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Exploring Digital Flashcards for Enhancing English Vocabulary Learning in Elementary Students

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Abstract: This research examined EFL elementary school students' purposeful vocabulary acquisition using a digital flashcard tool in self-study. This research used Quizlet as a Computer Assisted Vocabulary Learning (CAVL) tool to have students repeat an intentional vocabulary learning activity at home for four weeks. This research included weekly vocabulary learning records, assessments, questionnaires, and individual interviews. Content and statistical analysis were used to examine the data. Students who used Quizlet more often gained more vocabulary, and there was a substantial association between digital flashcard usage and vocabulary increases. The students also liked utilizing digital flashcards for self-study, and Quizlet's features, convenience of use, and language learning potential were their main perks. This study's results help language instructors understand EFL students' deliberate vocabulary acquisition using the suggested digital flashcard technology.

Keywords: Computer Assisted Vocabulary Learning (CAVL); Intentional Vocabulary Learning; Digital Flashcards; English as a Foreign Language (EFL).

Introduction

Taiwan speaks English like other Asian countries. Taiwan's "Bilingual Nation" policy promotes English as the primary and secondary language by 2030. Bilingual education and English language acquisition are policy priorities (National Development Council, 2018). In this environment, English education improvement is vital. Many parents also want their kids to lead. Taiwanese primary school children study English in first grade. The 12-Year Basic Education requires English for six years in elementary school, three in junior high, and three in high school. Some studies show more kindergarteners and preschoolers acquiring English (Ku, 2019; Tseng et al., 2019). Learning a second language (L2) or foreign language (FL) needs a strong vocabulary (Nation, 2001; Schmitt, 2008).

Language teachers start classes with vocabulary, offer homework, and test it. English language learning is for communication. Due to the prevalence of vocabulary notebooks, paper wordlists, and bilingual dictionaries, there is no one vocabulary study method. Digital flashcards and audio-visual inputs may help EFL students acquire vocabulary (Yowaboot & Sukying, 2022; Peters, 2019; Peters & Webb, 2018). Studies demonstrate that intentional vocabulary learning, which stresses focused repetition and retention, enhances students' vocabulary (Hirschel & Fritz, 2013; Honarzad & Soyoof, 2023). Word lists, flashcards, and vocabulary notebooks may aid purposeful vocabulary development (Elgort & Nation, 2010).

Technology has transformed teaching and learning, especially word learning (Bueno & Nemeth, 2022). Mobile devices are used by many educators for individualized instruction. Access, security, cost, teacher and learner digital tool proficiency (Nguyen, 2021), and intelligent technology risks (Konstantakis, 2022). Van, Dang,

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Pham, Vo, and Pham (2021) claim use of technology to learn foreign languages enhances self-directed learning in and out of class. Focused vocabulary improvement using digital flashcards. Researchers suggest digital flashcards boost vocabulary and track learning progress (McLean, Hogg, & Rush, 2013; Nakata, 2008). Digital flash cards' retesting feature helps students rehearse unfamiliar words and retain knowledge (Hulstijn, 2001).

Wright (2016) says Quizlet helps users create and study flashcards using numerous approaches. Over 50 million monthly users and 400 user-generated study sets make it a popular flashcard app (Matthew, 2019). Digital flashcards have been studied for university students, but not for high school and primary school students. Some interviews (Anjaniputra & Salsabila, 2018) demonstrated that Quizlet's features made vocabulary learning pleasant for students. These elements made learning new ways interesting for students. According to Skattenborg (2020), educators believed Quizlet functioned when used appropriately. It improved repetition, motivation, and instructional variation. Student stated Quizlet varied and stimulated learning. To fill this gap, this research examines Taiwanese elementary school EFL students' self-study vocabulary acquisition using Quizlet. This article delves into two key research questions:

1. Did the frequency of digital flashcard use among students lead to notable vocabulary gains?
2. What were the students' perceptions of learning vocabulary through the utilization of digital flashcards?

By addressing these research questions, the study aims to contribute valuable insights to the literature on the efficacy of digital flashcards, specifically focusing on younger learners within the context of Taiwan's bilingual education system.

