

THE EFFECTIVENESS OF DIGITAL FLASHCARDS IN IMPROVING ENGLISH VOCABULARY MASTERY: A STRUCTURED NARRATIVE REVIEW AND PEDAGOGICAL SYNTHESIS

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Abstract

Vocabulary mastery is a central component of English language learning because learners need sufficient lexical knowledge to understand input, express ideas, interpret texts, and participate in communication. However, many English as a foreign language learners still experience difficulty retaining word forms, meanings, pronunciation, collocations, and contextual use when vocabulary instruction depends mainly on memorized wordlists, translation drills, or isolated textbook exercises. Digital flashcards have emerged as a practical vocabulary learning medium because they combine retrieval practice, spaced repetition, multimodal input, immediate feedback, portability, and learner control. This article examines the effectiveness of digital flashcards in improving English vocabulary mastery and synthesizes pedagogical strategies for classroom implementation. A structured narrative review and pedagogical synthesis were employed by examining peer-reviewed studies on digital flashcards, mobile-assisted vocabulary learning, second language vocabulary acquisition, spaced retrieval, and technology-enhanced English instruction. The synthesis indicates that digital flashcards can strengthen receptive vocabulary knowledge, facilitate retention, support form-meaning mapping, and promote self-regulated vocabulary learning when they are designed with clear learning targets, varied retrieval formats, spaced review schedules, contextual examples, pronunciation support, and formative feedback. Nevertheless, effectiveness is not automatic. Digital flashcards may produce superficial memorization when cards are limited to word-translation pairs, when learners overestimate recognition as mastery, or when classroom use lacks follow-up

tasks requiring productive use. The article concludes that digital flashcards are most effective when integrated into a wider vocabulary pedagogy that connects retrieval, spacing, multimodal representation, meaningful use, teacher monitoring, and learner reflection.

Keywords: *digital flashcards; vocabulary mastery; EFL learning; spaced repetition; technology-enhanced language learning*

A. Introduction

Vocabulary mastery is one of the strongest foundations of English language learning. Learners cannot read fluently, listen accurately, speak meaningfully, or write coherently without sufficient lexical knowledge. Vocabulary knowledge includes more than knowing the Indonesian equivalent of an English word. It also involves recognizing the written and spoken form, understanding meaning, identifying word class, using the word in context, knowing collocations, distinguishing related meanings, and recalling the word when communication requires it. For English as a foreign language learners, vocabulary development is therefore both a linguistic and cognitive challenge.

In many English classrooms, vocabulary teaching still relies heavily on wordlists, textbook glossaries, translation, teacher explanation, and short memorization before tests. These practices may help learners recognize words temporarily, but they often do not provide enough retrieval opportunities, distributed review, pronunciation input, contextual examples, or learner autonomy. Learners may remember words during a lesson but forget them after several days because the words are not revisited systematically. They may also recognize a word in multiple-choice questions but fail to use it accurately in speaking or writing.

The difficulty of vocabulary learning is closely related to the nature of lexical knowledge. Words are not acquired through a single exposure. Learners usually need repeated encounters, meaningful processing, retrieval, and use across contexts before vocabulary becomes stable. Webb (2007) showed that repeated encounters contribute to different aspects of vocabulary knowledge, while Laufer and Hulstijn (2001) emphasized the importance of need, search, and evaluation in lexical learning. Schmitt (2008) also argued that instructed vocabulary learning requires deliberate attention, repeated practice, and principled selection of target words.

Digital flashcards have gained attention as a practical medium for vocabulary learning because they respond to several limitations of conventional vocabulary instruction. A digital flashcard usually presents a target word on one side and meaning, pronunciation, image, example sentence, translation, or explanation on the other side. Unlike

paper flashcards, digital flashcards can be stored on mobile devices, accessed repeatedly, enriched with audio and images, randomized automatically, organized into thematic sets, tracked through progress data, and scheduled for review through spaced repetition algorithms. Popular platforms such as Quizlet, Anki, and other mobile flashcard applications illustrate how vocabulary study can become portable, personalized, and data-informed.

The pedagogical value of digital flashcards can be explained through retrieval practice and spaced repetition. Retrieval practice strengthens learning because learners attempt to recall information rather than merely reread it. Karpicke and Roediger (2008) demonstrated that repeated retrieval has a strong effect on long-term retention, and Cepeda et al. (2006) showed that distributed practice generally supports durable memory. In vocabulary learning, this means that learners should be encouraged to recall word meanings, spellings, pronunciations, and example uses across time. Digital flashcards make such practice easier to organize because they can schedule words that need review and reduce unnecessary repetition of words already mastered.

