TECHNOLOGY-ENHANCED LANGUAGE LEARNING (TELL): A REVIEW OF TRENDS AND CHALLENGES IN ENGLISH EDUCATION

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ABSTRACT

The rapid integration of digital technologies into language education has generated a growing body of research on Technology-Enhanced Language Learning (TELL); yet, despite its increasing prominence, a comprehensive synthesis of trends and challenges in TELL within English education remains underrepresented. This systematic literature review (SLR) follows the PRISMA framework, examining 55 peer-reviewed articles indexed in Scopus and Sinta databases published between 2021 and 2026, selected based on their relevance to TELL in English Language Teaching (ELT) contexts, particularly within Indonesian and global EFL settings. Findings reveal three major trends: the increasing adoption of mobile-assisted language learning (MALL), the proliferation of synchronous and asynchronous online platforms, and the use of AI-powered tools and gamification in language pedagogy. Three critical challenges were identified: digital equity and access disparities, teacher competency and digital literacy gaps, and academic integrity concerns. TELL demonstrates significant potential for enhancing English language acquisition across all skills; however, its effective implementation requires systematic teacher training, equitable access to infrastructure, and context-sensitive pedagogical design. Future research directions are proposed.

Keywords : *Technology-Enhanced Language Learning; TELL; English Education; EFL; Digital Technology; Systematic Literature Review.*

ABSTRAK

Integrasi teknologi digital yang pesat ke dalam pendidikan bahasa telah memunculkan banyak penelitian mengenai Pembelajaran Bahasa Berbasis Teknologi (Technology-Enhanced Language Learning/TELL); namun, meskipun semakin menonjol, sintesis menyeluruh tentang tren dan tantangan TELL dalam pendidikan bahasa Inggris masih terbatas. Tinjauan pustaka sistematis (systematic literature review/SLR) ini mengikuti kerangka PRISMA dengan menelaah 55 artikel berpeer-review yang terindeks dalam basis data Scopus dan Sinta yang terbit antara tahun 2021 dan 2026, yang dipilih berdasarkan relevansinya terhadap TELL dalam konteks pengajaran bahasa Inggris (English Language Teaching/ELT), khususnya pada konteks EFL di Indonesia dan global. Temuan mengungkapkan tiga tren utama: meningkatnya adopsi pembelajaran bahasa berbantuan perangkat seluler (mobile-assisted language learning/MALL), berkembangnya platform daring sinkron dan asinkron, serta pemanfaatan perangkat bertenaga kecerdasan buatan (AI) dan gamifikasi dalam pedagogi bahasa. Tiga tantangan kritis teridentifikasi: kesenjangan kesetaraan dan akses digital, kesenjangan kompetensi guru dan literasi digital, serta persoalan integritas akademik. TELL menunjukkan potensi besar untuk meningkatkan pemerolehan bahasa Inggris pada seluruh keterampilan; namun, penerapannya yang efektif memerlukan pelatihan guru yang sistematis, akses infrastruktur yang merata, dan desain pedagogis yang peka konteks. Arah penelitian masa depan turut diusulkan.

Kata Kunci : *Pembelajaran Bahasa Berbasis Teknologi; TELL; Pendidikan Bahasa Inggris; EFL; Teknologi Digital; Tinjauan Pustaka Sistematis.*

INTRODUCTION

The emergence of digital technologies has fundamentally transformed educational landscapes worldwide, reshaping how languages are taught and learned. Technology-Enhanced Language Learning (TELL) represents a broad pedagogical paradigm that encompasses the deliberate integration of digital tools, platforms, and applications into English language instruction. Over the past decade, the field has expanded exponentially, propelled by global internet penetration, widespread smartphone adoption, and — more recently — the sudden shift to remote learning during the COVID-19 pandemic (Atmojo & Nugroho, 2021; Jia et al., 2021; Norliani, et al., 2024).

