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TECHNOLOGY-ENHANCED LEARNING (TEL) IN TEACHING READING COMPREHENSION IN EFL CONTEXTS: A SCOPING REVIEW

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Abstract

Reading comprehension is a significant element of reading. Research shows that digital technology can assist language learners in improving their reading comprehension. This scoping review aimed to examine and describe research papers concentrating on using Technology-Enhanced Learning (TEL) for teaching reading comprehension to lower-level English as a Foreign Language (EFL) learners in a non-English-speaking context. Databases like ERIC, OneSearch, Google Scholar, Scopus, and ResearchGate were used to categorize peer-reviewed research articles between 2014 and 2025. Thirty papers that met the inclusion criteria were selected for analysis. Research papers concentrated on English-speaking contexts, and theoretical studies were excluded, choosing only non-English teaching settings and those containing evaluative evidence of TEL interventions. Results show that multimedia applications and AI-driven tools are broadly used in teaching reading comprehension in the EFL context. TEL is indicated as an accelerator in student engagement, personalized learning, and reading comprehension skills. However, TEL has some challenges, such as teacher professional development, accessibility problems, and the sustainability of technology-based interventions. Future investigations should examine efficient TEL strategies to incorporate into the EFL curriculum and assess their cross-cultural adaptability.

Research questions and objectives:

For this study, the following research questions have been chosen:

1. What is the current status of research on using technology-enhanced learning (TEL) tools to enhance reading comprehension among EFL students?

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2. What types of technologies and digital tools are most often implemented in EFL reading classes, and how are they incorporated into pedagogical practice?
3. What are the impacts of TEL on EFL students' reading comprehension results across different proficiency levels and educational contexts?
4. How do the methodological designs of studies on TEL in EFL reading instruction differ?
5. What are the benefits and limitations connected to TEL in EFL reading classrooms in the existing literature?

As a former English learner, as a foreign language learner, and an English as a second language educator and researcher, I intend to review the previous and existing studies between 2014 and 2025 on improving EFL reading comprehension, incorporated with technology-enhanced learning, to find answers to the questions above. With this research paper, I aim to showcase the current status of research on using TEL in enhancing reading comprehension, and hopefully to improve further inquiry into the matter. This paper will complement the article by Oakley (2024), with its specific target on implementing TEL in reading instruction in EFL contexts. Additionally, it will provide teachers, educators, and curriculum developers with an overview of research findings and enlighten them with ideas on how to enhance their teaching experiences with TEL digital tools. Finally, this paper will discuss the gaps in the systematic review of existing literature and offer implications for further studies in ESL teaching and EFL embedding TEL.

Literature review:

For the past decades, Technology-Enhanced Learning (TEL) has raised important questions, inquiring how technology can be designed to enhance learning and how this enhancement can be correctly measured (Kirkwood & Price, 2014, p.6). Balacheff et al. (2009) believe that TEL tools enhance information processing and identify collaborative learning in digital settings that optimize transformation in education. The role of TEL has been widely researched recently in enhancing reading comprehension skills in English as a Foreign Language environments (Kirkwood & Price, 2016; Mistar, Zuhairi, & Yanti, 2016; Abdelhalim. 2017; Nourdad, Masoudi, & Rahimali, 2018; Pardede, 2019; Kim, 2020; Halimah, Putri,

Modern American Journal of Linguistics, Education, and Pedagogy
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Volume 01, Issue 03, June, 2025
Website: usajournals.org

Hakim, & Mutiah, 2022; Nurwahidah, Sulfasyah, & Rukli, 2023; Oakley, 2024; Ali, AbdAlgane, Youssif, Elkot, & Abbass, 2024; Yarmakeev, Pimenova, Abdrafikova, & Khusainov, 2024; Rachmawati, Noor Sahid, & Prananda, 2025). Alongside TEL, multimedia integration in reading class content design is thought of as optimal technology integration to enhance reading instruction (Yeh, Hungn & Chiang, 2016; Taj, Ali, Sipra, & Ahmad, 2017; Mohammadian, Saed, & Shahi, 2018; Dong, You, Alharbi, & Ahmad, 2022; Yan & Zhang, 2024; Lu & Li, 2024). As well as multimedia, Artificial Intelligence (AI) and AI-based learning systems are also thought to improve self-regulated reading (Pan et al., 2024), which reduces stress and anxiety in developing reading comprehension (Celik et al., 2024) and personalizes reading proficiencies (Dong et al., 2022). Concerning computer-assisted reading teaching, internet reading strategies boost digital literacy skills (Giron-Garcia, 2015), critical literacy (Al-Seghayer, 2016), and digital navigational skills in reading (Taj et al., 2017).

No	Study	Theoretical perspective	Participants/language/ context	Research questions/ purpose statement	Research methods/ Data collection and analysis	Key findings
1	Abdelhalim (2017)	Habits of Mind (HoM) (e.g., critical thinking, persistence) and Shared Inquiry (collaborative discussions)	N=50 Ages: 22-24 Language(s): Arabic Language Level: Pre-Intermediate level Academic level: a two-year English diploma certification Department: Deanship of Community Service and Continuous Education Center, Imam University, KSA Location: Egypt	To investigate the effect of the proposed instructional strategy (HoM and Shared Inquiry) on EFL students' reading comprehension and engagement	Quasi-experimental with pre-test/ post-test, Reading Comprehension Test, Reading Engagement Scale, Focus Group Interviews, Independent. Paired t-tests and effect sizes for analysis.	The experimental group outperformed the control group in reading engagement such as behavioral, emotional, and cognitive dimensions. Student motivation and participation increased.
2	Ali (2024)	Dialogic Teaching and Technology Integration	N=60 Age: N/A Languages: English, Arabic Language level: N/A Academic level: University Department: Qassim University Location: Saudi Arabia	To examine the strategies that can enhance the synergetic impact of dialogic teaching and technology incorporation in ESP reading instruction and comprehension.	Semi-structured interviews, Recorded Dialogic Teaching sessions, Standardized Reading Comprehension Tests, descriptive and inferential statistics (paired t-tests), and thematic analysis.	A combination of dialogic teaching with technology showed significant improvements in critical thinking and active engagement reading comprehension. **Blackboard** was used as a collaborative tool, and multimedia resources, such as interactive

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Volume 01, Issue 03, June, 2025
Website: usajournals.org

						presentations and audio snippets, were integrated. Success elements were Open-ended questioning, collaborative discourse, and teacher-mediated feedback.
3	Al-Jarf (2014)	TEL tools like Elluminate Live on improving language acquisition	N=49 Age:18-21 Languages: English, Arabic Language level: College students majoring in translation Enrolled in English reading course Academic level: university Department: The College of Language and Translation Location: King Saud University, Riyadh, Saudi Arabia	A web-conferencing software, Elluminate Live's effect in reading practice sessions on students' reading skills development and overall achievements	Pre/post-tests to assess reading improvement. Comparative statistical analysis to evaluate reading performance differences.	**Blackboard LMS's synchronous online tool, Elluminate Live**, in reading instruction improves comprehension, engagement, and general reading performance. Collaborative learning is promoted through real-time reading discussions in virtual classrooms using live chats, polls, Voice over IP, and screen sharing while doing interactive comprehension exercises.
4	Al-Maashani & Mudhsh(2023)	CALL (Computer-Assisted Language Learning) and MALL (Mobile-Assisted Language Learning) as successful technology adoption in language classrooms	N=0 Focus on previous literature rather than empirical data. Age: No participants Language level: Broader EFL/ESL contexts Language: EFL/ESL Department: English Language Center, University of Technology and Applied Sciences Location: Sultanate of Oman	Synthesizing existing research on the effect of digital resources and online networks in EFL/ESL settings.	Qualitative literature review, TEL-based resources including conference proceedings, educational reports, and peer-reviewed articles.	**Interactive whiteboards, mobile applications, and learning management systems** foster motivation, engagement, and personalized learning experiences. Online collaborative writing and digital storytelling improve reading skills.
5	Al-Seghayer (2016)	Computer-assisted reading (CAR) in L2 reading	N=70 Age: N/A Language level: N/A ESL/EFL instructors Language(s): English, Arabic Department: form multiple universities Location: Al-Imam University, Riyadh, Saudi Arabia	To examine educators' opinions on the CALL theory in enhancing reading skills and pedagogical constructivism, emphasizing learner-centered reading settings guided by technology.	Quantitative survey, descriptive and inferential statistical analyses, including means, standard deviations, paired t-tests, and bootstrapped p-values.	CAR is viewed as valuable technology that improves learner autonomy and engagement. Since some teachers resist using multimodal texts, including audio and visuals, further professional development is seen as needed on CAR tools.
6	Celik et al. (2024)	ChatGPT-simplified texts on EFL students' reading skills	N=105 Age: Undergraduate students Language(s): English & Turkish	To explore the effect of ChatGPT-simplified authentic texts on university language	A within-subjects design, a demographics survey, a reading comprehension test (RCT), the foreign language reading anxiety	A significant improvement in reading comprehension and inferring scores following the ChatGPT intervention.

