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Mobile-Assisted Language Learning in Tertiary EFL Education: A Decade of Systematic Evidence (2015–2025)

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Abstract
The rapid advancement of mobile technologies has reshaped global education, particularly language learning in higher education. The systematic literature review of mobile-assisted language learning in tertiary EFL contexts from 2015 to 2025 aims to synthesise empirical evidence on how mobile technologies have been implemented and examined in English learning, focusing on key trends, pedagogical strategies, and theoretical frameworks. The significance of this study lies in consolidating fragmented research to provide evidence-based insights for educators, researchers, and policymakers seeking to integrate mobile tools effectively into tertiary English education. Following the PRISMA guidelines, 42 empirical studies were analysed from major academic databases. Results show a clear shift from technology-focused studies to pedagogically and theoretically integrated approaches, indicating that MALL has become a learner-centred and context-sensitive practice that supports both language acquisition and instructional design in tertiary EFL education. Overall, the findings highlight the growing pedagogical potential of MALL in fostering active and autonomous learning, underscoring its impact on modernising tertiary EFL instruction and shaping future research and policy directions.
Keywords: EFL learners, higher education, mobile-assisted language learning, systematic literature review

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Introduction

The ubiquity of mobile technologies has transformed global education, with language learning being among the most profoundly affected fields (Kukulska-Hulme & Shield, 2008; Pegrum, 2014). Mobile-Assisted Language Learning (MALL) marks a significant departure from conventional classroom-based practices, introducing flexible, learner-centered approaches that overcome the limits of time and place (Sharples et al., 2005; Stockwell, 2013). This transformation is especially visible in higher education, where it has become an especially promising context for adopting MALL, shaped by several intersecting conditions. University learners generally display strong digital skills and have reliable access to mobile devices (Dou et al., 2025; Jeong, 2023). In addition, the self-directed nature of tertiary studies aligns closely with the independent learning opportunities that mobile technologies provide(Shen et al., 2023; Wu, 2015). Over time, research on MALL has progressed from initial studies assessing technical viability to more advanced inquiries addressing pedagogical effectiveness, learner perceptions, and theoretical integration with established models of language acquisition (Hwang & Fu, 2019; Kacetl & Klímová, 2019). The field has expanded considerably, with investigations examining a wide range of applications including vocabulary growth, reading and writing skills, and oral communication. This broader focus mirrors both technological progress and enhanced insight into how mobile tools can support multiple dimensions of language learning (An et al., 2021; Lai et al., 2022).

Although numerous empirical studies have been published, the field still lacks comprehensive syntheses that could offer solid, evidence-informed recommendations to teachers, researchers, and policymakers (Hema & Gandhimathi, 2025). This absence is particularly problematic in light of the considerable financial commitments made to educational technologies and the increasing emphasis on evidence-based decision-making in higher education (Guo et al., 2024; Lazaro & Duart, 2023). Accordingly, the main aim of this systematic review is to critically examine and synthesise empirical research on MALL in tertiary English as a foreign language (EFL) education from 2015 to 2025, with the goal of providing a comprehensive and evidence-based understanding to inform future research, instructional practice, and policy development in higher education.

Several pressing issues underscore the significance of this review. To begin with, the COVID-19 pandemic accelerated the integration of mobile technologies in higher education and reshaped research priorities. Rather than focusing solely on adoption, studies began examining learner autonomy, digital equity, and the sustainability of technology-mediated pedagogy. This shift reflects a move toward viewing MALL not just as a technological tool but as a pedagogical response that supports continuity, interaction, and engagement during educational disruptions (Jeong, 2023; Lee, 2021). This rapid transition underscored both the opportunities and constraints of mobile technologies in facilitating language learning, pointing to the need for a systematic assessment of existing research (Šramová, 2024; Zou et al., 2021).

In addition, the diversity of existing MALL studies poses difficulties for practitioners who wish to apply evidence-driven practices. Research differs widely in terms of theoretical grounding,

research design, learner populations, and outcome measures, which makes deriving clear conclusions about effectiveness or best practices challenging(Li et al., 2022; Mihaylova et al., 2022). A systematic review is therefore essential to map patterns, consolidate insights, and identify both convergences and inconsistencies across the literature (Guo et al., 2024).

Furthermore, the rapid evolution of digital technologies means that results from earlier MALL investigations may have limited applicability to present-day contexts (Hu et al., 2023; Li et al., 2023). By targeting research published between 2015 and 2025, this review encompasses the most up-to-date evidence while ensuring sufficient scope to detect emerging trends and developments.

The decision to focus specifically on tertiary-level EFL education is driven by the unique nature of this learner group. University students differ significantly from younger learners in terms of their autonomy, metacognitive capacities, and motivational orientations (Alamer & Al Khateeb, 2023; Peng et al., 2024; Rashid et al., 2021). Moreover, tertiary EFL contexts are typically shaped by explicit academic and professional objectives that influence both learning strategies and expected outcomes (Wang et al., 2024).

This Systematic Literature Review (SLR) aims to consolidate empirical studies on the use of MALL in tertiary-level English language education published between 2015 and 2025. The objectives of the study are as follows: to explore trends in the integration of MALL in English language instruction at the university level; to examine the theoretical and instructional frameworks that underpin MALL practices in higher education settings. Based on these objectives, the following research questions guide this review:

RQ1: What are the key themes and trends in empirical studies on MALL in tertiary English education over the past decades?

RQ2: Which pedagogical strategies, theoretical models, and research methods are most commonly employed in MALL research at the tertiary level?

By addressing these questions, this review offers a decade-long synthesis of empirical evidence (2015–2025) that maps developmental trajectories, identifies dominant theoretical and pedagogical trends, and critically evaluates methodological rigour across studies. In doing so, it contributes not only a comprehensive evidence base but also an intellectual framework that clarifies how mobile technologies have reshaped communicative language learning in higher education contexts.

Literature Review

To situate the present study within the broader field, this section reviews the theoretical foundations and historical trajectory of MALL. It also identifies critical gaps in existing systematic reviews, thereby clarifying the necessity and contribution of the current research.

Theoretical Foundations of Mobile-Assisted Language Learning

Mobile-Assisted Language Learning (MALL) involves the use of handheld devices to support language learning both inside and outside the classroom, through applications, multimedia,

and communication tools (Kukulska-Hulme, 2009). The conceptual basis of MALL is deeply interdisciplinary, integrating perspectives from educational psychology, applied linguistics, and technology studies. This breadth reflects the diverse ways in which mobile technologies mediate language acquisition and create opportunities for both formal and informal learning (Godwin-Jones, 2017b; Kukulska-Hulme & Shield, 2008). Current MALL scholarship frequently draws upon several influential theoretical perspectives that help explain how mobile tools can enhance second language learning processes.

Technology Acceptance Models

One of the most widely employed frameworks in MALL research is the Technology Acceptance Model (TAM) proposed by Davis (1989). TAM suggests that learners' intention to adopt technology is influenced primarily by two perceptions: its usefulness and its ease of use. In mobile learning contexts, TAM has been extensively applied to investigate how students evaluate and accept mobile applications for language learning, often showing robust explanatory power across different cultural and institutional environments (Venkatesh & Davis, 2000).

As TAM has evolved, researchers have developed extended models such as the Unified Theory of Acceptance and Use of Technology (UTAUT), which introduces variables like social influence and facilitating conditions (Venkatesh et al., 2003). UTAUT has gained traction in MALL research, especially in tertiary education, where peer influence and institutional infrastructure play significant roles in adoption. For instance, Almaiah et al. (2022) found that institutional support and peer encouragement strongly predict university students' willingness to engage with MALL platforms. These findings suggest that acceptance models remain crucial for understanding the sociotechnical dimensions of MALL. Empirical studies on MALL have consistently supported the assumptions of TAM, showing that learners' perceived usefulness and ease of use significantly influence their willingness to adopt mobile technologies for English language learning.

