Effects of Kahoot! on Vocabulary Learning and Student and Teacher Perceptions

KATETAWAN HATTEE*
Faculty of Liberal Arts, Prince of Songkla University, Thailand
ADISA TEO
Faculty of Liberal Arts, Prince of Songkla University, Thailand
Corresponding author email: katetawantrang21@gmail.com

Abstract
The purposes of this study were to investigate the effects of Kahoot! in enhancing English vocabulary knowledge among Thai students and to explore the perceptions of both students and their teacher regarding the utilization of Kahoot! in a school setting. The study involved 60 M.1 students divided into two groups: a control group that received vocabulary instruction using a traditional method, and an experimental group that received vocabulary instruction through the utilization of Kahoot!. Data were collected by tests (a pre-test, a post-test, a delayed test, and immediate tests), a questionnaire, and an interview. The findings indicate that Kahoot! was more effective in the short-term immediate tests. In the delayed test, there was a significant difference in the receptive vocabulary knowledge between the two groups, with the experimental group outperforming the control group. Furthermore, the students in the experimental group showed greater improvement in receptive vocabulary knowledge compared to productive vocabulary knowledge through the use of Kahoot! In terms of perceptions, both the students and the teacher expressed a favorable perception toward Kahoot! as a vocabulary learning and teaching tool.

INTRODUCTION

In the ASEAN Economic Community (AEC), English learning achievement is increasingly important for making connections with others, obtaining employment opportunities, and accessing media and the internet. However, Thailand’s low English learning achievement rank of 97th out of 112 non-native English-speaking countries (EF Education First, 2022) may hinder its growth in the future. With the intention of addressing this issue, the government of Thailand has implemented different policies such as an increase in the total number of hours dedicated to English classes and a curriculum reform (Franz & Teo, 2018). However, despite these efforts, the problem of low English learning achievement among Thai students persists.

To better understand the causes of this problem, researchers have carried out studies on factors that might contribute to low English learning achievement in Thailand. These studies have identified a lack of vocabulary knowledge and motivation as problems among Thai students.
who are learning English (Chawwang, 2008; Laksanasut & Seubsang, 2021; Saengpakdeejit, 2014). Several studies in recent years have tried to tackle this problem. Some of them found using games as a tool to increase learner motivation and facilitate classroom teaching and learning was successful (Chen & Hsu, 2020; Duncan, 2020; Hwang et al., 2023).

Based on the findings of previous studies on video games in education, specifically for language learning, it is found that integrating video games in education provides several potential benefits. Video games can facilitate not only vocabulary learning but also subject-matter learning. Among video game-like platforms adapted for educational use, Kahoot! has been selected as a tool in several research studies (Aramruangsakul, 2018; Chiang, 2020; Wichadee & Pattanapichet, 2018). One of the reasons why Kahoot! is chosen is that it surpassed other similar platforms by injecting an element of competitiveness into the game. Research shows that this competitive element can enhance student engagement and motivation (Wang & Tahir, 2020). In addition to its gaming experience being more engaging and potentially motivating for students, Kahoot! uses integrated graphical user interfaces and audio components, which are found to be effective in improving learning outcomes (Licorish et al., 2018; Fuster-Guilló et al., 2019). However, it should be noted that Kahoot! is not meant to replace vocabulary class but rather it should be used as a tool to support learners and teachers.

Using educational video games to enhance motivation and ease the learning process has been a topic of great interest among numerous researchers. As mentioned earlier, using digital games like Kahoot! to learn new words is not a new idea. A lot of research has shown that it generally helps people learn words better (Tseng & Chang, 2021; Wichadee & Pattanapichet, 2018), but what exactly gets better about learning words has not yet been studied in sufficient detail. It is this research gap that this current study seeks to fill. Specifically, the study focuses on two aspects of vocabulary learning: how well students can understand words when they see them (receptive vocabulary), and how well they can use these words (productive vocabulary). By doing so, the study hopes to shed light on how effective Kahoot! is for helping Thai students learn English vocabulary.

Objectives and research questions

The current study aimed to examine the effects of Kahoot! in improving English vocabulary knowledge among Thai students as well as the perceptions of both students and the teacher toward Kahoot! Specifically, the study addressed the following research questions:

1. How do M.1 Students develop vocabulary knowledge through Kahoot?

2. Are there any differences in M.1 students’ vocabulary knowledge gained through Kahoot and traditional vocabulary methods?

3. What are the students’ and teacher’s perceptions of Kahoot!?
LITERATURE REVIEW

1. Receptive and productive vocabulary knowledge

Nation (2001), Read (2004), and Schmitt (2014) have identified two types of vocabulary knowledge: receptive and productive. Receptive vocabulary knowledge is defined as the ability that allows a person to understand a word’s meaning through reading or listening, while productive vocabulary knowledge is the ability that allows a person to use the word in speaking or writing. This means that if learners focus only on receptive knowledge, they may only recognize words but lack the knowledge on how to use them. For example, for the word “university” a student with receptive vocabulary knowledge will be able to recognize, read and understand the meaning of the word either inside or outside of a sentence such as “Sarah likes to go to university.” The student could even interpret it as Sarah is a diligent person. However, productive knowledge requires more than comprehension. If a student lacks the required productive vocabulary knowledge for the word “university”, he/she might struggle to create a sentence that correctly contains the word university.

To achieve effective communication, productive vocabulary knowledge is necessary. Susanto (2017) as well as Teng and Xu (2022) found that a lot of vocabulary tasks provided by teachers are receptive in nature; for example, matching words with meanings and identifying the word from the context. While these are easier to create and mark, the productive vocabulary knowledge gained from them is limited. Several factors such as class duration and the number of students can also affect how teachers teach vocabulary; larger classes or limited time could lessen the quality of the lesson. In this case, teachers need to balance both receptive and productive vocabulary knowledge in the classroom, as well as decide on the teaching method that could create an efficient vocabulary class.

