The Impact of Gamified Vocabulary Learning Using Quizlet on Low-Proficiency Students

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Abstract

During the last decade, vocabulary learning has gradually moved from paper-based to digital flashcards. The elements of gamified learning seem to have brought some distinctive excitement into learning English words, which is commonly perceived as tedious and repetitive. However, gamified vocabulary learning has mostly been conducted in-class, while the class-hour is normally limited, the number of the words that have to be learned are numerous, and low-proficiency students have their own typical pace of learning. Therefore, using an action classroom research, this study implemented a two-cycle of vocabulary learning for 10 weeks at a university in Thailand, involving very low-level students ($N = 65$; 18.5% male and 81.5% female), who previously did not pass the university proficiency test and had to take a basic English remedial course in their first academic term. The target vocabulary was 500 academic English words at the A1-A2 CEFR levels. Quizlet was selected as the gamification tool since its potential had been indicated by preceding research. In the first cycle of the study (5 weeks), the students learned vocabulary without Quizlet support, then in the second cycle, they learned vocabulary with Quizlet support provided by the teacher. Quizlet support was designed to assist students in their vocabulary learning at home. The students' learning outcomes were measured by using in-class vocabulary tests weekly. The results of paired-sample t-tests disclosed significant improvement in both conditions: before and after Quizlet activities were performed and pre-and post-test vocabulary scores. These results suggest that gamified vocabulary learning can be integrated into vocabulary learning instruction as it can address key issues in vocabulary learning.

Keywords: EFL, Gamification, Online flashcard, Quizlet, Vocabulary,

Introduction

Recent reviews and empirical studies have signified growing interest in gamified English language learning for its positive impacts on student learning experience and outcome. For instance, a systematic review of 22 publications from 2008 to 2019 indexed by Scopus, Eric, and Web of Science confirms that gamified English learning has been associated with enjoyable, engaging, motivating, and fun learning experiences; it is effective for delivering content language learning while enhancing students' engagement,

motivation, and satisfaction during the learning process (Dehghanzadeh et al., 2019). In another review, Zou et al. (2019) noted the potential of gamified English learning for facilitating reading and listening comprehension and enhancing short- and long-term vocabulary learning. Empirical studies examining the use of gamified application tools in English learning have also observed similar findings such as improving the levels of students' learning motivation and engagement (Sun & Hsieh, 2018), fostering, and reinforcing learning (Tan Ai Lin et al., 2018), and creating a better classroom environment favored by students (Cárdenas-Moncada et al., 2020).

Among others, gamified English learning has altered the landscape of vocabulary learning. It is reasonable to reveal that, to some extent, learning English vocabulary can be tedious due to the demand for memorization and repetition as the words need to be acquired and used in productive skills such as in writing and speaking. To address such a common learning experience, the practice of gamifying vocabulary teaching and learning has started to be visible, which has the potential to transform some rote vocabulary learning and repetition into a fun learning experience. Gamification can promote elements such as problem-solving, collaboration, and independent learning (Kapp, 2012). Gamifying vocabulary learning is one solution to get students interested and excited about learning words in a playful context, yet still within comprehensive vocabulary instruction (Kingsley & Grabner-Hagen, 2018). Previous research studies have established that gamified vocabulary learning can significantly enhance student learning motivation and engagement which can potentially lead to better learning outcomes (e.g., Medina & Hurtado, 2017; Waluyo, 2020; Weissheimer et al., 2019). Yet, there is also a report on non-significant differences between the learning outcomes of the class using gamification and the class using traditional face-to-face vocabulary instruction (Rachels & Rockinson-Szapkiw, 2018).

Studies on gamified vocabulary learning are, however, still dominated by an in-class implementation. Meanwhile, there are a certain number of words that one must learn to function in the English language (Stahl & Nagy, 2005), which normally cannot be covered by teaching the target words in the class-hour. Learning L2/foreign language vocabulary has always been difficult, and the success may depend on students' autonomous learning of the learned words (Agustín-Llach & Alonso, 2017). Therefore, studies exploring the implementation of gamified vocabulary learning outside the classroom is needed to see if it has the potential to enhance in-class vocabulary learning outcomes. Driven by such need, the present study seeks to prove if providing gamified vocabulary learning support at home for students can significantly improve learning outcomes in class and overall. It attempts to extend the exploration of the impacts of gamified learning beyond the application in class. More importantly, the participants are low-proficiency students who previously failed to enroll in General English (GE) courses in their first academic term due to the need to take a remedial English course. This study intentionally focuses on low-proficiency students as they are the ones who need more help, and it is assumed that their success may apply to other students with a higher level of English proficiency. Among the available gamification tools, this study utilized Quizlet implemented in a classroom action research design within 10 weeks.

Literature Review
Quizlet in Gamified Vocabulary Learning

Vocabulary learning through flashcards has long been known and practiced either in L1 or L2/foreign language learning. During the last decade, there have been online programs created specifically to maximize vocabulary learning through online flashcards. Quizlet is one of the programs enabling paired-associate learning accessible across electronic devices (Nakata, 2011). Early studies have suggested some benefits of using computer-based flashcards over paper-based flashcards, such as facilitating various types of exercises (Nesselhauf & Tschichold, 2002), enabling implicit and explicit vocabulary learning (Ellis, 1995), and encouraging active, independent learning (García & Arias, 2000). Created by Andrew Sutherland in 2005, currently, Quizlet has approximately 50 million monthly users, 3 billion study sessions, and 350 million vocabulary sets (Quizlet, 2020). Nakata (2011) conducted a critical investigation of flashcard software and he noted that evaluated against the criteria of flashcard learning and paired-associate learning, Quizlet stands out for its features related to flashcard creation, multilingual support, flexibility to add images, and various types of exercises; nonetheless, it does not support scheduling and expanded retrieval with increased intervals as learning proceeds. Vocabulary sets in Quizlet can be shared through a wide range of methods and forms, including printing, embedding, URL link, and QR code, which offer alternatives for students to study at their own pace.

