

## Effects of mobile-assisted language learning (MALL) on vocabulary retention in 10th-grade EFL students in an Ecuadorian public school

### Efectos del aprendizaje de idiomas asistido por móviles en la retención de vocabulario en estudiantes EFL de décimo grado ecuatorianos

Narcisa de Jesús Orellana Orellana<sup>1</sup> (jess4unarci@gmail.com) (<https://orcid.org/0009-0000-1406-2905>)

Gina Silvana Venegas Álvarez<sup>2</sup> (gina.venegas@utc.edu.ec) (<https://orcid.org/0000-0003-3263-6225>)

#### Abstract

The study examined the effect of Mobile-Assisted Language Learning (MALL) on the vocabulary retention of tenth-grade English as a Foreign Language (EFL) students in an Ecuadorian public school utilizing Quizlet, Kahoot, and Wordwall. The study used a one-group mixed-methods quasi-experimental design with a pre-test, a six-week intervention, a post-test, and a student perception survey. Mean vocabulary scores improved from  $M = 4.23$  ( $SD = 2.47$ ) to  $M = 8.40$  ( $SD = 1.22$ ) on a 10-point scale. The average gain was 4.17 points, 95% CI [3.36, 4.98], and the improvement was statistically significant,  $t(29) = 10.53$ ,  $p < .001$ , with a strong effect size (Cohen's  $d = 1.92$ ). These results were confirmed by a Wilcoxon signed-rank test ( $W = 0$ ,  $p < .001$ ). The qualitative results showed that the students thought that matching activities and quizzes were the most efficient types of vocabulary acquisition. Most of them did not have any serious issues, although some of them had issues with internet connectivity and understanding unfamiliar vocabulary. Overall, the results indicate that the use of Quizlet, Kahoot, and Wordwall as MALL tools can be useful to improve vocabulary retention and active participation in Ecuadorian EFL classrooms.

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<sup>1</sup> Universidad Técnica de Cotopaxi, Ecuador

<sup>2</sup> Universidad Técnica de Cotopaxi, Ecuador

## Resumen

En este estudio se examinó el efecto del aprendizaje de idiomas asistido por dispositivos móviles (MALL) en la retención de vocabulario de estudiantes de décimo de inglés como lengua extranjera (EFL) de una institución educativa pública ecuatoriana mediante el uso de Quizlet, Kahoot y Wordwall. El estudio tuvo un diseño cuasiexperimental de métodos mixtos con un solo grupo, pre-test, intervención de seis semanas, post-test y una encuesta de percepción estudiantil. Las puntuaciones medias del vocabulario mejoraron de  $M = 4.23$  ( $SD = 2.47$ ) a  $M = 8.40$  ( $SD = 1.22$ ) en la escala de 10 puntos. El promedio de ganancia fue de 4.17 puntos, IC del 95 % [3.36, 4.98], y la mejora fue estadísticamente significativa,  $t(29) = 10.53$ ,  $p < .001$ , con un tamaño de efecto grande ( $d$  de Cohen = 1.92). Dicho resultado fue confirmado mediante la prueba de Wilcoxon para rangos con signo ( $W = 0$ ,  $p < .001$ ). Los resultados cualitativos mostraron que las actividades de emparejamiento y los cuestionarios fueron los formatos más eficaces para aprender vocabulario. La mayoría de los participantes no manifestó dificultades importantes, salvo algunos que refirieron de problemas relacionados con la conectividad a Internet y la comprensión de vocabulario desconocido. En conjunto, los resultados sugieren que el uso de las herramientas MALL Quizlet, Kahoot y Wordwall puede ayudar a mejorar la retención de vocabulario y motivar una mayor participación de los estudiantes en las aulas ecuatorianas de inglés como lengua extranjera.

**Keywords:** mobile learning, vocabulary retention, English as a foreign language, gamification

**Palabras clave:** aprendizaje móvil, retención de vocabulario, inglés como lengua extranjera, gamificación

## Introduction

Vocabulary retention is of relevance to English as a Foreign Language (EFL) instruction as students are required to recall and reproduce lexical terms beyond the moment of their original presentation. Learning vocabulary includes not just knowing individual words but also understanding meaning, correlating words with context, and recalling words for communication. Vocabulary knowledge is a basic component of language learning since it supports the

comprehension and production of a range of abilities (Nation, 2022). Vocabulary retention is especially critical in this respect in EFL courses because pupils' exposure to English outside school is limited.

In many public-school environments, children acquire new vocabulary in class but often lose it right after instruction. This hinders their participation in oral and written activities, understanding short texts, and expressing simple views. In the Ecuadorian EFL context, Tamayo Maggi and Cajas Quishpe (2020) reported challenges in the process of learning English associated with a lack of opportunities for students to practice the language. This means that vocabulary learning should not be constrained by traditional classroom instruction but augmented with additional strategies that allow students to study, practice, and engage with words more often.

To answer this need, Mobile-Assisted Language Learning (MALL) has been proposed as an educational strategy. MALL is the use of mobile devices and software like Wordwall, Kahoot and Quizlet to facilitate language learning in flexible and interactive ways. As Çakmak (2019) mentions, mobile learning offers students the chance to access language materials outside the physical classroom, where there can be additional chances for practice. Similarly, mobile learning applications are pertinent to language learning as they cater to the learners' goal to employ digital technologies for academic purposes, as highlighted by Ahmed et al. (2024). These contributions point to the possibility of transforming mobile devices into instructional resources, from simple instruments of communication, if they are used with clear pedagogical purposes.

Recent studies have proven that MALL is effective in learners' learning and remembering of language. Xodabande et al. (2025) found that mobile-assisted learning with digital flashcards helped in the maintenance of long-term recall of technical terms. Koleini et al. (2024) also found that mobile-assisted learning was useful for students' vocabulary knowledge. The findings of these studies indicate that mobile technology can offer frequent exposure, retrieval practice, and self-directed review, which are crucial conditions for language retention. Thus, MALL is significant not only in that technology is introduced into the classroom but also in that it can provide well-structured possibilities for students to learn language actively.

While the use of digital technology in education has increased in Latin America, access, connection and pedagogical integration challenges remain. Okoye et al. (2023) claim that the impact of digital technologies on teaching and learning in Latin America is dependent upon the manner they are implemented. According to ECLAC (2024), the connectivity gaps continue to be an exclusion factor in the region. This is important because mobile learning is not effective just because the devices are available but requires preparation, training, and equal access situations.

The use of mobile devices in Ecuadorian schools is regulated by the Ministry of Education by Ministerial Agreement No. MINEDUC-MINEDUC-2025-00015-A. This rule sets out guidelines for the responsible use of mobile phones and similar devices in educational institutions. In this study, using mobile devices is an intentional act of teaching, rather than informal use of phones. Thus, Wordwall, Kahoot and Quizlet were selected as a MALL tool to better practice vocabulary through interactive exercises based on students' curricular content.