2. Teaching vocabulary

Vocabulary development is essential to language learning, but it has not been given the attention it deserves. Some educators were concerned that paying too much attention to vocabulary, at the expense of grammar, might be problematic (Carter & McCarthy, 1988). As time has passed, teachers nowadays do recognize the importance of teaching vocabulary. This has led to a new challenge for them which is to find the most effective method of teaching vocabulary. However, several of the factors that teachers have to take into account, such as student motivation, student backgrounds, and class engagement vary from class to class. It is, thus, crucial for teachers to judge which method is the best suited for each session.

To teach vocabulary effectively, it is crucial for teachers to have a comprehensive understanding of the various aspects involved in learning a word, including its meaning, form, grammar, collocations, register, and frequency of occurrence. McCarten (2007) argued that it is not recommended to teach everything about a word the first time it is taught. Instead, teachers should decide how much to cover based on factors such as frequency of occurrence and level of difficulty. It is also important that teachers differentiate receptive vocabulary from productive vocabulary as learners may become frustrated if they understand a word but struggle to use it in context or form sentences.
Creating an engaging vocabulary class requires teachers to have a good command of the subject and use different teaching methods. Using modern learning tools such as educational games, videos, and apps can make vocabulary learning more enjoyable for students and provide teachers with additional materials. However, it is still crucial for teachers to understand how these tools work and know when to use them. If the process is correctly done, it can lead to an engaging and interactive class.

3. Kahoot!

Kahoot! is an innovative game-based learning platform, widely recognized as an engaging way for students to learn vocabulary. According to Dellos (2015), Kahoot! provides a responsive system that encourages interaction amongst its players while creating an exciting and competitive learning atmosphere. Specifically for language classes, this educational game uses quizzes with various question formats to teach vocabulary. Moreover, the game-based approach features various question formats like multiple choice, fill-in-the-blank, and image-based questions, allowing students to practice recall, recognition, and application of vocabulary words in a dynamic way.

Research has proven the effectiveness of Kahoot! as an educational strategy. For Hadijah et al. (2020), Kahoot! is considered an effective tool for language learning. Lin et al. (2018) added that computer games provide an effective language learning experience. The combination of graphical user interfaces with the audio components of Kahoot! provides learners with an engaging gaming experience which may encourage them to interact with the content (Hadijah et al., 2020; Nguyen & Yukawa, 2019). Kahoot! is often compared to digital games like Quizizz and Quizlet; what sets it apart is its competitive aspect, which has been shown to increase motivation (Aljaloud et al., 2015, as cited in Wang & Tahir, 2020). Furthermore, Kahoot! can be linked back to Thomas Malone's (1980) theory of intrinsically motivated instruction which emphasizes goals, captivation, and curiosity as vital factors in making learning enjoyable.

Kahoot! can also bring its share of challenges into the classroom; however, there are still some requirements: students need access to mobile devices and the internet in order to participate, while teachers require a display device so as to demonstrate the activity. It is suggested that teachers should familiarize themselves with its operation before using Kahoot! in class.

Studies have found that Kahoot! is an effective tool for teaching vocabulary. Studies by Flores Quiroz et al. (2021), Ford (2018), Lierena and Rodríguez (2017), Mansur and Fadhilawati (2019), Tseng and Chang (2021), and Wichadee and Pattanapichet (2018) all used similar research methods. They divided the students into an experimental group which received Kahoot! instruction and a control group that received traditional treatment. In all these studies, the experimental group demonstrated higher vocabulary achievement by outperforming the control group through vocabulary tests. This shared result highlights the positive impact of Kahoot! on learning. In addition, Gholami et al. (2022) revealed that Kahoot! was more effective than traditional methods at improving vocabulary recall and retention, as shown through the results of immediate and delayed recall tests.
Furthermore, studies have shown that multimodality and digital games can be effective tools for English language teaching, as they can engage and motivate students, and help them to learn the material more effectively. Studies by Aramruangsakul (2018), Medina and Hurtado (2017), Saharat and Seubsang (2021), Tan et al. (2019), Wang and Tahir (2020), and Wichadee and Pattanapichet (2018) reported positive learner perceptions of Kahoot! as an interactive, engaging, and motivating tool for vocabulary learning. These positive results also lead to increased participation, active learning, and improved focus during vocabulary instruction on the learners’ part. Sakulprasertsri (2020) found that teachers in Thailand were generally positive about the use of multimodality, and Wichadee and Pattanapichet (2018) found that students who used digital games reported being more motivated to learn English because they found the games fun and challenging and felt that they helped them to learn the material more effectively.

The above literature review has proved that although traditional methods for vocabulary acquisition exist, there are still studies conducted to search for an alternative way of teaching vocabulary. Studies exploring game-based learning platforms like Kahoot! present promising results, demonstrating their potential to enhance vocabulary knowledge and learner motivation. Several studies (Flores Quiroz et al., 2021; Ford, 2018; Lierena & Rodríguez, 2017; Mansur & Fadhillawati, 2019; Tseng & Chang, 2021; Wichadee & Pattanapichet, 2018) show positive learning outcomes for students using Kahoot! when compared with the traditional method. Notably, Gholami et al. (2022) revealed the potential of Kahoot! for long-term retention. Additionally, research found positive perceptions of Kahoot! by both learners and teachers, emphasizing its engaging and motivating nature (Aramruangsakul, 2018; Medina & Hurtado, 2017; Saharat & Seubsang, 2021; Tan et al., 2019; Wang & Tahir, 2020; Wichadee & Pattanapichet, 2018).

However, there are some gaps in the existing research. While several studies compare Kahoot! to traditional methods, a deeper understanding of how Kahoot! contributes to vocabulary learning is needed, specifically, the area in which Kahoot! improves vocabulary knowledge. Furthermore, research focusing on different learner profiles and contexts is always needed as a supplement to understand its wider applicability.