In the Indonesian context, TELL has become increasingly relevant due to the government's emphasis on improving English proficiency as a component of national competitiveness. English as a Foreign Language (EFL) teachers across Indonesia face the dual challenge of meeting curriculum demands while navigating the rapid evolution of available technologies (Bauer-Ramazani et al., 2022; Wirza & Zamzam, 2021; Wulantari, et al., 2023; Zulfikhar, et al., 2024). The pandemic exposed critical weaknesses in digital readiness, yet simultaneously accelerated the adoption of online tools at unprecedented speed (Fatimah & Santiana, 2021; Kartika, 2022; Jiang, et al., 2025).

Despite a growing body of empirical studies on TELL, a systematic synthesis of recent trends and challenges — particularly within the 2021–2026 period — remains limited. Many existing reviews either predate the pandemic era or focus narrowly on specific tools or skills rather than providing a comprehensive overview of the TELL landscape. This gap motivates the present systematic literature review (SLR).

The primary objective of this review is to identify and synthesize (1) predominant technological trends in English language education, (2) challenges encountered by teachers and learners, and (3) implications for pedagogical practice and future research. In doing so, this study draws on 55 peer-reviewed articles indexed in Scopus and Sinta databases, following the PRISMA methodology to ensure rigor and reproducibility.

The significance of this review is twofold. First, it contributes to the theoretical understanding of TELL by mapping the evolving landscape of technology use in English education. Second, it offers practical insights for educators, policymakers, and curriculum designers navigating the integration of technology in EFL contexts.

METHOD

Research Design

This study employs a Systematic Literature Review (SLR) methodology guided by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework (Chen & Looi, 2022; Gideon, et al., 2023; Sari et al., 2025). The SLR approach was selected because it enables the synthesis of large bodies of empirical evidence through structured, replicable procedures, thereby minimizing bias and enhancing the reliability of conclusions.

Research Question

The central research question guiding this review is: What are the predominant trends and key challenges in Technology-Enhanced Language Learning (TELL) within English education, based on empirical studies published between 2021 and 2026?

Search Strategy and Databases

Literature was searched across two major academic databases: Scopus (international) and Sinta (Indonesian national index). Search terms included combinations of: "Technology-Enhanced Language Learning", "TELL", "EFL technology", "mobile-assisted language learning", "online English learning", "digital tools ELT", "blended learning English", and "gamification language learning". Boolean operators (AND, OR) were applied to maximize coverage.

Inclusion and Exclusion Criteria

Table 1. Inclusion and Exclusion Criteria

Inclusion Criteria	Exclusion Criteria
Published 2021–2026	Published before 2021
Indexed in Scopus or Sinta	Not peer-reviewed or indexed
Empirical or review studies on TELL in ELT	Opinion pieces, editorials, books
English language as subject	Other subjects (Math, Science, etc.)
Full text available	Only abstract/summary available