Wordwall, Kahoot and Quizlet are online tools where teachers can build interactive activities such as quizzes, matching exercises, gap-fill exercises and game-based reviews. These applications allow students to practice English vocabulary in an interactive way (Moreira Oña et al., 2025). This finding is relevant to the present study, because these technological applications provide a frequent and dynamic exposure to vocabulary, which can aid retention in EFL learners. Moreover, Álvarez Llerena et al., (2026) claim that digital games can influence the learning experiences of students by increasing motivation and engagement. This suggests the possibility of using game-based platforms to make pupils more engaged in vocabulary practice.

In this respect, the present study seeks to explore the influence of Mobile-Assisted Language Learning through Wordwall, Kahoot, and Quizlet on the vocabulary retention of 10th-grade EFL learners in a public school in Ecuador. This study uses a mixed-methods approach. Quantitative data were pre-test and post-test, and qualitative data was student perception survey. This approach allows to test vocabulary gains and students' impressions of Wordwall, Kahoot and Quizlet as a mobile-assisted vocabulary learning aid.

### *Vocabulary Retention in EFL Learning*

Retaining vocabulary is an important feature of learning English as a foreign language (EFL) as students need to remember and recall terms after training to apply them in real communication contexts. As Nation (2022) describes, vocabulary knowledge is not simply knowing the translation of a term, but rather knowing its meaning, form, use, and context. Learning vocabulary in this sense involves repetition, meaningful practice, and chances to retrieve. This is especially so in EFL environments where pupils have minimal exposure to English outside the classroom.

In public schools, children acquire new language during a lecture but lose it after a short period of time because they do not have many chances to practice. This condition impairs their capacity to comprehend reading texts, engage in speech activities, and formulate coherent phrases. Tamayo Maggi and Cajas Quishpe (2020) discovered that students require additional opportunities to develop their English skills in Ecuadorian EFL learning. Their contribution is relevant to the present study since one of the problems that can hinder students' communicative development is vocabulary retention.

Mobile-assisted vocabulary acquisition has been explored to improve students' retention by using repetition and active recall. Xodabande et al. (2025) found that mobile-assisted learning through digital flashcards improved the long-term memory of technical terminology. Their findings indicate that mobile technologies can be useful for students in remembering language when they offer a systematic review and repeated exposure. Similarly, positive effects of mobile-assisted learning on students' technical vocabulary knowledge were observed by Koleini et al. (2024). These studies support the premise that mobile applications can be effective if they are not utilized randomly, but as part of a planned pedagogical intervention.

Okumuş Dağdeler et al. (2020) also found that the use of Mobile-Assisted Language Learning contributed to the collocation learning of EFL learners. Their study was about collocations, but it is pertinent because collocations are part of lexical knowledge and they need repeated exposure for retention. This suggests that mobile applications can help learners move beyond single words

and consolidate more complicated vocabulary patterns. In the present study, this supports the concept that practice with Wordwall, Kahoot, and Quizlet could be beneficial to vocabulary retention by providing students with the opportunity to engage with lexical items in diverse activity formats.

Teymouri (2024) evaluated the recent development of mobile-assisted vocabulary acquisition and highlighted the role of digital tools in the practice of vocabulary, especially those that increase repetition and retrieval. This is an essential contribution because the recall of vocabulary depends on the students' capacity to review the terms numerous times. Hence, systems like Wordwall, Kahoot and Quizlet can be effective when they provide opportunities for learners to drill vocabulary through quizzes, matching activities, missing-word exercises, and other interactive formats.

### *Mobile-Assisted Language Learning*

Mobile-Assisted Language Learning (MALL) is the use of mobile devices and applications to help with language learning either in the classroom or outdoors. According to Çakmak (2019), MALL is flexible since students can access learning resources through portable devices. Such flexibility is important in EFL environments, since there is often insufficient time in the classroom for students to drill vocabulary in depth. MALL thus can provide more possibilities to study and more exposure to English language.

Ahmed et al. (2024) investigated students' intention to use mobile learning applications and emphasized the significance of perceived utility and accessibility in language learning. The study shows that mobile learning is beneficial when technology is found to be practical and meaningful to the learners. This idea is essential for the present study since students' impressions of Wordwall, Kahoot and Quizlet are taken into consideration as part of the analysis. The students' perception of Wordwall, Kahoot and Quizlet as useful, motivating and easy to use may have contributed to their involvement with vocabulary exercise.

MALL, in conjunction with learning-oriented evaluation, can be used to improve lexical fluency (Al-Abri et al., 2025). This means that mobile learning should not be viewed as an isolated or

casual activity but as part of a planned instructional process. The present study utilizes Wordwall, Kahoot, and Quizlet as structured tools aligned to the vocabulary subjects of the unit and the content of the pre-test and post-test. This is a crucial connection as it allows the intervention to be directly targeted towards vocabulary retention.

Alqarni (2024) positively affected mobile-assisted learning on learning English vocabulary and grammar. The research supports the view that MALL can be effective in helping children enhance distinct language components if activities are well designed. However, the success of MALL might be affected by factors such as student level, availability of mobile devices, access to the internet, and instructor support. Therefore, the present work studies MALL in a specific setting of a public school in Ecuador.

Aliakbari and Mardani (2022) researched MALL and its effect on speaking development. Their research was based on speaking, but it is still valuable for our study because speaking growth is very dependent on vocabulary knowledge. Students will not be able to communicate well if they do not remember the terms they need to use. Vocabulary retention is seen here as a building block for the wider development of language. Thus, a technology that helps students retain language may also have an indirect effect on their communicative skills.

Auliya et al. (2021) explored mobile-assisted language learning platforms that can be used to support reading skills. Their study is relevant, as vocabulary knowledge is equally important for reading comprehension. The more words students know and retain, the more likely they are to grasp texts. This connection illustrates that vocabulary knowledge and use are not independent talent, but helps other language skills. Thus, mobile platforms for vocabulary practice may have wider benefits for EFL learning.

Nst et al. (2023) examined the usage of Rosetta Stone as a MALL application in EFL learning. Their documental analysis is a contribution to the understanding of MALL as a flexible educational method that allows the integration of different types of applications. Rosetta Stone, Wordwall, Kahoot, and Quizlet are not the same, yet these programs demonstrate how mobile applications can be combined in learning English. This also confirms the premise that mobile

learning is not confined to a single platform but rather depends on the teacher's choice and usage of digital resources to meet certain learning objectives.

Sanjaya (2023) explores the potential and consequences of MALL for EFL and ESL learners. The author highlights that mobile learning has the potential to expand access, autonomy and motivation, but at the same time requires planning and control. This is vital as mobile devices can be distracting if not used with clear instructional intentions. In the current study, Wordwall, Kahoot and Quizlet were utilized as a guided learning aid for vocabulary practice rather than free or informal mobile use.

