# DIGITAL LITERACY IN ENGLISH LANGUAGE EDUCATION: BRIDGING TEACHERS' COMPETENCE AND LEARNERS' NEEDS

Nova Holan Diva Situmorang[1]
Jismulatif[2]
Supriusman[3]

[1,2,3] Universitas Riau, Riau, Indonesia

Corresponding author: nova88815@gmail.com

## ABSTRACT

Digital literacy has become indispensable in English language education, particularly in bridging teacher competence with learner needs in a rapidly evolving digital era. This study employed a Systematic Literature Review (SLR) of peer-reviewed works published between 2020 and 2025, focusing on digital literacy and digital competence in ELT/EFL contexts. Key sources include micro-course interventions for teacher development in higher education (Discover Education, 2025), empirical analyses of EFL teachers' digital literacy in Chinese universities (Feng & Sumettikoon, 2024), and case studies of Indonesian pre-service teachers' digital practices (Nur, Nur & Sunra, 2023). The findings reveal that while teachers generally possess basic digital tool knowledge, they often lack the pedagogical integration skills and confidence needed to foster critical digital engagement. Learners, meanwhile, demonstrate familiarity with everyday technologies but require structured support for academic digital tasks. Thematic synthesis highlights persistent barriers, including limited training opportunities, inadequate infrastructure, and insufficient institutional support. Opportunities identified involve the adoption of micro-courses for continuous professional development and practice-oriented modules that enhance both pedagogy and learner participation. This review addresses the gap in understanding how teacher digital competence and learner digital literacy intersect in ELT/EFL contexts, offering a unified perspective to inform teacher education and policy. This paper concludes that strengthening teacher competence alongside addressing learners' digital literacy needs is crucial to ensuring digital literacy functions as a transformative element in ELT rather than as a superficial supplement. These findings provide practical insights for teacher training programs seeking to strengthen digital literacy in ELT.

**Keywords:** Digital Literacy, EFL, English Language Education, Learner Needs, Teacher Competence

## INTRODUCTION

The rapid advancement of digital technologies has transformed education globally, making the integration of digital tools in English language teaching (ELT) essential rather than optional. Digital literacy, the ability to access, evaluate, and use digital resources meaningfully has emerged as a critical skill for both teachers and learners (Değirmenci, 2024). In English language education, the depth to which digital literacy is embedded in pedagogy significantly influences teaching effectiveness and learning outcomes.

For teachers, digital literacy extends beyond basic technical proficiency. It involves the ability to design learner-centered digital activities, critically select and adapt resources, and scaffold students' digital engagement. Feng Sumettikoon (2024) found that the interplay among key dimensions of digital literacy, information, communication, collaboration, ethics, and creation—strongly shapes how EFL teachers adopt technology in their classrooms. Similarly, Bui et al. (2022) highlight that teachers' effective use of digital tools is influenced by access to technology, professional development opportunities, and institutional support.

Learners, meanwhile, are immersed in digital environments, but their everyday familiarity with technology does not guarantee academic digital competence. Wahyuddin et al. (2024) reported a moderate positive correlation ($r = 0.456$) between students' digital literacy and English proficiency in blended learning contexts. Moreover, research on EFL students in China suggests that digital literacy enhances online learning power, with perceived teacher support mediating this relationship. These findings underscore the importance of aligning teacher competence with learners' digital needs.

When such alignment is lacking, digital tools risk being underutilized or superficially integrated. Conversely, strong alignment fosters autonomy, critical engagement, and meaningful language learning experiences. This paper investigates how bridging the gap between teachers' digital literacy competence and learners' digital needs can transform ELT practices, highlighting key opportunities and challenges from recent empirical studies. Therefore, this study aims to systematically review recent literature (2021–2025) to examine how digital literacy bridges teacher competence and learner needs in ELT/EFL contexts. By addressing the limited integration of teacher digital competence and learner digital literacy within a unified framework, this study contributes to a deeper understanding of how balanced digital pedagogies can inform teacher education, curriculum design, and educational policy.

To situate this investigation within existing scholarship, the following section reviews key theoretical and empirical perspectives on digital literacy, highlighting how it has been conceptualized in relation to teachers' competence and learners' needs in ELT/EFL contexts.

***Concept of Digital Literacy***

Digital literacy is widely recognized as a multifaceted competence that extends beyond basic technical skills. Eshet-Alkalai (2004) conceptualizes digital literacy as a set of survival skills that enable individuals to function effectively in the digital era, encompassing cognitive, socio-emotional, and ethical dimensions. Similarly, UNESCO (2018) defines digital literacy as the ability to access, manage, understand, integrate, communicate, evaluate, and create information safely and appropriately through digital technologies. These frameworks establish the foundation for understanding how digital literacy intersects with English language education, where both teachers and learners must navigate complex digital landscapes to optimize teaching and learning outcomes.

Building on these foundational definitions, it becomes essential to examine how digital literacy manifests specifically within English language teaching particularly from the teachers' perspective.

***Teachers' Digital Literacy in ELT***

Teachers' digital competence plays a pivotal role in determining how technology is integrated into English language teaching. A systematic review published in International Journal of Educational Research Open (2022) found that pedagogical beliefs, confidence, and institutional support are key factors shaping technology use in classrooms. Despite acknowledging its potential, many teachers employ digital tools in teacher-centered ways, which limits opportunities for learner autonomy. In Indonesia, Agusprayuningtyas Iskandar Dewanti (2023) reported that English learning materials at the senior high school level underrepresent digital literacy, thereby restricting students' exposure to essential 21st-century skills. This indicates a need to strengthen teachers' pedagogical design and digital integration to move beyond functional use toward transformative practice.

While teacher competence determines the quality and effectiveness of technology-mediated instruction, learners' digital readiness equally shapes how learning experiences are received and applied. Hence, to understand the broader dynamics of digital literacy in ELT, it is crucial to also consider how learners engage with and develop digital competencies within educational contexts.

***Learners' Digital Literacy in ELT***

Learners' digital literacy levels directly influence their engagement with English learning tasks. Pertiwi Rodliyah (2023) found that university students in Indonesia demonstrated varied competencies in information literacy, ICT use, and media literacy, which affected their motivation and classroom participation. At the secondary level, Mufidati (2023) showed that students with higher digital literacy achieved stronger reading comprehension outcomes, illustrating the link between digital competence and language proficiency. Similarly, Eryansyah Erlina Fiftinova Nurweni (2023) reported that students recognized the importance of digital literacy for meeting 21st-century skill demands but continued to face barriers such as limited device access and inadequate support. These findings emphasize that digital literacy is unevenly distributed among learners and requires targeted instructional interventions.

Taken together, the literature on teachers and learners suggests that while both groups engage with digital tools, their competencies and experiences often diverge. This disconnect raises a crucial question of how these two dimensions can be effectively bridged to achieve pedagogical balance and mutual digital empowerment.

***Bridging Teachers' Competence and Learners' Needs***

A persistent gap exists between teachers' digital competence and learners' digital literacy needs. While teachers may perceive themselves as digitally literate, their practices often fail to reflect learner perspectives or support autonomous engagement. Alfia Sumardi Kristina (2023) found that students' attitudes and behavioral intentions toward digital literacy in EFL classrooms were strongly influenced by perceived support and access to technology. However, when instructional practices remain limited to basic tool use, learners' expectations for interactive and dynamic digital learning environments go unmet. Bridging this gap requires strengthening teachers' professional development, aligning curricular goals with learners' actual digital practices, and embedding meaningful digital literacy tasks in classroom instruction.

