



Digital Flashcards vs. Paper-Based Cards for Phrasal Verbs Mastery

Ece Sağlık Civaner^a*

^a İstanbul University-Cerrahpaşa, Türkiye; <https://orcid.org/0000-0002-9027-5555>

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Abstract

This research aims to investigate the impact of digital flashcards versus traditional paper-based flashcards on the vocabulary development of English as a Foreign Language (EFL) students, with a particular focus on learning phrasal verbs. The study was conducted with 44 A2 level students from a Turkish state university's prep school, who were randomly divided into experimental (digital flashcards) and control (paper-based flashcards) groups. Both groups took pre and post-tests, and qualitative interviews were conducted with five participants from experimental group to explore their attitudes towards digital flashcards. The research findings indicate that although the experimental group showed significant progress, there was no statistically significant difference between the two groups. The interviews revealed positive attitudes towards digital flashcards, highlighting their efficiency, accessibility, and engagement. Overall, both methods proved effective, indicating that intentional vocabulary learning through flashcards contributes to vocabulary development regardless of the format. The study recommends incorporating digital flashcards into language education for their advantages, including ease of access and engagement.

Research Article

Keywords: Intentional Vocabulary Teaching, Digital Flashcards, Phrasal Verbs

Introduction

The acquisition of vocabulary is essential for the mastery of four language skills. In the absence of sufficient vocabulary, individuals learning a second language would be incapable of participating in activities designed to strengthen their language abilities, such as reading, writing, and grammar exercises (Bueno-Alastuey & Nemeth, 2020).

It is widely agreed that the ability to acquire a language is greatly dependent on achieving mastery of its vocabulary (Webb & Nation, 2017) and a significant obstacle for students is the acquisition of new vocabulary (Schmitt, 2008). Acquiring new words is a challenge, and acquiring phrasal verbs—verbs and particles with grammatical functions—becomes considerably more difficult (Mahdavi & Bagheri, 2014). Moreover, Bronshteyn and Gustafson (2015) pointed out that phrasal verbs indicate unpredictability due to their potential to convey literal, aspectual, or idiomatic interpretations.

* Corresponding author. School of Foreign Languages, İstanbul University-Cerrahpaşa, Türkiye.
e-mail adress: ecesaglik@iuc.edu.tr

Both learners and teachers frequently struggle to determine the most effective method for learning vocabulary. Teachers implement a range of instructional strategies to help second language learners increase their vocabulary, including the use of dictionaries, visual aids like photos or actual objects, games, songs, and flashcards. Aisyiah (2017) asserted that the application of effective strategies is necessary for learning or teaching words.

Since the technology is an integral part of our lives, it provides extra opportunities for teachers to be used in the classroom because of the widespread use of mobile applications through mobile devices. Mobile Assisted Language Learning (MALL) describes the use of mobile devices to deliver learning to students at any time and from any location (Ilic, 2015). MALL serves as a major source of language instruction for students, and it also helps students retain newly acquired abilities and makes it possible for them to use those skills anytime they are needed (Tabatabaei & Goojani, 2012).

According to recent studies on MALL, mobile apps greatly improve EFL learners' linguistic proficiency and provide them with more opportunities for language practice (Xodabande & Atai, 2020; & Ginting & Fithriani, 2021; Lin & Lin, 2019). Although there are some studies investigating vocabulary acquisition via MALL, the current literature on this issue through mobile-assisted learning for teaching phrasal verbs using digital flashcards is limited. Additionally, there is a lack of research comparing the effectiveness of digital flashcards through mobile applications with paper-based flashcards. Therefore, the aim of this research is to explore innovative pedagogical approaches in language education, specifically focusing on the mastery of phrasal verb through digital materials. With the increasing dominance of mobile technology in education, it is crucial to understand the effectiveness of mobile flashcards compared to paper cards. This study utilizes technology to enhance language instruction and compares the efficacy of these two methods in acquiring phrasal verbs. Additionally, this research aims to improve pedagogy by identifying and promoting the most effective and engaging teaching methods for learning phrasal verbs. The study investigates how digital tools such as mobile apps can effectively teach these complex language patterns in education technology in a more engaging and successful way as phrasal verbs are integral part of effective communication in language learning. This study's findings can benefit language learners, educators, curriculum designers, and educational institutions.