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			Language level: N/A Department: Foreign Languages Education Location: Ondokuz Mayiz University, Samsun, Turkey	learners' reading comprehension	scale (FLRAS), and statistical analysis using SPSS v.26, including normality tests and Wilcoxon signed-rank tests.	No considerable change was seen in reading anxiety levels. ChatGPT simplification has a positive impact on inferencing and reading comprehension.
7	Chea & Xiao (2024)	The influence of AI-assisted tools on improving reading comprehension, critical thinking, and vocabulary acquisition	N= 24 Age: university students Language(s): English & Chinese Language level: mixed levels Department: mixed majors Location: Dali University, China	Use of AI in Education (AIED) and AI-driven technology to improve reading comprehension, engagement, and vocabulary acquisition	Surveys to assess perspectives and challenges, pre- and post-tests utilizing IELTS reading materials, and semi-structured interviews for in-depth analysis. Quantitative study with paired samples t-tests in SPSS and qualitative analysis with thematic content analysis based on interviews.	AI tools such as ChatGPT, ChatPDF, and QuillBot increased the reading scores of experimental students, along with higher engagement, motivation, and confidence,
8	Daweli & Mahyoub (2024)	Examining EFL learners' perspectives on the use of AI tools in their reading classes	N= N/A Age: Undergraduate students (20-25 yo) Language(s): English & Arabic Language level: mixed level Department: Languages and Translation, English Language Program Location: Taibah University, Saudi Arabia	Adaptive and personalized learning experiences are well supported by intelligent tutoring systems, AI-driven platforms, and other digital technologies	A cross-sectional survey design, exploratory study, descriptive statistics.	Language learners reported that their reading skills, motivation, and confidence increased. Their needs were met by adaptive and supportive learning powered by AI tools.
9	Dong et al. (2022)	AI applications in literacy instruction, multi-criteria decision support system in online reading	N = not a human but a conceptual and experimental study Age: no actual learners but rather system design and technical modeling Language(s): English Language level: N/A Department: School of Foreign Languages, Xiamen Institute of Technology, China, Department of IT and Computer of Computer Science, Saudi Arabia Location: not location-bound to a classroom context	To improve online reading instruction, designing and applying AI-powered applications and English multimode to boost online language learning	System simulation and conceptual-experimental design. To implement the Analytic Network Process (ANP), Super Decisions software and a particular multi-criteria decision support system (MCDM) were used. Weighted, unweighted, and limit matrices were generated. The most efficient design was determined.	Multimodel English learning is boosted by VidReader, Classcraft, chatbots, and Seeing AI. The suggested model integrates multimodel recourses with better decision making skills.

Modern American Journal of Linguistics, Education, and Pedagogy
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Website: usajournals.org

10	Gao (2023)	Exploring how data mining technology can improve reading and writing instruction	N = exact number of participants not mentioned Age: age range is also not mentioned Language(s): Language level: Department: Location:	A BERT-based model and TF-IDF and TFC improvement algorithms assess and extract high-quality sentences from reading to apply to writing.	Controlled experiment, pre- and post-test analysis, and machine learning models, such as BERT, TF-IDF, and BI-attention to analyze sentence selection and text comprehension.	AI and Natural Language Processing (NLP) can enhance EFL language learners' reading and writing skills in higher education. Data mining in education boosts students' learning patterns, and cognitive overload in reading comprehension decreases using the sliding-window method.
11	Giron-Garcia (2015)	Investigating how technology, online texts, and digital literacy improve reading comprehension based on critical engagement and autonomous learning.	N= 58 Age: The university students' age is not specifically stated Language(s): English and Spanish Language level: intermediate to advanced EFL learners Department: English Studies Location: Spain	Does new literacy such as multimodel (hyperlinks, images, and texts) and digital literacy (skills of assessing and synthesizing online information) improve with task-based learning (Cybertasks)?	Qualitative data, case studies, self-reported data, qualitative case study with a WebQuest intervention, student reflections, exam performance, and thematic analysis of language learners' replies to assess skill development, metacognition, and engagement.	A WebQuest-based intervention fosters lifelong learning skills and critical online reading. Case studies showed deeper content understanding, exam preparation advantages, and high engagement when reading literacy was integrated with evaluating online content and navigating hyperlinks skills. Cybertasks enhanced language learners' autonomy, content mastery, and metacognitive skills in an Applied Linguistics course.
12	Halimah et al. (2022)	Integrating a mind mapping technology with suggestopedia to improve EFL reading comprehension	N= 15 vocational school students Age: N/A Language(s): N/A Language level: N/A Department: Pharmacy of Bkakti Medika Health Vocational School Location: Cianjur District West Java Province, Indonesia	Do mind maps improve visual learning and reading comprehension? Does suggestopedia combined with mind maps lead to a more entertaining and interactive learning process?	Qualitative descriptive, structured questionnaires, observations on the reading of narrative text class, and data analysis were achieved through thematic coding and categorization based on five analytical steps.	The integration of suggestopedia (relaxed classroom environment) with mind maps as a technological tool revealed improved comprehension and engagement. A relaxed and enjoyable learning atmosphere reached with suggestopedia increases learning motivation and decreases student anxiety. Background music while storytelling and role-playing enhances collaborative learning.
13	Hong (2025)	Investigating text mining technology's impact on enhancing college-level EFL learners' reading	N = 80 Age: N/A, but they are first-year university students Language(s): EFL/ Mandarin Language level: N/A Department: School of foreign languages	Do AI-driven recommendation systems promote engagement? Do smart classrooms ensure structured reading instruction and effective	Qualitative analysis, controlled experiment, SPSS and STATA to evaluate reading comprehension, Excel table processing software, questionnaire to assess language learners' emotional,	A smart classroom-based teaching model that incorporates text mining technologies, such as TF-IDF algorithms, knowledge structure similarity, and reading preference models, suggests tailored reading

