Technology-Enhanced English Language Learning: A Systematic Review of Digital Tools, Outcomes, and Limitations (SLR)

Gurpreet Kaur Phander Gurmeet Singh[1], Nur Aina Fatini Norhaslizam[2], Zamri Mahamod[3]

[1]Sekolah Kebangsaan Jalan Baharu Parit Buntar 33100 Kerian, Perak, Malaysia

[2]Sekolah Kebangsaan Haji Abu Bakar Mukim Lepai 05350 Alor Setar, Kedah, Malaysia

[3]Fakulti Pendidikan, Universiti Kebangsaan Malaysia, 43600 Bangi, Selangor, Malaysia

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ABSTRACT

The rapid advancement of digital technology has significantly transformed English language learning (ELL), yet existing research findings remain fragmented across various tools and contexts. This systematic literature review (SLR) aims to critically evaluate the types of digital tools integrated into ELL, their associated learning outcomes, and the limitations hindering their effective implementation. Guided by the PRISMA 2020 statement, the study analyzed 15 high-quality empirical articles published between 2021 and 2026 a timeframe capturing the "digital era" and post-pandemic pedagogical shifts retrieved from Scopus, Google Scholar, and ScienceDirect. Findings reveal a diverse array of utilized digital tools, ranging from artificial intelligence (AI) agents like ChatGPT and Google Assistant to mobile-assisted language learning (MALL) applications, digital game-based platforms, and immersive technologies such as Virtual Reality (VR) and the Metaverse. The synthesis indicates that integrating these tools yields substantial positive outcomes, specifically improving vocabulary acquisition, writing coherence, and speaking fluency. Furthermore, digital tools foster learner-centered environments, significantly increasing student engagement, motivation, and autonomy. However, the review identifies critical limitations that impede successful integration. Prominent challenges include the digital divide and unequal access to infrastructure, varying levels of digital literacy among both students and educators, and technical glitches. Ethical concerns regarding AI, such as academic integrity and potential over-reliance, also emerged as significant barriers. The study concludes that while digital tools offer transformative potential, their effectiveness depends on structured institutional support and teacher professional development. These insights contribute to the formulation of inclusive educational policies, such as Malaysia's National Education Blueprint 2026–2035, by providing a foundation for blending technology with sound pedagogical practices.

Keywords: -technology, English language, digital tools, outcomes, limitations

INTRODUCTION

Technology-enhanced English language learning (TEELL) has become a critical area of focus within contemporary Applied Linguistics, driven by rapid advancements in digital technologies and the increasing demand for innovative, flexible, and learner-centred pedagogies. Digital tools, including mobile applications, artificial intelligence (AI)-driven platforms, virtual learning environments, and online collaborative systems, have significantly transformed the landscape of English language education. These tools enable learners to access authentic materials, receive immediate feedback, and participate in interactive communication, thereby enhancing language acquisition beyond traditional classroom settings (Jones, 2021; Kukulska et al., 2022).

The rapid expansion of digital learning was further accelerated by the COVID-19 pandemic, which forced education systems worldwide to transition to online and blended learning modalities. This shift revealed both the potential and limitations of technology integration in English language learning. While digital tools have been associated with improved learner engagement, autonomy, and motivation, challenges such as unequal

access to digital infrastructure, limited teacher readiness, and issues related to instructional design remain prevalent (Hodges et al., 2021; Zawacki, 2023). These challenges underscore the need for systematic evaluation of digital tools and their pedagogical effectiveness.

In Malaysia, the integration of technology in English language learning is closely aligned with ongoing national education reforms, particularly under the recently introduced National Education Blueprint 2026–2035 (RPM 2026-2035). This comprehensive national framework, which encompasses both school-level and higher education plans, represents a strategic effort to transform the education system into one that is more inclusive, high-quality, and globally competitive. The reform emphasises the integration of digital technologies and AI as key enablers in curriculum delivery, teaching practices, and learning processes, reflecting a strong commitment to preparing students for future digital and knowledge-based economies.

RPM 2026-2035, a core component of this national framework, outlines several strategic priorities, including improving educational quality, enhancing equitable access, and strengthening digital competence among learners. It also promotes bilingual proficiency, critical thinking, and holistic student development, all of which are essential for effective English language learning in the 21st century. Additionally, the reform introduces systemic changes such as new assessment approaches, strengthened teacher professional development, and increased emphasis on digital learning environments, thereby creating a supportive ecosystem for technology-enhanced language education.

Despite these policy advancements, the implementation of technology-enhanced English language learning in Malaysia continues to face several challenges. These include disparities in digital access between urban and rural schools, varying levels of teacher digital literacy, and inconsistencies in the adoption of digital pedagogies. Such issues highlight the importance of examining not only the effectiveness of digital tools but also the contextual factors influencing their successful integration into English language classrooms.

Globally, research on TEELL has grown substantially, exploring a wide range of digital tools and their impact on learning outcomes. Studies have demonstrated that mobile-assisted language learning (MALL), AI-based applications, and online collaborative platforms can improve vocabulary acquisition, communicative competence, and learner engagement. However, the diversity of tools and research methodologies has resulted in fragmented findings, making it difficult to establish a comprehensive understanding of their overall effectiveness and limitations (Kukulska, 2022; Zawacki, 2023).

Given these developments, there is a clear need for a systematic synthesis of recent studies to consolidate evidence and provide clearer insights into the role of digital tools in English language learning. Systematic literature reviews, guided by frameworks such as the PRISMA 2020 statement (Page et al., 2021), offer a rigorous and transparent approach for identifying, evaluating, and synthesising relevant research.

Therefore, this study aims to conduct a systematic review of literature published between 2021 and 2026 on technology-enhanced English language learning, focusing on three key dimensions: (i) the types of digital tools employed, (ii) the learning outcomes associated with their use, and (iii) the limitations and challenges encountered. In line with this aim, the study seeks to critically evaluate and identify the digital tools integrated into English language learning contexts, examine the learning outcomes associated with their use, and analyse the limitations that may hinder their effective implementation in teaching and learning processes.

Research Questions & Objectives

The purpose of this study is to critically evaluate and identify the digital tools that have been integrated into English language learning, as well as to investigate the associated learning outcomes and limitations of these tools in supporting classroom teaching and learning.

Research Questions

1. Which digital tools are utilised in English language learning contexts?

2. What learning outcomes are associated with the integration of digital tools in English language learning?

3. What limitations are encountered in the integration of digital tools in English language learning?

Research Objectives

1. To investigate the digital tools utilised in English language learning contexts.

2. To identify the learning outcomes associated with the integration of digital tools in English language learning.

3. To analyse the limitations encountered in the integration of digital tools in English language learning.

RESEARCH METHODOLOGY

This study adopts a Systematic Literature Review (SLR) approach as the primary method for analysing and synthesising findings from previous studies that explored the integration of digital tools in English language learning, with a particular focus on the learning outcomes and associated limitations. This approach is selected because it enables a structured and comprehensive analysis of existing research within a similar context, facilitates the identification of key themes and highlights gaps for future research (Lame, 2019). This section presents a critical discussion of the research design, data sources and search strategy, inclusion and exclusion criteria, article selection process and data analysis methods employed in this study.

Research Design

The research design for this study is qualitative based on the approach of systematic reviews of literature. This study does not involve field-based data collection but instead focuses on the identification, selection and analysis of journal articles published within a specified time frame (2021-2026). This approach is appropriate as it enables the researchers to form a conclusion from various findings to develop a comprehensive understanding of the research topic. In this context, the study aims to identify and examine the digital tools integrated in the learning of the English language, along with their associated learning outcomes and limitations, based on the existing research findings.

Data Sources and Search Strategy

For the purpose of analysis, articles were obtained from several recognised databases. They are Google Scholar, Scopus and ScienceDirect. The use of multiple databases enables researchers to obtain a more diverse and comprehensive range of studies. The strategy of finding requires the use of specific search keywords related to the research topic, such as *"technology"*, *"English language"*, *"digital tools"*, *"outcomes"*, and *"limitations"*. The combination of these keywords is arranged using the Boolean operators such as 'AND' and 'OR' to ensure that the search results are more accurate and relevant (Aliyu, 2017). The search was limited to articles published between 2021 and 2026 and only in English.