Literature Review

The Importance of Types of Vocabulary Learning

Since vocabulary proficiency in English language acquisition is significant, it is imperative for the teacher to identify the suitable methodology and approach to instruct vocabulary to students. This will result in a more dynamic classroom environment and foster greater enthusiasm among the learners towards studying English.

Meara (1994) classifies the process of learning vocabulary. Incidental learning is not the same as intentional or conscious learning. He believes that it differs from intentional learning, which is organized by teachers or students. That is, students acquire vocabulary through their participation in activities such as reading, speaking, writing, and interacting with others. Intentional learning primarily emphasizes the direct growth of vocabulary, while incidental learning occurs as an indirect consequence of another activity, such as reading or writing. Both can have a significant impact on the acquisition of vocabulary (Nation, 2001).

By giving students lots of opportunities for engagement and rich, detailed input, incidental learning emphasizes students' capacity to deduce the meaning of new words from context (Webb & Nation, 2017).

It enhances learners' understanding of word usage and meaning through context, while simultaneously fostering reading or listening skills and vocabulary acquisition.

L2 learners can engage in intentional vocabulary learning through several methods. In addition to utilizing readily accessible tools like dictionaries and course books, a variety of methods, such as flashcards, word list learning, writing tasks, serious games, and fill-in-the-blanks activities, play a substantial role in enhancing vocabulary acquisition (Webb et al., 2020; Li and Hafner, 2022)

Phrasal Verbs

According to Benettayeb (2010), vocabulary is the total amount of words in a language. One of the greatest challenges in learning English is learning phrasal verbs in terms of vocabulary. Acquiring vocabulary can be challenging, particularly when it involves mastering phrasal verbs that serve grammatical purposes (Mahdavi & Bagheri, 2014). A phrasal verb is a word that is formed by combining a verb with an adverbial particle. Phrasal verbs present multiple challenges for English learners who are acquiring it as a second language (L2). One of them is unpredictability of the meaning. The range of meanings can vary from transparent, or literal, (e.g., stand up) to aspectual, or completive, (e.g., eat up) to opaque, or idiomatic, (e.g., face off)(Celce-Murcia, M., & Larsen-Freeman, D.,1999). From a semantic perspective, the meaning of a phrasal verb cannot be readily understood based just on the meaning of the verb and particle when considered separately.

Intentional Vocabulary Learning through Flashcards

Students often employ various paired-associate vocabulary acquisition techniques, such as wordlists, paper word cards, vocabulary notebooks, and digital flashcards, to efficiently acquire a substantial quantity of vocabulary in a limited timeframe (McLean, Hogg, & Rush, 2013).

Flashcards are a collection of cards with information on both sides, specifically created for the purpose of learning vocabulary. Flashcards are frequently utilized for the purpose of assessing learning progress and promoting the retention of information through repetition (Davis 2013). They enable learners to improve their memory and understanding of second language terms by repeatedly memorizing and flipping the cards to test their knowledge of the word's form and meaning. Flashcards can take several forms, including printed copies and digital flashcards (DFs). Flashcards demonstrate superior efficacy compared to alternative methods of vocabulary acquisition, regardless of the mode of delivery. Flashcards, as demonstrated by Nation (2013), facilitate the expansion of students' vocabulary and aid in their ability to concentrate on both the structure and significance of words (Komachali & Khodareza, 2012).

Studies about Vocabulary Learning and Digital Flashcards

Recently, interest in mobile-assisted language learning (MALL) has been developing, as seen by the growing number of studies investigating the benefits of digital flashcards (DFs) in mobile applications for vocabulary learning. Researchers generally agree that digital flashcards are quite good for vocabulary learning. However, the results are commonly divided into two groups compared with paper flashcards: more effective and similarly important.

Ashcroft, Cvitkovic and Praver (2018) carried out a study with 139 Japanese university students to explore the effectiveness of digital flashcards (Quizlet) and traditional flashcards for vocabulary acquisition. The study found that students with low and intermediate competency had far higher immediate vocabulary gains than those using paper flashcards, and significantly better long-term retention. However, advanced learners did not show a significant difference in immediate gains between the two ways, but favoured the traditional

paper flashcards for long-term retention. The researchers thought the success of the digital tools was due to the interactive elements and feedback they provided, which is helpful for lower-level learners who may not have metacognitive techniques. Advanced learners, on the other hand, have already acquired strong study habits and they are less dependent on digital factors.

