ELTIN JOURNAL:
Journal of English Language Teaching in Indonesia
p-ISSN 2339-1561
e–ISSN 2580-7684

DIGITAL MEDIA FOR VOCABULARY LEARNING IN ELEMENTARY SCHOOLS: BENEFITS AND CHALLENGES

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Received: May 20, 2026; Accepted: June 26, 2026

ABSTRACT

Although numerous studies have reported positive effects of digital media on vocabulary learning, the findings remain fragmented and primarily focus on Western or higher-education contexts. Few studies have thoroughly explored both the advantages and implementation challenges of digital media for elementary EFL learners in Asia. This systematic review aims to analyze the benefits and challenges of using digital media to enhance elementary students' English vocabulary acquisition and to identify effective pedagogical strategies for implementation. Using PRISMA 2020 guidelines, this systematic review analyzed thirteen articles published between 2021 and 2026 from ERIC, Google Scholar, and ScienceDirect. Results indicate that the primary challenges involve infrastructure limitations, including internet connectivity and device access (69.23%), as well as technical issues or system incompatibility (38.46%). Regarding benefits, 69.23% of studies reported significant improvements in vocabulary mastery, followed by increased motivation and engagement (46.15%) and enhanced long-term retention (30.77%). Game-based learning and gamification were the most prevalent pedagogical strategies (46.15%), followed by multimedia tools, including augmented reality, songs, and videos (23.08%). These findings highlight the importance of technological infrastructure, teachers' digital literacy, and adaptive instructional strategies in supporting vocabulary learning in Asian elementary EFL classrooms.

Keywords: Digital Media, Elementary Schoola, English Language, Systematic Review, Vocabulary

A. INTRODUCTION

Vocabulary is the cognitive bridge that allows pupils to go from "learning to read" to "reading to learn" and to deal with increasingly complex information. As Hinkel (2022) notes, the understanding of vocabulary has various dimensions, such as form, meaning and use, which are particularly important in the early years of language learning. Moreover,

Schmitt et al. (2021) propose that vocabulary education should go beyond isolated lists of words to knowledge-based techniques that reflect the learner's actual capability, since a lack of vocabulary directly restricts communicative ability across all language abilities. Vocabulary mastery constitutes a fundamental foundation in English language learning at the elementary school level. Vocabulary is a core component of comprehending and producing meaning across the four language skills: listening, speaking, reading, and writing. At the elementary stage, English instruction represents students' initial exposure to a foreign language (Pratiwi et al., 2025). Thus, early vocabulary development supports clarity of communication and pronunciation accuracy (Fan, 2020).

However, traditional approaches to vocabulary teaching often rely on rote learning and teacher-centered methods, which can diminish students' interest and impair long-term retention. Recent research reveals that vocabulary teaching and learning have shifted from traditional rote learning to interactive, technology-assisted approaches. Thus, teachers are encouraged to use creative and contextually meaningful methods of instruction, especially in elementary classes, where the learning characteristics differ from those of older learners (Habiba, 2024). The challenge of vocabulary instruction is particularly pronounced across Asian educational contexts, where English functions primarily as a foreign language (EFL) rather than a second language. In countries such as Indonesia, Thailand, Vietnam, and China, elementary students encounter English almost exclusively within the classroom, resulting in limited naturalistic exposure and insufficient opportunities for incidental vocabulary acquisition (Bansong et al., 2023). Studies conducted in Southeast Asian settings reveal persistent structural challenges: large class sizes, examination-oriented curricula, and a continued reliance on grammar-translation methods that prioritize memorization over meaningful use (Salam et al., 2024). In Thailand specifically, research by Boonmoh et al. (2022) involving Thai EFL teachers revealed significant barriers to technology integration in language classrooms, including insufficient ICT infrastructure, inadequate teacher training, and time constraints, all of which directly impede effective vocabulary instruction. A follow-up study by Boonmoh et al. (2022) further confirmed that even during the COVID-19 pandemic, Thai EFL teachers reported low readiness and limited pedagogical competence in integrating digital tools meaningfully into vocabulary learning activities. In the Chinese EFL context, Teng & Wang (2021) found that despite the growing availability of educational technology platforms, teachers' use of these tools for language instruction remained largely superficial, often confined to basic presentation tasks rather than interactive vocabulary engagement. These regional realities underscore that the challenges of vocabulary teaching in Asia are not merely technological but are deeply rooted in pedagogical, institutional, and sociolinguistic factors.