Despite these emerging insights, the literature still lacks an integrated perspective that explicitly connects teacher digital competence with learner digital needs highlighting an important gap in current research.

***Research Gap***

Although research on digital literacy in ELT has grown substantially in recent years, few studies explicitly explore how teacher competence and learner needs can be strategically integrated to create transformative language learning experiences. Much of the existing literature treats teacher and learner digital literacy separately rather than as interconnected dimensions of classroom ecology. This paper addresses this gap by proposing a conceptual framework to harmonize teacher digital competence with learner requirements, aiming to foster more equitable, participatory, and effective English language education in the digital era.

## METHODS

This study adopted a Systematic Literature Review (SLR) design to synthesize peer-reviewed research on digital literacy and digital competence in English Language Teaching (ELT) contexts published between 2021 and 2025. The review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines to ensure transparency and replicability.

***Search Strategy***

Data collection was conducted in October 2025 using four major academic databases: Scopus, ERIC, ScienceDirect, and Google Scholar. The search keywords included combinations of: ("digital literacy" OR "digital competence") AND ("ELT" OR "EFL" OR "English language teaching") AND ("teacher education" OR "language learners")

***Inclusion and Exclusion Criteria***

Articles were included if they:

1. Focused on digital literacy or digital competence in ELT/EFL contexts,
2. Were empirical or intervention-based studies,
3. Were published in peer-reviewed journals between 2021 and 2025,
4. Provided open access or DOI-linked access.

Exclusion criteria included non-English articles, opinion pieces, non-peer-reviewed reports, and studies outside ELT/EFL contexts.

***Screening and Selection***

The initial search across four major academic databases (Scopus, ERIC, ScienceDirect, and Google Scholar) identified 16,700 records. After applying a custom publication range (2021–2025) and filtering for articles only, 1,550 records remained. Following removal of duplicates and selecting open-access articles, 541 records were retained. Titles and abstracts of 489 records were screened, resulting in 326 full-text articles being excluded due to irrelevant topics, methods, or contexts. The final selection included 49 studies that met the eligibility criteria. The selection process is illustrated in the PRISMA flowchart (Figure 1).

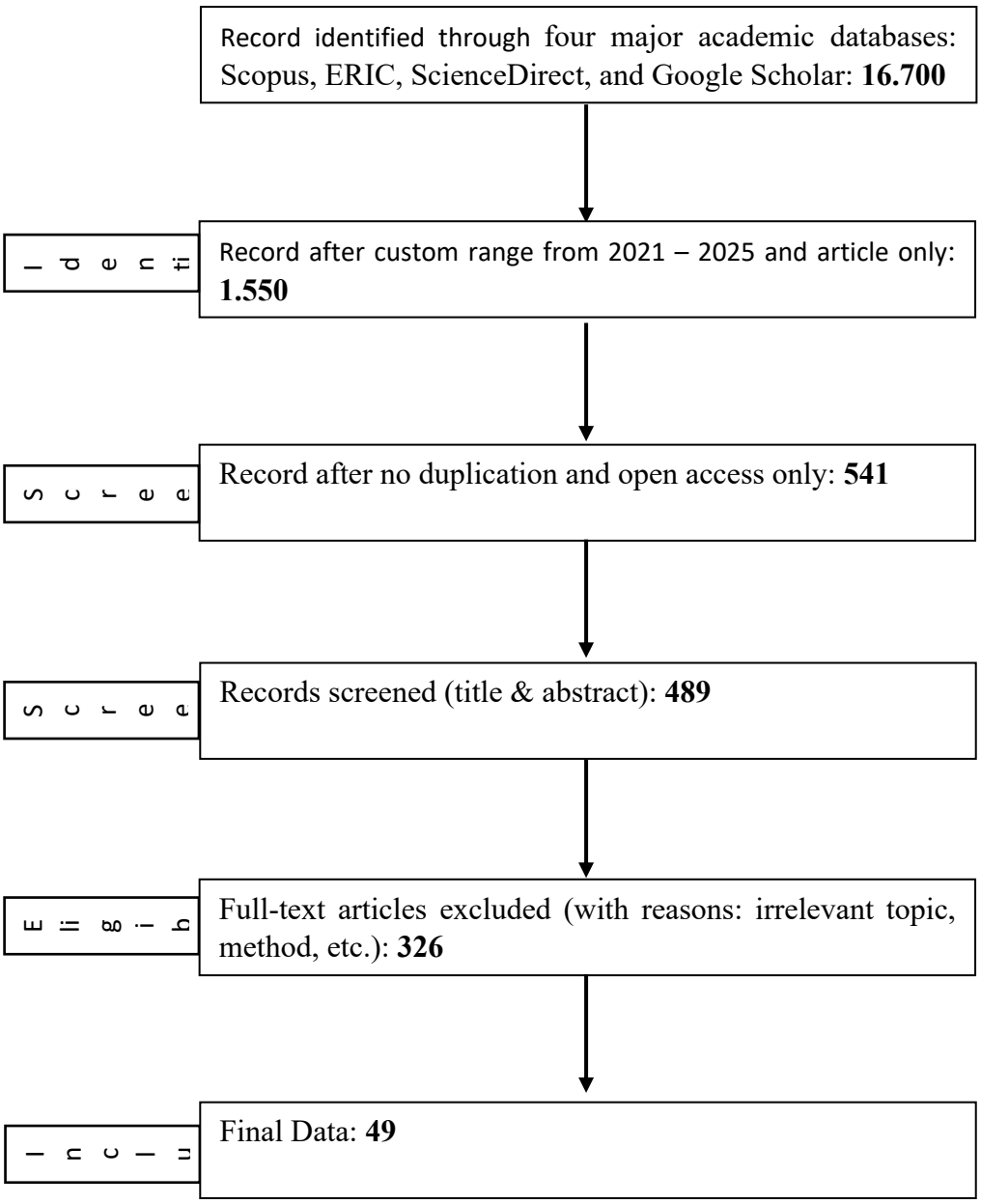


**Figure 1.** PRISMA Flowchart of Study Selection Process

***Data Extraction and Analysis***

The review process followed the four main phases of PRISMA 2020: Identification, Screening, Eligibility, and Inclusion. The initial search across four major academic databases Scopus, ERIC, ScienceDirect, and Google Scholar identified 16,700 records. After applying a custom publication range (2021–2025) and filtering for journal articles only, 1,550 records remained. Following the removal of duplicates and limitation to open-access sources, 541 records were retained. Titles and abstracts of 489 records were screened, while 326 full-text articles were excluded due to irrelevant topics, methods, or contexts. The final selection included 49 studies that met the eligibility criteria. The selection process is summarized in the PRISMA flowchart (Figure 1).

A structured data extraction table was designed to capture key information from each eligible study, including author and year, country, focus area, research method, and key findings (see Table 1).

To synthesize the data, a thematic analysis approach was employed following the framework of Braun and Clarke (2006). The process involved three iterative steps:

1. Coding: assigning descriptive labels to summarize recurring concepts related to teachers' digital competence, learners' digital literacy, and pedagogical innovation.

2. Theme development: grouping similar codes into broader themes, such as barriers to digital integration, opportunities for professional development, and pedagogical strategies for digital literacy.
3. Interpretation and synthesis: integrating and comparing themes across studies to identify global trends, contextual challenges, and pedagogical implications for ELT/EFL classrooms.