Ho (2019) compared the use of Quizlet application with traditional paper flashcards for vocabulary acquisition in a mixed-methods quasi-experimental study with 39 Vietnamese high school EFL learners. The study employed pre-, immediate and delayed post-tests and found that Quizlet users had considerably better gains in vocabulary both instantly and over time. The multimodal environment of Quizlet explains the effect of reducing cognitive overload and increasing engagement through gamified feedback. However, some learners still reported that traditional paper flashcards were more successful for deep memorisation, showing a discrepancy between actual learning outcomes and student perceptions.

Li and Hafner (2022) compared the effectiveness of a mobile digital flashcard app (Zhimi) with traditional paper flashcards for 85 Chinese undergraduate EFL learners. Both approaches boosted second language vocabulary learning but the mobile app group made significantly greater gains in both receptive and productive collocational knowledge. The app's success was attributed to its interactive activities, spaced repetition algorithms and multimodal characteristics that enhanced cognitive processing. The qualitative interviews showed that the students were excited about the app as it was easy to access and had a game-like progression, but they mentioned the importance of strong self-discipline for long-term autonomous use.

Yüksel et al. (2022) investigated the effectiveness of digital flashcards (DFs) and wordlists in teaching technical vocabulary to 57 undergraduate pharmacy students. The results revealed that the use of DFs helped students acquire technical vocabulary better; students' attitude towards the use of DFs was positive, the perceived usefulness of the Quizlet app was a predictor of success in the DF conditions, and the practice of digital apps was a positive predictor of their intention to use the Quizlet application. The study results show that teacher-made DFs may be an effective tool to help students learn vocabulary and grasp technical terms.

The effectiveness of mobile-assisted language learning through a digital flashcard application (NAWL builder) versus traditional paper flashcards and word lists was investigated by Xodabande et al. (2022). In the present study, 361 specific academic terms were taught to 86 university students of psychology in Iran for 15 weeks. Using the digital flashcard application resulted in significantly greater gains in vocabulary.

Dizon & Tang (2017) conducted a study to investigate the efficiency of digital flashcards (electronic flashcards) versus paper-based flashcards in teaching vocabulary to 52 first-year English Foreign Language (EFL) students from private colleges in Japan. According to the findings, there was no significant difference in the effectiveness of digital/electronic flashcards and paper-based flashcards in enhancing the students' receptive and productive vocabulary in a second language. Hence, the use of digital/electronic flashcards does not appear to differ significantly from the use of paper-based flashcards. Both are equally good in teaching vocabulary. Therefore, the researchers are eager to re-examine the use of electronic flashcards to improve the students' vocabulary mastery.

Honarzard & Soyoof (2023) conducted a study to investigate the effectiveness of digital flashcards vs paper flashcards on foreign language vocabulary learning. The study was carried out on 34 participants in two groups. One group learned with mobile devices and the other group learned with traditional flashcards. Both digital and non-digital flashcards led to significant gains in L2 vocabulary acquisition.

However, the Anki software was more successful. Also, 10 students participated in the qualitative analysis of the study. The results indicate that paper flashcards should not be entirely dismissed. They limit screen time and distractions, build muscle memory and allow for student-controlled repeating patterns. They also provide for flexibility in the amount of information repeated.

Finally, Nikoopour and Kazemi (2014) investigated the effectiveness of mobile, online and traditional paper flashcards on the vocabulary learning of 109 advanced Iranian EFL learners over a 10-week period with a total of 70 words. The results showed that the mobile and paper groups were much better than the online group, but there was no significant difference between the mobile and paper groups. The researchers attributed these findings to the portability and convenience of mobile and paper flashcards. Qualitative data also indicated a more positive attitude towards mobile-assisted learning among students, with accessibility frequently mentioned as a key element for studying at their own pace.

As mentioned earlier, the number of studies comparing digital and paper-based flashcards for vocabulary learning is increasing (Ashcroft et al., 2018; Ho, 2019; Li & Hafner, 2022; Yüksel et al., 2020; Xodabande et al., 2022; Dizon & Tang, 2017; Honarзад & Soyooof, 2023; Nikoopour & Kazemi, 2014). The majority of studies have concentrated on teaching general vocabulary and the ones studying about phrasal verbs have been researched through different approaches such as cognitive approach (Al-Otaibi, 2019), task-based (Chou, 2020), game-based, social media compared to the classroom-based instruction (Roohani & Vinchek, 2023), or multimodal flashcards to find out the effectiveness of reading, writing, speaking, and listening practice modes (Spring & Takeda, 2024). However, the use of digital flashcards to teach phrasal verbs through a mobile application for adult learners in a prep school at a university context has not been studied and is yet to be examined.