#### *Game-Based Vocabulary Practice with Wordwall, Kahoot and Quizlet*

Wordwall, Kahoot and Quizlet are interactive digital platforms that allow teachers to create vocabulary activities such as multiple-choice quizzes, matching exercises, missing-word tasks and game-based reviews. These activities can increase vocabulary learning since students must identify words, determine meanings, fill in sentences and review knowledge repeatedly. Moreira Oña et al. (2025) state that Wordwall can improve English vocabulary learning. Their findings are immediately relevant since they give proof that Wordwall may improve vocabulary growth via interactive digital exercise.

In this way, Wordwall is useful for vocabulary retention because it combines repetition, engagement and motivation. Students aren't just reading a vocabulary list, but instead they are making choices, selecting responses, getting feedback, and repeating tasks. This technique can assist language learners focus on the meaning and form of words. In addition, Wordwall is accessible via mobile devices, making it suitable for MALL intervention.

Álvarez Llerena et al. (2026) studied digital games as emotional learning experiences and underlined that game-based activities can affect students' motivation and involvement. Their study does not focus on Wordwall, Kahoot Quizlet, but it does support the premise that digital games can make learning environments more interesting. Motivation is vital in vocabulary learning, because students must repeat and review terms several times. If the activity is involved and fun pupils are more likely to practice.

Phan, Tran (2024) evaluated the usefulness of Kahoot for vocabulary learning. They found that game-based learning can impact students' accomplishment and teachers' opinions. This evidence is useful, but not the method utilized in this study, as it shows that gamified digital platforms can assist vocabulary practice. Wordwall has the same qualities as a game-based tool: instant response, graphic design and competitive and playful forms.

Tran and Le (2023) studied the effect of Quizlet on vocabulary enhancement and found out that digital vocabulary tools assist students in learning vocabulary through regular use. Despite the distinct approach, notably the usage of digital flashcards, Quizlet's addition does serve to place Wordwall in the wider realm of digital vocabulary acquisition. In this way the three programs Wordwall, Kahoot and Quizlet offer repetition and learner engagement to develop vocabulary. For instance, the justification for using them as mobile-assisted vocabulary tools is supported.

According to Rakhmawati (2020), mobile applications can assist autonomous learning of blended English classes. This principle is significant as the memory of terminology increases when pupils practice beyond the teacher's explanation. Wordwall, Kahoot, and Quizlet can help with this, as students can work independently on activities, go through vocabulary at their own pace and repeat jobs when necessary. In this study, autonomy is not defined as studying without the teacher's guidance, but as the chance for students to practice more actively through mobile technology.

Triyoga et al. (2023) examined students' impressions of MALL in learning English, for instance. Their study is relevant as learner perception can influence the success of mobile learning. Students may be more inclined to engage with a tool if they find it useful, easy to use and compelling. Therefore, this study also conducts a perception survey to explore students' experience of Wordwall, Kahoot and Quizlet and their assessment of their usefulness in vocabulary retention.

### *MALL in the Ecuadorian and Latin American Educational Context*

The deployment of MALL in Latin America must be contextualized in terms of digital access, connectivity, and educational planning. Digital technologies have impacted teaching and learning

in Latin America, but their effects vary depending on infrastructure, teacher preparation and pedagogical application, they argue (Okoye et al., 2023). Therefore, technology itself does not ensure learning gains. To be successful, mobile learning needs to be conducted with defined objectives and adequate classroom supervision.

In Latin America, the Economic Commission for Latin America and the Caribbean (ECLAC) (2024) emphasizes that connectivity limitations are still a factor of exclusion. This is significant since mobile learning is not only about having gadgets but also about having access to internet and digital resources. These criteria may differ for pupils in public schools. Hence, MALL intervention using Wordwall, Kahoot and Quizlet involve planning, teacher supervision and institutional assistance to reduce the probable obstacles.

In Ecuador, the Ministry of Education provides the regulation for the use of mobile phones and similar devices in educational institutions by Ministerial Agreement No. MINEDUC-MINEDUC-2025-00015-A. This rule is significant as it offers a framework for the responsible and educational use of mobile devices. The mobile phones in this study are not for leisure or unlimited access but are utilized as instruments for learning vocabulary using Wordwall, Kahoot, and Quizlet. This difference is crucial to explain the intervention in the setting of public schools in Ecuador.

Andino et al. (2025) found that mobile learning applications can enhance the English communication competencies of high school pupils in Ecuador. This local evidence is essential as it shows that mobile learning may be utilized in Ecuadorian secondary education. But there is a need to investigate the effect of various tools on specific outcomes, such as language retention. This study answers this requirement by examining the Effects of MALL on vocabulary retention in tenth-grade students.

Tamayo Maggi and Cajas Quishpe (2020) addressed the issues of EFL Ecuadorian students' English learning. Their work provides some perspective on why mobile-supported methods would be essential in this environment. Students who struggle with language skills and who have limited exposure to English may have more opportunities to improve with interactive tools.

Therefore, Wordwall, Kahoot, and Quizlet might help students to retain vocabulary by frequent interesting vocabulary drill, which is related to the subject of the lecture.

### *Literature Review*

The literature examined reveals that language retention involves regular exposure, recall, and meaningful practice. MALL can help with such conditions by providing students with access to digital activities that go beyond the typical training in vocabulary development. Findings from research on mobile-assisted vocabulary acquisition, digital flashcards, gamified platforms and mobile applications suggest that technology can assist vocabulary growth when used pedagogically. In this sense, Wordwall, Kahoot, and Quizlet are regarded as good MALL tools since they allow the teacher to generate engaging vocabulary activities from curricular information.

At the same time, studies suggest that mobile learning must be cautiously adopted. Its effectiveness can be affected by access, connectivity, student motivation, and teacher assistance. This is especially important in Ecuadorian public schools, in which the use of mobile devices should conform to institutional standards. Therefore, this study looks at both vocabulary performance and students' perceptions to determine the effects of MALL on vocabulary retention.

### *Research Questions:*

Vocabulary retention remains a relevant difficulty in EFL learning based on the literature review, mainly in circumstances where students have less exposure to the language outside the classroom. Previous research has shown that Mobile-Assisted Language Learning can help with vocabulary retention through repetition, interaction, feedback, autonomy, and learner involvement. In this study, Wordwall, Kahoot and Quizlet are considered as mobile-assisted learning tools that can be used to improve the retention of vocabulary through interactive and game-based vocabulary exercise. Considering the Ecuadorian public-school context and the need for structured digital learning methodologies, the present study is directed by the following research questions:

1. How can Mobile-Assisted Language Learning with Wordwall, Kahoot, and Quizlet influence the vocabulary retention of 10th-grade EFL students in an Ecuadorian public school?
2. What are students' perceptions about the use of Wordwall, Kahoot and Quizlet as mobile-assisted tools in learning and retention of English Vocabulary?

