

Improving EFL students' vocabulary acquisition: a phenomenological study on the use of the "DuoCards" mobile application

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ABSTRACT

This study investigates English as a Foreign Language (EFL) students' perceptions of the "DuoCards" mobile application as a tool for vocabulary enrichment. Employing a qualitative research design with a descriptive phenomenological approach, data were gathered through questionnaires administered to 20 junior high school students, followed by in-depth interviews with five selected participants. The findings reveal seven key themes: (1) Usability and Features – DuoCards is perceived as user-friendly and effective in supporting vocabulary acquisition; (2) Accessibility – the application offers flexible access, though some students reported login issues; (3) Vocabulary Enrichment – visual stimuli and interactive elements aid in vocabulary retention; (4) Confidence in Communication – while the app increases motivation, its influence on spoken confidence remains limited; (5) Content Coverage – learners appreciate the comprehensive and regularly updated vocabulary topics; (6) Technical Challenges – occasional access issues, particularly during the login process, were noted; and (7) Feature Awareness – while interactive functions are available, a lack of user awareness may limit their optimal use. The results indicate that DuoCards has significant potential as a mobile-assisted language learning (MALL) tool. However, technical and pedagogical improvements are recommended to maximize its impact. Overall, DuoCards is endorsed as an effective supplementary platform for enhancing students' vocabulary acquisition in EFL contexts.

Keywords: DuoCards, student perception, vocabulary enrichment

Article History: Received 25 Apr 2025, Final revision 15 May 2025, Published 17 May 2025

Introduction

Vocabulary is a fundamental element in language acquisition and is the foundation for effective communication in language learning (Harmer & Thornbury, 2012). A broad and diverse vocabulary helps one convey ideas and thoughts better and supports understanding and interpreting the surrounding environment (Nurmanova & Komiljonova, 2024). Students will find it difficult to convey ideas, understand written materials, and communicate effectively without adequate vocabulary. According to Groot (2000) vocabulary knowledge is a fundamental requirement for second-language learners to succeed in various language-related tasks.

Students must enrich their vocabulary to improve their language skills and overcome

communication barriers, especially those learning English as a second language (Christanti, 2018). A strong vocabulary helps students gain confidence in conversation, improves reading comprehension, and supports their writing ability. Moreover, as English is widely regarded as a global language, enriching vocabulary equips students to excel academically and professionally in an increasingly interconnected world (Andika & Mardiana, 2023). In line with this, the Quran highlights the divine gift of language and communication, as stated in Surah Ar-Rahman (55:4): "'*Allamahul bayān*" ("He taught him speech and intelligence"). This verse emphasizes that the ability to speak and convey meaning is a

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DOI: <https://dx.doi.org/10.30595/lks.v19i2.26360> ©2025 Leksika. All rights reserved.

blessing from Allah, reinforcing the importance of learning and expanding vocabulary.

For English as a Foreign Language (EFL) learners, achieving B1-level proficiency as defined by the Common European Framework of Reference for Languages (CEFR) – requires mastering a wide range of vocabulary to understand general texts, express opinions, and engage in everyday conversations (Council of Europe, 2020). However, vocabulary acquisition remains one of the biggest challenges for EFL learners due to limited exposure, ineffective memorization techniques, and lack of meaningful practice (Nation, 2001; Schmitt & Schmitt, 2020)

At the local level, particularly in Indonesia, EFL learners often rely on memorization and translation-based learning, which limits their ability to use vocabulary in meaningful contexts (Cahyono & Widiati, 2021). Moreover, research shows that traditional classroom learning methods often prioritize grammar over vocabulary development, resulting in limited lexical competence among students. The lack of access to authentic English language materials and real-life practice opportunities further compounds this problem.

Similar issues were observed in the research setting, where many students struggle with vocabulary retention and have difficulty applying new words in real-life communication. Classroom observations and discussions with teachers revealed that students often memorize vocabulary without fully understanding its contextual usage, leading to passive rather than active vocabulary knowledge. Additionally, challenges in integrating digital tools into vocabulary learning persist, as traditional teaching methods dominate classroom instruction. Given these issues, this study explores how the *DuoCards* application can help address these challenges and enhance students' vocabulary acquisition.