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Website: usajournals.org

		comprehension .	Location: China	comprehension development?	cognitive, and behavioral engagement in reading.	materials, and it enhances personalized learning.
14	Kim (2020)	Exploring learner satisfaction and reading comprehension achievement through real-time Zoom video lectures	N= 100 Age: N/A, but they are freshmen Language(s): English and Korean Language level: N/A Department: Economics, International Trade, and Law Location: Seoul, Korea	What is the role of Zoom in language interaction and developing communicative competence? Do learning engagement and reading comprehension improve through intercultural learning and tele-collaboration?	TOEIC tests, SPSS for analysis, quasi-experimental design, Likert-scale surveys.	EFL learners reported satisfaction owing to ease of access, self-directed learning, and increased motivation. Real-time Zoom interaction promotes EFL reading comprehension.
15	Lu & Li (2024)	Studying blended teaching in College English Reading classes, underscoring resource richness and flexibility.	N= N/A Age: N/A college-level EFL students Language(s): English and Chinese Language level: N/A Department: N/A Location: China	Do test subjects validate the recommendation model as effective? Does blended learning align with adaptive learning and personalized education? Are AI-based approaches applied successfully to reading material recommendation multi-source data fusion?	Both qualitative and quantitative methods, algorithmic modelling, empirical validation, interviews, and questionnaires.	The personalized online English reading recommendation model successfully matched EFL learners' reading preferences. Multi-source fusion model is suggested, including data collection (reading habits and needs are gathered), multi-source information fusion module (various materials merged), information aggregation module (data processed and analyzed), and application layer module (personalized reading sources suggested).
16	Maspul (2024)	Exploring the combination of technology with a collaborative reading strategy – reciprocal teaching to improve reading instruction.	N= N/A Advanced Teaching MEd program educators Age: N/A Language(s): English Language level: Advanced Department: Advanced Teaching and Education Location: University of People	Does reciprocal teaching empower language learners to take ownership of their learning as a transformative strategy? How do digital tools such as multimedia annotations, gamification, and online collaborative platforms enrich the reciprocal teaching procedure?	Multi-faceted qualitative study, audio-recording, transcriptions, group discussions, documented classroom observations, in-depth field notes, comprehensive thematic literature analysis and synthesis. Triangulation to boost reliability and validity.	Technology tools such as gamification, digital storytelling, online collaborative platforms, and virtual book clubs make reciprocal teaching effective and engaging. In turn, reciprocal teaching encompassing multimedia annotations, peer tutoring, and digital annotation tools enhances reading comprehension, collaborative learning, critical thinking, and metacognitive skills among struggling and low-income readers, too.
17	Moham madian et al. (2018)	Investigating how video technology can enhance EFL reading comprehension .	N= 30 male students Age: 16-18 years old Language(s): English and Farsi Language level: intermediate Department:	Do authentic materials and cognitive multimedia learning aid to enhance reading comprehension? How does implied dual coding, including	Quasi-experimental design with pre- and post-tests. Longman placement test as a homogeneity check instrument.	By providing motivational engagement, visual context, and authentic input, technologies with video materials increased the reading comprehension of

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			Location: Iran	visual and auditory input, expose learners to real-world language in documentaries and news clips?		experimental group participants, who scored a significantly higher mark on the post-test.
18	Rachmawati (2025)	Examining the use of AI, multimodality, and digital technology in reading teaching.	N= 10 teachers Age: N/A Language(s): English Language level: Professional English teachers Department: English Education Department at Junior High Schools Location: Indonesia	The implementation of artificial intelligence (AI) and digital technology in teaching reading at the high school level.	Qualitative case study, reading class observations, interviews.	Multimodality, such as audio, video, and texts, enhances reading comprehension. AI supports teachers in providing personalized learning, interactive reading activities, and lesson preparation.
19	Taj (2017)	Investigating CALL and MALL's impact on EFL preparatory program students' reading comprehension.	N= 122 Age: 19-22 years old Language(s): English Language level: intermediate Department: Preparatory Year Program Location: Saudi Arabia	Does technology integration, such as authoring tools and mobile apps, enhance reading comprehension? Do WhatsApp and Hot Potatoes enhance vocabulary pre-teaching and interactive reading?	Quasi-experimental and qualitative analysis. Descriptive and inferential statistics, t-tests.	Effective use of freely available tools for resource-constrained reading materials. Hot Potatoes is an effective tool for cloze exercises, multimodal vocabulary cards are beneficial for L1/Ls translations. CALL/MALL reduces anxiety and improves reading comprehension. TEL input is gender neutral.
20	Wang (2022)	Examining computer-assisted and AI-powered evaluations in a college writing and reading course.	N= 178 Age: N/A Language(s): English Language level: N/A college-level Department: N/A Location: Beijing, China	To investigate EFL language learners' perceptions and views on computer-assisted tools to improve their writing and reading abilities.	Quantitative data analysis with pre- and post-tests. Qualitative analysis through surveys, interviews.	Computer-assisted evaluation tools were found effective in giving instant feedback. EFL language learners' independent learning abilities improved. A positive correlation was observed between initial expectations and the final evaluation of computer-assisted learning tools and learning results.
21	Yan et al. (2024)	Exploring how multimedia technology can improve student engagement and reading comprehension.	N= 100 Age: N/A Language(s): English Language level: N/A Department: Basic Education Department Location: China	Do multimedia tools, projectors, and smart tablets engage students with interactive content? Do innovative teaching methods, such as the optimal integration of traditional methods with multimedia and proper multimedia content design, enhance reading comprehension?	Quasi-experimental design, a questionnaire, pre-, mid-, and post-tests with seven reading comprehension items to compare the performance of control and experimental groups.	Multimedia technology was admitted as a key factor to create interactive and engaging learning environments, stimulating students' engagement and improving classroom productivity. Compared to traditional methods, multimedia technology has been recognized as effective for reading comprehension, providing

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Volume 01, Issue 03, June, 2025
Website: usajournals.org

						interactive and diverse reading materials.
22	Yarmakeev et al. (2024)	The implementation of longreads (long-form texts) as an instrument to apply edutainment (education + entertainment) in teaching extensive reading in EFL settings.	N= 54 Age: Language(s): English Language level: Pre-A1 to A2, primary school students Department: Location: Kazan, Russia	Do lengthy and semantically rich reading materials accompanied by different multimedia elements enhance understanding and student engagement? Do educational technologies, such as edutainment create engaging learning, providing educational rigor?	Mixed-methods approach, questionnaire on learning motivation, textbook content analysis, quantitative analysis of learning outcomes.	Longreads created for specific topics integrated with multimedia elements, such as visual aids and infographics, improved EFL language learners' reading skills, vocabulary, and motivation. Educational content encompassing interactive tasks creates more engaging educational contexts.
23	Yeh et al. (2016)	Web 2.0 collaborative learning theory with Reciprocal teaching. Google Docs collaborative annotation in English reading classes	N= 54 Age: 18-20 years old Language(s): English Language level: low-intermediate Department: Non-English majors Location: Taiwan	Did Google Docs collaborative online annotations enhance reading comprehension? What reading processes emerged in the application of Web 2.0 collaborative learning?	TOEIC-based pre- and post-tests, participation records, quantitative t-tests, qualitative content analysis with coding, categorization, and collaboration, collaborative tasks through Google Docs.	Collaborative online annotations showcased feedback actions and recursive reviewing, supporting metacognitive engagement. Collaborative dialogues and mutual feedback deepened reading comprehension.
24	Zhu (2024)	Studying internet integrated with technology in improving reading comprehension in senior high school reading instruction.	N= not specifically stated Age: app. 15-16 yo Language(s): English Language level: Intermediate Department: Public Foreign Language Education Location: China	Does technology-enhanced learning, ranging from whiteboard collaboration and interactive quizzes, foster a student-centered and more dynamic reading instruction?	Teaching case study approach, qualitative descriptive method.	Internet+technology method improved language comprehension, logical thinking, and cross-cultural communication. Using word formation puzzles, QR code-based quizzes, mind maps, and writing platforms instruct students in structuring responses.
25	Patra et al. (2022)	E-learning through WhatsAPp versus face-to-face learning to enhance reading comprehension and reading motivation	N= 60 Age: 20-33 yo Language(s): English Language level: intermediate Department: English Language Institute Location: Iran	Do student-centered approaches with constructivist principles enhance reading comprehension? Does e-learning increase reading motivation?	Oxford placement test, Motivation for reading questionnaire, independent-samples t-test utilizing SPSS.	E-learning, including gamification, encouraged interaction and participation. reading comprehension and reading motivation were fostered.
26	Asadi &Ebadi (2025)	To examine AR in fostering reading comprehension, personalization, and student motivation.	N= 98 Age: 22-36 yo Language(s): English Language level: Intermediate Department: Higher Education Institution Location: Iran	To study the impact of AR app "XR Plus" in reading classes on reading comprehension improvement. To examine teachers' opinions on integrating AR in EFL reading instruction.	Mixed-methods design, Dialang reading comprehension test, quantitative one-way ANCOVA, qualitative semi-structured interviews with teachers, and thematic analysis with NVivo	AR fostered reading comprehension, supported vocabulary retention, significantly enhanced the comprehension of abstract concepts in a more engaging reading instruction.