## Materials and Methods

This study followed a mixed-methods approach to explore the effects of Mobile-Assisted Language Learning (MALL) on vocabulary retention in 10th-grade EFL students in an Ecuadorian public school. The mixed-methods technique was chosen because it enables the researcher to incorporate both quantitative and qualitative data to gain a more thorough grasp of the research problem. Creswell and Plano Clark (2018) say that mixed-methods research combines numerical data with participants' viewpoints to better comprehend outcomes. Similarly, Tashakkori and Teddlie (2010) point out that mixed-methods research is helpful when a single data type cannot fully account for an educational phenomenon.

The quantitative part included a pre-test and post-test to examine students' vocabulary retention before and after the use of Wordwall, Kahoot, and Quizlet. The qualitative part was utilized to assess the students' perceptions of Wordwall, Kahoot, and Quizlet as mobile-assisted vocabulary learning aids by conducting a student perception survey with open-ended questions. Thus, the mixed-methods approach was suitable because it allowed students to know not only if students ground their vocabulary retention but also how they experienced the use of Wordwall, Kahoot, and Quizlet during the learning process.

### *Research Design*

The research was a quasi-experimental pre-test/post-test design with a one-group design. This approach was appropriate to the research because it was conducted in a genuine classroom situation in which random assignment of students to experimental and control groups was not practicable. Educational research is generally conducted in natural settings, where the researcher is dealing with already existing groups, not groups formed arbitrarily (Kumar, 2019). Hence, the

same set of students underwent the pre-test, Wordwall intervention, post-test, and perception survey.

The qualitative component was based on explanatory logic because the students' impressions were collected after the intervention to assist explaining the quantitative results. This implies that the post-test results gave proof of improvement in vocabulary, and the survey responses helped to evaluate how students viewed Wordwall, Kahoot, and Quizlet in terms of motivation, usability, independent practice, and vocabulary retention. The combination of quantitative and qualitative data allows for a wider assessment of the impact of MALL on language retention.

The intervention was also conceived as a process of educational innovation. McKenney and Reeves (2018) state that educational interventions should be created, implemented, and assessed systematically in response to real classroom needs. With this notion, the Wordwall, Kahoot and Quizlet activities were connected to the vocabulary subjects of Unit 6, the students' English level and the learning objectives of the intervention.

#### *Participants:*

The sample was made up of 30 10th grade EFL learners from a public school in Ecuador. The group comprised of 15 females and 15 males. They were chosen by convenience sampling as the researcher had access to this group in an institutional environment. Borsotti (2009) further clarifies that in empirical social research, the choice of sample is generally determined by the nature of the setting as well as the ease of access to the participants. Therefore, the convenience sampling was adequate for this classroom-based study.

All the participants were learning English as a foreign language (EFL) and had been previously exposed to terminology related to the themes covered in Unit 6. The investigation was carried out with the students in ordinary English classes. The pedagogical intervention involved the use of mobile devices; for this reason, institutional approval and parental consent were regarded necessary according to the Ecuadorian educational standards for the responsible use of mobile phones in schools.

### *Background of study*

The study was done in a public school in Ecuador with 10th-grade EFL students. The intervention concentrated on language from Unit 6 “Expanding My World,” such as global identity, countries and nationalities, currencies and comparisons, travel terminology, and past events. These contents were picked because they were part of the students’ learning process and they could be practiced through interactive activities in the three applications.

The Ecuadorian educational framework was significant to the study, since the usage of mobile devices in schools should be regulated and pedagogically justified. The Ecuadorian Ministry of Education (2025) sets out recommendations for the responsible use of mobile phones and similar devices in educational institutions. Wordwall, Kahoot, and Quizlet were therefore employed as tools for structured learning and not as general mobile phone use. The activities were designed and supervised and related to the objectives of vocabulary of the English lesson.

### *Intervention*

The intervention was implemented using Wordwall, Kahoot and Quizlet platforms which enable teachers to develop interactive vocabulary activities. The reason for choosing these applications was that they included activities such as quizzes, matching, missing letters and games as reviews. The formats proved beneficial in vocabulary recognition, recall, repetition and student engagement.

The intervention was created in the setting of normal English sessions. The teacher-researcher designed Wordwall, Kahoot and Quizlet exercises to practice vocabulary linked to Unit 6 for students. The activities were framed around the lexical themes of the unit. First, pupils practiced nations and nationalities. Then they dealt with currencies and comparisons. Finally, they practiced language about traveling and past experiences. This sequence allowed for the gradual and repeated review of language by students.

The students accessed the Wordwall, Kahoot and Quizlet activities on mobile devices during the intervention with teacher supervision. The teacher gave instructions, watched participation,

answered questions, and asked pupils to repeat activities if needed. The intervention aimed not just to bring technology to the classroom but to use electronic devices as a pedagogical tool for vocabulary acquisition by repetition and interactive practice.

### *Tools*

The data collection was obtained by three instruments: pre-test, post-test, and student perception survey.

A pre-test was given before the intervention to determine students' prior vocabulary knowledge of Unit 6. It had 15 multiple-choice questions divided into three sections: global identity, global economy and global experiences. A pre-test was given to determine the baseline of the students' vocabulary knowledge before using Wordwall, Kahoot and Quizlet.

The post-test was performed following the session to assess students' vocabulary retention and enhancement. Also, there were 15 multiple-choice items related to the same vocabulary areas of the pre-test. The post-test was supposed to be a parallel instrument, assessing similar language content and skills but not the same questions. This allowed the researcher to compare students' performance before and after the MALL intervention.

Following the post-test, a student impression survey was conducted to gather qualitative and supplementary information on students' experiences with Wordwall, Kahoot and Quizlet. The survey consisted of 5 Likert scale questions and 2 open-ended questions. Likert measures assessed students' impressions of vocabulary retention, convenience of use, motivation, individual practice and readiness to utilize the applications in future English sessions. The open-ended questions encouraged students to answer questions about their experience using the three applications and which one was the most useful and the obstacles they encountered when using these applications.

### *Instruments validation*

Expert judgment was used to validate the pre-test, post-test, and student perception survey. Three EFL specialists examined the instruments for clarity, relevance of content, appropriateness of

level, and consistency with the vocabulary issues of Unit 6. The validation process was necessary since the instruments were needed to test vocabulary retention in a way that was congruent with the students' level and the goal of the study.

The instruments were adjusted according to the observations of the experts. Some distractors were modified in the pre-test and post-test to be clearer, more convincing and suitable for the students' level. In addition, certain item phrasing was changed to reduce ambiguity and to guarantee that the questions tested vocabulary knowledge, not extraneous grammatical complexity. In the student perception survey, some sentences were reworded to increase clarity and to better fit the items with the concepts of vocabulary retention, motivation, usability, and independent practice.

