

# A Game-Based Vocabulary App for EFL Learners: Design and Development Study

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## Abstract

This study aimed to developed game-based vocabulary application to enhance English as a foreign language (EFL) learning among junior high school students. This research employed a Research and Development (R&D) design adapted from the Jolly and Bolitho model, which involved seven stages: needs analysis, design of the syllabus and course grid, product creation, expert validation, revision, and implementation. This study gathered data through questionnaires, expert reviews, and classroom observations. The Android app featured interactive games, quizzes, audio-visual resources, and vocabulary lists. It was created with Smart Apps Creator and Canva. The app received a “very good” rating from experts for media design and content accuracy. Student responses indicated increased motivation, improved vocabulary retention, and a preference for independent learning. These findings suggest that the developed vocabulary app is an effective supplementary tool to support vocabulary acquisition in EFL contexts.

**Keywords:** EFL; Game-Based Learning; Vocabulary App; Media Development; Mobile-Assisted Language Learning

Vocabulary competence has long been acknowledged as one of the most important indicators of success in learning English as a Foreign Language (EFL), as evidenced by observations conducted among junior high school students. They often struggle to comprehend spoken and written texts and to communicate effectively when they lack sufficient vocabulary knowledge, whether they learn English Language through input or output activities. Nation (2013) emphasizes that to understand authentic reading materials or input-based text, students need to master approximately 8.000-9.000 word families, and if they need to comprehend spoken discourse, students require around 6.000-7.000-word families. Similarly, Schmitt (2000) highlights that vocabulary involves both the number

of words and the quality of understanding related to form, meaning, and use. Thus, in order to master the vocabulary, students need to comprehend words and use them within meaningful and suitable contexts. This lexical threshold and multidimensional view of vocabulary knowledge highlight the need for effective and engaging vocabulary instruction in EFL settings.

Despite its significance, vocabulary teaching still mostly rely on conventional techniques like memorization, bilingual word lists, and dictionary use in many EFL situations, particularly in Southeast Asia (Webb, 2020). These techniques, while prevalent, often lead to poor long-term retention due to their repetitive and passive nature. González-Fernández and Schmitt (2008) highlighted that learning

vocabulary involves not only the number of words and comprehension of words but also the depth of knowledge, including understanding of collocation, usage, and register, aspects that conventional methods frequently overlook.

In response to these limitations, based on observation and interview, there has been a growing interest among junior high school teachers in exploring more interactive and engaging ways of learning vocabulary to foster gradual improvement. One promising approach that often occur from them is Game-Based Learning (GBL), which combines linguistic input with student autonomy, engagement, and active involvement. GBL offers rapid feedback, encourages repeated exposure, and present contextualized learning opportunities—all of which improve motivation and retention (Plass et al., 2015; Reinders & Wattana, 2015). Unlike traditional routines, GBL has been shown to be beneficial in vocabulary acquisition by empirical research. In contrast to non-game instruction, digital games have a medium-to-large beneficial impact on vocabulary acquisition outcomes, according to a meta-analysis by Hung et al. (2014).

Building on the principles of GBL, recent technological innovations have extended these opportunities through Mobile-Assisted Language Learning (MALL). MALL refers to the use of portable devices such as smartphones and tablets to facilitate language learning, including Vocabulary anytime and anywhere beyond classroom boundaries (Kukulska-Hume & Shield, 2008; Burston, 2015; Viberg & Gronlund, 2013). Like GBL, MALL fosters active engagement and learner autonomy but further supports ubiquitous access and personalized learning pathways that are often limited in classroom-based games. In the context of Junior High EFL learners, who are already familiar with mobile devices in their daily routines, MALL offers a highly relevant platform for integrating English vocabulary practice into their everyday lives. Through gamified features, audio-visual resources, and push alerts, smartphones facilitate self-

paced study and provide ubiquitous access to educational materials (Burston, 2015); MALL apps enhance learner autonomy, motivation, and vocabulary retention, particularly when combined with gamification (Huang et al., 2020). Furthermore, a study by Enayat et al. (2025) compared the effects of two newly developed apps on L2 receptive and productive vocabulary acquisition, finding significant improvements among learners using these tools. Thus, Personalized, casual learning environments that boost task relevance and lower anxiety are advantageous to learners, who determine how they engage and progress throughout the learning.