Materials and Methods

Participants

Thirteen fourth-graders from Taiwan (eight boys, five girls) averaged 10 years old (SD = 0.55) in this research. CEFR Beginner Level (A1) is their goal. They attend 1.5-hour English sessions three times a week after four years of study. Their four years of computer knowledge qualify them for CAVL tasks. Six students used digital vocabulary flashcards; instructors used paper ones. Table 3.1 provides demographics.

Table 3.1: Participant demographics

	Subjects (N=13)
Age	
Minimum	9
Mean	10
Maximum	11
Gender	
Male	8
Female	5
Years of English learning	
1 to 2 years	0
3 to 4 years	4
5 years and above	9
Years of using computers	
1 to 2 years	0
3 to 4 years	4
5 years and above	9
Experience of using printed flashcards	
Yes	13
No	0
Experience of using digital flashcards	
Yes	6
No	7

Instructional Design

This study's instructional design utilized Quizlet as a self-study vocabulary learning instrument (to be introduced in Section 1), through which students were required to complete a CAVL task (to be described in Section 2) for 15 minutes twice per week in order to better their vocabulary learning.

The CAVL Tool: Quizlet

In 2005, Andrew Sutherland invented Quizlet, a popular learning tool for all levels and subjects. A mobile app and over 100 million flashcard sets are available for free or with a $15/year Quizlet Plus membership for picture uploads and ad-free usage. CAVL tool Quizlet lets users study flashcard sets using various self-evaluation forms. According to Figure 3.1, users may practice vocabulary using digital flashcards with six self-assessment forms in two learning modes: Study (Flashcards, Learn,

Speller, and Test) and Play (Scatter and Gravity) for free.

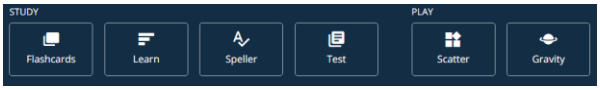

Figure 3.1: Screenshot of different self-assessment formats available in Quizlet

Below are Quizlet Study's Flashcards, Learn, Speller, and Test self-assessment formats:

- Images and audio flashcards help users learn words. The cards may be flipped, pronunciation controlled, and vocabulary acquisition started for effective self-assessment. Learn: Users self-assess by inputting vocabulary terms from meaningful photographs. You may activate or disable audio. Incorrect phrases are read, defined, and illustrated by the computer to improve vocabulary and spelling. Speller: This self-assessment lets users listen and type correct answers at variable playback speed. The application provides feedback on incorrect letters, making it great for vocabulary, listening, and spelling practice. Test: A flashcard-based self-assessment exam includes spelling, matching, multiple choice, and true/false questions. Similar to classroom vocabulary examinations, users may review their results and errors.

Along with the four self-assessment formats of the Study mode, Quizlet's Play mode provides Scatter and Gravity game-based learning activities. Scatter matches phrases and meanings by dragging and dropping. Time is monitored, making vocabulary study competitive and fun. Gravity is a multi-level typing game. Users write phrases as they scroll down the screen, and their scores and levels are recorded. Higher scores speed up scrolling and emphasize missing phrases for better spelling and memory.

2. The Vocabulary Learning Task

Students self-studied 10 vocabulary words every week on Quizlet for four weeks. Quizlet users trained weekly word sets using six self-assessment modes. Students tracked their weekly Quizlet use in a learning diary.

Research Procedures

Elementary EFL students' Quizlet vocabulary acquisition was examined using a pre- and post-test approach. Students and guardians gave informed permission, including a Chinese translation for clarity. The seven-week program included Preparation, Intervention, and Evaluation.

- During the first week of the Preparation Phase, students completed a 15-minute pre-test with 100 words, choosing 40 for the post-test based on wrong or unanswered questions. Following a pre-intervention survey, they received Quizlet accounts and learnt how to use it.
- The researcher added ten words weekly to Quizlet for homework during the Intervention Phase (weeks 2-5). It took 15 minutes twice a week plus learning journals.
- Students completed a 15-minute post-test and a post-intervention questionnaire during the Evaluation Phase (weeks 6-7). Individual 15-minute interviews were also held to examine vocabulary acquisition.