The instrument was pilot-tested with a small sample of students whose features were similar to those of the intended participants. The pilot was carried out to make sure that the instructions were intelligible, the items were suitable for the level of the students, and the predicted time to complete was enough. The pilot validated the appropriateness of the instruments for classroom usage, and the final versions were utilized in the study.

### *Procedure for Data Collection*

Data collection was done in three phases, pre-intervention, intervention, and post-intervention.

The pre-intervention stage also involved obtaining institutional authorization and parental consent as the usage of mobile devices was for educational reasons. Students were informed that the activities and instruments were part of an academic research process and that their answers would be utilized only for research reasons. Then, the pre-test was given to assess students' vocabulary knowledge at the beginning.

In the intervention phase, students engaged in Wordwall vocabulary tasks that were aligned to Unit 6. The teacher-researcher supervised the usage of the platform, monitored the engagement of students, and ensured that the activities were related to the objectives of the English class.

Students practiced vocabulary in interactive formats such as quizzes, matching tasks, and fill-in-the-blank exercises.

In the post-intervention, the students took the post-test to measure the vocabulary retention following the MALL intervention. Then they completed the student perception survey. The survey was meant to explore students' perspectives towards Wordwall, Kahoot and Quizlet as a vocabulary learning aid in mobile learning and to get some qualitative data which might explain the quantitative data.

### *Analysis of data*

Quantitative data were evaluated by descriptive statistics. The pre-test and post-test scores of students were compared to find out the changes in vocabulary performance after the MALL intervention. The analysis comprised a comparison of scores, mean scores, percentage of improvement and general performance patterns. This allowed the researcher to identify if students demonstrated improvement in vocabulary retention after using Wordwall, Kahoot and Quizlet.

Qualitative data from open-ended survey questions were examined using theme analysis. Braun and Clarke (2006) state that thematic analysis is beneficial for detecting, organizing and analyzing patterns in qualitative data. The written responses of the students in this study were analyzed to find common themes relating to motivation, simplicity of use, vocabulary practice, perceived learning benefits and obstacles when using Technological applications.

Finally, the quantitative and qualitative results were merged to provide an overall interpretation of the findings. Pre and post-test data indicated the amount of vocabulary growth and the replies to the survey provided insight into the students' experiences with Wordwall, Kahoot and Quizlet. This integration was compatible with the mixed-methods approach since it allowed the study to correlate measurable vocabulary outcomes with learners' opinions of the MALL intervention.

## Results

The quantitative data revealed a continuous rise in vocabulary performance following the MALL intervention. The pre-test mean was 4.23 (SD = 2.47) and the post-test mean was 8.40 (SD = 1.22), as shown in Table 1. The average gain was 4.17 points on the 0-10 reporting scale. Twenty-eight students showed improvement and two retained their original score, which represents an improvement of 98.43% while no student scored lower on the post-test, indicating that the improvement was not limited to only a few students but reflected a general tendency in the group.

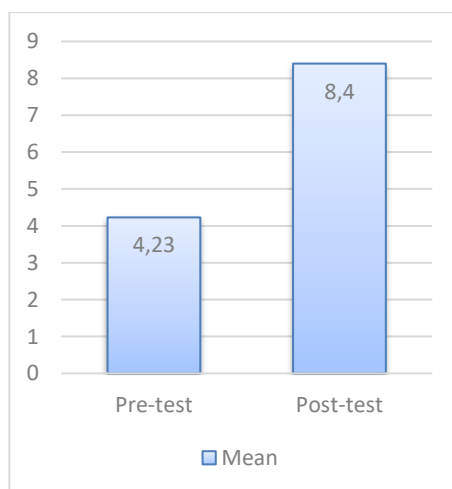
Table 1. Descriptive statistics for vocabulary scores

| Measure   | N  | Mean | SD   | Median | Minimum | Maximum |
|-----------|----|------|------|--------|---------|---------|
| Pre-test  | 30 | 4.23 | 2.47 | 4.0    | 1.0     | 10.0    |
| Post-test | 30 | 8.4  | 1.22 | 9.0    | 6.0     | 10.0    |
| Gain      | 30 | 4.17 | 2.17 | 5.0    | 0.0     | 8.0     |

Source: *Own Elaboration based on pre-test and post-test results.*

Figure 1 illustrates the difference between the pre-test and post-test mean scores. The increase suggests that repeated and interactive vocabulary practice through mobile-assisted tools supported students' vocabulary retention.

Figure 1. Pre-test and post-test mean scores



Source: *Own Elaboration*

A paired-samples t-test was used to evaluate if the reported increase was statistically significant. Table 2 indicates a statistically significant difference between pre-test and post-test scores,  $t(29) = 10.53$ ,  $p < .001$ , with a 95% confidence interval of 3.36 to 4.98 points. The impact size was large (Cohen's  $d_z = 1.92$ ), indicating that the intervention had a strong practical effect on vocabulary performance. Because the Shapiro-Wilk test suggested that the gain scores were slightly nonnormal, the Wilcoxon signed-rank test was also evaluated. A nonparametric test verified the improvement,  $W = 0$ ,  $p < .001$ .

Table 2. Paired statistical tests and effect size

Source: *Own elaboration based on paired pre-test and post-test data.*

The student perception survey has also reflected positively towards the utilization of mobile-assisted technologies. Table 3 Distribution of responses for each item of the Likert scale. The maximum agreement was seen in the categories of vocabulary retention, ease of learning and motivation when 27 students (90.0%) chose 'Agree' or 'Strongly agree'. The item of autonomous practice had 26 positive replies (86.7%) and the item of future use had 25 positive responses (83.3%). The results of the study indicate that most of the learners found Quizlet, Kahoot and Wordwall to be effective, engaging and manageable tools for practicing vocabulary.

