

# The Effect of Electronic Flashcards on EFL Students' Vocabulary Learning: The Case of Saudi Arabia

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## ABSTRACT

*This study aimed to investigate the effect of electronic flashcards on EFL vocabulary learning of preparatory-year female students at a Saudi Arabia. It was conducted following the quantitative research methodology with a quasi-experimental design. Two groups were assigned: an experimental group who used electronic flashcards, and a control group who employed the traditional method of vocabulary learning. A pre-test and a post-test were administered in order to appraise their performance before and after the experiment. The results revealed that the post-test scores of students in the experimental group were significantly higher than their pre-test. Also, the results showed that electronic flashcards promoted students' vocabulary, causing a statistical significance in comparison to the control group. Based on these findings, this study was able to draw a number of implications and recommendations.*

## KEYWORDS

*Electronic Flashcards; Vocabulary learning; EFL; Saudi Arabia*

## INTRODUCTION

Vocabulary learning is essential to learn a language, including a foreign language. Therefore, EFL learners must have a lexical knowledge to be able to communicate. There is no clear-cut way of learning vocabulary since a variety of traditional methods are widely used, such as paper wordlists, vocabulary notebooks or bilingual dictionaries. However, there are alternative and innovative ways which can help EFL learners to master vocabulary items more effectively, such as electronic flashcards (Dodigovic, 2013; Komachali, & Khodareza, 2012; Spiri, 2014).

The rapid and multi-faceted development of technology has influenced all fields of study, including language education. Nowadays, most of the learning, working and communication take place via technology, and thus, EFL teachers are highly recommended to integrate technological tools in EFL classrooms (Ball, 2011; Larsen-Freeman & Andersen, 2011; Warschauer & Meskill, 2000). The use of web-based flashcard applications is one way of incorporating technology for vocabulary learning.

## Statement of the Problem

The best way of vocabulary learning is still an area of debate although a considerable amount of research has been conducted to examine the impact of different techniques on EFL vocabulary learning. In the Saudi context, EFL students usually struggle to find an effective way that can help them to learn vocabulary (Al-Shehri, 2013; Alzeer, 2015). One of the common ways is to memorize L2 forms with their L1 translations, which they find useless. Other demotivated learners ignore vocabulary learning as a whole, and thus, their language proficiency is extremely affected. Moreover, little attention is paid towards teaching and

learning vocabulary items in many EFL contexts (Godwin-Jones, 2010) as some teachers hold a negative perception that vocabulary learning is students' own task. Others employ traditional methods which do not fit into learners' needs. With the lack of knowledge of some alternative tools, students still use traditional ways when learning vocabulary. Therefore, there is a need to investigate the effect of electronic flashcards on EFL vocabulary learning as an alternative practice in order to cope with the needs of this tech-driven generation and get them motivated in the learning process.

### ***Significance of the Study***

This study contributes mainly to the field of technology in language education. It strongly supports the use of technology in EFL language teaching and learning. Thus, it is believed to add a value to the body of literature related to the use of web-based tools for vocabulary learning, especially in the Saudi context.

The present study promotes the replacement of traditional pedagogical approaches used for EFL vocabulary teaching and learning with new ICT-based instructional tools. It would encourage the use of innovative applications such as Quizlet as a way to learn vocabulary more effectively. Also, it can make the learning process easier and more enjoyable by enlightening students and educators about this tool in order to improve the learning outcomes and create better opportunities for students to learn and operate in today's e-society.

## **LITERATURE REVIEW**

### ***Vocabulary Learning***

Vocabulary is one of the most important components in learning a language. "Vocabulary acquisition is a crucial, and in some senses, the central component in successful foreign language acquisition" (Beglar & Hunt, 2005, p. 7). It is fundamental, but it is not an easy job for many EFL learners (Shen, 2003). They need lexical knowledge in order to express their ideas and convey messages successfully since the wrong use of vocabulary may cause misunderstanding or hinder communication (Allen, 1983). Also, vocabulary knowledge enables learners to access a variety of written and spoken input. Therefore, a great amount of time should be allocated for vocabulary learning, which makes more progress in language learning than grammar (Thornbury, 2002). Regardless of their proficiency level, all learners need to learn vocabulary (Nation, 1990).