To enhance transparency and reliability, all extracted data were cross-checked and aligned with PRISMA 2020 reporting standards. The thematic synthesis informed the organization of results and discussion presented in the following sections.

## FINDINGS AND DISCUSSION

The results of this systematic literature review (SLR) provide a comprehensive overview of recent research on digital literacy in English language education. A total of 49 peer-reviewed studies published between 2021 and 2025 were analyzed, covering various educational levels and contexts across Asia, Europe, the Middle East, and the Americas. The studies employed diverse research designs, including systematic literature reviews, mixed-method approaches, and experimental investigations. Most of the research focused on teachers' digital competence, technology integration, artificial intelligence (AI) in ELT, and learner engagement in digital learning environments. The synthesis highlights both opportunities and ongoing challenges in bridging teachers' digital competence and learners' evolving digital literacy needs.

Table 1 presents a detailed summary of the 49 studies included in this review, outlining their authors, publication years, countries, focus areas, research methods, and key findings related to digital literacy and English language education.

**Table 1.** Summary of Studies Included in the Systematic Literature Review (SLR)

| No. | Author (Year) | Country | Focus Area | Method | Key Findings |
|---|---|---|---|---|---|
| 1 | Tomas Kaqinari (2023) | Switzerland | Factors influencing online teaching and educational technology use during COVID-19 | Systematic review (qualitative) and narrative synthesis | Facilitators: prior tech experience, positive attitudes, adaptability, motivation. Barriers: lack of experience, negative beliefs, low tech competence. Need for onboarding & digital competence. |
| 2 | Cao Cu Giac (2025) | Vietnam | Teacher acceptance of digital technology in secondary education (TAM framework) | Quantitative survey (Google Form, 364 teachers, SPSS analysis) | Perceived usefulness, ease of use, peer support, and school policy significantly influence technology adoption. Psychological and social factors also play an important role in teachers' acceptance and effective integration of digital tools. |
| 3 | Moisés Selfa-Sastre (2022) | Spain | Digital technology in language education; collaborative creativity | Systematic literature review of 26 peer-reviewed empirical studies | Digital technology supports collaborative creativity in three roles: (1) tutoring device for co-creation skills, (2) tool to develop co-creative thinking, (3) medium to create rich environments for collective creative processes. Technology enhances student engagement and equips learners with competences to tackle complex problems. |

| No. | Author (Year) | Country | Focus Area | Method | Key Findings |
|---|---|---|---|---|---|
| 4 | Irene Cadime (2022) | Portugal | ICT-based intervention for reading skills in children with reading disabilities | Single-group pre-test/post-test design; Tier 2 intervention using digital tool "I'm still learning"; remote delivery | Significant gains in word reading, oral reading fluency, and listening comprehension; gains independent of gender, number of sessions, or interventionist; parents reported positive perceptions of remote intervention |
| 5 | Moisés Selfa Sastre (2022) | Spain | Digital literary practices and creativity in initial teacher training | Qualitative analysis of student-created cyberpoems using Genially; analysis based on multimodality, hypertextuality, interaction | Creation of cyberpoems promotes literary creativity, digital literacy, and multimodal reading comprehension; prepares future teachers for digital literary mediation in classrooms |
| 6 | Nieves Gutiérrez-Ángel (2022) | Spain, Portugal | Digital literacy in higher education and teacher education | Systematic review of empirical studies from the last 11 years | Digital literacy programs in universities enhance self-efficacy, digital writing/reading skills, use of databases, digital content design, and pedagogical innovation; studies also relate digital literacy to motivation, commitment, attitudes, and satisfaction |
| 7 | Beatriz Peña-Acuña (2022) | Spain | Digital literacy & language learning; AI-assisted ELT | Quasi-experimental; quantitative survey of 128 primary education students | Students perceived improvement mostly in oral skills; app enhanced vocabulary memorization; self-evaluation feature was positively received; AI app promoted engagement and motivation in English learning |
| 8 | Andreia Nunes (2022) | Portugal | Teachers' digital literacy; ICT integration in literacy classrooms | Survey; 125 Portuguese language teachers in grades 5–12 | Effective use of ICT predicted by internal factors (self-efficacy, constructivist teaching conception) and external factors (lack of access/support, gatekeepers); highlights key targets to facilitate ICT use in literacy education |
| 9 | Isolda Margarita Castillo-Martínez (2023) | Mexico, Spain | Academic literacy; digital literacy; university students | Mixed method; survey (595 students), test for personality type, interviews, focus group | Cognitive aspect perceived lowest; positive attitude supports literacy development; personality awareness helps improve skills; emotional factors impact literacy; students prefer digital interaction with texts; Mexican students perceived higher mastery than Spanish students |

| No. | Author (Year) | Country | Focus Area | Method | Key Findings |
|---|---|---|---|---|---|
| 10 | Nisar Abid (2023) | Pakistan | Reading habits; study skills; secondary education; English language | Descriptive correlational survey; 1,614 secondary students; RHQ and SSS questionnaires | Students showed competent reading habits and study skills; strong positive correlations among reading habits, study skills, and academic achievement; moderate predictive value of reading habits and study skills for English achievement; suggests reflective assignments and library lessons |
| 11 | Elena del Pilar Jiménez-Pérez (2023) | Spain | Reading competence; emotional intelligence; high school students | Quasi-experimental longitudinal; 389 students aged 16–18 | Evidence of a direct relationship between reading competence and emotional intelligence; stimulation of reading habits improved outcomes in the experimental group |
| 12 | Haoyuan Zheng (2023) | China | Grammatical knowledge; reading comprehension; cognitive processes | Meta-analysis; 86 studies; 14,852 readers (primary to university) | Large correlation between grammatical knowledge and reading comprehension; grade group moderates effect; cohesive tie function transfers across text comprehension |
| 13 | Rosa Tabernero-Sala (2023) | Spain | Digital reading; critical reading; children | Qualitative documentary study; content analysis of 836 virtual epitexts from YouTube/Vimeo | Strategies promoting critical reading include emphasizing author presence, book materiality, artistic discourse, and hybridization of reality and fiction; supports critical thinking development in children |
| 14 | Li Yin (2023) | Beijing, China | Early literacy; word reading & writing; visual perception | Experimental study with 60 preschoolers; character decision & learning tasks; longitudinal follow-up | Children learned symmetrical characters better; asymmetrical character learning predicted Chinese word writing abilities; analytic perception relates to early writing ability |
| 15 | Jamie L. Metsala (2023) | Canada | Early reading development; reading fluency; oral language skills | Longitudinal study with 83 second- and third-grade students over 18 months | Gains in word reading fluency predicted later word- and text-reading fluency; morphological awareness contributed to both; listening comprehension specifically predicted text-reading fluency |
| 16 | Andrea Strandberg (2023) | Sweden | Early reading development; word reading; eye-tracking | Eye-tracking study with 164 first graders and 206 second graders; regression analysis | Eye movements accounted for ~60% of variance in concurrent word reading and ~48% one year later; mean fixation duration uniquely predicted reading ability; eye movements |