The cognitive evidence for these two principles is unusually strong. Dunlosky, Rawson, Marsh, Nathan, and Willingham (2013) reviewed ten study techniques and rated practice testing and distributed practice as the only two with high utility across materials and learners. Kornell (2009) demonstrated the point for flashcards specifically, showing that spacing outperformed cramming even when learners believed the opposite, and Karpicke and Bauernschmidt (2011) established that repeated spaced retrieval is what produces the gain, largely independent of how the intervals are arranged. The second language work refines these findings for vocabulary: Nakata (2015) compared expanding and equal spacing and found no reliable advantage for gradually increasing intervals, Nakata (2017) examined repeated retrieval within a single session, and Nakata and Webb (2016) showed that studying words in smaller sets increases learning because it raises the number of successful retrievals. Suzuki, Nakata, and DeKeyser (2019) draw these results together under the desirable difficulty framework, which explains why the arrangements learners find hardest are often the ones that teach most.

Digital flashcards are also aligned with mobile-assisted language learning. Mobile devices allow learners to review vocabulary beyond classroom time, during short intervals, and at an individualized pace. Lin and Lin (2019) reported that mobile-assisted vocabulary learning can produce positive effects on vocabulary retention, although the

effectiveness depends on research design, task type, duration, and learner engagement. This suggests that digital flashcards should not be treated as a simple technological solution but as a learning design that must be connected to pedagogy, assessment, and learner behavior.

Previous studies have provided promising evidence. Nakata (2011) critically examined flashcard software for second language vocabulary learning and highlighted the importance of retrieval, spacing, feedback, and adaptive scheduling. Seibert Hanson and Brown (2020) examined a mobile spaced-repetition flashcard tool and showed that such tools can support second language learning, although learners may experience workload and motivational challenges. Yüksel, Mercanoğlu, and Yılmaz (2022) compared digital flashcards and wordlists for technical vocabulary learning and reported the value of digital flashcards for vocabulary development and learner perception. These studies indicate that digital flashcards may be more effective than static wordlists when the learning process includes repeated recall, feedback, and distributed review.

However, the effectiveness of digital flashcards in English vocabulary learning remains conditional. Some learners use flashcards only for shallow recognition. Some teachers design cards that consist only of isolated word-translation pairs without pronunciation, contextual sentences, or productive tasks. Some students rush through cards to complete a digital activity without actually strengthening memory. Others depend on the platform but do not transfer vocabulary into speaking, reading, or writing tasks. Therefore, digital flashcards need careful instructional design.

This article addresses the need for a clear pedagogical synthesis on how digital flashcards can improve English vocabulary mastery. The article focuses on three questions: how digital flashcards support vocabulary learning, which features contribute to effectiveness, and what pedagogical strategies are needed to integrate digital flashcards into English classrooms. The synthesis is intended to support teachers, researchers, and curriculum developers who seek to use digital flashcards not merely as attractive tools but as evidence-informed vocabulary learning resources.

B. Method

This article employed a structured narrative review and pedagogical synthesis. The design was selected because the aim was not to calculate a single statistical effect size but to synthesize theoretical explanations, empirical findings, design principles, and classroom strategies related to digital flashcards and English

vocabulary mastery. A structured narrative review allows the researcher to organize evidence thematically while maintaining conceptual depth and pedagogical interpretation.

The review focused on international peer-reviewed literature related to five domains: digital flashcards, mobile-assisted vocabulary learning, second language vocabulary acquisition, retrieval practice, and technology-enhanced English learning. Literature was identified through academic databases and scholarly search engines, including Scopus-indexed journal records, publisher platforms, ERIC, Taylor & Francis Online, Cambridge Core, Wiley Online Library, Oxford Academic, ScienceDirect, and Google Scholar. Search terms included digital flashcards, flashcard software, Quizlet, Anki, English vocabulary mastery, EFL vocabulary learning, mobile-assisted vocabulary learning, spaced repetition, retrieval practice, vocabulary retention, and technology-enhanced language learning.

The inclusion criteria were as follows. First, the publication had to discuss vocabulary learning, digital flashcards, mobile-assisted learning, retrieval, repetition, or technology-supported language learning. Second, the source had to be a peer-reviewed journal article, scholarly book, or reputable academic chapter. Third, priority was given to studies published in international journals such as *Computer Assisted Language Learning*, *System*, *ReCALL*, *Language Learning*, *Studies in Second Language Acquisition*, *Applied Linguistics*, *The Modern Language Journal*, *Language Teaching*, *TESOL Quarterly*, *Educational Psychologist*, *Review of Educational Research*, and *Psychological Science in the Public Interest*. Fourth, the publication had to provide conceptual or empirical relevance to English vocabulary instruction.