Table 3. Student perception survey results

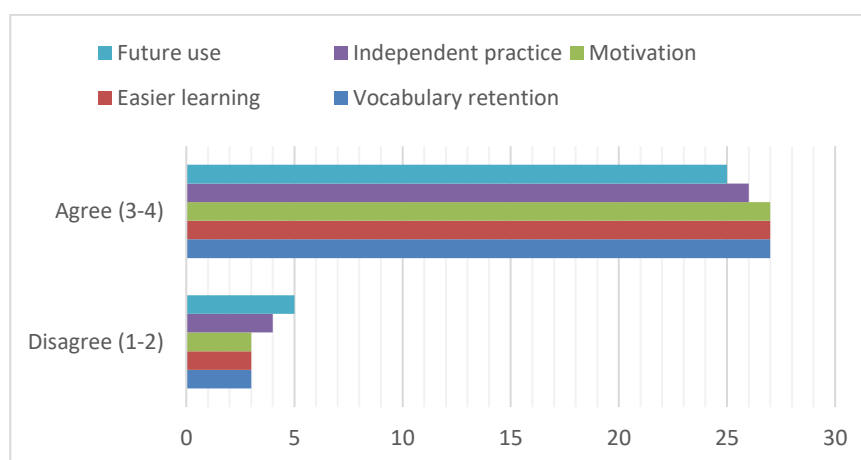
| Item                          | 1<br>Strongly<br>disagree | 2<br>Disagree | 3<br>Agree | 4<br>Strongly<br>agree | Mean                               | Agreement<br>n | Agreement<br>% |
|-------------------------------|---------------------------|---------------|------------|------------------------|------------------------------------|----------------|----------------|
|                               |                           |               |            |                        |                                    |                |                |
| Test                          | Statistic                 |               | df         | p_value                | Interpretation                     |                |                |
| Test                          | Statistic                 |               | df         | p-value                | Interpretation                     |                |                |
| Paired t-test                 | 10.532                    |               | 29         | <.001                  | Significant post-test increase     |                |                |
| Wilcoxon signed-rank          | W = 0                     |               |            | <.001                  | Robust confirmation of improvement |                |                |
| I1<br>Vocabulary<br>retention | 1                         | 2             | 14         | 13                     | 3.3                                | 27             | 90.0           |

|                                |   |   |    |    |      |    |      |
|--------------------------------|---|---|----|----|------|----|------|
| <b>I2 Easier learning</b>      | 1 | 2 | 12 | 15 | 3.37 | 27 | 90.0 |
| <b>I3 Motivation</b>           | 1 | 2 | 13 | 14 | 3.33 | 27 | 90.0 |
| <b>I4 Independent practice</b> | 1 | 3 | 12 | 14 | 3.3  | 26 | 86.7 |
| <b>I5 Future use</b>           | 1 | 4 | 15 | 10 | 3.13 | 25 | 83.3 |

Source: *Own elaboration based on the student perception survey.*

Figure 2 illustrates the number of students who disagreed or agreed with each question on the survey. The prevalence of agreement confirms the quantitative findings that students viewed the activities as effective for vocabulary learning and retention.

Figure 2. Student perception survey by item



Source: *Own elaboration*

The open-ended questions provide additional qualitative data on students' experiences of learning. 25 students validly answered the first open-ended question. Table 4 shows that the most reported useful activity was matching or pairing. This activity was reported by ten students, or 33.3% of the total sample and 40.0% of valid replies. Six students (20.0% of total sample and

24.0% of valid answers) referred to quiz activities and three students to completion activities. These answers show that the students enjoyed exercises that involved them in identifying, connecting and retrieving words interactively.

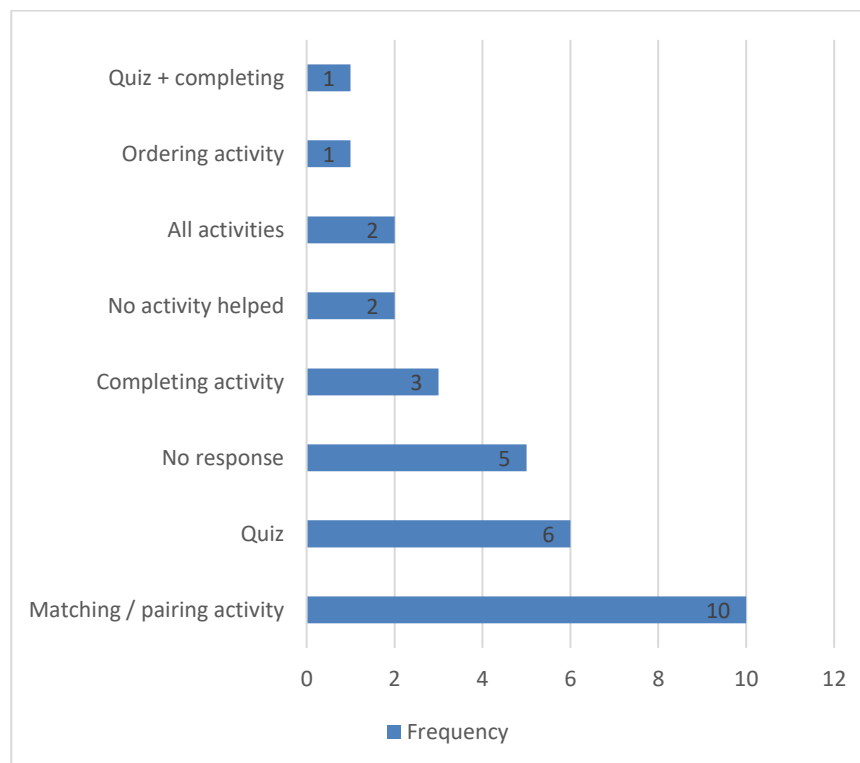
Table 4. Open-ended responses: most helpful activities

| Category                    | Frequency | % of total (n=30) | % valid responses (n=25) |
|-----------------------------|-----------|-------------------|--------------------------|
| Matching / pairing activity | 10        | 33.3              | 40.0                     |
| Quiz                        | 6         | 20.0              | 24.0                     |
| No response                 | 5         | 16.7              |                          |
| Completing activity         | 3         | 10.0              | 12.0                     |
| No activity helped          | 2         | 6.7               | 8.0                      |
| All activities              | 2         | 6.7               | 8.0                      |
| Ordering activity           | 1         | 3.3               | 4.0                      |
| Quiz + completing           | 1         | 3.3               | 4.0                      |

Source: *Own elaboration based on students' open-ended responses.*

Figure 3 displays the categories identified in the first open-ended question. Matching or pairing activities were the most frequent category, followed by quiz activities.

**Figure 3. Most helpful activities reported by students**



Source: *Own elaboration.*

Regarding the second open-ended question, 24 students gave valid answers on the challenges found during the intervention. Sixteen students claimed they did not have any major difficulties, which accounts for 53.3% of the overall sample and 66.7% of the valid replies, according to Table 5. The biggest issues involved vocabulary or language understanding (four students), technical or access problems (three students) and interface use (one student). These results suggest that the intervention was overall accessible for most participants; however, connection and lexical understanding should be taken into consideration when applying MALL activities in public-school contexts.

