



The Effectiveness of Memorization Techniques on the Development of Secondary School Students' Reading Comprehension

ประสิทธิผลของเทคนิคการจำต่อการพัฒนาการอ่านจับใจความของ นักเรียนระดับมัธยมศึกษา

Krirk Kisawadkorn,¹ Hakim Sudinpreeda² and Salwanee Lateh³

เกริก กีสวัสดิ์คอน¹ ฮากิม สูดินปริดา² และ ชัลวานี ลาเตะ³

Article History

Receive: June 21, 2023

Revised: August 16, 2023

Accepted: August 22, 2023

บทคัดย่อ

การวิจัยครั้งนี้มีวัตถุประสงค์เพื่อตรวจสอบการใช้เทคนิคการจำเพื่อพัฒนาการอ่านจับใจความของนักเรียนไทยที่ใช้ภาษาอังกฤษเป็นภาษาต่างประเทศ ในการจัดการวิจัยนั้น เครื่องมือหลักที่ใช้ คือ แบบทดสอบก่อนและหลังเรียน โดยเครื่องมือดังกล่าวใช้สำหรับประเมินการอ่านจับใจความของนักเรียนขณะก่อนและหลังการได้รับสิ่งทดลอง ซึ่งเป็นเทคนิคการจำต่างๆ ได้แก่ การใช้บัตรคำ กลุ่มก้อนความคิด และเทคนิคการเรียงตามอักษร ในส่วนของผู้เข้าร่วมนั้น เป็นนักเรียนไทยชั้นมัธยมศึกษาปีที่ 5 ปีการศึกษา 2565 จากโรงเรียนโพธิ์ศรีราชศึกษา จังหวัดปัตตานี ประเทศไทย จำนวนทั้งหมด 51 คน ทุกคนใช้ภาษาอังกฤษเป็นภาษาต่างประเทศ ผลการวิจัยพบว่า คะแนนแบบทดสอบหลังและก่อนเรียนมีความแตกต่างกันอย่างมีนัยสำคัญทางสถิติ กล่าวคือ การอ่านจับใจความสำคัญของนักเรียนพัฒนาขึ้นอย่างมีนัยสำคัญหลังจากใช้เทคนิคการจำสิ่งนี้บ่งชี้ได้ว่านักเรียนสามารถจดจำคำศัพท์ได้ ซึ่งช่วยสนับสนุนการอ่านจับใจความ จากข้อมูลที่รวบรวมสะท้อนให้เห็นการใช้เทคนิคการจำมีผลต่อการพัฒนาการอ่านจับใจความเนื่องจากนักเรียนสามารถจดจำคำศัพท์ในเนื้อหาที่อ่านได้อย่างมีประสิทธิภาพมากขึ้น ด้วยเหตุที่นักเรียนสามารถจดจำคำศัพท์ได้ทำให้พวกเขาเข้าใจเนื้อหาและรู้ใจความสำคัญยิ่งไปกว่านั้น ส่วนเสริมของแบบทดสอบหลังเรียนพบว่า นักเรียนส่วนใหญ่นิยมใช้เทคนิคการเรียงตามอักษร รองลงมา คือ การใช้บัตรคำ และกลุ่มก้อนความคิด ตามลำดับ การวิจัยนี้พิสูจน์แล้วว่าเทคนิคการจำทั้งสามแบบเหมาะสมสำหรับการสนับสนุนนักเรียนในการเรียนรู้และจดจำคำศัพท์ซึ่งสามารถพัฒนาการอ่านจับใจความของพวกเขา เทคนิคการจำต่างๆ เหล่านี้สามารถนำไปรวมเข้ากับบทเรียนเพื่อส่งเสริมการเรียนรู้ของนักเรียน ประโยชน์ที่ได้รับจากข้อมูลของการวิจัยนี้ คือ ครูสามารถนำไปใช้พัฒนาการเรียนรู้คำศัพท์ของนักเรียน โดยครูอาจจะสอนนักเรียนวิธีการต่างๆในการใช้เทคนิคการจำแบบการใช้บัตรคำ กลุ่มก้อนความคิด และเทคนิคการเรียงตามอักษรเพื่อเรียนรู้และจดจำคำศัพท์จากบทเรียน