| No. | Author (Year) | Country | Focus Area | Method | Key Findings |
|---|---|---|---|---|---|
| | | | | | are stable predictors of word reading |
| 17 | Xundan Wang (2023) | Hongkong, China | Teacher competence, Web 2.0 integration, Pedagogical practices, Obstacles | Systematic Review (PRISMA 2020), Theme Analysis | Teachers value tech-integrated content instruction, the use of Web 2.0 improves student learning and enriches teaching methods. Obstacles include tools, teacher factors, external influences and Suggestions provided for improvement |
| 18 | José Fernández Cerero (2025) | Spain | ChatGPT use, teacher digital competence, pedagogical practices, AI in education | Systematic Literature Review (Web of Science, Scopus, ERIC, Google Scholar) | The use of ChatGPT as a digital tool can support continuous professional development for teachers, facilitate understanding of complex content, optimize lesson planning, and reduce the burden of repetitive tasks. However, it also presents challenges, such as technology dependency, the need for specific training, and ethical considerations in educational application. The study recommends that ChatGPT should be used critically and informedly, accompanied by teacher training strategies to ensure its effective and responsible implementation in the classroom. |
| 19 | Sandra Heine (2022) | Germany | Clarifying the concept and definition of digital resources as part of teachers' professional digital competence | Systematic Review | The study found that the term "digital resources" is used inconsistently in educational research, which limits its effective application in promoting teachers' digital competence. It emphasizes the need for a clearer, unified definition to support both research and teacher training. |
| 20 | Molly Li (2025) | USA | Examining the role of AI-integrated scaffolding in enhancing agency and creativity of K-12 EFL learners | Systematic Review | The study found that AI tools, when used thoughtfully, can reduce students' cognitive load, foster ideation, and support self-regulated learning without undermining student autonomy. AI scaffolding functions in three ways: cognitive support, creative collaboration, and language enhancement. It also highlighted the importance of |

| No. | Author (Year) | Country | Focus Area | Method | Key Findings |
|---|---|---|---|---|---|
| | | | | | balancing AI assistance with learner decision-making and ensuring equitable access. |
| 21 | Vahid Reza Mirzaeian (2023) | Iran | Examining the role and effectiveness of Google Translate in foreign language learning | Systematic Review | The review found that the improved quality of Google Translate has increased its pedagogical value and learners' tendency to use it in language learning. However, many instructors still distrust its accuracy. The study emphasizes the need for pedagogical strategies and further research to maximize its educational potential. |
| 22 | Tolga Sarıca (2025) | Türkiye | Exploring EFL students' perceptions of AI-assisted writing tools in language learning | Systematic narrative hybrid review (SWOT & content analysis) | The study found that AI tools enhance students' writing efficiency, accuracy, idea generation, and personalized learning. However, concerns such as over-reliance, plagiarism, and ethical issues remain. It highlights the importance of teacher training, AI literacy programs, and ethical guidelines to ensure responsible and effective integration in ELT. |
| 23 | Miguel Angel Paidican (2022) | Spain | Examining in-service teachers' technological-pedagogical knowledge (TPACK) in primary education | Systematic literature review (Kitchenham 2004) | The review revealed limited but growing research on the TPACK model in primary education, highlighting its potential to strengthen teachers' technological and pedagogical knowledge. It also suggests involving students, parents, and administrators to enrich technology integration and foster more collaborative learning environments. |
| 24 | Arnab Kundu (2025) | India | Investigating the integration and impact of AI tools in EFL teaching in school contexts | Systematic literature review (PRISMA) | The study revealed that AI tools significantly improved student engagement, motivation, and language proficiency through adaptive learning, assessment, speech recognition, pronunciation support, and personalized learning. However, challenges such as accessibility, teacher training, and ethical considerations remain, requiring strategic implementation and support. |

| No. | Author (Year) | Country | Focus Area | Method | Key Findings |
|---|---|---|---|---|---|
| 25 | Lamis Ismail Omar (2023) | Oman | Examines machine translation postediting in English/Arabic translation and its implications for AI application in translation pedagogy. | Systematic Literature Review using PRISMA of 60 studies | The study found that most research has focused on evaluating and developing MT software, while neglecting translator competencies. It emphasizes the importance of postediting as a key digital literacy skill that needs to be developed among Arabic translation students to bridge the gap between research and pedagogy. |
| 26 | Quadri Noorulhasan Naveed (2022) | Saudi Arabia | Investigates the development, implementation, and theoretical frameworks of mobile learning in higher education. | Systematic Literature Review (PRISMA, TCCM framework) of 161 articles | The review revealed that mobile learning has significantly transformed teaching and learning by integrating multiple learning theories and factors such as ease of use, accessibility, and social interaction. Most studies were conducted in developing countries with a strong focus on students. It emphasizes the importance of digital literacy and pedagogical adaptation to fully leverage mobile learning in education. |
| 27 | Erfan Aslanyan-rad (2024) | Iran | To explore the application of ChatGPT-based TPACK theory and identify the required teacher competencies for integrating GenAI into education. | Systematic Literature Review (SLR), Bibliometric Analysis (BA), Deductive Content Analysis (DCA) | The study identified multiple ChatGPT-based TPACK competency dimensions (GenAI-CK, TK, PK, PCK, TPK, TCK, and TPACK). It highlights that integrating ChatGPT requires comprehensive technological and pedagogical competence development among instructors to support digital transformation in education. |
| 28 | Lang Zuo (2024) | Malaysia | To review the use of digital tools in teacher collaboration and explore related issues and challenges. | Systematic Literature Review (SLR) of 11 articles from Web of Science, ERIC, and Science Direct | The study found that digital tools have significantly transformed teacher interaction, communication, and collaboration. However, various issues—such as infrastructure limitations, low digital competence, and lack of sustained support—hinder effective collaboration. The study calls for stronger digital infrastructure, teacher training, |

| No. | Author (Year) | Country | Focus Area | Method | Key Findings |
|---|---|---|---|---|---|
| | | | | | and policies that promote sustainable collaboration practices. |
| 29 | Watcharapol Wiboolyasarin (2024) | Thailand | Efficacy and pedagogical implications of AI-driven chatbots in second language learning | Systematic review of 30 empirical studies (2020–2024) | Systematic review of 30 empirical studies (2020–2024) |
| 30 | Ángel Alfonso Jiménez Sierra (2022) | Colombia | Development of TPACK in teachers using Lesson Study | Systematic literature review of 16 studies (2015–2021) | Lesson Study provides contextualized opportunities to address teachers' training needs, promotes self-assessment, and facilitates new conceptions of teaching with technology, with an integrative TPACK perspective predominating in teacher development research. |
| 31 | Amr Adel (2025) | Australia | Integration of ChatGPT in education with ethical and computational perspectives | Systematic literature review, interest analysis, and case studies | ChatGPT can enhance personalized learning, provide real-time feedback, and increase teaching efficiency and learner engagement, but challenges include AI bias, limitations in replicating teacher–student emotional dynamics, and the need for ongoing research to guide responsible AI integration in education. |
| 32 | Yufeng Qian (2025) | USA | Pedagogical applications of generative AI in higher education | Systematic literature review | Generative AI enhances teaching efficiency and supports creativity, critical thinking, learning autonomy, and prompt literacy, but overreliance may risk outsourcing critical cognitive skills; effective integration requires student–teacher–AI collaboration and further research on multimodal AI tools. |
| 33 | David Pérez-Jorge (2025) | Spain | AI-driven APIs for educational information management | Systematic literature review | AI-driven APIs enhance educational information management by enabling data interoperability, personalized learning, automated feedback, real-time monitoring, and predictive analytics, improving engagement, comprehension, and achievement, though challenges include privacy |