The Self-Determination Theory (SDT) (Deci & Ryan, 2000) holds that when learners' psychological requirements for autonomy, competence, and relatedness are satisfied, they are more willing to participate. SDT posits that learners' motivation and engagement increase when their psychological needs for autonomy, competence, and relatedness are satisfied. Recent studies have reinforced the applicability of SDT in digital learning contexts, showing that supporting these needs enhances intrinsic motivation, self-directed learning, and long-term retention (Wang et al., 2024; Yang et al., 2025). In the context of vocabulary learning for junior high EF learners, MALL and GBL provide practical means to operationalize these principles.

MALL platforms allow learners to control the pace and sequence of learning, access gamified exercises, and receive immediate feedback, fostering autonomy and competence, while social and collaborative features enhance relatedness (Huang et al., 2020; Burston, 2015). Moreover, MALL can integrate features such as retrieval practice, spaced repetition, and adaptive difficulty, which deepen vocabulary processing beyond mere motivation, supporting better retention and transfer of words to meaningful contexts. Similarly, GBL offers interactive, contextually rich tasks with progressive challenges and instant reinforcement, while

adaptive difficulty and repeated engagement and instant reinforcement, while adaptive difficulty and repeated engagement further strengthen competence, and collaborative gameplay promotes relatedness among peers (Plass et al., 2015; Reinders & Wattana, 2015). Hence, when learners believe that tasks are meaningful and intrinsically gratifying, which are important characteristics of well-designed educational games and mobile applications, such engagement can be increased, claims Dörnyei (2020). In this case, a mobile vocabulary application that not only improves lexical knowledge but also enhances learners' engagement, autonomy, and sustained motivation, providing a supportive environment for EFL vocabulary acquisition.

This work is to create game-based mobile application for EFL vocabulary learning while taking these pedagogical, technological, and psychological insights into account. The objective is to overcome the drawbacks of conventional vocabulary education by offering an interesting, dynamic, and user-friendly tool that encourages learner motivation and autonomy while supporting vocabulary retention.

**Method**

This study adopted the materials development framework proposed by Jolly and Bolitho (2011), which emphasizes a flexible, cyclical, and context-sensitive approach to instructional material design. Their model consists of interrelated stages, including identifying a learning need, contextual and pedagogical realization, material production, student use, and ongoing evaluation and revision. Drawing from this theoretical foundation, the current study adapted the model into seven systematic phases to guide the design, implementation, and evaluation of an Android-based vocabulary learning application for junior high school students. The adapted phases included: (1) needs analysis, (2) syllabus and course grid design, (3) product development, (4) expert validation, (5) product

revision, (6) implementation, and (7) data analysis. These stages reflect the iterative nature of materials design while ensuring a structured process that is responsive to learner needs, curriculum alignment, and instructional effectiveness.

Based on their availability and desire to take part in the vocabulary acquisition intervention, thirty-eight-grade students from a public junior high school in Central Java, Indonesia, participated in this study

**Data Collection Technique and Instrument**

This study used a variety of data collection methods to provide a thorough assessment at every stage of growth. During the needs analysis, a student questionnaire was utilized to collect quantitative information on the vocabulary difficulties and learning preferences of the students. The app's content and media quality were evaluated using expert validation forms, which produced both written feedback and numerical scores. Student involvement and app use were recorded upon adoption through controlled classroom observations. Post-use questionnaires also revealed information about students' learning experiences, such as vocabulary growth, motivation, and the usefulness of the program.

There were 26 items in the questionnaire, which were grouped under a number of important concepts. The elements, component focus, item numbers, and corroborating references are compiled in Table 1.

Table 2. Questionnaire Blueprint

Aspects	Components	Number of Items	Reference
Students' vocabulary difficulties	How difficult it is for students to understand vocabulary words	1 (Question 1)	Nation (2013)
Students' vocabulary difficulties	How students struggle to remember new vocabulary words	1 (Question 2)	Schmitt (2008); Nation (2013)
Students' vocabulary difficulties	Whether learning new vocabulary is challenging for students	1 (Question 3)	Webb & Nation (2017)