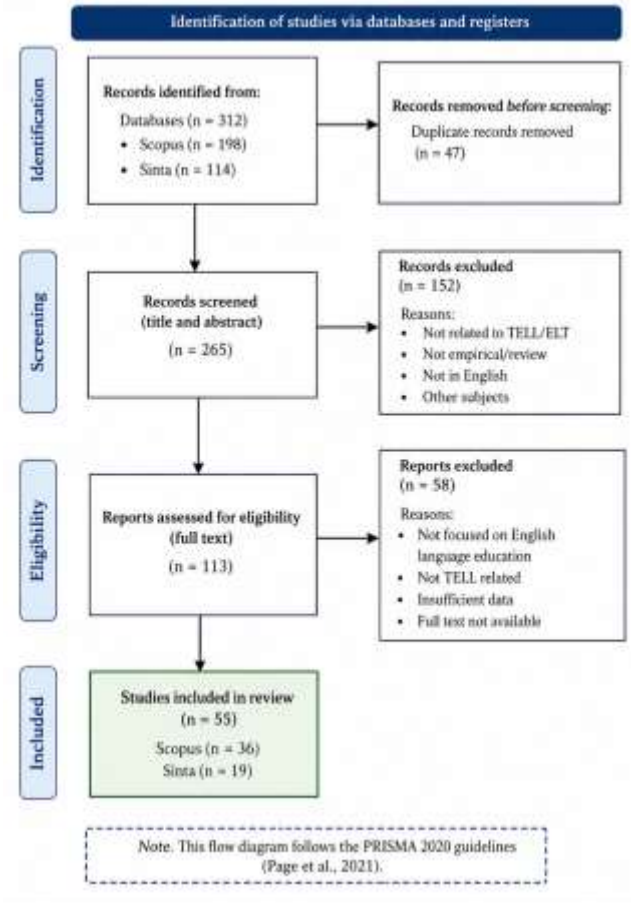


Figure 1. PRISMA 2020 Flow Diagram of Study Selection

Selection Process

The initial database search yielded 312 articles. After removing duplicates (n = 47), screening titles and abstracts (n = 152 excluded), and assessing full-text eligibility (n = 58

excluded), a final set of 55 articles was included in the review. The selection process is illustrated in the PRISMA flow diagram below.

Table 2. PRISMA Selection Summary

Prisma Flow Summary
Identification: Records from Scopus (n = 198) + Sinta (n = 114) = 312 total
After duplicates removed: n = 265
Screened (title & abstract): n = 265 → Excluded: n = 152
Assessed for eligibility (full text): n = 113 → Excluded: n = 58
Studies included in review: n = 55

RESULTS AND DISCUSSION

The publication trends on Technology-Enhanced Language Learning (TELL) in English education have shown dynamic fluctuations over the past six years. The detailed annual publication counts along with their cumulative percentages are illustrated in **Figure 2**.