In recent years, English language instruction has undergone a paradigm shift toward integrating digital media in elementary classrooms. Digital tools such as interactive software, digital storybooks, multimedia applications, and mobile-assisted learning platforms have significantly transformed instructional practices. Technology is no longer viewed merely as a supplementary tool but as an essential component that facilitates enriched learning environments (Cipta et al., 2023). The integration of mobile applications, for example, has been shown to support English vocabulary development through interactive and adaptive learning features (Marbun et al., 2023). The visual, auditory, and interactive affordances of digital media align well with children's cognitive and developmental characteristics. M. F. Teng (2023) demonstrated, through a mixed-methods study with Chinese-speaking EFL students, that multimedia input combining video, audio, and definitional information

produced significantly stronger vocabulary retention on both immediate and delayed post-tests compared to definition-only conditions, providing robust empirical support for technology-enhanced vocabulary instruction in Asian EFL contexts.

Empirical studies consistently report positive outcomes associated with digital media integration. Multimedia features have been found to enhance student engagement and cognitive involvement (Salam et al., 2024). Digital flashcards improve vocabulary proficiency among elementary EFL learners (Yowaboot & Sukying, 2022). Multimodal instructional strategies contribute to better comprehension and retention (Bansong et al., 2023), while structured digital tools provide controlled practice and systematic feedback (Ohle-Peters et al., 2025). Furthermore, gamification and interactive platforms have been recognized for increasing learner motivation and participation (Arzfi et al., 2025). Despite these promising findings, challenges remain in the practical implementation of digital media. Infrastructure limitations, insufficient internet access, limited teacher training, and technical issues continue to hinder effective integration (Salam et al., 2024). These constraints highlight that successful implementation depends not only on technological availability but also on pedagogical readiness and institutional support.

Although numerous studies have examined the effectiveness of digital media in improving vocabulary learning, the existing literature remains fragmented. Many previous reviews focus primarily on measuring learning outcomes or analyzing a single type of digital tool, without accounting for the broader instructional ecosystem in which these tools operate (Salam et al., 2024; Ohle-Peters et al., 2025). Others discuss implementation barriers without systematically linking them to evidence-based pedagogical solutions (Cipta et al., 2023; Marbun et al., 2023). Furthermore, prior research has predominantly been conducted in Western and East Asian higher education contexts, leaving South and Southeast Asian perspectives at the elementary school level underrepresented, with English-as-a-foreign-language challenges that are structurally acute and contextually distinct (Bansong et al., 2023;Yowaboot & Sukying, 2022). Critically, there remains a limited, comprehensive synthesis that integrates educational benefits, implementation challenges, and instructional strategies within a unified analytical framework, particularly in the context of elementary education in Asia.

What distinguishes the present study from previous research is its deliberate adoption of an integrative, multi-dimensional analytical lens. Rather than examining digital media effects in isolation or cataloguing implementation barriers as a standalone concern, this review synthesizes three interconnected dimensions: pedagogical benefits, contextual challenges, and instructional strategy recommendations within a coherent framework specifically tailored to the Asian elementary EFL context. Unlike earlier reviews that aggregate findings without regional differentiation, this study critically foregrounds the sociolinguistic and infrastructural realities of Asian classrooms as mediating factors in the effectiveness of digital vocabulary instruction. This integrative approach addresses a gap in the literature. It provides a more holistic, actionable basis for researchers and practitioners seeking to advance vocabulary learning in elementary EFL settings across Asia. To address this gap, this study seeks to answer the following research questions:

1. What educational benefits are associated with the integration of digital media in vocabulary learning at the elementary school level?

