabe and Stoller, 2011).

Traditional reading instruction methods such as teacher-led vocabulary sessions, comprehension worksheets, and rote reading exercises have been effective to a certain extent but often fail to meet the diverse and evolving needs of modern learners, particularly in large or under-resourced classrooms (Bachiri et al., 2024). These approaches are typically linear and lack the flexibility required for learners with varying levels of proficiency, motivation, and learning styles. In contrast, AI-powered reading tools, including Intelligent Tutoring Systems (ITS), speech recognition software, Natural Language Processing (NLP) applications, and adaptive reading platforms, provide dynamic and learner-centred support. They can analyse learners' reading behaviours, track progress, and adjust content in real time to offer personalised, multimodal experiences that foster engagement and comprehension (Yuan, 2025; Lu et al., 2021).

The emergence of advanced Large Language Models (LLMs), such as ChatGPT, has further revolutionised reading instruction by enabling conversational learning, customised text generation, and interactive comprehension exercises (Kasneci et al., 2023). These AI-powered tools can replicate some aspects of human tutoring by offering personalised prompts, scaffolding, and instant feedback. Additionally, applications such as Duolingo and Reading Assistant Software (RAS) integrate gamification and adaptive pathways to sustain learner motivation while systematically improving reading comprehension and fluency (Wilang et al., 2025). Despite these promising advancements, there is still a lack of systematic empirical synthesis on the use and effectiveness of AI-powered tools for developing English reading skills. Much of the existing research focuses on general language learning outcomes or the broader adoption of AI in educational contexts (Zawacki-Richter et al., 2019), with fewer studies examining specific reading-related outcomes such as fluency, comprehension, and learner engagement. Furthermore, there is limited understanding of the practical challenges and constraints encountered during the implementation of AI reading tools. These gaps create uncertainty for educators and policymakers who seek to adopt AI for literacy instruction in ESL/EFL and other English language learning classrooms.

Addressing these gaps is crucial for building evidence-based strategies for AI integration in reading pedagogy. By synthesising empirical research, this systematic literature review (SLR) aims to provide a comprehensive analysis of the types, effectiveness, and challenges of AI-powered reading tools, with a focus on ESL, EFL, and related English learning contexts. Specifically, the review seeks to answer the following research questions: (1) What types of AI-powered tools have been utilised to support English reading instruction in ESL, EFL, and related language learning contexts from 2021 to 2025? (2) How effective are these tools in enhancing reading skills among learners in these contexts? (3) What challenges have been reported during the application of these AI tools?

Literature review

Importance of reading for English learners in diverse contexts

Reading proficiency is widely acknowledged as the bedrock of holistic language development, enabling learners to access information, engage with diverse texts, and

participate effectively in academic and social contexts. Proficient reading supports vocabulary acquisition, syntactic awareness, and discourse competence, core components that underpin listening, speaking, and writing skills (Nation, 2013; Grabe and Stoller, 2011). In additional-language learning contexts such as ESL and EFL, reading plays a pivotal role in bridging receptive and productive skills. Research consistently shows that vocabulary knowledge, both breadth and depth, is strongly correlated with reading comprehension performance among L2 learners (Al-Khasawneh, 2019; Hu and Nation 2000). Indeed, vocabulary size alone accounts for a significant portion of variance in reading comprehension scores (moderate correlation of $\sim r = 0.64$). Reading is also essential for fostering critical thinking and lifelong learning. In today's digital, information-rich environments, learners must navigate vast and varied text types, evaluate information credibility, and interpret multimodal content—skills vital for active participation in knowledge societies (Lai et al., 2023).

Despite its importance, many English learners struggle with reading proficiency due to linguistic, cognitive, and affective barriers. Limited vocabulary, unfamiliar syntax, and complex discourse structures frequently impede comprehension (Koda and Zhang, 2012; Carrell and Eisterhold 1983). Cognitive constraints, such as working memory limitations and insufficient metacognitive strategies, further complicate the reading process. Effective comprehension requires both accurate decoding and higher-order processes like prediction, summarization, and self-monitoring (Mokhtari and Reichard, 2002; Pressley and Afflerbach 1995). Sociocultural and emotional factors also play a critical role. Cultural unfamiliarity in reading materials may lead to disengagement, while affective barriers such as low motivation or reading anxiety undermine persistence. Traditional reading instruction, such as vocabulary drills, comprehension worksheets, and choral reading, is often too generalized to meet diverse learner needs, especially in large, mixed-ability classrooms (Bachiri et al., 2024).

These challenges highlight the need for more innovative, inclusive, and responsive approaches to reading instruction. Artificial intelligence (AI)-powered reading tools offer one such solution. By leveraging adaptive learning pathways, real-time feedback, and multimodal instructional features, these tools can personalise reading experiences, mitigate barriers to comprehension, and promote learner autonomy. Their ability to support differentiated learning makes them especially valuable in diverse educational contexts. Thus, investigating how AI supports English reading development across ESL, EFL, and related learning environments is both timely and pedagogically necessary.

Role of AI in reading instruction

Recent years have witnessed a growing body of research on the role of artificial intelligence (AI) in reading instruction, with studies highlighting its potential to enhance comprehension, fluency, and vocabulary acquisition. Systematic reviews have confirmed that AI-powered tools, such as Intelligent Tutoring Systems (ITS), adaptive learning platforms, and Natural Language Processing (NLP)-based text simplifiers, provide significant pedagogical benefits by providing personalized feedback, adaptive content, and interactive learning experiences (Tessensohn et al., 2025; Zhu and Wang 2025). These studies also highlight how AI systems outperform traditional reading instruction in terms of scalability, real-time assessment, and learner engagement. Crompton and Burke (2023) observed that while AI tools were initially more widely applied to writing and speaking tasks, there has been a surge in AI-driven reading applications such as comprehension-focused chatbots and adaptive e-readers, which are

increasingly recognised for their ability to personalise the reading experience and sustain learner motivation. One of the key strengths of AI in reading instruction is its ability to replicate the benefits of personalized tutoring. In a meta-analysis of ITS applications for K-12 learners, Xu et al. (2019) found significant improvements in reading comprehension when compared to traditional methods, with adaptive questioning and feedback leading to deeper engagement with texts. Similarly, in a mixed-methods study of 60 EFL university students, Wei (2023) discovered that learners who used an AI-driven reading platform improved their comprehension and vocabulary significantly. The platform adapted the complexity of reading materials based on student performance and incorporated interactive comprehension prompts that encouraged critical thinking and independent learning.