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Website: usajournals.org

27	Larysa et al (2014)	To explore Technology-enhanced Learning (TEL)'s impact on reading comprehension, multimodal literacy, and cognitive processing.	N= 517 Age: 7-8 yo Language(s): English Language level: early elementary Department: English Language Arts Location: Canada	To investigate if integrating web-based applications, such as ABRACADABRA and ePEARL, into language instruction enhances reading comprehension in early elementary language learners.	Quasi-experimental design, ABRA (a multimedia literacy tool), ePEARL (a digital portfolio supporting self-regulatory learning (SEL), GRADE Test, OWLS-II as instruments; teacher self-reports, ANCOVA, SPSS for statistical data analysis, trace data from software usage.	Authentic classroom environment, standardized assessments, and tests with real-world feasibility supported metacognitive and literacy skills.
28	Azmuddin et al. (2020)	To examine online blended learning environments integrated with Digital Annotation Tools (DAT) to support reading comprehension.	N= 55 Age: 21-23 yo Language(s): English Language level: Intermediate to advanced Department: Science and Technology Location: Malaysia	Do digital annotation tools support online reading comprehension in technical disciplines? Do structured annotation strategies in blended learning help language learners understand complex academic texts more efficiently?	iREAD platform (Interactive reading for academic disciplines), Minf for main idea and Mvoc for vocabulary markers, SPSS in quantitative, NVivo and thematic analysis in qualitative analysis.	DAT supported online reading comprehension in ESP classes, suggesting structured annotation strategies.
29	Khubyari & Narafshan (2016)	Mobile-Assisted Language Learning (MALL)'s impact on reading comprehension in Iranian reading instruction	N= 40 Age: 15-20 yo Language(s): English Language level: Intermediate Department: English Language Institutes Location: Iran	To investigate the effectiveness of MALL on language learners' reading comprehension.	Quasi-experimental design, Cambridge Placement Test, EngliForEveryone.org materials as pre- and post-reading tests, and independent and paired-sample t-tests.	Mobile phone use in reading instruction enhanced reading comprehension, favoring this method of reading for its convenience and accessibility.
30	Capodieci et al. (2020)	To examine the cognitive theory of reading comprehension with the help of cloze technique (for text prediction and inferential reasoning), CALL and SRL	N= 28 Age: Language(s): Italian Language level: below-average reading comprehension Department: Clinical practice in a private learning disability Location: Italy	To assess the effectiveness of a distance and an individualized technology-based intervention using Cloze app in enhancing reading comprehension of students with speech disorders, ADHD, and learning disabilities (LD).	Quasi-experimental design, Cloze app through Ridinet digital platform, narrative and informative tests, WISC-IV cognitive testing, correlation analysis.	Cloze app was rated as highly enjoyable and useful, being an adaptive individualized intervention with distant clinician monitoring. Comprehension scores improved significantly with positive user engagement and motivation, highlighting inference-based strategy for enhanced comprehension.

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Methods

Literature search procedures

I first developed a list of journals for the literature search based on the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) reporting guidelines by Page et al. (2021). The list comprises twenty-four journals that report on different types and aspects of systematic reviews and evidence synthesis of research in EFL reading comprehension. Most of these journals are international journals that publish papers on language education, applied linguistics, and technology education, according to which the journals were categorized into five groups. Those journals that focus on technology-enhanced EFL reading (group 1) are the International Journal of Information and Education Technology, International Review of Research in Open and Distributed Learning, Soft Computing, Journal of Computers, International Journal of Advanced Culture Technology, Library Hi Tech, Philology and Culture, RELC Journal, and Applied Mathematics and Nonlinear Sciences. This group of journals was searched for by entering the following keywords: technology-enhanced learning, reading strategies, reading comprehension strategies, digital reading, and reading instructional strategies. The second journal group concentrates on Computer-Assisted Language Learning (CALL) and online tools: Arab World English Journal (AWEJ) Special Issue on CALL, ReCALL, Learning, Media and Technology, and Journal of Mekong Societies. These journal articles were grouped using keywords, such as tech-enhanced learning, AI tools, critical review of reading instruction strategies, and EFL tech. The third group journals represent traditional pedagogy and strategies, naming the following: Theory and Practice in Language Studies, English Language Teaching, Advances in Language and Literary Studies, Bellaterra Journal of Teaching and Learning Language and Literature. These journal papers were chosen by searching key themes like internet literacy, digital reading, instructional strategies, and teacher practices. The fourth group of journals embodies regional and context-specific studies, which signify localized practices and cultural adaptations: Journal of Education and English Language Teaching (JEDLISH), Allure Journal, and Journal of Educational Research. These research papers were qualified by inserting keywords of tech narrative texts and teacher challenges in technology. The last

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group of journals comprises interdisciplinary and emerging trends in broad education tech, such as Applied Mathematics and Nonlinear Sciences, Education Sciences, and the Journal of Global Education and Humanity. They characterize systematic reviews on AI's academic impact in education.

Some journal selection procedures reflected articles that met inclusion criteria (discussed later). Out of twenty-eight journals, twenty-four fully represented inclusion criteria, excluding four, namely the International Journal of Applied Linguistics and English Literature, English Language Teaching, Journal of English Teaching, and International Journal of Instruction - did not publish any research that met the inclusion criteria established for the review. In addition to the journals yielded for our research, I then quested Education Resources Information Center (ERIC), OneSearch, Google Scholar, Scopus, and ResearchGate databases as they comprise a lot of journals in the sphere of technology integration and education and are often utilized in meta-analysis and scoping reviews (Booth et al., 2016; Page et al., 2021; Oakley, 2024).

Second, I used the term and expressions: (a) technology-enhanced learning, (b) reading strategies, (c) reading comprehension strategies, (d) digital reading, (e) reading instructional strategies, (f) tech-enhanced learning, (g) AI tools, (h) critical review of reading instruction strategies, (i) EFL tech, (j) internet literacy, (k) digital reading, (l) instructional strategies, (m) teacher practices, (n) tech narrative texts, (o) teacher challenges in technology, and (p) AI's academic impact in education, along with their combinations, to seek the selected journal indexes and the databases between 2015 and 2025. The inclusion criteria required articles to (a) represent empirical evidence, which consists of qualitative and quantitative data on learning outcomes, (b) use technology-enhanced learning (TEL)-based methodology where the product of EFL reading is tested in conjunction with educational techs, (c) direct at EFL students' reading comprehension, (d) include research carried out within non-English environments (e) have a publication date between 2014 and 2025- from the beginning of several influential discussions emerged in TEL for EFL reading comprehension including shift from passive to interactive reading focused on digital literacy (Giron-Garcia, 2015; Yeh et al., 2015, Al-Jarf, 2015; Kirkwood & Price, 2015) and others on assumptions about TEL efficacy in language learning up to the last complete year of publications

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Volume 01, Issue 03, June, 2025
Website: usajournals.org

before the accomplishment of this paper. These discussions proposed to challenge the conventions of TEL productivity in foreign language learning, emphasizing the implications for aligning pedagogy with tech tools in EFL reading rather than solely relying on technology integration in education (Kirkwood & Price, 2015). Other proposals were extending investigations beyond educational techs' role in reading comprehension towards improving metacognitive skills reflected on collaborative and social annotation tools, which are found in synchronous online learning and live virtual classes (Yeh et al., 2015; Al-Jarf, 2015).

The exclusion criteria demanded that we discard research papers where technological integration (a) was not used in conjunction with reading comprehension-based tasks, such as studies on traditional methods with no tech integration, (b) was done on a surface level, without analysis of impact on reading comprehension, (c) are non-educational tech, for instance, general Information and Communication Technologies (ICT) without pedagogical application, (d) which are limited up to-2014 publications that focus on modern tools, (e) study types that are editorials and non-empirical reviews, except for systematic and scoping reviews, and (f) translation studies which were originally written in languages other than English. Using the inclusion and exclusion criteria, 30 empirical studies were identified that met the criteria. Geographical locations beyond the USA have been included.