Preceding studies have suggested learner acceptance of Quizlet in various contexts. In Japan, Dizon (2016) integrated Quizlet into a class studying Academic Vocabulary List (AWL) for 10-weeks and explored students' perceptions on perceived usefulness, perceived ease of use, and behavioral intention to use Quizlet; the results disclosed a high level of acceptance of Quizlet with the average scores of the responses higher than 4 on a 5-point Likert-scale. In Indonesia, the findings of a qualitative study from Anjaniputra and Salsabila (2018), who assessed the merits of Quizlet for vocabulary learning at the tertiary level, also indicated students' enjoyment and reported positive impacts on learning development. Recently, Çeçen (2020) examined students' perceptions of the use of *Edmodo,* Quizlet, and *Canva* by using the technology acceptance model; the study identified that these apps were favored by lower-level students in Turkey. EFL students in Thailand have also been reported to be satisfied with the use of Quizlet in vocabulary learning as it helps them remember vocabulary effectively within less time than traditional methods (Sangtupim & Mongkolhutthi, 2019). Additionally, Quizlet has been among the popular apps used by English lecturers at the university level since it can turn the classroom into a convenient, exciting, and fluid place for learning English (Ulla et al., 2020).

The number of empirical studies investigating the impacts of integrating Quizlet on vocabulary learning outcomes is relatively low, yet the results have been encouraging. Utilizing Quizlet in a language preparatory program in Turkey, Korlu and Mede (2018) discovered a significant improvement in student vocabulary acquisition as well as the level of autonomy in vocabulary learning. Quizlet support from teachers can stimulate students' willingness to explore the application independently at home, which consequently makes them learn the target words and practice the exercises within the app (Setiawan & Wiedarti, 2020), although, in another context, students' willingness may not be stimulated as expected (Aydın, 2020). In the latest study, Bueno-Alastuey and Nemeth (2020) investigated the effects of Quizlet and *Podcast* on student vocabulary acquisition; the difference between the two apps was not noticeable, yet Quizlet support significantly

enhanced students' retention of new vocabulary. Significant learning gains have been reported by several studies that utilized pre- and post-test research design (e.g., Dizon, 2016; Nemeth, 2019; Tosun, 2015).

One of the alternative ways to utilize Quizlet in vocabulary learning is to make students create their vocabulary flashcards, which has the potential to trigger student independent learning (Wright, 2016). Nonetheless, Wright (2016) notes that if Quizlet is used for students to create their flashcards, accuracy may emerge as a problem. Another way is to play it live in class. In his teaching reflection, Wolff (2016) described that "Quizlet Live was designed to bring fresh energy into the classroom, and not only helps students enhance vocabulary skills, but learn teamwork and communication skills as well. (p. 27)". Quizlet Live brings in an exciting social game that helps learners see the autonomous study as a way to have a better performance in the live vocabulary game. Korkealehto and Siklander (2018) incorporated Quizlet into a blended learning approach, in which students had the opportunity to create vocabulary sets and played each other's set; they noticed some development in the aspects of self-regulated, self-paced, and collaborative learning among students. These different ways of utilizing Quizlet in teaching and learning are due to the growing interest in using smartphone apps to learn English vocabulary (Davie & Hilber, 2015).

Quizlet for Gamified Vocabulary Learning at Home

As briefly discussed earlier, the present study intends to contribute to the development of research on gamified vocabulary learning at home. It is thought to be an effective way to help low proficiency students with their vocabulary learning at home, yet the empirical evidence is still scarce. The previous section has provided a brief review of Quizlet together with the applications and impacts on gamified vocabulary learning. Hence, this section shall elaborate on the potential of utilizing Quizlet as gamified learning support for students at home. Reflecting upon his experience of using Quizlet in various EFL classes in the United States, ranging from community college to university levels, Cunningham (2017) emphasizes that Quizlet can serve as a place for vocabulary training for students that would accelerate the growth of autonomy in vocabulary learning. Before the last decade, implementing focused vocabulary-training programs was difficult since teachers had to create, manage, and disseminate vocabulary sets by themselves. Nonetheless, with the advent of an online app, such as Quizlet, that can support various training approaches in the types of gamified vocabulary exercises, implementing an online vocabulary training program outside the classroom is no longer an issue. It enables the teacher to address such obstacles as the limited class-hour and the need to cover a certain number of English words within a period (Robertson, 2015). Though still limited, several numbers of studies have explicitly employed Quizlet in such context.

Dreyer (2014) studied the effect of computer-based self-access learning on vocabulary test scores conducted weekly for 14-weeks. Involving 95 high school students, the study created vocabulary sets on Quizlet for students to study every week at home, followed by weekly vocabulary tests in class. The teacher was able to monitor students' activities in Quizlet through a teacher's account. In brief, the study found that those who frequently used Quizlet for their vocabulary learning and training at home outperformed those who used it less frequently in vocabulary tests. Providing Quizlet for students to study prior to coming to class can improve their class participation. Runhaaret al. (2012)

created intervention and control groups of a class that had been reported to have reading difficulties. The intervention group received home-learning support through Quizlet, while the control group did not. The findings demonstrated that the students in the intervention group spent less time on vocabulary and general language questions in reading compared to those in the control group; they also became more active and engaged in reading class activities.