AI technologies have also demonstrated significant potential for improving oral reading fluency and pronunciation accuracy. In an eight-week study of 120 primary school students, Elmaadaway et al. (2025) found measurable improvements in reading speed, word accuracy, and prosody with the use of AI-assisted oral reading tools. Tessensohn et al. (2025) noted that these fluency tools are especially beneficial for ESL and EFL learners who lack sufficient opportunities for repeated oral practice, as they provide individualised monitoring and performance analytics. In addition to cognitive gains, AI enhances learner motivation and engagement through gamified and interactive experiences. Niyozov et al. (2023) reported a 25% increase in vocabulary and a 19% improvement in reading comprehension among EFL learners who used ChatGPT as a reading companion, attributing these outcomes to the chatbot's conversational interface and adaptive feedback. Similarly, He (2024) discovered that an adaptive AI reading platform improved comprehension and vocabulary retention among secondary school students by automatically adjusting text complexity to match learner proficiency, preventing frustration and maintaining interest.

Materials and Methods

This systematic literature review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidelines, which provide a structured approach for improving the transparency, rigor, and reproducibility of review-based research. The aim of this review was to examine empirical studies published between 2021 and 2025 that investigated the use of artificial intelligence (AI)-based tools to support the development of English reading skills among learners across diverse instructional settings. This review adopted a descriptive comparative approach to synthesize findings from a diverse range of educational contexts, learner profiles, and AI technologies. Through this process, the review seeks to conceptually analyze how various AI-powered tools contribute to enhancing English reading skills. The Scopus database was exclusively used to locate relevant journal articles, and the entire review process was systematically carried out through four key phases: identification, screening, eligibility, and inclusion.

Phase 1: Identification phase

The Scopus database was selected as the sole source for article retrieval due to its wide coverage of high-quality, educational and technological literature. The search was conducted and yielded 203 results. The keywords and Boolean operators used for the search were systematically designed to combine three key conceptual domains: (1)

artificial intelligence technologies, (2) reading skill development, and (3) English language learner contexts. To ensure inclusivity, the search string incorporated multiple labels including “ESL,” “EFL,” “English as a Second/Foreign Language,” and “English language learners. The keywords used when searching for the articles are as seen in *Table 1*.

***Table 1**. Keywords used to find related articles.*

Database	Keywords
Scopus	("artificial intelligence" OR "AI" OR "machine learning" OR "natural language processing" OR "speech recognition" OR "intelligent tutoring system" OR "chatbot") AND ("reading" OR "reading skills" OR "reading comprehension" OR "reading fluency" OR "literacy") AND ("ESL" OR "EFL" OR "English as a Second Language" OR "English as a Foreign Language" OR "English language learners")

Phase 2: Screening phase

Upon conducting the database search, duplicate records were first identified and removed. Out of the 203 initial search results (as shown in Appendix 1), 35 duplicate entries were excluded (as shown in Appendix 2). The remaining 168 records underwent a title and abstract screening process to determine their alignment with the inclusion criteria. At this phase, 113 articles were excluded for one or more of the following reasons: (1) they did not focus on English reading skills, (2) they were not set in English language contexts, or (3) they lacked AI tool integration. Only empirical studies that investigated AI-based tools for improving English reading skills among English language learners were considered eligible to move to the next phase.

Phase 3: Eligibility phase

Following the screening process, 55 full-text articles were retrieved and reviewed to assess their eligibility. Articles were evaluated based on the key inclusion criteria as stated in *Table 2*. During this phase, 30 studies were excluded for reasons including theoretical or conceptual focus, articles with inaccessible full texts, or not published between 2021 and 2025. A total of 25 articles met all eligibility criteria and were retained for further evaluation.

***Table 2**. Inclusion and exclusion criteria.*

Inclusion Criteria	Exclusion Criteria
Primary empirical research (quantitative, qualitative, mixed-methods)	Theoretical, conceptual, or review articles
Measurable reading-related outcomes reported	Studies focusing on language skills other than reading
Published between 2021 and 2025	Not published between 2021 and 2025
AI-powered tools used to support reading skills	Studies without AI-based interventions
Focus on English language learners	Not set in English language contexts
Full-text journal articles or conference papers	Articles with inaccessible full texts

Phase 4: Exclusion phase

After the eligibility assessment, the remaining full-text articles were subjected to a final round of exclusion to ensure that only the most relevant and rigorous studies were included in the synthesis. During this phase, the 25 eligible articles was reviewed once

more to confirm alignment with the inclusion criteria and to eliminate any residual discrepancies. A total of 15 articles were excluded at this stage for several reasons: some lacked sufficient detail on the AI tool used, others did not report measurable reading-related outcomes clearly, and a few did not isolate English language learners as the primary participant group. Additionally, any articles found to contain ambiguous methodologies were also removed. As a result, 10 qualified empirical studies (as shown in *Table 3*) were remained and included in the final analysis. These selected studies provided a balanced and comprehensive dataset for answering the research questions, offering insights into the types of AI tools employed, the educational settings involved, and the effects of such tools on English reading skills. *Figure 1* shows a clearer view of the entire process from Phase 1 through Phase 4.