**RESEARCH METHODOLOGY**

1. Participants

1.1 Students

In this study, 60 M.1 students from a public school in Songkhla were selected as participants. The age range of the participants was between 12 and 13 years, with an even distribution of gender. Notably, all participants had been learning English since kindergarten and were enrolled in specialized English classes. They were purposively selected from two intact classes, with 30 students out of 50 from each class specifically selected based on their pre-test scores, ranging from 28 to 47, to minimize differences between the two classes in their vocabulary knowledge. This resulted in 60 students, 30 from each class, serving as participants of
the study. Those students who were not selected were excluded from the study. However, they attended the class as usual and were also involved in the Kahoot! sessions, but no data were collected from these students for the purpose of this study.

The two intact classes, with 30 students each, were then randomly assigned to the experimental group and the control group. The experimental group received instruction on the target words using the Kahoot! method, while the control group followed a traditional method. Both groups were taught by the same teacher who was also a participant in the study. Consent from all participants was obtained during the initial week of the study. It should be mentioned that a majority of students in the experimental group had prior experience with Kahoot!. However, this prior experience was not a part of the selection criteria for participation in the study.

1.2 Teacher

Throughout the study, a single teacher with 2 years of English teaching experience and prior use of Kahoot! instructed both student groups and participated in the research. The teacher collaborated closely with the researcher, ensuring consistent instruction and minimizing bias. Her responsibilities included delivering lessons, administering and collecting tests, providing student feedback, and participating in an interview on the use of Kahoot!'s use. Regarding the teacher’s previous experiences with digital games, the teacher mentioned having used Quizlet. The teacher's experience ensured effective implementation of the experimental method employed in this study.

2. Treatment

The research was conducted over six weeks, with 10 minutes of treatment each week focusing on 10 target words. In total, 60 target words were covered over the duration of the study, consisting of nouns, verbs, and adjectives in equal proportion. The words were chosen from the school syllabus. Both groups of students participated in a vocabulary session for 10 minutes at the beginning of each weekly class, with the experimental group using Kahoot! and the control group receiving traditional teaching. Both groups were taught the same vocabulary items each week by the same teacher throughout the study.

For the experimental group, an online game-based learning platform, Kahoot!, was used to teach the target words in the classroom. To operate Kahoot!, the teacher served as the host of the game and created a set of questions prior to the game. The joining code was then given to the students, and their joining requests were accepted. The students needed a mobile device that could connect to the internet to participate. In this study, only the multiple-choice format with additional pictures as visual aids was used.

For the control group, which received traditional treatment devoid of any game-based elements, the required tools were a textbook, a blackboard, and a projector. The process of teaching vocabulary began when the teacher wrote the target words and their meanings on the blackboard and instructed the students to note them down in their notebooks. After that, the teacher showed the students how to spell, use, and pronounce each word, along with
the corresponding picture displayed through a projector. Finally, the teacher randomly selected students to pronounce a word randomly selected by herself. These teaching procedures were repeated in all classes throughout the duration of the study. Despite the differences in the teaching methods, the exercises for both groups focused on teaching the target words and their meanings, spelling, usage, pronunciation, and association with corresponding pictures.

3. Instruments

This study deployed three types of instruments: tests, a questionnaire, and an interview. The tests aimed at measuring the students' vocabulary knowledge, while the questionnaire was utilized to gather insights into student perceptions of Kahoot! Additionally, interviews were conducted to glean perspectives from the teacher regarding her perception of the effectiveness of Kahoot!

The vocabulary knowledge tests used in this study included six immediate tests, a pre-test, a post-test, and a delayed test. All tests were designed to assess the students' understanding of the target words, which included nouns, verbs, and adjectives in a balanced proportion. The tests were carefully constructed to include questions that measured both receptive and productive vocabulary knowledge. To ensure consistency and align with established approaches (Nation, 2008; Read, 2000), each part of the test utilized multiple-choice questions with four answer choices.

The six immediate tests consisted of ten items each, with an equal distribution of five items for receptive vocabulary knowledge and five items for productive vocabulary knowledge. These tests were designed to provide regular and immediate feedback on the students' vocabulary acquisition progress each week throughout the intervention period.

The pre-test, post-test, and delayed test functioned as more comprehensive assessments comprising 60 items each. These tests consisted of 30 items for receptive vocabulary knowledge and 30 items for productive vocabulary knowledge. The inclusion of a balanced number of items in both parts aimed to capture the students' overall understanding and usage of all target words in the study. It is important to note that these tests were essentially the same test, administered at different stages of the study.

It should be noted that in all the tests used in this study, each target word appeared exclusively in either the receptive or productive vocabulary knowledge part of the tests. This deliberate choice was made to avoid repetition and ensure that students were assessed on different aspects of vocabulary knowledge. Additionally, to prevent students from recognizing word meanings based on similar choice patterns used in Kahoot!, the answer choices in the tests differed from those presented in the Kahoot! activities.

In the receptive vocabulary knowledge part of the tests, students were presented with an English word and required to select its corresponding meaning in Thai. This part assessed their ability to comprehend and associate English vocabulary with the appropriate Thai equivalent. On the other hand, the productive vocabulary knowledge part assessed the students' ability
to use English vocabulary to form meaningful sentences. They were presented with a sentence prompt and required to select the word that could complete the sentence appropriately. This part aimed to measure their understanding of word usage and their ability to apply the target words in context.

The questionnaire was given to the experimental group to assess their perception of Kahoot!. It consisted of two parts: student background and perceptions of Kahoot! The perceptions of Kahoot! section was divided into two parts. The first part consisted of 15 Likert-type items ranging from 1 (strongly disagree) to 5 (strongly agree). These items addressed three aspects of Kahoot! with five items each: perceived ease of use, perceived usefulness, and general attitude toward technology. The second part contained an open-ended item to elicit additional comments and suggestions concerning Kahoot!. The students could freely express their thoughts and opinions in this part.

The semi-structured interview with the teacher was conducted to gather additional information about her experiences with Kahoot! and her thoughts on its effectiveness as a vocabulary learning tool. The interview consisted of 10 questions, categorized in a similar manner to the students' questionnaire, including three categories: ease of use of Kahoot!, its usefulness, and general perceptions toward technology. While some questions in the interview overlapped with those in the student survey, additional inquiries were made about any difficulties the teacher encountered while implementing Kahoot!