Inclusion And Exclusion Criteria

In this study, the article selection process was done rigorously through the establishment of systematic inclusion and exclusion criteria, ensuring that only relevant and high-quality studies were analysed. These criteria encompassed several dimensions including type of literature, language, publication period, indexing status, study context and research focus. The careful specification of these criteria aligns with the established guidelines for systematic literature reviews which emphasise transparency, consistency and methodological rigour. In terms of the type of literature, only empirical research, peer-reviewed journals and mixed-method articles that explicitly examined the use of digital tools in English language learning along with their associated learning outcomes and limitations were used. Priority was given to empirical studies investigating the impact of technological interventions such as learning management systems, mobile-assisted language learning (MALL), artificial intelligence tools, and online collaborative platforms on learners' outcomes,

including language proficiency, engagement, motivation, and skill development. This focus is consistent with recent research highlighting the growing role of digital technologies in transforming language learning practices (Jones, 2021; Kukulska et al., 2022).

Studies that did not directly address technology-enhanced English language learning or lacked empirical evidence were excluded, as they did not meet the core requirements of the review. Regarding language, only articles published in English were selected, as English remains the primary medium of scholarly communication in the field of technology-enhanced language learning. This ensures consistency in analysis and minimises potential issues related to translation and interpretation. The publication timeframe was limited to studies published between 2021 and 2026. This restriction was applied to capture the most recent developments in digital technologies and their applications in English language learning, particularly in response to the rapid expansion of online and blended learning environments following the COVID-19 pandemic. Earlier studies were excluded, as they may not adequately reflect current technological advancements or post-pandemic pedagogical practices (Hodges et al., 2021; Zawacki, 2023).

Furthermore, only articles indexed in reputable academic databases, such as Scopus, Google Scholar and ScienceDirect, were included to ensure the credibility, reliability, and methodological rigour of the selected studies. Articles from non-indexed or predatory journals were excluded due to concerns regarding academic quality and validity. In terms of study context, research conducted in both local and international settings was considered, provided that the findings were applicable to general English language learning environments. This approach enables broader comparative insights while maintaining relevance across diverse educational contexts. However, studies conducted in highly specialised or non-transferable contexts were excluded.

Finally, with respect to research focus, only studies that clearly evaluated the use of digital tools in English language learning and reported measurable outcomes such as improvements in language skills, learner engagement, motivation, or identified limitations and challenges were included. This criterion reflects current systematic review practices that emphasise outcome-based evidence and practical implications (Zawacki , 2023). Studies that addressed technology use in education without a specific focus on English language learning, or those that failed to link digital tools with learning outcomes, were excluded.

Overall, this stringent screening process ensured that only high-quality, relevant, and methodologically sound studies were selected for thematic analysis in this systematic literature review. Table 1 presents a summary of the inclusion and exclusion criteria.

Table 1. Inclusion and Exclusion Criteria

CRITERIA	**INCLUSION**	**EXCLUSION**
Type of literature	Empirical research, peer-reviewed journal articles, mixed-methods studies, conference proceedings, and systematic reviews.	Non-empirical papers, purely theoretical essays, editorials, book chapters, "grey literature", and personal blogs.
Language	Studies published in English	Studies published in languages other than English or those focused on acquiring non-English languages
Timeframe	Contemporary research primarily published between 2021 and 2026, focusing on the "digital era"	Historical or outdated studies published prior to modern digital advancements (e.g., pre-2015 or pre-2021 depending on the specific article)
Indexing	Scholarly work indexed in Scopus, Google Scholar and ScienceDirect.	Unindexed reports, non-academic sources, trade magazines, and publications lacking a formal DOI or peer-review process.

Country	Global scope with concentrations in Asian EFL contexts (Indonesia, Turkey, Saudi Arabia, China, Uzbekistan, Brunei) and international university demographics	Studies conducted in native English-speaking (Anglophone) countries or localized studies that do not address global learning networks
Research focus	Articles that directly examined the use of digital tools in English language learning, including their outcomes and limitations, were selected. Emphasis was placed on empirical studies exploring technologies such as learning management systems, MALL, AI tools, and online collaborative platforms, particularly in relation to language proficiency, engagement, motivation, and skill development.	General educational technology studies without a pedagogical link to English language acquisition or studies involving other subjects (e.g., STEM, science).

Systematic Review Process

The article selection process for this study was conducted systematically in accordance with the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) model, which comprises four main stages: identification, screening, eligibility, and inclusion (Page et al., 2021).

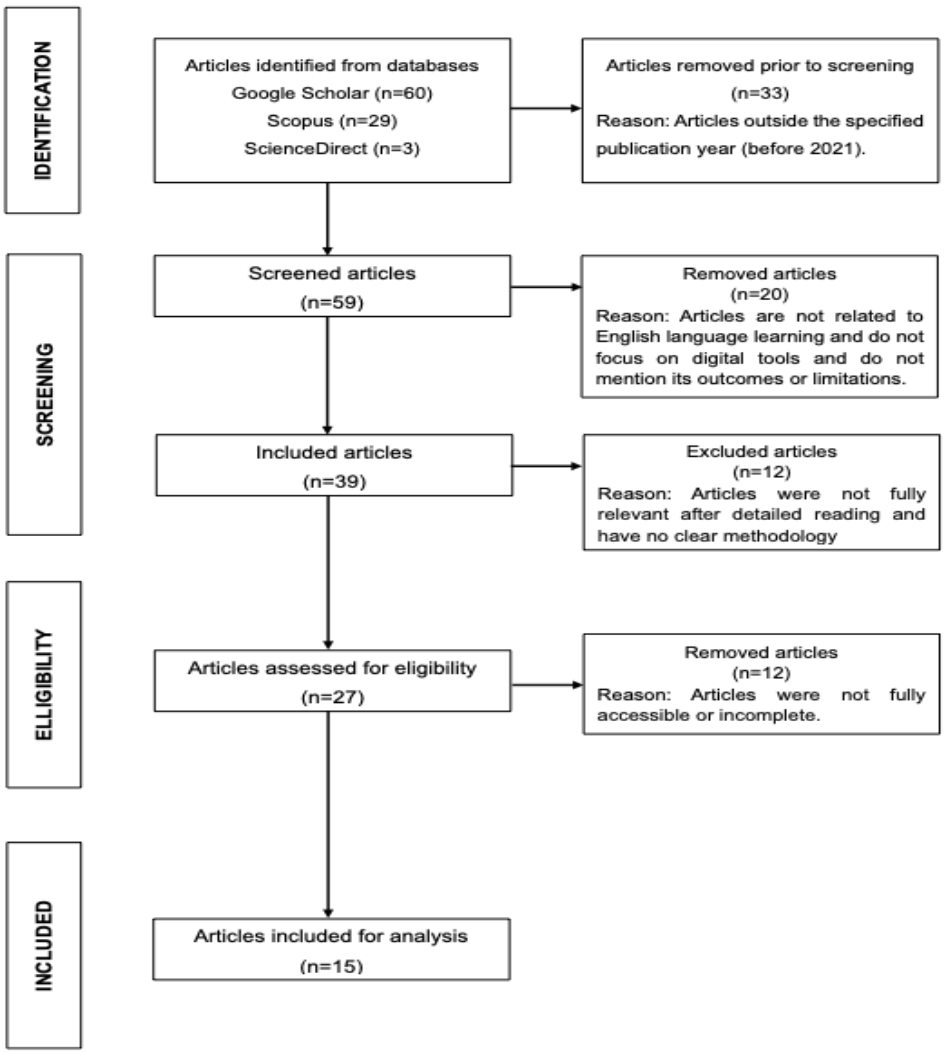

Figure 1. PRISMA Systematic Literature Review adapted from Page et al. (2021)

a. Identification

During the identification stage, a total of 92 articles were identified through searches in three major databases, namely Google Scholar (n = 60), Scopus (n = 29), and ScienceDirect (n = 3). These articles were selected based on specific keywords related to the integration of digital tools in English language learning, as well as the associated outcomes and limitations. However, 33 articles were excluded prior to the screening stage, as they did not meet the publication timeframe criteria, specifically those outside the specified publication year (e.g., before 2021). Moreover, the articles were also excluded because they are not written in the English language.