Results

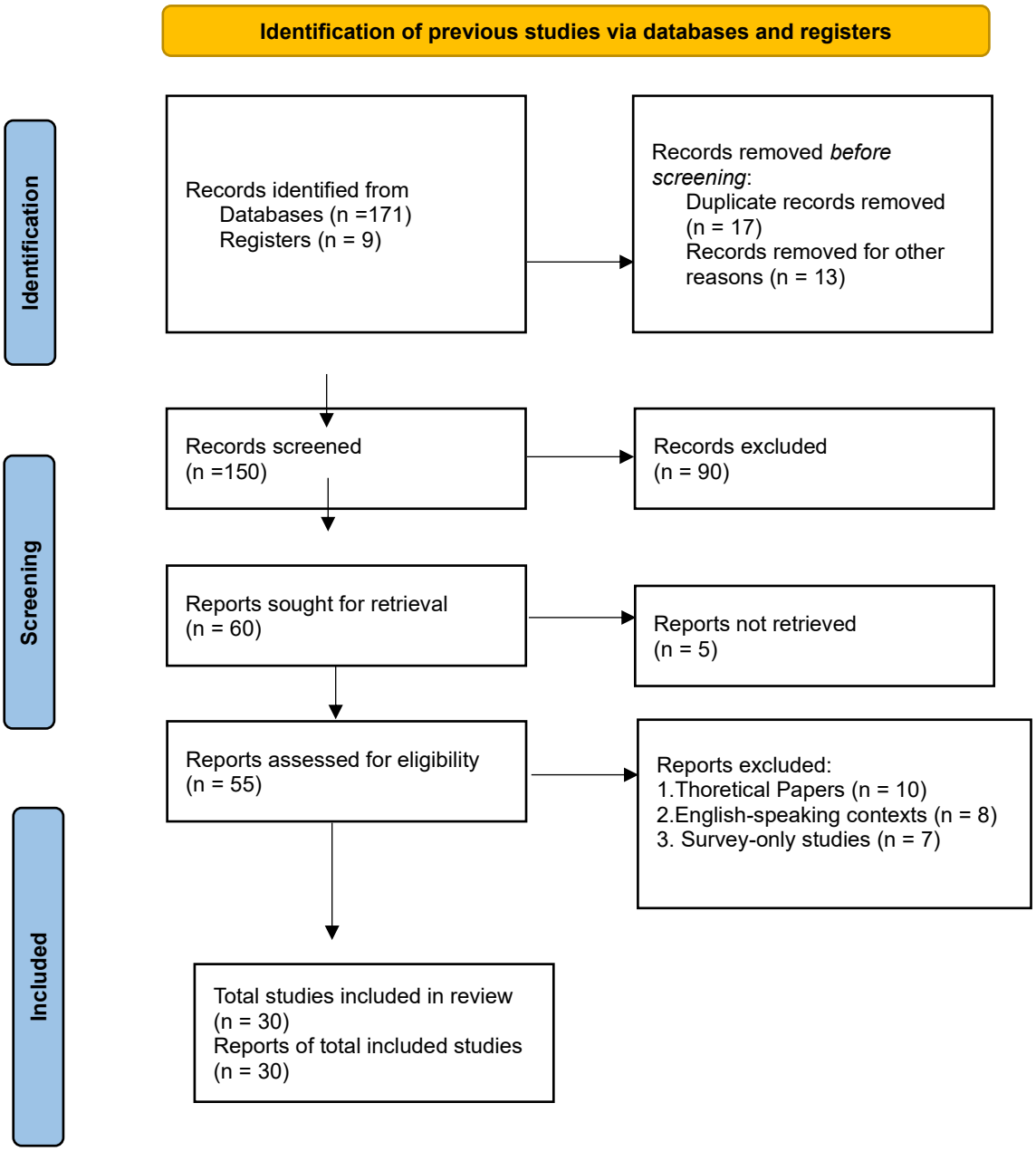
Study selection

Preferred Reporting Items for Systematic reviews and Meta-Analysis (PRISMA) suggested by Page et. al (2020) explain and elaborate on guidance and exemplars for reporting systematic reviews. The guidance includes the 27-item checklist and flowchart template for a systematic review, which is presented below (see Table 1 - PRISMA flow diagram). Records identified from databases included 171, out of which registers counted 9, including ongoing and unpublished study records. Databases comprised Education Resources Information Center (ERIC), OneSearch, Google Scholar, Scopus, and ResearchGate. Articles were allocated for synthesis, excluding protocol-level or unpublished data identified. As a search tool, keyword-based indexing was used for database synthesis, whereas metadata and study status information were used as research tools for identifying the

Modern American Journal of Linguistics, Education, and Pedagogy
ISSN (E): 3067-7874
Volume 01, Issue 03, June, 2025
Website: usajournals.org

register. Duplicated records (30) were removed, and the rest (150) peer-reviewed and scientific articles were screened. Out of these, 90 records were excluded, and 60 reports were thus sought for retrieval. Out of the retrievals, only 5 reports were not retrieved, and the rest 55 reports were assessed for eligibility. 10 theoretical papers, 8 English-speaking contexts, and 7 survey-only studies were examples of excluded reports. Finally, studies that were included in the review accounted for 30.

Table 1: PRISMA flow diagram for updated systematic review



Modern American Journal of Linguistics, Education, and Pedagogy
ISSN (E): 3067-7874
Volume 01, Issue 03, June, 2025
Website: usajournals.org

I based my selection on a review of article abstracts and titles, and found 30 articles that warranted an in-depth analysis. Figure 1 demonstrates the article distribution by journal. As Figure 1 illustrates, most empirical studies on TEL in EFL contexts that met my selection criteria were published in the Applied Mathematics and Non-Linear Sciences (3 articles), Theory and Practice in Language Studies (2 articles), and JEDLISH, International Review of Research in Open and Distributed Journal, and other journals had 1 article each.

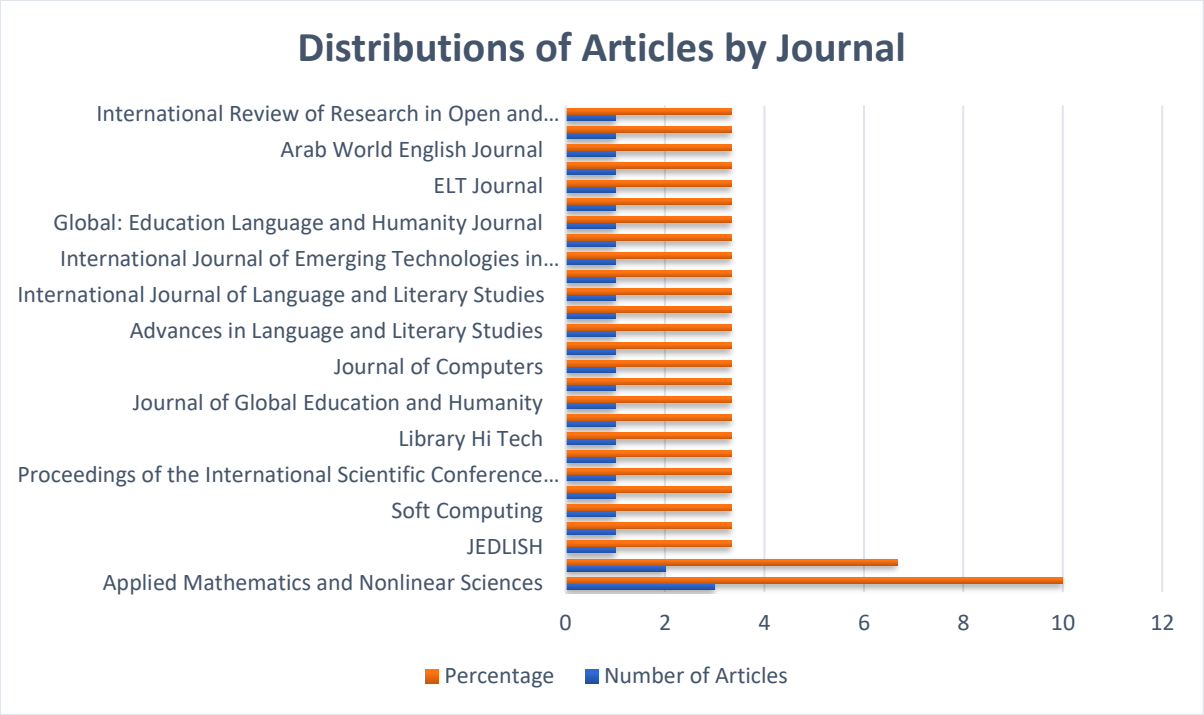


Figure 1:

Figure 2 portrays article distribution over time. Although this study does not aim to provide an overview of the historical development of TEL research in EFL reading instruction, the distribution of journals over time may improve an understanding of the learning environment and the state of the existing research on the topic under review. As for Figure 2, most of the related empirical studies on reading instruction via TEL were published in 2024 (7 articles), 2020 and 2022 (4 articles), respectively, and 2025 (3 articles) followed by the other years.