This problem is not unique; Hifni & Fahriany (2022) found that immersive environments, such as studying abroad, significantly enhanced EFL learners' vocabulary acquisition through real-life interactions, suggesting that exposure and meaningful engagement are crucial for vocabulary development. While studying abroad is not always feasible, mobile

applications like DuoCards can simulate similar immersive experiences digitally. Furthermore, Daulay et al. (2024) highlighted that integrating ICT in EFL classrooms positively influences classroom management and student engagement, underscoring the potential of digital tools to enhance vocabulary learning when effectively implemented.

Starting from this problem, this research discusses how students perceive technology-based vocabulary learning methods. In education, students' perceptions of learning methods play a crucial role in determining their engagement and the overall effectiveness of the learning process. According to Gibson (1979) in ecological perception theory, perception is not solely dependent on cognitive interpretation but is also influenced by the environment and the available information. Perception is a psychological process that begins with sensory experiences through the five senses, which individuals then process into positive or negative responses through selection, interpretation, and reaction (Erin & Maharani, 2018). It is also described as an active process of acquiring and managing information influenced by one's environment (Otter, as cited in Ghalebi et al. (2020)). Furthermore, perception involves organising and interpreting stimuli to generate understanding (Nugroho, as cited in Saifuddin (2018)). Fieldman (1999) emphasizes that perception is a constructive process where individuals go beyond mere stimuli to form meaningful experiences.

Perception plays a vital role in students' academic success. Research by Handrianto et al. (2021) found that a positive perception of a teaching method enhances motivation and engagement in the classroom. Conversely, students with a negative perception of a course or teaching approach are likelier to struggle with comprehension and experience lower motivation to learn (Nation, 2001). Students' perceptions of educational technology significantly influence its effectiveness in the digital era. Nender et al. (2022) found that students with a positive perception of flashcard-based applications, such as Anki, demonstrated greater vocabulary acquisition than those using conventional methods. Similarly, research by Solin & Salmiah (2025) highlighted that students' perception of digital

learning applications could enhance material retention when they find the applications user-friendly, interactive, and beneficial.

The *DuoCards* app offers students a high-quality and innovative English learning experience. *DuoCards* offers a gamification system and flashcard-based language learning app designed to help users improve their language skills, especially in mastering vocabulary. The app utilizes the Spaced Repetition System (SRS), which ensures hard-to-remember words appear more frequently while easy-to-remember words appear less frequently. Key features of *DuoCards* include the ability to create your flashcards, support for multiple languages, a simple and intuitive interface, and tracking of learning progress.



Figure 1. *DuoCards* Logo

Several studies support students' perceptions and benefits of mobile applications in enriching English vocabulary. Aziz (2023) found that mobile apps significantly improve EFL students' vocabulary acquisition compared to traditional methods. Nender et al. (2022) showed that the Anki app enhanced students' vocabulary mastery more effectively than conventional learning. Solin & Salmiah (2025) study explored students' perceptions of the Lingo Learn application as a learning tool to enhance vocabulary mastery.

A study by Nasution & Maryati Salmiah (2024) examined students' perceptions of using the Cake application for vocabulary learning that are beneficial and highly effective in learning new vocabulary. Rihana et al. (2024) confirmed that Duolingo was an engaging and motivating tool for vocabulary learning. Afifka & Dauly (2024) found Busuu compelling, as students appreciated its accessibility and user-

friendly design, which boosted their motivation. Aprilani & Suryaman (2021) demonstrated that Quizlet improved vocabulary retention through interactive features, making learning more enjoyable.

Previous studies have highlighted the benefits of popular applications in supporting vocabulary learning. However, there is still a lack of research specifically examining the *DuoCards* application, particularly in the context of EFL students in Indonesia. Additionally, prior research has predominantly focused on high school or university students, while studies exploring the use of mobile applications among junior high school students remain scarce. Therefore, this study aims to fill this gap by investigating junior high school students' perceptions of the *DuoCards* application in enriching their vocabulary.