| No. | Author (Year) | Country | Focus Area | Method | Key Findings |
|---|---|---|---|---|---|
| | | | | | concerns, algorithmic bias, and methodological limitations. |
| 34 | Zhao Wanli (2025) | China | Deeper learning in foreign language education integrating learning science and computer science | Scientometric review using SSCI data, Citespace and Vosviewer | Scientometric review using SSCI data, Citespace and Vosviewer |
| 35 | Sheila Noonen (2024) | Korea | Integration of generative AI in modern writing pedagogy | Annotated bibliographical study / literature review | Integrating generative AI into writing instruction enhances students' critical engagement with digital media; teachers and institutions require support, training, and guidelines for effective AI use; students need explicit instruction to remain critical creators and consumers while maintaining academic integrity. |
| 36 | Melissa Bond (2021) | London | Secondary school experiences of emergency remote education during COVID-19 | Systematic review / narrative synthesis of 81 empirical studies | Online learning engagement is enhanced by self-regulation, collaborative tools, synchronous lessons, and teacher-made videos; social isolation and inequity negatively impacted participation; online assessment was challenging but feedback and quizzes helped; parental support was important but limited by digital skills and access. |
| 37 | Gkintoni et al. (2025) | Greece | AI and ML integration with Cognitive Load Theory and Educational Neuroscience for personalized learning | Systematic review of 103 papers | AI-driven adaptive systems improve learning efficacy, personalize instruction, manage cognitive load; highlights ethical/data challenges |
| 38 | Fitas, R. (2025) | Germany | AI supporting inclusive education for multilingual and special needs learners | Literature review / book chapter | AI tools enhance inclusion, provide real-time translation, support learners with disabilities, improve engagement and performance; challenges include access and ethical use |
| 39 | Liu, J., Johari Bin Sihes, A., & Lu, Y. (2025) | Malaysia, China | Influence of generative AI and LLMs on critical thinking in EFL education | Systematic Review using PRISMA framework (2022–2025, 15 studies) | Generative AI and LLMs have dual roles: 66.67% of studies show positive effects on learners' critical thinking, 33.33% report negative effects. |

| No. | Author (Year) | Country | Focus Area | Method | Key Findings |
|---|---|---|---|---|---|
| | | | | | Limitations include user dependency, AI reliability, and pedagogical integration. Recommends careful integration to enhance learning without replacing critical thinking. |
| 40 | Bhandari, L. P., Dahal, N., Awasthi, J. R., & Dhungana, S. (2025) | Nepal | Technology-mediated task-based language teaching (TBLT) in ELT | Systematic Review using PRISMA framework (17 studies: qualitative, quantitative, mixed methods) | Technology-mediated TBLT enhances learner motivation, engagement, and English language skills (fluency, accuracy, complexity). Challenges include limited tech access, lack of teacher training, and reluctance to adopt digital tools. Recommends more longitudinal research on TBLT implementation and assessment. |
| 41 | Hu, X., Xu, W., Wan, Z., Liu, M., & Xu, W. (2025) | China | Teachers' self-efficacy and digital competence | Scoping Review of journal articles (2000–2025, Web of Science) | Teachers' digital competence is influenced by self-efficacy, professional development, collaborative practices, access to digital resources, and institutional support. Highlights the need for refined measurement techniques and exploration of complex interplay between self-efficacy and digital competence. |
| 42 | Xu, H., Wang, Y., & Ma, J. (2025) | Hong Kong, China | Intercultural communicative competence (ICC) in EFL and digital pedagogy | Systematic Review | ICC development in EFL is enhanced by digital tools (e.g., virtual exchanges) fostering cultural adaptability, empathy, and multilingual identity. Proposes hybrid ICC model integrating digital literacy to support intercultural communication in digitally mediated, multicultural learning contexts. |
| 43 | Yan, W., Li, B., & Lowell, V. L. (2025) | USA | Integration of AI and Extended Reality (XR) in language education | Systematic Literature Review (32 empirical studies, 2017–2024, PRISMA) | AI–XR technologies support speaking, vocabulary, writing, and intercultural competence. Benefits: technical, pedagogical, affective. Challenges: technical limits, pedagogical constraints, scalability, ethics, infrastructure. Recommends adaptive AI systems, learner-centered interaction, and longitudinal studies. |

| No. | Author (Year) | Country | Focus Area | Method | Key Findings |
|---|---|---|---|---|---|
| 44 | Hammond, S. P., Jennings-Tallant, L., Parkinson, E., Hill, P., Scholefield, E., Lloyd, R., & Dyer, H. T. (2025) | United Kingdom | Digital literacies of children under 6 via video-sharing platforms | Scoping Review | Children's digital literacies are shaped through interaction with platforms like YouTube and TikTok. Supporting adults play a key role in mediating these experiences. Highlights knowledge gaps and sets agenda for research in early childhood digital literacy. |
| 45 | Zadeh, M. M., Isaee, H., & Barjesteh, H. (2025) | Indonesia | AI-enhanced Project-Based Learning in English language education | Systematic Review (PRISMA) | Identified 7 elements of AI-enhanced PBL (real-time feedback, adaptive learning, contextualized use, continuous AI support, structured guidance, collaborative learning, intelligent content). Improves motivation, engagement, and language proficiency. Challenges include AI overdependence, reduced teacher-student interaction, insufficient training, and content biases. |
| 46 | Khezrlou, S., & Stockwell, G. (2025) | China | Mobile-Assisted Language Learning (MALL) | Synthetic Review | Identified gaps in MALL research: overemphasis on digital artifacts, limited integration in classroom environments, and lack of methodological rigor. Highlights positive outcomes for language learning and recommends standardized methodologies and adaptive learning integration for future studies. |
| 47 | Llanos-Ruiz, D., Abella-García, V., & Ausín-Villaverde, V. (2025) | Spain | Virtual Reality in Higher Education | Systematic Review | VR enhances student motivation, engagement, and digital competencies; contributes to multiple SDGs (4, 3, 7, 8, 10, 11, 13). Challenges include high cost, limited accessibility, teacher training, lack of standardization, and short-term study designs. Calls for broader, longitudinal, interdisciplinary research. |
| 48 | Basantes-Andrade, A., Bastidas-Amador, G., | Ecuador | Digital Technologies in Teaching | Systematic Literature Mapping | 23 studies analyzed; focus on adaptation/management, intercultural knowledge, communication skills, and |

| No. | Author (Year) | Country | Focus Area | Method | Key Findings |
|---|---|---|---|---|---|
| | Ruiz-Chagna, C., et al. (2025) | | Intercultural Competences | | attitudes. Technologies like COIL and immersive tools effectively promote intercultural learning. Gaps: leadership and personal development, equity issues. Growth in research since 2019. |
| 49 | Tekir, S. (2025) | Turkey | Online Classroom Management Post-Pandemic | Literature Review | 20 empirical studies analyzed; effective strategies include student engagement, clear and timely communication, and technological tool usage. Gaps remain in understanding long-term effectiveness and adaptability across diverse educational contexts. |

Following the synthesis presented in Table 1, the findings were analyzed thematically and grouped into four major themes, as discussed below.

**Theme 1: Teachers' Digital Competence and Professional Readiness**

A substantial number of studies (e.g., Nunes, 2022; Wang, 2023; Hu et al., 2025; Fernández Cerero, 2025) emphasize the crucial role of teachers' digital competence in ensuring effective technology integration. Teachers who demonstrated higher digital confidence and self-efficacy were more likely to adopt constructivist, student-centered approaches using digital tools. Key factors influencing readiness include self-efficacy, prior technological experience, institutional support, and perceived usefulness (Giac, 2025; Nunes, 2022). Conversely, barriers such as lack of infrastructure, insufficient training, and limited administrative support continue to hinder effective digital adoption (Lang Zuo, 2024; Naveed, 2022).