คำสำคัญ : เทคนิคการเรียงตามอักษร ; การอ่านจับใจความ ; เทคนิคการจำ ; นักเรียนที่ใช้ภาษาอังกฤษเป็นภาษาต่างประเทศ ; กลุ่มก้อนความคิด

^{1,2} อาจารย์, วิทยาลัยนานาชาติดิษะคริน, มหาวิทยาลัยหาดใหญ่, Lecturer, Didyasarin International College, Hatyai University

³ นักศึกษาศึกษาศาสตรบัณฑิต, วิทยาลัยนานาชาติดิษะคริน, มหาวิทยาลัยหาดใหญ่, Bachelor of Education Student, Didyasarin International College, Hatyai University



ABSTRACT

The purpose of this study was to investigate the usage of memorization techniques to enhance Thai EFL students' reading comprehension. In conducting the study, the main research instrument was the pre-test and post-tests. The instrument was used to assess students' reading comprehension before and after receiving the treatment which included different memorization techniques, namely using flashcards, chunking, and the alphabetical order technique. The participants consisted of 51 Thai EFL students of Grade 11 in the academic year 2022 from Phokiratseuksa School, Pattani Province, Thailand. The results showed that there was a statistically significant difference between the post-test scores and the pre-test scores. In other words, the students' reading comprehension improved significantly after employing the memorization techniques. This indicated that the students could memorize vocabulary which supported their reading comprehension. From the collected data, it reflected that the usage of memorization techniques had a positive effect on developing reading comprehension as participants could remember vocabulary in reading texts more effectively. Since the participants could memorize vocabulary, they were able to understand the texts and find the main ideas. Moreover, the additional section of the post-test found that the majority of the students preferred to use the alphabetical order technique, followed by using flashcards and chunking respectively. This study proved that the three memorization techniques were suitable for supporting students in learning and remembering vocabulary which could enhance their reading comprehension. These techniques could be included in lessons to promote students' learning. The benefits of this research was that the teacher could be employed this research to develop students' vocabulary learning which the teachers might instruct students in various different ways of applying the memorization techniques using flashcards, chunking, and the alphabetical order technique to learn and remember vocabulary from learning materials.

Keywords : Alphabetical Order Technique ; Reading Comprehension ; Memorization Technique ; EFL Students ;
Chunking

Introduction

Regarding Thai education, it is important that students must know vocabulary when learning English (Harmer, 2001). Many teachers carry out lessons on English vocabulary by requiring their students to memorize words and meanings from texts (Reutzel and Cooter, 1992). This may be difficult for Thai EFL students to remember words and meanings in learning materials if they do not possess any memorization techniques. In order to assist children recall language, teachers must teach memorization techniques. Teachers also have to keep in mind that the memorization techniques need to be suitable for the students' academic levels.

Memorizing English vocabulary is one of the essential factors concerning the success of learning English as a second language (Surmanov and Azimova, 2020). If students cannot memorize English vocabulary, they are likely to encounter major problems in learning the target language. This often happens



to Thai students learning English as the second language. Afzal (2019) stated that without vocabulary, it causes poor performance in the four language skills of speaking, writing, reading, and listening. This can indicate that L2 students need to remember vocabulary of the target language. Chiew and Ismail (2021) pointed out that memorizing vocabulary is one of the most challenging tasks for L2 students when learning another language. Hoque (2018) mentioned that secondary students and university students try to memorize learning materials by employing rote memorization. However, they do not know effective techniques for memorizing. Therefore, they mainly look over the learning materials until they can remember the information.

In order to remember vocabulary, rote learning is considered to be a usable technique. Rote learning is the memorization of information based on repetition. It relies on utilizing frequent repetition to allow students to quickly recall the meaning of the material (Huang, Kerdphol and Inthong, 2018). Students can apply various memorization techniques for rote learning such as using flashcards, writing words over and over again, recording notes and playing them back, doing spelling drills, chunking information, and employing the alphabetical order technique. According to this study, three memorization techniques, namely using flashcards, chunking, and the alphabetical order technique were introduced to students. These three techniques were regarded as useful techniques to help students learn and remember vocabulary more efficiently (Hoque, 2018).