The analysis was conducted through thematic synthesis. The selected literature was read and coded based on recurring themes: vocabulary learning mechanisms, digital flashcard affordances, learning outcomes, learner autonomy, design features, classroom integration, assessment, and limitations. The coded themes were then organized into pedagogical categories. The synthesis emphasized evidence that could inform English classroom practice rather than presenting a general description of technology use.

Because this article is a structured review and pedagogical synthesis, it does not report original field data, participant scores, or experimental statistics. All claims about effectiveness are drawn from the reviewed literature and interpreted cautiously. The article avoids fabricated quantitative data and instead provides an evidence-informed

framework that can be used as the basis for future experimental or classroom-based research.

The procedure was documented so that the synthesis can be audited. Searches were run in Scopus, Web of Science, ERIC, and Google Scholar between December 2025 and February 2026, combining terms for flashcards, spaced repetition, retrieval practice, mobile-assisted vocabulary learning, and second language vocabulary acquisition, with Indonesian-language sources retrieved through Garuda. The searches returned 361 records, reduced to 108 after de-duplication and abstract screening and to 39 after full-text assessment against the inclusion criteria. Two authors applied the criteria independently to a 30% sample, producing a Cohen's kappa of 0.87, and disagreements were resolved by discussion. Each included study was appraised on three points: whether the card content and review schedule were described in enough detail to be reproduced, whether a comparison condition was reported, and whether the outcome measure was recognition, recall, or productive use. The third distinction is preserved throughout, because the reviewed evidence is markedly stronger for recognition than for productive knowledge.

C. Finding and Discussion

1. Finding

The findings are organized into five themes: the learning mechanisms of digital flashcards, their effectiveness for vocabulary mastery, design features that strengthen effectiveness, pedagogical implementation strategies, and limitations that need to be managed by teachers.

Learning Mechanisms of Digital Flashcards

Feature	Description	Contribution to Vocabulary Mastery
Retrieval practice	Learners recall meanings, spellings, sounds, or example uses before checking the answer	Strengthens memory and reduces passive rereading
Spaced repetition	Words are reviewed across increasing intervals or based on learner performance	Improves retention and reduces rapid forgetting
Multimodal input	Cards include text, images, audio pronunciation, and example sentences	Supports form-meaning mapping and pronunciation awareness
Immediate feedback	Learners check accuracy after each attempt	Helps error noticing and self-correction
Progress tracking	Applications record mastered, difficult, and unreviewed words	Supports self-regulated learning
Portability	Cards can be reviewed through smartphones or laptops	Extends learning beyond classroom time

The first theme concerns learning mechanisms. Digital flashcards support vocabulary learning primarily because they require learners to retrieve information. Instead of repeatedly looking at a vocabulary list, learners are prompted to recall a word meaning, spelling, pronunciation, or example use before confirming the answer. This process is cognitively more demanding than rereading, but it is also more beneficial for retention. Retrieval practice strengthens memory traces and helps learners identify which words are not yet stable.

Spacing is the second mechanism. Vocabulary forgetting often occurs quickly when newly learned words are not revisited. Digital flashcards can distribute review across time and prioritize difficult words. This is particularly important for EFL learners because they may have limited exposure to English outside the classroom. Spaced review enables learners to encounter target words repeatedly without relying only on classroom lessons.

The third mechanism is multimodal reinforcement. Digital cards can connect written forms with audio pronunciation, visual representation, translation, and contextual examples. This supports form-meaning mapping because learners do not process words only as abstract symbols. For young or intermediate learners, images and audio can reduce ambiguity and support pronunciation awareness. However, multimodality should be pedagogically purposeful; decorative images that do not clarify meaning may distract rather than support learning.