The findings indicate that while teachers generally recognize the pedagogical value of technology, digital literacy training remains uneven across educational levels and regions. The results align with the TPACK framework, suggesting that professional development must simultaneously address technological, pedagogical, and content knowledge.

**Theme 2: Integration of Artificial Intelligence (AI) in Language Education**

Recent years have witnessed a surge in research on AI and generative technologies in ELT/EFL. Studies (e.g., Kundu, 2025; Aslanyan-rad, 2024; Sarıca, 2025; Mirzaeian, 2023; Omar, 2023; Qian, 2025) consistently highlight that AI tools such as ChatGPT, Google Translate, and adaptive learning systems enhance learner engagement, feedback, and individualized instruction. AI fosters creativity, critical thinking, and autonomous learning, supporting multimodal and interactive experiences (Noonen, 2024; Liu et al., 2025).

However, several challenges were also noted:

- Ethical and pedagogical concerns, including plagiarism, over-reliance, and AI bias (Adel, 2025; Sarıca, 2025),
- Need for teacher AI literacy and policy guidance to ensure responsible implementation (Fernández Cerero, 2025; Qian, 2025).

These studies suggest a paradigm shift, from using technology merely as a *tool* toward embracing.

**Theme 3: Digital Literacy and Pedagogical Innovation**

Across the dataset, many studies demonstrate that digital literacy enhances teaching creativity, collaborative learning, and learner motivation. For instance, Selfa-Sastre (2022) and Peña-Acuña (2022) show how digital storytelling, AI-assisted language learning, and multimodal literacy promote engagement and critical reading. Incorporating digital projects, gamified tools, and virtual classrooms

transforms the traditional classroom into an interactive, inquiry-based environment (Bond, 2021; Tabernero-Sala, 2023; Llanos-Ruiz et al., 2025).

Teachers who integrate digital literacy effectively tend to foster autonomy, communication, and problem-solving skills among student, key competencies for 21st-century learning. Nonetheless, some studies caution that without reflective pedagogy, digital tools risk reinforcing superficial engagement rather than deep learning (Metsala, 2023; Strandberg, 2023).

**Theme 4: Emerging Technologies and Future Directions**

Newer technologies such as Virtual Reality (VR), Extended Reality (XR), and mobile learning have begun redefining language learning experiences (Yan et al., 2025; Llanos-Ruiz et al., 2025; Naveed, 2022). VR and XR environments enhance motivation, intercultural competence, and empathy, while mobile learning expands accessibility and flexibility. Moreover, AI-enhanced Project-Based Learning (Zadeh et al., 2025) and technology-mediated TBLT (Bhandari et al., 2025) demonstrate how combining task-based frameworks with digital support can lead to measurable improvements in fluency, accuracy, and engagement.

However, these innovations come with practical limitations, high costs, infrastructure demands, and limited methodological consistency (Llanos-Ruiz et al., 2025; Tekir, 2025). Future research should explore longitudinal and cross-context studies to evaluate the sustainability and ethical implications of these emerging tools.

**Cross-Theme Discussion**

Synthesizing all four themes reveals a shared insight: Digital literacy in English language education is both a pedagogical necessity and a socio technical challenge. While the potential of AI and digital tools to transform language learning is undeniable, the effectiveness of such transformation depends on teacher competence, ethical awareness, and institutional support systems. Bridging the gap between teacher readiness and learner needs will require systemic professional development, policy alignment, and equitable access to digital resources.

These findings collectively underscore the evolving nature of digital literacy in ELT/EFL. They form the basis for the Conclusion section, which discusses implications for teachers, policymakers, and researchers in developing future-ready digital pedagogies.

## CONCLUSION

This systematic literature review analyzed 49 studies published between 2021 and 2025, revealing how digital literacy has become a cornerstone of transformation in English Language Teaching (ELT) and English as a Foreign Language (EFL) context. The review identified four interrelated themes:

1. Teachers' digital competence and professional readiness,
2. Integration of artificial intelligence (AI) in language education,
3. Digital literacy and pedagogical innovation, and
4. Emerging technologies and future directions.

Overall, the findings indicate that digital competence among teachers remains a decisive factor in determining the success of digital literacy integration. Teachers who possess strong digital, pedagogical, and reflective skills tend to implement more innovative, learner-centered approaches. However, significant disparities persist across regions, emphasizing the need for structured and continuous professional development programs.

The second theme highlights the rapid rise of AI integration in language learning. While AI technologies such as ChatGPT, machine translation, and adaptive learning systems have enhanced teaching efficiency and learner engagement, their use also raises concerns about ethics, academic integrity, and technological dependence. Therefore, AI literacy and ethical digital pedagogy must be included as essential components of teacher education and curriculum design.

The third and fourth themes underscore the role of pedagogical innovation and emerging technologies, including virtual reality (VR), mobile learning, and project-based learning (PBL)—in fostering creativity, intercultural competence, and learner motivation. Yet, these innovations require institutional support, infrastructure readiness, and long-term policy alignment to ensure sustainability and equitable access.

Taken together, the synthesis shows that digital literacy is not merely a technical skill but a multidimensional competence that connects technological knowledge with critical, ethical, and pedagogical awareness. To bridge the gap between teachers' competence and learners' evolving digital needs, educational institutions must design comprehensive frameworks that promote collaboration between teachers, policymakers, and researchers.

As digital technologies continue to reshape the educational landscape, cultivating digitally literate teachers and learners is no longer an option but a necessity, one that defines the future quality, equity, and humanity of English language education. Provide the conclusion to your study, and final words on the value of your analysis, research, or paper. Limitations of your study should be addressed. Recommendations for future research related to your topic should also be mentioned.

## ACKNOWLEDGMENT

The authors are deeply grateful to God Almighty for His wisdom, grace, and guidance throughout the completion of this research. Sincere appreciation is extended to the Jambi English Language Teaching (JELT) Conference Committee for providing the opportunity to present and publish this work, and to the University of Riau for its continuous academic support and encouragement. The authors also wish to express heartfelt thanks to their families and loved ones for their unwavering love, understanding, and motivation, which have been an invaluable source of strength throughout this journey.

## REFERENCES

Abid, N., Aslam, S., Alghamdi, A. A., & Kumar, T. (2023). Relationships among students' reading habits, study skills, and academic achievement in English at the secondary level. *Frontiers in Psychology, 14*, 1020269. https://doi.org/10.3389/fpsyg.2023.1020269

Adel, A., Ahsan, A., & Davison, C. (2024). ChatGPT promises and challenges in education: Computational and ethical perspectives. *Education Sciences, 14(8)*, 814. https://doi.org/10.3390/educsci14080814

Agusprayuningtyas, N. F., Iskandar, I., & Dewanti, R. (2024). The incorporation of digital literacy in EFL learning materials for senior high school students. *STAIRS (Scientific, Technology, and Art Research Series), 3*(1), Article 7. https://doi.org/10.21009/stairs.3.1.7

Alfia, N., Sumardi, S., & Kristina, D. (2021). Integrating digital literacy into EFL classroom: A study of theory of planned behavior. *Jurnal Pendidikan Indonesia, 10*(3), 495–505. https://doi.org/10.23887/jpi-undiksha.v10i3.29812