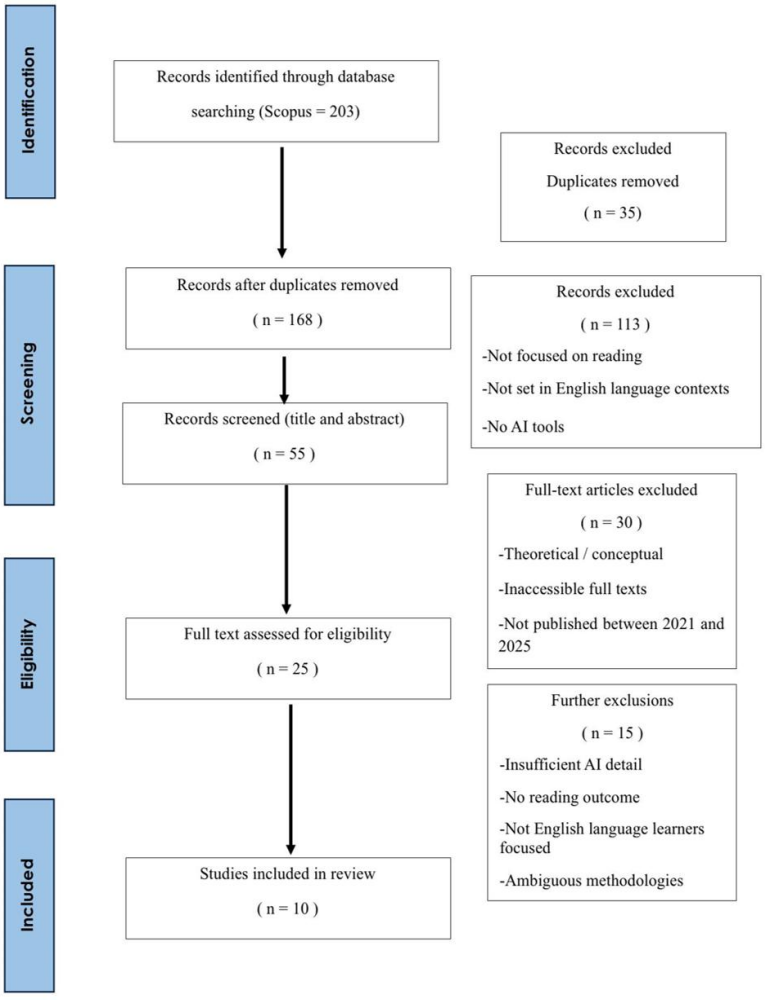

Figure 1. *Stream chart of the research article selection process.*

Table 3*. Empirical studies qualified for analysis.*

Article No.	Author(s)	Title
1	Wiyaka et al. (2024)	From Nervous to Fluent: The Impact of AI Chatbot-Assisted Assessment on English Reading Anxiety and Performance in Indonesia
2	Shafiee Rad (2025)	Reinforcing L2 reading comprehension through artificial intelligence intervention: refining engagement to foster self-regulated learning
3	Kusumawati et al. (2025)	Integration of Web-Based Intelligent Tutoring System (TuinLec) into Text Structure Strategy to Improve Text Strategy Memory and Reading Comprehension Skills
4	Alazemi (2024)	Formative assessment in artificial integrated instruction: delving into the

		effects on reading comprehension progress, online academic enjoyment, personal best goals, and academic mindfulness
5	Wilang et al.(2025)	Exploring the Relationship of Reading Fluency and Accuracy in L2 Learning: Insights from a Reading Assistant Software
6	Nisha and Gill (2024)	English Reading and Writing Enhancement for Deaf and Hard of Hearing (DHH) Students with Skybox AI: Utilization of AI Image Generators
7	Çelik et al. (2024)	Does AI Simplification of Authentic Blog Texts Improve Reading Comprehension, Inferencing, and Anxiety? A One-Shot Intervention in Turkish EFL Context
8	Yuan (2025)	Artificial Intelligence in Language Learning: Biometric Feedback and Adaptive Reading for Improved Comprehension and Reduced Anxiety
9	Hidayat (2024)	Effectiveness of AI-Based Personalised Reading Platforms in Enhancing Reading Comprehension
10	Rodríguez-Fuentes et al. (2024)	Digital reading aloud protocols and its effects on EFL fluency

Results and Discussion

Types of AI-powered tools utilised in reading instruction

The reviewed studies reveal a diverse range of AI-powered tools employed to support and enhance English reading instruction across various ESL/EFL and other English language learning contexts. *Table 4* summarises the types of AI-powered tools utilised in reading instruction.

***Table 4**. Types of AI-powered tools utilised in reading instruction.*

Article No.	Author(s)	Tool(s)/Platform(s)	Tool Category
1	Wiyaka et al. (2024)	Reading Bot	Chatbot System
2	Shafiee Rad (2025)	ReadToMe (RTM)	Intelligent Tutoring System (ITS) / Speech-based Reading Application
3	Kusumawati et al. (2025)	TuinLec	Intelligent Tutoring System (ITS)
4	Alazemi (2024)	Nearpod	Adaptive Reading Platform
5	Wilang et al. (2025)	Reading Assistant Software	Speech-Based Reading Application
6	Nisha and Gill (2024)	Skybox AI	Multimodal AI Application
7	Çelik et al. (2024)	ChatGPT	NLP / Chatbot System
8	Yuan (2025)	Smart Sparrow	ITS / Biometric & Adaptive Platform
9	Hidayat (2024)	ReadTheory	Natural Language Processing (NLP) / Adaptive Reading Platform
10	Rodríguez-Fuentes et al. (2024)	Read Naturally Live	Speech-Based & Adaptive Reading Platform

Chatbot system

Chatbot systems offer interactive, text-based platforms capable of providing timely feedback, comprehension prompts, summaries, and text simplification. For instance, the Reading Bot, used in Indonesia for secondary school students, facilitated grammar and vocabulary practice through conversational exchanges tailored by natural language processing technologies, as demonstrated in the study by Wiyaka et al. (2024). Similarly, ChatGPT was applied in a Turkish university setting to simplify authentic blog texts, helping lower-proficiency EFL learners by making complex materials more accessible, as reported in the study by Çelik et al. (2024).

Intelligent Tutoring Systems (ITS)

Intelligent Tutoring Systems (ITS) represent another significant category of AI tools. These systems, including TuinLec, ReadToMe™, and Smart Sparrow, deliver structured, adaptive instruction emphasizing strategic reading skills and learner scaffolding. TuinLec was designed to improve the text structure strategy knowledge of upper elementary students by providing adaptive pathways and detailed feedback, as shown in the study by Kusumawati et al. (2025). ReadToMe™ integrates multi-sensory

instructional design and offers gamification and localized pronunciation support, which enhances self-regulated reading comprehension for L2 learners, as reported in the study by Shafiee Rad (2025). Smart Sparrow employs biometric sensors and reinforcement learning to dynamically adjust reading materials, thus tailoring the learning experience to the cognitive and emotional states of Chinese EFL learners, as highlighted in the study by Yuan (2025).