Studies have also combined Quizlet with the use of other social media for enhancing students' engagement with vocabulary tasks. Tran (2016) designed Quizlet as an out-of-class vocabulary learning support for EFL students in Vietnam. Students were informed to post their vocabulary test scores on Facebook, which gradually grew into an impromptu competition among students, which led to the active usage of the provided Quizlet. In another study, Quizlet was shared with students through official *LINE* groups for two semesters (Tran, 2018). The objective was to observe the interplay between the use of social networking and the potential of providing out-of-class vocabulary support by using Quizlet. It was observed that social networking can be a means for building student-teacher meaningful interactions enhanced by the out-of-class vocabulary support on Quizlet. Nonetheless, despite the reported findings on students' increased engagement and enjoyment in vocabulary learning through Quizlet, it does not always produce better learning outcomes. Tosun (2015) applied Quizlet for 6-weeks in a class implementing a blended learning approach; there were no significant differences between students' vocabulary scores in the experimental and control groups. It was further suggested that just because there is gamified learning support from the teacher it does not necessarily make students use and study the vocabulary sets independently at home. Therefore, the teacher should create a learning instruction that includes an online monitoring system. Additionally, Alzeer (2015) observed that both paper and Quizlet flashcards were equally effective in enhancing students' vocabulary learning and retention.

From previous studies, it can be learned that the integration of Quizlet as a gamified vocabulary learning support at home can involve several stages. Students are, first, given a pre-test assessing their pre-vocabulary knowledge. Then, several weeks of implementation are determined, which depend on research need and interest, ranging from 2 to 10 weeks. The teacher gives students a few days to explore the Quizlet set at home, before having a vocabulary test in class. In this instance, the teacher should maintain a monitoring system either online or by asking students individually if they use the Quizlet set for their vocabulary learning and training at home. The implementation may involve two groups, in which one receives and the other one does not receive the gamified learning support. At the end of the treatment, a vocabulary post-test is administered coupled with a survey questionnaire exploiting students' perceptions of their learning experience. In Quizlet, students can practice the provided words through various types of exercise, such as *Learn, Write, Spell, Test, Match, and Gravity*. Students can also get together outside the classroom and play the Quizlet collaboratively with their friends using Quizlet *Live*. Figure 1 below illustrates the implementation.

Figure 1

An illustration of the application of Quizlet *from previous studies*
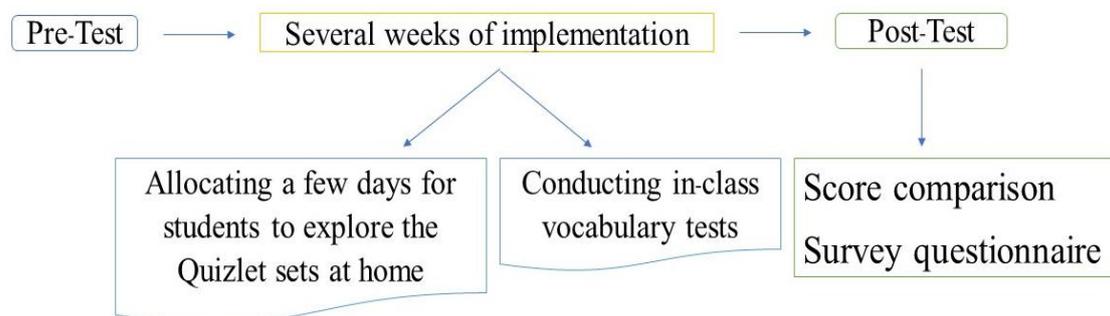
The Present Study

The present study is driven by the need to promote the implementation of gamified vocabulary learning at home. The class-hour is normally insufficient to cover all the words that students have to learn and acquire to be able to understand and communicate in English. A review study from Schmitt (2008) noted that students need to study 8,000-9,000-word families to be able to read and 5,000-7,000-word families to perform oral communication in English. To participate in basic, daily conversations, students have to acquire knowledge of 2,000-3,000 words, which is also the minimum number to start reading authentic texts (Schmitt, 2007). To put this into perspective, 800-1,200 hours of instruction is the estimate for EFL students in Asian countries to acquire such a vocabulary size (Schmitt, 2008), meaning that more hours of instruction would be required if the target vocabulary size is larger. Moreover, the issue is not only about the limited class-hour, but also the differences existing among students in learning and acquiring new words. More attention has to be given to those whose proficiency levels are low, which also entails more hours of instruction. Therefore, this study intended to address such issues by exploiting the potential of using gamified vocabulary learning at home, serving as a place for both vocabulary learning and training for students.

Early studies have pointed out the positive impact of using flashcards in vocabulary learning (e.g., Nakata, 2008, 2011; Elgort, 2011). During the last decade, several studies have explored the application of digital flashcards and compared the impact of paper-based learning. The findings, thus far, have been mixed, yet digital flashcards are superior in the aspects of accessibility and flexibility (e.g., Hsu, 2013; Sage et al., 2020). In addition, the latest study from Serfaty and Serrano (2020) confirms the usefulness of digital flashcards in facilitating independent learning, which is a vital component in vocabulary learning. Albeit, in another study, digital flashcards failed to enhance independent learning due to low levels of motivation and discipline among students (Tosun, 2015). At this point, Stockwell and Reinders (2019) contend that the use of technology in language teaching and learning may or may not lead to higher levels of motivation and autonomous behavior, especially when focusing on low-level students. Appropriate pedagogies involving technology affordances and sufficient training on how to use the selected app for achieving learning goals are essentially decisive.