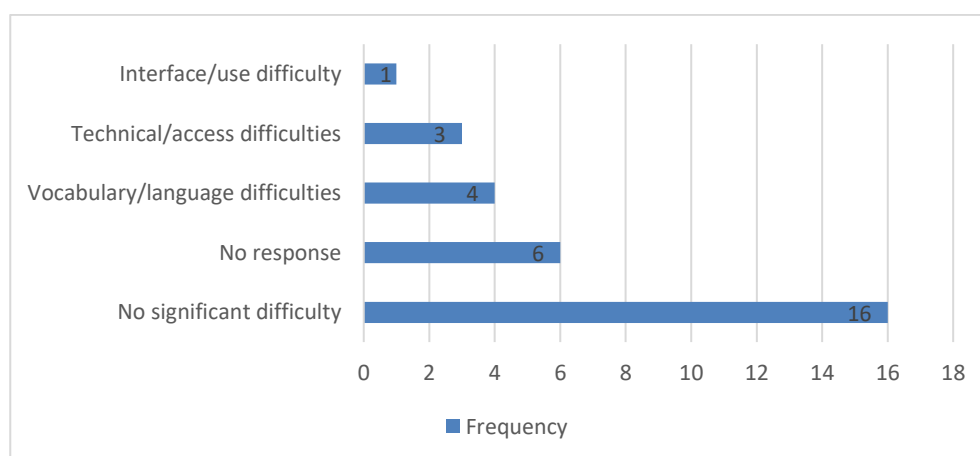
Table 5. Open-ended responses: difficulties reported by students

| Category                         | Frequency | % of total (n=30) | % valid responses (n=24) |
|----------------------------------|-----------|-------------------|--------------------------|
| No significant difficulty        | 16        | 53.3              | 66.7                     |
| No response                      | 6         | 20.0              |                          |
| Vocabulary/language difficulties | 4         | 13.3              | 16.7                     |
| Technical/access difficulties    | 3         | 10.0              | 12.5                     |
| Interface/use difficulty         | 1         | 3.3               | 4.2                      |

Source: *Own elaboration based on students' open-ended responses.*

Figure 4 shows that most students did not report major difficulties. Nevertheless, the presence of technical and vocabulary-related challenges indicates that teacher support remains necessary during MALL activities.

Figure 4. Difficulties reported by students



Source: *Own elaboration.*

In general, the quantitative and qualitative findings indicate that the MALL intervention had a positive effect on language retention. The increase in exam scores suggests evidence of learning. In the survey and open-ended responses, students generally found the tools to be useful, inspiring and accessible. But the results also indicate that successful implementation depends on instructor guidance and clear instructions and attention to likely connection or vocabulary understanding difficulties.

## Discussion

This study sought to explore the impact of Mobile-Assisted Language Learning (MALL) on vocabulary retention of 10th-grade English as a Foreign Language (EFL) students in an Ecuadorian public school using Quizlet, Kahoot, and Wordwall. It also attempted to investigate students' impressions of the usage of these digital tools for vocabulary training. Overall, the results revealed that the implementation of mobile-assisted learning activities had a good effect on students' vocabulary retention and developed positive attitudes towards technology-assisted language learning. Therefore, both study questions were answered using a combination of quantitative evidence from pre-test and post-test and qualitative evidence from the students' perception survey.

The numbers showed that students held onto more language after the six-week intervention. The results imply that the constant exposure to words through mobile applications increases lexical knowledge. Repeated contacts, appropriate context, retrieval practice and chances to utilize the sentences help vocabulary learning (Nation 2022). Thus, the progress observed is not due to the use of technology alone but rather to the instructional context of the vocabulary exercise. The intervention offered several opportunities to the students to be exposed to the target language in multiple formats that enabled them to retrieve the lexical elements in varied contexts. Maybe this constant work has developed the ability to keep words in mind, to a point where it's not just about blind remembering.

The results obtained are consistent with the findings of Xodabande et al. (2025) who found that mobile-aided vocabulary learning greatly improved long-term vocabulary retention as a result of

frequent retrieval and digital review activities. Koleini et al. (2024) also mentioned that mobile-assisted learning had a positive impact on the students' understanding of vocabulary because there were more opportunities to repeat the words continuously. Also, Teymouri (2024) discovered that digital applications aid in vocabulary learning, and learners are creating and revising lexical items over time. The usefulness of MALL is not just in the integration of digital devices, but also in the capacity to offer several opportunities for repeated exposure to vocabulary as shown in this study and in previous studies.

Moreover, the results are consistent with the findings of Okumuş Dağdelen et al. (2020) in that Mobile-Assisted Language Learning had a good influence on collocation learning of EFL learners. They paid attention to collocations. However, the mechanism of learning is the same. Both vocabulary and collocation learning require repeated lexical exposure and active recall. The results reported thus further support earlier research which suggested that mobile assisted settings stimulate lexical development due to frequent exposure to language.

Apart from the vocabulary retention, the study presents the educational values of Mobile-Assisted Language Learning. Çakmak (2019) indicates that MALL is a language teaching strategy that extends the traditional classroom by allowing learners to access learning resources through their mobile devices. The intervention was embedded into regular English sessions, but the usage of mobile applications transformed the classroom practice into lively student-centered learning experiences, a little different from the usual vocabulary teaching. So, technology was not simply a technological marvel but was employed as a teaching tool.

Similarly, Ahmed et al. (2024) discovered that learners use mobile learning apps when these are considered as useful, accessible and easy to use. This is corroborated by the qualitative findings of this study. Most of the students considered the activities to be interesting, educational, and inspiring and this could have contributed to a positive attitude and active involvement during the intervention. The positive attitudes of learners are very important since motivation is often the most important factor in deciding how often learners will repeat learning exercises, a process directly linked to vocabulary retention.

The present results are in line with the results of Al-Abri et al. (2025), who said that mobile assisted learning is more effective when it is incorporated in the scheduled educational activities with continuous evaluation. In this study, Quizlet, Kahoot and Wordwall were not offered as separate technical tools. The apps were picked to help with a variety of language development. To encourage quick memory, competitive quizzes were used on Kahoot, different interactive vocabulary games on Wordwall and students were given digital flashcards to revisit periodically on Quizlet. The learners' progress in the different areas of vocabulary is probably due to the lack of restriction in the use of digital resources.

Similarly, Alqarni (2024) discovered that mobile-assisted learning can also improve language development in general and not limited to vocabulary learning if instructional activities are effectively scaffolded. The same results were also reported by Aliakbari and Mardani (2022) for speaking growth. They argued that the basis of communication skills is lexical knowledge. The speaking performance was not directly studied in this study. However, with improved vocabulary retention, it can lead to better speaking ability in the future as the kids will have more lexical resources to talk with.

The findings are in line with the findings of Auliya et al. (2021), who found that mobile-assisted learning can support the growth of reading through word reinforcement, for that reason vocabulary knowledge is one of the most robust predictors of reading comprehension over time. Vocabulary retention gains can generalize to other linguistic abilities. To this purpose, Nst et al. (2023) underlined the educational potential of some mobile applications for language acquisition and mentioned that the effectiveness of MALL is more related to pedagogical integration than to the individual application. Thus, the current study agrees with the notion that teachers may have conflicting instructional views regarding vocabulary development using many m-Apps.