Arslan Değirmenci, G. (2024). Digital literacy in english language teaching: Charting future pathways for global understanding. *IJASOS-International E-Journal of Advances in Social Sciences, 10*(29), 1–?. https://doi.org/10.5281/zenodo.13363219

Aslanyan-rad, E. (2025). A presentation of an extended lens of technology of ChatGPT-based TPACK theory dimensions: An exploratory systematic literature review scope. https://orcid.org/0000-0002-9117-7703

Basantes-Andrade, A., Bastidas-Amador, G., Ruiz-Chagna, C., Congo-Cervantes, M., & Quintana-Andrade, G. (2025). Integration of digital technologies in the teaching of intercultural competences: Systematic literature mapping. *F1000Research, 14*, 772. https://doi.org/10.12688/f1000research.167364.1

Bhandari, L. P., Dahal, N., Awasthi, J. R., & Dhungana, S. (2025). Technology-mediated task-based language teaching: A systematic review. *Cogent Education, 12(1)*, 2560051. https://doi.org/10.1080/2331186X.2025.2560051

Bond, M., Bergdahl, N., Mendizabal-Espinosa, R., Kneale, D., Bolan, F., Hull, P., & Ramadani, F. (2021). *Global emergency remote education in secondary schools during the COVID-19 pandemic: A systematic review*. The International Public Policy Observatory.

Bui, T. H. (2022). English teachers' integration of digital technologies in the classroom. *International Journal of Educational Research Open, 3,* 100204. https://doi.org/10.1016/j.ijedro.2022.100204

Cadime, I., Ribeiro, I., Cruz, J., Cosme, M. C., Meira, D., Viana, F. L., & Santos, S. (2022). An intervention in reading disabilities using a digital tool during the COVID-19 pandemic. *Frontiers in Psychology, 13*, 862383. https://doi.org/10.3389/fpsyg.2022.862383

Cao, C. G., Cao, T. V. G., Ly, H. H., & Tran, T. T. N. (2025). A study on teachers' acceptance of digital technology in Vietnamese secondary education. *International Journal of Learning, Teaching and Educational Research, 24(2)*, 38–62. https://doi.org/10.26803/ijlter.24.2.3

Castillo-Martínez, I. M., Cerros Regalado, C. P., Glasserman-Morales, L. D., & Ramírez-Montoya, M. S. (2023). Academic literacy among the university students in Mexico and Spain. *Frontiers in Psychology, 13*, 1055954. https://doi.org/10.3389/fpsyg.2022.1055954

Christiani, N., Tungka, N., & Nainggolan, R. (2022). Exploring digital literacy skills of prospective Indonesian EFL teachers. *International Journal of Multidisciplinary Applied Business and Education Research, 3*(7), 1413–1422. https://doi.org/10.11594/ijmaber.03.07.20

Eryansyah, E., Erlina, E., Fiftinova, F., & Nurweni, A. . (2019). EFL Students' Needs of Digital Literacy to Meet the Demands of 21stCentury Skills. *Indonesian Research Journal in Education |IRJE|*, *3*(2), 442–460. https://doi.org/10.22437/irje.v3i2.8297

Eshet-Alkalai, Y. (2004). Digital literacy: a conceptual framework for survival skills in the digital era. *Journal of Educational Multimedia and Hypermedia*, *13*(1), 93+. https://link.gale.com/apps/doc/A117041877/AONE?u=googlescholar&sid=bookmark-AONE&xid=e9431dfd

Fitas, R. (n.d.). Inclusive education with AI: Supporting special needs and tackling language barriers. Technical University of Darmstadt.

Feng, L., Sumettikoon, P. An empirical analysis of EFL teachers' digital literacy in Chinese higher education institutions. *Int J Educ Technol High Educ* 21, 42 (2024). https://doi.org/10.1186/s41239-024-00474-1

Fernández Cerero, J., Montenegro Rueda, M., Román Graván, P., & Fernández Batanero, J. M. (2025). ChatGPT as a digital tool in the transformation of digital teaching competence: A systematic review. *Technologies, 13(5)*, 205. https://doi.org/10.3390/technologies13050205

Gkintoni, E., Antonopoulou, H., Sortwell, A., & Halkiopoulos, C. (2025). Challenging cognitive load theory. *Brain Sciences, 15(2)*, 203. https://doi.org/10.3390/brainsci15020203

Gutiérrez-Ángel, N., Sánchez-García, J.-N., Mercader-Rubio, I., García-Martín, J., & Brito-Costa, S. (2022). Digital literacy in the university setting. *Frontiers in Psychology, 13*, 896800. https://doi.org/10.3389/fpsyg.2022.896800

Hammond, S. P., Jennings-Tallant, L., Parkinson, E., Hill, P., Scholefield, E., Lloyd, R., & Dyer, H. T. (2025). Digital literacies and video-sharing platforms in early childhood. *Digital Culture & Education, 16(1)*, 102–138.

Heine, S., Krepf, M., & König, J. (2023). Digital resources as an aspect of teacher professional digital competence. *Education and Information Technologies, 28*, 3711–3738. https://doi.org/10.1007/s10639-022-11321-z

Hu, X., Xu, W., Wan, Z., Liu, M., & Xu, W. (2025). Bridging self-efficacy and digital competence. *SAGE Open, 15(3)*, 1–25. https://doi.org/10.1177/21582440251363716

Jiménez Sierra, Á. A., Ortega Iglesias, J. M., Cabero-Almenara, J., & Palacios-Rodríguez, A. (2023). Development of teacher TPACK from Lesson Study. *Frontiers in Education, 8*, 1078913. https://doi.org/10.3389/feduc.2023.1078913

Jiménez-Pérez, E. D. P., de Vicente-Yagüe Jara, M. I., León Urrutia, M., & García Guirao, P. (2023). Emotions and reading. *Frontiers in Psychology, 14*, 1085945. https://doi.org/10.3389/fpsyg.2023.1085945

Kaqinari, T. (2023). Facilitators and barriers to online teaching. *Trends in Higher Education, 2(4)*, 636–666. https://doi.org/10.3390/higheredu2040038

Khezrlou, S., & Stockwell, G. (2025). A synthetic review of MALL research. *Digital Studies in Language and Literature.* https://doi.org/10.1515/dsll-2024-0026

Kundu, A., & Bej, T. (2025). Transforming school EFL teaching with AI. *International Journal of Artificial Intelligence in Education.* https://doi.org/10.1007/s40593-025-00470-0

Li, M., & Wilson, J. (2025). AI-integrated scaffolding. *Information, 16(5)*, 519. https://doi.org/10.3390/info16070519

Liu, J., Sihes, A. J. B., & Lu, Y. (n.d.). How generative AI influences language learners' critical thinking. Universiti Teknologi Malaysia; Yibin University.