Furthermore, while some studies have explored the effectiveness of gamification in language learning (Rihana et al., 2024), research specifically examining how the Spaced Repetition System (SRS) in *DuoCards* influences vocabulary retention is still limited. SRS enhances memory retention by frequently repeating difficult words while showing mastered words less often. Given that this method has been proven effective in vocabulary acquisition (Schmitt & Schmitt, 2020), this study examines how this feature improves students' vocabulary retention and language skills.

Therefore, this study focuses on EFL students at the Junior High School level in Indonesia, investigating their perceptions of using *DuoCards* to enrich their vocabulary. Given the app's accessibility and user-friendly interface, it is believed to be an effective tool for vocabulary learning. Although various studies have explored the use of digital applications for vocabulary acquisition, research explicitly examining *DuoCards* remains limited. This study addresses this gap by providing insights into students' perceptions of the app's effectiveness in vocabulary enrichment. Thus, the research question guiding this study is: What are students' perceptions of using the *DuoCards* app to enrich their vocabulary?

Method

This study used a qualitative approach with a descriptive phenomenological design to explore students' perceptions of the *DuoCards*

application in vocabulary learning. A phenomenological design is used to understand students' subjective experiences, focusing on

their perceptions, emotions, and reflections (Moustakas, 1998). The study categorizes key themes based on student responses to provide a comprehensive analysis.

The research was conducted at Agung Persada Junior High School, North Sumatera, involving 20 students (11 males, 9 females) who had used *DuoCards* for four weeks. Participants were selected through purposive sampling, ensuring they had regular access to the app (at least three times a week) and could articulate their experiences. Five students were later selected for interviews based on their willingness and ability to provide in-depth insights.

Data were collected using questionnaires and interviews. The questionnaire consisted of 20 statements using a five-point Likert scale (1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly

Agree). Unlike digital distribution, the questionnaire was printed and distributed in class to ensure all participants completed it in a controlled setting. The interviews, lasting 45-60 minutes, were conducted with five selected students to explore deeper perspectives. Questions were categorized into seven themes: Usability and Features, Accessibility, Vocabulary Enrichment, Confidence in Communication, Content Coverage, Technical Challenges, and Feature Awareness on *DuoCards* Application.

Questionnaire responses were assigned numerical values (1-5) for data analysis and converted into percentages for more straightforward interpretation. Braun & Clarke (2006) applied thematic analysis to interview transcripts to identify recurring patterns, while Miles (1998) used thematic content analysis to categorize insights.

Results and Discussion

Result

The research results are presented based on questionnaire responses and interviews. The results are categorized into seven key aspects of students' perceptions of the *DuoCards* application for vocabulary enrichment.

1. Usability and Features

The table below indicates students' perceptions of the app's usability, including ease of navigation, user-friendly features, and overall effectiveness in vocabulary learning.

Table 1. Students' Perceptions of the Usability and Features of the *DuoCards* Application

No.	Statement	SD (1)	D (2)	N (3)	A (4)	SA (5)	Mean (M)	(%)
1.	The <i>DuoCards</i> application is easy to use and navigate.	0	0	5	4	11	4.30	82.50%
2.	The features of <i>DuoCards</i> are user-friendly and helpful in learning vocabulary.	0	0	2	5	13	4.55	88.75%
3.	The quizzes and exercises in the application help reinforce my vocabulary learning.	0	1	3	9	7	4.10	77.50%
4.	The repetition system in <i>DuoCards</i> (e.g., flashcards) is beneficial for reinforcing vocabulary learning.	0	0	8	7	5	3.85	71.25%
5.	The gamification elements in <i>DuoCards</i> (e.g., progress tracking and rewards) make learning more engaging and motivating.	0	0	6	5	9	4.15	78.75%
6.	The audio pronunciation feature in the application helps me learn correct word pronunciations.	0	0	5	4	9	4.22	80.56%
7.	The progress tracking feature in the application helps me monitor my learning and improvement.	0	1	3	9	7	4.10	77.50%

According to the table 1, students generally positively perceived the Usability and Features of the *DuoCards* Application. Most agreed that the app is easy to navigate ($M = 4.30$, 82.50%) and provides flexibility in learning vocabulary anytime and anywhere. No participants strongly disagreed with its usability, indicating that the app was well-received. These findings align with student responses, such as Student 1 stating:

"DuoCards is an app that is easy to use anywhere and anytime, providing flexibility in learning English vocabulary." (S1)