### ***Deliberate Vocabulary Learning***

The current study is in favor of explicit vocabulary learning which aligns with proponents who claim that vocabulary should be taught or learned deliberately using different techniques via multimedia (Coady, 1993; Nation, 2001). Deliberate learning occurs when there is an intentional or explicit focus to learn vocabulary items. Intentional learning leads to greater vocabulary gains and better retention (Coady, 1993; Nation, 2001; Schmitt, 2008). It results in effective vocabulary learning and long-term retention since it includes processes of more exposure and manipulation on vocabulary items (Schmitt, 2008). From a psycholinguistic standpoint, Hulstijn (2001) claimed that it is the explicit focus and interpretation of forms and meanings of vocabulary items that determine their retention. Thus, explicit vocabulary instruction about a word should be implemented in L2 vocabulary learning (Gardner, 2013; Laufer, Meara & Nation, 2005) such as the use of electronic flashcards (Gardner, 2013).

### ***Electronic Flashcards as a Learning Tool***

Electronic flashcard is a deliberate vocabulary learning activity which can be designed in a monolingual or a bilingual learning mode. In the monolingual mode, input is presented only in the learners' L2. However, both L1 and L2 are involved in the bilingual learning mode (Elgort & Piasecki, 2014). Monolingual flashcards usually have the L2 word on one side and L2 definition on the other side. In contrast, bilingual flashcards display the L2 vocabulary item on one side and L1 translation on the reverse side (Elgort & Piasecki, 2014; Komachali & Khodareza, 2012; McLean, Hogg, & Rush, 2013). A visual image is a significant feature that can be implemented in both types of flashcards to reinforce vocabulary learning (Elgort & Piasecki, 2014). Research in this area is inconclusive regarding which is better in terms of vocabulary retention. One study found no significant difference between the L2 vocabulary retention of learners using L1 translation and those using L2 definition (Yoshii, 2006). Other studies concluded that using L1 translation results in better retention for low proficiency learners, whereas using L2 definitions leads to better retention for high proficiency learners (Hu, Vongpumivitch, Chang, & Liou, 2014; Watanabe, 1997). However, these studies indicated that using L2 definitions may benefit and help low proficiency learners to improve their language and increase their vocabulary knowledge. Another study conducted by Elgort (2011) found that the use of bilingual flashcards did not develop vocabulary learning of low proficiency learners, but it did work well with high proficiency learners. The study also suggested the use of monolingual flashcards for all learners regardless of their proficiency levels. Therefore, monolingual flashcards are used in the current study with the integration of visual images.

### ***A Brief Overview of Quizlet***

Quizlet is one of the most well-known web-based flashcard tools with millions of users and visitors. It is a platform used to promote vocabulary learning through flashcard study sets. It has a free mobile app that allows teachers and learners to use it anywhere at any time. Users of Quizlet must create an account for free if they want to save their progress in activities with each flashcard set. They have eight different learning modes or game-like activities, namely Learn, Flashcards, Write, Spell, Test, Match, Gravity, and Live, as presented in Figure 1. For this study, all the eight activities are used. Such activities help learners to check their understanding of the vocabulary items as well as promoting their retention.



**Figure 1.** The Learning Modes of Quizlet

### ***Studies on the Use of Electronic Flashcards for Vocabulary Learning***

There are studies that demonstrate positive results regarding the use of electronic flashcards for vocabulary learning through different applications such as Anki, WordEngine, and StudyStack (Altiner, 2011; Başoğlu & Akdemir, 2010; Hung, 2015; McLean, et al., 2013), but a few research studies have been conducted to evaluate the use of Quizlet platform for English vocabulary learning. For example, Humphreys (2017) investigated the effect of Quizlet flashcards in comparison to paper word cards. Thirty Japanese university students were divided into two groups. One group used the application to type the words and their

translation and the other group wrote them on their word cards. Ten words were introduced per week over five weeks. Pre- and post- tests were applied to both groups in order to measure students' knowledge of the vocabulary items before and after the treatment sessions. The results showed that Quizlet group outperformed the group who used paper word cards. However, the study was limited in its small number of participants.