Llanos-Ruiz, D., Abella-García, V., & Ausín-Villaverde, V. (2025). Virtual reality in higher education. *Societies, 15*, 251. https://doi.org/10.3390/soc15090251

Mahmud, A. F., Mahmud, M., Weda, S., & Munir, M. (2025). Digital literacy and learning interaction: An ethnographic study of Indonesian EFL classrooms. *FOSTER: Journal of English Language Teaching, 6*(3), 192–210. https://doi.org/10.24256/foster-jelt.v6i3.255

Metsala, J. L. (2023). Longitudinal contributions of morphological awareness. *Frontiers in Education, 8*, 1194879. https://doi.org/10.3389/feduc.2023.1194879

Mirzaeian, V. R., & Oskoui, K. (2023). Google Translate in foreign language learning. *Applied Research on English Language, 12(2)*, 51–84. https://doi.org/10.22108/ARE.2023.134264.1949

Mufidati, A. (2024). The effect of digital literacy towards efl students' reading comprehension. *Indonesian Journal of Foreign Language Studies*, *1*(1), 1–9. Retrieved from https://indofes.org/index.php/journal-indofes/article/view/1

Naveed, Q. N., Choudhary, H., Ahmad, N., Alqahtani, J., & Qahmash, A. I. (2023). Mobile learning in higher education. *Sustainability, 15(18)*, 13566. https://doi.org/10.3390/su151813566

Noonen, S., & Baek, J. (2024). Exploring the integration of generative AI in modern writing pedagogy. *Journal of Computer Education, 27(4).* https://doi.org/10.32431/kace.2024.27.4.015

Nor Pazilah, F., Hashim, H., Yunus, M. Md., & Rafiqah, K. M. R. (2023). Exploring Malaysian ESL pre-service teachers' perceptions on knowledge of learners, digital literacy and 21st century competency. *International Journal of Learning, Teaching and Educational Research, 23*(1), Article 15. https://doi.org/10.26803/ijlter.23.1.15

Nunes, A., Limpo, T., & Castro, S. L. (2022). Predictors of Portuguese teachers' ICT use. *Frontiers in Psychology, 13*, 1006713. https://doi.org/10.3389/fpsyg.2022.1006713

Nur, Z. F., Nur, S., & Sunra, L. (2023). Analyzing pre-service english teachers' digital literacy skills in EFL teaching. *ELS Journal on Interdisciplinary Studies in Humanities, 6*(3), 416–427. https://doi.org/10.34050/elsjish.v6i3.27627

Omar, L. I., & Salih, A. A. (2024). English/Arabic machine translation postediting. *Informatics, 11(2)*, 23. https://doi.org/10.3390/informatics11020023

Paidican, M. A., & Arredondo, P. A. (2022). Technological-pedagogical knowledge. *Contemporary Educational Technology, 14(3)*, e370. https://doi.org/10.30935/cedtech/11813

Peña-Acuña, B., & Crismán-Pérez, R. (2022). Research on Papua. *Frontiers in Psychology, 13*, 1019278. https://doi.org/10.3389/fpsyg.2022.1019278

Pérez-Jorge, D., González-Afonso, M. C., Santos-Álvarez, A. G., Plasencia-Carballo, Z., & Perdomo-López, C. d. l. Á. (2025). AI-driven APIs in educational information management. *Information, 16(7)*, 540. https://doi.org/10.3390/info16070540

Pertiwi, I., & Rojab Siti, R. (2022). Digital literacy in EFL learning: University students' perspectives. *JEES (Journal of English Educators Society)*, *7*(2), 197–204. https://doi.org/10.21070/jees.v7i2.1670

Rini, H. M., & Nabhan, S. (2023). Exploring critical digital literacy in a higher education EFL classroom: Teachers' views and practices. *ELT Forum: Journal of English Language Teaching*, *12*(3), 216-228. https://doi.org/10.15294/elt.v12i3.69160

Qian, Y. (2025). Pedagogical applications of generative AI in higher education. *TechTrends.* https://doi.org/10.1007/s11528-025-01100-1

Sarıca, T., & Gençoğlu, S. D. (2025). EFL students' perceptions of AI-assisted writing tools. *The Literacy Trek.* https://doi.org/10.47216/literacytrek.1669804

Selfa Sastre, M., & Falguera Garcia, E. (2022). From text on paper to digital poetry. *Frontiers in Psychology, 13*, 882898. https://doi.org/10.3389/fpsyg.2022.882898

Selfa-Sastre, M., Pifarré, M., Cujba, A., Cutillas, L., & Falguera, E. (2022). The role of digital technologies to promote collaborative creativity. *Frontiers in Psychology, 13*, 828981. https://doi.org/10.3389/fpsyg.2022.828981

Strandberg, A., Nilsson, M., Östberg, P., & Seimyr, G. Ö. (2023). Eye movements as predictors of word reading ability. *Frontiers in Education, 8*, 1077882. https://doi.org/10.3389/feduc.2023.1077882

Tabernero-Sala, R., & Colón-Castillo, M. J. (2023). Promotion of critical reading through digital environment. *Frontiers in Psychology, 14*, 1154513. https://doi.org/10.3389/fpsyg.2023.1154513

Tekir, S. (2025). Strategies for effective classroom management in online teaching. *SAGE Open, 15(3)*, 1–17. https://doi.org/10.1177/21582440251377321

Wahyuddin, N., Nur, Y., Arnas, R., & Hermansyah, S. (2024). Digital literacy integrated with blended learning in improving EFL students' English language skills: A lesson learned from the independent campus program. *Journal of Language and Literature Studies, 4*(4), 744–757. https://doi.org/10.36312/jolls.v4i4.2351

Wanli, Z., Youjun, T., & Xiaomei, M. (2025). Scientometric review of deeper learning. *SAGE Open.* https://doi.org/10.1177/21582440251322564

Wang, X. (2023). Pedagogical integration of Web 2.0 in K–12 English teaching. *Applied Linguistics Inquiry, 1(1)*, 16–33. https://doi.org/10.22077/ali.2023.6056.1009

Welsi Damayanti, Nur Rahmad Yahya Wijaya, & Rasuki, R. (2025). Literature review on digital literacy: Building basic competence among students in developing countries. *Indonesian Journal of Education (INJOE)*, *5*(1), 216~224. Retrieved from https://injoe.org/index.php/INJOE/article/view/211

Wiboolyasarin, W., Wiboolyasarin, K., Tiranant, P., Jinowat, N., & Boonyakitanont, P. (2025). AI-driven chatbots in second language education. *Ampersand, 14*, 100224. https://doi.org/10.1016/j.amper.2025.100224

Xu, H., Wang, Y., & Ma, J. (2025). Intercultural communicative competence in EFL education. *Cogent Education, 12(1)*, 2557608. https://doi.org/10.1080/2331186X.2025.2557608

Yan, W., Li, B., & Lowell, V. L. (2025). Integrating AI and XR in language education. *Education Sciences, 15(8)*, 1066. https://doi.org/10.3390/educsci15081066

Yin, L., & McBride, C. (2023). Sensitivity to symmetry in writing. *Frontiers in Education, 8*, 1150075. https://doi.org/10.3389/feduc.2023.1150075

Zadeh, M. M., Isaee, H., & Barjesteh, H. (2025). AI in project-based learning. *Indonesian Journal of Pedagogy and Teacher Education, 3(3).* https://doi.org/10.58723/ijopate.v3i3.502

Zheng, Q., Yuan, Z., & Pan, X. (2024). Examining the influencing effect of EFL students' digital literacy on their online learning power: the mediating role of perceived teacher support. *Asia Pacific Journal of Education*, *45*(1), 20–34. https://doi.org/10.1080/02188791.2024.2404669

Zheng, H., Miao, X., Dong, Y., & Yuan, D.-C. (2023). Grammatical knowledge and reading comprehension. *Frontiers in Psychology, 14*, 1098568. https://doi.org/10.3389/fpsyg.2023.1098568

Zuo, L., Krish, P., & Jain, J. (2025). Teacher collaboration through digital tools. *Pertanika Journal of Social Sciences & Humanities, 33(1)*, 99–118. https://doi.org/10.47836/pjssh.33.1.05