Students' vocabulary difficulties	How difficult it is for students to pronounce new vocabulary words	1 (Question 4)	Field (2005); Derwing & Munro (2015)
Students' vocabulary difficulties	Whether students find vocabulary learning boring	1 (Question 6)	Sadeghi & Pihie (2015); Hwang & Wu (2012)
Students' vocabulary difficulties	How often students mix up the meanings of words that sound similar	1 (Question 7)	Nation (2013); Schmitt (2008)
Students' interest in and preferred vocabulary learning activities	Types of vocabulary learning activities students prefer	6 (Questions 8-13)	Nation (2006, 2013); Wu (2018); Reinders & Wattana (2015)
Students' expectations regarding the quality of Android game-based learning media	Students' views on appropriate criteria for Android game-based vocabulary learning applications	5 (Questions 14-18)	Hung, Yang, & Hwang (2014); Wu (2018); Hwang et al. (2016)
Students' preferences in using the developed Android game-based application	Students' preferences in using the vocabulary learning application	7 (Questions 19-25)	Reinders & Wattana (2015); Hwang & Wu (2012); Kim et al. (2018)
Students' suggestions and comments on app development	Students' suggestions, comments, and ideas regarding the Android-based vocabulary learning application	1 (Question 26)	Wu (2018); Sadeghi & Pihie (2015)

### Needs analysis

To determine students' vocabulary learning difficulties, preferred learning media, and preparedness for mobile-assisted learning, a requirements analysis was conducted. Thirty-eight Junior high school students were given a structured questionnaire based on Nation (2013) and Richards (2002). Interests, learning frequency, preferred study methods, and opinions about game-based media were the main topics of the questionnaire. The outcomes of this phase influenced the application's design elements, vocabulary range, and learning goals.

### Designing the syllabus and course grid

Based on the needs analysis and with reference to the Indonesian national curriculum ([Permendikbud No. 37 Tahun 2018](#)), a thematic vocabulary syllabus was designed. This phase corresponds to the contextual and pedagogical realization in Jolly and Bolitho's framework. The syllabus comprised four thematic modules: "Introducing Self and Others," "Culinary and Me," "Home Sweet Home," and "I Love My School." Each module integrated carefully selected vocabulary items, communicative learning objectives, and corresponding interactive tasks to promote contextualized vocabulary learning. A detailed course grid was developed to map the vocabulary, learning targets, and activity types within each lesson.

### Product development

The digital product, a vocabulary game app for Android, was developed using Canva and Smart Apps Creator. Canva was utilized to design the user interface elements, including the layout, icons, buttons, and visual assets, ensuring a visually engaging and user-friendly experience aligned with principles of aesthetic usability. Smart Apps Creator served as the primary platform for building the interactive functionalities of the application, enabling the integration of multimedia components and user interactions. Key aspects of the software included gamified tasks, interactive quizzes, visual clues, audio pronunciation, and vocabulary lists. Every feature was informed by theoretical frameworks, specifically the Self-Determination Theory ([Deci & Ryan, 2000](#)), which emphasizes intrinsic motivation, and Mayer's Multimedia Learning Theory (2009), which supports the use of verbal and visual elements to enhance learning outcomes.

### Expert validation

Two specialists, one in educational media and one in English language instruction, assessed the prototype. Four components—content, language, presentation, and layout—were covered by a structured validation form.

A Likert scale with four points was used to rate each item. The expert judgment data was analyzed using the following formula:

$$M = \frac{\sum X}{N}$$

MM = Mean score

$\sum X$  = Total score from all expert responses

N = Total number of items

The average score was then interpreted using the following scale (see Table 2):

Table 2. Average score interpretation

Score Range	Category
3.25–4.00	Very Good
2.50–3.24	Good
1.75–2.49	Fair
1.00–1.74	Poor

### *Inter-rater reliability*

#### *Product revision*

Minor changes were made to improve the interface's design, navigation, and instruction clarity based on input from experts. Other enhancements included better voice pronunciation, color contrast, and quiz timing.

#### *Implementation*

In the final phase, aligned with the student-use and revision stage of the Jolly and Bolitho framework, the application was implemented in a classroom context. Sixty students used the app during structured classroom activities and in independent learning sessions. Observational data were collected to assess usability, student engagement, and behavioral indicators of vocabulary retention. Additionally, a post-use questionnaire gathered student feedback on the application's motivational impact, usability, and satisfaction.

#### *Data analysis*

In order to analyze the data, descriptive statistics were used in accordance with the Research and Development (R&D) design based on Jolly and Bolitho (2011). The primary

objective of the study was to develop, validate, and implement a game-based vocabulary learning application; therefore, the analysis focused on evaluating product feasibility, usability, and learner response rather than measuring comparative treatment effects. Expert validation scores for both media and content aspects were summarized using descriptive statistics (mean, percentage, and interpretive category). The aforementioned average score algorithm was used to analyze quantitative data from the needs analysis and expert validation. To find trends in user behavior and instructional consequences, qualitative data from observations and open-ended student replies were thematically grouped.