Similarly, Dizon and Tang (2017) compared the effect of electronic flashcards to paper ones on enhancing learners' receptive and productive English vocabulary knowledge. The participants were fifty-two Japanese students in their first year at university. They were divided into two groups: one used digital flashcards to study vocabulary and the other one studied from paper flashcards over a twelve-week period. The use of the application was left up to learners' preference either to use Quizlet, Cram, or both of them. Pre- and post- tests were undertaken to examine students' knowledge of the targeted words before and after the treatment. Results revealed that the group of learners who studied from electronic flashcards performed better than the other group in the post-test. However, it is of paramount importance to ensure the homogeneity of the two groups prior to conducting the study in order to have more reliable results and this is what the study lacked. Also, some learners used only one application while others studied from both, but there was a preference for using Quizlet. Therefore, it is difficult to decide which one had the positive impact on students' vocabulary learning. To solve this, it should be precisely defined either to assign only one program for the group or to have a comparison between two groups, each one uses a different application.

With regard to the Saudi context, Alzeer (2015) conducted a study with sixty-three university students majoring in English. They were divided into two groups; the experimental one used computerized flashcards via Quizlet to study academic vocabulary whereas the control group studied from paper counterparts. Three tests were undertaken: a pre-test, an immediate post-test, and a two-week delayed post-test. Results indicated that the scores of the two groups did not significantly differ in the immediate and delayed post-test. This may be because of the large number of words covered in every session, which led to cognitive overload. There were forty terms introduced in an hour. Another reason could be the incomplete use of Quizlet multimedia activities and, thus, the full use of the application will lead to different findings. Additionally, the academic terms were studied only for the purpose of the experiment. They were not part of students' university course, which may cause a decrease in their motivation. Furthermore, another study was conducted with the aim of investigating the effect of Quizlet flashcards on Saudi male EFL students' vocabulary learning (Sanosi, 2018). There was a control group who studied in the regular teaching method. A pre- and post- test were administered. Results revealed that the experimental group outperformed the other group in their post-test, suggesting that web-based flashcards had increased their vocabulary knowledge.

After reviewing previous studies, it can be noticed that most of them compared electronic flashcards with paper ones, but only few made the comparison with other methods, such as wordlists, vocabulary notebooks and the traditional method of vocabulary learning. In addition, Quizlet, the free version, was used with a focus on academic words as the targeted vocabulary (Alzeer, 2015). Another deficiency is the use of non-probability sampling, such as convenience, which is considered as not representative of the sample population (Alvi, 2016). Further studies are needed in order to investigate the effect of electronic flashcards on EFL students' vocabulary learning, especially in the Saudi context, since the studies on this matter are very limited.

Therefore, the current study aims to address such limitations in the literature and respond to current trends that emphasize upon the integration of technology in language teaching and learning. Quizlet Teacher with its advantageous features is the host platform of this study which has not been evaluated empirically in the literature. The random sampling is implemented to ensure the representativeness of this study. The targeted vocabulary items are part of the participants' course book which makes the present study different from many previous studies that focused solely on academic words. This study attempts to answer the following research question:

What is the effect of using electronic flashcards on EFL students' vocabulary learning?

## **METHODS**

### **Participants**

The participants were female students at the preparatory-year level taking obligatory English courses at the English Language Institute (ELI), King Abdulaziz University, Saudi Arabia. Their ages ranged between 18 and 20. The EFL learners under study were at intermediate level of proficiency in English, i.e., (B1) level according to the Common European Framework of Reference for Languages (CEFR). Learners at this level can express themselves in a limited way in familiar situations, understand the main points of clear standard input, and produce simple text on topics that are familiar or of personal interest.

Random sampling is the method adopted in the current study because it reflects the features of the population. The use of such probability sampling provides every individual with an equal opportunity to be selected (Alvi, 2016). Therefore, two classes of ELI-103 were randomly selected; an experimental group who used electronic flashcards, and a control group who studied applying the traditional method of vocabulary learning. Each group consisted of twenty-one students.