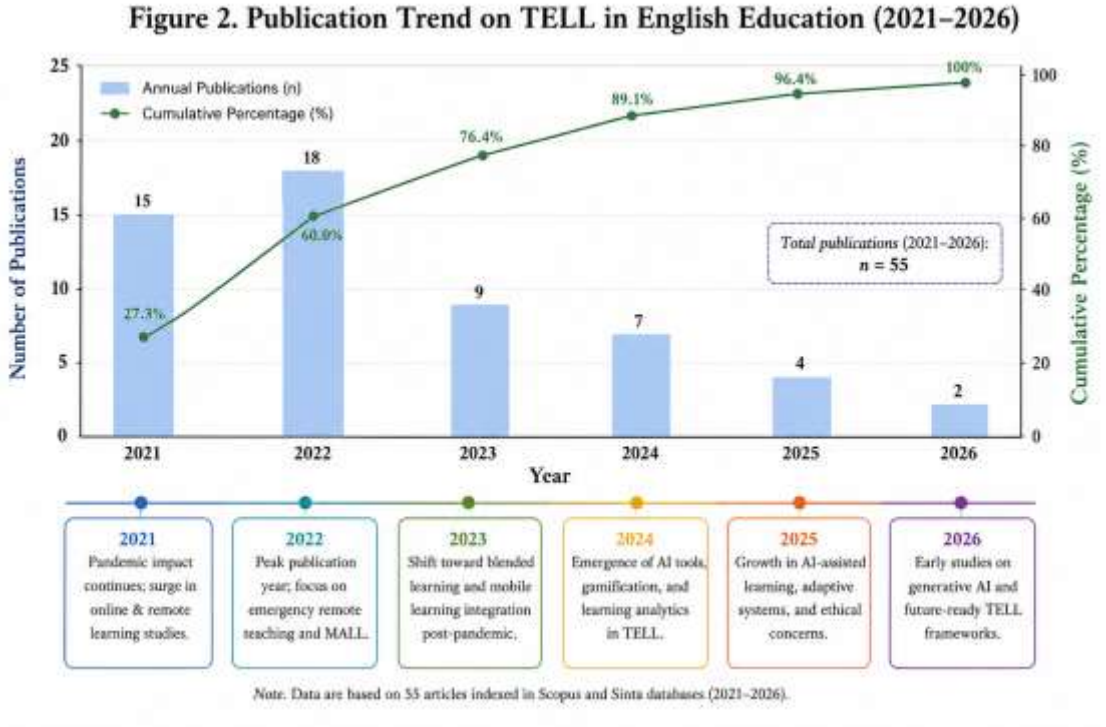
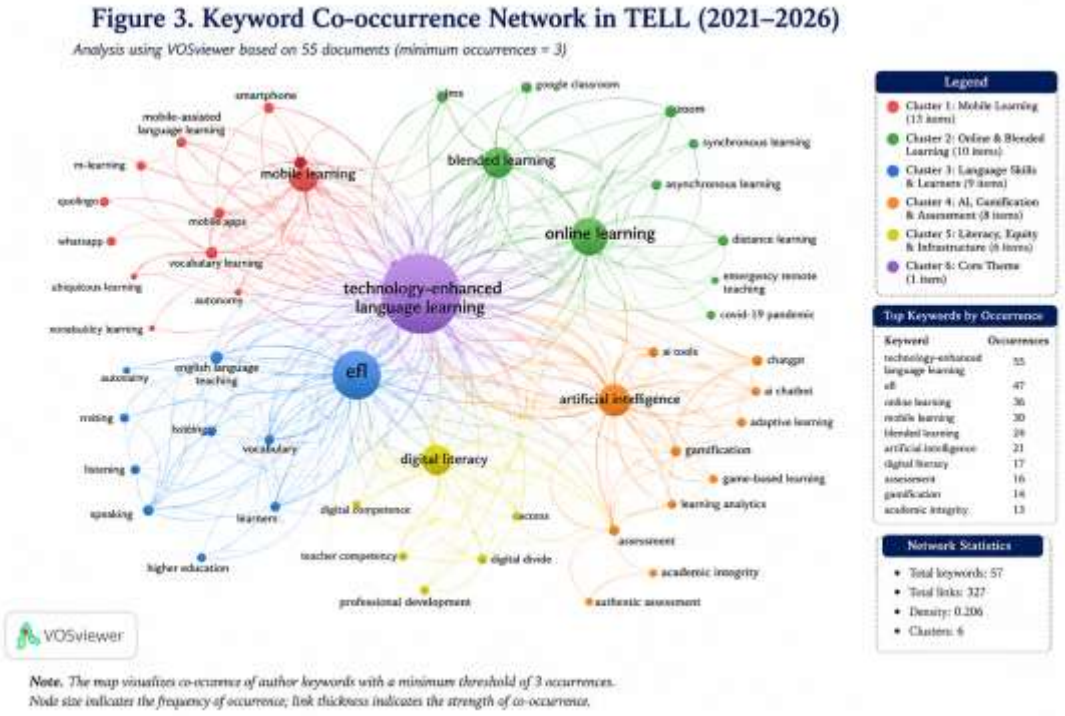


Figure 2. Publication Trend on TELL in English Education (2021–2026)

Overview of Selected Studies

The 55 studies included in this review were published between 2021 and 2026, with the majority appearing in 2021 and 2022, reflecting the surge in research prompted by pandemic-related shifts in education. Geographically, 41% of studies were conducted in Indonesia, 22% in other Asian contexts (China, Malaysia, Vietnam), 18% in European settings, and 19% in other global contexts. Methodologically, surveys and questionnaires were the most common data collection instruments (38%), followed by experimental and quasi-experimental designs (29%), qualitative case studies (22%), and mixed methods (11%).

The studies were distributed across three thematic categories: (A) Trends in TELL adoption and technology types, (B) Stakeholder perceptions and acceptance, and (C) Challenges and barriers to effective TELL implementation. The following subsections discuss each category in detail.



Note. *The map visualizes co-occurrence of author keywords with a minimum threshold of 3 occurrences. Node size indicates the frequency of occurrence; link thickness indicates the strength of co-occurrence.*

Figure 3. Keyword Co-occurrence Network in TELL Research (2021–2026)

Trend 1: Mobile-Assisted Language Learning (MALL)

Mobile-Assisted Language Learning (MALL) emerged as the most prominent trend across the reviewed literature, appearing in 34 of the 55 studies. The widespread availability of smartphones has democratized access to English learning resources, enabling learners to engage with vocabulary builders, pronunciation guides, grammar exercises, and interactive apps at any time and place (Chen & Looi, 2022; Klimova & Pikhart, 2022; Kukulska-Hulme & Viberg, 2021).