Adaptive reading platform

Adaptive reading platforms also play a crucial role in AI-supported reading education. Nearpod, for instance, provides a multimedia-rich, interactive environment that delivers personalized quizzes, real-time feedback, and collaborative tools tailored to each learner's pace; its benefits for Kuwaiti EFL learners are detailed in the study by Alazemi (2024). ReadTheory offers leveled passages and adaptive questioning, personalizing reading tasks to the student's ability while continuously monitoring progress, as observed among senior high school students in the study by Hidayat (2024). Some of these platforms, such as ReadToMe™ and Read Naturally Live, also incorporate speech-based features to support oral reading development, an approach supported by findings from Shafiee Rad (2025) and Rodríguez-Fuentes et al. (2024).

Speech-based reading application

Speech-based reading applications are widely utilized in reading instruction to support oral reading development, fluency, and pronunciation. The Reading Assistant Software (RAS) and Read Naturally Live both employ speech recognition technology to provide immediate feedback on pronunciation, reading rate, and prosody, as described in the study by Wilang et al. (2025) and in the study by Rodríguez-Fuentes et al. (2024). These applications are designed to enable personalized and adaptive reading practice that adjusts to learners' oral reading performance.

Multimodal AI application

Some AI tools extend beyond text and speech by incorporating multimodal visual supports. Skybox AI, for example, generates immersive 3D visual backgrounds from textual prompts to enrich reading experiences for Deaf and Hard of Hearing students, serving as an innovative bridge between English written texts and sign language comprehension, as described in the study by Nisha and Gill (2024).

Natural Language Processing (NLP)

Natural language processing (NLP) underpins many of the described AI tools. NLP algorithms are utilized not only in chatbots and simplification tools like ChatGPT, but also in adaptive platforms such as ReadTheory and Smart Sparrow to analyze text complexity, provide contextual feedback, and personalize content in real time. Supporting technologies, such as Google Translate and various online dictionaries, leverage NLP to assist learners with vocabulary and comprehension outside dedicated instructional platforms, as described in the study by Çelik et al. (2024).

Effectiveness of AI tools in enhancing reading skills

Improvements in reading comprehension

A consistent and substantial improvement in students' reading comprehension emerges as the strongest outcome across all studies utilizing AI-powered tools for English reading instruction. In the study by Wiyaka (2024), Indonesian secondary school students using the Reading Bot chatbot achieved statistically significant gains in reading performance compared to those in teacher-led classes, as the chatbot's adaptive feedback helped students better understand texts and apply reading strategies. Similarly, Shafiee Rad (2025) found that learners using the ReadToMe™ platform more than doubled their mean comprehension scores, with multi-sensory instruction, instant feedback, and personalization identified as key drivers of success. Kusumawati et al. (2025) reported that the TuinLec Intelligent Tutoring System significantly improved upper elementary students' ability to identify main ideas and analyze text structures, while Alazemi (2024) documented higher post-test comprehension scores among Kuwaiti EFL learners using Nearpod, supported by its interactive and adaptive feedback features. In senior high schools, Hidayat (2024) demonstrated that ReadTheory, a personalized AI reading platform, led to substantially higher post-test scores compared to standard curricula due to its adaptive questioning and instant feedback. At the university level, Çelik et al. (2024) showed that using ChatGPT to simplify authentic texts markedly improved comprehension and inferencing abilities. Similarly, Yuan (2025) found that Chinese EFL learners using the Smart Sparrow platform achieved significantly greater comprehension gains than those using conventional digital reading programs, with biometric adaptation and real-time scaffolding playing a pivotal role.

Enhancing reading fluency and accuracy

Significant improvements in reading fluency and accuracy emerged as core benefits of AI-powered interventions across multiple studies, supported by both quantitative metrics and qualitative insights. In the study by Wilang et al. (2025) using the Reading Assistant Software (RAS), a strong correlation between increased reading fluency and accuracy was observed, with a Pearson's $r = 0.984$ ($p < 0.01$), indicating that progress in one skill directly enhanced the other. RAS offered interactive oral reading practice and real-time, individualized feedback on pronunciation, intonation, and pacing, fostering consistent improvement regardless of gender or background. Similarly, Rodríguez-Fuentes et al. (2024) reported that adult EFL learners using the Read Naturally Live platform showed notable gains in speech rates, with beginner students increasing from 81.2 to 98.5 words correct per minute (wcpm) and upper-intermediate learners improving from 132.5 to 139.8 wcpm, alongside measurable enhancements in prosody and expressive reading. The platform's individualized pacing, repeated text exposure, and instant corrective feedback were key factors driving these outcomes. Speech and pronunciation gains were also noted with adaptive, multi-sensory AI tools such as ReadToMe™, where Shafiee Rad (2025) highlighted the role of text-to-speech conversion, pronunciation localization, and analytic feedback in boosting fluency, accuracy, and learners' confidence when engaging with challenging texts.

Reducing reading anxiety and enhancing motivation

In the study by Wiyaka et al. (2024), Indonesian secondary school students using the Reading Bot chatbot experienced statistically significant reductions in English reading anxiety across multiple measures, whereas the control group taught through traditional methods showed no notable change. The chatbot's adaptive and supportive feedback

created a low-pressure environment where students felt safe to practice and engage, reducing the stress commonly linked with reading assessments. Similarly, Shafiee Rad (2025) found that participants using the ReadToMe™ platform reported marked increases in self-regulated learning and engagement scores, with instant personalized feedback, interactive activities, and gamification features enhancing motivation, confidence, and enjoyment. Alazemi (2024) documented a comparable rise in academic enjoyment, mindfulness, and motivation among Kuwaiti EFL learners using Nearpod, where real-time adaptive feedback and collaborative tasks boosted both participation and comprehension. In addition, Yuan (2025) demonstrated that Chinese EFL learners using the Smart Sparrow platform reported significantly lower reading anxiety and greater motivation compared to those in the control group, with biometric data, such as heart rate variability and eye-tracking; objectively confirming these findings. The positive impact of AI tools on motivation also extended to special populations, as Nisha and Gill (2024) observed heightened reading engagement and excitement among Deaf and Hard of Hearing students using Skybox AI for multimodal, visually immersive instruction.