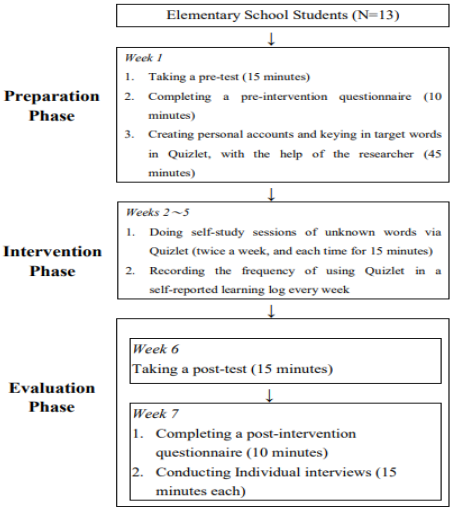

Figure 3.2: Research procedures

Data Sources

The data obtained for this study via a Google form was subjected to analysis utilizing version 23 of the Statistical Package for the Social Sciences (SPSS). The data including the vocabulary learning tests, vocabulary learning questionnaires, self-reported vocabulary learning logs, and individual interviews, are detailed below:

1. *Vocabulary Learning Tests*

Students took pre- and post-tests. 100 GEPT Vocabulary Basic 1500 items were randomly selected for the pre-test. The Taipei Language Training and Testing Center classifies competency (Cheng, Klinger, Fox, Doe, Jin, & Wu, 2014). The GEPT Vocabulary Basic 1500 was picked because students require these terms. 40 pre-test unanswered or wrong words were selected for the intervention. Quizlet's 40 items were utilized in the post-test. Post-test correct responses assessed vocabulary improvements.

2. *Vocabulary Learning Questionnaire*

A 20-item questionnaire was given before and after the educational intervention. A Chinese translation clarified. First 10 things were demographic. Adapted MSLQ items 11-19 examined intrinsic learning motivation (Pintrich and De Groot, 1990). It stressed self-efficacy, intrinsic worth, and self-regulation. This research used a five-point Likert scale. The last question was open-ended concerning word learning strategies.

3. *Self-reported Vocabulary Learning Logs*

Students recorded Quizlet usage weekly throughout the intervention (weeks 2–5). An modified vocabulary acquisition record from Kim, Rueckert, Kim, and Seo (2013) was utilized. It marked Quizlet function use frequency. These records connected digital flashcard usage to self-study and vocabulary improvements.

4. *Individual Interviews*

Volunteers gave digital flashcard opinions in individual interviews. Five questions were slightly changed from Seppala & Alamaki (2003) and Yamamoto (2014). All 15-minute interviews were in Chinese. Thirteen interviews were audio recorded, transcribed, and translated into English for content analysis to answer study questions.

Results and Discussion

Result

This chapter presents data analysis results and interprets them for the two study issues. In Research Question 1, students' self-reported learning logs and post-test gain scores relative to the pre-test were investigated to determine their vocabulary learning gains via digital flashcards. Next, surveys and interviews were used to examine students' impressions of digital flashcards for vocabulary acquisition (Research Question 2).

The Students' Vocabulary Learning Gains Resulting from their Use of Digital Flashcards

This section discusses whether Quizlet affected students' vocabulary growth. Based on self-reported logs, Table 4.1 illustrates post-test gains and Quizlet utilization. Maximum individual gain = 40, minimum individual gain = 10, mean gain = 24.76 (SD=10.63). Quizlet use averaged 20.92 (SD=13.90), with a high of 50 and a low of 8. Student 1, the most regular user, answered all questions correctly, while Student 13, the least frequent, gained the least. Quizlet usage was associated with better post-test gains, except for Student 8, who used it less but fared similarly. The interview suggests Student 8 spent more time on Quizlet every session. Quizlet usage increases vocabulary overall.