2. What challenges and barriers are encountered in implementing digital media in this context?
3. What pedagogical strategies are identified as effective in overcoming these challenges and optimizing their use?

This study offers a novel contribution by synthesizing the three dimensions of benefits, challenges, and pedagogical strategies into a comprehensive systematic review. Unlike previous studies that focus on isolated aspects, this research provides an integrated perspective that connects effectiveness with implementation realities. By doing so, it generates a more holistic understanding of digital vocabulary instruction in elementary education and offers practical implications for teachers, curriculum designers, and future researchers.

B. METHOD

This study employed a systematic literature review, following PRISMA guidelines, to ensure transparency and rigor in selecting and analyzing relevant studies examining the benefits and implementation challenges for vocabulary learning in elementary schools in Asia (Rethlefsen et al., 2021). A systematic search was conducted across three major databases: Scopus, ERIC, and Science Direct. The search utilized the following Boolean string: ("vocabulary learning" OR "lexical development") AND ("digital media" OR "technology-enhanced learning") AND ("elementary school" OR "primary education") AND ("EFL" OR "English as a foreign language") AND ("Asia"). The following inclusion and exclusion criteria were used to select the research articles for this study: (1) peer-reviewed studies, (2) studies published between 2021 and 2026. (3) the studies focus on vocabulary learning in elementary or primary education; studies not focusing on vocabulary learning are excluded; (4) the studies must be conducted in an Asian context; other contexts outside of Asia are excluded; (5) the studies must be written in English; (6) studies outside elementary education are excluded. Following the application of the predefined inclusion and exclusion criteria, two reviewers independently screened the titles and abstracts of all identified records to determine their eligibility for inclusion. Eligible studies then underwent a full-text review to verify their relevance to the research objectives. Any discrepancies between reviewers were resolved through discussion and mutual agreement.

A standardized data extraction form was employed to systematically collect information from the selected studies. The extracted data included the author(s), publication year, research methodology, sample characteristics, and findings concerning the benefits and challenges of English language teaching in primary schools in Asia. In addition, the studies were categorized according to the quality and indexing status of the publication outlets, namely reputable international journals and accredited national journals.

This study identified 48 articles (Scopus: 24, ERIC: 12, and ScienceDirect: 12). After reviewing the full texts, the researcher removed duplicates and articles that did not meet the inclusion criteria, resulting in the exclusion of 19 articles and leaving 29 articles for future review. Next are abstract reading and title screening; 16 articles are selected, and 13 articles are excluded. Continuous is full-text review and evaluation; 13 articles meet the inclusion criteria for the final analysis, and 3 articles are excluded.

Table 1. PRISMA of Study Selection Process

Stage	Records	Action	Excluded (n)
Identification	Records identified through database searching: Scopus (n=24), ERIC (n=12), ScienceDirect (n=12). Total N = 48	Initial pool	—
Screening	Records after removing duplicates and unmet criteria (N = 29)	Duplicate/criteria removal	19
Eligibility	Records after abstract and title screening (N = 16)	Abstract screening	13
Included	Final studies included in the review (N = 13)	Full-text evaluation	3

The table below presents 13 studies that meet the inclusion criteria for the final analysis. Based on this final result, there are 11 Scopus-indexed articles (6 in Q1, 4 in Q2, and 1 in Q3) and 1 Sinta 3-accredited article; all of these indicate a varied distribution across journal indexing categories.

