Using WordSift in English vocabulary teaching in a Thai classroom: Student vocabulary retention

การใช้โปรแกรมเวิร์ดซิฟต์สอนคำศัพท์ภาษาอังกฤษในชั้นเรียนไทยกับความคงทนในการจำคำศัพท์ของนักเรียน

ศุภธิดา ดำชู[1]

Supatida Dumchoo

ไซนี แวมูซอ[2]

Zainee Waemusa

บทคัดย่อ

เวิร์ดซิฟต์ คือเว็บไซต์สร้างกลุ่มคำออนไลน์ที่พัฒนาขึ้นสำหรับการสอนคำศัพท์ แต่งานวิจัยที่ศึกษาประสิทธิผลของโปรแกรมนี้ต่อความคงทนในการจำคำศัพท์ยังมีจำกัด บทความนี้มีวัตถุประสงค์เพื่อ 1) เปรียบเทียบความคงทนในการจำคำศัพท์ภาษาอังกฤษของนักเรียนกลุ่มทดลองที่เรียนคำศัพท์ผ่านเวิร์ดซิฟต์ กับกลุ่มควบคุมที่

[1]นักศึกษาระดับปริญญาโท สาขาการสอนภาษาอังกฤษเป็นภาษานานาชาติ ภาควิชาภาษาและภาษาศาสตร์ คณะศิลปศาสตร์ มหาวิทยาลัยสงขลานครินทร์ วิทยาเขตหาดใหญ่

M.A. Student, Teaching English as an International Language, Department of Languages and Linguistics, Faculty of Liberal Arts, Prince of Songkla University, Hat Yai Campus

[2]ผู้ช่วยศาสตราจารย์ ดร. ภาควิชาภาษาและภาษาศาสตร์ คณะศิลปศาสตร์ มหาวิทยาลัยสงขลานครินทร์ วิทยาเขตหาดใหญ่

Assistant Professor, Ph.D., Department of Languages and Linguistics, Faculty of Liberal Arts, Prince of Songkla University, Hat Yai Campus

เรียนโดยมีครูเป็นผู้ชี้นำ 2) นำเสนอทัศนคติของนักเรียนต่อการเรียนดังกล่าว งานวิจัยนี้ใช้หลักการตาม TPACK บูรณาการความรู้ด้านเนื้อหา การเรียนการสอน และเทคโนโลยี โดยกลุ่มตัวอย่างเป็นนักเรียนชั้นมัธยมศึกษาปีที่ 5 จำนวน 37 คน ในโรงเรียนมัธยมศึกษาแห่งหนึ่งในจังหวัดพัทลุง จำนวน 2 กลุ่ม มีเครื่องมือวิจัยคือ แบบสำรวจคำศัพท์ แบบฝึกหัดคำศัพท์ ข้อสอบวัดผลสัมฤทธิ์ ซึ่งสอบหลังเรียน 3 วัน ข้อสอบวัดความคงทนในการจำคำศัพท์ในระยะยาว หรือหลังเรียน 14 วัน และคำถามสัมภาษณ์แบบกึ่งโครงสร้าง ผลการศึกษา โดยใช้ independent *t* test พบว่า นักเรียนกลุ่มควบคุมมีคะแนนสูงกว่ากลุ่มทดลองอย่างมีนัยสำคัญ $t(35) = 3.609$, $p = .01$ อย่างไรก็ตาม การเปรียบเทียบคะแนนภายในกลุ่ม โดยใช้ paired *t* test ไม่พบว่าคะแนนความคงทนในการจำคำศัพท์ของทั้งสองกลุ่มลดลงอย่างมีนัยสำคัญเมื่อเปรียบเทียบกับคะแนนผลสัมฤทธิ์ (กลุ่มทดลอง $t = -.08$, $p = .93$, กลุ่มควบคุม $t = 6.78$, $p < 0.01$) ข้อมูลจากการสัมภาษณ์ชี้ให้เห็นว่ากลุ่มทดลองเชื่อว่าเวิร์ดซิฟต์มีส่วนช่วยส่งเสริมการเรียนและการจำคำศัพท์ในทางบวก การวิจัยในอนาคตควรศึกษาวิธีประยุกต์ใช้เวิร์ดซิฟต์เพื่อช่วยเพิ่มปริมาณคำศัพท์ที่นักเรียนจดจำในระยะยาว

คำสำคัญ: เวิร์ดซิฟต์ ความคงทนในการจำคำศัพท์ การเรียนรู้แบบร่วมมือ การเรียนภาษาอังกฤษในฐานะภาษาต่างประเทศของนักเรียนไทย TPACK