Also, Student 3 highlights:

"The application is easy to use, does not take too long to respond, and is easy to understand." (S3)

Students found the features user-friendly and helpful for learning vocabulary ($M = 4.55$, 88.75%). The quizzes and exercises reinforced learning ($M = 4.10$, 77.50%), while gamification elements, such as progress tracking and rewards, made learning more engaging ($M = 4.15$, 78.75%). The audio pronunciation feature in the application received a highly positive response from students ($M = 4.22$, 80.56%). However, the flashcard-based repetition system scored lower

($M = 3.85$, 71.25%), suggesting room for improvement. These findings are consistent with student interviews, where Student 1 stated:

"The features in DuoCards help the learning process effectively. For example, video features support pronunciation skills and vocabulary cards that can be customized according to the user's level of understanding." (S1)

Similarly, Student 2 emphasized the interactive elements, saying:

"Unlike books, which can be dull due to a lack of visual and interactive elements, DuoCards offers interesting features that enhance vocabulary retention." (S2)

DuoCards is an effective vocabulary learning tool with well-designed features, though improvements in the vocabulary repetition system could further enhance its effectiveness.

2. Accessibility

The accessibility of *DuoCards* for students was explored, highlighting its flexibility for learning anytime and anywhere while addressing potential access issues, as indicated in the table 2:

Table 2. Students' Perceptions of Accessibility to the *DuoCards* Application

No.	Statement	SD (1)	D (2)	N (3)	A (4)	SA (5)	Mean (M)	%
8.	I can conveniently access the <i>DuoCards</i> application anytime and anywhere.	0	1	3	15	3	3.91	72.73

Based on the table, most students agreed they could easily access the *DuoCards* application anytime and anywhere. The results show that none strongly disagreed, one disagreed, three were neutral, fifteen agreed, and three strongly agreed with the statement ($M = 3.91$, 72.73%).

These findings are consistent with student responses in the interview. For instance, Student 1 stated:

"DuoCards is an app that is easy to use anywhere and anytime, providing flexibility in learning English vocabulary." (S1)

Similarly, Student 3 highlighted the ease of access by stating:

"The application is easy to use, does not take too long to respond, and is easy to understand." (S3)

This confirms that most students found *DuoCards* highly accessible and convenient for learning. However, a small percentage of students remained neutral or disagreed, possibly due to initial difficulties, as expressed by Student 4, who mentioned:

"When I first started using the DuoCards app, I felt a little confused because I had to log in first before I could access its features." (S4)

Table 3. Students' Perceptions of the *DuoCards* Vocabulary Enrichment Application

No.	Statement	SD (1)	D (2)	N (3)	A (4)	SA (5)	Mean (M)	(%)
9.	The visual aids and images used in the application enhance my understanding of vocabulary words.	0	0	2	16	2	4.00	75.00%
10.	<i>DuoCards</i> are an effective tool for enriching my English vocabulary.	0	0	10	7	3	3.65	66.25%
11.	<i>DuoCards</i> improve my ability to remember new vocabulary.	0	0	4	10	6	4.10	77.50%
12.	I recommend the <i>DuoCards</i> application to my peers for vocabulary enrichment.	0	0	11	2	7	3.80	70.00%

The data shows that most students perceive *DuoCards* positively as a tool for vocabulary enrichment. The absence of strong disagreement further indicates that most students found the application beneficial.

One of the strengths of *DuoCards* is its visual aids and images, which were rated highly (M = 4.00, 75.00%). This finding aligns with Student 2, who mentioned:

"The DuoCards application allows us to learn from pictures or reading... The vocabulary we learn from this app is easy for school children to remember and learn." (S2)

This suggests that *DuoCards*' visual elements help students grasp new words more effectively.

Regarding its effectiveness in vocabulary enrichment, students gave a moderate agreement score (M = 3.65, 66.25%). While most students are neutral with the statement, some agree, indicating that individual learning styles might influence their

DuoCards is a flexible and convenient tool for vocabulary learning, although improvements in the login process could further enhance the user experience.