The present study will explore the following questions:

1. To what extent does the use of digital flashcards impact EFL students' vocabulary development for phrasal verbs compared to paper-based flashcards?
2. What are the attitudes of EFL students towards vocabulary learning using digital flashcards through a mobile app for acquiring new vocabulary?

Methodology

Research Design

This quasi-experimental study used a pre-test/post-test design with a mixed-methods approach to investigate the effectiveness of digital flashcards for teaching phrasal verbs via Quizizz, compared with paper-based flashcards, and to examine students' attitudes and reflections on digital flashcards. The experimental and control groups were randomly assigned. The pre-test and post-test results comprised quantitative data, and interviews with students from the experimental group constituted the qualitative data of the study. In short, this research involved integrating quantitative and qualitative data to triangulate findings and answer the research questions.

Participants

The participants of the current study consisted of 44 students who were at a prep school in a Turkish state university. They were between 18 and 20 years old. The language proficiency level of the students was A2 level, and each had to take the proficiency exam whether to pass the exam to start studying at their department or to find out their level to study at the prep school. The participants were separated into the control group (n=22) and the experimental group (n=22). The researcher and the instructor of the study

conducted this research in her classes and randomly chose the groups. While the control group studied the word cards on a paper-based version, the experimental group was given the opportunity to study the same word cards through flashcards on a mobile app. Before the experiment, a pre-test for their vocabulary knowledge and an independent sample t-test were applied to ensure there was no significant difference between those groups.

Instruments

Target Words and Materials

Target words were chosen according to the wordlist of the unit of the book, where students were supposed to learn 40 phrasal verbs. The book was their main coursebook chosen at the institution, and the wordlist of this book was chosen according to the unit's content. There were only 40 target phrasal verbs, and all of them were chosen to be used in this study. The study involved a division of 40 phrasal verbs into four sets of 10 items, and the students were expected to learn ten phrasal verbs each day during the study for four days.

The study comprised two types of materials: paper-based flashcards and digital flashcards. In the first type of material, a flashcard was prepared for each phrasal verb. In each flashcard, the researcher included the pronunciation, definition, a sample sentence, and a picture to make the vocabulary more memorable, and they were printed in 2 sets to give the students each day.

As for the second type of material, a mobile app called Quiziz was utilized to prepare the same flashcards, including all the elements mentioned on the flashcards in a digital format. In terms of the difference between these two types of flashcards, students were able to reach the flashcards out of the class by clicking on the link, and they were also assigned to the students to study as a task. Also, a small quiz between 10 and 20 questions for each set was prepared for the students in the experimental group to reinforce their learning after studying the set of flashcards on the app for each day.

However, the other students in the control group could only study the flashcards in the class. In addition, they did not have a chance to see the progress made since the study was comprised of asking each other questions between two groups and answering the questions of the instructor as a whole class study.

GO OFF

/gəʊ ɒf/

If a warning device warning device goes off, it starts to ring loudly or make a loud noise

What time does your alarm go off in the morning to wake you up?



Fig. 1. A sample of a flashcard

Vocabulary Pre-test and Post-test

A pre-test comprised of 40 multiple-choice questions (see Appendix A)was prepared by ChatGPT. Each question aimed to assess one phrasal verb on the flashcards, and students were supposed to choose the correct answer out of four options. Also, questions were revised one by one and adapted, if necessary, according to the context and level of the students. Then, the test was given to two instructors other than the researcher to solve and analyze the test to ensure it was appropriate for the study in terms of reliability. As for the post-test, the same questions were used in a mixed order to understand the effectiveness of the experiment.

Qualitative Interviews

After the post-test, the researcher chose five participants through a systematic sampling technique according to the level of gains. The researcher aimed to discover the students' attitudes and reflections towards digital learning to study vocabulary. These five students also gave their consent to share their ideas. It was conducted face-to-face in the researcher's office, and there were only three questions to be answered:

1. Do you think using digital flashcards through a mobile app is effective for acquiring vocabulary knowledge? Please give your reasons why it is useful or not.
2. What are the advantages and disadvantages of using a mobile app while learning new vocabulary compared to other strategies used for vocabulary learning?
3. Would you keep using digital flashcards through a mobile app to study and learn new vocabulary on your own after the experience? Why or why not?