### **Material**

The main material used in the current study was electronic flashcards. There were six flashcard sets created by the researcher via Quizlet Teacher. Every flashcard set included six to seven vocabulary items taken from the units of B1 English Unlimited coursebook. The set was posted prior to every treatment session. On the first side, the electronic flashcards consisted of L2 form, while, on the other side, L2 definition and a visual image were provided. The English definitions were taken from Longman Dictionary of Contemporary English. The pronunciation of the words is automatically available there.

### **Research Procedure**

The current study took place in three stages: pre-experiment, the experiment, and post-experiment.

#### **Pre-experiment**

Two sections of the ELI-103 were randomly selected for the purpose of the study: an experimental group and a control group. Because of the quasi-experimental design of this study, it was of paramount importance to verify the homogeneity and comparability of both groups in terms of some common variables like gender, age, origin and proficiency level of English (Alvi, 2016). All the participants were females, within the same age range, and they were of Arab origin. Regarding their proficiency level, all EFL students at the ELI are grouped together based on their scores of the Cambridge International Examinations that are undertaken at the beginning of each academic year, and, thus, the participants under study



were at B1 level according to the Common European Framework of Reference for Languages (CEFR). For further investigation, a pre-test was administered to the experimental and control groups in order to ensure that both groups were homogeneous.

### ***The Experiment***

After taking the pre-test, there was an orientation for the experimental group in which they were introduced to the use of Quizlet Teacher, its features and how to register on it. There was a class created via Quizlet Teacher where all members of the group were requested to join it. Then, the experimental group used the electronic flashcards created by the researcher for vocabulary learning during a three-week intervention whereas the control group was not exposed to such method. There were two sessions per week; students were required to study six to seven words in each session along with doing all their related activities. The researcher had an advantage of tracking students' progress in order to ensure that everyone in the group did all the activities for each flashcard set.

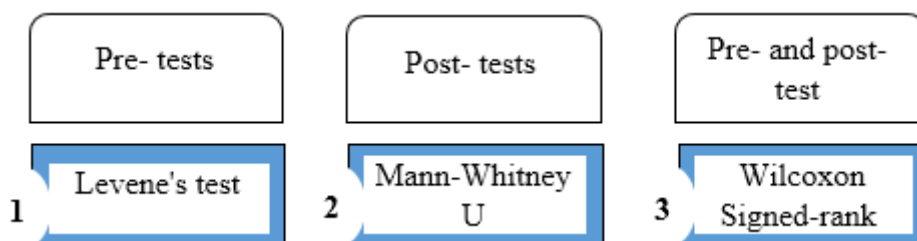
As for the target vocabulary items, six to seven words were selected from each of six units of the B1 English Unlimited Coursebook.

### ***Post-experiment***

After the completion of the treatment, a post-test was administered to the experimental and control groups in order to examine the effect of web-based flashcards on students' vocabulary learning.

### ***Data Analysis***

In order to answer the aforementioned research question, the quantitative data gathered from the pre-test and post-test were analyzed using three non-parametric statistical tests through the Statistical Package for Social Sciences (SPSS). First, Levene's test was performed to ensure the homogeneity and comparability of the two groups. Second, the post-test scores of the experimental group and control one were compared using Mann-Whitney U test. Third, a statistical test called Wilcoxon Signed-rank was utilized to determine if a significant improvement occurred as a result of the treatment sessions by comparing the pre- and post-test scores of the experimental group. The number of students in both groups was less than thirty, thus, such non-parametric tests were applied (Barnes & Lewin, 2005), as shown in Figure 2. Non-parametric or distribution-free tests do not assume that the outcome is normally distributed and are used when the sample size is small, as opposed to parametric tests, which involve specific probability distributions such as the normal distribution and are used when the sample size is more than thirty (Siegel & Castellan, 1988).