All the tests, the questionnaire, and the semi-structured interview questions were checked for validity by a panel of three experts in the field. Any required changes were made. Then, a pilot study was conducted with a group of 30 M.1 students in a different school in Songkhla to try out the pre-test and the six immediate tests. The Cronbach's alpha coefficients for the pre-test and the six immediate tests in the pilot study were 0.69 and 0.48 respectively. After the pilot study, these tests were revised to improve their clarity and reduce ambiguity. The Cronbach's alpha coefficients for the pre-test and the six immediate tests in the study were 0.75 and 0.78 respectively. This indicates an acceptable level of reliability of the tests.

4. Data collection

In the beginning, the pre-test was applied in both groups to measure their vocabulary knowledge. After that, at the end of each vocabulary session over the period of six weeks, an immediate test was administered to both groups. Then, in the sixth week, which was the last week of the experiment, both groups of students were tasked to complete their final immediate test, followed by the post-test on the following day. Immediately after the post-test, the experimental group completed the questionnaire regarding their perception of Kahoot!. On the following week, the teacher participated in the semi-structured interview with the researcher regarding her perception of Kahoot!. Two weeks after the end of the experiment period, the delayed test was administered to both groups of students to assess their retention of the target vocabulary.
5. Data analysis

To address the first and second research questions, the scores of both the experimental group and the control group on all tests including the pre-test, the six immediate tests, the post-test, and the delayed test were analyzed using descriptive statistics, t-test, and effect size. Effect sizes were interpreted using Cohen’s d criteria, where the values of 0.2, 0.5, and 0.8 are considered a small, medium, and large effect respectively.

Regarding the final research question, which focused on student perceptions of Kahoot!, the quantitative data from the questionnaire administered to the experimental group were analyzed using descriptive statistics. The data obtained from the open-ended question were categorized and analyzed qualitatively.

As for the teacher’s perception of Kahoot!, the semi-structured interview data were analyzed in three phases. First, the interview recordings were transcribed word-for-word. Second, data from the transcript were coded into positive and negative themes related to the use of Kahoot! to teach vocabulary. In addition, the transcript data were also coded for additional comments and information that the teacher provided about Kahoot! such as her familiarity with Kahoot! and plans for future implementation of Kahoot! in the classroom.

FINDINGS

1. M.1 students’ vocabulary knowledge development after learning through Kahoot!

To address the first research question concerning the difference in the experimental group’s vocabulary knowledge after learning vocabulary through Kahoot!, their pre-test, post-test, and delayed test scores were compared. Each test had a full score of 60. The results are presented in Table 1.

<table>
<thead>
<tr>
<th>Vocabulary knowledge</th>
<th>Test</th>
<th>Mean</th>
<th>S.D.</th>
<th>t-value</th>
<th>Effect size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Receptive</td>
<td>Pre-test</td>
<td>22.57</td>
<td>3.37</td>
<td>1.64</td>
<td>0.33</td>
</tr>
<tr>
<td></td>
<td>Post-test</td>
<td>23.80</td>
<td>4.18</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Productive</td>
<td>Pre-test</td>
<td>15.43</td>
<td>7.09</td>
<td>1.61</td>
<td>0.24</td>
</tr>
<tr>
<td></td>
<td>Post-test</td>
<td>16.93</td>
<td>5.95</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>Pre-test</td>
<td>38.00</td>
<td>9.60</td>
<td>1.90</td>
<td>0.30</td>
</tr>
<tr>
<td></td>
<td>Post-test</td>
<td>40.73</td>
<td>8.80</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Receptive</td>
<td>Post-test</td>
<td>23.80</td>
<td>4.18</td>
<td>-4.57**</td>
<td>0.50</td>
</tr>
<tr>
<td></td>
<td>Delayed test</td>
<td>25.60</td>
<td>3.09</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Productive</td>
<td>Post-test</td>
<td>16.93</td>
<td>5.95</td>
<td>-3.26**</td>
<td>0.22</td>
</tr>
<tr>
<td></td>
<td>Delayed test</td>
<td>18.07</td>
<td>4.79</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>Post-test</td>
<td>40.73</td>
<td>8.80</td>
<td>-5.81**</td>
<td>0.80</td>
</tr>
<tr>
<td></td>
<td>Delayed test</td>
<td>43.67</td>
<td>7.23</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**significant at 0.01 level
Table 1 shows comparisons of the experimental group’s scores under pre-test and post-test conditions, and post-test and delayed test conditions. T-test results indicate no significant difference between their pre-test and post-test scores on either receptive or productive knowledge. However, when comparing the post-test and delayed test scores, the t-test results display a statistically significant increase in both areas. This positive change was evident in both receptive (d = 0.50, medium effect size) and productive (d = 0.22, small effect size) vocabulary knowledge, culminating in a large total effect size (d = 0.80). These effect sizes highlight that the treatment had a larger effect on improving the experimental group’s receptive vocabulary knowledge. Overall, while there was not a significant difference between the pre-test and post-test scores, there was a notable improvement over time as seen in the significant difference between post-test and delayed test scores. This significant increase in the delayed test scores suggests that the students showed improvement in the longer term in both receptive and productive vocabulary knowledge after utilizing Kahoot! as a learning tool. However, the fact that their delayed test scores were significantly higher than their post-test scores is unusual and counterintuitive.

2. Differences between the effects of Kahoot! vocabulary learning and those of traditional vocabulary learning on M.1 students' vocabulary knowledge

To answer the second research question investigating the difference in vocabulary knowledge gained between two groups, the t-test was used to compare the post-test and delayed test results of the experimental group and the control group. Effect size was also analyzed. The results are shown in Table 2.