Procedure

In this quasi-experimental study, the researcher randomly divided participants into two groups: a paper-based flashcard group (CG) and a digital flashcard group (EG). Then, they were asked to fill out their consent form, where they shared their personal information, such as name and contact information, and they agreed to join the experiment as a volunteer. After the form process, the pre-test consisting of 40 multiple-choice questions was given to complete in 40 minutes in both classes. The following day, the study to learn ten phrasal verbs as a set started for each day. While the digital flashcard group studied the sets on a mobile app, the control group individually studied the same set with paper-based flashcards. The experimental group had a chance to study the phrasal verbs on their mobile app in the classroom, and they were able to reach the flashcards outside of the class. As for the control group, students tested themselves by asking their classmates questions about the picture related to the phrasal verb, definition, and sample sentence. Lastly, the instructor made students study the phrasal verbs as a whole class activity. In addition, all participants completed a mini quiz to revise the set of the day to enhance their learning at the end of each session. Lastly, all participants studied four sets of phrasal verbs in four days and completed the learning process. In the last section, post-tests and interviews were conducted to see if there was any significant difference between the two types of learning.

Data Collection and Analysis

The researcher marked the pre-and post-test answers for each student in both groups. Each question's point was 2,5 points, so the 40 questions' maximum total score would be 100 points. Descriptive statistics and independent t-tests were utilized for quantitative data analysis. Also, each participant's progress between pre and post-test was included in a table. As for the interviews, qualitative content analysis was applied to understand the students' attitudes to the mobile app while learning new vocabulary.

Results and Discussion

Findings about Students' Vocabulary Development

The descriptive statistics (mean, standard deviation, standard error) defining both control group and experimental group are provided below.

Table 1.

Descriptive Statistics of the Pretest for Control and Experimental Group

Group	Group	N	M	SD	Std. Error Mean
PreTest	Control Group	22	71.48	11.77	2.51
	Experimental Group	22	69.89	7.89	1.68

To determine if there are statistical differences in the pretest scores of the groups before the treatment for the participant homogeneity, the independent sample t-test was employed to evaluate the pre-test results of both groups. There was no discernible difference between the experimental and control groups since the difference did not significantly contribute to the overall significance. In other words, it demonstrated the uniformity of the study's participants. In this regard, the efficient sampling of choosing participants demonstrates the accomplishment and successful practice of the internal validity of this study.

Table 2 shows the independent t-test results for the groups on the pre-test task. Table 1 shows descriptive statistics of the pre-tests done with experimental and control groups.

Table 2 .

Independent Samples t-test Scores (Pretest)

		F.	Sig.	t	df	Sig. (2-tailed)
PreTest	Equal variances assumed	2.97	0.09	0.53	42.00	0.60
	Equal variances not assumed			0.53	36.70	0.60

The pre-test results of the two groups did not significantly differ statistically, as evidenced by the independent samples t-test findings in Table 2. Consequently, the participants' initial level is almost equivalent to that of the other group, as it is roughly normally distributed, with $t = 0.53$ ($df = 42$, $p > .05$).

The descriptive statistics of posttest for both control group and experimental group can be found in Table 3. When the posttest results of the experimental and control group are analyzed, students in the experimental group who used digital flashcards did not perform significantly better in the post test ($M = 87.05$, $SD = 7.78$) than the students who utilized paper-based flashcards ($M = 81.02$, $SD = 15.40$). As it can be concluded from

the independent samples t-test scores below (Table 4), there was not a significant difference between the post test results of the experimental and control group ($t = -1.64$, $p > 0.5$).

Table 3.

Descriptive Statistics of the Posttest for Control and Experimental Group

	Group	N	M	SD
PostTest	Control Group	22	81.02	15.40
	Experimental Group	22	87.05	7.78

Table 4.

Independent Samples t-test Scores (Posttest)

		F.	Sig.	t	df	Sig. (2-tailed)
PostTest	Equal variances assumed	5.06	0.03	-1.64	42	0.11
	Equal variances not assumed			-1.64	31.05	0.11

Regarding the score gain, the control and experimental groups saw a minimum gain of 2.5 points, except for one student. The maximum gain in the control group was 20 points for two students, with two achieving a gain of 32.5 points. The details can be seen in the Table 5 below.

Table 5.