Abstract

WordSift is a word cloud generator website developed for vocabulary teaching. However, few empirical studies have examined its effects on vocabulary retention. This study aimed to 1) compare students' English vocabulary retention

between an experimental group learning new words through WordSift and a control group learning through the teacher-directed method; 2) report on students' perceptions in vocabulary learning. The technological pedagogical content knowledge (TPACK model) was utilized as a theoretical framework. The subjects were 37 Mathayomsueksa 5 students in a secondary school in Phatthalung Province, Thailand, who were divided into two groups: the experimental group and the control one. The researcher used the following research tools: vocabulary survey forms, exercise handouts, achievement tests administered after 3 days of the treatment, retention tests administered after 14 days of the treatment, and semi-structured interview question sets. The results showed that through the independent *t*-test, the control group significantly outperformed the experimental one in vocabulary retention, $t(35) = 3.609$, $p = .01$. However, through the paired *t* test, the scores within groups did not show significant decrease in retention scores from the achievement tests (experimental group $t = -.08$, $p = .93$, control group $t = 6.78$, $p < 0.01$) and thus indicated vocabulary retention. Moreover, the interview data revealed that WordSift helped students' learning and vocabulary retention in positive ways. It is suggested that future studies should focus on the effects of WordSift use on increasing vocabulary size in long term retention.

Keywords: WordSift, vocabulary retention, collaborative learning, Thai EFL students, TPACK

Introduction

Vocabulary is the gist of English teaching because lexis is basically a fundamental element in languages (Lessard-Clouston, 2013). In the English as a foreign language (EFL) context, language learners tend to acquire unfamiliar words through their normal classrooms, while native speakers have plenty of opportunity to be exposed to a large amount of new vocabulary throughout their entire life (Siyanova-Chanturia & Webb, 2016).

According to Goulden, Nation, and Read (1990), an estimated number of vocabulary that an educated English native speaker knows is around 20,000 word families, whereas the vocabulary size of a well-educated non-native speaker of English is smaller than a half of that or around 8000–9000 word families (Nation, 2006). Sadeghi, Khezrlou, and Modirkhameneh (2016) reported that advanced language learners will possess a larger size of vocabulary compared to those low proficiency users. Adequate word bank contributes to better language quality by extending word choice when producing output and enhancing thorough understanding in receptive skills. Vocabulary teaching, therefore, is central for EFL.

Vocabulary acquisition is intertwined with retention when ones recognize the meanings of orthography they see, sounds they hear, or are able to pick up a word in the repertoire and use for their production. Despite a vital role of vocabulary learning, many Thai students struggle

with their limited English vocabulary (Srimanee & Laohawiriyanon, 2014). A possible justification is that English is used as a foreign language in Thailand and most of the learning occurs in formal classrooms where students might not have adequate opportunity to be exposed to the English language. Jingjit (2015) also pointed out that inaction on vocabulary teaching in Thailand, especially the lack of technology integration, decreased students' interest and dampened their enthusiasm for learning. As a result, recent educational policy encourages teachers to utilize the potentials of new technology into the classroom. The same phenomenon happens worldwide in this digital age. However, although current teaching methods are technocentric, many educational technologies are applied without the proper understanding (Mishra & Koehler, 2006).

Literature shows that a well-integrated technology in education could help learners learn a foreign language, especially vocabulary. In Dubois and Vial's (2000) study, it was evidenced that the use of multimedia technology[3] could help evoke learners' memory in learning Russian vocabulary as a foreign language.

[3]Multimedia technology refers to the combination of different data forms in one presentation, e.g. texts, audios, images, animations, graphics, and others

WordSift[4] is a free word cloud generator website that was purposefully created for vocabulary teaching (Hakuta, 2011). The program provides a visual display in different modes which relates to a clicked word in the cloud, i.e. pictorial representation, videos, thesaurus, and context. The application offers ample opportunities to play with the language and teachers can design classroom activities and a compatible pedagogy that meet the learning needs.

WordSift is one of the multimedia representations whose benefit on vocabulary retention was documented in Talang and Mahmoodi (2013) and Smith and Qayyum (2017). This application, however, has not been investigated in any Thai context yet. Therefore, this research study helped examine the credibility of its positive impact on vocabulary retention in a Thai context in particular. Talang and Mahmoodi (2013) also suggest that a compatible pedagogical approach used with WordSift should be explored simultaneously in the future.

Jingjit (2015) noted that, in the Thai educational context, the way technology is integrated into vocabulary teaching seemingly does not meet learning objectives due to a lack of understanding in selecting appropriate educational materials. To fill this gap, this present study was

[4]The uniform resource locator (URL) of the site is https://wordsift.org

conducted on the notion of Mishra and Koehler's (2006) technological pedagogical content knowledge (TPACK model) which emphasizes the interplay among technology, teaching approach, and the subject matter that is to be taught.