Supporting self-regulated and metacognitive reading behaviours

Multiple studies highlight the capacity of AI-powered reading tools to foster self-regulated and metacognitive reading behaviours among diverse learner groups. In the study by Shafiee Rad (2025), learners using the ReadToMe™ (RTM) platform demonstrated a significant increase in self-regulated learning scores, rising from 2.23 to 4.78 in the experimental group, an improvement attributed to features such as instant feedback, adaptive difficulty, progress monitoring, and gamified goal-setting, which collectively encouraged students to plan, monitor, and reflect on their reading strategies. Similarly, Kusumawati et al. (2025) reported that the TuinLec intelligent tutoring system improved students' procedural and organizational reading strategies, enabling them to develop more structured memory and analytical skills for problem-solution and comparative text structures. Personalized adaptive platforms, including ReadTheory and Smart Sparrow, further reinforced these outcomes. In particular, Yuan (2025) found that learners using Smart Sparrow benefitted from real-time scaffolding, individualized feedback, and reflective prompts that enhanced their ability to self-regulate reading pace and comprehension, with biometric data confirming improved management of cognitive load. Likewise, Alazemi (2024) noted that Kuwaiti EFL learners using Nearpod developed higher academic mindfulness, stronger goal-setting habits, and reflective strategy adjustments, all of which are hallmarks of metacognitive engagement.

Challenges in the implementation of AI tools in reading instruction

Technical and infrastructural challenges

A common challenge across the reviewed studies is the reliance of AI-powered reading tools on stable technical infrastructure, which is not always guaranteed in educational settings. Shafiee Rad (2025) reported that approximately 23% of learners encountered technical issues while using the ReadToMe™ platform, including slow loading times, occasional software glitches, and difficulties navigating the interface. Such disruptions impeded the smooth flow of reading practice and often required instructor intervention. Similarly, Alazemi (2024) emphasized that effective use of platforms like Nearpod depends heavily on reliable internet connectivity and adequate

access to digital devices, resources that are not always available in less well-equipped schools or rural areas. Kusumawati at al. (2025) also highlighted that students using the TuinLec Intelligent Tutoring System needed compatible hardware and uninterrupted internet access to fully benefit from the tool's adaptive modules.

Pedagogical alignment and teacher readiness

Pedagogical alignment and teacher readiness remain significant challenges across multiple studies, with five of the ten studies explicitly mentioning this issue (Kusumawati et al., 2025; Alazemi, 2024; Hidayat, 2024; Rodríguez-Fuentes et al., 2024; Wiyaka et al., 2024). Teachers frequently needed to adapt their traditional methods to accommodate AI-driven platforms while ensuring that automated feedback was balanced with human guidance. Wiyaka et al. (2024) observed that instructors using the Reading Bot were required to interpret its feedback and it for students, as over-reliance on the bot's pre-programmed responses could lead to a lack of deeper comprehension. Hidayat (2024) similarly found that adaptive tools like ReadTheory were most effective when teachers were able to scaffold instruction, monitor students' engagement, and supplement AI-driven tasks with teacher-led strategies.

The findings suggest that integrating AI tools involves not just technical knowledge but also a shift in teaching philosophy and classroom dynamics. Kusumawati et al. (2025) noted that teachers needed additional support to align TuinLec with text structure instruction, especially since the system introduced new learning pathways that were different from conventional teaching practices. Alazemi (2024) highlighted that Nearpod required teachers to blend real-time interactive quizzes and multimedia elements with existing lesson plans, which demanded both digital literacy and pedagogical flexibility. Rodríguez-Fuentes et al. (2024) added that teachers using Read Naturally Live had to take on a facilitator role, guiding students' fluency development while interpreting the platform's analytics. Collectively, these findings underscore the importance of professional development and training to equip teachers with the skills needed to integrate AI tools as effective supplements to instruction.

Data privacy and ethical considerations

Data privacy and ethical concerns were raised in two studies (Yuan, 2025; Alazemi, 2024), reflecting growing awareness of how AI-powered platforms handle sensitive learner information. Yuan (2025) highlighted this issue in the context of Smart Sparrow, which collects biometric data such as heart rate variability (HRV) and eye movement patterns to monitor cognitive and emotional states. While these features enhanced personalization, they raised concerns about how such data would be stored, processed, and protected. The study emphasized the necessity for clear data governance policies and informed consent, particularly when working with younger learners or vulnerable populations. Similarly, Alazemi (2024) noted that platforms like Nearpod, which track learner performance and engagement metrics, also require transparency in data usage and strong cybersecurity protocols.

Personalization and adaptive system limitations

While AI tools are designed to offer personalized and adaptive learning experiences, a few studies (Kusumawati et al., 2025; Shafiee Rad, 2025; Yuan, 2025; Hidayat, 2024) reported that current adaptive algorithms are not always sufficient to meet the diverse

needs of learners. Shafiee Rad (2025) found that although ReadToMe™ adjusted content to learners' performance levels, its automated adaptations sometimes misaligned with students' specific reading goals, leading to either overly simple or excessively challenging tasks. Kusumawati et al. (2025) noted similar limitations in TuinLec, where some learners struggled with pre-programmed pathways that did not account for unique reading difficulties. Hidayat (2024) highlighted that ReadTheory's adaptive questioning was effective overall but occasionally failed to accommodate students with very low baseline comprehension, resulting in frustration or disengagement. Yuan (2025) also reported that although Smart Sparrow provided advanced personalization through biometric feedback, the adaptive responses were not always sufficient for learners requiring deeper conceptual explanations. These findings collectively suggest that AI-driven personalization, while valuable, is not yet a complete substitute for human intuition and individualized teacher support.

Contextual and content limitations

Rodríguez-Fuentes et al. (2024) reported that Read Naturally Live, originally developed for first-language learners, required adaptation to better suit adult EFL learners, particularly with regard to cultural relevance and text complexity. Çelik et al. (2024) similarly pointed out that while ChatGPT-based text simplification improved comprehension, a single session of AI intervention was insufficient to produce long-term gains in reading proficiency or anxiety reduction. Nisha and Gill (2024) also highlighted that Skybox AI-designed to create immersive visual contexts for Deaf and Hard of Hearing learners, depended heavily on teacher expertise and advanced technical setups. The scalability of such a tool was limited, especially in schools lacking sufficient infrastructure or staff training.