This study has reviewed the use of Quizlet, one of the online flashcard applications, from previous studies and discovered that the app has been widely accepted among EFL

students across contexts, yet the application in vocabulary learning is still limited to in-class gamified implementation. To contribute to the research literature, the current study integrated Quizlet into vocabulary learning of low English proficiency level undergraduate students at a university in Thailand. The integration involved a two-cycle classroom action research design for 10 weeks. The findings of this study can provide empirical evidence as to whether gamified vocabulary learning at home can be effective in helping students learn and acquire more vocabulary within a period of time. It is also expected that the findings can shed light on how digital flashcard application supports and scaffolds low-proficiency students' vocabulary learning at home and in class. The following research question guides this study:

● How does gamified vocabulary learning at home through Quizlet impact low proficiency students' vocabulary learning outcomes in class?

Method

Research Design

This study employed a two-cycle classroom action research model. Cunningham (2008) emphasized that in classroom action research, teachers act as researchers who monitor and analyze the dynamics of the classroom as well as the students' learning progress, then intervene with an idea based on a particular theoretical construct to improve learning and attain better learning outcomes. The research design is centralized upon teachers' critical observation and inquiry during their involvement and teachers' quick initiatives to effect a desirable change (McKernan, 1996). In the present study, the objective was to examine the impact of gamified vocabulary learning at home on low-proficiency students' vocabulary learning outcomes in class. Students learned without and with *Quizlet* support in the first and second cycle, respectively. Each cycle lasted for 5 weeks. Furthermore, this study applied a one-group pretest-posttest design, where the same dependent variable is evaluated in one group of participants before and after the intervention is given (Privitera & Delzell, 2019). Figure 2 below illustrates the research design.

Figure 2
Illustration of the research design
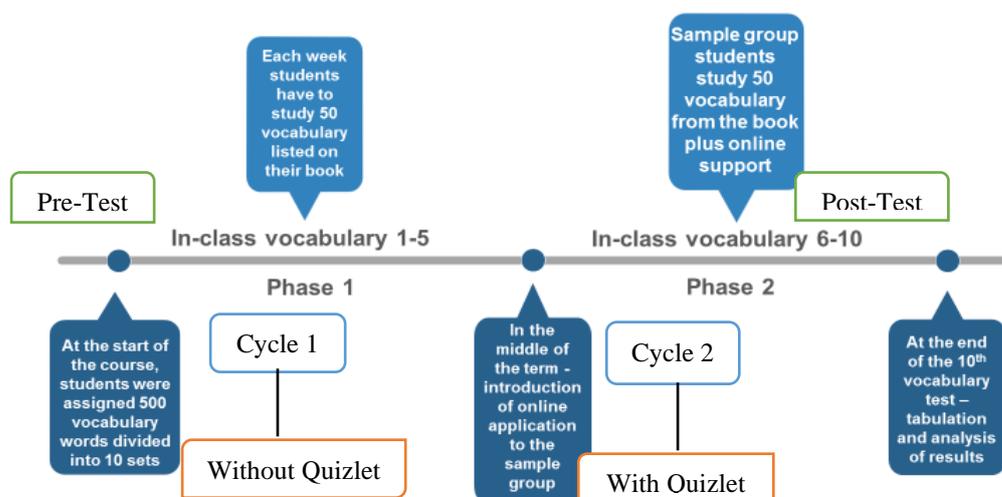
Context and Participant

The study was carried out in the 2nd term of the 2019-20 Academic Year (November 2019 - January 2020) at Walailak University, Thailand. It involved 1st-year students studying a General English (GE) course entitled 'English Communication Skills', aged from 18 to 20 years old. The students consisted of 18.5% male and 81.5% female with a total of 65 participants. These students took an English proficiency test named Walailak University Test of English Proficiency (WUTEP) in August 2019. The results showed that all of these students had a very low proficiency level - A1 in the Common European Framework of Reference (CEFR). As a consequence, they were not allowed to take a GE course in their first academic term. They had to attend a basic, remedial English course for one academic term and achieve satisfactory results. This English Communication Skills course was their first GE course of the six required GE courses. The teacher was aware of the students' proficiency levels; thus, this action research was planned to improve the students' learning outcomes in the aspect of academic English vocabulary. The students had different academic majors, as displayed in Table 1.

Table 1

Students' academic majors (N = 65)

Major	Male	Female
Chemical Engineering		1
Digital Communication Arts		1
Electrical engineering	1	
Environmental Health, Occupational Health and Safety	3	9
Information Technology and Digital Innovation	1	1
Interior Design		1
Law	2	3
Management of Information and Digital Media	2	1
Medical Information Science Innovation		2
Medical Technology		3
Multimedia Technology, Animation, and Games	2	

Nursing		11
Pharmacy		2
Physical Therapy		5
Political Science	1	2
Thai Language		4
Tourism and Hotels		7
Total	12	53

Instruments

Three instruments were used to collect the data. The first instrument comprised of pre- and post-tests, given before the class started and after the class ended. These two tests measured the students' vocabulary knowledge prior to and after the study, respectively. The tests involved 20 multiple-choice questions, encompassing questions about word meaning, sentence completion, part of speech, synonym, and antonym. The pre and post-test questions had different questions, yet the patterns of the questions were maintained for ensuring that they both assessed the vocabulary knowledge that students just learned throughout the study. The sample pre-and post-test questions can be seen in Table 2.