Table 4.1: Descriptive statistics of the students' gains in vocabulary scores and frequency of using Quizlet

Participants	Gains	Frequency
Student 1	40	50
Student 2	40	39
Student 3	38	37
Student 4	32	31
Student 5	30	19
Student 6	28	21
Student 7	22	13
Student 8	20	8
Student 9	19	15
Student 10	17	13
Student 11	15	10
Student 12	11	9
Student 13	10	8
	Mean=24.76; SD=10.63	Mean=20.92; SD=13.90

Table 4.2 shows that all 13 students were separated into two groups based on their mean vocabulary increase scores from the pre-test to the post-test. Students with gain scores above the average (Mean=24.76) were classed as more progress (MP), whereas those below this were labeled as less progress (LP). Among the six MP students (S1~S6), the mean score was 34.66, with a standard deviation of 5.31. Gain scores ranged

from 28 to 40 for these students. The LP Group contained seven kids (S7~S13) with a mean score of 16.28 and a standard deviation of 4.53. Gain scores ranged from 10 to 22 for these students.

Table 4.2: The vocabulary gain scores for the more progress and less progressgroups in the post-test

More Progress (MP) Group		*Less Progress (LP) Group*	
Participants	*Gains*	*Participants*	*Gains*
Student 1	40	Student 7	22
Student 2	40	Student 8	20
Student 3	38	Student 9	19
Student 4	32	Student 10	17
Student 5	30	Student 11	15
Student 6	28	Student 12	11
		Student 13	10
	Mean=34.66; SD=5.31		Mean=16.28; SD=4.53

Table 4.3 shows that the 13 students were separated into two groups by mean frequency of usage. Students who reported a frequency of usage above the group's average (Mean=20.92) were placed in the more frequent (MF) group, while those who reported a frequency below this were placed in the less frequent (LF) group. The MF Group contained six students (S1~S6) with a mean score of 32.83 and a standard deviation of 11.70. Highest frequency was 50, lowest was 21 among these students. The LF Group contained seven kids (S7~S13) with a mean score of 10.85 and a standard deviation of 2.79. The greatest frequency was 15 and the lowest was 8.

Table 4.3: High and low frequency groups of using Quizlet

More Frequent (MF) Group		*Less Frequent (LF) Group*	
Participants	*Frequency*	*Participants*	*Frequency*
Student 1	50	Student 7	13
Student 2	39	Student 8	8
Student 3	37	Student 9	15
Student 4	31	Student 10	13
Student 5	19	Student 11	10
Student 6	21	Student 12	9
		Student 13	8
	Mean=32.83; SD=11.70		Mean=10.85; SD=2.79

In Tables 4.2 and 4.3, MP and LP students were the same as MF and LF students. The more students utilized Quizlet to study vocabulary, the better their gain scores.

An independent samples t-test was used to see whether the average gain scores of the MF and LF groups varied substantially. A substantial difference (t=6.73, p<.001) was seen between the two groups, with the MF Group (M=34.66, SD=5.31) outperforming the LF Group (M=16.28, SD=4.53) on the vocabulary test. Students who used Quizlet more often scored higher on the vocabulary exam, and vice versa.

Table 4.4: Statistical results of the students' scores in the post-test

	Minimum	Maximum	Mean	SD	*T*	*p*
MF Group	32	40	34.66	5.31	6.73*	.000
LF Group	10	22	16.28	4.53		

**Significance p < .001*

In addition, the relationship between the students' frequency use of digital flashcards, and their vocabulary gain scores was further explored; thus, a Pearson correlation analysis was computed to examine whether there was a statistically significant correlation between the two variables, as shown in Table 4.5. The results indicated that there was a significant correlation (r=.915, p< .001) between these two values. That is to say, the results for the MF Group revealed that the more often (Mean=32.83) the students used Quizlet to learn vocabulary, the higher vocabulary gain scores (Mean=34.66) they could get. In contrast, the results for the LF Group showed that the less the students used Quizlet (Mean=10.85), the lower their vocabulary gain scores (Mean=16.28) they could get. Overall, based on the results presented above, the students' vocabulary gains were highly correlated (r=0.7~0.99) with their frequency of using Quizlet.