<table>
<thead>
<tr>
<th>Test</th>
<th>Vocabulary knowledge</th>
<th>Experimental group</th>
<th>Control group</th>
<th>t-value</th>
<th>Effect size</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Mean</td>
<td>S.D.</td>
<td>Mean</td>
<td>S.D.</td>
</tr>
<tr>
<td>Post-test</td>
<td>Receptive</td>
<td>23.80</td>
<td>4.18</td>
<td>23.73</td>
<td>3.19</td>
</tr>
<tr>
<td></td>
<td>Productive</td>
<td>16.93</td>
<td>5.95</td>
<td>16.10</td>
<td>5.76</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>40.73</td>
<td>8.80</td>
<td>39.83</td>
<td>8.00</td>
</tr>
<tr>
<td>Delayed test</td>
<td>Receptive</td>
<td>25.60</td>
<td>3.09</td>
<td>23.50</td>
<td>4.19</td>
</tr>
<tr>
<td></td>
<td>Productive</td>
<td>18.07</td>
<td>4.79</td>
<td>17.10</td>
<td>5.72</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>43.67</td>
<td>7.23</td>
<td>40.60</td>
<td>8.76</td>
</tr>
</tbody>
</table>

*significant at 0.05 level

Table 2 shows that the experimental group outperformed the control group in both the post-test and the delayed test, but a statistically significant difference at the 0.05 level between the two groups was shown only in their delayed test scores on receptive vocabulary knowledge with a medium effect size of 0.58. The findings suggest that there was a moderate practical difference in vocabulary knowledge gained after the treatment between the two groups, particularly between their receptive vocabulary knowledge in the delayed-test only. This suggests that Kahoot! may have helped the experimental group retain the vocabulary, particularly in a receptive context, in the longer term, and thus it can be a valuable tool for reinforcing vocabulary learning. This retention could be attributed to the engaging and interactive nature
of Kahoot!, which likely enhanced students' motivation and attention, leading to better retention of vocabulary knowledge over time. However, similar to Table 1, it is observed that both groups’ delayed test scores were generally higher than their post-test scores, which is unusual and counterintuitive.

To fully address the second research question, it is necessary to also investigate the short-term effects of the treatment on the two groups’ gain of vocabulary knowledge in each week over the period of the study. This entails a comparison of their immediate test scores using t-test and effect size. The results are shown in Table 3.

### Table 3
Immediate test scores of the experimental and control groups

<table>
<thead>
<tr>
<th>Immediate test</th>
<th>Vocabulary knowledge</th>
<th>Experimental group</th>
<th>Control group</th>
<th>t-value</th>
<th>Effect size</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Mean</td>
<td>S.D.</td>
<td>Mean</td>
<td>S.D.</td>
</tr>
<tr>
<td>1</td>
<td>Receptive</td>
<td>4.00</td>
<td>0.87</td>
<td>4.10</td>
<td>0.92</td>
</tr>
<tr>
<td></td>
<td>Productive</td>
<td>3.33</td>
<td>1.18</td>
<td>3.33</td>
<td>1.09</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>7.33</td>
<td>1.67</td>
<td>7.43</td>
<td>1.41</td>
</tr>
<tr>
<td>2</td>
<td>Receptive</td>
<td>4.17</td>
<td>0.83</td>
<td>3.57</td>
<td>0.90</td>
</tr>
<tr>
<td></td>
<td>Productive</td>
<td>3.57</td>
<td>0.86</td>
<td>3.23</td>
<td>1.07</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>7.74</td>
<td>1.48</td>
<td>6.80</td>
<td>1.63</td>
</tr>
<tr>
<td>3</td>
<td>Receptive</td>
<td>3.77</td>
<td>0.86</td>
<td>3.53</td>
<td>0.82</td>
</tr>
<tr>
<td></td>
<td>Productive</td>
<td>3.20</td>
<td>1.03</td>
<td>3.03</td>
<td>1.10</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>6.97</td>
<td>1.67</td>
<td>6.56</td>
<td>1.57</td>
</tr>
<tr>
<td>4</td>
<td>Receptive</td>
<td>3.50</td>
<td>1.14</td>
<td>3.07</td>
<td>1.11</td>
</tr>
<tr>
<td></td>
<td>Productive</td>
<td>2.97</td>
<td>1.25</td>
<td>2.23</td>
<td>1.10</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>6.47</td>
<td>2.30</td>
<td>5.30</td>
<td>2.09</td>
</tr>
<tr>
<td>5</td>
<td>Receptive</td>
<td>4.57</td>
<td>0.50</td>
<td>4.10</td>
<td>0.84</td>
</tr>
<tr>
<td></td>
<td>Productive</td>
<td>3.90</td>
<td>0.84</td>
<td>3.57</td>
<td>0.94</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>8.47</td>
<td>1.22</td>
<td>7.67</td>
<td>1.49</td>
</tr>
<tr>
<td>6</td>
<td>Receptive</td>
<td>4.03</td>
<td>0.85</td>
<td>3.97</td>
<td>0.81</td>
</tr>
<tr>
<td></td>
<td>Productive</td>
<td>3.70</td>
<td>0.84</td>
<td>3.63</td>
<td>1.16</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>7.73</td>
<td>1.55</td>
<td>7.60</td>
<td>1.57</td>
</tr>
</tbody>
</table>

* significant at 0.05 level
** significant at 0.01 level

Table 3 shows that in the second immediate test there was a statistically significant difference between the experimental group and the control group at the 0.01 and 0.05 levels for their receptive vocabulary knowledge and their overall vocabulary knowledge with the medium effect size (d = 0.70 and d = 0.61) respectively. Similar results were observed in the fifth immediate test. For the fourth immediate test, a statistically significant difference at the 0.05 level between the two groups were found only in their productive vocabulary knowledge with the medium effect size of 0.63. As for the other immediate tests, except for the first one, the experimental group outperformed the control group, but the difference was not statistically significant. In summary, the results indicate that the treatment demonstrated a tendency toward notable effectiveness, particularly in enhancing receptive vocabulary knowledge.
3. Students’ and teacher’s perceptions of Kahoot!

3.1 Students’ perceptions of Kahoot!

The experimental group’s responses to the questionnaire investigating their perceptions of Kahoot! were analyzed and the results are presented in Table 4.