Modern American Journal of Linguistics, Education, and Pedagogy
ISSN (E): 3067-7874
Volume 01, Issue 03, June, 2025
Website: usajournals.org

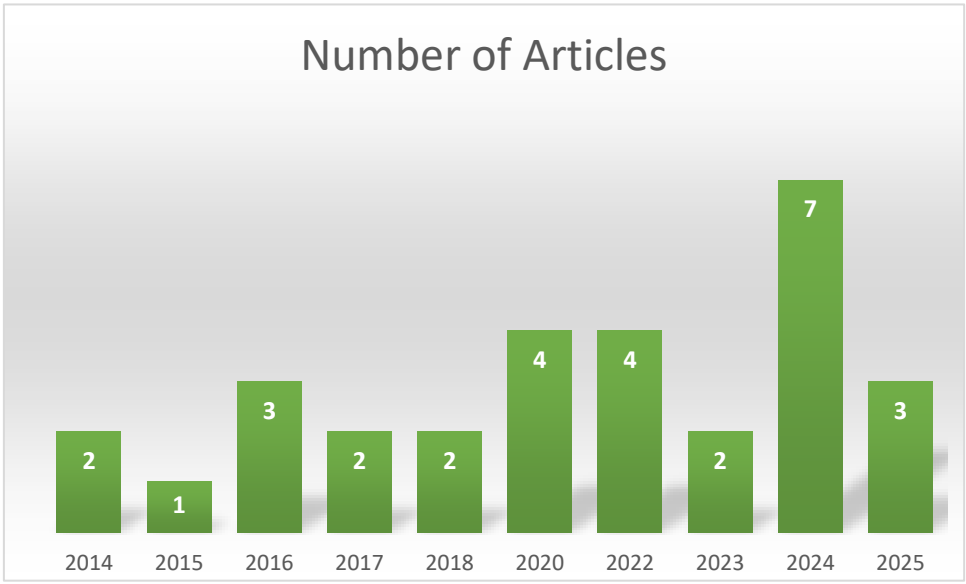


Figure 2.

Analysis of Articles

First, I identified the main target topics of each selected article. If an article dealt with two or more different topics, I included that article under all of those topics. In addition, I analyzed the data concerning contexts targeted and learner populations in the research papers on TEL in EFL reading instruction. Specifically, I focused on the age range of the language learners. I also looked for the TEL digital tools utilized in TEL-based reading comprehension courses. Finally, the articles were analyzed regarding lessons learned and methodological choices.

Findings and Discussions

Target Topics

The chosen empirical research papers on TEL in EFL contexts concentrated on numerous topics (see Table 2). Specifically, most research has aimed at many types of AI-assisted reading tools, blended learning, and collaborative learning. Based on the number of articles, e-learning platforms, and gamification ranked the second, the wider concentration on mobile-assisted language learning and multimodal literacy with online engagement appeared in three studies, which, together with personalized learning and reading motivation, reveal the prevalence

Modern American Journal of Linguistics, Education, and Pedagogy
ISSN (E): 3067-7874
Volume 01, Issue 03, June, 2025
Website: usajournals.org

of researchers' inquiry into using TEL in reading instruction. Surprisingly, TEL in early education and video-based instruction did not receive such attention, although all the selected studies focused on improving reading comprehension of EFL students via TEL digital tools. Although several studies focused on improving reading comprehension of EFL students with various student engagement activities in a systematic review form or from students' perspectives, they were not focused on the current inquiry (Pardede (2019), Par (2020), Masitoh (2023), Kirkwood (2016), Page (2021), Puentedura (2013).

Table 2

No	Topic	Studies
1	AI-assisted reading tools	Chea & Xiao (2024); Celik et al. (2024); Hong (2025); Gao (2023); Dong et al. (2022);
2	Blended learning	Lu & Li (2024); Al-Maashani & Mudhsh (2023);
3	Collaborative learning	Yeh et al. (2016); Maspul (2024); Kim (2020);
4	Digital annotation	Azmuddin et al. (2020);
5	E-learning platforms	Al-Jarf (2014); Al-Seghayer (2016); Patra et al. (2022);
6	Gamification	Maspul (2024); Patra et al. (2022);
7	L2 writing	Gao (2023); Hong (2025);
8	Mindmapping	Halimah et al. (2022);
9	Mobile-assisted language learning	Taj (2016); Khubyari & Narafshan (2016);
10	Multimodal literacy.	Giron-Garcia (2015); Rachmawati (2025); Larysa et al. (2014);
11	Online engagement	Kim (2020); Yan et al. (2024);
12	Personalized learning	Lu Li (2024); Chea & Xiao (2024);
13	Reading comprehension	Abdelhalim (2017); Ali (2024); Celik et al. (2024); Capodieci et al. (2020);
14	Reading motivation	Patra et al. (2022); Daweli & Mahyoub (2024);
15	Reciprocal teaching	Maspul (2024); Yeh et al. (2016);
16	Synchronous learning	Kim (2020); Al-Jarf (2014);
17	Teacher perspectives	Al-Seghayer (2016); Rachmawati (2025); Daweli & Mahyoub (2024);
18	TEL in early education	Larysa et al. (2014);
19	Video-based instruction	Mohammadian et al. (2018);
20	Web-based reading tools	Zhu (2024);

Modern American Journal of Linguistics, Education, and Pedagogy
ISSN (E): 3067-7874
Volume 01, Issue 03, June, 2025
Website: usajournals.org

The 20 target topics identified in the selected article studies can be further categorized into broader groups: technology type/platform, instructional approach/strategy, learning enhancement tools, targeted learning outcomes, learner-centered personalization and support, and teacher-focused perspectives. The verification behind this grouping is provided by the pedagogical intent and thematic function of each topic. Technology focuses on the medium and tools, including Mobile-Assisted Language Learning (MALL), Computer-Assisted Language Learning (CALL), Artificial Intelligence (AI), and different platforms, including AI-driven platforms, online collaborative platforms, virtual book clubs, digital storytelling, gamification, QR code-based quizzes, word formation puzzles, writing platforms, and mind maps. The second grouping is an instructional approach that reflects collaboration and synchronous classes, which represent structured strategies. Such collaboration classes can represent tele-collaboration, intercultural learning through Zoom, self-directed learning via real-time Zoom interaction, collaborative tasks through Google Docs, interactive quizzes, and whiteboard collaboration to enhance dynamic reading instruction. The third grouping is learning tools, which refer to particular support that improves the content delivery. Examples of such content delivery learning tools can comprise web-quest-based intervention, case studies that show deeper content understanding, and hyperlink skills developed by cyber-tasks, which enhance content mastery and language learners' autonomy. The fourth grouping is targeted learning outcomes, which directly relate to comprehension, motivation, and other student skill goals. Such learning outcomes, which were derived from different TEL digital tools, include developing reading comprehension, motivation, engagement, personalized learning, confidence, decreasing student anxiety, but boosting self-directed learning. The next grouping is personalization and support, which tailors students' experiences and supports EFL language learners across different developmental stages. Such personalizations are achieved by Augmented Reality (AR) to make reading instruction more engaging, and AR to support vocabulary retention and significantly enhance reading comprehension. The last categorization is teachers' perspectives, which are centered on educators and systemic roles, who express their perspectives and insights on the effectiveness of TEL in their reading instruction. Such perspectives assess and

Modern American Journal of Linguistics, Education, and Pedagogy
ISSN (E): 3067-7874
Volume 01, Issue 03, June, 2025
Website: usajournals.org

challenge students' learning outcomes, reading materials, and the reading scores of the exploratory study, participants, and descriptive statistics.