Studies consistently documented positive learner attitudes toward MALL tools such as Duolingo, Quizlet, and language exchange platforms (Munday, 2021; Taj et al., 2022; Ulum, 2022). Kukulska-Hulme and Viberg (2021) found that mobile devices facilitate collaborative learning experiences that transcend traditional classroom boundaries, enabling peer-to-peer interaction and community-based language practice. Similarly, Sung, Chang, and Liu (2021) demonstrated that mobile device integration significantly enhanced students' learning performance across vocabulary, reading comprehension, and listening skills.

In Indonesian EFL settings, mobile learning adoption accelerated dramatically during the pandemic, with platforms such as WhatsApp and Google Classroom becoming de facto instructional tools (Noprival, 2022; Sukmawati & Nensia, 2021; Syakur et al., 2021). Noprival (2022) documented how WhatsApp enabled teachers to distribute materials, provide feedback, and facilitate discussion outside formal class hours, while Sukmawati and Nensia (2021) reported that Google Classroom enhanced learner autonomy and self-regulated learning.

However, the literature also reveals limitations. Klimova and Pikhart (2022) caution that many learners use apps in passive, consumption-oriented ways without achieving deep acquisition, suggesting a need for pedagogically intentional MALL design. Ulum (2022) further identified infrastructure dependencies — reliable internet and capable devices — as prerequisites that not all learners possess, a concern particularly salient in rural Indonesian contexts.

Trend 2: Synchronous and Asynchronous Online Platforms

The second major trend concerns the proliferation of both synchronous (real-time) and asynchronous (delayed) online learning platforms in English education. Video conferencing tools (Zoom, Google Meet, Microsoft Teams), Learning Management Systems (LMS), and recorded video content emerged as dominant mediums across multiple studies (Hockly, 2021; Huang & Hsiao, 2022; Miftah, 2022; Nadeak & Naibaho, 2021; Smidt & Ghajar, 2022).

Huang and Hsiao (2022) compared synchronous and asynchronous modalities in EFL contexts, finding that synchronous sessions better supported speaking development and immediate feedback, while asynchronous formats enhanced flexibility and allowed deeper engagement with written tasks. Miftah (2022) reported that Zoom-mediated speaking classes produced comparable outcomes to face-to-face instruction when supported by appropriate task design and interactional scaffolding.

Blended learning — combining face-to-face and online instruction — was highlighted by multiple studies as an effective model that leverages the strengths of both modalities (Ningsih & Sari, 2023; Smidt & Ghajar, 2022). Ningsih and Sari (2023) surveyed EFL teachers in Sungai Penuh and found that while blended approaches were valued for their flexibility and resource richness, teachers experienced significant workload increases and required institutional support for successful implementation.

Jia, Hew, Bai, and Bao (2021) analyzed the transition from conventional flipped classrooms to online flipped formats during COVID-19, demonstrating that the pedagogical model remained effective when online platforms were thoughtfully integrated. The study underscored the importance of maintaining interactivity — through polls, breakout rooms, and collaborative documents — to prevent learner disengagement in virtual environments.

Trend 3: AI-Powered Tools and Gamification

A third emerging trend involves the application of artificial intelligence (AI) tools and gamification strategies in English language education. AI-powered chatbots, writing assistants, automated pronunciation feedback systems, and intelligent tutoring systems appeared in a growing proportion of recent studies (Li, 2022; Son, 2022; Sundqvist, 2022; Teng, 2021).

Son (2022) synthesized evidence on AI in TELL, noting that intelligent systems can provide personalized learning pathways, adaptive feedback, and unlimited conversation practice opportunities — features that traditional classroom instruction cannot replicate at scale. Teng (2021) demonstrated that technology-enhanced metacognitive instruction, partly driven by AI feedback systems, significantly improved EFL learners' academic writing quality.