Scores of Pretest and Posttest of Control and Experimental Group

CG	Pretest	Posttest	EG	Pretest	Posttest
S1	72.5	75	S1	52.5	85
S2	90	100	S2	60	82.5
S3	50	60	S3	65	67.5
S4	65	42.5	S4	57.5	82.5
S5	60	75	S5	67.5	95
S6	45	55	S6	57.5	90
S7	80	80	S7	80	85
S8	65	85	S8	75	85
S9	62.5	82.5	S9	72.5	80
S10	85	100	S10	70	95
S11	80	87.5	S11	70	77.5
S12	85	95	S12	75	85
S13	70	80	S13	70	90
S14	85	90	S14	67.5	97.5
S15	70	87.5	S15	85	100
S16	60	57.5	S16	72.5	85
S17	72.5	90	S17	77.5	92.5
S18	67.5	85	S18	75	85
S19	80	95	S19	72.5	100
S20	72.5	80	S20	75	90

S21	85	100	S21	75	85
S22	70	80	S22	65	80

To sum up, the experimental group had received a treatment—studying phrasal verbs through digital flashcards over a period of one week—and they did not perform better than the control group with traditional instruction with paper-based flashcards. This assertion was tested using an independent sample t-test. The experimental group's mean score ($M=87.2$) ($SD=7.78$) was a little higher than that of the control group's mean score ($M=81.05$, $SD=15.40$), which also revealed that their sig. (2-tailed) (0.11) was higher than (0.05). This statistical evidence confirmed that there was no significant difference between the experimental and control groups' mean scores of their post-test.

Finding about Attitudes of Participants towards Digital Flashcard as a Tool

After the post-test, five participants were interviewed to explore their ideas about their experience about the use of digital flashcards. There were three major themes found in the interviews: engagement, accessibility, and efficiency.

The first and the second interview question were related to each other. Some sample answers are as follows:

S1: *“I could remember the phrasal verbs better thanks to the visuals on the flashcards.”* (efficiency)

S2: *“While we were learning the phrasal verbs, I was able to take screenshots and study later on them.”* (accessibility)

S4: *“I could reach my flashcards just clicking on a link which was time-saver and cost effective.”* (efficiency)

S3: *“If the flashcards were in a paper-based mode, they would get lost easily.”* (accessibility)

S2: *“After studying the main coursebook for the whole semester, this activity was unusual, and not basic as in the coursebooks while learning vocabulary. So I enjoyed it!”* (engagement)

S5: *“It caught my attention well because we were supposed to learn 10 phrasal verbs using our mobile phones and it was a different technique. I could never learn this amount of phrasal verbs by myself.”* (engagement)

There were no disadvantages mentioned about it, but participants gave some suggestions to improve its efficiency.

S1: *“Instead of ready-made flashcards, we could have put effort in the preparation stage.”*

S2: *“If I wrote my own sentence, I could remember the phrasal verbs easier.”*

S5: *“The antonym of the phrasal verbs on the flashcards could make easier to learn them.”*

When it comes to the last question if they would use this system again, students stated that they could use the same system for complicated vocabulary. Some sample answers as follows:

S4: *“It is a more suitable way for learning as a class, but paper-based flashcards can be more effective while studying at home.”*

S5: *“It may take a lot of time to prepare it online but I can do it for the difficult words I can not remember.”*

The researcher concluded that students were in favor of using digital flashcard technique through a mobile app for vocabulary and they even included some comments to improve and use it for a better application.

Research question 1 was about the impact, if any, of using digital flashcards have on the EFL students' vocabulary development for phrasal verbs compared to paper-based flashcards.

First of all, it was discovered that the mean scores of the experimental and control groups' pre-tests were similar at the starting point. In both the pre-test and post-test, the students' combined mean scores from the

two groups were compared. After the treatment with digital flashcards, the experimental group's overall mean score increased from 69.89 to 87.05. The overall mean score for the control group, on the other hand, was 71.48 in the pre-test and increased to 81.42 in the post-test. Although there was a significant progress between pre- and post-test scores of the experimental group, there was no significant difference in their posttest scores compared to the control group.