Objectives

1. To investigate the effectiveness of memorization techniques on students' reading comprehension.
2. To investigate which memorization techniques students prefer to use in learning and remembering vocabulary.

Literature Review

Reading Comprehension

Reading comprehension is considered as the ability to perceive written words (Alghonaim, 2020). That is to say, reading comprehension concerns understanding the meanings of what is read. Reading comprehension occurs when the words in a passage have become a part of one's thoughts or ideas. It makes reading fun, entertaining, and informative. Pressley (2000) indicated that reading comprehension is essential for success in education, work, and daily life.

Reading comprehension is an active process which requires students to understand vocabulary in order to identify the meaning of the text. This will allow them to identify the main ideas of the text which is an important goal in reading (Langan, 2010). It is crucial that students must know vocabulary because most learning materials are in written forms (Nordlund and Norberg, 2020). There are some interesting studies that examine students' reading comprehension. For example, the study by Nasution, Harida, and Rambe (2018) examined reading strategies employed by successful readers in order to develop their reading comprehension. The participants were nine students of the English Department of State Institute for Islamic Studies Padangsidimpuan, Indonesia. This study used two research instruments which were multiple-choice

tests and interviews. The tests which comprised reading texts were applied to evaluate students' reading comprehension. As for the interviews, they were applied to ask students about the usage of reading strategies when completing the tests. The researchers found that most students utilized three reading strategies while taking the tests. These strategies were focusing on the first sentence, focusing on the last sentence, and reading the first paragraph. The strategies helped them improve their reading comprehension allowing them to achieve high scores in the tests.

Another study was conducted by Sek, Katenga and Mushunje (2021). The researchers investigated students' reading comprehension after taking part in a 10-week extensive reading program. They also investigated whether gender differences had an effect on the results. The participants were 33 freshmen from a university in Thailand. This study employed both pre- and post-tests to assess students' reading comprehension before and after attending the program respectively. According to the results, the students developed their reading comprehension after participating in the 10-week extensive reading program. The post-test mean score was higher than the pre-test mean score. The increase was considered statistically significant. Moreover, gender differences had no effect on the results because the differences between the scores of the pre- and post-tests were not statistically significant.

Students who are learning English as a second language will surely have difficulty with the target language if they do not know vocabulary in reading texts. Moreover, students should not learn only vocabulary. They should learn vocabulary together with the texts (Maxwell and Meiser, 1997). Hence, students need reading comprehension to learn and understand vocabulary within the reading texts. One way to learn and memorize vocabulary in reading materials is by engaging in rote learning.

Rote Learning

Rote learning involves the memorization of information based on repetition. It is a memorization technique (Hoque, 2018). Basically, rote learning supports the idea that learners will be able to quickly recall the meanings of words by engaging in frequent repetition (Huang et al., 2018). Learners can obtain some details from the learning materials by repeating the information (Atikah and Rezki, 2018). Rote learning can also help learners memorize vocabulary more efficiently (Huang et al., 2018). Rote learning includes various memorization techniques. However, some techniques are suitable for helping learners remember vocabulary in learning materials. The memorization techniques that can be applied for learning and remembering vocabulary are as follows:

The first technique is using flashcards. This technique utilizes cards as reminders of various words and meanings (Lin, McDaniel and Miyatsu, 2018). In each card, the target word is written on one side of the card and the meaning is written on the other side (Jo, 2018). The meaning of each target word should be translated into the learner's first language (Jo, 2018 ; Nation and Webb, 2011). Learners apply flashcards by reading the target word before trying to recall its meaning (Lin et al., 2018).

The second technique is chunking. This technique involves separating information into smaller chunks which are easier to remember (Suppawittaya and Yasri, 2021). Normally, the human brain is unable to memorize the whole information at once. Chunking is a technique which helps learners to memorize



shorter information so they can recall it at a future stage (Fountain and Doyle, 2012). Chunking can be used to memorize vocabulary. For example, a learner wants to memorize a list of words relating to food such as *pineapple*, *strawberry*, *porridge*, *mustard*, *cauliflower* and *ketchup*. These words can be chunked into different groups according to their colors. Therefore, he/she remembers *pineapple* and *mustard* as yellow items, *strawberry* and *ketchup* as red items, and *porridge* and *cauliflower* as white items.