3. Vocabulary Enrichment

The effectiveness of *DuoCards* in expanding students' vocabulary was examined, particularly through visual aids, flashcards, and interactive learning features, as indicated in the table 3:

perceived usefulness. However, Student 1 emphasized the app's benefits, stating:

"Before using this app, I had a limited amount of English vocabulary. However, after downloading DuoCards, I was able to learn everyday vocabulary and enrich my vocabulary gradually." (S1)

DuoCards received the highest approval in helping students remember vocabulary (M = 4.10, 77.50%). Student 3 highlighted this aspect, saying:

"The features help me learn vocabulary, and there is a video feature that will explain more details about the vocabulary." (S3)

The combination of interactive features and visual support strengthens long-term vocabulary retention.

Regarding peer recommendations, *DuoCards* received a positive response (M = 3.80, 70.00%), though some students remained

neutral. Overall, the findings suggest that *DuoCards* is a valuable tool for vocabulary learning, mainly due to its visual elements and interactive features. However, varying levels of enthusiasm indicate that while many students benefit, further enhancements could improve its overall effectiveness for a broader range of learners.

4. Confidence in Communication

The impact of *DuoCards* on students' confidence in using new vocabulary in conversations and their motivation to learn was analyzed. As indicated in the table 4:

Table 4. Students' Perceptions of Their Confidence in Using the *DuoCards* Application.

No	Statement	SD (1)	D (2)	N (3)	A (4)	SA (5)	Mean (M)	(%)
13.	I feel more confident using new vocabulary words in conversations after using <i>DuoCards</i> .	5	0	5	4	6	3.30	57.50
14.	<i>DuoCards</i> keep me motivated to learn new words regularly.	0	1	3	9	7	4.10	77.50
15.	Learning vocabulary through <i>DuoCards</i> is more enjoyable than traditional methods such as textbooks or word lists.	0	1	4	9	6	4.00	75.00

The findings reveal that students generally had a positive perception of *DuoCards* regarding motivation and engagement, but their confidence in using new vocabulary in conversations remained moderate. *DuoCards* received high approval for motivation (M = 4.10, 77.50%), indicating that its features encourage regular vocabulary learning. Student 1 shared:

"The app increased my confidence in pronouncing English vocabulary, especially after watching the videos and listening to audio that helped me understand the correct pronunciation. Overall, the features available in DuoCards provide a more enjoyable learning experience compared to the conventional method of learning through books."(S1)

Additionally, students found learning with *DuoCards* more enjoyable than traditional methods like textbooks and word lists (M = 4.00, 75.00%). This suggests that interactive features, such as multimedia elements, contribute to a more engaging learning experience. Student 3 noted:

"I enjoy using DuoCards because it makes learning fun, and I can practice vocabulary in a way that does not feel boring." (S3)

However, regarding confidence in using new vocabulary in conversations, responses were more varied (M = 3.30, 57.50%). Some students agreed that *DuoCards* helped them feel more confident, but a noticeable percentage remained neutral or disagreed. While *DuoCards* is effective in vocabulary acquisition, it may need additional features, such as interactive speaking exercises, to enhance real-world application and conversational confidence. The results suggest that *DuoCards* is an effective vocabulary learning and motivation tool. However, its impact on students' confidence in using vocabulary in real-life conversations is less consistent, pointing to a potential area for improvement.

5. Content Coverage

The variety and sufficiency of the app's vocabulary topics, explanations, and updates were evaluated, assessing their relevance to students' learning needs, as indicated in the table 5:

Table 5. Student Perception of Content Coverage on DuoCards Application

No	Statement	SD (1)	D (2)	N (3)	A (4)	SA (5)	Mean (M)	%
16.	The variety of vocabulary topics covered in the application is sufficient for my learning needs.	0	0	4	12	4	4.00	75.00
17.	The application provides adequate explanations and examples for new vocabulary words.	0	2	3	9	6	3.95	73.75
18.	Regular updates and new content in the application keep me engaged and interested in learning.	0	0	4	8	8	4.20	80.00

Most students positively perceived the completeness of DuoCards' material, particularly in terms of vocabulary variety, explanations, and content updates. DuoCards received strong approval for its range of vocabulary topics ($M = 4.00$, 75.00%), suggesting that most students felt the app met their learning needs. However, some students remained neutral, indicating that the breadth of topics could be expanded further to cater to diverse learning preferences.