The findings of the earlier studies (Ashley et.al.,2018; Nikoopour& Kazemi, 2014; Dizong & Tang; 2017) are consistent with these findings. According to these studies, both digital flashcards and paper-based flashcards increased students' achievement. To start with, these findings are similar to the study conducted by Ashley et.al (2018). They found that digital material and traditional material did not make any difference in terms of vocabulary gain for advanced level students in that study, while the same result was found in lower intermediate level students in the current study. Also, Nikoopour and Kazemi (2014) conducted a study where they compared mobile, paper, and online flashcards and there was improvement in vocabulary learning but no significant difference between mobile and paper-based flashcards. Lastly, Dizong & Tang (2017) found no significant difference between digital flashcards and paper-based flashcards in teaching vocabulary to 52 first-year English Foreign Language (EFL) students from private colleges in Japan. It can be concluded that using digital flashcards are useful for teaching phrasal verbs, but it may not make a difference in a study conducted for a short period such as one week as seen in this study. Shortly, according to the quantitative results of the study, both digital flashcards and paper-based flashcards can aid EFL students in developing their vocabulary knowledge.

Research question 2 was related to students' attitudes regarding the digital flashcard use in vocabulary learning. To address this question, an interview with five participants were conducted and a content analysis was utilized to find out the results. The study's conclusions show that the participating students had favorable perspectives of digital flashcard use in their learning process as a consequence of a better acquiring of knowledge. The students found the digital flashcards practical in terms of engagement, accessibility, and efficiency. They also added some suggestions such as being able to add their own sentence or antonym of the word.

The study supports the conclusions of several previous studies in the literature (Honarzard & Soyooof ,2023; Li&Hafner, 2022; Nikoopour&Kazemi,2014; Xodabande et al. ,2022). These authors claim that mostly students gave positive reactions to the use of digital flashcards. It encourages to improve their vocabulary knowledge in a simpler way. Ease of use was the key factor in one study (Dizon&Tang, 2017). In another study (Honarzard & Soyooof ,2023), while high mobility and its positive environmental impact because of saving paper were the advantages, some disadvantages were the digital eye strain and migraines caused by increased screen time, not being able to add hand-drawn sketches or handwriting to digital cards. Nikoopour&Kazemi (2014) found that ubiquity, high accessibility, and portability were the key points that made students flexible while learning new vocabulary. Xodabande et al. (2022) stated that students' engagement and motivation with their discipline-specific academic vocabulary increased thanks to digital flashcards.

Overall, it was concluded that EFL students' experiences with both methods let them learn phrasal verbs effectively and that they had good attitudes regarding the use of digital flashcards while learning new vocabulary in English.

Conclusion

The goal of the current study was to compare the impact of digital flashcards and paper-based flashcards as a traditional way of teaching vocabulary and discover the attitudes of students about using digital flashcards in vocabulary teaching. As said by this study, digital flashcards did not make a big difference

compared to paper -based flashcards, but it affected the results of pre and post test scores of experimental group in a positive way.

Regarding the views of EFL students showed that they have very good attitudes towards using digital flashcards to learn English vocabulary.

On the basis of the study's main conclusions, it can be concluded that the use of flashcards as an intentional type of vocabulary teaching is successful no matter what the type it is. Consistently with previous studies and results from students' interviews, digital flashcards have more advantages than paper-based flashcards such as easy access, being cost-effective, being editable, and increasing engagement of the students. Student can also develop positive attitudes to learning new words which is an integral part of language learning.

Regarding pedagogical implications, the instructors may employ this technique in their lessons easily, so this can be incorporated into the curriculum and materials to guide teachers have an interactive and efficient lessons. Secondly, EFL teachers should integrate digital materials such as flashcards into their classroom practice and support their traditional materials. Lastly, schools can organize trainings to integrate digital materials into the curriculum for their teachers.

Limitations and Suggestions for Further Research

The study has several limitations. First, the research was done with a limited number of students which included only 22 students. This should be considered to generalize the findings because of the small sample size. Secondly, the period of the experiment lasted only four days which may have affected the results as well and it could be generalized. More research should be conducted on the effectiveness of digital flashcards and paper-based flashcards for vocabulary teaching to conclude which one is more effective and find out advantages of them in other contexts with large number of student size.