Table 4.5: Correlational analysis of vocabulary gains and frequency of using Quizlet

	Gain		Frequency			
	Mean	SD	Mean	SD	*r*	*P*
MF Group	34.66	5.31	32.83	11.70	.915*	.000
LF Group	16.28	4.53	10.85	2.79		

**Significance p < .001*

The Students' Perceptions of Learning Vocabulary with Digital Flashcard

The second study question concerning EFL students' digital flashcard vocabulary acquisition was addressed via surveys and interviews. Thirteen students completed post-intervention surveys and interviews. Questionnaires examined

self-study using digital flashcards, whereas interviews examined Quizlet use.

The paired sample t-test (Table 4.6) showed significant differences between pre- and post-intervention surveys for Items 1, 2, 4, 6, and 7 (t-values -2.23 to -4.07, all p<.05). After the intervention, Quizlet was seen as better for vocabulary acquisition. Items 1, 2, 4, 6, and 7 changed significantly for students. This shows they used Quizlet for difficult terms, gained test confidence, and understood the relevance of learning objectives.

Table 4.6: The comparison of the pre- and post-intervention questionnaire results regarding the students' perceptions of vocabulary learning

Questionnaire Items	Pre-intervention questionnaire Mean	Post-intervention questionnaire Mean	S I	*t*
1. I know that I will be able to learn vocabulary well for this class by myself.	3.53	4.53	.51	-3.606*
2. I think that the vocabulary that I am learning in this class is useful for me.	3.61	4.69	.48	-4.070*
3. I ask myself questions to make sure I understand the vocabulary items that I have been studying.	3.23	4.30	.85	-2.156
4. I'm confident that I can understand the most difficult vocabulary items that I am learning in this class.	2.84	4.00	1.22	-2.232*
5. I think that the vocabulary that I am learning in this class is interesting.	4.15	4.69	.63	-1.849
6. When studying vocabulary, I will normally set learning goals for myself so that I can decide how and what I want to learn.	3.23	4.38	.86	-3.248*
7. I'm confident that I can do an excellent job in the vocabulary test.	3.07	3.92	1.18	-2.419*
8. Even when participating in the vocabulary learning sessions does not guarantee that I will get a good grade, I still love to participate in them.	3.53	4.23	1.30	-1.511
9. When studying vocabulary, I will normally try to identify the concept or word usage that I do not understand well.	3.38	3.92	1.18	-1.996

* *Significance p < .05*

This study used a questionnaire based on three subscales: self-efficacy, intrinsic motivation, and self-regulation to understand students' task completion perceptions when learning English vocabulary on Quizlet (Table 4.7). Students rated their opinions on a Likert scale from 1 (strongly disagree) to 5 (strongly agree). All students (100%) agreed with Item 1, "I know that I will be able to learn vocabulary well for this class by myself." The majority (76%) agreed with Item 4, "I'm confident that I can understand the most difficult vocabulary items that I am learning in this class." The majority of students (84%) agreed with Item 7, "I'm confident that I can do an excellent job in the vocabulary test." (M=3.92, SD=1.18). On the intrinsic motivation measure, all students (100%) agreed with Item 2, "I think that the vocabulary that I am learning in this class is useful for me." The majority (92%) agreed with Item 5, "I think that the vocabulary that I am learning in this class is interesting." The majority of students (77%) agreed with Item 8, "Even when participating in the vocabulary learning sessions does not guarantee that I will get a good grade, I still love to participate." (M=4.23, SD=1.30). On the self-regulation scale, 92% of students agreed with Item 3, "I ask myself questions to make sure I understand the vocabulary items that I have been studying." Most (85%) agreed with Item 6, "When studying vocabulary, I will normally set learning goals for myself so that I can decide how and what I want to learn." The majority of students (76%) agreed with Item 9, "When studying vocabulary, I will normally try to identify the concept or word usage that I do not understand well." (M=3.92, SD=1.18). After self-studying using Quizlet, most students agreed with all post-intervention questionnaire questions. As a result, they were eager to use Quizlet again since they believed it would enhance their vocabulary and grades and raise their enthusiasm in studying language. Students said Quizlet helped them assess their focused vocabulary memorization and attain their learning objectives.