**Figure 2.** Non-parametric tests for quantitative data analysis

## RESULTS OF THE STUDY

A pre- test was undertaken by the two groups who were randomly selected from the intended population. The purpose was to investigate any differences between them. The results indicated that both groups had homogeneity of variances since the  $P\text{-value} = .666 > 0.05$ . It can be concluded that the two groups were homogenous and comparable and this is very important to ensure in quasi-experimental studies prior to the intervention. Table 1 presents the result of Levene's test of homogeneity.

**Table 1.** Levene's Homogeneity Test

Levene Statistic	df1	df2	Sig.
.189	1	40	.666

After that, the groups were set as an experimental group who used electronic flashcards for vocabulary learning, and a control group who studied following the traditional method. Subsequent to the completion of the three-week intervention, a post- test was administered for both groups to test their knowledge of the target vocabulary items.

To answer the research question properly, two non-parametric tests were employed to investigate if there was a significant difference between the test scores of both groups.

### *Comparing the Post-test Results of Both Groups*

Mann-Whitney Test was utilized to check whether there was a significant difference between the post-test scores of students in the experimental group and the ones in the control group.

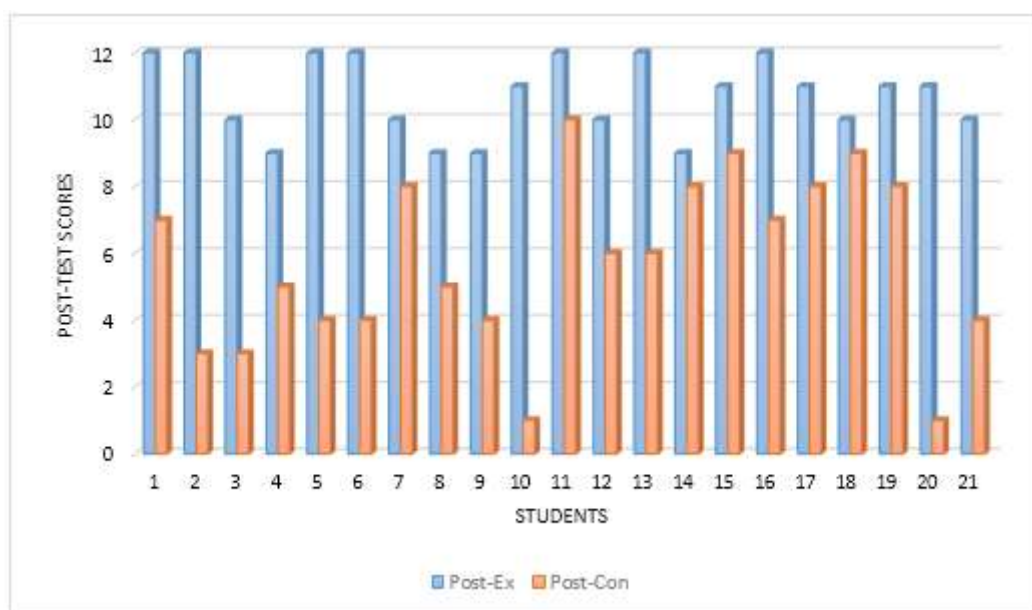
**Table 2.** Mann-Whitney Test

Ranks			
Group	N	Mean Rank	Sum of Ranks
Post- Con	21	11.50	241.50
Post- Exp	21	31.50	661.50
Total	42		

**Table 3.** Test Statistics of Mann-Whitney Test

	posttest
Mann-Whitney U	10.500
Z	-5.320
Asymp. Sig. (2-tailed)	.000

As presented in Table 2, the results show that students in the experimental group got higher scores than their fellows in the control group with a mean rank of (31.50). Also, the difference between the post-test scores of the two groups is statically significant because the  $P\text{-value} = .000$ , as seen in Table 3. It can be inferred that electronic flashcards improved vocabulary learning of students in the experimental group.



**Figure 3.** Post-test scores of the experimental group and control group

#### ***Comparing Students' Test Results Before and After the Experiment***

Wilcoxon Signed Ranks Test was performed (See Table 4) in order to investigate if there was a significant difference between the scores of students in the experimental group before and after the experiment. The pre-test and post-test scores of students are presented in Figure 4.