Over-reliance on automated feedback

Concerns about learner over-reliance on AI systems were reported in three studies (Wilang et al., 2025; Alazemi, 2024; Rodríguez-Fuentes et al., 2024). While AI tools like Nearpod and Reading Assistant Software (RAS) were shown to enhance engagement, Alazemi (2024) noted that some students became overly dependent on the real-time corrections provided by Nearpod, leading to a reduction in their willingness to self-monitor or develop independent strategies. Wilang et al. (2025) similarly observed that while RAS improved fluency and accuracy, it also made learners rely too heavily on automated feedback rather than reflective self-assessment. Rodríguez-Fuentes et al. (2024) reported that Read Naturally Live required instructor intervention to sustain motivation, as students tended to engage passively with the automated tasks after initial novelty wore off. These findings highlight the importance of blending AI-driven scaffolding with teacher-led activities to maintain a balance between technological assistance and the development of autonomous learning habits.

Results and Discussion

RQ 1: What types of AI-powered tools have been utilised to support English reading instruction in ESL, EFL, and related language learning contexts from 2021 to 2025?

The review reveals a rich and diverse ecosystem of AI-based tools applied in English reading instruction, reflecting the multidimensional nature of reading development. Key

categories include chatbot systems (e.g., Reading Bot, ChatGPT), intelligent tutoring systems (e.g., TuinLec, ReadToMe, Smart Sparrow), speech-based reading applications (e.g., ReadToMe, Reading Assistant Software, Read Naturally Live), adaptive reading platforms (e.g., Nearpod, ReadTheory, Read Naturally Live), multimodal AI applications (e.g., Skybox AI) and Natural Language Processing tools (e.g., ChatGPT, ReadTheory). Each category addresses different aspects of reading skills—chatbots facilitate interactive practice and simplify texts, intelligent tutoring systems provide tailored, adaptive scaffolding, and speech-based tools focus on enhancing fluency and prosody. Tools such as Skybox AI extend modality by integrating visual and speech-based inputs, supporting diverse learner needs. Adaptive reading platforms personalize reading tasks through real-time feedback and leveled content while Natural Language Processing tools analyzing text complexity, simplifying content, and generating feedback in real time. This diversity underscores AI's potential for personalized and contextualized reading support, aligning with Luckin et al. (2016) view of AI fostering innovation in personalised learning.

RQ 2: How effective are these tools in enhancing reading skills among learners in these contexts?

The literature and systematic review indicate that AI-powered tools have demonstrated notable effectiveness in enhancing English reading skills within ESL/EFL and related contexts between 2021 and 2025. This aligns with the understanding that reading is a critical foundation for language acquisition, supporting vocabulary growth, grammatical awareness, and discourse competence (Nation, 2013; Grabe, 2009). A recurring finding across the ten qualifying empirical studies is the substantial improvement in reading comprehension among learners employing diverse AI interventions. For instance, chatbot systems such as Reading Bot provided interactive, personalized feedback, resulting in statistically significant gains in reading performance compared to traditional teacher-led methods (Wiyaka et al., 2024). Similarly, the ReadToMe platform offered multi-sensory, adaptive instruction and instant feedback, more than doubling mean comprehension scores among users (Shafiee Rad, 2025). These outcomes align with earlier research suggesting that AI tools can create individualized learning pathways and dynamically adjust materials to meet learner needs (Zawacki-Richter et al., 2019; Luckin et al., 2016).

Intelligent Tutoring Systems (ITS) such as TuinLec and Smart Sparrow were particularly effective in fostering reading sub-skills such as identifying main ideas, understanding text structures, and applying reading strategies through adaptive scaffolding and real-time support (Kusumawati et al., 2025; Yuan, 2025). These findings echo theoretical perspectives on effective reading, which stress the interplay of bottom-up decoding and top-down processes like prediction, summarization, and self-monitoring (Grabe and Stoller, 2011; Mokhtari and Reichard, 2002). Moreover, adaptive platforms and speech-based applications such as Reading Assistant Software (RAS), Read Naturally Live, and ReadTheory contributed to improvements in reading fluency and accuracy. These tools leveraged speech recognition technology, repeated reading, and immediate corrective feedback to help learners strengthen oral fluency and prosody (Wilang et al., 2025; Hidayat, 2024; Rodríguez-Fuentes et al., 2024).

Another notable area of effectiveness is the impact of AI tools on motivation and reading anxiety reduction. Reading anxiety, often linked to unfamiliar vocabulary or cultural references, was significantly reduced when learners used tools that provided

real-time, non-judgmental feedback (Wiyaka et al., 2024). For example, Smart Sparrow leveraged biometric feedback to detect stress and adjust tasks to reduce cognitive load and enhance engagement (Yuan, 2025). Gamification features and interactive experiences in tools like Nearpod and ReadToMe further boosted learner motivation and participation (Alazemi, 2024), reflecting findings that emotionally supportive environments promote persistence and confidence in reading.

Finally, an important dimension of effectiveness lies in the capacity of AI tools to support self-regulated and metacognitive reading behaviours. Platforms such as ReadToMe and TuinLec have been shown to encourage goal-setting, comprehension monitoring, and reflection, thereby fostering independent reading skills and strategic awareness (Kusumawati et al., 2025; Shafiee Rad, 2025). These findings are corroborated, who noted that AI-enhanced reading environments promote metacognitive engagement in EFL contexts by enabling structured, interactive, and self-paced reading tasks. Similarly, adaptive platforms like ReadTheory and Smart Sparrow provide learners with data-driven feedback and reflective prompts, supporting the development of planning, monitoring, and evaluation strategies during the reading process (Yuan 2025). Further observed that interaction with AI-based conversational agents supports learners in articulating their thought processes and reviewing reading decisions—an essential component of metacognitive growth.

Overall, these findings indicate that AI-based tools are effective not only in improving reading comprehension and fluency but also in cultivating motivation, confidence, and metacognitive skills.

RQ 3: What challenges have been reported during the application of these AI tools?

While AI-powered reading tools have demonstrated significant potential, their implementation is accompanied by notable challenges. Technical and infrastructural barriers such as unstable internet connections, device limitations, and software glitches remain a major hurdle, particularly in resource-constrained contexts. Shafiee Rad (2025) and Alazemi (2024) observed that disruptions in platforms like ReadToMe™ and Nearpod undermined the continuity of reading activities. These challenges resonate, who argue that inadequate infrastructure amplifies the digital divide, limiting equal access to AI-driven educational opportunities. This is particularly concerning for rural or under-resourced schools where stable connectivity and compatible hardware cannot be guaranteed. Besides, teacher readiness and pedagogical alignment also emerged as critical challenges. Integrating AI into reading instruction requires teachers to acquire both technical expertise and pedagogical agility to balance automated feedback with human guidance. Traditional methods like choral reading or vocabulary drills often fail to meet the needs of diverse learners (Nation, 2013), and AI tools are not inherently effective unless teachers adapt them to specific learning contexts. Hidayat (2024) as well as Wiyaka et al. (2024) highlighted that Reading Bot and ReadTheory yielded the best outcomes when teachers actively interpreted AI feedback and scaffolded instruction to ensure deeper comprehension. Without sufficient training and professional development, teachers risk using AI as a superficial substitute rather than as a complementary instructional tool.