Table 2. Summary of Included Studies

No	Author(s) and Year	Country	Participants	Research Design	Type of Digital Media
1	Milorad Cerovac & Therese Keane (2024)	Australia	Primary school students, ages 8–10 (collaborative groups)	Qualitative (collaborative problem-solving case study)	Not digital — hands-on Design & Technologies tasks (technical/engineering vocabulary)
2	J. Julia, Tedi Supriyadi, Prana Dwija Iswara (2022)	Indonesia (West Java)	45 elementary school teachers	Qualitative case study (questionnaire + in-depth interviews)	Religious songs as learning media (audio, non-digital)
3	Alpona Shirin (2020)	Bangladesh (Dhaka)	12 primary school teachers	Qualitative (semi-structured focus group interviews)	Traditional game-based learning, "Tic-tac-toe" (non-digital)
4	Suhartawan Budianto, Nur Sayidah, Sucipto, & Amirul Mustofa (2022)	Indonesia	12 English teachers & 569 Grade 4 students (6 elementary schools)	Survey research (teacher & student perception)	Mobile applications
5	Ülkü Çoban Sural & Zehra Yaşar Sağlık (2024)	Turkey	91 Grade 4 students (3 classes: 2 experimental, 1 control)	Quasi-experimental (pretest–posttest control group design)	Web 2.0 technology-assisted vocabulary tools
6	Juan Chen, Shuxia Yang & Bing Mei (2021)	China	100 Grade 4 students (50 experimental, 50 control)	Embedded mixed-methods quasi-experimental case study	Digital educational game (Quizlet)

7	Nurhazarifah Che Hashim, Harwati Hashim & Zaid Abdi Alkareem Alyasseri (2022)	Malaysia	38 primary students, ages 10–14 (19 experimental, 19 control)	Quasi-experimental	Mobile Augmented Reality app (ARSEM)
8	Chuang Chen & Nurullizam (2024)	China (Henan Province)	60 Grade 4 students	Quasi-experimental (pretest–posttest control group design)	Self-regulated vocabulary learning mobile application (SRVL-MAPP)
9	Hongling Wu & Xingting Wang (2026)	Multiple (45 pooled primary studies, 2019–2024)	N/A — meta-analytic sample (45 empirical studies)	Systematic review / meta-analysis	AI-driven gamified learning environments (general, multiple tools)
10	Mehmet Aşıkcan (2022/2023)	Turkey (Konya)	32 Grade 4 students	Participatory action research (qualitative)	Digital tools (H5P, Sitepal, Plotagon, etc.)
11	Annika Ohle-Peters, Erdal Papatga & Nele McElvany (2025)	Germany	254 Grade 4 students (18 classes)	Randomized controlled field trial (experimental, pre–post survey)	Tablet-based digital reading texts
12	Anindita Dey & Shamim Aktar Munshi (2025)	India (West Bengal, Jalpaiguri)	84 elementary pupils	Quantitative survey	Visual/ICT applications (flashcards, picture books, ICT apps)
13	Mahjabin Chowdhury, Zohreh Eslami, L. Quentin Dixon, Radhika Viruru, Wen Luo et al. (2023/2024)	Bangladesh	13 elementary English language learners	Mixed-methods case study (network analysis)	Digital game-making (Scratch programming platform)

C. FINDINGS AND DISCUSSION

Based on the systematic literature review, there are three main clusters in this study: challenges and implementation, educational benefits and opportunities, and effective strategies for pedagogical needs. Each table presents the frequency of each article included in the study.

1. Implementation Challenges

This subsection presents the thematic analysis of the implementation challenges identified across the reviewed studies. Table 3 shows the emerging themes related to the obstacles in the use of digital media for vocabulary learning, completed by their frequency of occurrence (n) and the percentage of the total number of the studies reviewed.

Table 3. Thematic Frequency Table of Reviewed Studies Implementation Challenges

No	Challenges	Frequency (n)	Percentage (%)
1	Infrastructure limitations & technology access (internet, devices)	9	69.23%
2	Low ICT competency and teacher digital literacy	4	30.77%
3	Technical barriers (glitches, coding, system incompatibility)	5	38.46%
4	Cognitive load and differences in student learning styles	2	15.38%
5	The lack of curriculum guidance and teaching time	3	23.08%