**Table 4.** Wilcoxon Signed Ranks Test

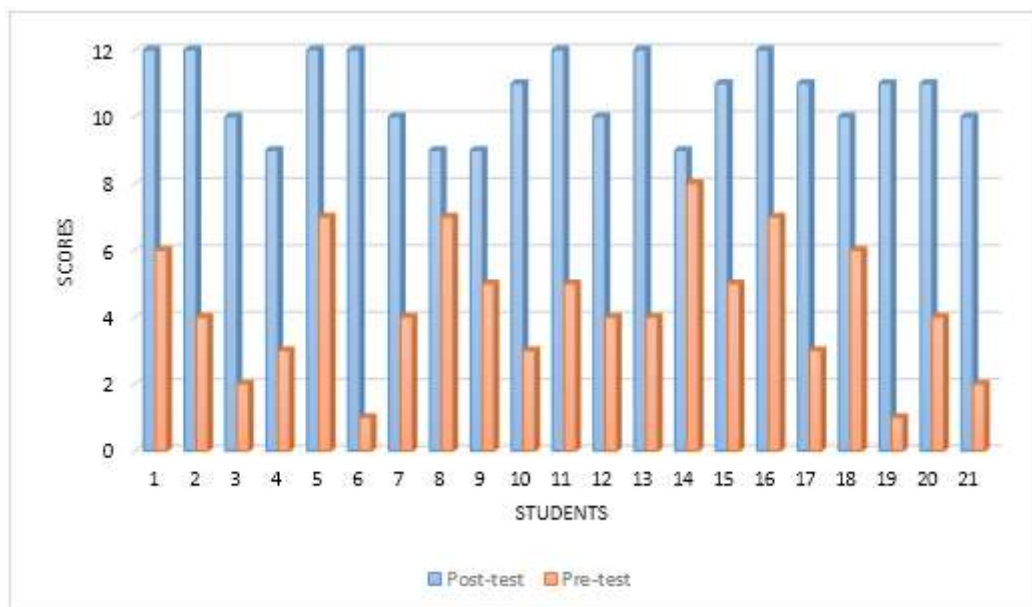
		N	Mean Rank	Sum of Ranks
Pre –Post Experimental	Negative Ranks	0 <sup>a</sup>	.00	.00
	Positive Ranks	21 <sup>b</sup>	11.00	231.00
	Ties	0 <sup>c</sup>		
	Total	21		

**Table 5.** Test Statistics of Wilcoxon Signed Ranks Test

Pre –Post Experimental	
Z	-4.032 <sup>b</sup>
Asymp. Sig. (2-tailed)	.000

As illustrated in Table 5, the P-value (i.e., .000) indicates a significant difference between the pre-test and post-test scores of the experimental group in favor of the post-test. In other words, students' scores in their post-test were significantly higher than their performance in the pre-test. It can be concluded that students' performance improved after the inclusion of electronic flashcards for vocabulary learning.





**Figure 4.** Students' scores of the experimental group before and after the intervention

## DISCUSSION

This study attempted to investigate the effect of electronic flashcards on EFL students' vocabulary learning. Students in the experimental group used electronic flashcards to learn English vocabulary for three weeks, whereas their counterparts in the control group were not exposed to such method. Based on the results of the non-parametric statistical tests, the post-test scores of students in the experimental group were significantly higher than their pre-test scores, which indicated that they improved due to the treatment sessions. This is in line with the results of previous research studies, such as Altiner (2011), Alzeer (2015) and Sanosi (2018), which found that learners who used electronic flashcards for vocabulary learning improved significantly in the post-test when compared to their pre-test scores. This implies that digital flashcards are useful and effective in enhancing vocabulary learning, as claimed by other researchers (Komachali & Khodareza, 2012; Laufer, et al., 2005; McLean, et al., 2013).