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Appendices

Appendix A

VOCABULARY PRE-TEST & POST-TEST

1. Jenny was _____ her vacation to the beach after a long year of hard work.
a) looking for b) looking round c) looking forward to d) looking up
2. The concert will _____ at 10 PM, so make sure to stay until the end for the final performance.
a) go out b) turn off c) be over d) turn on
3. Could you please _____ the client later today regarding their inquiry about the product?
a) take out b) call back c) put away d) go off
4. _____! You can do it!
a) give up b) turn on c) come on d) take off
5. The teacher asked the students to _____ the missing words in the exercise.
a) fill in. b) take out c) write down d) look forward to
6. Despite her doubts, Sarah decided to _____ about the surprise party to see if her best friend was involved in the planning.
a) take off b) go off c) find out d) stand up
7. Despite feeling unwell, Tom had to _____ early to catch the morning flight for his important business meeting.
a) turn up b) get up c) put away d) check in
8. After borrowing the book for a month, Sarah felt obliged to _____ to the library before the due date to avoid late fees.
a) pick out b) give up c) give back d) put off
9. Tom encountered a tough challenge in the crossword but decided he wouldn't _____ until he found all the answers.
a) take out b) go off c) put off d) give up
10. Alice decided to _____ her new colleague to establish a good working relationship.
a) take out b) give up c) get on with d) look for
11. The unpleasant smell in the kitchen didn't _____ despite opening the windows.
a) go out b) go away c) turn off d) put away
12. I was tired, but I decided to _____ for dinner with my friends to celebrate my birthday.
a) go out b) take off c) put away d) turn on
13. Mary needs to _____ her cat while her parents are on vacation.
a) turn off b) look up c) give back d) look after
14. He wants to _____ the price of the bike before buying it.
a) take back b) look up c) put away d) give up
15. Tom decided to _____ his keys before leaving for work.
a) take out b) stand up c) look for d) turn off
16. Jack was determined to _____ the money he owed to his friend by the end of the month in spite of financial difficulties.
a) wake up b) pay back c) turn off d) turn down
17. She's going to _____ her friend at the station.
a) pick up b) put away c) take back d) turn down
18. Mark made a conscious decision to _____ his phone and concentrate on studying for the exam.
a) fill in b) give back c) turn off d) put away
19. Sarah felt a chill in the air and decided to _____ her jacket before leaving for the walk.
a) put on b) put off c) take out d) check in

20. Feeling exhausted, after a long day at work, Sarah decided to _____ and relax on the comfortable couch.
a) run out of b) put away c) sit down d) give back
21. Before leaving the house, Mark made sure to _____ all the lights to save energy.
a) turn off b) put on c) wake up d) take out
22. When the room felt chilly, Mark chose to _____ the heater for added warmth.
a) sit down b) put away c) give back d) turn on
23. Feeling enthusiastic, Sarah chose to _____ in order to cheer louder for her team during the match.
a) sit down b) stand up c) turn on d) put away
24. After realizing the wrong size, Mark decided to _____ the shirt to the store for a replacement.
a) take back b) sit down c) turn on d) stand up
25. Please _____ your shoes before entering the house.
a) turn on b) take off c) write down d) go off
26. Could you _____ the music a bit? It's too quiet.
a) turn up b) turn off c) take off d) go out
27. I'll _____ my old clothes to make space in the wardrobe.
a) take out b) fill in c) go off d) throw away
28. Could you _____ this information in your notebook?
a) put on b) write down c) take out d) check in
29. She needs to _____ the dress before buying it.
a) take back b) try on c) put off d) go off
30. Despite the cold weather outside, Jack chose to _____ the thermostat to lower the room temperature.
a) turn off b) turn up c) turn down d) stand up
31. Can you _____ this package at the post office for me?
a) send back b) put off c) turn down d) wake up
32. Please _____ the garbage before it starts smelling.
a) put on b) take out c) fill in d) go off
33. I always _____ early to catch the sunrise at the beach.
a) take off b) wake up c) turn down d) stand up
34. It is a good idea to _____ early at the airport to ensure a smooth boarding process.
a) take off b) check in c) turn down d) stand up
35. I'll _____ my friend at the bus stop tomorrow morning.
a) wake up b) take out c) check in d) drop off
36. At 6 AM, Sarah's alarm clock started to _____, indicating the time for her morning routine.
a) turn on b) go off c) put on d) turn up
37. It takes too much time to _____ the best outfit for the party from her wardrobe.
a) take out b) go off c) pick out d) put on
38. Before choosing her new home, I walked around the neighborhood to _____ and see what was nearby.
a) take out b) go off c) look up d) look round
39. They decided to _____ the trip due to unforeseen circumstances.
a) give back b) put off c) give up d) stand up
40. Despite planning, I realized I would _____ milk for her morning coffee and hurried to the store.
a) run out of b) go off c) look round d) take out