Table 4.7: The descriptive results of the post-intervention questionnaire regarding the students' perceptions of vocabulary

		SA	A	N	D	SD
	Self-Efficacy					
1.	I know that I will be able to learn vocabulary well for this class by myself.	62%	38%	0%	0%	0%
4.	I'm confident that I can understand the most difficult vocabulary items that I am learning in this class.	46%	30%	0%	24%	0%
7.	I'm confident that I can do an excellent job in the vocabulary test.	38%	46%	8%	8%	0%
	Intrinsic Motivation					
2.	I think that the vocabulary that I am learning in this class is useful for me.	70%	30%	0%	0%	0%
5.	I think that the vocabulary that I am learning in this class is interesting.	77%	15%	8%	0%	0%
8.	Even when participating in the vocabulary learning sessions does not guarantee that I will get a good grade, I still love to participate in them.	69%	8%	0%	23%	0%
	Self-Regulation					
3.	I ask myself questions to make sure I understand the vocabulary items that I have been studying.	46%	46%	0%	8%	0%
6.	When studying vocabulary, I will normally set learning goals for myself so that I can decide how and what I want to learn.	47%	38%	0%	15%	0%
9.	When studying vocabulary, I will normally try to identify the concept or word usage that I do not understand well.	38%	38%	16%	8%	0%

Note: SA = strongly agree, A = agree, N = neutral, D = disagree, SD = strongly disagree

Table 4.8 displays the results of the paired sample t-tests to see whether three pre- and post-intervention questionnaire subscales differed significantly. The self-efficacy and self-regulation subscales improved significantly (t=-2.75, p=.027) and (t=-2.46, p=.042). Overall, the three post-intervention questionnaire sub-scales (M=4.29, SD=0.91) improved from the pre-intervention questionnaire (M=3.39, SD=1.02). This shows that students thought Quizlet may help them learn vocabulary properly, boost their confidence in achieving excellent results on vocabulary examinations, and improve their habits for establishing learning objectives.

Table 4.8: Statistical results of the three sub-scales in the pre- and post-interventionquestionnaires

Sub-scales	Pre-intervention questionnaire		Post-intervention questionnaire			
	Mean	SD	Mean	SD	*t*	*p*
Self-Efficacy	3.14	1.06	4.15	0.97	-2.752*	.027
Intrinsic Motivation	3.76	0.90	4.53	0.80	-2.476	.082
Self-Regulation	3.28	1.10	4.20	0.96	-2.466*	.042
Total	3.39	1.02	4.29	0.91	-2.564	.050

** Significance p < .05*

To further understand students' Quizlet vocabulary learning experiences, semi-structured interviews were undertaken, as shown in Table 4.9. After content analysis of interview remarks, some typical student quotations are offered to demonstrate the basic themes.

Table 4.9: The students' interview comments on using the digital flashcard tool to learn vocabulary

Themes	Frequency (N)	Percentage (%)
The various functionalities of the tool	12	93%
Ease of use of the tool	10	77%
Language learning potential of the tool	9	69%

- *Theme 1: The various functionalities of the tool*

The tool's features were the main reason students liked Quizlet. Students (N=12; 93%) said they learnt the target words utilizing different learning self-assessment forms, which were enjoyable and beneficial for vocabulary acquisition. The following student comments are related:

> *'Quizlet provides many different learning self-assessment formats to help me learn the vocabulary assigned by the teacher. In particular, I am fond of using Test because this self-assessment format generates four different types of questions for users….' – [**Student 2**]*
>
> *'Quizlet is a great leaning tool for me. There are various self-assessment options provided for users….' – [**Student 5**]*

- *Theme 2: Ease of use of the tool*

Quizlet's ease of use was the second most cited benefit. According to their interview responses, 77% of students (N=10) said Quizlet was simple and comfortable for learning target words. The following comments demonstrate this.