Table 2
Sample pre- and post-test questions

Pre-test	Post-test
1. A person with whom someone works. A. College B. Colleges C. Colleague D. Collaboration	1. The details of the place where someone lives or works. A. Address B. Mattress C. Work D. House
2. "My life is empty without you." What is the opposite of the word "empty" in the sentence? A. Full B. Blank C. Desolate D. Clear	2. An event in which a car, train, or plane is damaged and often someone is hurt. A. Oxidant B. Accident C. Battle D. Race

The other two instruments were students' in-class vocabulary tests before (week 1-5) and after Quizlet was utilized (week 6-10). The types of questions were similar to those in the pre-and post-tests, involving word meaning, sentence completion, part of speech, synonyms, and antonyms. There were 15 multiple-choice questions in one test. Each test was administered in the first 15-minute of class. The students' scores from test 1 in week 1 to test 10 in week 10 were collected. The weekly in-class vocabulary test was administered by using Socrative.com. The teacher launched the vocabulary test on Socrative.com in class, then students used their smartphones to enter the quiz. Students

were familiar with the Socrative application because they used it before in another course. The sample vocabulary test questions are displayed in Figure 3.

Figure 3

The appearance of the vocabulary test on Socrative.com
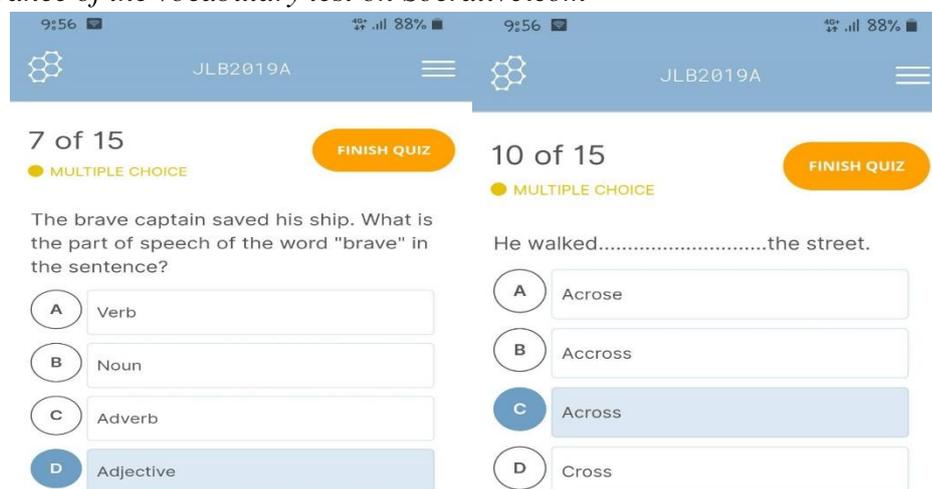
Target Words

The vocabulary learning targeted English academic words ranging from A1 to A2 in the CEFR. There were 500 words that students had to learn from the course in this study. The total number of words was decided by the academic committee: the university required students to have learned 3,000 English academic words by the end of their 2nd year of study. Since there were six required GE courses that students had to take within two years of their study, it was decided that students had to learn 500 words in one GE course. These 500 words were then, divided into 10 vocabulary sets – each set contained 50 words. Students studied one vocabulary set in one week independently at home. When students came to class in the following week, they would take a vocabulary test that evaluated their vocabulary knowledge of the words in the set accordingly, and this was repeatedly done weekly.

Table 3

Sample of the target words

Able (Adj)	Accident (N)	Available (Adj)	Bottom (N)	Break (V)
Change (V)	Cheap (Adj)	Copy (V)	Download (V)	Famous (Adj)
Terrible (Adj)	Variety (N)	Actually (Adv)	Bake (V)	Brush (N)
Dress (V)	Thirsty (Adj)	View (N)	Visit (V)	Adventure (N)
Bath (N)	Cabinet (N)	Cover (V)	Easily (Adv)	Earn (V)
Festival (N)	File (N)	Luggage (N)	Tidy (Adj)	Timetable (N)
Waitress (N)	Wake (V)	Afraid (Adj)	Choose (V)	Empty (Adj)

Finally (Adv)	Mistake (N)	Toe (N)	Together (Adv)	Watch (V)
Become (V)	Beginner (N)	Belong (V)	Clever (Adj)	Clearly (Adv)
Foreign (Adj)	Noisy (Adj)	Trainer (N)	Below (Prep)	Bill (N)

Procedure

Stage 1 - Introduction

The teacher gave a brief introduction of the course and vocabulary learning to students in the class. At this stage, students knew that they would have to study each vocabulary set every week and would have vocabulary tests in class. The teacher informed students that the ten vocabulary sets had been put in the course textbook. The target words were neither discussed nor taught in class. Students were expected to use all means to study the target words independently outside the classroom. A pre-test was administered to students.

Stage 2 - Implementation (Week 1-5)

Students studied each vocabulary set at home independently and took vocabulary tests accordingly in class. From week 1 to week 5, there was not any support given to students. At this point, students explored each vocabulary set independently at home. Their vocabulary test scores were recorded by the teacher.

Stage 3 – Intervention (Week 6-10)

Quizlet was introduced to students and a short training on how to use it was given in class. The teacher shared the links of the Quizlet vocabulary sets to students from weeks 6 to 10. In this instance, students were expected to explore each vocabulary set on Quizlet, utilizing the app for a place of vocabulary learning as well as training – since they could do various exercises within the app. The teacher shared the Quizlet sets through URL links and QR codes with students in class and Facebook groups. Students continued to take vocabulary tests in class and the teacher maintained the record. Figure 4 exhibits the appearance of the flashcard on Quizlet.com. On the left side, various exercises for student vocabulary learning and training are available for use.