Regarding vocabulary explanations and examples, students generally found them helpful ($M = 3.95$, 73.75%). However, a few students expressed neutral or slightly negative responses, suggesting that the clarity and depth of explanations could be further refined. Student 2 emphasized the importance of explanation videos, stating:

"This app provides complete vocabulary materials and features that support effective learning. One of the most helpful features is

the explanation videos that provide a deeper understanding of specific vocabulary. With this feature, I can learn better, moving from not knowing a vocabulary to understanding and using it confidently." (S2)

The highest rating was given to the regular updates and new content ($M = 4.20$, 80.00%), indicating that frequent updates keep students engaged and interested in learning new vocabulary. This suggests that content refreshment is crucial in maintaining students' motivation.

6. Technical Challenges

Technical issues students encountered while using the app, such as login problems and usability challenges that may hinder the learning experience were identified, as indicated in the table 6:

Table 6. Students' Perceptions of Technical Challenges with DuoCards Application

No	Statement	SD (1)	D (2)	N (3)	A (4)	SA (5)	Mean (M)	Percentage (%)
19.	I sometimes experience technical difficulties when using Duocards.	1	3	4	7	5	3.60	65.00%

The data suggests that some students encounter technical issues while using DuoCards, as reflected in the moderate mean score ($M = 3.60$, 65.00%). While most students acknowledged experiencing occasional

technical problems, some respondents disagreed or remained neutral, indicating varied user experiences.

A common issue students noted was the login process before accessing the learning features. Student 4 stated:

"As a new user, my first experience of using DuoCards was confusing, mainly due to the login process that had to be done before accessing the learning features." (S4)

Although technical difficulties are not a significant barrier, addressing these concerns, such as improving login procedures and minimizing glitches, could help enhance the overall user experience and make access to the app smoother and more user-friendly.

7. Feature Awareness

Student suggestions for additional features to enhance *DuoCards*' effectiveness in vocabulary learning were highlighted, as indicated in the table 7.

Table 7. Students' Perceptions of Feature Awareness in DuoCards Application

No	Statement	SD (1)	D (2)	N (3)	A (4)	SA (5)	Mean (M)	Percentage (%)
20.	Some features in <i>Duocards</i> do not fully meet my vocabulary learning needs.	1	2	5	7	5	3.65	66.25%

Therefore, rather than adding new features, efforts to enhance the app's effectiveness can focus on (Increasing feature awareness - Ensuring that users fully understand and utilize the existing features through tutorials, notifications, or in-app guides; Optimizing user experience- Making

The table results indicate that *DuoCards* is generally effective in supporting vocabulary learning, with an average score of 3.65 (66.25%). While some students feel that certain aspects could be improved, this is likely due to a lack of exploration or awareness of the features already available in the application.

DuoCards offers interactive features, including quizzes, AI-powered chat, speaking exercises, flashcards, progress tracking, rewards, and engaging educational videos. Additionally, the app provides extensive vocabulary categories, personalized learning options, and an immersive learning experience through conversation simulations.

features more accessible and intuitive so that users can easily find the exercises and materials they need, Enhancing adaptation based on user feedback - Utilizing user interaction data to refine and improve existing features to better align with their needs).

Discussion

The results of this study show that EFL students have a generally positive perception of the *DuoCards* application as a tool for vocabulary enrichment. According to the findings, the first is usability and features; students found *DuoCards* easy to use and navigate, with user-friendly features that enhanced their vocabulary learning. The positive response supports that intuitive and interactive digital tools enhance effective language learning (Handrianto et al., 2021).

Furthermore, gamification elements such as progress tracking and rewards have been shown to boost motivation. This aligns with Rihana et al. (2024) research, which found that gamified applications like Duolingo increase user engagement.

Second is accessibility ; most students agreed that *DuoCards* provides easy access to learning anytime and anywhere. This supports Nation's (2013) claim that accessibility plays a crucial role in vocabulary retention. However,

some students initially faced challenges with login procedures, similar to findings by Ghalebi et al. (2020), who noted that minor technical issues can affect user experience.