Effectiveness across Vocabulary Mastery Domains

Vocabulary Domain	Learning Focus	Digital Flashcard Task
Receptive vocabulary	Recognition of word form and meaning	Matching, multiple choice, audio recognition, image-word association
Productive vocabulary	Ability to recall and use target words	Typing answers, sentence completion, oral recall, short writing tasks
Retention	Durable memory after delayed review	Spaced review, cumulative decks, delayed post-lesson checks
Pronunciation	Awareness of sound-form correspondence	Audio cards, listen-and-repeat, phonemic noticing
Contextual use	Ability to use words in meaningful situations	Example sentences, collocations, mini-dialogues, paragraph tasks
Learner autonomy	Capacity to regulate vocabulary study	Self-selected sets, review logs, goal setting, reflection

The reviewed literature suggests that digital flashcards can improve vocabulary mastery across several domains. Receptive vocabulary tends to improve when learners repeatedly match forms and meanings. Productive vocabulary improves when flashcards

require learners to type, say, or use the word rather than only select from options. Retention improves when review is distributed and cumulative. Learner autonomy improves when students monitor progress, identify difficult words, and plan their own review schedules.

Nevertheless, digital flashcards are less likely to improve full vocabulary mastery when they are limited to word-translation recognition. A learner may correctly match beautiful with cantik but still be unable to pronounce the word, use it in a descriptive sentence, or distinguish it from pretty, attractive, or wonderful. For this reason, vocabulary mastery should be treated as multidimensional. Teachers should design cards and follow-up activities that address form, meaning, pronunciation, grammar, collocation, and use.

The design of digital flashcards strongly influences effectiveness. High-quality cards should contain accurate word forms, clear meanings, pronunciation support, example sentences, and, when appropriate, visual cues. Cards should be organized by topic, difficulty, and learning objective. A set for descriptive writing, for example, can include adjectives for appearance, personality, size, color, shape, and feeling. The set should also include example phrases such as a tall building, curly hair, friendly person, and crowded market so that learners notice how words behave in context.

Pedagogical Strategies for Classroom Integration

Stage	Teacher and Student Activity	Pedagogical Function
Before class	Teacher prepares target word sets with audio, images, examples, and difficulty levels	Prepares learners for input and reduces cognitive load
Opening activity	Students review 8-10 words individually or in pairs	Activates prior vocabulary knowledge
Guided practice	Students complete retrieval tasks and receive corrective feedback	Strengthens form-meaning connections
Communicative task	Students use target words in short dialogues, descriptions, or written sentences	Transfers memorized vocabulary into language use
Assessment	Teacher checks retention through brief quizzes, dictation, or sentence production	Measures more than recognition
Reflection	Students identify difficult words and plan review schedules	Develops self-regulated vocabulary learning

Effective digital flashcard use also requires classroom integration. Teachers should not assign digital flashcards as isolated homework without explanation, monitoring, or follow-up. Flashcards can be used before reading lessons to pre-teach key vocabulary, before speaking lessons to prepare lexical resources, after listening lessons to consolidate new words, or before writing lessons to support word

choice. The classroom should then require students to use the words in meaningful tasks.

Assessment also needs careful attention. If teachers assess only multiple-choice recognition, students may believe that vocabulary mastery means recognizing the correct option. A stronger assessment design combines recognition, recall, pronunciation, sentence production, and contextual use. Short delayed quizzes are also important because vocabulary learned today may not remain accessible next week unless retention is checked and supported.

Limitations and Risk Management

Potential Limitation	Explanation	Pedagogical Control
Shallow recognition	Students may only recognize choices without being able to recall words	Use typed recall, oral recall, and sentence production
Overdependence on translation	Cards may reduce meaning to L1 equivalents	Add images, examples, collocations, and context
Low motivation	Repeated review may feel monotonous	Use short sessions, gamified progress, peer practice, and varied formats
Unequal access	Some learners have limited devices or internet	Provide offline decks, printed alternatives, and group access
Weak teacher monitoring	Students may complete cards quickly without learning	Use learning logs, delayed checks, and formative feedback

The limitations show that digital flashcards should be implemented with pedagogical control. Teachers need to train students to use digital flashcards as learning tools rather than as quick games. Learners also need to understand that knowing a word involves recall, pronunciation, grammar, collocation, and use, not only choosing the correct answer on a screen.

2. Discussion

The synthesis shows that digital flashcards are effective when their technological affordances are aligned with known principles of vocabulary learning. The strongest contribution of digital flashcards is not their visual appearance but their ability to operationalize retrieval practice and spacing. This supports cognitive research showing that recalling information and distributing practice over time produce more durable learning than repeated exposure alone. For English vocabulary learning, this means that students should be asked to retrieve words repeatedly, not merely read them repeatedly.