Constructivist Learning Theory

Constructivist theories, particularly those of Piaget (1977) and Vygotsky (1978), emphasize learners' active role in constructing knowledge through engagement with tasks and social interactions. This perspective resonates strongly with MALL, where learners interact with authentic, real-life materials and contexts via mobile devices (Kukulska-Hulme, 2020).

Social constructivism is especially relevant to MALL because of its focus on collaborative learning and peer interaction. Mobile platforms facilitate communication across time and space, enabling learners to work in communities of practice, share experiences, and receive feedback (Lai et al., 2022).The collaborative affordances of messaging apps, voice-recording tools, and online forums align closely with constructivist principles, supporting both individual reflection and collective meaning-making (Ma & Chiu, 2024). Evidence from recent MALL research aligns with constructivist principles, demonstrating that mobile-based collaborative tasks and interactive activities foster active knowledge construction and meaningful learner engagement.

Motivation Theory

A third theoretical pillar in MALL research is motivation theory, particularly Self-Determination Theory (SDT) by Deci and Ryan (2013). SDT posits that intrinsic motivation flourishes when learners experience autonomy, competence, and relatedness. Applied to MALL, SDT has been used to explain how mobile tools can enhance learner engagement and persistence (Ryan & Deci, 2000). Mobile applications that provide immediate feedback on performance or allow learners to set their own pace can strengthen their sense of competence and autonomy (Shen et al., 2023). Similarly, collaborative mobile tasks create opportunities for relatedness by connecting learners socially (Oga-Baldwin et al., 2023; Zakaria et al., 2025). Empirical findings further confirm the relevance of SDT in MALL contexts, indicating that mobile-supported learning environments enhance learners' intrinsic motivation by promoting autonomy, competence, and relatedness.

Self-Regulated Learning

Self-regulated learning (SRL) offers a useful lens for understanding how MALL supports tertiary EFL development. Building on classic models in which learners cyclically forethink, enact strategies, and self-reflect (Pintrich, 2000; Zimmerman, 2002), recent empirical studies provide convergent evidence of mobile technologies' facilitative role in fostering SRL skills: for example, Boroughani et al. (2023) demonstrated that mobile-assisted SRL interventions significantly enhanced university students' academic vocabulary acquisition compared to traditional methods. Similarly, a longitudinal quantitative study found that sustained MALL involvement improved both vocabulary learning attitudes and self-regulatory capacity (Xiao et al., 2022). A 2025 systematic review further confirmed that MALL environments afford interactive, adaptive, and collaborative supports that reinforce learner autonomy and SRL, leading to improved motivation and language proficiency (Pan et al., 2025). Collectively, these findings suggest that MALL not only provides language exposure, but also scaffolds learners' ability to regulate their own learning. Empirical evidence supports the application of SRL theory in MALL, as studies reveal that mobile tools facilitate goal-setting, strategy use, and self-monitoring, thereby strengthening learners' capacity for independent language learning.

Evolution of MALL Research in Tertiary Level

The trajectory of MALL research can be divided into distinct phases, each reflecting shifts in technological capability, pedagogical orientation, and methodological rigor.

Early Phase (2000–2010)

The first decade of MALL scholarship was largely exploratory. Mobile devices of this period were technologically limited, leading to small-scale feasibility studies focused on SMS-based vocabulary practice or audio listening tasks (Kukulska-Hulme & Shield, 2008). Most studies lacked strong theoretical grounding and involved small samples, but they laid the foundation by establishing mobility as a distinctive affordance of mobile learning (Sharples et al., 2005). These

pioneering efforts demonstrated that learning could extend beyond classrooms and laboratories, sparking broader interest in mobile pedagogy.

Expansion Phase (2011–2020)

With the widespread availability of smartphones and tablets, MALL research entered a more sophisticated phase. Scholars began integrating established language learning theories with mobile technologies, exploring multimedia applications, adaptive learning systems, and gamification (Burston, 2015; Pegrum, 2014). Research methodologies became more rigorous, with randomized controlled trials and large-scale surveys increasingly common (Sung et al., 2016). At the same time, practical concerns such as digital equity, privacy, and institutional integration emerged as central issues (Godwin-Jones, 2017a; Habbash, 2020; Stockwell, 2010).

Maturation Phase (2021–Present)

The current phase of MALL is marked by methodological rigor and theoretical depth (Naveed et al., 2023). Recent research has shifted from simple adoption studies to nuanced analyses of learning outcomes, contextual variables, and learner differences (Khezrlou et al., 2025). Mixed-methods and longitudinal designs are now more frequently used to capture complex patterns of learner engagement and skill development (Bai, 2024). Additionally, studies increasingly consider cultural and contextual diversity, recognizing that MALL effectiveness varies across different educational systems and learner populations (Hossain, 2024). More recently, emerging research has incorporated artificial intelligence (AI) and adaptive learning systems to personalize instruction, provide real-time feedback, and enhance learner autonomy, marking a new stage of technological sophistication in MALL (Gligorea et al., 2023; Warschauer & Xu, 2024).

Although systematic literature reviews on technology-enhanced and mobile-assisted language learning have been conducted, several critical gaps remain that justify the present study.

1. Skill-Specific Focus: Much of the existing synthesis has focused on specific language skill (Nawaz et al., 2025; Shavkatovna et al., 2024) rather than addressing mobile-assisted language learning in tertiary English as a foreign language contexts. Reviews often cover broad educational settings, which limits their applicability to higher education where learner autonomy, institutional policies, and curricular integration play distinctive roles (Naveed et al., 2023).

2. Limited Temporal Scope: Prior reviews have been constrained by relatively narrow timeframes, often stopping before the recent acceleration of mobile learning research driven by rapid technological innovation and the global shift toward blended and online learning (Zhou et al., 2023). Consequently, more recent empirical studies published between 2020 and 2025, which reflect the impact of new applications such as AI-powered platforms, gamification, and adaptive systems (Khosrawi-Rad et al., 2025; Ma et al., 2025; Ren & Tan, 2025), have not been systematically synthesized.

3. Lack of Contextual Analysis: Earlier reviews have tended to focus on learning outcomes without sufficiently examining contextual moderators such as cultural differences, learner

characteristics, and institutional support mechanisms (Khezrlou et al., 2025; Okumuş Dağdeler, 2023).

4. Theoretical Narrowness: Existing reviews rarely integrate multiple theoretical perspectives, instead relying on single frameworks such as the Technology Acceptance Model, which provides only partial explanations of the complex pedagogical processes in mobile-assisted learning (Almaiah et al., 2022).

Addressing these gaps, this review synthesizes empirical evidence from 2015 to 2025, offering a comprehensive and context-specific understanding of mobile-assisted language learning in tertiary English as a foreign language education.

Methodology

This review was conducted following the **Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA)** framework (Page et al., 2021), which guided the systematic identification, screening, eligibility, and inclusion of studies. A detailed checklist and flow diagram were applied to document the selection process.

The protocol for this review was developed in advance to specify the research objectives, eligibility criteria, search and selection strategies, data extraction methods, and synthesis procedures (Gough et al., 2012). These procedures ensured consistency and traceability throughout the review.

To strengthen reliability and validity, databases were searched using systematic strategies, and all records were independently screened. Standardized data extraction forms were used to compile and compare study characteristics. Following recommendations for methodological transparency and replicability in educational research (Torgerson, 2003), the review process was documented in detail to facilitate verification.

Databases and Search Strategies

Research was conducted using two premier academic databases, Scopus and Web of Science (WoS), chosen for their extensive and complementary coverage of peer-reviewed literature across disciplines. As literature in scientometrics affirms, combining these “titans of bibliographic information” enhances completeness and reduces bias when performing systematic reviews (Pranckutė, 2021). From this extensive search, 42 empirical studies were ultimately selected for inclusion in the systematic review. This number was deemed sufficient to achieve data saturation, as it reflects a comprehensive coverage of relevant MALL research within the defined timeframe and meets the sample adequacy standards recommended for systematic literature reviews (Petticrew & Roberts, 2005).

The search strategy was refined through iterative testing and pilot searches. The final query integrated three concept clusters with Boolean operators. See Figure 1 below.