In investigating the applications of WordSift in a large project, this paper merely presents the findings of student retention in learning English vocabulary between a WordSift-using group and a non WordSift-using group, and the student attitudes toward learning through the application.

Literature Review

1. TPACK Model

This research study draws on technological pedagogical content knowledge or TPACK (Mishra & Koehler, 2006) as the theoretical framework for the practical application of WordSift in an EFL classroom. TPACK emerged from the integration of new technology in 21st century into teaching for the purpose of even more effective pedagogy. The framework comprises of three main components that overlap one another, stressing on the complex interdependence among them. Isolated technological knowledge (TK) refers to the ability to operate software and hardware devices while pedagogical knowledge (PK) is insightful understanding about the process of teaching and learning. The last

component, content knowledge (CK), represents the knowledge of a particular subject matter that is to be taught. The intersection point where every construct is blended (TPACK) is the heart of the framework. It is believed to be the foundation of good teaching, understanding how to use a specific technology to enhance the right teaching method on a particular content.

Its high degree of parsimony makes TPACK gain the ongoing growth of interest among researchers worldwide (Graham, 2011). In their application of technology in the classroom, teachers have their options about what to situate in each of the three domains and how to unite them altogether (Koehler & Mishra, 2009). This framework is not restricted to technology integration but include other things, e.g. aiding devices that best suit a particular context. However, when it comes to practice, those teaching aids will not be the only instructional mediums, but will "transform the nature of a subject at the most fundamental level" (McCormick & Scrimshaw, 2001, p. 47).

2. TPACK: Application to a curriculum design with WordSift

The following figure illustrated practical knowledge situated in each TPACK domain for this study (Figure 1).

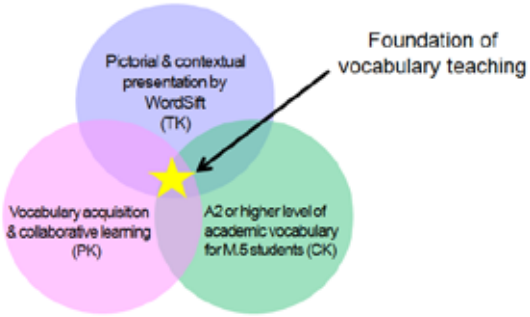

Fig. 1 Boundaries of knowledge in this study based on TPACK model

According to the TPACK model used as a principal model in vocabulary teaching, at the early stage, teachers should realize subject matters to be instructed before moving to responsive pedagogy until applicable technology is opted. For teachers, the foremost facts are the content in the CK domain for example subject matters in each subject or academic vocabulary as required for students to learn in each level of language learning. On the PK domain, the theories of vocabulary acquisition were laid with the effort to understand the nature of how vocabulary is acquired and what should be the most appropriate reinforcement to promote student retention. Based on Pimsleur (1967)' s graduated interval recall theory, it is more effective to study a small number of words over several short period of time than to study larger amount in one longer period. The appropriate number of vocabulary items

to be learned each time was proposed as five to seven in Hunt and Beglar (2002) with the explanation that learners can have more time for the reviews. Graves (2016) also suggests one way to increase learners' vocabulary size, which is to encourage them to have adequate word exposure through listening, speaking, reading, and writing. This is in line with McKeown and Beck (2014), who insist that vocabulary learning is most effective when learners encounter new words several times. The researchers also claimed that repetition and review should take place almost immediately after the words are introduced.

Collaborative learning (CL) can be situated in the same domain as responsive teaching approach. CL emphasizes individuals' engagement in every stage of the learning process while performing their mutual task (Beatty & Nunan, 2004). Thus, it facilitates communication among learners. The approach is different from cooperative learning in terms of group members' responsibility and engaged interaction. In cooperative learning, each group member is responsible for their individual task, but will finally gather to complete the activity. Research-based evidence showed that using CL and technology together can enhance student language learning in a Thai context (Waemusa, 2016). Other studies from diverse contexts which indicated that the results are consistent with this notion are those of Paulson and Faust (2002); Chih-Cheng, Hsiao, Tseng, and Hsin-jung, (2014)

WordSift can be adopted in the TK domain because it was purposefully created for vocabulary teaching (Roman, Thompson, Ernst, & Hakuta, 2016). WordSift can help enrich academic vocabulary-learning conditions across content areas (Farkas, 2009). Moreover, it can be used as a supplementary tool in an attempt to enhance collaborative learning among the students. To utilize this application, users can insert their texts into a provided box. After clicking the "Sift" button, the program will generate the text into a colorful cloud of 50 most frequent words from the extract. Visual displays which are shown on the same page under the cloud are image, video, thesaurus, and context windows. Users then can choose which features to play with. For instance, a teacher can have students learn the meanings of the target words by exploiting information from pictures and the word context. After the teacher clicks on a target word, s/he may enlarge the image window which contains related pictures. The window of context where the word is from then is open up in order to provide helpful context clues about the meaning of the word (Figure 2). The properties afforded by WordSift work on dynamic classrooms where active and collaborative learning is encouraged. The benefits of the tool on vocabulary retention improvement were reported in Talang and Mahmoodi (2013) and Smith and Qayyum (2017). This positive outcome can be explained by an underlying theory about the potentials of

multimedia. It is insisted that multimedia can facilitate memory. According to Carpenter and Olson (2012), when new vocabulary items are introduced together with multimedia, retention is better enhanced than when learning from a written text alone because images and word are dually coded.