Figure 4
The appearance of the flashcard on Quizlet.*com*

Vocabulary Set 1

STUDY
- Flashcards
- Learn
- Write
- Spell
- Test

Play
- Match
- Gravity
- Live

Empty (Adj.)

← 2/2 →

Vocabulary Set 1

STUDY
- Flashcards
- Learn
- Write
- Spell
- Test

Play
- Match
- Gravity
- Live

Having nothing inside
ว่างเปล่า
e.g. an empty box

← 2/2 →

Stage 4 - Evaluation

The post-test was conducted. The teacher concluded the class.

Data Analysis

The normality of the data was first checked by looking at the values of *Skewness* and *Kurtosis*. George and Mallery (2003) suggest that the values between -2 and +2 indicate normal distribution. As displayed in Table 4 below, all the values of *Skewness* and *Kurtosis* of the students' pre-test, average before and after Quizlet, and post-test scores fall within the suggested range. The data were, then, continued with parametric tests. To examine the impact of the intervention, paired-sample *t*-tests were conducted on students' vocabulary scores before and after Quizlet was given, and students' pre-and post-test scores. The trends in students' vocabulary test scores were also analyzed descriptively by using a line chart.

Table 4
Descriptive Statistics

	Mean	SD	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Pretest	10.34	3.03	1.00	.30	-.93	.59
The students' scores before Quizlet	10.94	1.58	-.33	.30	.31	.59
The students' scores after Quizlet	13.11	1.21	-.66	.30	.08	.59
Posttest	15.03	3.52	-.61	.30	-.83	.59

Result and Discussion

Result

A paired-sample *t*-test was performed on students' vocabulary test scores before and after Quizlet was utilized. The confidence interval percentage was set up at 95%. The results disclosed a significant difference *(t* (65) = -16.06, *p* < .001), in which the means of students' scores increased from 10.94 to 13.11, out of 15. The effect size was large: (*Cohen's d* = (13.11 - 10.94)/1.40 = 1.55). A strong, positive correlation was observed between these two scores (*r* = .723, *p* < .001)**.** These results indicated significant improvement in students' in-class vocabulary test scores after receiving Quizlet support. Afterward, a second paired-sample *t*-test was conducted on students' pre-and post-test scores. The results also revealed a significant difference *(t* (65) = -10.60, *p* = .001), improving the means from 10.34 to 15.03 of 20, with large effect size (*Cohen's d* = (15.03 - 10.34)/3.34 = 1.41) and a positive correlation (*r* = 4.14, p = .001). These second results showed significant progress in students' vocabulary learning outcomes overall as the result of the intervention. The details can be seen in Table 5.

Table 5
Results of paired-sample t-test (N = 65)

		Mean	SD	Std. Error Mean
Pair 1	Before Quizlet	10.94	1.57	.195
	After Quizlet	13.11	1.21	.150
Pair 2	Pre-test	10.34	3.03	.376
	Post-test	15.03	3.52	.436

		Correlation	Sig.
Pair 1	Before & After Quizlet	.723	.000
Pair 2	Pre- & Post-Test	.414	.001

Paired Samples Test

Paired Differences			*t*	*df*	Sig. (2-tailed)

Mean	SD	Std. Error Mean

| Pair 1 | Before – After Quizlet | -2.17 | 1.09 | .14 | -16.06 | 64 | .000 |
| Pair 2 | Pre- & Post-Test | -4.69 | 3.57 | .443 | -10.60 | 64 | .000 |

From the fluctuations of students' scores throughout the in-class vocabulary tests, it is noticeable that the students' scores started to increase significantly in week 6's test, the period where students received the Quizlet support within one week before the test. Students' scores stayed at higher levels from weeks 6 to 10, with the highest mean score at 13.48 in week 9 and the lowest mean at 12.75 in week 8. Nevertheless, on average, students' scores before Quizlet was utilized (week 1-5) were still lower than the lowest mean score after Quizlet was introduced. The details are illustrated in Chart 1.

Figure 5

Students' scores from test 1 to 10
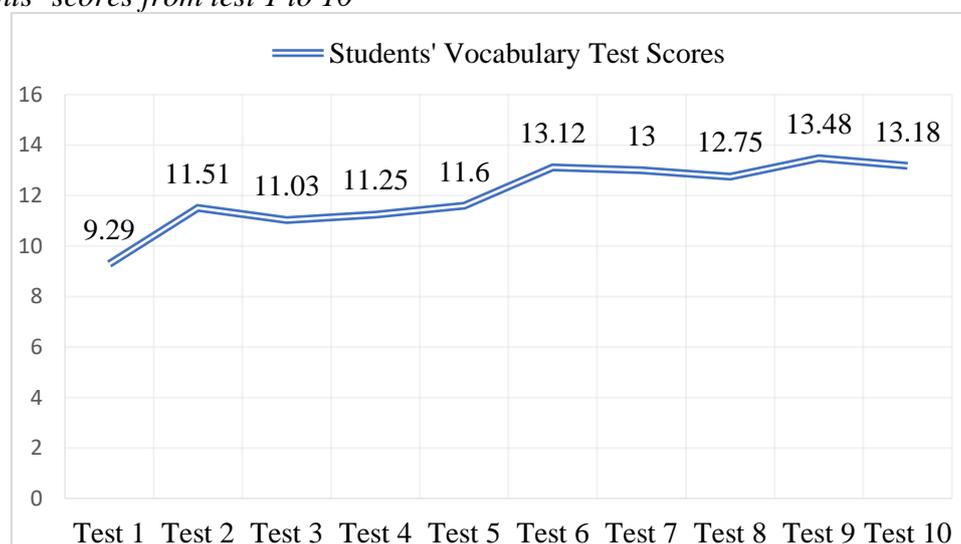
Discussion