### **Result and Discussion**

The needs analysis questionnaire was distributed to 60 seventh-grade students to identify their attitudes and preferences related to vocabulary learning and mobile media (see Table 3).

Table 3. Needs questionnaire result

Indicator	Mean (M)
Vocabulary is essential in learning English	3.75
Difficulty in memorizing English vocabulary	3.45
Preference for game-based and visual learning	3.60
Accessibility to Android smartphones for learning	3.90

The findings indicated that students were highly aware of the importance of vocabulary mastery, had trouble in memorizing vocabulary through conventional methods, and expressed strong interest in interactive and mobile-based learning approaches. Most students reported owning or having regular access to Android smartphones, making it a viable platform for app-based vocabulary instruction.

Following the completion of the needs

analysis, a course grid was systematically designed to serve as a structural framework guiding the development of Android application-based English learning units. The design process was informed by the highest percentage responses obtained from the needs analysis questionnaire, ensuring that the resulting materials were closely aligned with the actual needs, interests, and proficiency levels of the target learners. In addition, the course grid was developed with reference to the relevant standard competencies (Kompetensi Inti) and basic competencies (Kompetensi Dasar) stipulated in the applicable curriculum. The course grid comprises six core elements: learning goals, basic competencies, indicators of achievement, learning materials, learning activities, and instructional media. Together, these elements provide a coherent and organized blueprint that ensures each unit is purposeful, measurable, and pedagogically sound.

The learning content is organized into four thematic units, each designed to develop specific communicative skills and vocabulary relevant to the learners' daily lives and academic contexts:

1. **Introducing Self and Others** – This unit focuses on enabling learners to introduce themselves and others in social situations. It covers the use of appropriate greetings, polite expressions, and essential personal information such as name, age, origin, and occupation.
2. **Culinary and Me** – This unit is designed to help learners express personal preferences and engage in conversations about food and beverages. Learners explore vocabulary related to local and international cuisine, practice expressing likes and dislikes, and develop the ability to describe culinary experiences.
3. **Home Sweet Home** – This unit introduces learners to the domestic environment by helping them identify and name common household items and rooms. It also develops learners' ability to

describe routine house chores, fostering practical language use in everyday home settings.

4. **I Love My School** – This unit encourages learners to discuss their academic lives by naming school subjects, describing classroom routines, and communicating about school events or cultural festivals. It aims to build learners' confidence in using English within their immediate educational environment.

With the course grid established as the foundational blueprint, the development of the Android-based learning application proceeded through a series of structured and systematic stages. The production process was carried out in five main phases: (1) user interface design, in which the visual layout and aesthetic elements of the application were crafted using Canva, with supporting graphic assets sourced from Flaticon to ensure an engaging and visually appealing interface suitable for the target learners; (2) asset preparation and import, in which all finalized visual and audio assets were organized and imported into Smart Apps Creator, the primary authoring tool used to build the application; (3) implementation of interactive features, including the integration of navigation buttons for seamless user experience, drag-and-drop activities to promote active learning, automated quizzes with instant scoring to support formative assessment, and audio feedback to reinforce correct responses and enhance learner engagement; (4) compilation and distribution, in which the completed application was compiled into an APK file format and distributed to relevant stakeholders via Google Drive for ease of access and installation on Android devices; and (5) integration of learning content, encompassing the first draft of all core pages within the application, including the welcome page, main menu, materials overview, individual chapter pages, quiz sections, game activities, vocabulary references, and a developer information page.

Upon the completion of the first prototype, the application underwent a rigorous

expert validation process to evaluate its quality prior to trial implementation. Two validators were involved in this stage: a specialist in English language education and a specialist in instructional media design. Each expert independently assessed the application using a structured evaluation rubric designed to examine both the content and media dimensions of the product. Ratings were assigned based on a four-point Likert scale, ranging from 1 (Poor) to 4 (Very Good), allowing for a nuanced and quantifiable assessment of the application's overall quality. The results of the expert validation are summarized in Table 4 below:

Table 4. Expert validation result

<b>Content Expert Validation</b>	<b>Score</b>	<b>Media Expert Validation</b>	<b>Score</b>
Accuracy of vocabulary	4.00	Interface and navigation	3.50
Appropriateness with syllabus	3.75	Multimedia integration (audio, image)	3.75
Clarity of instructions	3.50	User engagement and interactivity	3.75
Integration of meaning and form	3.75	Technical functionality	4.00
Average	3.75	Average	3.75

Both experts rated the application as "Very Good". Their feedback led to several improvements, such as clearer navigation, enhanced font visibility, and the addition of instruction buttons to guide student use. The revised version of the vocabulary app was implemented in a tryout involving 60 seventh-grade students. The trial consisted of two sessions (2 × 80 minutes) in which students engaged with the app independently using their Android devices. Since the implementation period was relatively short, the data collected primarily reflect immediate engagement and perceived usefulness rather than long-term vocabulary retention or transfer of learning. Nevertheless, the positive engagement patterns

and favorable learner responses indicate that the app has strong potential to support vocabulary learning if integrated over a longer instructional period. Future research should incorporate extended use and a delayed post-test to evaluate retention and transfer more comprehensively. Short-term implementation is commonly used in early-stage instructional technology development to assess usability and learner acceptance before conducting longitudinal testing (Hsu & Lin, 2022). Therefore, this study focuses on feasibility and learner perception rather than retention outcomes.

Classroom observation conducted during the trial implementation revealed several encouraging findings regarding student engagement and the overall usability of the application. Students demonstrated a notably high level of focus throughout the learning session and interacted actively with the various features embedded in the application. The majority of students were able to complete all game-based tasks within the allocated time, suggesting that the difficulty level and pacing of the activities were well-suited to the learners' abilities. Among the available features, the audio feedback and drag-and-drop game activities emerged as the most favored by students, indicating a strong preference for interactive and multimodal learning experiences. From a technical standpoint, the implementation proceeded smoothly, with minimal disruptions caused by technical barriers such as application lag or device incompatibility, reflecting the overall readiness of the application for classroom use.

The findings from the post-implementation questionnaire further corroborated the observational data and provided quantitative evidence of the application's positive reception among students. As illustrated in the figure below, 85% of students reported that the application was helpful in supporting vocabulary retention, while 80% expressed a preference for the app-based learning experience over conventional

textbook-only exercises. Most notably, 90% of students indicated a strong desire to use similar Android-based applications in their future English learning activities (see Figure 1). These results collectively suggest that the application was not only well-received in terms of usability and engagement, but also perceived as an effective and preferable alternative to traditional learning media.

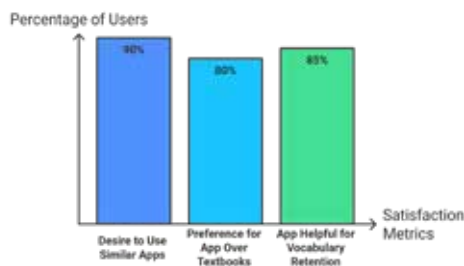


Figure 1: Post implementation result

The chart above visually summarizes the three key indicators from the post-implementation questionnaire, making the distribution of student responses clear at a glance. The consistently high percentages across all three items — ranging from 80% to 90% — reinforce the conclusion that the application was both effective and well-received, offering strong justification for its continued use and further development in English language learning contexts.

These results indicate that the developed vocabulary application was positively received and perceived as helpful in supporting vocabulary practice and learning motivation. Students demonstrated high engagement during use, preferred the interactive format over textbook-based tasks, and expressed interest in similar learning tools in the future. While these findings suggest strong usability and motivational appeal, the current study did not include pre- and post-test measures to determine actual vocabulary gains. Therefore, the findings should be interpreted as evidence of perceived effectiveness and practical potential, and further research is needed to examine measurable improvements in vocabulary acquisition through controlled testing.

The results of this study demonstrate that creating a mobile, game-based vocabulary learning app can successfully address typical difficulties junior high school students have learning English vocabulary. The needs analysis’s findings show that although students understand the importance of vocabulary in language acquisition, they also have trouble memorizing information through conventional means. This supports the findings of Nation (2013), who highlighted that while vocabulary acquisition frequently lacks adequate contextualization and participation in standard classroom methods, it is a critical predictor of EFL learners’ success. While the findings align with Nation’s (2006, 2013) assertion that vocabulary is foundational for successful language performance, this study shows that students’ difficulties stemmed from routine and low-engagement learning practices rather than vocabulary exposure alone. This nuance extends Nation’s position by emphasizing the role of engagement and contextual reinforcement in vocabulary development. Similarly, although the multimedia elements of the application reflect Mayer’s (2009, 2020) and Lawson and Mayer’s (2024) Cognitive Theory of Multimedia Learning, this study highlights that active manipulation (e.g., drag-and-drop matching, interactive quizzes) had a more noticeable motivational impact than passive multimedia presentation. This extends Mayer’s framework by suggesting that interactivity, not just multimodality, plays a decisive role in vocabulary engagement.