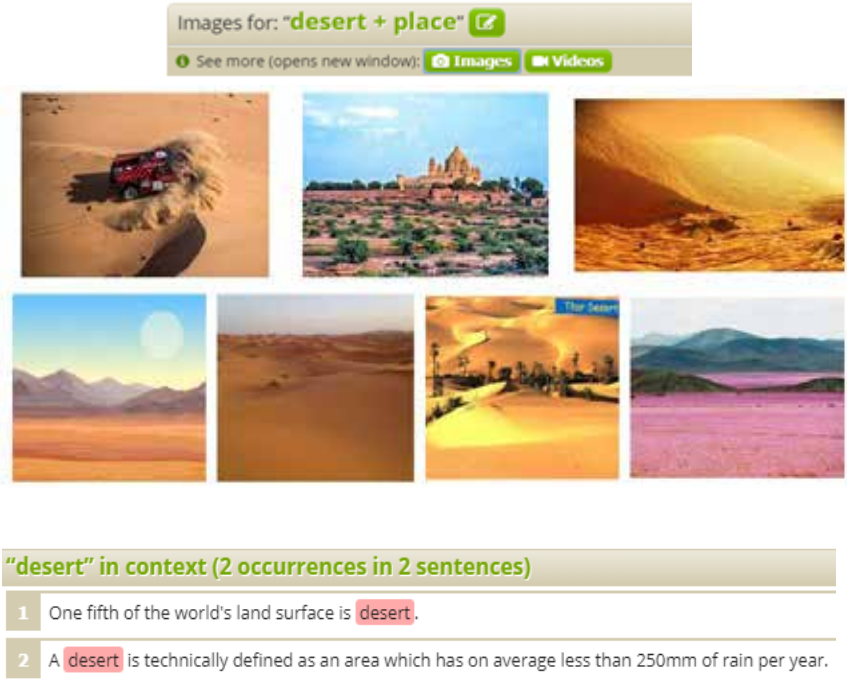

Fig. 2 Image and context modes of WordSift

The researcher exploited the aforementioned theories from the three knowledge domains, shaping the treatment for the students in the experimental

group, and hypothesized that WordSift could boost the student retention better when compared to learning through teacher-directed method.

Research methodology

1. Research design

To explore the effects of the use of WordSift in learning vocabulary and students' perception, the explanatory sequential mixed-method design (Fetters, Curry, & Creswell, 2013) was applied in this study. Vocabulary achievement and retention tests were set to collect quantitative data. Focused group interviews were conducted to explore in-depth data from the qualitative findings.

2. Research questions

Two research questions were raised as follows.

2.1 Are there any significant differences of vocabulary retention between the student group using WordSift in English vocabulary learning and a group learning through the teacher-directed method?

2.2 What are the student perceptions of the use of WordSift in vocabulary learning?

3. Student groups

The students were 37 Mathayomsueksa 5 students who were taking Basic English 32102 subject in the second semester of academic year 2017 in a

secondary school, in Phatthalung Province, Thailand. Through a purposive sampling, they were chosen and divided into two groups, i.e. control and experimental groups based on their regular classes. The number of the students for each group was 19 and 18 respectively. To ensure the homogeneity between groups, vocabulary survey tests were administered to them before the treatment began. The result showed that none of them achieved the scores higher than 25 percent (22.5 out of 90 items). The homogeneity then was assumed.

4. Research instruments

In addition to WordSift, the following instruments were used to collect data in this study.

4.1 Vocabulary survey test

Before the treatment started, the student subjects from the control and the experimental groups were required to complete a vocabulary survey test by filling up the definitions of provided words in Thai. The purposes were to seek for their unfamiliar words and to find the homogeneity between groups. This test contained 90 A2[5] or higher level vocabulary from nine topics in the school's textbook and other sources (ten vocabulary items selected from each topic). Finally, 54 unknown vocabulary items (six items from each topic) were chosen as the target words to be taught in the treatment.

[5]Based on Common European Framework of Reference for Languages or CEFR

4.2 Vocabulary exercises

The students in each group learned new six vocabulary items from each topic in the selected textbook through the designed interventions (see 5.1.1). The tables of the six target words with parts of speech were distributed to them to complete the definitions in Thai while receiving the treatment. In total, there were nine sets of exercises under nine topics.