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Mean</th>
<th>S.D.</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Learning English vocabulary using Kahoot! is easy and uncomplicated.</td>
<td>3.97</td>
<td>1.10</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Learning English vocabulary through Kahoot! is easier than learning directly from a teacher.</td>
<td>3.53</td>
<td>1.01</td>
<td>Agree</td>
</tr>
<tr>
<td>3</td>
<td>I don’t spend much time understanding how to use Kahoot!</td>
<td>4.17</td>
<td>0.87</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>I understand and can use Kahoot! without the guidance from a teacher.</td>
<td>4.07</td>
<td>1.11</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>I did not encounter issues while using Kahoot!</td>
<td>3.87</td>
<td>0.97</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Using Kahoot! makes me learn English vocabulary more efficiently.</td>
<td>4.10</td>
<td>0.96</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Learning English vocabulary through Kahoot! helps me become more familiar with new words.</td>
<td>4.13</td>
<td>0.94</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Learning English vocabulary through Kahoot! encourages me to learn new words.</td>
<td>4.07</td>
<td>1.05</td>
<td>Agree</td>
</tr>
<tr>
<td>9</td>
<td>I feel more engaged in the classroom when using Kahoot!</td>
<td>4.17</td>
<td>1.05</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>I feel more confident in my English vocabulary when using Kahoot!</td>
<td>3.87</td>
<td>0.97</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>General perception towards technology.</td>
<td>4.24</td>
<td>0.77</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>I enjoy using technology to help me learn English vocabulary.</td>
<td>4.40</td>
<td>0.86</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>English vocabulary learning should be promoted using technology both inside and outside the classroom, such as at home or in other accessible locations.</td>
<td>4.10</td>
<td>0.96</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>I believe using technology to learn English vocabulary is a good thing.</td>
<td>4.27</td>
<td>0.87</td>
<td>Strongly Agree</td>
</tr>
<tr>
<td>15</td>
<td>I feel satisfied when the teacher applies technology in teaching English vocabulary.</td>
<td>4.30</td>
<td>0.84</td>
<td>Agree</td>
</tr>
<tr>
<td></td>
<td>I like to learn English vocabulary using technology during my free time.</td>
<td>4.13</td>
<td>1.14</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Overall</td>
<td>4.08</td>
<td>0.72</td>
<td>Agree</td>
</tr>
</tbody>
</table>

Note: 4.20 - 5.00 = Strongly agree, 3.40 - 4.19 = Agree, 2.61 - 3.39 = Neutral, 1.80 - 2.60 = Disagree, 1.00 - 1.79 = Strongly disagree

It was found that the overall perception toward Kahoot! of the students in the experimental group was in the range of “agree” (\(X = 4.08\)), which could be interpreted as indicating that they were satisfied with Kahoot! vocabulary learning. For general perception toward technology, the students’ responses were interpreted as “strongly agree”, while their responses to the remaining two categories, namely ease of use of Kahoot! and its usefulness were interpreted as “agree”. The three items with the highest mean values were Item 11 “I enjoy using technology to help me learn English vocabulary.” (\(X = 4.40\)), Item 14 “I feel satisfied when the teacher applies technology in teaching English vocabulary.” (\(X = 4.30\)), and Item 13 “I believe using technology to learn English vocabulary is a good thing.” (\(X = 4.27\)). Notably, all of them belong
to the same category, which is general perceptions toward technology. This indicates that the students in the experimental group have a favorable perception toward technology overall and they are not against the use of technology in teaching and learning vocabulary.

On the other hand, the three items with the lowest mean values were Item 1 “Learning English vocabulary using Kahoot! is easy and uncomplicated.” (X̅ = 3.97), Items 5 and 10 “I did not encounter issues while using Kahoot!” and “I feel more confident in my English vocabulary when using Kahoot!” (X̅ = 3.87 each), and Item 2 “Learning English vocabulary through Kahoot! is easier than learning directly from a teacher.” (X̅ = 3.53). All these mentioned items belong to the same category which is the ease of use of Kahoot! with only Item 10 as an exception.

While the quantitative results reflect overall positive perceptions of Kahoot! among the students, in the open-ended part of the questionnaire some of them suggested potential areas where Kahoot! could be improved. A few mentioned the amount of time that is needed when joining the session and the problems when some students were disconnected from the session and could not rejoin resulting in incidents where the disconnected students had to ask their friends who were still in the session to share their device with them. These obstacles could be possible factors that slightly lowered the mean scores of items related to "ease of use" and "confidence with vocabulary learning through Kahoot!" compared to the other items in the questionnaire.

Based on the result of the analysis of the questionnaire data, it could be said that the students in the experimental group have a positive perception toward the use of Kahoot! in general. Students reported enjoying the competitive aspects of Kahoot!, which made learning more enjoyable and less like traditional classroom activities. This positive response from students highlights the motivational benefits of using game-based learning tools like Kahoot! Furthermore, the students' familiarity with digital devices and online learning platforms likely contributed to their ease of use and overall positive perception of Kahoot! However, there are some problems in the practicality of the use of Kahoot! in the classroom which could be inferred from the three items with the lowest mean values concerning the ease of use of Kahoot! This could be due to the required preparation time and technical issues such as connection problems, individual device problems, and the crash of the application itself. One of the students also mentioned that he could not participate in the game because on one of the experiment days, his mobile phone could not connect to the internet, so he had his friend share her device with him.

### 3.2 Teacher’s perception of Kahoot!

During the interview, the teacher shared her experiences and opinions on the effectiveness of Kahoot! as a vocabulary learning tool. Specifically, the teacher shared her views on incorporating technology into teaching practices, ease of use of Kahoot!, its usefulness, factors affecting its use, problems encountered while using it, and her plan for using it in the future.

Regarding the general perception towards integrating digital games in English vocabulary learning, the teacher expressed her belief that digital games can be a valuable tool to engage students and make the learning experience more interactive and enjoyable. She emphasized
that games provide a fun and engaging way for students to practice and reinforce their vocabulary, making the learning process feel less like work and more like play.