*'I think it's great! It is very easy for me to learn vocabulary via Quizlet. Even ifI am absent from the English classes at the cram school, I will still learn the assigned vocabulary items by myself using Quizlet….' – [**Student 4**]*

*'Quizlet makes it very convenient for me to learn vocabulary. Firstly, the interface is simple, making it easy to create flashcard sets. Secondly, when my home computer was occupied, accessing Quizlet through a tablet or smartphone was convenient.' – [**Student 9**]*

- *Theme 3: Language learning potential of the tool*

The tool's language learning potential was the third most popular positive. In interviews, many students (N=9; 69%) thought Quizlet might increase their vocabulary and vocabulary exam performance, as seen in the following comments:

*'In addition to the vocabulary assigned by the teacher, sometimes I also searched for other flashcard learning sets on Quizlet because I wanted to know more vocabulary than my classmates. I would thus select the suitable sets for myself to acquire the new words.' – [**Student 1**]*

*'After I began to use Quizlet to learn English vocabulary words, I found that it really enhanced my learning. Digital flashcards were different from printed ones because they had many features, such as pronunciation, that helped me strengthen my listening and speaking by playing the sounds repeatedly.' –[**Student 13**]*

In conclusion, most students liked using Quizlet to study vocabulary, citing its functionality, convenience of use, and language learning potential. However, several students were hesitant to use Quizlet for self-study owing to the need for further supervision. Below are examples of comments:

*'I am used to learning English or unknown vocabulary with the teacher by my side all the time. Since I began using Quizlet by myself, I have been afraid of making mistakes. Because I am worried of not to understand the content very well, I hope that the teacher can lead me to learn every assigned word.' – [**Student 7**]*

*'I consider myself as an easily distracted learner, so learning under the teacher's guidance is more helpful for me than learning on my own. If I had the teacher by my side to provide me with step by step guide to use Quizlet for learning new words, then I could pay much more attention and stay more focused during the learning process.' – [**Student 12**]*

The students' interview remarks highlighted Quizlet's functionality, convenience of use, and language learning potential for self-study. Quizlet was simple to use, improved vocabulary development, and increased student enthusiasm in studying. However, other students, especially poor scorers and infrequent users, wanted the instructor to aid them with self-study. Thus, to increase student attentiveness and achievements, the instructor should provide more assistance for self-study students.

Discussion

Did the students' frequency of digital flashcard use lead to their vocabulary gains?

Quizlet was used to examine basic EFL students' vocabulary learning experiences. All students in this research found that weekly Quizlet usage improved their vocabulary, similar with prior studies. Students' vocabulary growth scores and flashcard usage frequency were also examined. Statistics showed a substantial association between the two factors, and students who used digital flashcards to acquire vocabulary gained higher vocabulary test results.

Two previous research (McLean, Hogg, & Rush, 2013; Nakata, 2008) investigated the impact of a CAVL tool and conventional teaching materials on vocabulary acquisition and examined how factors like CAVL tool use and student vocabulary scores related. McLean, Hogg, and Rush (2013) examined if Word Engine, a digital flashcard tool, was more successful than teaching vocabulary in a classroom. This older research included two experimental and one control groups. First experimental group studied vocabulary using Word Engine for two hours a week; second group did the same plus intensive reading for one hour a week. Students using Word Engine outperformed those using conventional education. McLean, Hogg, and Rush

(2013) also found that two hours of weekly Word Engine usage increased vocabulary acquisition more than one hour. This was consistent with the high correlation between flashcard usage and vocabulary growth in this research.

Bower and Rutson-Griffiths (2016) examined how spaced repetition software (SRS) and a TOEIC word collection affected TOEIC results. Cooori, an online SRS with flashcards, was employed in their research. Example sentences, translations, and pronunciations in Cooori helped students learn target terms. This system contained two buttons, 'knew it' and 'did not know it', to check whether students had learned the target words and give them another opportunity to study. One iteration was recorded each button click. Next, TOEIC scores and flashcard repetitions were compared to determine their association. The findings showed that utilizing Cooori to study a word list might help prepare for language competence examinations. There was also a strong association between Cooori usage and TOEIC overall results, suggesting that flashcard repeats may affect vocabulary acquisition. This matched the association between Quizlet usage and vocabulary increase scores in this research.