Table 2. Database Identification

Database	Keywords
Google Scholar	*'technology' and 'English language learning' and 'digital tools' and 'outcomes' and 'limitations'*
Scopus	*'technology' or 'English language' or 'digital tools' or 'outcomes' or 'limitations'*
ScienceDirect	*'technology' or 'English language' or 'digital tools' or 'outcomes' or 'limitations' or 'teachers' or 'students'*

b. Screening

Subsequently, in the **screening stage**, 59 articles were examined based on their titles and abstracts. Of these, 20 articles were excluded, as they did not relate to English language learning and have no focus on digital tools. Most of the articles excluded also did not mention outcomes or limitations associated with the integration of digital tools. This resulted in 39 articles being retained for further evaluation.

c. Eligibility

The third stage is **eligibility**, in which 39 articles were assessed more thoroughly to determine the relevance of their full content. 12 articles were excluded, as they were not fully relevant after detailed reading and have no clear methodology. Furthermore, out of the 27 articles assessed for eligibility, 12 articles were excluded, as their full texts were not accessible. This resulted in a final total of 15 articles that met all the criteria and were included for thematic analysis.

d. Inclusion

Following the screening process, 15 articles were selected as they met the required standards and criteria of the study.

LIST OF SYSTEMATIC LITERATURE REVIEW STUDIES

The following table summarises the 15 selected journal articles analysed in this systematic literature review on the integration of digital tools in English language learning, focusing on learning outcomes and limitations.

Each article is summarised based on key findings, including the title of the study, type of study, sample, data collection approach, digital tools, outcomes and limitations.

The diversity of research designs, including both quantitative and qualitative approaches, as well as varied educational contexts, demonstrates the flexibility of digital tool integration in addressing issues related to student engagement, learning outcomes, and learning constraints. The emphasis on outcomes and limitations also provides valuable insights for educators and policymakers in enhancing the effectiveness of technology integration in educational settings.

Table 3. Systematic Literature Review

No	Title, Author(s) & Citation	Type of Study	Sample	Data Collection Approach	Digital Tools, Outcomes and Limitations	Key Findings
1.	**A Systematic Review of Conversational AI Tools in ELT** Wan Yee Winsy Lai & Ju Seong Lee. Lai, W. Y. W., & Lee, J. S. (2024). A systematic review of conversational AI tools in ELT: Publication trends, tools, research methods, learning outcomes, and antecedents. *Computers and Education: Artificial Intelligence*, *7*, 100291. https://doi.org/10.1016/j.caeai.2024.100291	**Systematic Review**.	32 peer-reviewed papers published between 2013 and 2023.	Systematic analysis of publication trends, tool types, and research methods.	**Tools:** Google Assistant, ChatGPT. **Outcomes:** Yielded positive outcomes in affective (43%) and cognitive skills (41%). **Limitations:** 100% of studies were in Asian EFL contexts.	There is a rapid increase in AI-related ELT publications; individual factors are the primary influence on tool adoption.
2.	**Digital Tools in Language Learning: Their Effectiveness, Impact and Challenges** M. A. S. P. Manchanayaka M. A. S. P. Manchanayaka. (2023). Digital Tools in Language Learning: Their Effectiveness, Impact and Challenges. *Sri Lanka Journal of Advanced Research Studies in Humanities and Social Sciences*, *13*(2), 1–13.https://doi.org/10.4038/sljarshss.v13i2.9	**Mixed-methods** (incorporating both quantitative and qualitative data)	**33 undergraduate students** enrolled in a compulsory English module	**Pre- and post-surveys**, classroom observations, and focus group discussions	**Tools:** Interactive language learning platforms and zoom. **Outcomes:** Average reading score improvement of 18.09 points (32.57% increase); Cohen's *d*=2.20. **Limitations:** Results focused solely on reading; the sample was limited to a specific student demographic (human resources management)	Digital tools significantly boost **reading proficiency, motivation, and engagement**, but success is hindered by technical glitches and digital literacy gaps
3.	**The Role of Technology in English Language Learning in the Digital Era** Hasbiyah Srianah Amir & Utary Rustam Amir, H. S., & Rustam, U. (2025). The role of technology in English language learning in the Digital Era. *Lingeduca: Journal of Language and Education Studies*,	**Mixed-methods Study** (incorporating both quantitative and qualitative data)	**200 university students** and **10 English language instructors**	- **Questionnaires** (students' perceptions, motivation, effectiveness) - **Interviews** (teachers' perspectives) - **Classroom observations** (real-time use of technology)	**Tools**: Mobile applications, online learning platforms/courses, Artificial Intelligence (AI) tools (e.g., chatbots, learning assistants), gamification tools, Virtual Reality (VR) applications **Outcomes:** Improved vocabulary acquisition, grammar retention,	Technology has a **significant positive impact** on English language learning; **mobile apps and AI tools** are the most effective among digital tools. There is a **positive correlation between technology use and learning outcomes** (e.g., increased engagement leads to

	4(1), 1–8. https://doi.org/10.70177/lingeduca.v4i1.2048			Data sources triangulated and analyzed using: -Statistical analysis (quantitative) -Thematic analysis (qualitative)	pronunciation accuracy and communication skills **Limitations:** Digital literacy gaps among learners, limited access to technology (accessibility issues), need for teacher training and readiness.	improved proficiency). Technology shifts learning from **teacher-centered to learner-centered**
4.	**Systematic Literature Review: The Effectiveness of Technology-Assisted Project-Based English Language Learning** Heni Rochimah, Muhammad Japar, & Etin Solihatin. Heni Rochimah, Muhammad Japar, & Etin Solihatin. (2024). Systematic Literature Review: The Effectiveness of Technology-Assisted Project-Based English Language Learning. *Participatory Educational Research*, *12*(1), 195–221. https://doi.org/10.17275/per.25.11.12.1	**Systematic Literature Review (SLR)** using a qualitative approach	**23 peer-reviewed articles** published between 2015 and 2023	**PRISMA process** and a predetermined review protocol covering bibliography and research details	**Tools:** Social media (WhatsApp, YouTube), Web tools (WebQuest), Video conferencing (Zoom, Skype), and VR. **Outcomes:** 91% of reviewed articles reported a positive influence on English acquisition. **Limitations:** Risk of publication bias and difficulty in generalizing due to methodological and geographical differences	**Technology-assisted project-based learning (TPjBL)** is highly effective (91% positive impact), with **student conditions (23%)** and **technological features (15%)** being the primary success factors
5.	**The Impact of Digital Tools on English Language Learning** Alimova Khilola Rustamovna. Alimova Khilola Rustamovna. (2019). THE IMPACT OF DIGITAL TOOLS ON ENGLISH LANGUAGE LEARNING. *Eureka Journal of Language, Culture & Social Change*, *2*(2), 151–160.https://doi.org/10.53315/1995-0713-2024-64-4-81-89	**Descriptive / Review Article** The article examines the impact and role of various technologies in educational systems	**General English Language Students** The text refers to "students" and "educational systems worldwide" rather than a specific experimental group	**Not explicitly stated** The provided excerpts do not detail a specific methodology, though they cite "results of the research" and reference multiple academic texts	**Tools:** Mobile applications, online platforms, virtual classrooms, multimedia resources, and interactive software. **Outcomes:** Improved accessibility, interactivity, and personalization of education. **Limitations:** Not mentioned in the provided excerpts.	Integration of digital tools **enhances learning outcomes** and effectively **prepares students for modern communication environments** by personalizing the educational experience
6.	**A Technology-Enhanced Language Learning Methods: Innovations, Integration and**	**Systematic Review**.	Scholarly articles and research works regarding	Comprehensive review of existing literature on technological innovation and	**Tools**: ICT, MOOCs, podcasts, YouTube. **Outcomes:** Fosters active, independent,	Strategic integration of technology accelerates language competence across all four core skills