Table 3 refers to the target contexts, including foreign language and second language contexts, where the studies were conducted. While Ali (2024), Al-Jarf (2014), Abdelhalim (2017), Al-Seghayer (2016), and Daweli & Mahyoub (2024) did their research in English along with Arabic language settings, Lu & Li (2024) and Chea & Xiao (2024) focused on Chinese in their studies. Most examinations were carried out in the English-only medium, based on observations. This table reflects other languages as a primary or secondary means of research language: Farsi in Mohammadian et al. (2018) Patra et al. (2022), Italian in Capodieci et al. (2020), Spanish in Giron-Garcia (2015), Korean in Kim (2020), and Turkish in Celik et al. (2024) studies.

Table 3

No	Target context	Study
1	Foreign language context	Ali (2024) Al-Jarf (2014) Al-Maashani & Mudhsh (2023) Al-Seghayer (2016) Celik et al. (2024) Chea & Xiao (2024) Daweli & Mahyoub (2024) Dong et al. (2022) Gao (2023) Giron-Garcia (2015) Halimah et al. (2022) Hong (2025) Kim (2020) Lu & Li (2024) Maspul (2024) Mohammadian et al. (2018) Rachmawati (2025) Taj (2017) Wang (2022) Yan et al. (2024) Yarmakeev et al. (2024) Yeh et al. (2016) Zhu (2024) Patra et al. (2022) Asadi & Ebadi (2025) Larysa et al. (2014) Azmuddin et al. (2020) Khubyari & Narafshan (2016) Capodieci et al. (2020)
2	Second language context	Daweli & Mahyoub (2024) Mohammadian et al. (2018) Asadi & Ebadi (2025) Capodieci et al. (2020)

Target Language	Studies
English	Abdelhalim (2017) Ali (2024) Al-Jarf (2014) Al-Maashani & Mudhsh (2023) Al-Seghayer (2016) Chea & Xiao (2024) Daweli & Mahyoub (2024) Dong et al. (2022) Gao (2023) Hong (2025) Kim (2020) Lu & Li (2024) Maspul (2024) Mohammadian et al. (2018) Rachmawati (2025) Taj (2017) Wang (2022) Yan et al. (2024) Zhu (2024) Patra et al. (2022) Asadi & Ebadi (2025) Larysa et al. (2014) Azmuddin et al. (2020) Khubyari & Narafshan (2016) Capodieci et al. (2020) Yeh et al. (2016) Yarmakeev et al. (2024)
Arabic	Abdelhalim (2017) Ali (2024) Al-Jarf (2014) Al-Seghayer (2016) Daweli & Mahyoub (2024)
Chinese	Chea & Xiao (2024) Lu & Li (2024) Hong (2025) Wang (2022) Zhu (2024)
Farsi	Mohammadian et al. (2018) Patra et al. (2022)
Italian	Capodieci et al. (2020)
Spanish	Giron-Garcia (2015)
Korean	Kim (2020)
Turkish	Celik et al. (2024)

Modern American Journal of Linguistics, Education, and Pedagogy
ISSN (E): 3067-7874
Volume 01, Issue 03, June, 2025
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Table 4 shows a classification of 17 types of educational technologies applied in existing literature on EFL reading comprehension, which spans from 2014 to 2025. Table 4 presents various integrations of both emerging digital tools and traditional tools in language instruction. The most often-used technologies include learning management systems, AI tools, mobile apps, interactive whiteboards, and video-based instruction. They were examined in three studies, respectively. These prominently utilized technology studies suggest a consistently growing academic emphasis on intelligent and platform-based technologies owing to their adaptability, enhanced learner engagement features, and significance.

The second subcategory can be moderately represented by technologies, which include multimedia, gamification, text mining, and web conferencing that appear in two studies each. These technologies offer asynchronous and synchronous learning engagements and have been linked with enhanced learner autonomy and interactivity. The last subgroup can be named as the least represented technologies because these tools were in only one study, which includes mind mapping, closed apps, digital annotation tools, Web 2.0 tools, webcasts, and augmented reality. Although these technologies were underrepresented or underexplored, they may suggest significant potential for developing and improving reading apprehension through collaborative inquiry, immersion, and visualization.

Regarding thematic patterns, it is noticeable that personalization and automation, including mobile apps, text mining, and AI tools, refer to a popular trend. As well as integrative approaches that include interactive whiteboards, video-based instruction, and LMS appear in many studies. Notwithstanding, constructive and immersive tools, such as mind mapping, AR, and Web Quests, remain undervalued, emphasizing a research practice gap in adopting student-centered and emerging technologies. These all can refer to further research, due to the poor delivery of such technologies, which suggests a necessity for more sensible inquiries, especially of understudied tools that comply with constructivist pedagogies and foster profounder learner engagement.

Modern American Journal of Linguistics, Education, and Pedagogy
ISSN (E): 3067-7874
Volume 01, Issue 03, June, 2025
Website: usajournals.org

Table 4

No	Type of technology	Study	#
1	Learning Management Systems	Al-Jarf (2014); Ali (2024); Al-Maashani & Mudhsh (2023);	3
	Web conferencing		
	AI tools	Al-Jarf (2014); Kim (2020)	
2	Digital annotation tools	Chea & Xiao (2024); Dong et al. (2022);	2
3	Multimedia	Hong (2025)	3
4	Mind mapping	Azmuddin et al. (2020)	
	Augmented Reality		1
	Cloze app	Yan et al. (2024), Mohammadian et al. (2018);	
5	Gamification		2
	Mobile apps		
6	Interactive whiteboards	Halimah et al. (2022)	
7	Google Docs		1
	Text mining	Asadi & Ebadi (2025)	
8	Video-based instruction	Capodieci et al. (2020)	1
9	WebQuests		1
	Web 2.0	Maspul (2024) Patra et al. (2022)	
10		Khubyari & Narafshan (2016) Taj (2017),	2
11		Al-Maashani & Mudhsh(2023)	3
		Al-Maashani & Mudhsh (2023) Zhu (2024)	
12		Yeh et al. (2016)	3
13		Hong (2025), Gao (2023)	1
14		Mohammadian et al. (2018), Kim (2020), Rachmawati (2025)	2
			3
15		Giron-Garcia (2015)	
16		Yeh et al. (2016)	1
17			1

Figure 3 represents methodological approach of 30 papers which are chosen for this scoping review research study. Among them, quantitative approach was used the most, and it appeared in 14 studies (Abdelhalim (2017), Al-Jarf (2014), Al-

Modern American Journal of Linguistics, Education, and Pedagogy
ISSN (E): 3067-7874
Volume 01, Issue 03, June, 2025
Website: usajournals.org

Seghayer (2016), Celik et al. (2024), Hong (2025), Kim (2020), Mohammadian et al. (2018), Taj (2017), Wang (2022), Patra et al. (2022), Capodieci et al. (2020), **Gao (2023),** Khubyari & Narafshan (2016) and
Yan et al. (2024). This quantitative method made up almost half of the whole study numbers and indicates an equally strong presence of empirical-based research. These research papers typically conducted pre- and post-tests, statistical analysis, and control groups to measure the efficiency of interventions on reading comprehension results of EFL students.

Quantitative research was followed by qualitative designs that appeared in 11 studies, including Ali (2024), Al-Maashani & Mudhsh (2023), Giron-Garcia (2015), Halimah et al. (2022), Lu & Li (2024), Maspul (2024), Rachmawati (2025), Yeh et al. (2016), Zhu (2024), Azmuddin et al. (2020), and Larysa et al. (2014). These research papers accounted for 36% of all studies selected that predominantly used classroom observations, interviews, and document analysis to examine students' interactions with digital tools, EFL learners' experiences, and their perceptions of incorporating TEL in improving their reading comprehension in depth.

The least used research approach was mixed methods, which accounted for 5 studies only (17%), including Chea & Xiao (2024), Daweli & Mahyoub (2024), Dong et al. (2022), Asadi & Ebadi (2025), and Yarmakeev et al. (2024). The mixed methods research approach blended quantitative data with qualitative perspectives. However, the mixed methods approach suggested a more holistic comprehension by incorporating contextual or affective data with learner reading outcomes, despite fewer in numbers. This distribution by methodology underscores a fairly balanced emphasis on quantitative and qualitative paradigms. This offers both empirical measurement and interpretive depth to the field, although a relatively restrictive number of mixed methods approaches were pinpointed in the paper selected. The opportunity for future research to bridge the gap between the two paradigms will enable a richer analysis of both digital reading instruction processes and reading outcomes.