Three Concept Clusters with Boolean Operators	
• **Mobile Technology**	(mobile OR smartphone OR tablet OR "mobile device" OR "mobile application" OR "mobile app" OR MALL OR "mobile learning" OR "m-learning")
• **Language Learning**	(language AND (learning OR acquisition OR education OR instruction) OR "English as a foreign language" OR EFL OR "English language learning" OR "second language" OR L2)
• **Educational Level**	(university OR college OR "higher education" OR tertiary OR undergraduate OR "post-secondary")

Figure 1. Three concept clusters with Boolean operators

Search terms were derived from prior reviews and recurrent keywords in seminal MALL publications (Burston, 2015; Khezrlou et al., 2025; Naveed et al., 2023; Zhou et al., 2023). Synonyms and variations were included to maximize sensitivity, while Boolean and proximity operators were applied to maintain precision.

To maintain relevance and quality, several filters were applied. See Figure 2 below.

Search Limitations and Filters	
· **Time frame**	2015–2025 (reflecting the maturation of mobile technologies and ensuring inclusion of the latest research)
· **Language**	English (to ensure comparability and accessibility)
· **Document Type**	Peer-reviewed journal articles
· **Subject Areas**	Social sciences, computer science, arts and humanities

Figure 2. Search limitations and filters

The cutoff starting at 2015 aligns with the widespread adoption of smartphones and the expansion of mobile learning applications, which makes research from this period highly applicable to contemporary practices (Burston, 2015; Metruk, 2024). These parameters ensured the review concentrated on high-quality, directly relevant research. In total, 320 **articles** were retrieved through databases searches and subjected to preliminary screening.

Screening and Selection Process

Study selection followed a two-step process consistent with PRISMA. First, titles and abstracts were screened against eligibility criteria. 169 articles deemed potentially relevant at this stage were retained for full-text review to avoid premature exclusion. The second stage of the review involved a detailed full-text assessment to ensure that studies aligned with the population, intervention, outcomes, and design criteria of the research scope. A standardized screening form was employed to record reasons for exclusion, thereby maintaining transparency and consistency in decision-making. See Figure 3 below.

Inclusion Criteria	Exclusion Criteria
· **Population:**University or college students learning English as a foreign language	Focused on primary or secondary school learners, or adults outside formal tertiary education
· **Setting:** Higher education institutions (colleges, universities, or equivalents)	Addressed languages other than English, or ESL in predominantly English-speaking contexts
· **Intervention:** Use of mobile devices or apps for language learning purposes	Relied on non-mobile or desktop-based technologies
· **Design:**Empirical studies (quantitative, qualitative, or mixed methods)	Consisted of literature reviews, conceptual papers, or editorials without empirical data
· **Outcomes:** Assessment of language proficiency, learner perceptions, or implementation processes	Provided insufficient methodological detail or demonstrated significant flaws in design
	Were inaccessible in full text or not available in English

Figure 3. Inclusion/Exclusion criteria

Following this, the methodological quality of the included studies was appraised using criteria adapted from established educational research evaluation frameworks (Thomas & Harden, 2008). Key dimensions of assessment included the clarity of research objectives, appropriateness of study design, adequacy of sample size and recruitment procedures, validity and reliability of instruments, suitability of data analysis methods, and transparency in reporting.

Through this rigorous two-step process of screening and appraisal, a total of 42 studies were identified as meeting the inclusion criteria and were retained for the final review. See Figure 4 below.

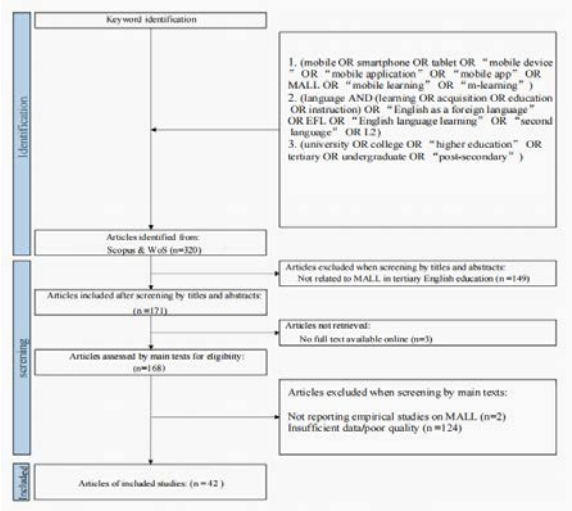


Figure 4. PRISMA flow diagram

Data Extraction and Synthesis

A structured data extraction form was developed to ensure consistency and comparability across studies included in this review. The form systematically captured study characteristics (author(s), year, country, research design, and participant demographics), intervention characteristics (type of device, application or platform employed, duration, intensity, and underlying theoretical foundations), outcomes (primary and secondary measures, along with major findings), and challenges (institutional barriers, limitations in integration with formal instruction,

cultural constraints, and issues related to technical support). This structured approach aligns with best practices in systematic reviewing, as it facilitates transparency, reduces reviewer bias, and enables meaningful synthesis of heterogeneous evidence (Petticrew & Roberts, 2005; Thomas & Harden, 2008).

Due to the diversity of methodologies, interventions, and outcome measures, the review employed **narrative synthesis** rather than meta-analysis. Following Popay et al. (2006), in synthesizing the findings, a structured multi-dimensional approach was adopted to ensure rigor and transparency. Thematic analysis was employed to group studies according to intervention type, theoretical orientation, and reported outcomes, while temporal analysis was conducted to trace changes in research foci and methodological approaches over time (Braun & Clarke, 2006; Thomas & Harden, 2008). In this process, thematic codes were derived through a hybrid approach that combined inductive and deductive reasoning: initial codes emerged inductively from patterns identified within the empirical data, while subsequent refinement and categorization were guided by established theoretical frameworks in mobile-assisted and technology-enhanced language learning. In addition, a quality-weighted interpretation strategy was used, assigning greater weight to studies with stronger methodological rigor, consistent with established guidance for systematic reviews in educational research (Gough et al., 2012; Petticrew & Roberts, 2005). The synthesis process was iterative, involving continuous reference back to primary sources to maintain accuracy, while tables and visual representations were developed to systematically summarize study characteristics and highlight emerging trends. This structured methodological process ensured that the review produced a comprehensive and credible synthesis of the evidence on MALL in tertiary EFL contexts.

Findings

The systematic review yielded **42 empirical studies** that satisfied the eligibility criteria. Collectively, these works reflect a wide-ranging exploration of MALL within tertiary-level EFL contexts between 2015 and 2025. They span diverse theoretical foundations, methodological traditions, and types of mobile learning tools, forming a solid base for understanding the current landscape of MALL research in higher education.

Publication Trends and Key Themes

In addressing RQ1, the findings are structured across two dimensions. The analysis first considers temporal and regional distributions, and then explores thematic variations.

Temporal and Regional Distribution of Publications

An analysis of publication patterns reveals a clear upward trajectory in MALL-related research within tertiary EFL education over the review period (2015–2025). See Figure 5 below. The number of eligible empirical studies increased markedly over time, reflecting growing scholarly interest and the accelerating integration of mobile technologies in language education. Only one qualifying study was published in 2015, and in 2016, no studies met the inclusion criteria,

although this does not necessarily indicate an absence of MALL-related publications during that year. Rather, it reflects the stringent eligibility requirements of this review, which excluded studies that did not align with the defined population, intervention, outcomes, or methodological standards. The volume began to rise from 2017 (n = 3) and peaked in 2024 (n = 10). Given that the cut-off date for the literature search was May 14, 2025, only a limited number of studies from 2025 (n = 3). were included. Notably, 2021 (n = 6), 2022 (n = 7), and 2023 (n = 5) also demonstrated heightened research activity. This pattern aligns with the broader post-pandemic shift toward digital and mobile learning, particularly in higher education contexts (Lazaro & Duart, 2023). The consistent increase over the decade signals not only the maturation of the MALL research field but also its sustained relevance in the evolving landscape of technology-enhanced language learning.