Data privacy and ethical considerations represent another significant issue. Platforms such as Smart Sparrow, which collect biometric data (e.g., eye-tracking and heart rate variability), raise questions about data ownership, storage, and the risk of misuse (Yuan 2025). As Zawacki-Richter et al. (2019) noted, AI integration must be accompanied by

transparent data governance frameworks and robust cybersecurity protocols to ensure ethical use, particularly when handling sensitive learner data in educational environments. Furthermore, adaptive limitations were also frequently reported across studies. While AI platforms aim to personalize learning pathways, their algorithms sometimes misalign with learners' needs, resulting in tasks that are either too challenging or overly simplistic. Kusumawati et al. (2025) and Shafiee Rad (2025) observed that ReadToMe and TuinLec occasionally failed to account for unique reading difficulties, leading to disengagement among learners. These findings support Grabe and Stoller (2011) assertion that effective reading instruction requires nuanced, context-aware scaffolding that AI alone cannot fully replicate. Human expertise remains essential in interpreting and responding to the subtleties of learner performance.

Another recurring challenge relates to the contextual and content suitability of AI-powered reading tools. Several studies noted that certain platforms, originally designed for first-language learners or general educational contexts, required significant adaptation for second-language or specialized learners. For instance, Rodríguez-Fuentes et al. (2024) highlighted that Read Naturally Live lacked cultural and linguistic relevance for adult EFL learners, necessitating content adjustments to match learners' backgrounds and proficiency levels. Similarly, Çelik et al. (2024) found that although ChatGPT-based text simplification improved comprehension, a single intervention session was insufficient for sustained gains in reading proficiency or anxiety reduction, indicating that the contextual depth and continuity of AI tasks remain limited. Furthermore, Nisha and Gill (2024) emphasized that tools such as Skybox AI, developed for Deaf and Hard of Hearing learners, depend heavily on teacher expertise and advanced technical setups, which limits their scalability in schools with minimal resources. These findings suggest that while AI technologies offer innovative possibilities, their full potential can only be realized when content, context, and learner needs are carefully aligned.

Finally, learner's over-reliance on automated feedback emerged as a concern. Although tools like RAS and Nearpod enhance fluency and comprehension, several studies (Wilang et al., 2025; Alazemi, 2024;) warned that learners may become passive, depending on real-time corrections instead of developing independent self-monitoring strategies. This aligns with research emphasizing the importance of fostering metacognitive awareness and strategic reading behaviors to promote active and reflective engagement with texts (Mokhtari and Reichard, 2002). Collectively, these challenges highlight that while AI tools offer transformative potential, their success depends on robust infrastructure, teacher expertise, ethical safeguards, and balanced integration with human-led instruction. Without these conditions, the risk of technical disruptions, misaligned personalization, or reduced learner autonomy can undermine their effectiveness.

Conclusion

To conclude, this study has systematically reviewed empirical papers on the use of AI-powered tools in English reading instruction across diverse learning contexts. This paper aimed to identify the types of AI tools utilized, evaluate their effectiveness in enhancing reading skills, and examine the challenges reported in their application. By analyzing 10 empirical studies published between 2021 and 2025, this review has addressed the gap in systematic reviews focusing specifically on AI-driven reading

instruction. The main findings emphasized six categories of AI-powered tools: chatbot systems, intelligent tutoring systems (ITS), adaptive reading platforms, speech-based reading applications, multimodal AI applications, and natural language processing (NLP) tools. Among these, intelligent tutoring systems and adaptive platforms, such as ReadToMe™, Smart Sparrow, and ReadTheory, emerged as the most prominent, showing significant improvements in reading comprehension, fluency, motivation, and learner confidence. AI tools also fostered metacognitive engagement, reduced reading anxiety, and supported self-regulated reading behaviors, making them effective supplements to traditional instructional approaches.

This review also identified several key challenges, including technical and infrastructural barriers (e.g., unstable internet and device limitations), teacher readiness and pedagogical alignment, data privacy and ethical considerations, adaptive limitations, contextual and content suitability of AI-powered reading tools and learner over-reliance on automated feedback. These findings highlight that while AI tools have transformative potential, their success depends on robust infrastructure, adequate teacher training, and careful integration with human-led instruction. The insights from this review provide educators, curriculum designers, and policymakers with valuable guidance for selecting and implementing AI-powered reading tools. Understanding the strengths and limitations of different AI applications allows for more personalized, technology-enhanced strategies that improve comprehension, fluency, and learner engagement. This research, however, has a few limitations. The review was restricted to studies from 2021–2025 and used a single database (Scopus), which may have excluded other relevant studies. Additionally, many of the reviewed studies focused on specific educational levels or populations, limiting the generalizability of findings. Future studies should investigate AI-powered reading interventions across a wider range of learners and contexts, conduct longitudinal studies to assess long-term impacts, and address ethical concerns related to data privacy and algorithmic transparency.

Despite these limitations, this review makes a significant contribution to understanding AI-driven reading instruction. AI-powered tools, when integrated effectively, have the potential to revolutionize reading pedagogy by offering adaptive, engaging, and data-informed learning experiences.

Acknowledgement

This systematic literature review would not have been completed without the support, guidance, and encouragement of various individuals. The author would like to express sincere appreciation to the main supervisor, Prof. Melor Md. Yunus, and the co-supervisor, Dr. Colin Wong, as well as postgraduate classmates, for their valuable insights, discussions, and academic support throughout the preparation of this review. Gratitude is also extended to the researchers whose published studies formed the foundation of this work.

Conflict of interest

The authors confirm that there is no conflict of interest involved with any parties in this research study.