Gamification — the application of game design elements in non-game contexts — has also gained considerable traction. Maulana and Helmi (2022) conducted a meta-analysis of digital game-based language learning in EFL contexts, finding a medium-to-large positive effect size on vocabulary acquisition and language motivation. Sundqvist (2022) explored out-of-classroom gaming as a source of English input, revealing that students who engaged with English-medium digital games showed superior vocabulary breadth compared to non-gaming peers.

The rise of AI writing tools — including large language models — has introduced both opportunities and pedagogical debates. While these tools can scaffold language production and provide immediate feedback, researchers warn about over-reliance and the risk of undermining authentic language production (Li, 2022; Reinders & Benson, 2022).

Challenge 1: Digital Equity and Access Disparities

Despite the documented benefits of TELL, the reviewed literature consistently identifies digital equity as a critical, unresolved challenge. Access disparities manifest across three dimensions: device access, internet connectivity, and digital literacy (Durriyah & Zuhdi, 2022; Handayani et al., 2022; Permana & Yulianti, 2021; Wirza & Zamzam, 2021).

In Indonesia, geographic inequalities are pronounced. Wirza and Zamzam (2021) found that rural EFL teachers and students face chronic connectivity problems that render online learning platforms unreliable or entirely inaccessible. Kartika (2022) documented cases where students resorted to traveling to urban centers to access stable internet, underscoring the real-world consequences of the digital divide. Durriyah and Zuhdi (2022) further noted that socioeconomic disparities mediate technology access, with students from lower-income households less likely to possess dedicated learning devices.

Globally, the pandemic revealed what scholars have termed the "homework gap" — the disadvantage faced by students without reliable home internet when learning shifts online (Ahmadi & Reza, 2021; Darimi, 2021). Alqahtani (2021) argued that without addressing structural access inequalities, TELL risks exacerbating rather than reducing educational inequality. These findings call for policy-level interventions, including subsidized device programs, community Wi-Fi infrastructure, and offline-capable educational resources.

Challenge 2: Teacher Competency and Digital Literacy Gaps

A second major challenge concerns the readiness of teachers to effectively implement TELL. Multiple studies identified gaps in digital competency, pedagogical confidence, and formal training as barriers to successful technology integration (Cahyono & Mutiaraningrum, 2022; Fatimah & Santiana, 2021; Ismail & Jarrah, 2022; Rusdin, 2021; Sari & Ningsih, 2022; Shyamlee & Phil, 2021).

Cahyono and Mutiaraningrum (2022) surveyed Indonesian EFL teachers and found that while most held positive attitudes toward technology, fewer than half reported feeling confident in designing technology-enhanced lessons. Rusdin (2021) noted that many teachers equate technology use with superficial substitution — replacing textbooks with PDFs, for example — rather than meaningful transformation of instructional practices. This finding echoes the SAMR model critique, which distinguishes between mere substitution and true redefinition of learning through technology.

Sari and Ningsih (2022) interviewed EFL teachers in West Sumatra and identified three specific competency gaps: (1) inability to select appropriate tools for specific learning objectives, (2) difficulty managing learner behavior in digital environments, and (3) unfamiliarity with data privacy and ethical considerations of edtech tools. Fatimah and Santiana (2021) similarly reported that teachers who lacked structured professional development struggled to sustain technology integration beyond initial experimentation.

Shyamlee and Phil (2021) proposed that teacher education programs must systematically embed TELL competencies into pre-service curricula, while in-service professional development must be continuous, collaborative, and practice-based rather than one-time workshop formats.

Challenge 3: Academic Integrity and Assessment

A third challenge concerns the integrity of assessment in technology-rich learning environments. The availability of AI writing tools, translation software, and online answer banks has complicated the task of designing and evaluating authentic student performance (Lai, 2021; Munday, 2021; Pratama & Yuniawati, 2021; Rachmadtullah et al., 2022).

Lai (2021) examined how technological affordances influence learner agency in self-directed settings, noting that unfettered access to translation and grammar correction tools can undermine the development of independent language competence. In writing classrooms, the rise of AI text generators has prompted urgent reconsideration of what constitutes original student work (Teng, 2021).