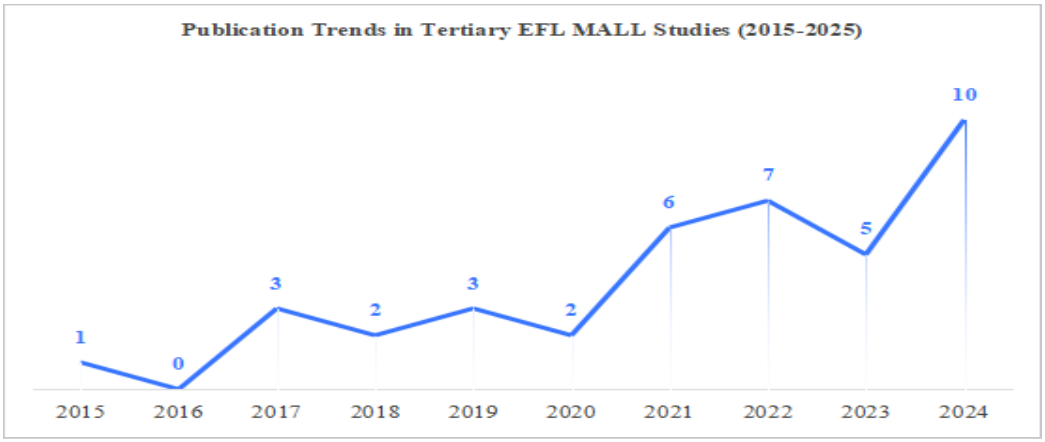


Figure 5. Publication trends of the included studies (2015–2025)

The most active years were **2021–2024**, which accounted for the bulk of the reviewed studies. This surge reflects both the **maturing of mobile technologies** and the acceleration of digital learning prompted by the COVID-19 pandemic (Hasumi & Chiu, 2024).

The studies were geographically diverse (See Figure 6 below.), though concentrated in **East Asia and the Middle East**. China dominated the sample, contributing over one-third of the studies (38%), followed by Turkey (16.7%). Other represented regions included Hongkong, Iran, Japan, Pakistan, Saudi Arabia and Vietnam. The prominence of Asian contexts is notable, as these regions combine high mobile penetration rates, strong policy support for educational technologies, and culturally specific challenges that influence the uptake and success of MALL interventions (Guo et al., 2024).

Taken together, the temporal and regional patterns reveal that MALL research in tertiary EFL education has evolved from sporadic early efforts into a sustained and geographically concentrated scholarly movement. The steady rise in publications mirrors both technological advancement and pedagogical adaptation, suggesting that MALL has moved beyond experimentation toward institutional integration. The dominance of Asian contexts indicates that regional educational priorities and infrastructure play a crucial role in shaping the global research

landscape. Collectively, these findings highlight that while MALL has achieved maturity as a research domain, its continued expansion depends on cross-regional collaboration and comparative inquiry to capture diverse pedagogical and cultural dynamics.

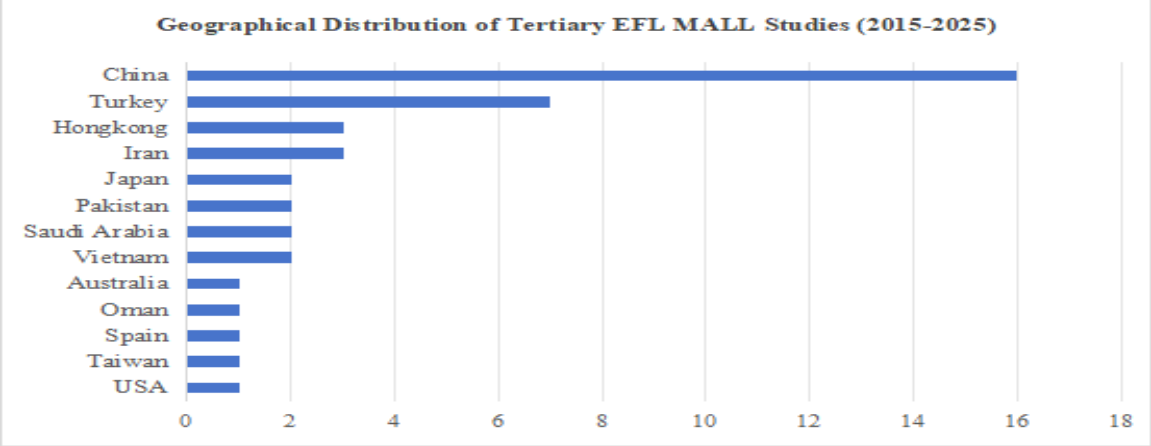


Figure 6. Geographical distribution of the included studies

Temporal and Regional Distribution of Themes

Early MALL studies (2015-2020) in the context of university English instruction predominantly focused on vocabulary, with subsequent attention given to speaking, listening, reading, writing, translation and interpretation. Nearly half of the reviewed studies investigated how mobile tools enhanced **specific aspects of English proficiency**. See Figure 4 below.

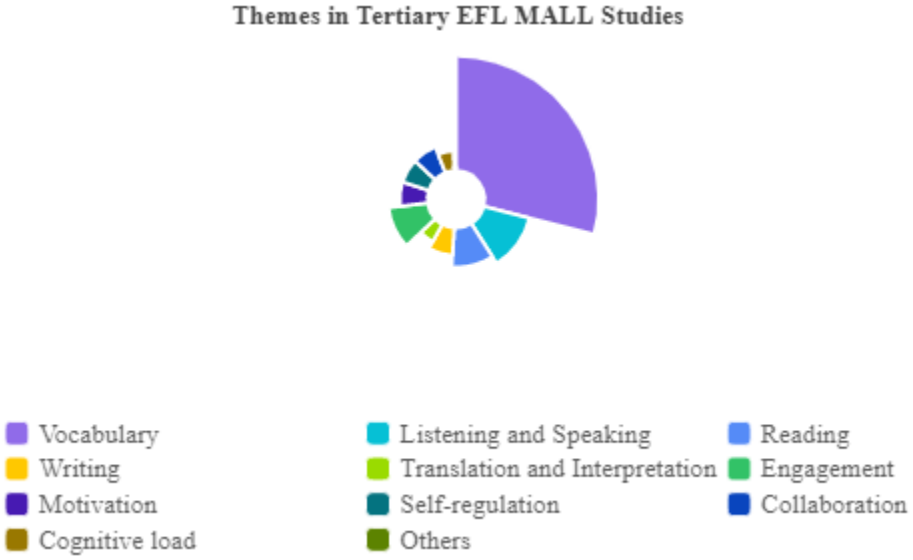


Figure 7. Thematic Diversity of the Included Studies

Vocabulary is the most widely examined skill, with approximately 29% of the reviewed studies explicitly focusing on vocabulary acquisition and retention. Wu (2015), and Zakian et al. (2022) reported medium-to-large effect sizes for mobile vocabulary learning. Effective strategies included **SRS-supported think-pair-share (Çelik & Baran, 2022)**, contextualized

reading support (Uz Bilgin & Tokel, 2019), **gamification** (Önal et al., 2022), and multimedia-enhanced vocabulary apps (Alhujaylan, 2024).

With respect to speaking and listening, the reviewed studies employed a range of approaches, with approximately 12% of the analyzed articles focusing explicitly on communication and oral expression skills. These included the use of speech recognition technologies for pronunciation practice (Dai & Wu, 2023), mobile applications designed for listening and speaking comprehension(Fang et al., 2021; Teeter, 2017), video-based oral tasks to promote interactive communication skills (Aşık et al., 2024; Huang, 2021) and authentic communication practices via chat platforms (Andujar & Salaberri-Ramiro, 2021; Jiang & Li, 2018).