	Effectiveness Wisda Ramadhani Robi'ah & Agus Wijayanto Robi'ah, W. R. & Wijayanto, A. 2025 , *A Technology-Enhanced Language Learning Methods: Innovations, Integration, and Effectiveness*. https://doi.org/10.2991/978-2-38476-386-3_13		ICT in ELT	integration strategies	student-directed learning. **Limitations**: Barriers include lack of infrastructure, slow internet, and teacher technical anxiety	but requires careful pedagogical planning
7.	**Enhancing English Language Proficiency and Digital Literacy Through Metaverse-Based Learning** Nepoleon Prabakaran, Harold A Patrick, Jacqueline Kareem Prabakaran, N., A Patrick, H., & Kareem, J. (2025). Enhancing English language proficiency and digital literacy through Metaverse-Based Learning: A mixed-methods study in Higher Education. *Journal of Information Technology Education: Research*, *24*, 010. https://doi.org/10.28945/5484	**Mixed-methods Study**	60 undergraduate students (30 experimental, 30 control).	Pre-test/post-test (IELTS model), 6-month retention test, and semi-structured interviews (N=15).	**Tools:** Integrated Metaverse platform (AR/VR). **Outcomes:** Significant immediate gains in all skills; reading/writing gains retained long-term. **Limitations:** Technical barriers, high equipment costs, and motion sickness.	Metaverse technology improves digital literacy and language skills, though speaking skills show the most decay after six months.
8.	**A Systematic Review of Effectiveness of Digital Tools to Improve Writing Skills of ESL Students.** Rawan Ahmed Alsoweed, Ebtehal Mohammed Alsuhayl, and Farah Nasser Algraini Alsoweed, R. A., Alsuhayl, E. M., & Algraini, F. N. (2025). A systematic review of effectiveness of digital tools to improve writing skills of ESL students. *Journal of Education and Human Development*.	**Systematic Review** guided by the **PRISMA framework.** It employed a structured four-phase process: identification, screening, eligibility assessment, and final inclusion of empirical research	**16 empirical studies** published between 2019 and 2024,. The review specifically focused on research conducted within the **Saudi Arabian ESL context**	A comprehensive search of four major academic databases: **Web of Science, Google Scholar, ScienceDirect, and ERIC**,. This was followed by manual coding and **thematic analysis** to identify patterns in digital tool functionality and writing development	**Tools:** AI-based apps (ChatGPT, Grammarly, Wordtune, chatbots), collaborative platforms (Google Docs), mobile apps (WhatsApp), and LMS platforms (Blackboard), **Outcomes:** Significant improvements in **vocabulary acquisition, grammatical accuracy, and compositional coherence**,. Tools provided real-time feedback and fostered learner autonomy. **Limitations:** Identified	Digital tools are highly effective in enhancing various dimensions of ESL writing in Saudi Arabia,. Success depends on **balanced and guided implementation** that addresses ethical concerns and usability barriers. The study emphasizes that **teacher training and ethical guidelines** are essential to prevent over-reliance on AI and maintain academic integrity

	https://doi.org/10.15640/jehd.v14p9				challenges include **usability and navigation issues** (specifically with Blackboard), **academic integrity concerns** regarding AI, and teacher skepticism about the academic depth of tools like WhatsApp	
9.	**Enhancing English Vocabulary Learning through Mobile Apps: A New Paradigm in Educational Technology.** Zeynep Efsun Kayra Kayra, Z. (2024). Enhancing English vocabulary learning through mobile apps: A new paradigm in educational technology. *Research Studies in English Language Teaching and Learning*, *2*(2), 87–95. https://doi.org/10.62583/rseltl.v2i2.41	**Quantitative research** using a **cross-sectional design**. It employed a structured survey to capture a "snapshot" of student perceptions and preferences at a specific point in time	**30 undergraduate students** enrolled in an English 2 class at a private university in **Türkiye**.	Data was collected through a **structured survey questionnaire** hosted on **Google Forms**. The survey utilized **multiple-choice and Likert-scale questions** and was distributed via a convenience sampling method through WhatsApp	**Tools:** Mobile vocabulary applications featuring **gamification**, **AI chatbots**, and audio-visual pronunciation aids. **Outcomes:** 60% of students favored apps over traditional textbooks; 43.3% highly rated the tools for pronunciation assistance. 63.3% expressed interest in integrating these tools into the formal classroom. **Limitations:** The study identified a **digital divide** between high-frequency users and those who have not adopted the tools. The effectiveness is described as **subjective**, heavily influenced by individual learning styles	Mobile apps represent a **paradigm shift** in ELT by providing flexible, interactive, and independent learning environments. **Gamification and pronunciation features** are the most valued elements that drive student engagement. The study concludes that while apps are highly effective for vocabulary acquisition, they should be **blended with traditional methods** to cater to diverse learner profiles
10.	**Exploring the impact of artificial intelligence on English language teaching: A meta-analysis** Feyza Nur Ekizer Ekizer, F. N. (2025). Exploring the impact of artificial intelligence on English language teaching: A meta-analysis. *Acta Psychologica*, *260*, 105649. https://doi.org/10.1016/j.actpsy.2025.105649	**Meta-Analysis**.	23 peer-reviewed experimental and quasi-experimental studies (2019-2025).	Systematic review following PRISMA; effect size calculated via Comprehensive Meta-Analysis (CMA) software	**Tools:** Chatbots, VR, and automated writing assessment. **Outcomes:** Large statistically significant overall effect ($g = 1.10$). **Limitations:** There was high variability among the studies ($I^2 = 92.66$), meaning the results differed widely due to differences in contexts such as learning environments, participants, and types of digital tools used.	AI pedagogies significantly improve writing accuracy and speaking fluency while reducing learner anxiety.
11.	**Generative AI in English-medium instruction:**	**Quantitative Cross-sectional**	387 social sciences students at	Structured survey and quantitative content analysis of	**Tools:** ChatGPT, Grammarly, Duolingo.	Language proficiency positively correlates

	Perceptions, usage, and impact on academic performance and language proficiency Rhian Webb, Dogan Yuksel, Kenan Dikilitas Webb, R., Yuksel, D., & Dikilitas, K. (2026). Generative AI in English-medium instruction: Perceptions, usage, and impact on academic performance and Language proficiency. *System*, *138*, 103973. https://doi.org/10.1016/j.system.2026.103973	**Survey**.	a Turkish university	student responses.	**Outcomes:** Complementary AI use positively associates with academic performance. **Limitations:** Students with lower proficiency may use AI as a crutch (substitutive use).	with EMI performance; AI is primarily used for translation and proofreading.
12.	**Bridging technology and pedagogy from a global lens: Teachers' perspectives on integrating ChatGPT in English language teaching.** Mohammad H. Al-khresheh Al-khresheh, M. H. (2024). Bridging Technology and pedagogy from a Global Lens: Teachers' perspectives on integrating chatgpt in English language teaching. *Computers and Education: Artificial Intelligence*, *6*, 100218. https://doi.org/10.1016/j.caeai.2024.100218	This study adopted a **qualitative research design** intended to decode and understand the intricate experiences and perceptions of teachers. It utilized **thematic analysis** and systematic coding to unpack the textual data	A purposely collected sample of **46 English language teachers** from **39 distinct nations and continents**. The pool included a broad representation of academic ranks (Lecturers to Full Professors) and varying levels of teaching experience	Data were collected by distributing an **open-ended questionnaire** via the academic platform **ResearchGate**. This instrument allowed participants to share detailed subjective narratives, challenges, and aspirations without constraints	**Tools: ChatGPT** (specifically conversational AI). **Outcomes:** Improved comprehension through **instant, real-time feedback**; the creation of **customized learning pathways** for diverse needs; and enhanced engagement through contextual simulations. It also served as an "always-available teaching assistant" for supplementary support. **Limitations:** Key challenges included the tool's struggle to capture **cultural nuances/sensitivity** and its inability to adequately address **pronunciation and listening skills**. Teachers also voiced concerns regarding student **over-reliance**, loss of **creativity**, and the **digital divide** regarding equity and access	Teachers recognize ChatGPT's potential for **personalized, dynamic interactions** but maintain caution regarding linguistic fidelity and creativity suppression. Perceptions vary by demographic: **experienced teachers** often see ChatGPT as a **supplementary tool**, while **newer educators** may lean on it more heavily. The study concludes that the future of ELT lies in a **hybrid learning model** where AI augments human teachers rather than replacing them
13.	**ChatGPT Integration in Writing Development: Student Experiences and Perspectives** Faahirah Rozaimee &	**Qualitative Study**	37 pre-university students in Brunei who had initially failed a	Qualitative survey (Google Forms) followed by thematic coding and analysis.	**Tools:** ChatGPT. **Outcomes:** Improved writing performance (14 achieved credits; 23 passed). **Limitations:**	Students view ChatGPT as a simple, effective brainstorming partner that reduces cognitive load during