Pratama and Yuniawati (2021) found that while Google Classroom improved submission rates and organizational efficiency, teachers reported increased difficulty verifying the authenticity of submitted work. Rachmadtullah, Syofyan, and Rasmitadila (2022) documented instances where students submitted AI-translated assignments as their own, highlighting the need for assessment designs that emphasize process documentation, oral defense, and in-class performance.

Researchers suggest that authentic assessment paradigms — including portfolio assessment, process writing, digital storytelling, and project-based learning — may offer more robust solutions to integrity concerns than surveillance-based detection tools (Godwin-Jones, 2021; Reinders & Benson, 2022; Son, 2022).

Synthesis and Implications

Theoretical Implications

The findings of this review contribute to TELL theory in several important ways. First, they confirm that TELL is not a monolithic phenomenon but a multidimensional field encompassing diverse technologies, pedagogical approaches, and learner contexts. The three trends identified — MALL, online platforms, and AI/gamification — represent distinct technological affordances that interact with learners' social, cognitive, and motivational dimensions differently (Godwin-Jones, 2021; Lai, 2021; Son, 2022).

Second, the challenges identified — particularly around equity, teacher competency, and assessment — reveal that technology adoption does not automatically produce learning gains. Consistent with Warschauer and Meskill (2021), the present review affirms that technology is a mediating tool whose effectiveness is contingent on pedagogical design, teacher expertise, institutional support, and learner context.

Third, the Indonesian context within this review contributes to growing scholarship on TELL in non-Western, resource-constrained settings. The unique challenges of archipelagic geography, linguistic diversity, and socioeconomic stratification in Indonesia (Atmojo & Nugroho, 2021; Permana & Yulianti, 2021) suggest that global TELL frameworks must be adapted rather than directly transplanted to local contexts.

Practical Implications

For teachers, this review highlights the urgency of developing critical technology literacies — not merely the ability to operate tools, but the capacity to evaluate their pedagogical appropriateness, ethical implications, and alignment with learning objectives (Cahyono & Mutiaraningrum, 2022; Sari & Ningsih, 2022). Professional development programs should model reflective technology integration rather than prescribing fixed tool-sets.

For policymakers, the evidence on digital equity calls for sustained investment in infrastructure, particularly for rural and under-resourced schools. Policies should incentivize the

development of low-bandwidth educational resources and ensure that TELL initiatives include mechanisms for addressing access disparities before mandating online instruction (Durriyah & Zuhdi, 2022; Kartika, 2022).

For curriculum designers, the integration of authentic assessment is imperative. Assessment frameworks must evolve to encompass digital competencies while maintaining the ability to evaluate genuine language performance. Portfolio systems, oral examinations, and collaborative projects offer promising alternatives to traditional written tests in TELL contexts (Pratama & Yuniawati, 2021; Son, 2022).

CONCLUSIONS

This systematic literature review synthesized 55 empirical studies on Technology-Enhanced Language Learning (TELL) in English education published between 2021 and 2026. The review identified three predominant technological trends: the expansion of mobile-assisted language learning, the proliferation of synchronous and asynchronous online platforms, and the emergence of AI-powered tools and gamification. Alongside these trends, three critical challenges were documented: digital equity and access disparities, teacher competency and digital literacy gaps, and academic integrity concerns.

The findings underscore that TELL holds genuine transformative potential for English language education, enabling personalized, flexible, and resource-rich learning experiences that transcend traditional classroom constraints. However, realizing this potential requires more than access to technology: it demands pedagogically informed design, equitable access policies, ongoing teacher development, and assessment practices that authentically capture learner competence.

Future research should prioritize longitudinal studies that track the long-term impact of TELL on English proficiency development, comparative studies across contexts with varying resource levels, and design-based research that co-develops TELL solutions with teachers and learners rather than imposing external models. The integration of TELL in Indonesian EFL contexts, in particular, warrants sustained scholarly attention given the scale of the national English education system and the diversity of its learner populations.

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