In the domain of reading comprehension, approximately 10% of the reviewed studies specifically investigated how mobile technologies support learners' reading processes, highlighting tools such as e-dictionaries (Zhang & Pérez-Paredes, 2024), annotation functions (Yang & Hu, 2024), and scaffolded tasks that facilitated comprehension and engagement with authentic texts , and consistently reported positive effects, particularly for lower-proficiency learners who benefited from instant glossaries and comprehension scaffolds. Moreover, customizable support features were found to exert a notably strong impact on learning outcomes.

In terms of writing, with approximately 7% of the reviewed studies specifically addressing writing skills as a core outcome, research indicates that MALL applications effectively enhance proficiency by fostering greater learner engagement (Rashid et al., 2021). Providing real-time feedback, and supporting iterative revision processes (Aghajani & Adloo, 2018), such mobile-mediated scaffolding was particularly beneficial in improving academic writing accuracy and fluency. However, findings from a Japanese study revealed that students who wrote by hand demonstrated significantly greater recollection of content than those who composed on smartphones (Lee, 2021).

Notably, in the area of translation and interpretation, only about 5% of the reviewed studies focused on these skills, underscoring translation as the least explored dimension in this field. Studies show that MALL tools contribute positively to skill development, mainly through mobile dictionaries, collaborative platforms, and context-sensitive resources (Lai et al., 2022). Learners reported improved accuracy, efficiency, and confidence when performing interpreting-related tasks in authentic settings (Chan, 2024).

In the most recent five-year period (2021–2025), the thematic orientation of MALL research in tertiary EFL education has demonstrated a noticeable shift, with increasing scholarly attention directed toward learner-centered constructs such as engagement (Yang & Hu, 2023), motivation (Alamer & Al Khateeb, 2023), self-regulation (Lai et al., 2022; Li & Kim, 2024), collaboration (Hu et al., 2023; Huang, 2021), and cognitive load (Lee, 2021; Yang & Hu, 2024). This trend reflects a move beyond purely technological or skill-based investigations toward a more nuanced exploration of psychological, social, and cognitive dimensions that shape the effectiveness of MALL in higher education contexts.

Apart from the temporal evolution of research themes, geographical contexts further shaped the focus of MALL scholarship, highlighting the interplay between regional priorities and thematic orientations. Studies conducted in East Asia tended to foreground adoption patterns and the influence of cultural factors (Lee, 2021; Ma, 2017; Zhang et al., 2025). Research from the Middle East placed stronger emphasis on language skill development and context-driven instructional practices (Aghajani & Adloo, 2018; Uz Bilgin & Tokel, 2019; Zakian et al., 2022). By contrast, investigations in Western contexts highlighted learner experiences and individual differences as central themes (Bikowski & Casal, 2018; Li & Kim, 2024).

Synthesizing these thematic and regional patterns, it becomes evident that MALL research in tertiary EFL education has transitioned from a skill-specific orientation toward a more holistic understanding of learning processes. The early dominance of vocabulary and discrete language skills reflects the initial phase of technological experimentation, whereas the recent emphasis on engagement, motivation, and self-regulation signifies a paradigmatic shift toward learner-centered and theory-driven inquiry. Moreover, regional distinctions suggest that sociocultural and institutional factors significantly shape how MALL is conceptualized and implemented. Collectively, these developments demonstrate that the field is moving toward greater theoretical maturity and contextual sensitivity, positioning MALL as a multidimensional construct that integrates linguistic, cognitive, and affective dimensions of language learning.

Pedagogical, Theoretical, and Methodological Dimensions of MALL Research

To address RQ2, the findings are organized into three interrelated dimensions. The first examines the pedagogical strategies and instructional design approaches employed in MALL research. The second highlights the theoretical models that have provided conceptual grounding for these studies. The third considers the methodological approaches most frequently adopted, reflecting how empirical investigations in this field have been conducted.

Pedagogical Strategies and Instructional Design

The reviewed studies revealed a variety of pedagogical strategies for integrating mobile technologies into tertiary EFL instruction. Blended learning emerged as a widely adopted approach, where mobile applications complemented classroom-based teaching (Ali et al., 2024; Avci & Adiguzel, 2017; Rashid et al., 2021). Evidence indicated that such integration enhanced both learner satisfaction and learning outcomes, particularly when instructional tasks were well aligned, teachers received appropriate training, feedback was continuous, and scheduling remained flexible (Chen, 2022; Nami, 2020; Yu et al., 2019). Collaborative learning was another prominent strategy, with findings showing that peer-to-peer interaction through social networks or mobile-supported platforms fostered greater engagement and improved language performance, provided that collaborative tasks and tools were purposefully designed (Aghajani & Adloo, 2018; Avci & Adiguzel, 2017; Huang, 2021). In addition, game-based learning gained attention for its potential to stimulate learner motivation through gamified features such as rewards and narrative elements. However, results on its effectiveness for improving language proficiency were mixed, suggesting

that outcomes depended largely on the quality of game design and its alignment with instructional objectives (Önal et al., 2022; Taskiran, 2019).

Overall, the reviewed evidence suggests that successful MALL implementation in tertiary EFL education hinges on intentional design rather than mere technological adoption. The consistent finding across blended, collaborative, and game-based learning studies is that pedagogical alignment — between mobile affordances, learning objectives, and instructional scaffolding — is the key determinant of effectiveness. While technology enhances flexibility, interactivity, and motivation, its pedagogical value materializes only when integrated within coherent instructional frameworks that actively engage learners in authentic and collaborative communication. This synthesis underscores that MALL is most effective when grounded in sound pedagogical design principles that balance innovation with purposeful learning intent.

Theoretical Models

The theoretical underpinnings of the reviewed studies reveal a wide-ranging but interconnected body of frameworks guiding MALL research in tertiary EFL education. Broadly, these can be organized into four clusters: technology adoption models, cognitive and self-regulation frameworks, constructivist and sociocultural perspectives, and pedagogical/task-based approaches.

The most prominent cluster comprises technology adoption models, which focus on explaining learners' acceptance and sustained use of mobile technologies. The Technology Acceptance Model (TAM) has provided a foundational lens for investigating how perceived usefulness and ease of use shape learners' behavioral intentions (García Botero et al., 2018; Hoi & Mu, 2021; Zhang et al., 2025). Building upon TAM, the Unified Theory of Acceptance and Use of Technology (UTAUT) extends this perspective by incorporating social influence and facilitating conditions, thus offering a more comprehensive account of adoption in diverse educational settings (Hoi, 2020; Hu et al., 2023; Ren & Tan, 2025). Closely aligned, the Theory of Planned Behavior (TPB) has been employed to capture the attitudinal and motivational determinants of learners' engagement with MALL (Ren & Tan, 2025; Wang et al., 2022). Together, these frameworks form a coherent strand of research concerned with understanding technology acceptance and behavioral intention in higher education contexts.

A second major cluster centers on constructivist and sociocultural perspectives, which foreground the social and contextual dimensions of learning. Central here is Vygotsky's Zone of Proximal Development (ZPD), frequently invoked to illustrate how mobile technologies can scaffold learners' progression through dynamic support (Fang et al., 2021; Huang, 2021; Ma, 2017). Broader constructivist orientations, including Social Constructivism and General Constructivist Theory, frame MALL as a process of collaborative knowledge construction (Chan, 2024; Rashid et al., 2021). Related perspectives such as Sociocultural Theory, Social-Contextual Theory, and Situated Learning Theory further stress that learning is inseparable from cultural, institutional, and interactional contexts (Chen, 2022; Lai & Zheng, 2018; Uz Bilgin & Tokel, 2019).

The third cluster draws on cognitive and self-regulation frameworks, reflecting interest in how learners process, regulate, and sustain learning in mobile environments. Self-Determination Theory and Self-Regulated Learning models highlight the importance of autonomy, goal-setting, and metacognitive strategies, positioning learners as active agents in their mobile learning journeys (Alamer & Al Khateeb, 2023; Lai et al., 2022; Li & Kim, 2024). Cognitive Load Theory provides complementary insights into instructional design, emphasizing the need to manage cognitive resources and avoid overload when tasks are delivered through mobile platforms (Yang & Hu, 2024; Yu et al., 2019). The Flow Theory, though less frequently applied, contributes by explaining how immersive and intrinsically motivating experiences can sustain learner engagement (Hu et al., 2023).