This project study was conducted with Mathayomsueksa 5 students who were required to take Basic English 32102 as a compulsory subject. According to the school's curriculum planning, these students had to master English at A2 or higher level academic vocabulary in the prescribed textbook or other sources that contained vocabulary at the same level. In this experiment, 54 unknown words from nine topics were selected as the target words to be instructed, six words from each topic to be precise. The vocabulary was picked up from the topics as shown in Table 1.

Table 1 Nine topics from the textbook

1. The minister for exams	2. The chemistry of love	3. Abuse and addiction
4. A mermaid and a magic comb	5. Diary of a tenacious teen	6. What is happiness?
7. Irregular verbs	8. Christmas songs	9. The Child labor

4.3 Vocabulary achievement and retention tests

A vocabulary achievement test was used to measure the student vocabulary acquisition in each lesson. It was conducted in the following session after a lesson the new vocabulary was introduced. Therefore, each achievement test contained the same six target words the students learned in the previous session, and there were nine sets of the tests all together. The achievement tests were in L2 translation test forms. The students had to fill in the right definitions of the given words in Thai. A vocabulary retention test had the same form as the achievement one but the items contained were shuffled. This test was used to measure the students' ability to remember the meanings of the words after 14 days of the first encounter. This time length is considered as a long term memory (Gu, 2003). In total, there were nine sets of the retention tests. The reliability of the tests was estimated after the tests were piloted to the other group of M.5 students who were not the target sampling. The reliability of the test was measured, and its Cronbach's Alpha was at .71, showing that the tests were reliable.

4.4 The interview question sets

In order to explore the students' perception both in the experimental and control groups, the researcher conducted focused group interviews in Thai using a semi-structured interview question sets. The validity of the questions was checked by three experts, and the language clarity was amended before implementation.

5. Intervention administration, data collection and analysis

5.1 Quantitative phase

As this paper aims to report some part of the large research study, only the results concerned will be referred. Data from the experimental and control groups were collected under the same procedures. The only different variables were the interventions given. When the treatment phase started, the English class was divided into two sessions a week, and the students in each group attended class twice a week according to their regular timetable. Starting from the first session of the first week, six unfamiliar words selected from the first topic were introduced to the students. They learned the new words through different interventions (see 5.1.1). In the second session of the first week, the five minute achievement test was administered. The ten minute retention test of first topic would be administered in the subsequent 14 days or the first session of the third week. Starting from the third week of the treatment, the students had to take: 1) the retention test of the topic learned from the previous two weeks, and 2) the achievement test of the topic learned in the earlier session. The same arrangement was administered repeatedly until all 54 vocabulary items from the nine topics were delivered (see Figure 3 for details).

Quantitative phase (Interventions)				
Week	**Sessions**	**Interventions**	**Achievement**	**Retention**
1	1	Topic 1		
	2		Topic 1	
2	1	Topic 2		
	2		Topic 2	
3	1	Topic 3		Topic 1
	2		Topic 3	
4	1	Topic 4		Topic 2
	2		Topic 4	
5,6,7,8....				
9	1	Topic 9		Topic 7
	2		Topic 9	
10	1			Topic 8
	2			
11				Topic 9

Qualitative phase (Interview)

Fig. 3 Data collection schedule

5.1.1 Two different types of the interventions

5.1.1.1 Intervention without WordSift

The students in the control group learned new vocabulary through the teacher-directed method, having the teacher play the key role in delivering lecture-based lessons in the classroom. The exercise or a table of six vocabulary items was distributed to each student who noted down the given meanings while the teacher was telling the definitions.

5.1.1.2 Intervention with WordSift

The students in the experimental group were divided into groups of 3-4 in each session. They received the tables of vocabulary from the teacher to complete the definitions. In this group, the students were assigned to find the word meanings through their group discussion. The teacher inserted a text from the chosen topic into WordSift and generated it into a cloud. When a target word was clicked, the image window was enlarged showing related pictorial presentation of the word. Then the context window which showed the word context was opened up. The students were encouraged to use information shown on the screen to find out the word definitions by discussing with their peers in groups collaboratively, meaning that everyone in the groups was required to suggest and exchange their ideas until they came to a conclusion.

Everyone helped figure out the meanings of each word, not breaking their task into pieces and assembling them at the end.

The teacher also walked around encouraging every group member to deliberate on the discussion so that they could equally be exposed to the words through listening, speaking and reading. The teacher also facilitated them in case of need. Through collaborative learning, everyone in each group was responsible for the task accomplishment. They had to contribute the conversation and elaborate on the reasons for their ideas until they found the right answers. They then wrote the meaning in the tables. When all the six words were done, the right answers would be shared and discussed by the teacher. Time allocated for this activity was 15 minutes approximately.