Moreover, there was a significant difference between the scores of students in the experimental group and those in the control group in their post-test results. This aligns with many studies in the literature demonstrating that web-based flashcards have effectively promoted students' vocabulary learning. For instance, Humphreys (2017) compared the impact of electronic flashcards with paper word cards and found that learners who used Quizlet flashcards outperformed the other group in the post-test. Also, the present study is consistent with the one conducted by Dizon and Tang (2017), which concluded that electronic flashcards were more effective than paper flashcards in terms of vocabulary learning, as students in the experimental group got higher scores in the post-test than their counterparts who used paper flashcards.

Contrary to that, this study is incompatible with the finding obtained by Alzeer (2015) in the Saudi context. In contrast to the current study, she found no significant difference between the post-test scores of students in the experimental group who were exposed to electronic flashcards and the ones in the control group who used paper flashcards. There are some possible justifications for the insignificant difference between the scores of the two groups in their post-test. First, the use of convenience sampling includes a bias selection of the population which can affect the quality and reliability of the results. Alternatively, the

incorporation of random sampling is more representative and leads to more reliable results (Dizon & Tang, 2017). Second, the vocabulary items in Alzeer's (2015) study were learned only for the purpose of the experiment. They were not a part of the participants' university course and they were academic and abstract terms. This might decrease the level of students' motivation and, thus, their post-test performance was affected. However, vocabulary items in the present study were taken from students' coursebook and this may be a factor which helped to make them more motivated to learn the words. Third, the learning modes of Quizlet were partially employed. The main focus was on Flashcard and Test (Alzeer, 2015) which means that only two of the learning modes were used. In contrast, the entire employment of Quizlet activities can lead to a significant difference between the two groups' performance, as obtained in the current study. Fourth, learners might be cognitively overloaded due to the large number of vocabulary items covered in every session. They were introduced to forty terms with their definitions in an hour. According to cognitive researchers, the amount of information processed at one time is limited (Mayer, 2005; Sweller, 1988). In Alzeer's (2015) study, the limit of memory capacity was probably exceeded and, therefore, cognitive overload occurred.

## **CONCLUSION**

This quantitative study is an endeavor to investigate the effect of electronic flashcards on EFL students' vocabulary learning. It aimed at examining students' performance before and after the experiment through a pre- and post- test. The results indicated that, when comparing the results of their pre- and post- test, students in the experimental group made a significant improvement due to the employment of electronic flashcards. Additionally, learners of the experimental group outperformed those of the control group in their post-test, suggesting a significant difference between the two groups.

## ***Pedagogical Implications of the Study***

Based on the findings of this study, there are some implications for those who are interested in the use of technology for vocabulary learning. First, the integration of electronic flashcards is to be taken into consideration when designing curricula or syllabuses. Second, training programs or workshops for instructors need to strongly emphasize upon the implementation of such an innovative approach in EFL classrooms. Third, educators should be willing to incorporate it by developing their technological skills, since this approach is tech-driven. Also, good planning is a prerequisite for a successful and efficient employment. Preferably, teachers are highly recommended to encourage the use of the application as an out-of-class activity in order to help students practice constantly and reinforce their vocabulary learning. Frequent exposure to the words leads to more effective and meaningful learning. In addition, teachers should keep an eye on students' performance via the application to ensure that they are on track, to praise achievements, thereby fostering honest competition

## ***Recommendations for Further Research***

The present study has thrown up many questions in need of further investigation. The issue of including both genders is an intriguing one which could be usefully explored in further research. For instance, the researcher could use two separate groups, a male section and a female section, to compare their performance after enough exposure to the method. In addition, a future study could assess the long-term effect of electronic flashcards on students' vocabulary learning through a delayed post-test. It would be a fruitful area for further work to examine the effect of digital flashcards in relation to different proficiency levels or

learning styles. This study can be replicated to investigate the same issue over a longer period of time, including a larger population. Such attempt could provide more reliable results.

Further empirical investigations are needed to estimate the effect of student-designed flashcards on their vocabulary development. These can help learners to closely explore the application as well as developing their autonomy. It may be worthwhile to conduct an experimental study comparing the effect of different electronic flashcard programs, such as Quizlet, Anki, Cram, WordEngine and StudyStack in order to find out which one is the most effective in terms of vocabulary learning.

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