The results of the analyses of students' vocabulary scores before and after Quizlet was introduced, and pre- and post-test scores revealed significant improvement. The trend of students' means of vocabulary scores from the 10-week implementation indicated higher scores from testa 6 to 10, compared to test 1-5. All these results verified that gamified vocabulary learning at home through Quizlet had a positive impact on students' vocabulary learning outcomes in class when measured by using vocabulary test scores. Despite the relatively small number, previous studies focusing on gamified learning at home were mostly conducted at the school level. Dreyer (2014), for instance, implemented 14-week support of Quizlet for students in one high school in the U.S.A. to study at home; the study uncovered that those who spent more time practicing on Quizlet obtained higher in-class vocabulary tests. In one school in the Netherlands, Runhaar et al. (2012) discovered that those who received Quizlet support at home spent less time on vocabulary questions in reading. The findings of the present study have added to the
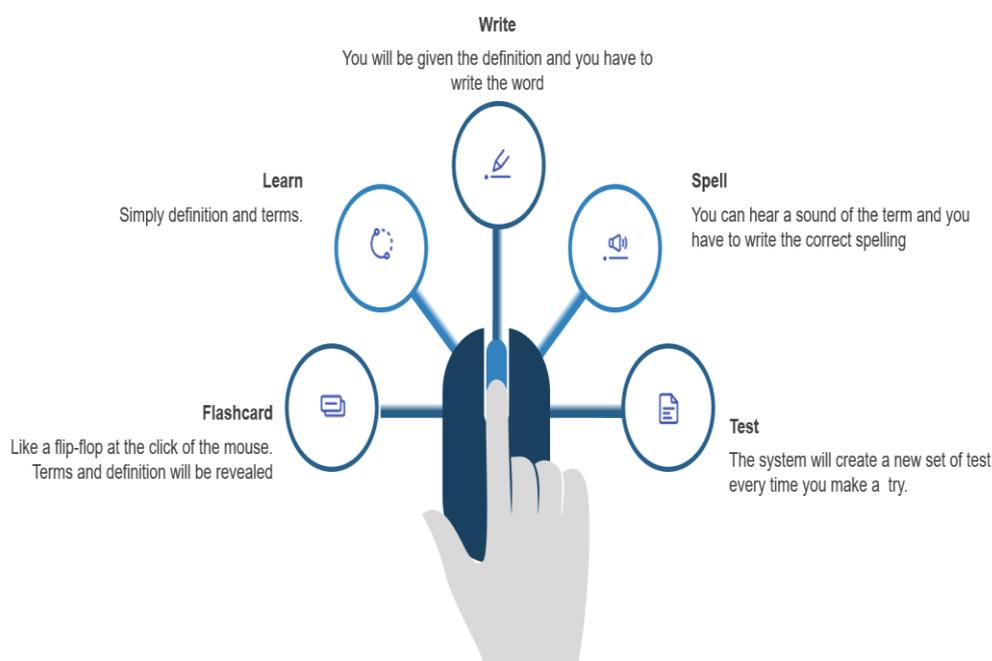
knowledge of the positive impact of gamified learning at home at the university level. The findings also fully sustain the positive impacts of Quizlet on students' vocabulary learning (e.g., Bueno-Alastuey & Nemeth 2020; Dizon, 2016; Korlu & Mede, 2018; Nemeth, 2019; Setiawan & Wiedarti, 2020; Tosun, 2015).

One of the rationales underlying the present study was to exploit the potential of gamified vocabulary learning at home to address fundamental obstacles in vocabulary learning, such as the number of words that have to be learned and acquired by students and the limited class-hour of instruction. As seen in Table 6, universities in Asian countries, including Japan, China, and Indonesia, have applied the required hours of instruction to ensure that students learn and acquired 2,000–4,000 English words. At the university where this study took place, a regulation was present that students needed to learn and acquired 3,000 English words within two years of study. Empirical studies have reported the number of English words that students need to learn and acquire to perform specific tasks in English, e.g., 8,000-9,000-word families for reading and around 5,000-7,000-word families to perform oral discourses in English (Schmitt, 2008), 2,000-3,000 words to start reading authentic texts (Schmitt, 2007), etc. However, formal vocabulary learning either at school or university levels has not been able to facilitate the learning of such a number of words. An appropriate instructional design for learning vocabulary that can follow up the suggestions from previous studies is genuinely needed at this point.