The most prevalent challenge in implementation is infrastructure limitations. Due to internet connectivity issues and limited access to digital devices, 9 articles (69.23%) are presented. This finding is related to the systematic literature review based on Akram et al. (2022), which shows that digital devices are one of the gaps in the learning process. Consistent with that, the lack of internet connectivity and infrastructure is the main obstacle to teachers' implementation of effective learning processes through ICT integration. These findings confirm that the connectivity barrier can be the most persistent challenge to enhancing educational technology. Thus, the technical barriers such as glitches, coding, and system incompatibility also pose challenges, as shown in 5 articles (38.46%). Similarly, the previous study conducted by Mustafa et al. (2024) which noted that AI design can enhance learning environments but can also pose challenges due to certain technical constraints. Whether in the programming educational context, it was found that the technical barrier regarding the AI errors (Elnaffar et al., 2026). This technical issue becomes a challenge for teachers and students with no technical background.

Less teaching time and a lack of curriculum guidance, cognitive load and differences in students' learning styles are shown in the 3 and 2 articles (23.08% and 15.38%). The lack of curriculum guidance and teaching time is similar to the study conducted by Wohlfart & Wagner (2025) stated that teachers frequently cite the lack of time as making digital learning in class ineffective. In addition, the study conducted by Le Cunff et al. (2025) The results showed that many navigation features prompt students to respond, which is relevant to unsuitable technology or to the implementation of technology in the classroom. Moreover, the low ICT competency and digital literacy are also a challenge, as in the same study conducted by Akram et al. (2022) indicates that internet connectivity, limited time, and a lack of technical support are barriers to the learning process.

2. Educational Benefits of Digital Media

This subsection addresses the first research question regarding the educational benefits of the integration of digital media in vocabulary learning among elementary school students. Table 4 presents the emerging themes related to the benefits explored across the reviewed studies, completed with their frequency of occurrence (n) and the percentage of the total number of studies. The themes are categorized as benefits and opportunities to provide a systematic literature review of the positive outcomes reported in the literature.

Table 3. Thematic Frequency Table of Reviewed Studies: Benefits of Digital Media

No	Benefits and Opportunities	Frequency (n)	Percentage (%)
1	Significant improvement in vocabulary mastery	9	69.23%
2	Increased motivation and engagement	6	46.15%
3	Long-term retention through visual media and AI	4	30.77%
4	Reduction in language learning anxiety	1	7.69%

The main benefit, according to the study's review, is a significant improvement in vocabulary mastery. It is present in 9 of 13 articles (69.23%). The next most frequently reported benefit is increased motivation and engagement (46.15%). This is followed by long-term retention through visual media and AI in 4 articles (30.77%). Moreover, the last one is reduction in language learning anxiety in an article (7.69%). The significant improvement in vocabulary mastery through digital media aligns with previous researchers' views. Chowdhury et al. (2024) stated that the use of digital media in language learning, particularly through the Digital Game-Based Language Learning (DGBLL) approach, provides engaging learning benefits and enhances students' vocabulary mastery. There are several other examples of digital media, including digital flashcards. Digital flashcards demonstrate that combining visual cues with interactive practice supports vocabulary learning and helps students retain new words (Yusuf et al., 2025). The Digital Game Wordwall is also a learning medium that captures students' attention. According to Sakkir et al. (2023), Wordwall is highly helpful for English vocabulary learning in the classroom and for creating engaging learning materials that increase students' interest.

In addition to retention and engagement, one of the emerging technologies involved is augmented reality (AR), which has been proven to provide an innovative and motivating learning environment. This is consistent with the view of Hashim, Majid, et al. (2022), who stated that a mobile AR-based learning system with this research approach broadens perspectives and offers an optimistic outlook for the world of education. More recent studies suggest that the immersive contextualization of vocabulary through AR not only supports memorization but also encourages deeper comprehension and the application of words in meaningful contexts, thus motivating learners to interact with target words in authentic-like scenarios (Nurjanah, 2025). These findings affirm that digital media can enhance vocabulary learning in English language education in schools.

3. Pedagogical Strategies

In addition to identifying the benefits of digital media, the reviewed studies also documented the various instructional approaches that assist teachers in vocabulary learning activities. Table 5 displays the pedagogical strategies that recurred across the studies, recorded by their frequency of occurrence (n) and the percentage of the total studies reviewed.