5.2 Qualitative phase

After the data from the quantitative phase was completely collected and analyzed, the focused group interviews were conducted to explore the perceptions of the students in both groups. The researcher selected eight students from each group. They were the top-four and the lowest four of the students based on their retention scores. The audio recorder was used during the interview.

To answer the research question 1, the raw scores were converted into percentage for simplification. The independent *t* test was

utilized to compare the means of the retention tests between the two groups. To examine the level of retention development, the paired *t* test was further computed to compare the means between the achievement and retention tests within each group.

The content analysis was carried out to answer the research question 2. The student conversations during the interviews were transcribed verbatim and the transcription was analyzed in depth.

Results

To answer the research question 1, the result showed that there was a significant difference in the means of vocabulary retention between the control group (*M*=76.02, *S.D.*=10.95) and the experimental group (*M*=63.07, *S.D.*=10.88) conditions; *t*(35)=3.60, *p*= .01 (Table 2). The higher scores indicated that the control group substantially outperformed the experimental one in the retention tests, *p*= .01. However, the comparison of the scores within groups showed that, like the control group, the students in the experimental group could maintain vocabulary retention after two weeks.

Table 2 Retention scores between groups

Part	Control Group (n=19)		Experimental Group (n=18)		t-test	df	sig	Effect size
	Score in %		Score in %					
	Mean	S.D.	Mean	S.D.				
Achievement	61.21	10.84	63.27	12.39	.540	35	0.59	0.18
Retention	76.02	10.95	63.07	10.88	3.609**	35	0.01	1.22

** Significant at 0.01 level

In comparing the results within the group, a significant difference in the means between the achievement and retention tests in the control group was found, t=6.78, $p < 0.01$ (Table 3). That was, the students in this group showed retention in vocabulary learning, their vocabulary size has been maintained, yet grown afterwards.

Table 3 Difference between achievement and retention tests within control group

Paired	Control Group: 5/1 (n=19)				Diff	t-test	df	sig
	Mean	S.D.	Mean	S.D.				
Achievement-Retention	61.21	10.84	76.02	10.95	14.81	6.781**	18	.000

** Significant at 0.01 level Diff = Difference

For the experimental group, the results indicated a non-significant difference between the achievement and retention tests (t=-.08, p=.93), yet the students could retain the vocabulary definitions because significant decrease in the retention scores was not found. In other words, their vocabulary size was still maintained after two weeks (Table 4).

Table 4 Difference between achievement and retention tests within experimental group

Paired	Experimental Group : 5/2 (n=18)				Diff	t-test	df	sig
	Mean	S.D.	Mean	S.D.				
Achievement-Retention	63.27	12.39	63.07	10.88	-.21	-.081	17	.936

Diff = Difference

In answering the research question 2, as to how the students perceived the use of WordSift in their vocabulary learning, it was found that the students who were treated by using WordSift showed a positive attitude towards the tool. These students considered visualization from interacting with the WordSift screen and example sentences as the potentials of WordSift that helped promote their vocabulary retention through different strategies. Furthermore, the visualization made their learning more pleasant. Some excerpts from the interview are shown as follows.

"What I saw on the screen especially pictures really could evoke my memory in both meanings and use."

B4*. (2018, January 23). Group Interview

"[....]. Later, when I encountered the words in the textbook, I recognized they were shown on the screen. [....]. I memorized the meanings from the context."

B1*. (2018, January 23). Group Interview

"I like WordSift because it could show related pictures. That was enjoyable"

B6*. (2018, January 23). Group Interview

"When a word and pictures are shown together, it is easier to think of its meaning later"

B8*. (2018, January 23). Group Interview

They also mentioned about the usefulness of the collaborative learning approach implemented in the classroom with WordSift by allowing them to share word meanings among group members and then providing a learning opportunity to explore word meanings and word contexts together on the WordSift screen.

"Collaborative learning is a good approach because the higher proficiency peers can help share their ideas with the weaker group members"

B3*. (2018, January 23). Group Interview

Discussion

The results of this study showed a significant difference in vocabulary retention between the control and experimental groups, and the control group significantly outperformed the experimental one. For the control group, the vocabulary meanings were not only retained after 14 days, but also grew in size. However, despite the unexpected results, insignificant change in retention scores of the experimental group indicated that the students could retain vocabulary at the same level after 14 days. The interview data also showed that using WordSift in learning vocabulary was perceived satisfactorily, compared with a learning way of a textbook-driven curriculum they had experienced in the past.