Since gamification can transform vocabulary learning into a playful context (Kingsley & Grabner-Hagen, 2018) and can enhance student learning motivation and engagement (e.g., Medina & Hurtado, 2017; Weissheimer et al., 2019), designing a vocabulary learning instruction that involves gamified learning support at home can be beneficial, not only can it potentially scaffold learner autonomy (Cunningham, 2017), but also it can address the need for more hours of instruction (Robertson, 2015; Rofiah & Waluyo, 2020). Quizlet is one of the online apps that can accommodate such an objective, which has widely been accepted by learners from various contexts for vocabulary learning (Çeçen, 2020; Dizon, 2016; Anjaniputra & Salsabila, 2018). The teacher can either create the vocabulary sets or search the available sets on Quizlet.com, then share the links with students to be explored at home. In Quizlet, students can practice the provided words through various types of exercise, such as *Learn, Write, Spell, Test, Match, and Gravity*, as shown in Figure 5. The class-hour, then, can be arranged in such a way that exploits students' vocabulary knowledge as a result of their independent learning, ranging from vocabulary tests to class activities that require students to use the words they have learned. Nonetheless, it is important to note that although it is independent learning, a monitoring system by the teacher is required; otherwise, students will not explore the Quizlet set, especially those with low proficiency and learning motivation (Tosun 2015). The monitoring system can be done by using social media, such as Class Facebook Group and Class Line Group (Tran, 2018, 2016), or using the *Quizlet* monitoring system in the premium mode.

Figure 6

The features of Quizlet − useful for vocabulary learning and training at home

Write

You will be given the definition and you have to write the word

Learn

Simply definition and terms.

Spell

You can hear a sound of the term and you have to write the correct spelling

Flashcard

Like a flip-flop at the click of the mouse. Terms and definition will be revealed

Test

The system will create a new set of test every time you make a try.

Nowadays, learning English through online applications has received some special interest from both researchers and educators. Quizlet is one of the applications that has been used in various ways, reflecting the growing interest in the use of this app for English learning (Davie & Hilber, 2015). For instance, aside from using Quizlet as gamified vocabulary learning support at home, studies have also incorporated this app into a blended learning approach, in which students can be assigned to create their own vocabulary sets and exchange the sets to be played in or outside class. In this type of instruction, Korkealehto and Siklander (2018) observed some growth in students' self-regulated, self-paced, and collaborative learning. In the case of low-proficiency students, it is undeniable that they have their own pace of learning; instead of forcing low-proficiency students to have the same speed of learning as other higher proficiency students, it may be wiser to aid their self-paced learning. Therefore, early studies have favored digital flashcards over paper-based flashcards for flexibility and variety. Digital flashcards have a wide range of exercises (Nesselhauf & Tschichold, 2002), allow implicit and explicit vocabulary learning (Ellis, 1995), and promote active, independent learning (Rico García, & Vinagre Arias, 2000). Now that the present study has established the positive impacts on in-class learning outcomes among low-level students, digital flashcards should be embedded in vocabulary learning instruction at the university level.

At the university level, students begin to specify their academic expertise and are likely to spend most of their time studying courses related to their academic majors. Students in a non-English speaking country, like those in Thailand, are normally required to keep learning English at the same time. After all, adequate English knowledge and skills are needed for them to be able to read and write international scientific papers. At this point, gamified vocabulary learning at home can be one of the alternatives to help university students enhance their vocabulary knowledge while studying specific courses in their academic majors. It is common knowledge that vocabulary knowledge underlies the knowledge and skills in reading, writing, listening, and speaking both either in L1 or

L2 language. Therefore, the efforts to create a fun and enriching vocabulary learning environment for students at the university level should be maintained and this study suggests Quizlet as one of the alternative gamifying tools.

Implication and Limitation

The findings of this study implicate the benefits of providing gamified vocabulary learning at home through Quizlet. The idea is fundamentally about providing learning support for students since the class-hour is normally inadequate to cover the study of the required, basic English words. This means that teacher does not have to use an online app; paper, in the form of a worksheet, for example, may also serve the purpose. Previous studies have also confirmed the equal effect of digital flashcards and paper on vocabulary learning outcomes (e.g., Hsu, 2013; Sage et al., 2020). Nevertheless, Quizlet has been among the popular apps used by English lecturers at the university level (Ulla et al., 2020) and can help students remember vocabulary effectively in less time than the traditional method (Sangtupim & Mongkolhutthi, 2019). Thus, English teachers should consider including Quizlet into their vocabulary learning instructional design. This recommendation is not limited to the English language teaches as teachers of other foreign languages, e.g., Chinese and German, have integrated this app into their learning instruction as well (Kraub, 2015; Wu, 2015). In Thailand, students' motivation to learn English is fairly low, implying that providing Quizlet sets and asking students to explore the app independently may not be enough to make students do the task. Therefore, if Quizlet is to be used for supporting vocabulary learning at home, the teacher should be aware of such circumstances and create a monitoring system accordingly.

It is acknowledged that the findings of this study are only limited to quantitative data. Some might argue that qualitative data would have added more depth to the results. This study was intentionally designed as action research with an emphasis on analyzing students' score improvement and it has achieved the objective. There were obstacles encompassing language barriers and the *Covid-19* situation that prevented researchers from conducting interview sessions with the participants. Thus, the findings of this study should be interpreted in the applied research design and cannot be generalized as there might be other factors affecting our results that researchers were not aware of. Future studies are advised to combine quantitative and qualitative data if conditions are feasible.

Conclusion

The study has identified the positive impacts of gamified vocabulary learning at home on low-proficiency students' vocabulary learning outcomes in class. It offers an alternative solution for common obstacles faced by the teacher and students in vocabulary learning. Nonetheless, it is emphasized that as much as the study intends to argue about the benefits of using Quizlet based on the results of the statistical analyses, it is also important to note that technology has its limits. Unless students have the initiative, are motivated, and maintain disciplinary habits to explore the vocabulary sets at home,

significant improvement may not be attained. The teacher has to consider technology affordances and provide sufficient training for students on using the app. Some studies did not find a significant impact of Quizlet; however, at the very least, the inclusion of gamified tools may give students some excitement in learning new words since gamification can create a playful context.

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