The present study makes an essential contribution towards the complementary role of Quizlet, Kahoot and Wordwall. All three applications use the MALL paradigm but allow vocabulary learning through various cognitive processes. Quizlet is a lightning-fast way to learn vocabulary. Kahoot is a competitive quiz system for testing recall and getting fast feedback. Wordwall provides a wide range of interactive tasks such as recognition, classification, matching, and

contextual interpretation of information. This mix of applications appeared to enhance the students' learning experience as more than one instructional strategy was used to drill vocabulary.

The findings from the quantitative data are supplemented by the results of the students' perception poll. Most participants felt that the most beneficial thing was activities, quizzes and exercises to conduct. They made the vocabulary drill more interesting and required greater attention during the activities. These preferences may have contributed to the good gains seen after the intervention, as the students were constantly exposed to the target language through several modalities of interaction. Similarly, Moreira Oña et al. (2025) presented a similar contribution of Wordwall and its efficiency in promoting vocabulary learning through interactive activities. Similarly, Kahoot improves vocabulary learning in terms of instant feedback and game-based learning (Phan & Tran, 2024), and Quizlet supports vocabulary growth in terms of lexical repetition with digital flashcards (Tran & Le, 2023). The results show that the same instructional sequence with different mobile apps offers distinct chances for learners to practice, review, and consolidate language. This may be one of the contributory factors for the advantages found in the present investigation.

The positive feelings of the students coincide with Álvarez Llerena et al. (2026), who indicated that game-based digital environments promote motivation, engagement and emotional involvement in the learning process. The interactive games made some participants think that the exercises were pleasant, and they learnt the language more easily. Motivation was a crucial part in keeping students interested in the intervention, as reflected in comments. Learning vocabulary is a repetitive process, hence, engaging learning experiences may increase students' active engagement in vocabulary review activities.

In addition, the qualitative results answer the second research question since the views on Mobile-Assisted Language Learning are mostly positive. The results are in line with the findings of Triyoga et al. (2023) that learners' perceptions have a significant role in the success of MALL implementation. If the digital applications are beneficial and engaging for the students, they will be active and continue the learning activities. Similarly, Sanjaya (2023) discovered that MALL

fosters learner autonomy since it allows learners to be more active in the learning process. As the intervention progressed, the children became more confident in their use of the programs and less direction was needed by the teacher as they became more familiar with the activities.

Despite all the great outcomes, some of the participants complained of slight difficulty with internet connectivity, foreign language, and occasional technical difficulties. This is in line with the findings of Okoye et al (2023) who stated that the efficient deployment of educational technologies depends on institutional architecture, teacher preparation and the availability of technological resources. “Digital inequality and inequalities in connectivity remain a problem in Latin America”, as ECLAC (2024) notes. Thus, there is a great deal of potential for teaching in Mobile Assisted Language Learning. But for the schools to capitalize on this potential, they need the correct tools in place.

The results provide important information about the pedagogical use of mobile devices in the educational system of Ecuador. The intervention was produced based on the rule of the Ministry of Education of Ecuador (2025), where the conditions of use of mobile devices in schools for educational purposes are established. The positive results imply that mobile devices can be great teaching tools, but only if they are effectively designed, supervised by teachers and closely linked to curriculum objectives. This finding is consistent with the research by Andino et al. (2025) that mobile learning apps improve students’ English communicative competencies in Ecuador. Likewise, they support the conclusions of Tamayo Maggi and Cajas Quishpe (2020) who pointed out the need to apply creative techniques to teach to find solutions for the chronic challenges of learning the English language in the educational contexts of Ecuador.

The findings of the current study have some practical consequences from a pedagogical point of view for the English teachers in public schools. Quizlet, Kahoot and Wordwall are not the alternative for traditional teaching, but they can be extra teaching tools. It provides more possibilities for vocabulary revision, quick feedback, student participation and self-learning. These allow teachers to improve vocabulary instruction without leaving the instructional setting. Thus, Mobile-Assisted Language Learning should be viewed as a pedagogical approach that enhances classroom practice via significant technology.

One of the main characteristics of this study is the integration of both quantitative and qualitative outcomes. Mixed methods were utilized to provide an objective measure of vocabulary gains and to analyze students' experiences of mobile-assisted learning. Triangulating the pre-test, post-test, and perception survey results provides complementary perspectives of the same educational event and increases the trustworthiness of the findings.

But there are certain limits to being mindful of. The experiment was conducted with a sample of thirty youngsters in a public school in Ecuador, limiting the generalization of the results. Also, the intervention was just 6 weeks in duration, and we could not test long-term retention of language. Finally, the study was limited to vocabulary development and did not explore the effects of MALL to other skills such as speaking, reading, listening, or writing. Future research may involve larger sample sizes, longer intervention durations, later post-tests and experimental designs with control groups to compare and provide more robust data on the long-term effectiveness of Mobile-Assisted Language Learning in EFL contexts.

The results indicated that the use of Mobile-Assisted Language Learning using Quizlet, Kahoot and Wordwall had a beneficial influence on students' favorable impressions and vocabulary retention in a public school in Ecuador. These findings add to the increasing research evidence in support of integrating mobile technology in English language teaching pedagogy and empirically justify the use of organized MALL tactics in secondary school.

## Conclusions

The findings of this study showed that the use of Mobile-Assisted Language Learning (MALL) through Quizlet, Kahoot, and Wordwall was effective in the vocabulary retention of tenth-grade EFL learners in a public school in Ecuador. There were improvements in students' vocabulary performance when the pre-test and post-test scores were compared, which indicates that mobile learning applications can be a useful tool for vocabulary acquisition when integrated systematically and linked to instructional objectives.

The mixed-methods approach gave a broader understanding of the intervention through the integration of quantitative information and students' views. The quantitative results showed that mobile applications improved vocabulary retention, while the qualitative data suggested that the students believed that the mobile applications were interesting, helpful, and effective in vocabulary learning. The preference for interactive activities such as quizzes, matching exercises and completion tasks implies that diversified digital practice may boost students' participation and facilitate vocabulary review.

The results also indicate the educational value of integrating several mobile applications in the same teaching procedure. The combined usage of Quizlet, Kahoot, and Wordwall gave various possibilities for repetition, recall, instant feedback and active involvement, which have been identified as key factors for vocabulary retention rather than relying on one platform. The findings of the study justify the implementation of Mobile-Assisted Language Learning as a supplemental pedagogical approach in the teaching of the English language.

Finally, the study contributes to the empirical evidence of Mobile-Assisted Language Learning in the Ecuadorian public-school setting. The results are limited to the characteristics of the participants and the duration of the intervention, but the results show that the pedagogically planned incorporation of mobile technology can support vocabulary learning. Future research may expand on this line of investigation by using larger samples, longer intervention periods and more language skills to better explore the educational potential of MALL.

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