Finally, a smaller but significant cluster involves pedagogical and task-based approaches, which translate theoretical insights into instructional design. Task-Based Language Teaching (TBLT) highlights the alignment of mobile learning with authentic, communicative tasks (Fang et al., 2021), while approaches such as the Lexical Approach, and Collaborative or Personalized Vocabulary Learning focus on targeted skill development (Al-Abri et al., 2025; Ma & Chiu, 2024). Earlier conceptual contributions adopted by researchers, including the Socio-Educational Model of SLA (Teeter, 2017), the M-Learning Framework (Lai & Zheng, 2018), Mobile-blended collaborative learning (Avci & Adiguzel, 2017), cultures-of-use conceptual framework (Bikowski & Casal, 2018), emerged in the late 2010s as attempts to theorize the growing role of digital technologies in language education; however, these frameworks have received comparatively limited attention in more recent MALL research.

From a broader perspective, the theoretical landscape of MALL research in tertiary EFL education reflects a gradual evolution from technology-focused adoption models toward more holistic frameworks that integrate cognitive, social, and pedagogical dimensions. This convergence suggests that effective MALL implementation is best understood not merely through learners' acceptance of technology, but through the interplay between motivation, interaction, and instructional design. As such, the field is moving toward a more integrated understanding in which theoretical models complement rather than compete, collectively illuminating how mobile technologies mediate both the process and context of language learning.

Research Methods

Analysis of methodological trends reveals both temporal evolution and regional differentiation in MALL research within tertiary EFL education. Temporally, the field has demonstrated a clear trajectory of increasing rigor and sophistication. Early studies, conducted by Wu (2015), Avci and Adiguzel (2017) and Aghajani and Adloo (2018), were largely exploratory, characterized by small samples and simple pre–post designs. Between 2019 and 2020, research designs became more robust, with the inclusion of larger sample sizes, control groups, and explicit theoretical grounding (Hoi, 2020; Yu et al., 2019) More recent investigations (2021–2025) reflect a mature stage of methodological development, with increasing emphasis on sustainability, learner diversity, and contextual implementation. These studies integrated designs with Rasch-based path

model (Hoi & Mu, 2021), structural equation modeling (Shen et al., 2023; Yang & Hu, 2024), and mixed-methods triangulation (Zhang et al., 2025).

Regionally, both the mobile tools adopted and the research methodologies employed vary considerably. In East Asian contexts. MALL research predominantly relied on large-scale surveys and mixed-methods approaches, with frequent use of mobile dictionaries, English learning applications, and social communication tools such as WeChat to support vocabulary acquisition and collaborative learning (Dai & Wu, 2023; Ma & Chiu, 2024; Zhang et al., 2025). In contrast, studies from the Middle East placed greater emphasis on exploring the development of specific language skills and investigating whether widely used social networking platforms such as WhatsApp and Facebook could effectively support learner motivation and skill enhancement, often using experimental or quasi-experimental designs to assess effectiveness (Alamer & Al Khateeb, 2023; Avci & Adiguzel, 2017). Meanwhile, research conducted in Western contexts showed a stronger tendency toward qualitative inquiry and smaller-scale interventions, employing innovative technologies such as mobile feedback systems, and specialized language learning apps to explore learner experiences and individual differences (Andujar & Salaberri-Ramiro, 2021; Bikowski & Casal, 2018; Li & Kim, 2024).

Viewed collectively, these methodological patterns illustrate how MALL research in tertiary EFL education has progressed from exploratory pilot studies to increasingly rigorous and contextually grounded designs. The diversity of methodological choices across regions reflects varying educational priorities and resource environments—East Asian research emphasizes scalability and quantitative validation, while Western studies often prioritize depth and learner-centered qualitative insights. This methodological plurality demonstrates the maturation of the field, highlighting an ongoing shift toward integrative, mixed-methods, and context-sensitive investigations that better capture the complex realities of mobile-assisted language learning.

Discussion

This systematic review of 42 empirical studies provides robust evidence for the promise of MALL in higher education EFL contexts, while also highlighting important contextual dynamics that shape its success. The following section responds to the two research questions and offer insights that extend beyond individual studies, advancing broader understanding of the field.

RQ1: *What are the key themes and trends in empirical studies on MALL in tertiary English education over the past decades?*

From Early Trends to Emerging Directions

This section reflects on the key themes and trends identified in MALL research (RQ1), considering how these developments advance our understanding of mobile-assisted language learning in tertiary English education. The synthesized evidence indicates that MALL research in tertiary EFL contexts has moved from exploratory demonstrations of technical feasibility toward

a more mature, pedagogically oriented literature. Two interrelated developments are particularly salient.

Initially, the temporal trajectory maps clearly onto three phases. In the early phase (2000–2010), studies were largely exploratory, focusing on the technical feasibility of using mobile devices for language practice (Kukulska-Hulme & Shield, 2008). The expansion phase (2011–2020) was characterized by increasing smartphone penetration and the rapid growth of mobile applications, leading to broader investigations of pedagogical affordances and learner acceptance (Sun & Long, 2025). The maturation phase (2021–present) marks a significant consolidation of research, with studies increasingly embedding MALL in institutional settings and exploring advanced technologies such as Augmented Reality (AR) and Virtual Reality (VR) to create immersive and authentic learning experiences (Huang et al., 2021). This temporal pattern extends and updates prior syntheses that documented the field's early optimism and recommended methodological strengthening (Burston, 2015; Sung et al., 2016).

Second, thematic emphases have shifted. Early work concentrated on discrete, technology-centered tasks (e.g., vocabulary drills, SMS-based activities). During the expansion phase, uptake and usability became prominent concerns; adoption studies and investigations of learner attitudes featured heavily. More recent research has re-oriented toward learner-centred questions—motivation, engagement, self-regulation, and collaborative practice—and toward multimodal and context-rich applications (e.g., short-video, AR-supported tasks). This thematic evolution both confirms and refines earlier review conclusions: whereas Burston (2015) and Sung et al. (2016) noted promising but fragmented evidence, the current corpus reveals consolidation around pedagogical value and learner experience, consistent with observations that MALL has moved from novelty to curricular consideration (Dou et al., 2024).

This thematic and temporal evolution underscores both theoretical and practical relevance. The shift toward learner-centred, context-rich applications suggests that MALL is not only a technological innovation but also a catalyst for rethinking instructional design and learner engagement strategies in tertiary EFL settings. The integration of immersive technologies and multimodal tasks highlights opportunities for advancing theoretical models of language acquisition, particularly those that account for social, cognitive, and motivational dimensions in digitally mediated environments.

RQ2: *Which pedagogical strategies, theoretical models, and research methods are most commonly employed in MALL research at the tertiary level?*

Pedagogical, Theoretical, and Methodological Convergence

In response to RQ2, this section examines how MALL research at the tertiary level integrates pedagogical strategies, theoretical frameworks, and methodological approaches, revealing patterns of convergence that characterize current scholarly practice. The findings of this review indicate that pedagogical strategies for integrating mobile technologies into tertiary EFL instruction have matured significantly, moving beyond feasibility studies to more systematic instructional design.

Earlier reviews emphasized the novelty of blended learning and mobile-based tasks but also pointed out that empirical validation was limited and inconsistent (Avci & Adiguzel, 2017). By contrast, recent evidence demonstrates that blended approaches, when supported by teacher training, clear task alignment, and continuous feedback, consistently enhance both learner satisfaction and language outcomes (Huang, 2021). This confirms earlier claims of potential while providing robust empirical support in university contexts (Zhou et al., 2023). Collaborative learning represents another area of development. Prior syntheses highlighted the promise of peer-to-peer collaboration in mobile environments but often noted weak evidence for sustained language gains (Avci & Adiguzel, 2017; Huang, 2021). More recent studies, however, show that well-structured collaborative tasks conducted via social or mobile platforms can foster engagement and improve language performance (Hu et al., 2023; Ma & Chiu, 2024). Similarly, game-based learning has evolved from early optimism about motivation to a more nuanced understanding: while gamified features enhance enjoyment, their effectiveness for language proficiency depends heavily on design quality and alignment with instructional goals (Önal et al., 2022; Taskiran, 2019).