	Mas Ayu Mumin Rozaimee, F., & Mumin, M. A. (2025). CHATGPT integration in writing development: Student Experiences and perspectives. *World Journal of English Language*, *15*(8), 74. https://doi.org/10.5430/wjel.v15n8p74		course.		Inaccurate responses and risk of student	writing.
14.	**The Effectiveness of Digital Game-Based Pedagogy in Language Abilities Among Children With Delay** Guanzheng Chen & Yuying Fan Chen, G. & Fan, Y. (2025). The Effectiveness of Digital Game-Based Pedagogy in Language Abilities Among Children With Delay. *International Journal of Distance Education Technologies (IJDET), 23*(1), 1-18. https://doi.org/10.4018/IJDET.369824	**Mixed-methods Study** (incorporating both quantitative and qualitative data)	60 chinese kindergarten children with language delay	**Quantitative:** Teachers' assessment scale (to measure language development outcomes) **Qualitative:** Semi-structured interviews with teachers and parents	**Tools:** Digital game-based pedagogy (educational digital games). **Outcomes:** Significant improvement in language abilities (e.g., vocabulary, grammar, communication skills), increased engagement and motivation and positive perceptions from teachers and parents **Limitations:** Distracted academic attention, over-reliance on games and concerns about prolonged screen exposure (radiation/health)	Digital game-based pedagogy **significantly improves language development** in children with delay compared to traditional methods, and stakeholders (teachers & parents) showed **positive attitudes but** emphasised the need for **balanced and controlled use of digital games**.
15.	**Research on digital entertainment media in English writing e-learning system based on interactive game learning method** Li Tianyi Tianyi, L. (2025). Research on Digital Entertainment Media in English writing e-learning system based on interactive game learning method. *Entertainment Computing*, *52*, 100855. https://doi.org/10.1016/j.entcom.2024.100855	**System Design / Empirical Research**.	English language learners (focusing on writing e-learning).	Development and evaluation of an e-learning system using an interactive game learning method.	**Tools:** Interactive game-based e-learning system. **Outcomes:** Increased learning interest and enthusiasm. **Limitations:** General digital inequality and ethical concerns regarding AI.	Interactive game-based methods yield positive learning attitudes and improved writing effects compared to traditional digital media.

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RESEARCH RESULT

Objective 1: To Investigate the Digital Tools Utilised in English Language Learning Contexts.

Based on the article analysis, many digital tools are utilised in English Language learning Contexts. In all 15 articles, the digital tools mentioned in each article are different, but some of them might coincide with one another. This classification is presented in Table 4, which is divided into eight sections, each highlighting different types of digital tools being used.

Table 4. The type of digital tools utilised in English language learning

The Type Of Digital Tools Utilised In English Language Learning	Article Research
Artifical Intelligence (AI)/Chatbots (ChatGPT, Grammarly, Wordtune, Automated Writing Assessment)	● Lai & Lee, 2024 ● Amir & Rustam, 2025 ● Alsoweed et al., 2025 ● Kayra, 2024 ● Ekizer, 2025 ● Webb et al., 2026 ● Al-khresheh, 2024 ● Rozaimee & Mumin, 2025
Mobile Applications (MALL) (General mobile apps, vocabulary apps, Duolingo, WhatsApp)	● Amir & Rustam, 2025 ● Rochimah et al., 2024 ● Rustamovna, 2026 ● Alsoweed et al., 2025 ● Webb et al., 2026
Virtual Reality (VR)/ Augmented Reality (AR)/ Metaverse	● Amir & Rustam, 2025 ● Rochimah et al., 2024 ● Prabakaran et al., 2025 ● Ekizer, 2025
Gamification/ Digital Education Games	● Amir & Rustam, 2025 ● Kayra, 2024 ● Chen & Fan, 2025 ● Tianyi, 2025
Video Conferencing/ Virtual Classrooms (Zoom, Skype)	● Manchanayaka, 2023 ● Rochimah et al., 2024
Social Media/ Web Tools (WhatsApp, Podcasts)	● Rochimah et al., 2024 ● Robi'ah & Wijayanto, 2025
Collaborative Docs (Google Docs)	● Alsoweed et al., 2025

The landscape of English language learning has experienced a profound shift toward automation, immersion, and mobile accessibility. An analysis of the selected literature reveals that Artificial Intelligence (AI) and automated conversational tools are the most prevalent technologies deployed in modern language contexts, appearing in over half of the reviewed studies (53.3%). This AI ecosystem is reinforced by a range of specialized tools, including automated grammar checkers, writing assistants such as Grammarly and Wordtune, and automated writing assessment systems that enhance compositional coherence and overall writing quality.

Complementing the rise of artificial intelligence is the widespread integration of Mobile-Assisted Language Learning (MALL) and gamified applications, which constitute the second largest technological pillar (40.0%). The literature shows that mobile vocabulary applications, interactive platforms such as Duolingo, and widely used communication tools like WhatsApp are commonly utilised to reduce learner anxiety and promote autonomous vocabulary learning beyond formal classroom settings. In addition, gamified tools and digital educational games are intentionally integrated into these systems to increase student engagement, shift learning from passive memorisation to active participation, and accommodate learners with diverse cognitive needs.

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Finally, the findings highlight a growing institutional reliance on immersive and collaborative virtual ecosystems to facilitate real-time language production. Immersive technologies, including Virtual Reality (VR), Augmented Reality (AR), and integrated Metaverse platforms, are utilized in 26.7% of the studies to drop learners into authentic, contextualized simulations that accelerate speaking and pronunciation accuracy. These immersive learning environments are fundamentally supported by standard digital infrastructures, including learning management systems (LMS) such as Blackboard, video conferencing tools like Zoom and Skype, and cloud-based collaborative platforms such as Google Docs. Collectively, these technologies help bridge geographical gaps and establish a holistic, technology-driven framework for modern English language learning.

Objective 2: To identify the learning outcomes associated with the integration of digital tools in English language learning.

Table 5 presents the learning outcomes associated with the integration of digital tools in English language learning. Three main learning outcomes were found when integrating the digital tools.

Table 5. The learning outcomes associated with the integration of digital tools in English language learning

The Learning Outcomes Associated with the Integration of Digital Tools in English Language Learning	Article Research
Linguistic and Cognitive Gains Studies demonstrate substantial improvements in vocabulary acquisition, writing coherence, and speaking fluency. Digital entertainment media and game-based systems specifically enhanced grammatical accuracy and creative thinking. One study noted that learners using an integrated Metaverse platform-maintained reading and writing gains over a six-month period.	• Robi'ah & Wijayanto, 2025 • Al-khresheh, 2024 • Rozaimee & Mumin, 2025 • Kayra, 2024 • Ekizer, 2025 • Webb et al., 2026 • Prabakaran et al., 2025 • Tianyi, 2025 • Ramamuthie & Aziz, 2022 • Rustamovna, 2026 • Amir & Rustam, 2025 • Chen & Fan, 2025
Affective and Behavioral Benefits Technology fosters a transition toward learner-centered environments, significantly increasing student engagement, motivation, and autonomy. AI chatbots are particularly effective in reducing Foreign Language Anxiety (FLA) by providing a "non-judgmental space" for practice. Furthermore, digital tools lengthen the time students spend speaking English outside the classroom.	• Lai & Lee, 2024 • Rochimah et al., 2024 • Manchanayaka, 2023

Based on Table 5, The research results from the 15 analyzed studies demonstrate that digital tools serve as a dual-purpose catalyst in English Language Learning (ELL), with the majority of evidence supporting

Linguistic and Cognitive Gains, while a significant subset focuses on Affective and Behavioral Benefits.