Modern American Journal of Linguistics, Education, and Pedagogy
ISSN (E): 3067-7874
Volume 01, Issue 03, June, 2025
Website: usajournals.org

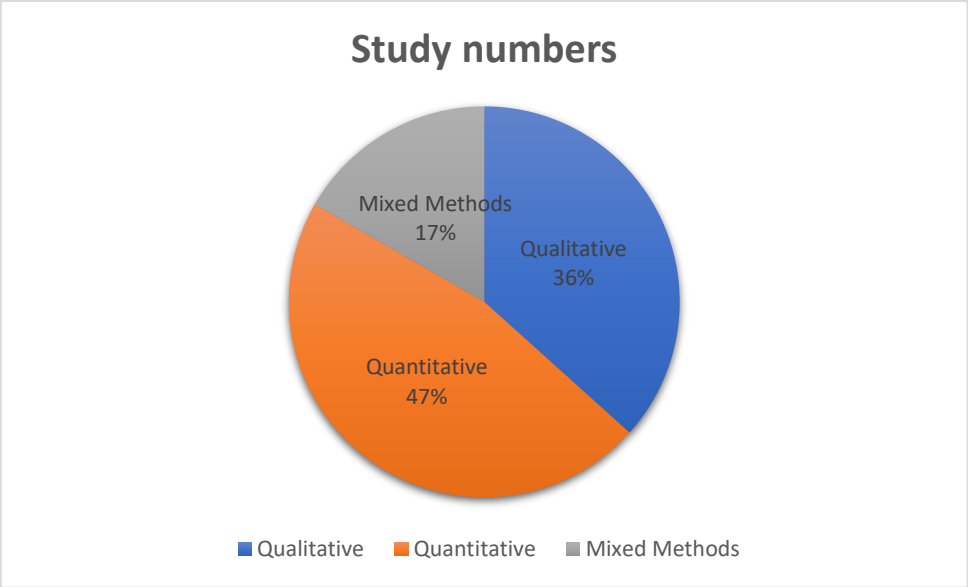

Figure 3

Conclusion

This meta-analysis review study looked at thirty empirical research papers published between 2014 and 2025 to examine how Technology-Enhanced Learning (TEL) integration may improve reading comprehension among EFL learners in non-English contexts. The current paper is targeted at answering five research questions and objectives concerning the current state of the field, application of technologies, and their preferred types, the efficiency of TEL among various contexts and English competency levels, methodological patterns, and benefits and difficulties of TEL in improving EFL reading comprehension.

Coming to the present status of TEL integration into EFL comprehension, the analysis shows that this field has witnessed considerable growth during the past ten years. There has been a significant rise in research between 2020 and 2025. This portrays an insistent academic interest in how digital tools convert reading instructions substantially. Beyond a mere technology integration, researchers have verified their concentration on the motivational, cognitive, and socio-emotional development of the EFL learners. This diversification also reflects on various geographical settings, comprising Spain, Turkey, Italy, China, Iran, and Saudi

Modern American Journal of Linguistics, Education, and Pedagogy
ISSN (E): 3067-7874
Volume 01, Issue 03, June, 2025
Website: usajournals.org

Arabia. This means an international acknowledgement of TEL's contribution to digital language teaching and learning beyond English-speaking environments.

According to the scope review analysis, the most frequently applied digital tools are AI-driven platforms, including ChatGPT, SeeingAI, and VeedReader, which are followed by Learning Management Systems (LMS) and mobile applications. The medium used TEL tools indicated video-based instruction and interactive whiteboards. Since these technologies have been implemented into pedagogical reading practices in different ways, all these tools share collaborative learning and resource sharing. As Al-Jarf (2014) emphasized, LMS platforms support resource sharing, and on-the-go learning is emphasized by the use of mobile apps (Khubyari and Narafshan, 2016). Regarding AI tools, they are believed to improve inferencing skills and adaptive learning (Chea & Xiao, 2024; Celik et al., 2024). In addition, Web 2.0 technologies are stated to promote critical reading practices and collaborative engagement, which are improved by Digital Annotation Technologies (Azmuddin et al. 2020). Among Digital Annotation Technologies, Google Docs (Yeh et al. 2016) is emphasized as an essential technology, although it is used less commonly, but it equally promotes collaborative practices along with the use of mind-mapping (Khalimak et al. 2022) and Augmented Reality (Asadi & Ebadi, 2025).

Concerning the application of TEL and its impact on educational contexts and English competency levels, it should be noted that across studies, consistent evidence shows that TEL positively influences reading apprehension results. In addition to higher reading apprehension test results from primary school to tertiary education, learning motivation and engagement have also been observed to be positively impacted by the integration of TEL. Students particularly obtained more from AI-powered platforms and smart classrooms because they suggest customized feedback, which decreases anxiety and increases cognitive and metacognitive reading strategies. Nonetheless, efficacy differs according to learners' English proficiency levels, such as while beginners necessitate careful scaffolding interventions, intermediate and advanced students seem to take advantage of autonomy-enhancing strategies.

Concerning TEL methodological designs, it should be noted that a fairly balanced concentration on quantitative (14 studies) and qualitative (11 studies) research

Modern American Journal of Linguistics, Education, and Pedagogy
ISSN (E): 3067-7874
Volume 01, Issue 03, June, 2025
Website: usajournals.org

designs was used in selected articles, followed by a smaller but significant presence of mixed methods approaches. Quantitative approaches applied pre- and post-study test designs to assess reading apprehension, whereas qualitative studies mostly depended on thematic analysis, classroom observations, and interviews to record and analyze EFL learners' experiences. Mixed-method studies, on the other hand, suggested more thoughtful perspectives by combining learner perspectives with quantitative results. This methodological diversity not only enhances the discipline but also suggests an opportunity for more integrative methodological approaches that reveal the emotive, contextual dynamics of TEL application alongside cognitive effects.

A number of advantages of the implementation of TEL in EFL reading classrooms have been observed in this scoping review. The analysis shows that there has been a consistent improvement in learner autonomy. In addition, TEL digital tools also improve differentiated instruction, permitting learning paths to be adaptive in order to meet diverse learners' needs. Additionally, incorporating visual, textual, and auditory components enhances students' content mastery and cognitive engagement.

However, noteworthy restrictions remain observable. The first challenge towards TEL integration is accessibility, which is a major concern with respect to low-resource settings where consistent access to digital resources is lacking. Sometimes, it is observed that digital infrastructure accessibility is not always guaranteed. Teacher preparedness can be another issue in TEL utilization, which was confirmed by several studies. Studies show that professional development for integrating TEL tools into teaching is insufficient. Sustainability is the last limitation of TEL, which is in question about its long-term efficiency, the digital tools' maintenance, adaptability, and feasibility. Digital literacy practices can reflect cultural differences that may also raise concerns about cross-cultural and cross-contextual transferability of TEL. Thank you for your attention.

To conclude, this meta-analysis identifies a gap in the transformative role of technology-enhanced learning tools in EFL reading instruction. However, it also needs more research into EFL reading comprehension education. The future studies should concentrate on carrying out longitudinal studies to evaluate TEL's long-term efficiency on reading development. The next implication is to expand

Modern American Journal of Linguistics, Education, and Pedagogy
ISSN (E): 3067-7874
Volume 01, Issue 03, June, 2025
Website: usajournals.org

mixed methods research to capture both quantitative and qualitative learning improvements. Next, examining under-represented technologies like Web-Quest-based interventions, mind-mapping, and augmented reality is wider scale. Furthermore, culturally aware TEL models can also be designed to adapt the educational context to learners with diverse needs. Last but not least, teacher training series should be prioritized to equip EFL teachers with more hands-on skills to make them TEL-informed and more aware of using digital technologies meaningfully in their classrooms.

All in all, immense potential for TEL to improve the academic confidence and reading comprehension skills of EFL learners at a global level is observed via a thorough and research-based incorporation of educational digital tools in this study.

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Volume 01, Issue 03, June, 2025
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