When discussing the perceived ease of use of Kahoot! for teaching vocabulary, the teacher described it as a user-friendly platform that allows her to easily create quizzes and games. She noted that the game format of Kahoot! is engaging and interactive, which helps to keep her students motivated and focused during the lesson. However, when comparing Kahoot! with more traditional teaching methods, such as lectures and discussions, the teacher expressed a higher level of comfort with the traditional methods which allow for a more structured class which is easier to manage. Additionally, she mentioned that the preparation time required for conducting a Kahoot! session, despite the actual class time dedicated to the game being relatively short, can be quite extensive.

In terms of the perceived usefulness and effectiveness of Kahoot!, the teacher highlighted its potential to enhance vocabulary learning. She emphasized that the game-based format of Kahoot! encourages students in a fun and interactive way, leading to better retention of new vocabulary. The teacher also noted that the element of competition and reward in Kahoot! can motivate students to practice and improve their vocabulary.

When asked about the factors that could affect the implementation of Kahoot! in the classroom, the teacher identified the level of teacher familiarity and comfort with the platform, student engagement and motivation, and the availability of technology and internet access as key factors. She admitted that if teachers are not familiar with Kahoot! or do not feel comfortable using it, it may impact its effective implementation. Similarly, the level of student engagement and motivation plays a crucial role in the success of Kahoot! sessions. Additionally, the availability of technology and a reliable internet connection is necessary for students to fully participate in the games.

Regarding problems encountered during Kahoot! sessions, the teacher mentioned that while there were minor issues such as errors in application or connectivity issues, they did not significantly cause a disturbance in game session or impact the overall effectiveness of the games.

Lastly, in terms of future use, the teacher expressed her intention to continue using Kahoot! in her English vocabulary lessons. She believes that Kahoot! is a valuable tool and plans to utilize it for various purposes, including review activities and introducing new vocabulary. However, she acknowledged that due to the required preparation time, she would use Kahoot! occasionally rather than for every lesson.

DISCUSSION

This study investigated the effects of Kahoot!, a digital game-based learning platform, on the students’ vocabulary knowledge, their perceptions, and the teacher's perception toward Kahoot! within a public school in Songkla, Thailand.
The findings show that Kahoot! tended to have an immediate positive effect on the experimental group’s vocabulary knowledge, and the effect tended to be stronger on receptive vocabulary knowledge. This suggests Kahoot! may have helped to improve the students’ ability to recognize vocabulary. The comparison of the experimental and the control groups’ scores on immediate tests supports this finding. In the second and fifth immediate tests, statistically significant differences between the two groups were found in their receptive vocabulary knowledge scores and their total scores with a medium effect size. Additionally, the fourth immediate test highlighted a significant difference between the two groups in their productive vocabulary knowledge scores with a medium effect size. Notably, the experimental group consistently outperformed the control group in all immediate tests, except the first, although the statistically significant differences in the performance of the two groups were found only in the above-mentioned three immediate tests. This consistent yet non-significant trend implies that the intervention of Kahoot! might have affected the performance of the experimental group to a degree.

As for the pre-test, post-test, and delayed test, while the overall performance of the experimental group did not show a significant increase due to the Kahoot! intervention, some of the data showed promising results. For example, students in the experimental group displayed better performance in the post-test compared to that in the pre-test, although the difference between most of their scores in these two stages was minimal and statistically insignificant. Nonetheless, the delayed test did show significant improvement in the experimental group’s scores for both receptive and productive vocabulary knowledge. Furthermore, the experimental group’s delayed test score on receptive vocabulary knowledge was significantly higher than that of the control group. This suggests that Kahoot! may have helped the experimental group to retain the vocabulary, particularly in a receptive context, in the longer term, and thus it can be a valuable tool for reinforcing vocabulary learning. Nonetheless, as pointed out earlier, the fact that both the experimental group and the control group in the present study had higher delayed test scores than their post-test scores is unusual and counterintuitive and must be taken with caution. Having said that, the experimental group’s significantly higher delayed test score on only receptive vocabulary knowledge might indicate some influence of the treatment on their learning of receptive vocabulary. While the delayed test showed significant improvement in the experimental group’s vocabulary knowledge, particularly in receptive terms, this finding requires careful interpretation due to a potential confounding variable. The delayed test occurred just before the midterm exam, which included the target vocabulary words. It is likely that both groups engaged in review activities in preparation for the exam, making it difficult to confidently point out the contribution of Kahoot! to the observed improvement in the experimental group’s scores. This limitation aligns with research by Roediger and Karpicke (2006, 2007) which focused on the use of repeated testing to enhance long term retention. Their study acknowledged that intervening incidents like preparation for exam or external learning outside classroom could influence the result of the experiment since it was difficult to measure how impactful the intervention was.

Overall, these results suggest that Kahoot! is more suitable in the short term than in the long term. The data from the immediate test scores demonstrated that while the experimental group showed significant improvement, particularly in receptive area, such effect is less evident
in a longer period. Furthermore, Kahoot! demonstrates a stronger focus on receptive vocabulary knowledge rather than productive vocabulary knowledge. This is evident in the design of the Kahoot! activities, as the majority of them primarily involve receptive tasks such as multiple choice and true/false questions. These question types require students to select the correct answer from a given set of options, emphasizing their ability to understand and recognize vocabulary in context. In contrast, only one question type, fill in the blank, can be considered a productive task, where students need to actively recall and use the correct vocabulary. However, it should be pointed out that this task is semi-productive and receptive since the test design incorporates multiple-choice options and requires comprehension of the sentence context. Therefore, the productive aspect of vocabulary use is not fully emphasized in the Kahoot! activities. Considering the specific productive test used in this study, which involved "fill in the blank" questions, it is important to note that even though it is categorized as a productive task, it still retains elements of receptive knowledge. The test design incorporates multiple-choice options within the fill-in-the-blank format, requiring the students not only to produce the appropriate vocabulary but also to comprehend the context of the given sentences. This indicates that they need both productive vocabulary knowledge and receptive knowledge to understand the sentence context and select the correct answer from the given choices.