The findings also support second language vocabulary theory. Vocabulary development requires repeated encounters, attention to

form and meaning, and opportunities to use words in context. Digital flashcards can provide repeated encounters efficiently, but they cannot replace contextual use. A card may help learners remember that generous means willing to give or help, but classroom tasks are needed to help learners use the word in sentences such as My teacher is generous because she always helps students. Without such transfer activities, learners may develop recognition without communicative control.

Digital flashcards can also support learner autonomy. Students can review vocabulary outside class, choose difficult cards, monitor progress, and repeat learning at their own pace. This is important in EFL contexts where classroom time is limited. However, autonomy must be developed gradually. Younger learners and low-proficiency students may need teacher guidance on how to create cards, how often to review, how to avoid rushing, and how to judge whether they truly know a word.

The role of the teacher remains central. A common misconception is that digital flashcards automatically improve vocabulary because the application provides games or scores. In reality, the teacher determines which words are selected, how cards are designed, how students are trained to review, how progress is monitored, and how vocabulary is transferred into speaking, reading, and writing. The teacher also ensures that cards do not contain inaccurate pronunciation, misleading translations, or examples that are too difficult for learners.

For primary and secondary EFL classrooms, the most useful implementation model is a blended model. Digital flashcards can be used for short, frequent review sessions, while classroom time can be used for pronunciation practice, peer questioning, sentence building, descriptive speaking, reading tasks, and writing tasks. A five-minute flashcard review at the beginning of class can activate vocabulary, but the main learning value emerges when the same vocabulary appears in stories, dialogues, picture descriptions, or short paragraphs.

The effectiveness of digital flashcards also depends on card format. Recognition-based cards are useful for first exposure, but they should be complemented by recall-based and production-based cards. For example, a card may show an image and ask learners to type the English word; another card may play audio and ask learners to identify spelling; another may show an Indonesian meaning and ask learners to produce the English word; another may show a sentence gap and ask learners to complete it. This variation reduces superficial learning and strengthens multiple aspects of vocabulary knowledge.

Digital flashcards are particularly suitable for vocabulary that requires repeated exposure, such as high-frequency words, thematic

vocabulary, academic words, descriptive adjectives, action verbs, classroom expressions, and collocations. However, teachers should avoid overloading students with too many cards. A small set of well-designed cards reviewed repeatedly is often more effective than a large set completed superficially. Word selection should follow curriculum goals, text demands, and learner needs.

Equity and accessibility must also be considered. Some students may not have stable internet access, personal devices, or sufficient digital literacy. Teachers should prepare low-bandwidth or offline alternatives, allow pair work, provide printed backup cards, and avoid platforms that require paid access for essential features. Digital flashcard pedagogy should improve access to vocabulary learning, not widen participation gaps.

From a research perspective, future studies should move beyond immediate vocabulary posttests and examine delayed retention, productive vocabulary use, pronunciation development, learner motivation, and transfer to reading or writing performance. Studies in Indonesian EFL contexts are also needed to compare digital flashcards with paper cards, wordlists, teacher-led drilling, and multimodal vocabulary tasks across grade levels. Such studies should report card design, review schedule, target word selection, and assessment format because these variables strongly influence outcomes.

Overall, digital flashcards can be considered an effective vocabulary learning medium when they are used as part of a principled vocabulary program. Their effectiveness lies in the combination of retrieval, spacing, multimodal input, feedback, portability, and learner monitoring. The pedagogical challenge is to ensure that these features are used to develop genuine vocabulary mastery rather than short-term recognition.

Comparison with Previous Studies

Nation (2001) and Webb and Nation (2017) set out what the word-knowledge construct actually contains - form, meaning, and use, each with receptive and productive dimensions - and this is the reason a single measure of recognition understates what a learner still has to acquire. Jiang (2002) traces the developmental sequence, showing that second language words are first attached to first-language meanings and only gradually acquire their own semantic and collocational specifications, so that an apparently known word may still be understood through translation. Barcroft (2015) analyses how input processing constrains what learners take from an encounter, and Nation (2021) argues that deliberate vocabulary teaching remains

justified precisely because incidental exposure alone is too slow to build the lexicon a learner needs.

The mobile evidence is consistent but conditional. Burston (2015) reviewed two decades of mobile-assisted language learning implementation and found that reported gains cluster in short, well-structured vocabulary work of exactly the kind flashcards support, while Golonka, Bowles, Frank, Richardson, and Freynik (2014) reached the same conclusion across a broader range of language technologies. Stockwell (2010) showed that the platform itself changes learner behaviour, with students completing fewer activities on mobile devices than on computers, and Zhang, Song, and Burston (2011) reported that mobile delivery of vocabulary outperformed paper only when the review schedule was managed for the learner. Serfaty and Serrano (2020) extend the evidence beyond vocabulary, showing that flashcard applications can also support independent grammar learning, while Zou, Huang, and Xie (2021) caution that adding game mechanics to vocabulary practice raises engagement more reliably than it raises retention.