The theoretical framing of MALL has also become more diverse and integrated. Earlier meta-analyses noted that research frequently lacked explicit theoretical grounding or relied narrowly on technology adoption models (Burston & Giannakou, 2022). This review shows that while models such as TAM remain widely used to explain learners' behavioral intentions (Zhang et al., 2025), recent studies extend adoption research through UTAUT and the Theory of Planned Behavior, adding dimensions of social influence and attitudinal factors (Hu et al., 2023; Ren & Tan, 2025). This confirms Pérez-Paredes and Zhang (2022) argument that robust adoption frameworks are necessary but insufficient on their own. Complementary perspectives are now increasingly incorporated. Constructivist and sociocultural theories, particularly Vygotsky's Zone of Proximal Development, situate mobile learning within interactive and contextualized practice (Fang et al., 2021). Compared to earlier research, which often treated mobile devices as delivery tools, current studies frame them as mediational resources for collaborative knowledge construction (Luo & Watts, 2024). This reflects a broader disciplinary shift toward learner-centered design. Likewise, motivational and self-regulation frameworks have gained prominence. Self-Determination Theory (Ryan & Deci, 2000) and Self-Regulated Learning models (Pintrich, 2000) underscore the centrality of autonomy, goal-setting, and metacognitive strategies in sustaining engagement—dimensions largely absent in earlier reviews but now confirmed by empirical work (Alamer & Al Khateeb, 2023; Li & Kim, 2024). Cognitive Load Theory further strengthens the instructional dimension by addressing design efficiency, ensuring that mobile tasks remain cognitively manageable (Yang & Hu, 2024). Together, these frameworks bridge the gap between technology adoption and language learning outcomes. Task-based approaches such as TBLT and lexical or personalized vocabulary learning demonstrate how theory translates into practice, emphasizing authentic, communicative tasks in mobile settings (Fang et al., 2021; Ma & Chiu, 2024). Earlier frameworks, such as the M-Learning Framework (Ozdamli, 2012) and the

Socio-Educational Model of SLA (Gardner et al., 1985) , were important for establishing conceptual ground but are now less visible, suggesting that MALL scholarship increasingly prioritizes empirically validated and context-sensitive models.

Methodological sophistication has increased. The earliest studies commonly used case studies and pre–post designs with small samples; the expansion phase added larger surveys and quasi-experimental comparisons. In the maturation phase, researchers more frequently employ randomized or controlled trials, mixed-methods triangulation, advanced statistical modelling, and learning-analytics approaches. This methodological progression addresses long-standing critiques in the literature about limited generalizability and weak causal inference (Burston et al., 2024), although gaps remain—notably the need for more longitudinal work assessing sustained learning gains and cross-cultural generalizability. Compared with earlier reviews, the present evidence shows both quantitative growth and qualitative consolidation: MALL has evolved from experimental curiosities into a field that interrogates pedagogy, learner experience, and scalable implementation. Nevertheless, the concentration of studies in particular regions and persistent methodological limitations caution against broad generalizations and underscore the need for comparative, multi-context research to test the transferability of current findings.

Overall, the contrast with earlier reviews is clear: where Burston (2015) and Sung et al. (2016) identified theoretical gaps and limited evidence, recent research demonstrates theoretical diversification, pedagogical sophistication, and stronger empirical grounding. This reflects the field's broader maturation, integrating adoption, constructivist, and motivational models with diverse and increasingly sophisticated methodology into a more coherent and multi-dimensional account of MALL in tertiary EFL contexts. These developments highlight that MALL research has progressed from isolated technology adoption to a comprehensive view of how mobile tools shape learning. The integration of pedagogical, theoretical, and methodological sophistication informs instructional design and provides a stronger empirical basis for refining language acquisition theories. This convergence also opens avenues for scalable, context-sensitive implementations in diverse tertiary EFL settings.

Limitations

Although this review followed rigorous procedures aligned with PRISMA recommendations (Page et al., 2021), several constraints must be acknowledged that may influence the interpretation and transferability of the results (Gough et al., 2012).

One major constraint relates to the scope of the search process. Restricting the search to English-language publications may also have created linguistic and cultural bias by omitting significant contributions published in other languages. This is a noteworthy issue given that much mobile learning research originates from non-English speaking regions, as seen in recent work from Zhang et al. (2025) and Al-Abri et al. (2025). Furthermore, the decision to limit the corpus to peer-reviewed journals may have excluded other potentially valuable sources such as dissertations, technical reports, or book chapters. While this restriction ensures quality and

accessibility, it may also reduce exposure to novel or experimental findings often found in emerging research outlets. Restricting the review to studies published between 2015 and 2025 ensured a contemporary focus but may not capture the full trajectory of mobile learning development. Including 2025 publications, although forward-looking, was also challenging because the year had not concluded at the time of data collection, creating the risk of incomplete coverage of the latest research.

Implications for Theory, Practice, and Policy

Theoretical Implications

The findings call for integrated theoretical frameworks that combine insights from technology adoption, learning sciences, and SLA theory (Ryan & Deci, 2000; Venkatesh et al., 2003). While single theories offer explanatory value, they cannot fully account for the multifaceted dynamics of MALL. Additionally, context—cultural, institutional, and individual—emerges as a decisive factor, suggesting that context-responsive frameworks are more appropriate than universal models (Pérez-Paredes & Zhang, 2022).

Practical Implications

For educators and instructional designers, the evidence emphasizes the effectiveness of blended designs that integrate MALL with classroom teaching (Yang & Hu, 2024; Zhang et al., 2025). Careful alignment of mobile activities with curricular goals, along with continuous monitoring and feedback, is essential (Li et al., 2024). Individual learner profiles should guide application selection and instructional design.

Policy Implications

At the policy level, institutions and governments should establish clear guidelines for mobile use in education, invest in robust technical infrastructure, and provide training programs for faculty. Attention to privacy and data protection in mobile contexts is also critical.

Collectively, these implications provide a roadmap for translating empirical evidence into theory-building, pedagogical practice, and informed policymaking, ensuring sustainable and effective integration of mobile technologies in tertiary EFL education.

Conclusion

This systematic review advances previous work by synthesizing empirical studies from 2015–2025 specifically in tertiary EFL contexts, integrating temporal, thematic, pedagogical, theoretical, and methodological dimensions. It highlights learner-centred constructs, emerging technologies, and regional variations that prior reviews had underexplored, providing a more comprehensive and context-sensitive understanding of MALL. This review demonstrates that MALL has become a pivotal component of tertiary EFL education, reshaping the ways learners interact with language, peers, and instructional content. The body of research from 2015 to 2025

highlights that MALL is not simply a technological supplement but a pedagogical innovation capable of promoting learner autonomy, authentic engagement, and access to diverse communicative contexts.

The findings collectively suggest that the effectiveness of MALL depends less on the availability of technology and more on its meaningful pedagogical integration, theoretical grounding, and contextual adaptation. This indicates that sustainable implementation in higher education requires alignment with curriculum goals, institutional support structures, and professional development opportunities for instructors. Without these considerations, the potential of MALL may remain underutilized, reducing its role to a transient trend rather than a long-term educational advancement.

Looking ahead, future research should employ more rigorous and diverse methodologies, including longitudinal and mixed-method designs, to capture the evolving impact of mobile learning on language acquisition. Expanding research beyond dominant geographical contexts will be essential to ensure greater generalizability and inclusivity. Moreover, theoretical development that integrates insights from language acquisition, motivation, and technology acceptance is needed to provide a more comprehensive framework for understanding MALL.