As results from this study showed some unexpected findings, namely that the control group significantly outperformed the experimental one in retention, the interview was also conducted to the control group to look for possible explanations. The data from the interview showed that

the control group had the word reviews one day before the tests outside the classroom. This act could be an intervening variable that substantially affected their increased retention scores, allowing them to experience word exposure during their reviews before the retention tests.

In contrast, the interview data showed that none of the students in the experimental group performed this extra activity due to heavy workload and their intention to test the effectiveness of the WordSift on their vocabulary learning. However, there was no significant change in the retention scores. It then might be possible that the word exposure from the group discussion activity was great enough to help maintain their retention, but could be greater to increase vocabulary size if they had repeated the words more than one time.

Using the TPACK perspective, the retention in the experimental group might be a result from multimedia integration into classroom. This goes in line with Talang and Mahmoodi (2013) and Smith and Qayyum (2017). In understanding this result in-depth, the data from the interview also was taken into account. As informed by the interviewee students, all of them considered pictures as a great tool that kept them focussed on their learning and turned boring lessons into the enjoyable ones. Thus they could pay full attention to the treatment. This finding is consistent with Chih-Cheng, Hsiao, Tseng, and Hsin-jung (2014) whose work affirms

the benefit of multimedia in vocabulary teaching. The qualitative data also revealed that when the students encountered the already learned words again, it was the pictures they had in mind that helped them recognize their meanings. This is consistent with Carpenter and Olson (2012) reporting that retention was better enhanced when words were introduced with pictures. In addition, some students pointed to a new strategy of using the context they explored during learning through WordSift. Previously, they only had tried to remember the meaning of a new word through its Thai translation. After they learned to guess a word meaning using context clue, they found a new way to memorize its meaning from the context it appeared in.

Being stated in the PK domain, the number of words introduced to the students each time also could be a factor affecting student retention. The results from this study showed that six vocabulary items gave satisfactory learning outcome in terms of retention. Time allocated for group discussion was long enough for the students to sufficiently work on each item. This aligns with Hunt and Beglar (2002) and Pimsleur (1967). Using WordSift as a tool to support collaborative learning could be a way to help store the word meanings in a long memory trace. When figuring out word definitions became the student mutual task, it reinforced the group interaction, providing more opportunity to deliberate on the

discussion. From the observation, the researcher found that the students and peers worked collaboratively when they reiterated the words, guessed their meanings, and heard the words several times during their group discussion. The whole process not only connected their sight and audition with the schema, but also increased word exposure that would lead to enduring memory (Graves, 2016).

In spite of the unexpected results, using WordSift through the TPACK perspective could, at some points, offer a penetrating insight about the properties of this technology and the other two knowledge domains. The results of this study revealed that learning outcomes depend on the ability to employ the appropriate technology based upon learning objectives, suit theories, and compatible teaching approach, but this needs a more carefully designed curriculum in the future. For the sake of future studies on vocabulary retention, the implications about how WordSift could be used through the TPACK model will be discussed in the following section.

Conclusion and implications

The findings from this study indicated a difference between the control and the experimental one in retention and that the control group significantly outperformed the experimental one in retention. Moreover, the use of WordSift gained a positive perception from the students. It is

recommended that using WordSift for vocabulary learning needs teachers to carefully design curriculum. It is expected that the use of this technology could enhance the quality of student learning especially in learning vocabulary. To support students in learning vocabulary with the use of technology, teachers need to change their attitude toward technological use and change their practice. To do this, teachers should adopt their new roles of education with technology (Laal & Laal, 2012). This means being a learning designer and facilitator, for example.

Using the technology through the TPACK could be beneficial if it is carefully designed and implemented by the teachers. In terms of technology implementation, the teacher in this study was the only person who operated WordSift. Having the students directly interact with the tool could be another practice that encourages their eagerness in learning. As WordSift provides many different features, teachers can manage how and when to utilize each property for practical effectiveness.

In addition, the orientation about collaborative learning should be provided to emphasize the importance of building knowledge together and to ensure that the learning procedures are on track. Vocabulary size might be adjusted to suit the student level and proficiency. The findings from this study also suggest that how to utilize WordSift to grow vocabulary size should be further investigated in the future.

1. Limitations

1.1 This study only investigated the effects of using WordSift with the collaborative learning approach on student receptive skills. Its benefits for a productive ability should be examined likewise.

1.2 This study was conducted on students who were not familiar with the differentiation of parts of speech. Therefore, the findings may not be applied or generalized to a different condition or other settings.

1.3 The findings from this study revealed the effectiveness of the treatment when a small number of vocabulary items were introduced to the students in each session. The merit may not be conclusive for a different learning load.

References

Beatty, K., & Nunan, D. (2004). Computer-mediated collaborative learning. *System*, *32*(2), 165–183.

Carpenter, S. K., & Olson, K. M. (2012). Are pictures good for learning new vocabulary in a foreign language? Only if you think they are not. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *38*(1), 92.