REFERENCES

[1] Alazemi, L. (2024): Formative assessment in artificial-integrated instruction: Effects on reading comprehension, enjoyment, and mindfulness. – Language Testing in Asia 14(1): 26p.
[2] Al-Khasawneh, F.M.S. (2019): The impact of vocabulary knowledge on the reading comprehension of Saudi EFL learners. – Journal of Language and Education 5(3): 24-34.
[3] Bachiri, Y.A., Mouncif, H., Bouikhalene, B., Hamzaoui, R. (2024): Integrating AI-based speech recognition technology to enhance reading assessments within Morocco's TaRl program. – Turkish Online Journal of Distance Education 25(4): 1-15.
[4] Carrell, P.L., Eisterhold, J.C. (1983): Schema theory and ESL reading pedagogy. – TESOL Quarterly 17(4): 553-573.
[5] Çelik, F., Yangın Ersanlı, C., Arslanbay, G. (2024): Does AI simplification of authentic blog texts improve reading comprehension, inferencing, and anxiety? A one-shot intervention in Turkish EFL context. – International Review of Research in Open and Distributed Learning 25(3): 287-303.
[6] Crompton, H., Burke, D. (2023): Artificial Intelligence in Higher Education: The State of the Field. – International Journal of Educational Technology in Higher Education 20(22): 22p.
[7] Elmaadaway, M.A.N., El-Naggar, M.E., Abouhashesh, M.R.I. (2025): Improving primary school students' oral reading fluency through voice chatbot-based AI. – Journal of Computer Assisted Learning 41(2): 20p.
[8] Grabe, W. (2009): Reading in a second language: Moving from theory to practice. – Cambridge University Press 467p.
[9] Grabe, W., Stoller, F.L. (2011): Teaching and researching reading. – Routledge 340p.
[10] He, X. (2024): Enhancing reading comprehension with AI-generated adaptive texts. – International Journal of New Developments in Education 6(7): 46-52.
[11] Hidayat, M.T. (2024): Effectiveness of AI-Based Personalised Reading Platforms in Enhancing Reading Comprehension. – Journal of Learning for Development 11(1): 115-125.
[12] Hu, M., Nation, I.S.P. (2000): Unknown vocabulary density and reading comprehension. – Reading in a Foreign Language 13(1): 403-430.
[13] Kasneci, E., Sessler, K., Kasneci, G. (2023): ChatGPT for education: Opportunities and challenges. – Nature Human Behaviour 7: 9-11.
[14] Koda, K., Zhang, D. (2012): Contribution of morphological awareness and lexical inferencing ability to L2 vocabulary knowledge and reading comprehension among advanced EFL learners. – Reading and Writing 25(5): 1195-1216.
[15] Kusumawati, E.T., Solihati, N., Sari, Z. (2025): Integration of Web-Based Intelligent Tutoring System (TuinLec) into Text Structure Strategy to Improve Text Strategy Memory and Reading Comprehension Skills. – International Journal of Learning, Teaching and Educational Research 24(4): 52-71.
[16] Lai, C., Zhu, W., Gong, G. (2015): Understanding the quality of out-of-class English learning. – TESOL Quarterly 49(2): 278-308.
[17] Luckin, R., Holmes, W., Griffiths, M., Forcier, L.B. (2016): Intelligence unleashed: An argument for AI in education. – Pearson Education 60p.
[18] Lu, X., Zou, B., Luo, S. (2021): Applying AI technologies to L2 reading: The potential of NLP-based tools. – Language Learning & Technology 25(1): 152-169.
[19] Mokhtari, K., Reichard, C.A. (2002): Assessing students' metacognitive awareness of reading strategies. – Journal of Educational Psychology 94(2): 249-259.
[20] Nation, I.S.P. (2013): Learning vocabulary in another language. – Cambridge University Press 10: 126-132.

[21] Niyozov, N., Bijanov, A., Ganiyev, S. (2023): The pedagogical principles and effectiveness of utilizing ChatGPT for language learning. – E3S Web of Conferences 461: 9p.
[22] Nisha, M.V., Gill, J.C.R. (2024): English reading and writing enhancement for Deaf and Hard of Hearing students with Skybox AI. – Forum for Linguistic Studies 6(6): 184-193.
[23] Pressley, M., Afflerbach, P. (1995): Verbal protocols of reading: The nature of constructively responsive reading. – Lawrence Erlbaum Associates 168p.
[24] Rodríguez-Fuentes, R.A., Ferrer Ariza, E., Linero, J. (2024): Digital reading aloud protocols and its effects on EFL fluency. – System 119: 15p.
[25] Shafiee Rad, H. (2025): Reinforcing L2 reading comprehension through artificial intelligence intervention. – Smart Learning Environments 12(1): 28p.
[26] Tessensohn, T.C., Yunus, M.M., Ismail, H.H. (2025): Using AI-powered tools in enhancing reading skills in the ESL classroom: A systematic review. – International Journal of Academic Research in Progressive Education and Development 14(2): 13p.
[27] Wei, L. (2023): Artificial intelligence in language instruction: Impact on English learning achievement, L2 motivation, and self-regulated learning. – Frontiers in Psychology 14: 14p.
[28] Wilang, J.D., Seepho, S., Kitjaroonchai, N. (2025): Exploring the relationship of reading fluency and accuracy in L2 learning. – Education Sciences 15(1): 13p.
[29] Wiyaka, W., Silitonga, L.M., Sunardi, S. Pramudi, Y.T.C. (2024): From nervous to fluent: The impact of AI chatbot-assisted assessment on English reading anxiety and performance in Indonesia. – Theory and Practice in Language Studies 14(12): 3851-3860.
[30] Xu, Z., Wijekumar, K.O., Ramirez, G., Irey, R. (2019): The effectiveness of intelligent tutoring systems on K-12 students' reading comprehension: A meta-analysis. – British Journal of Educational Technology 50(6): 3119-3137.
[31] Yuan, H. (2025): Artificial intelligence in language learning: biometric feedback and adaptive reading for improved comprehension and reduced anxiety. – Humanities and Social Sciences Communications 12(1): 1-16.
[32] Zawacki-Richter, O., Marín, V.I., Bond, M., Gouverneur, F. (2019): Systematic review of research on AI applications in higher education. – International Journal of Educational Technology in Higher Education 16(2): 1-27.
[33] Zhu, M., Wang, C. (2025): A systematic review of research on AI in language education: Current status and future implications. – Language Learning & Technology 29(1): 1-29.