This research and others proved that digital flashcards may help kids learn language. High-frequency digital flashcard usage improves vocabulary acquisition in students. Thus, language teachers should employ digital flashcards to help students acquire vocabulary.

What were the students' perceptions of learning vocabulary using digital flashcards?

After completing the vocabulary acquisition assignment in self-study, students had favorable attitudes about digital flashcards on the three subscales (self-efficacy, intrinsic motivation, and self-regulation). The findings showed considerable gains in self-efficacy and self-regulation from pre- to post-intervention surveys. Most students said Quizlet helped them acquire language and control their study habits. The students' interview replies also showed that Quizlet's functionality, convenience of use, and language learning potential were the top three advantages of utilizing it to learn vocabulary. These results matched prior research (Altiner, 2011; Liu, Lan & Ho, 2014; Rachmadi, Muliat, Aeni, 2023; Spiri, 2008).

Altiner (2011) examined how flashcards affect students' vocabularies. This CAVL program, Anki, gives students four alternatives (Again, Hard, Good, and Easy) according on how well they recall the target words. The tool will display the same word after a short or long time depending on the learner's choice. Students' pre- and post-intervention questionnaires and interview responses showed that Anki helped them expand their vocabulary, particularly their academic vocabulary. They also said Anki's sample sentences and explanations helped them recall target terms. Anki was also straightforward to use and had a clear purpose. These results generally matched the students' questionnaire and interview replies about using Quizlet in this research. Quizlet helped students acquire vocabulary and was easy to use, according to them.

Another flashcard technology, WordChamp (WC), was tested on EFL learners' vocabulary acquisition and attitudes about it by Spiri (2008). Study design included two experimental groups. One group used WC digital flashcards to study vocabulary, whereas the other used paper flashcards. This digital flashcard application helped WC group members learn the target words via drills. Additionally, kids had to acquire vocabulary via WC three or four times a week. The results showed that WC boosted students' vocabulary more than paper flashcards. WC's practical features, such as hearing to native speakers' recordings, were particularly liked by students. This matched how students in the present research regarded Quizlet's features. This study's students liked Quizlet's typing, self-quizzing, and game-based vocabulary-learning features.

To conclude, students liked utilizing Quizlet for vocabulary study. Students also praised Quizlet's features and ease of use. Language instructors should give user-friendly, multi-functional tools like Quizlet to assist students acquire vocabulary.

Conclusions

The study aimed to investigate the impact of using a digital flashcard tool, Quizlet, on the vocabulary gains of elementary EFL students. The results of the study indicated that regular weekly-based use of Quizlet led to improvements in the students' vocabulary knowledge, and there was a high correlation between the frequency of flashcard use and their vocabulary gain scores. These findings were consistent with previous studies that explored the effectiveness of digital flashcard tools in vocabulary learning.

The students' perceptions of learning vocabulary using digital flashcards were also examined through questionnaire responses and interviews. The analysis revealed that the students expressed positive views about using Quizlet. They believed that Quizlet was an effective tool to assist them in learning vocabulary, regulate their learning situations, and improve their learning habits. The students particularly appreciated the various functionalities of Quizlet, its ease of use, and its potential for language learning.

Overall, the study's findings suggest that digital flashcard tools like Quizlet can be valuable resources to enhance students' vocabulary development, and the frequency of use can positively impact their vocabulary learning performance. Moreover, the positive feedback from students about Quizlet's functionalities and user-friendliness highlights the importance of providing students with accessible and multi-functional tools to support their vocabulary learning efforts.

In conclusion, language educators are encouraged to incorporate digital flashcard tools, such as Quizlet, into their teaching methodologies to assist students in their vocabulary learning and foster positive learning experiences.

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