Chih-Cheng, L. I. N., Hsiao, H.-S., Tseng, S., & Hsin-jung, C. (2014). Learning English vocabulary collaboratively in a technology-supported

classroom. *TOJET: The Turkish Online Journal of Educational Technology*, *13*(1).

Dubois, M., & Vial, I. (2000). Multimedia design: the effects of relating multimodal information. *Journal of Computer Assisted Learning*, *16*(2), 157-165.

Farkas, D. (2009). Wordsift: A tool for developing academic vocabulary in science. California. *Science Teachers Association California Classroom Science*, *21*(2).

Fetters, M. D., Curry, L. A., & Creswell, J. W. (2013). Achieving integration in mixed methods designs—principles and practices. *Health services research*, *48*(6pt2), 2134-2156.

Goulden, R., Nation, P., & Read, J. (1990). How large can a receptive vocabulary be? *Applied Linguistics*, *11*(4), 341–363.

Graham, C. R. (2011). Theoretical considerations for understanding technological pedagogical content knowledge (TPACK). *Computers & Education*, *57*(3), 1953–1960.

Graves, M. F. (2016). *The vocabulary book: Learning and instruction*. Teachers College Press.

Gu, P. Y. (2003). Vocabulary learning in a second language: Person, task, context and strategies. *TESL-EJ*, *7*(2), 1–25.

Hakuta, K. (2011). "WordSift": Supporting instruction and learning through technology in San Francisco. The senior urban education research fellowship series. Volume IV. *Council of the Great City Schools*.

Hunt, A., & Beglar, D. (2002). Current research and practice in teaching vocabulary. *Methodology in Language Teaching: An Anthology of Current Practice*, 258–266.

Jingjit, M. (2015). The effects of multimedia learning on Thai primary pupils' achievement in size and depth of vocabulary knowledge. *Journal of Education and Practice*, *6*(33), 72–81.

Laal, M., & Laal, M. (2012). Collaborative learning: what is it? *Procedia-Social and Behavioral Sciences*, *31*, 491–495.

Lessard-Clouston, M. (2013). *Teaching vocabulary*. TESOL International Association. 1925 Ballenger Avenue Suite 550, Alexandria, VA 22314.

McCormick, R., & Scrimshaw, P. (2001). Information and communications technology, knowledge and pedagogy. *Education, Communication & Information*, *1*(1), 37–57.

McKeown, M. G., & Beck, I. L. (2014). Effects of vocabulary instruction on measures of language processing: Comparing two approaches. *Early Childhood Research Quarterly*, *29*(4), 520–530.

Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. *Teachers College Record*, *108*(6), 1017.

Koehler, M., & Mishra, P. (2009). What is technological pedagogical content knowledge (TPACK)? *Contemporary Issues in Technology and Teacher Education*, *9*(1), 60–70.

Nation, I. (2006). How large a vocabulary is needed for reading and listening? *Canadian Modern Language Review*, *63*(1), 59–82.

Paulson, D., & Faust, J. (2002). *Techniques of active learning. June 14, 2011*.

Pimsleur, P. (1967). A memory schedule. *The Modern Language Journal*, *51*(2), 73–75.

Roman, D., Thompson, K., Ernst, L., & Hakuta, K. (2016). WordSift: A free web-based vocabulary tool designed to help science teachers in integrating interactive literacy activities. *Science Activities: Classroom Projects and Curriculum Ideas*, *53*(1), 13–23.

Sadeghi, K., Khezrlou, S., & Modirkhameneh, S. (2016). Calling Iranian learners of L2 English: Effect of gloss type on lexical retention and reading performance under different learning conditions. *Journal of Research in Reading*.

Srimanee, J., & Laohawiriyanon, C. (2014). *Vocabulary learning strategies of Thai Grade 9.* Retrieved from http://202.28.199.15/bitstream/123456789/890/1/008.pdf

Siyanova-Chanturia, A., & Webb, S. (2016). Teaching vocabulary in the EFL context. In *English Language Teaching Today* (pp. 227–239). Springer.

Smith, D., & Qayyum, A. (2017). Improving student approaches to online assessment in higher education with visualization software. In C.

M. Stracke, M. Shanks & O. Tveiten (Eds.), *Smart universities education's digital future.* Paper presented at the International WLS and LINQ Conference 2017, Kristiansand, Norway, 7-9 June. (pp. 53-57). Berlin: Logos Verlag Berlin GmbH.

Talang, T., & Mahmoodi, H. (2013). The effect of using word clouds on EFL students' long-term vocabulary retention. *Journal of English Language Teaching and Learning*, *11*.

Waemusa, Z. (2016). *The use of a Wiki to promote online collaborative learning at a Thai university* (Doctoral dissertation, Auckland University of Technology).