Linguistic and Cognitive Gains

The dominance of linguistic and cognitive gains is evidenced by 12 of the 15 studies, which highlight measurable improvements in language proficiency, academic performance, and higher-order thinking. Research by Ekizer (2025) reports a large overall effect size (g = 1.10) for AI-ready pedagogies, specifically identifying substantial improvements in writing accuracy and speaking fluency. This is mirrored by Webb et al. (2026), who found a positive correlation between Generative AI usage and both academic GPA and language proficiency. Immersive technologies also show sustainable results; Prabakaran et al. (2025) revealed significant gains in reading, writing, and speaking that were maintained for six months post-intervention in a Metaverse environment. Specialized tools like mobile apps and game-based systems further support these gains, with Kayra (2024) and Chen & Fan (2025) documenting accelerated vocabulary acquisition and improved pronunciation through flexible, audio-visual learning patterns. Beyond basic skills, tools like ChatGPT help refine analytical skills and critical thinking, as noted by Al-khresheh (2024) and Rozaimee & Mumin (2025), who observed that students used AI to simulate counterarguments and better structure their thoughts for complex essays. Similarly, studies by Ramamuthie & Aziz (2022) and Tianyi (2025) emphasize the role of digital tools in improving technical writing elements such as grammar, spelling, and punctuation while fostering creative thinking through interactive systems. Broad skill enhancement is also supported by Rustamovna (2026), Amir & Rustam (2025), and Robi'ah & Wijayanto (2025), who all conclude that digital tools effectively accelerate language competence and facilitate interactive instruction across all four domains of listening, speaking, reading, and writing

Affective and Behavioral Benefits

While skill acquisition is vital, three major studies emphasize the psychological and behavioral impact of technology, focusing on how these tools reshape the learner's experience. Lai & Lee (2024) explicitly report that affective outcomes, including enjoyment and reduced anxiety, were the most frequent category identified in their systematic review, representing 43% of analyzed outcomes. These tools create a "non-judgmental space" for practice, which significantly lowers speaking anxiety and sparks learning interest. Manchanayaka (2023) corroborates this by identifying "heightened motivation and engagement" as the primary indicators of digital tool effectiveness, leading to more active participation in communication tasks. Behavioral shifts are further highlighted by Rochimah et al. (2025), whose research on technology-assisted project-based learning (TPjBL) found a 91% positive influence, largely attributed to how collaborative digital environments "ignite students' enjoyment of learning" and foster autonomous interaction. Collectively, these findings suggest that the affective benefits of technology such as increased confidence and engagement often serve as the necessary foundation for achieving the linguistic and cognitive gains observed in the broader body of literature.

Objective 3: To analyse the limitations encountered in the integration of digital tools in English language learning.

The limitation encountered in the integration of digital tools in English language learning poses certain barriers to the implementation despite having a positive approach to the digital tools' usage. Table 6 presents four limitations encountered in the integration of digital tools in English language learning.

Table 6. The limitations encountered in the integration of digital tools in English language learning

The Limitations Encountered in the Integration Of Digital Tools in English Language Learning	Article Research
The Digital Divide and Infrastructure Unequal access to hardware, high equipment costs (e.g., VR headsets), and technical glitches such as slow internet connectivity or server crashes remain major hurdles.	• Amir & Rustam, 2025 • Robi'ah & Wijayanto, 2025 • Prabakaran et al., 2025 • Kayra, 2024 • Al-khresheh, 2024 • Tianyi, 2025

Literacy and Teacher Readiness Significant gaps in digital literacy among both students and educators often lead to technical anxiety. Many educators lack the formal training necessary to effectively integrate AI and immersive tools into established curricula.	• Amir & Rustam, 2025 • Robi'ah & Wijayanto, 2025 • Alsoweed et al., 2025
Ethical and Cognitive Concerns A primary concern is academic integrity and the potential for over-reliance on tools like ChatGPT, which may inhibit independent critical thinking and suppress original creativity. Additionally, AI agents sometimes provide inaccurate, irrelevant, or simplified responses that fail to capture the cultural nuances and emotive complexity of human interaction.	• Alsoweed et al., 2025 • Webb et al., 2026 • Al-khresheh, 2024 • Chen & Fan, 2025
Physical and Practical Challenges Prolonged usage of digital tools raises concerns regarding screen radiation, eye strain, and potential game addiction. Furthermore, voice-based AI often struggles to recognize diverse accents or utterances from lower-proficiency students, leading to learner frustration.	• Prabakaran et al., 2025 • Chen & Fan, 2025

Based on Table 6, the analysis of the 15 selected articles identifies four primary categories of limitations that hinder the effective integration of digital tools in English language learning (ELL): The Digital Divide and Infrastructure, Literacy and Teacher Readiness, Ethical and Cognitive Concerns, and Physical and Practical Challenges.

The Digital Divide and Infrastructure

The literature emphasises that technological progress often exacerbates existing educational inequalities. Al-khresheh (2024) highlights that the "digital divide" is both technological and sociocultural, where regions with limited infrastructure or students from lower socioeconomic backgrounds risk falling behind. This is particularly evident in immersive technologies; Prabakaran et al. (2025) note that the high cost of equipment like VR headsets and the need for robust technological infrastructure present major hurdles in resource-constrained settings. Consequently, Rochimah et al. (2025) argue that for effective implementation of technology-assisted project-based learning, schools and governments must first review the availability of stable internet access and essential hardware such as computers

Literacy and Teacher Readiness

A significant barrier to technology integration is the gap between the availability of tools and the competency of educators to use them. Manchanayaka (2023) and Amir & Rustam (2025) both pinpoint "digital literacy gaps" as a core challenge, emphasising an urgent need for comprehensive teacher training to ensure educators can maximise the benefits of these tools. Research by Ramamuthie & Aziz (2022) further observes that many teachers remain tethered to "conventional methods" and traditional drilling because they lack awareness or training in technology-orientated approaches. Similarly, Robi'ah & Wijayanto (2025) and Kayra (2024) suggest that educators must be informed of the potential drawbacks of technology to better navigate new educational paradigms and facilitate more adaptable learning environments.

Ethical and Cognitive Concerns

The rise of generative AI has introduced profound ethical and cognitive risks. Lai & Lee (2024) report concerns regarding academic integrity, potential cheating, and a long-term loss of critical thinking skills if students use AI as a "crutch". This is supported by Rozaimee & Mumin (2025), who found that students often encountered "irrelevant and inaccurate responses" from ChatGPT and feared becoming overly reliant on the tool at the expense of their independent writing development. Webb et al. (2026) add that students with lower proficiency are particularly prone to using GenAI as a "substitute" for learning rather than a "complement". Furthermore, Ekizer (2025) warns of "algorithmic bias" and "data privacy" issues, while Tianyi (2025) notes

that automatic correction systems may lack the human guidance necessary to catch semantic errors in lower-level learners. Rustamovna (2026) also notes the necessity for "effective" opportunities, implying that current traditional models are limited in their ability to address these evolving concerns.

Physical and Practical Challenges

Unique practical barriers emerged, particularly regarding intensive usage and younger learners. Chen & Fan (2025) explicitly identify physical health threats, including prolonged screen radiation and eye strain, alongside behavioural risks such as potential game addiction and distracted academic attention. These findings suggest that while digital tools offer engagement, the lack of student self-regulation especially in early childhood education requires a carefully balanced and monitored pedagogical approach to prevent negative health and learning habits

RESEARCH DISCUSSION

Digital Tools Utilised in English Language Learning Contexts

The first objective of this study was to investigate the specific types and frequencies of digital tools currently being utilised within English language learning environments. The findings reveal a landscape heavily dominated by two distinct technological pillars: Generative/Conversational Artificial Intelligence (53.3%) and Mobile-Assisted Language Learning (MALL) applications (40.0%).

A. The AI-Driven Shift in Language Classrooms

The overwhelming prevalence of AI tools specifically ChatGPT, Grammarly, and Wordtune, signals a paradigm shift away from traditional software toward interactive agents (Al-khresheh, 2024; Alsoweed et al., 2025; Webb et al., 2026). Historically, Computer-Assisted Language Learning (CALL) relied on drill-and-practice applications that offered predictable, pre-programmed responses. The contemporary integration of conversational AI tools, however, allows for what Vygotsky's Socio-Cultural Theory calls dynamic scaffolding. This is because, these tools process and generate natural language in real-time, they act as an accessible learning facilitator (Al-khresheh, 2024), shifting the role of technology from a passive dictionary to a conversational partner.

To optimise this shift, institutions must look past baseline technical setups and actively build specialized digital competence frameworks. As the European Centre for Modern Languages (ECML, 2026) notes, the sustainable integration of AI in language education relies entirely on developing teacher and student capacities for purposeful and ethnically bounded technology use, rather than treating automated tools as simple answers to pedagogical gaps. This ongoing evolution means that the core metric of success in the modern English language learning landscape is no longer the mere availability of automated tools, but the depth of reflective human-machine collaboration designed into the language curriculum.