Table 4. Thematic Frequency Table of Reviewed Studies: Pedagogical Strategies

No	Pedagogical Strategies	Frequency (n)	Percentage (%)
1	Game-Based Learning & Gamification (e.g., Quizlet, Wordwall, Kahoot)	6	46.15%
2	Explicit Vocabulary Instruction	2	15.38%
3	Constructionist Approach (game creation via Scratch)	2	15.38%
4	Integration of Self-Regulated Learning (SRL) and Adaptive AI	2	15.38%
5	Use of Multimodal Media (AR, songs, video, visual literacy)	3	23.08%

In addition to identifying the benefits of digital media, the reviewed studies also reported several effective pedagogical strategies for supporting vocabulary learning. The most frequently reported strategy was game-based learning and gamification through platforms such as Quizlet, Kahoot, and Wordwall (46.15%). It has perspectives similar to those of previous studies. According to Ahmed et al. (2022), the study's conclusions suggest that using game-based learning tools rather than more conventional teaching techniques may yield better results. Additionally, the study's consequences can motivate students to learn and practice English vocabulary outside the classroom.

Additionally, explicit vocabulary instruction and the constructionist approach (15.38%). There is a similar opinion about this perspective, according to Yirssie et al. (2023) mentioned that explicit vocabulary instruction was one of the most effective methods for improving students' vocabulary retention and reading comprehension, as well as Masrul & Wicaksono (2023) mentioned that providing a comprehensive understanding of how implementing explicit instruction can have a maximum impact on students' vocabulary. Subsequently, the integration of self-regulation and adaptive AI, which are presented in 2 articles (15.38%), is similar to a study conducted by Fitriati et al. (2026) the perceived advantages include enhanced vocabulary acquisition, grammar understanding, and increased learner independence. These align with studies that position AI as a tool for enabling personalized and adaptive learning, and that show it can significantly enhance English language learning when used thoughtfully, especially when combined with human instruction. Educators must guide students in balancing AI-assisted learning with critical thinking, ethical use, and interpersonal communication to ensure complete educational development. Finally, the next strategy is shown in 3 journals, using multimodal media such as AR, songs, videos, and visual literacy (23.08%). It has similarities to prior studies mentioned by Dewi et al. (2026) that combining animated input with retrieval practice through muted-video tasks, guided repetition, and scaffolded writing, supported by home engagement that strengthened digital learning habits. In conclusion, this multimodal approach is particularly effective in helping children understand and retain new English vocabulary.

D. CONCLUSION

This systematic literature study aims to analyze the educational benefits, the implementation challenges, and the pedagogical strategies related to the use of digital media to enhance elementary school students' English vocabulary acquisition in the Asian context. Based on 13 articles published between 2020 and 2026, digital tools, especially game-based and multimodal platforms, can enhance students' vocabulary mastery, increase their motivation, and support long-term retention. In addition, these benefits are based on implementation and on addressing limitations, including inadequate facilities, a lack of teachers' ICT competency, and an insufficient curriculum guide. Pedagogical strategies such as gamification, multimodal learning, and self-regulated approaches can be used to optimize the educational potential of digital media in this topic. This research provides recommendations for teachers to prioritize gamification and multimodal strategies in the learning process, integrating them with tools and complementing them with explicit vocabulary instruction. In addition, the recommendation for elementary schools, especially in Asia, is to invest in digital infrastructure, develop a program focused on ICT literacy for English teachers, and revise the curriculum framework. Moreover, this study has several limitations. The analysis was limited to 13 articles published between 2020 and 2026, which may not fully represent all existing literature on the same topic. Furthermore, the reviewed studies focused on Asian elementary school students only, which may limit the generalizability of the findings to other educational settings and regions. In addition, future researchers should investigate the specific contexts of implementing vocabulary learning across diverse cultures, educational backgrounds, and technological landscapes within Asia.

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