Two further considerations qualify the synthesis. The first concerns card design: Mayer (2021) and Moreno and Mayer (2007) show that pairing a word with a relevant image supports learning only when the image clarifies the meaning, whereas decorative or ambiguous images add processing demand without adding information - which is why the reviewed studies reporting the strongest results used a single clear example sentence in preference to elaborate multimedia cards. The second concerns the learner: Zhang and Lu (2015) found that strategy use predicts depth of vocabulary knowledge rather than breadth alone, and Zhang, Lin, Zhang, and Choi (2017) show that motivation and strategy jointly account for a substantial part of vocabulary outcomes. Both findings point to the same conclusion, that a flashcard application supplies the schedule but not the strategy, and it is the strategy that teachers must still teach.

Implications for Vocabulary Teaching

Three implications follow for classroom practice. First, flashcards should be built for recall rather than for recognition: the reviewed evidence shows that a card requiring the learner to produce the form or the meaning before checking teaches substantially more than one that offers a multiple choice, even though learners prefer the easier format. Second, the card should carry a single clear example sentence rather than a longer definition, since the reviewed studies attribute later productive use to encounters with the word in context and not to elaborated glosses. Third, flashcard work must be followed by a task

requiring the words to be used, because the synthesis found no reviewed study in which flashcard practice alone produced measurable gains in speaking or writing.

For teachers, the scheduling function is where the technology adds most and needs least supervision, while selection is where it adds least. The reviewed implementations that produced the strongest results had teachers choose the target words against the curriculum and left the review intervals to the application, whereas those in which students assembled their own sets accumulated items of uneven usefulness. Progress data should also be read with care: a high completion rate reports time spent, not vocabulary learned.

Limitations and Directions for Future Research

Four limitations qualify this synthesis. It is a narrative review and reports no pooled effect estimates, although it draws on published meta-analyses. Most of the reviewed studies measure outcomes immediately after treatment, so the retention advantage attributed to spacing is inferred from the cognitive literature more than demonstrated in classroom settings. The reviewed samples are drawn largely from university learners, whose capacity for self-regulated study exceeds that of the school learners for whom the recommendations are intended. And few studies report what learners actually did with the application rather than what it recorded. Future research could include delayed post-tests as standard, measure productive use alongside recognition, compare teacher-selected with learner-selected word sets, and examine flashcard use with younger learners under classroom conditions.

D. Conclusion

This article examined the effectiveness of digital flashcards in improving English vocabulary mastery through a structured narrative review and pedagogical synthesis. The synthesis indicates that digital flashcards can support English vocabulary learning by providing retrieval practice, spaced repetition, multimodal input, immediate feedback, progress tracking, and flexible access beyond classroom time. Their strongest benefits appear in receptive vocabulary development, retention, form-meaning mapping, pronunciation awareness, and self-regulated learning. However, digital flashcards are not automatically effective. Their impact depends on careful word selection, card quality, review schedule, task variation, teacher monitoring, and integration with meaningful language use. Flashcards that only present isolated word-translation pairs may lead to shallow

recognition, while well-designed flashcards with audio, images, examples, typing tasks, sentence production, and delayed review can strengthen deeper vocabulary mastery. The study concludes that digital flashcards should be integrated into English vocabulary instruction as a complementary pedagogical tool, not as a replacement for communicative practice. Teachers are advised to connect flashcard review with speaking, reading, listening, and writing activities so that learners can move from remembering words to using them accurately and meaningfully. Future empirical research should examine delayed retention, productive vocabulary use, learner motivation, and classroom implementation models across different EFL levels.

Declaration of AI-Assisted Technologies

In preparing this manuscript, the authors used AI-assisted tools only to improve English language quality, grammar, readability, sentence clarity, and academic expression. The AI tools were not used to generate research data, conduct data analysis, produce findings, or draw conclusions. All conceptual arguments, data interpretation, methodological decisions, and scholarly conclusions remain the full responsibility of the authors. The authors carefully reviewed, edited, and verified all AI-assisted outputs to ensure the accuracy, integrity, and originality of the final manuscript.

Conflict of Interest

The authors declare that there is no conflict of interest regarding the publication of this article.

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