B. The Domination of Mobile and Gamified Ecosystems

The high frequency of mobile applications (40.0%) and gamification tools (20.0%) such as Duolingo, WhatsApp, and educational games highlights the informalisation of language learning (Amir & Rustam, 2025; Chen & Fan, 2025; Kayra, 2024). This pattern indicates that modern language acquisition is no longer physically restricted by the geographic or temporal walls of institutional settings. Instead, mobile-first environments are strategically leveraged to extend organic student exposure to English through daily interactions. The compiled empirical data demonstrates that modern language programs are intentionally pairing the high-processing intelligence of AI with the high-accessibility format of smartphones, building a multi-layered digital ecosystem designed to maximise out-of-class linguistic practice.

The Outcome of Digital Tools (AI) Technology in English Language Learning

A major finding of this study depicts the consistently positive impact of digital technologies on language

learning outcomes. As 15 articles were thematically reviewed and studied, improvements were observed in linguistic, affective, cognitive, and behavioural domains, mentioning that technology integration contributes to holistic language development rather than isolated skill acquisition in the English language.

a) Linguistic Outcome

AI technology should be inclusively integrated to ensure accessibility for all students, regardless of their backgrounds or abilities, throughout the teaching process (Intan Idura Mohamad Isa & Hishamuddin Ahmad, 2024). This aligns with the goals of the Malaysian Education Development Plan (PPPM 2013–2025), whereby the Ministry of Education Malaysia (KPM) introduced digital learning as a process in which teachers utilise digital technology to achieve objectives during lessons (UsninZolhilmi Adnan & Hazrati Husnin, 2024). However, some teachers argue that access to technological equipment and resources, including stable internet connectivity, poses a challenge in incorporating AI into classroom teaching (Geoffrey F. C. Lim et al., 2024; Nor Asiah Mohamad @ Razak, 2024). This is due to a lack of infrastructure and technological resources, prompting teachers to lean more towards conventional teaching methods. Geoffrey F. C. Lim et al. (2024) also emphasise that teachers must have adequate access to equipment and technological resources in order to successfully integrate them into teaching. Therefore, sufficient access to these tools and the extent of teachers' access are crucial in ensuring effective use of AI technology in teaching the Malay language.

b) Affective Outcome

Beyond linguistic gains, the reviewed studies consistently highlighted the positive influence of digital technologies on learners' attitudes and emotions. One of the most frequently reported outcomes was increased learner engagement. Interactive interfaces, gamified learning activities, and immersive experiences encouraged active participation and sustained motivation (Ishaq et al., 2021).

The findings also revealed that digital technologies contribute significantly to reducing Foreign Language Anxiety (FLA), a major barrier to language learning success. AI chatbots and conversational agents provide learners with a non-judgmental environment where mistakes can be made without fear of embarrassment or negative evaluation. This psychological safety encourages experimentation and risk-taking, which are critical for language development. Several studies found that learners reported greater confidence and willingness to communicate after engaging with AI-assisted language learning platforms (Abano & Estremera, 2026) .In addition, digital learning environments promote learner autonomy by enabling students to control the pace, timing, and content of their learning experiences. This flexibility enhances learners' sense of ownership over their learning process and contributes to higher levels of intrinsic motivation (Chengli et al., 2025).

c) Cognitive and Behavioral Outcomes

The review further revealed that digital technologies foster important cognitive and behavioral skills. AI-powered tools encourage critical reflection by providing feedback that learners must evaluate, interpret, and apply. When used appropriately, these technologies can enhance analytical thinking, problem-solving abilities, and metacognitive awareness (Abano & Estremera, 2026) . Moreover, digital platforms facilitate self-regulated learning by enabling learners to monitor progress, set goals, and engage in independent study. This is particularly evident in mobile-assisted learning environments, where students frequently engage in language learning activities outside formal classroom settings. Such findings suggest that digital technologies support lifelong learning habits and foster greater responsibility for learning outcomes.

Limitations Encountered in the Integration of Digital Tools in English Language Learning

Based on research findings, there are four key impacts on limitation of Digital Tools (AI) Technology in English Language Learning. These include Technical and Infrastructure Challenges, Pedagogical and Ethical Concerns, Digital Literacy and Professional Development Gap, Health and Well Being Concern

a) Technical and Infrastructure Challenges

The most frequently reported barrier relates to infrastructure and technological accessibility. Many educational

institutions, particularly in developing regions, continue to experience limitations in internet connectivity, hardware availability, and technical support (Chengli et al., 2025). Advanced technologies such as VR and Metaverse platforms often require expensive equipment and stable high-speed internet connections, making widespread implementation difficult. Furthermore, AI-powered voice recognition systems may struggle to accurately interpret diverse accents, pronunciation variations, and speech patterns of lower-proficiency learners. Such limitations can lead to inaccurate feedback and potentially frustrate learners who rely on these systems for speaking practice.

b) Pedagogical and Ethical Concerns

A second challenge concerns the pedagogical implications of AI integration. Several studies raised concerns regarding learners' over-reliance on AI-generated content. While tools such as ChatGPT can enhance productivity and provide useful support, excessive dependence may reduce opportunities for independent thinking, creativity, and authentic language production (Abano & Estremera, 2026). Additionally, AI systems occasionally generate inaccurate, misleading, or contextually inappropriate responses. Consequently, learners must possess sufficient digital literacy skills to critically evaluate AI-generated information. Without such skills, there is a risk that students may accept inaccurate outputs without verification, potentially undermining learning quality

c) Digital Literacy and Professional Development Gap

Although readiness levels are positive, the review identified persistent gaps in digital literacy among both educators and learners. Many teachers reported uncertainty regarding the pedagogical integration of AI tools and expressed concerns about ethical issues, assessment validity, and academic integrity. This finding highlights the need for targeted professional development programs that focus not only on technical skills but also on pedagogical applications and ethical considerations (Chengli et al., 2025).

d) Health and Well-Being Concern

Several studies highlighted practical concerns associated with prolonged technology use. Extended screen exposure has been linked to eye strain, fatigue, and reduced physical activity. Additionally, highly gamified learning environments may contribute to distraction or excessive technology dependence if not carefully managed (Ishaq et al., 2021). Although these concerns were not classified as major barriers, they underscore the importance of balanced technology integration practice.

Implications of the Study

The synthesis of findings across the three research objectives yields critical implications for English language education. These implications provide actionable blueprints for educators, policymakers, and researchers aiming to optimize digital tool integration while mitigating structural and behavioral risks.

Pedagogical Implications

1. **Transitioning to "Complementary" Rather Than "Substitutive" AI Pedagogy:** A key pedagogical implication of this study is the need for educators to reconsider how students engage with artificial intelligence and automated writing tools in language learning. Given concerns that excessive dependence on AI may contribute to superficial learning and undermine academic integrity, particularly among lower-proficiency learners (Alsoweed et al., 2025; Webb et al., 2026), teachers should implement assessment strategies that promote responsible and complementary use of these technologies. One practical approach is the adoption of a two-phase writing framework. In the first phase, students may use conversational AI tools such as ChatGPT for idea generation, outlining, vocabulary expansion, and preliminary language support (Al-khresheh, 2024; Lai & Lee, 2024). In the second phase, students are required to independently produce, revise, and refine their written work, preferably through supervised or classroom-based activities. Such an approach enables learners to benefit from technological assistance while maintaining active cognitive engagement, fostering authentic language development and preserving academic integrity.

2. **Overcoming Teacher Anxiety through Targeted Training:** Given that 20% of the reviewed studies identify teacher technological anxiety and insufficient readiness as significant barriers to technology integration (Amir & Rustam, 2025; Robi'ah & Wijayanto, 2025), educational institutions should extend professional development efforts beyond basic technical training. Rather than focusing solely on the operational aspects of digital tools, professional development programs should emphasise Technological Pedagogical Content Knowledge (TPACK), enabling teachers to integrate technology meaningfully within language instruction. This approach equips teachers not only with technical competencies but also with the pedagogical expertise required to align technological tools with learning objectives. By strategically incorporating digital technologies into lesson design, educators can create more supportive learning environments, reduce learners' affective barriers, and encourage meaningful communication and engagement in language learning activities (Kayra, 2024; Tianyi, 2025).