The fact that Kahoot! is primarily designed for use with mobile phones contributes to the dominance of receptive vocabulary tasks. Using a mobile phone to type can be more challenging and time-consuming compared to using a keyboard or writing by hand. The limitations of typing on a mobile phone screen may discourage students from actively engaging in productive vocabulary tasks that require more extensive writing or sentence construction. Studies suggest that typing on mobile phones can be less efficient and accurate compared to using keyboards, especially for tasks requiring extended text input or sentence construction. For instance, Lee and Billinghurst (2016) found that while touchscreens improved in speed and accuracy over time, physical keyboards still offered significant advantages, particularly for experienced users and longer texts. Additionally, Liu et al. (2022) showed that the decreasing size of mobile phone keyboards negatively impacts typing speed and accuracy, further emphasizing the challenges of mobile input for extended text production. It can, then, be said that the design of Kahoot! activities favor receptive tasks that align with the ease of interaction through mobile devices.

In addition, the session joining time and disconnection issues mentioned by the students in the open-ended part of the questionnaire also highlight areas of technical problems. Unfortunately, the solution to the mentioned problems is not possible on the user side. However, in the future, if Kahoot! is able to address these mentioned concerns by allowing students to join the session immediately without having to input the code given by the teacher every time Kahoot! is used and allowing the disconnected students to rejoin immediately, it will not only improve the user experience for both students and teachers but will also contribute to ease of use, which is an area where the quantitative data showed a slight dip.

As for the perceptions of both the students and the teacher regarding the use of Kahoot! as an educational tool, the findings reveal the students in the experimental group had a positive reaction toward Kahoot! They expressed favorable opinions and attitudes toward the platform, highlighting its ability to make classes more enjoyable, encourage healthy competition,
generate a greater interest in the learning material. Consequently, it is evident that the students preferred Kahoot! as a teaching tool. It should be pointed out, however, that the majority of the students in the experimental group had previous experience with Kahoot! and this may have contributed to their comfort with it.

During the interview, the teacher also expressed a favorable opinion towards Kahoot!, despite the challenges of the time required for preparation and setup in actual classroom settings. These findings are consistent with those of previous studies reporting positive student attitudes toward Kahoot!, and increased motivation (Sakulprasertsri, 2020; Wichadee & Pattanapichet, 2018) as well as favorable opinions toward the multimodal approach (Sakulprasertsri, 2020).

CONCLUSION

The study suggests Kahoot! could be an effective tool for teaching vocabulary to M.1 students in a school in Southern Thailand. The students using Kahoot! showed some improvement in their vocabulary knowledge. Specifically, the results indicate that Kahoot! tended to be effective in the short-term immediate tests, while the delayed test scores showed significant improvement in the students’ vocabulary knowledge. Additionally, the findings suggest that Kahoot! was particularly effective in improving the students’ receptive vocabulary knowledge, which was confirmed by the analysis of data from all the tests in the study. Kahoot! as a vocabulary teaching tool was also well received by both the students and the teacher. The students liked the interactive and game-like features of the platform, and the teacher found Kahoot! simple to use in the classroom.

It is important to consider the contextual limitations of this study. The conclusions drawn are specific to M.1 students in a school in Southern Thailand and may not be directly applicable to other educational contexts. Additionally, the study acknowledges the need for further research with a larger sample size and differences in student ages and backgrounds to gain a more comprehensive understanding of the impact of Kahoot! on learners' vocabulary knowledge. It is also important to note that this study had a time constraint. Due to the limited duration of the experimental period which lasted only six weeks, the study encountered constraints in observing and collecting data over a longer period of time and may miss out on the frequency and intensity of the treatment. In addition, the higher average delayed test score compared to the post-test score could be influenced by a confounding variable, the intervening review session before the midterm exams of the students. To provide a clear-cut and more comprehensive understanding of the effects of Kahoot! on vocabulary learning, future research should consider an extended study duration and guard against any confounding variables in the research.

The results of this study suggest that using Kahoot! as a teaching tool for vocabulary instruction may be beneficial. However, it is crucial to consider the learners' background and familiarity with technology-based learning before implementing Kahoot! in the classroom. Each learner adapts differently to various teaching methods, emphasizing the need to assess their exposure and comfort level with technology.
Teachers should familiarize themselves with Kahoot! prior to its implementation to prevent technical issues and to effectively provide instruction and support to learners during Kahoot! activities. The study also highlights that Kahoot! is particularly effective in the short term, demonstrating its potential for reinforcing vocabulary learning. Its implementation can also significantly enhance learner motivation, as indicated by the positive attitude and increased motivation as reported by the students learning vocabulary through Kahoot! in this study.

Having included both productive and receptive vocabulary tests in this study to comprehensively assess the impact of Kahoot! on both aspects of vocabulary learning and to identify specific areas where Kahoot! might be more or less effective, the results suggest that Kahoot! is better suited for teaching receptive vocabulary rather than productive vocabulary. However, it is essential to acknowledge the limitations of Kahoot! identified by both the teacher and the students in the current study, such as the time required for preparation and setup, as well as the dependence on devices and a reliable internet connection. These limitations should be taken into account when considering the feasibility of using Kahoot! as an instructional tool. In light of these results, it is recommended that educators carefully consider the learners' backgrounds, ensure their own familiarity with Kahoot!, and be aware of the motivational benefits offered by Kahoot! in a vocabulary classroom. Attention should be given to the limitations associated with preparation time, technical requirements, and the differentiation between receptive and productive vocabulary. By addressing these considerations, teachers can effectively utilize Kahoot! as a valuable tool to enhance vocabulary learning in the classroom.

THE AUTHORS

Katetawan Hattee is a MA student who is currently pursuing a master's degree in Applied English Language Studies at the Faculty of Liberal Arts, Prince of Songkla University, Thailand. His areas of interest include technology in language teaching and corpus linguistics.

katetawantrang21@gmail.com

Adisa Teo is an associate professor of English at Prince of Songkla University, Thailand. She obtained her PhD in Education with emphasis on Second Language Acquisition and Teacher Education from the University of Illinois, U.S.A. Her research interests include second language acquisition, Global Englishes, ELT, course/materials development, and teacher education.

adisa.s@psu.ac.th

REFERENCES