In order to foster a deeper understanding, Mayer’s Cognitive Theory of Multimedia Learning, which promotes the integration of text, images, and audio, is supported by this. Utilizing interactive components like drag-and-drop, audiovisual modeling, and quick feedback is consistent with research by Hwang and Wu (2012), who found that gamification features greatly improve student motivation and retention. The positive validation scores from both content and media experts indicate that

the app successfully aligned with curricular goals and applied multimedia principles in a pedagogically appropriate way. The interactive elements, including immediate feedback, audiovisual modeling, and task repetition, are consistent with research demonstrating that well-designed GBL environment can facilitate engagement and deeper vocabulary processing (Reinders & Wattana, 2015; Plass et al., 2015).

Beyond cognitive engagement, learner motivation was further supported by affective and autonomy-related mechanisms as explained in Self-Determination Theory (Deci & Ryan, 2000). Furthermore, while Hwang and Wu (2012) found that gamification enhances motivation, the present findings show that motivation was closely tied to learners' autonomy and pacing control, suggesting that game elements alone are not sufficient; rather, agency must be intentionally built into GBL design. Student feedback and implementation observations provide additional evidence of the application's ability to encourage participation and self-directed learning. Over 85% of students reported improved vocabulary retention and expressed positive opinions about the learning experience. These results support those of Reynolds and Taylor (2024), who discovered that, in comparison to traditional education, the use of Kahoot! in EFL classes greatly improved vocabulary retention and student motivation. Additionally, the availability of Android-based solutions is consistent with the ways that mobile platforms offer adaptable, student-centered learning environments in Mobile-Assisted Language Learning (MALL), as discussed by Kukulska-Hulme and Shield (2008). In addition, the findings also support the Self-Determination Theory (Deci & Ryan, 2000; Deci et al., 2006; Grenier et al., 2024), especially the competence and autonomy tenets. The software gave pupils a sense of agency that is frequently lacking in traditional instruction by letting them decide the sequence and speed of their education. The game's built-in incentives, such as points, animations, and sounds for the right response, acted as

feedback systems that boosted confidence and motivation.

In sum, the integration of gamification and mobile technology within a structured vocabulary syllabus has demonstrable pedagogical value. The results are consistent with Schmitt (2000) and Prensky (2001), who argued that game-like features can transform vocabulary learning into a more interactive, engaging, and learner-centered process. However, it should be noted that the effectiveness of such tools depends on thoughtful design, appropriate scaffolding, and alignment with pedagogical goals. Future studies might explore long-term vocabulary retention, broader curricular integration, and comparative effectiveness against other digital learning approaches.

### Conclusion

The purpose of this project was to create and implement a game-based vocabulary learning program for junior high school EFL students. The findings show that learners' vocabulary problems can be successfully addressed, engagement can be increased, and autonomous learning can be encouraged by combining interactive game features with mobile technology. Positive learner feedback and expert validation support the developed app's viability as an additional instrument for English language instruction, especially for vocabulary enrichment in line with the national curriculum.

Despite these promising outcomes, this study does, however, have a number of limitations should be acknowledged. First, only one school context was included in the sample size, which might not accurately reflect larger student groups. Second, the implementation time was only two sessions, which limited the opportunity to evaluate vocabulary knowledge transfer or long-term retention. Third, the study did not use standardized pre/post-testing or comparisons between control groups; instead, it relied mostly on self-reported data and descriptive statistics.

Future studies should examine the long-term impacts of mobile game-based learning on vocabulary growth, considering performance in real-world communication tasks and retention over time. Deeper insights may also be obtained via experimental research that contrasts this app with other teaching strategies (such as flashcards and textbook-based drills). Furthermore, studies could look into how these apps can help students with a range of requirements and preferences, such as those who are visually or auditorily impaired. The app's instructional usefulness could be further increased by adding grammar, pronunciation, or integrated language skills to the content.

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