Policy and Institutional Implications

1. **Bridging the Digital Divide via Strategic Infrastructure Design:** The prominence of digital divide and technology equity concerns, identified in 40% of the reviewed studies (Amir & Rustam, 2025; Prabakaran et al., 2025; Tianyi, 2025), highlights the need for targeted policy responses from educational institutions and government authorities. To ensure equitable access to technology-enhanced language learning, policymakers should prioritize strategies that maximize accessibility and inclusivity across diverse educational contexts. One practical approach is the adoption of a mobile-first, low-bandwidth technology framework that accommodates learners with varying levels of technological access. Rather than allocating substantial resources to specialized and often costly technologies, such as virtual reality (VR) equipment, institutions may achieve broader educational impact by investing in reliable internet infrastructure and supporting the use of widely accessible, cloud-based platforms. Applications such as WhatsApp and Google Docs can facilitate collaborative language learning while remaining compatible with commonly available student devices, including smartphones (Alsoweed et al., 2025). Such investments can help reduce disparities in technology access and promote more equitable participation in digital language learning environments.

2. **Establishing Algorithmic Integrity and AI Governance Guidelines**: The increasing integration of generative artificial intelligence (AI) tools into ESLwriting instruction highlights the need for institutions to develop clear and consistent policies governing their use. Existing international literature suggests that transparent guidelines can support academic integrity while promoting fair and equitable assessment practices for diverse learner populations, including non-native English speakers (European Centre for Modern Languages, 2026). Accordingly, educational institutions should establish explicit frameworks that delineate acceptable and unacceptable uses of AI in academic writing. Such policies may distinguish between AI-assisted editing functions, including grammar correction, language refinement, and feedback provision, and AI-generated content that substitutes for students' original work. Clear policy guidance can help ensure that AI serves as a supportive learning resource while preserving authentic student engagement and academic accountability.

Theoretical and Methodological Implications

1. **Expanding Beyond the Sampling Lock of Asian EFL:** Methodologically, this study identifies a notable geographical concentration within the existing body of research, with most empirical evidence originating from Asian EFL learning contexts (Lai & Lee, 2024). This limitation restricts the broader applicability of current findings and raises questions regarding the generalizability of established CALL and MALL frameworks across diverse educational settings. To strengthen the external validity of future research, scholars should expand the geographical scope of their investigations by examining technology-enhanced language learning interventions in African, Latin American, and European ESL/EFL contexts (International Journal of Humanities, Commerce and Education, 2026). Such diversification would provide valuable insights into how cultural learning preferences, socioeconomic factors, and linguistic backgrounds influence learners' engagement with digital technologies and automated feedback systems. A more geographically diverse evidence base would contribute to the development of context-sensitive theories and practices for technology-assisted language learning.

2. **Shifting from Short-Term Metrics to Longitudinal Tracking:** Finally, the reviewed literature demonstrates a strong emphasis on short-term learning outcomes, often measured through immediate improvements in reading, writing, or overall language performance (Manchanayaka, 2023; Ekizer, 2025). While these findings provide valuable evidence of the effectiveness of technology-enhanced language learning interventions, they offer limited insight into the sustainability of such gains over time. Consequently, there remains a need for research that examines the long-term retention of language skills beyond the initial intervention period. Future studies should therefore employ longitudinal research designs that extend beyond the commonly used 4-to-8-week implementation periods. Tracking learners over longer durations, such as six to twelve months after the intervention, would provide a more comprehensive understanding of whether observed improvements reflect enduring language development rather than temporary increases in engagement or motivation associated with exposure to new technologies. Such evidence would contribute to a more robust evaluation of the long-term effectiveness of digital tools in ESL education.

RECOMMENDATIONS FOR FUTURE RESEARCH

Based on the thematic synthesis of the 15 gathered articles evaluating the intersection of technology-enhanced English language learning (TELL), several structural gaps regarding digital tools, language learning outcomes, and pedagogical limitations have emerged. The following paragraphs outline key pathways to guide subsequent empirical investigations in this domain.

1. **Granular Feature Isolation Across Digital Tools:** Future research should transition away from evaluating digital platforms as broad, monolithic entities and instead focus on granular feature isolation across specific digital tools. The current body of literature frequently treats technological interventions as holistic systems—such as a generic mobile application or a conversational chatbot—making it difficult to isolate which software design elements or user interfaces drive successful language acquisition. As noted by recent systematic reviews in instructional design, evaluating technology as an undifferentiated whole fails to account for the specific multimodal scaffolds that alter cognitive engagement. To address this ambiguity, subsequent empirical studies must employ comparative feature-isolation methodologies. Researchers should directly benchmark the linguistic efficacy of synchronous, real-time voice-based interactive agents against asynchronous, text-only automated feedback mechanisms to determine which precise configuration optimizes syntactic and phonological mastery.

2. **Multi-Dimensional Assessment of Language Learning Outcomes:** There is a critical need to broaden the scope of language learning outcomes measured within technology-enhanced environments. The 15 gathered articles for this review predominantly highlight easily quantifiable, discrete language indicators—such as short-term vocabulary retention or basic reading comprehension scores. However, complex, productive language skills like spontaneous oral fluency and pragmatic writing competence remain heavily underrepresented in current empirical data. Systematic reviews focusing on digital text comprehension underscore that traditional pre- and post-tests are fundamentally process-blind, failing to capture authentic communicative and digital reading competencies. Future TELL investigations should incorporate multimodal and process-oriented evaluation metrics, blending quantitative automated writing evaluation (AWE) tools and speech-recognition engines with qualitative human rubrics or neuro-cognitive tools (such as eye-tracking) to provide a more holistic, 360-degree view of how digital tools impact communicative proficiency.

3. **Investigation into Cognitive and Pedagogical Limitations:** Future investigations must aggressively address the cognitive and pedagogical limitations identified across current digital tool integrations. While digital tools frequently lower students' affective filters and boost immediate motivation, contemporary literature reviews highlight a worrying rise in digital dependency and "cognitive offloading". Because immediate predictive text, machine translation, and automated grammar correctors act as a cognitive "crutch," students often generate polished final outputs through passive surface learning rather than deep cognitive linguistic processing. Longitudinal studies are required to explore how this over-reliance impacts a learner's internal grammatical drafting and long-term retention over time. This will assist educators in

identifying the precise pedagogical boundaries where technology transitions from a supportive scaffold into a learning detriment.

4. **Overcoming Sampling and Contextual Limitations:** Finally, future research must actively work to overcome the severe sampling and contextual limitations that currently restrict the generalizability of TELL literature. The compiled dataset exhibits a pronounced bias toward highly resourced higher education environments and specific English as a Foreign Language (EFL) geographical regions. As highlighted by comprehensive scoping reviews on global technology integration, this lopsided distribution overlooks severe socio-technical boundaries, algorithmic biases, and digital divide constraints present in low- and middle-income countries. To build a more globally representative framework, future systematic reviews and primary empirical studies must expand their scopes to include lower-bandwidth, mobile-only learning contexts in developing socioeconomic regions, as well as younger K-12 populations. This contextual diversification will clarify how variations in digital literacy, socioeconomic status, and age alter both technology acceptance and actual linguistic development.

CONCLUSION

This systematic literature review provides a comprehensive evaluation of the integration, outcomes, and limitations of digital tools in the English language learning between 2021 and 2026. The synthesised findings demonstrate a profound pedagogical shift toward automation, immersion, and mobile accessibility, driven heavily by the rapid emergence of Artificial Intelligence (AI), Mobile-Assisted Language Learning (MALL), Virtual Reality (VR), and gamification platforms. Structurally, these tools yield multifaceted benefits by significantly enhancing student vocabulary acquisition, reading comprehension, writing performance, and grammatical accuracy. Furthermore, they lower psychological barriers such as foreign language anxiety, effectively altering the emotional state of the learner to boost overall classroom engagement and autonomy.

However, the widespread implementation of these technological interventions is fundamentally constrained by a pronounced digital divide, significant infrastructure limitations, and the cognitive risks of student over-reliance or "crutch" behavior. Moving forward, the successful evolution of language education relies on moving past a blind trust in software capabilities and embracing a carefully structured, hybrid learning framework (Veluri et al., 2025). To optimise this paradigm shift and protect academic integrity, institutions must redefine how students interact with technology, ensuring digital tools are intentionally deployed as balanced, reflective scaffolds rather than direct substitutes for cognitive effort (European Centre for Modern Languages [ECML], 2026). Overall, this study serves as a foundation for other researchers to conduct studies on the same topic, as it provides a comprehensive synthesis of current research on digital tool integration in English language learning. Hence, future research is recommended to explore more context-specific implementations and to investigate long-term impacts of digital tool integration on language learning outcomes.

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