Third is vocabulary enrichment; which confirmed that *DuoCards* effectively enriched students' vocabulary, particularly through visual aids. This aligns with Schmitt & Schmitt (2020), who emphasized the role of visual support in vocabulary acquisition. However, the moderate agreement on vocabulary enrichment suggests that while *DuoCards* is useful, additional vocabulary contexts or adaptive learning paths may further enhance its effectiveness.

Fourth is confidence in communication; while *DuoCards* motivated students to learn vocabulary, their confidence in using new vocabulary in conversations was moderate. This finding is consistent with Christanti (2018) statement that vocabulary knowledge alone does not guarantee fluency; meaningful practice in communicative settings is necessary. Future improvements in *DuoCards* could include interactive speaking exercises to build conversational confidence.

Fifth is content coverage ; the completeness of vocabulary topics and explanations was well-received, supporting previous research by Atia et al. (2022), emphasizing the importance of diverse and structured content. The regular updates in *DuoCards* kept students engaged, reinforcing findings from Nender et al. (2022), who found that continuous content updates sustain student motivation.

Sixth is technical challenges ; some students experienced technical difficulties, particularly during login. This aligns with Aziz (2023), who identified technical barriers as a common challenge in digital learning tools. Addressing these issues through streamlined login processes and offline accessibility could improve the user experience.

In contrast to Aprilani & Suryaman (2021), who recommended that vocabulary apps should include more interactive elements like adaptive learning levels and customizable

content, *DuoCards* already offers these features, including AI-powered chat, adaptive learning paths, and personalized vocabulary practice. The seventh is feature awareness ; while *DuoCards* has proven effective, some students felt it did not fully support vocabulary learning. This could be because they were unaware of or did not explore the app's features. *DuoCards* is widely praised for its use of visual aids, such as images, flashcards, video stories, AI-powered chat, and audio features, which significantly improve vocabulary comprehension and rate.

This aligns with dual coding theory, which suggests that combining verbal and visual information can strengthen memory. In addition, the effectiveness of the spaced repetition system (SRS) in vocabulary retention was highlighted, confirming that systematic exposure to new words is beneficial for students. Some students suggested minor improvements to the repetition system for greater effectiveness.

Although *DuoCards* supported vocabulary acquisition, students' confidence to actively use new words in conversation remained moderate. However, the app already offers interactive speaking exercises, indicating that further guidance or structured exercises could help maximize this feature. Technical issues, such as occasional login problems and requests for more extensive vocabulary topics, were also noted, highlighting the need for continuous updates and user-centred improvements.

This study contributes to the research on mobile-assisted language learning (MALL) applications, reinforcing the cognitive theory of multimedia learning. Teachers can integrate *DuoCards* into EFL instruction to enhance vocabulary learning. Although *DuoCards* are a valuable tool, continued refinements in content variety, technical accessibility, and user engagement strategies can further optimize their effectiveness. Future research could compare *DuoCards* with other vocabulary learning apps or explore its long-term impact on retention and communicative competence.

Conclusion

The study concluded that *DuoCards* is an effective digital vocabulary enrichment tool based on student perceptions. Its easy-to-use

design, interactive features, and gamification elements increased student engagement and motivation in learning new vocabulary. The

findings highlight the benefits of visual aids, spaced repetition, and flexible accessibility, all of which support vocabulary retention.

However, although *DuoCards* facilitated vocabulary acquisition, some students reported moderate confidence in using newly learned words in real-life conversations. This suggests further emphasis on productive language skills, particularly speaking fluency. As the app already includes interactive speaking exercises and AI-driven conversations, ensuring students fully use these

features through guidance and structured practice could help bridge this gap.

For future research, it would be valuable to explore *DuoCards*' long-term impact on vocabulary retention and its effectiveness in developing speaking proficiency. Comparative studies with other vocabulary learning apps could provide deeper insights into their relative strengths. In addition, refining existing speaking exercises and enhancing adaptive learning features based on user feedback could further optimize *DuoCards* as a vocabulary-learning app.

Acknowledgement

The researcher sincerely appreciated the students who participated in this study and shared their valuable insights and experiences with the *DuoCards* app. The researcher would

also like to thank the colleagues and mentors for their constructive feedback and encouragement throughout the research process.

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