In conclusion, MALL presents both opportunities and challenges. Its capacity to support flexible, engaging, and personalized learning experiences positions it as a valuable approach in tertiary EFL education. However, realizing its full potential requires ongoing empirical investigation, theoretical refinement, and deliberate pedagogical integration, ensuring that mobile technologies contribute meaningfully and sustainably to language learning in diverse higher education contexts.

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Appendices

Appendix A

Coding Scheme

Code	Country/Region	Theme	Theoretical Framework/Pedagogical Strateg	Resear	Mobile Technology/Tool	Analytical Tools	Findings	Challenges	New format or approach
2015-1	China	vocabulary	no	quanti	designed		- The smartpho	- The study highlights the lack of user c	
2017-1	Turkey	communication skills,vocabulary	collaborative	mix	whatsapp		- The study fou	- Students faced difficulties in agreeing	
2017-2	Hongkong	personalized learning	socio-cultural framework	quali	many		- The study rev	- The paper highlights pedagogical limit	
2017-3	Japan	listening speaking	motivation	quanti	shadowing		- The study hig	- The scarcity of opportunities to commu	
2018-1	Iran	writing	cooperative learning	quanti	telegram		- The study inv	- Students relied too much on online cor	
2018-2	USA	reading	cultures-of-use conceptual framework	mix	designed interactive digital textbook		- The study fou	- Many students find digital textbooks c	
2019-1	Turkey	AR	game-based learning	quanti	desinged AR game		- EFL learners l	Not addressed in the paper.	
2019-2	Turkey	contextual vocabulary learning	situated learning theory	mix	designed app		- The study fou	- Novice learners struggle with transfer a	
2019-3	China	proficiency, satisfaction,cognitive loads	cognitive load	mix	designed a mobile learning platform		- The study val	- The study faced challenges due to a la	
2020-1	Vietnam	learners' attitude, behavioral intention	UTAUT	quanti	many	Rasch-based path model	- The study sup	- The study's cross-sectional nature limi	
2020-2	Iran	choices and perceptions	mobile learning	quanti	many	ANOVA	- The study fou	- Challenges in mobile learning include s	
2021-1	Spain	cognitive engagement,emotional engagement	chat-based communication. CMC MMC	mix	whatsapp,facebook		- The study fou	- The lack of curriculumintegration pose	
2021-2	Taiwan	vocabulary,grammar,oral communication	TBLT,ZPD	mix	designed app for IG activities		- Mobile-suppo	- Large classroomsizes limit learners' act	
2021-3	Vietnam	teacher support, students' acceptance	TAM	quanti	many	Rasch-based path model	- The study fou	- Technical limitations include small scre	
2021-4	China	speaking, engagement	Social constructivism,Collaborative learning	mix	smartphone		- The study fou	- Students found video editing to be tim	
2021-5	Japan	writing,cognitive	memory and notetaking	quanti	Google Doc		- Handwritten n	- Controlling independent variables, suc	
2021-6	Pakistan	writing blogpost	learner-training framework	quali	designed MALL-based programme		- The study fou	- Technical difficulties hindered student	
2022-1	Turkey	vocabulary	TPACK, Student response systems	mix	SRS app – Socrative		- The study fou	- SRS technology is rarely utilized in lang	
2022-2	China	learners' perceptions	mlearning	quali	Kahoot,Padlet		- The study con	- Internet connectivity issues were a sig	
2022-3	China	vocabulary,translation,students' intention,Self regulation Self-directed	integrative model of behavior prediction	quanti	many	SEM	- The study fou	- Vietnamese and Japanese learners rarel	
2022-4	Turkey	tense,acceptance, motivation	no	mix	designed SOS Table mobile game		The SOS Tabl	Participants reported negative features	
2022-5	Turkey	listening speaking	mlearning	quanti	smartphone		- Participants s	- The research sample is limited to two u	
2022-6	Chian	adoption intention	theory of planned behaviour (TPB)	quanti	many	Mplus	- The study fou	- The study's construct of compatibility	
2022-7	Iran	vocabulary	no	quanti	flashcard app	SPSS,ANOVA	- The study fou	- The motivational impact of mobile devi	
2023-1	Saudi Arabia	motivation	self-determination theory (SDT)	quanti	whatsapp	ANOVA,SEM	- The study fou	- WhatsApp requires well-thought imple	
2023-2	China	pronunciation,collaboration, peer feedback	skill acquisition theory, sociocultural theory	mix	wechat,automatic speech recognition		All three grou	Students expressed concerns about pe	
2023-3	China	Collaborative MALL	UTAUT and flow theory	quanti	many	AMOS 24.0,SPSS 26.0	- The study rev	- High perceived costs can reduce users	
2023-4	China	behavioral intention to use MELR	UTAUT	quanti	many	SEM	- The study ide	- The study had a limited sample size of	
2023-5	China	engagement,preference	no	mix	Xuexitong		- The study fou	- The study's data collection at the seme	
2024-1	Saudi Arabia	phrasal verbs,vocabulary	constructive learning theory	quanti	PHRASAL VERBS app	ANOVA	- The experimer	- EFL learners struggle with the complex	
2024-2	Pakistan	grammar	Connectivism	quanti	whatsapp and many other	SPSS 23.0	- The study fou	Not addressed in the paper.	
2024-3	Turkey	presentation skills	no	quali	Video-Enhanced Observation		- The study con	- The paper highlights the issue of distra	
2024-4	Hongkong	Interpreting	situated learning	quali	desinged Virtual Interpreting Practice,	VR	- The study fou	- Participants experienced anxiety due to	
2024-5	Australia	engagement	self-regulated learning (SRL)	mix	automated feedback systems (AFSs)		- Participants re	- The study identified constraints relate	
2024-6	China	vocabulary	no	quanti	VR,computer, mobile	G*Power 3.1.9.4 software,	- The study hig	- Participants noted limitations in the val	
2024-7	China	self-regulation, motivation	Sociocultural theory (SCT)	quali	many		- The study rev	- Limited sac smartphone-assisted Englis	
2024-8	Hongkong	vocabulary,self-regulation, collaborative personalised lea	self-regulation, collaborative learning, person	mix	Schoology		- The study pro	- The study Self-regulated, Collaborativ	
2024-9	China	reading,cognitive load	cognitive load framework	mix	waiyanyuedu	ANOVA,SEM	- The study fou	- VR's software and hardware systems w	
2024-10	China	dictionary, reading	no	mix	three mobile dictionaries	SPSS (version 28.0)	- The study fou	- Participants perceived greater cognitiv	
2025-1	Oman	vocabulary retention, lexical fluency, speaking performanc	Digital Learning Ecology (DLE) framework	mix	Mentimeter, a Student Response System		- The integratio	- The quizzes designed through Mentim	
2025-2	China	learners' willingness	TAM-TPR framework	quanti	many	SEM,AMOS 23.0	- The study val	Not addressed extended TAM-TPR framew	
2025-3	China	dictionary,reading, vocabulary	TAM	mix	three mobile dictionaries	MANOVA	- The study fou	- Participants reported excessive definiti	

Appendix B

List of Included Studies

Code (Ref. ID)	Full Reference (APA 7th)
01	Wu, Q. (2015). Pulling mobile assisted language learning (MALL) into the mainstream: MALL in broad practice. *PLoS ONE*, *10*(5), Article e0128762. https://doi.org/10.1371/journal.pone.0128762
02	Avci, H., & Adiguzel, T. (2017). A case study on mobile-blended collaborative learning in an english as a foreign language (EFL) context. *International Review of Research in Open and Distributed Learning, 18*(7), 45-58. https://doi.org/10.19173/irrodl.v18i7.3261
03	Ma, Q. (2017). A multi-case study of university students' language-learning experience mediated by mobile technologies: a socio-cultural perspective. *Computer Assisted Language Learning*, *30*(3-4), 183-203. https://doi.org/10.1080/09588221.2017.1301957
04	Teeter, J. L. (2017). Improving motivation to learn English in Japan with a self-study shadowing application. *Languages*, *2*(4), Article 19. https://doi.org/10.3390/languages2040019

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