The third technique is the alphabetical order technique which employs letters to assist in memorizing. That is to say, it utilizes letters of A, B, C, D, E and so on to work as reminders of information instead of using numbers (Lehmann, 2012). Regarding this technique, each letter is turned into a picturized form and then the form is associated with information that needs to be memorized. Learners can apply the alphabetical order technique to memorize vocabulary. For example, the letters are turned into animals as follows: A is associated with *ape*, B with *bear*, C with *cat* and D with *dog*. Learners can use animals in alphabetical order to help them remember vocabulary involving careers such as *veterinarian*, *postman*, *scientist*, and *zookeeper*. They can create memories that a *scientist* is testing an *ape*, a *zookeeper* is feeding a *bear*, a *cat* is being treated by a *veterinarian*, and a *postman* is being chased by a *dog*. Besides animals, learners can turn letters into other picturized forms, for instance, objects, foods, cartoon characters, and more.

All three memorization techniques concerning rote learning are ways to help learners recall vocabulary. Memorization techniques are applied after learners have already studied the learning materials (Miyatsu, Nguyen and McDaniel, 2018). They need to comprehend the information before trying to remember it with memorization techniques. Additionally, learners can choose more than one technique to help them remember information. When learners have found their proper techniques, they will show improvement in memorizing information (Risnawati, 2019).

The Advantages of Rote Learning

Rote learning has several key aspects showing that it can help students develop their learning abilities (Hoque, 2018). Generally, students often feel a sense of accomplishment when they are able to memorize something they have learnt. As rote learning comprises various memorization techniques, students who are engaged in this type of learning will gain many advantages as follows:

Firstly, by utilizing rote learning, memorized data are kept in a student's short-term memory. The longer the student keeps the data in his/her memory, the greater chance that everything will be stored in his/her long-term memory (Foer, 2011). Secondly, rote learning stimulates a student's mind to exercise (Foer, 2011). As his/her mind becomes active, it results in mental diligence. Thirdly, rote learning can train a student's mind to stay focused on learning materials (Robinson, 1993). It can also generate memory schemas which assist in organizing and interpreting information. Lastly, the student who employs techniques relating to rote learning is likely to recall and retain information more quickly than others who do not employ them (Robinson, 1993).

Many educators agree that rote learning can be used in the school system to help students remember important information. However, rote learning needs to be utilized with other teaching methods to support students' memorization and create effective ways to learn academic courses (Azaimi, 2018).

The Disadvantages of Rote Learning

Rote learning is considered as an ineffective way of learning by some researchers. Morton (2011) pointed out that rote learning concerns cramming a large portion of information which is difficult for many students. Van de Lint and Bosman (2019) indicated that rote learning urges students to mainly memorize information without thinking. As students are involved in rote learning, they generally memorize information through repetition. They may not actually understand the information that is memorized. As for Mayer (2002), he mentioned that students who prefer rote learning will fail to think for themselves since they are used to following instructions. Furthermore, rote learning cannot raise critical thinking. Students will lack critical thinking skills if rote learning is utilized as a primary teaching method.

Conceptual Framework

Reading comprehension, a fundamental skill, empowers learners to decipher words in written form (Alghonaim, 2020). Achieving reading comprehension involves grasping and retaining words in memory (Pressley, 2000), thereby enabling learners to discern textual meanings and identify key concepts (Langan, 2010). Rote learning, a strategy for retaining information, often underpins the process of understanding and recalling textual information (Huang et al., 2018). This approach involves repeated information rehearsal until it can be readily recalled from memory. Rote learning encompasses various techniques, including the use of flashcards, chunking, and the alphabetical order technique. These techniques offer learners practical means to memorize vocabulary embedded in reading materials. In the context of this study, these three memorization techniques are proposed as interventions to enhance students' reading comprehension. By adopting these techniques, students can augment their ability to internalize vocabulary within learning materials.

Through the exploration of these techniques, the study seeks to improve the understanding of how memorization techniques can impact reading comprehension and vocabulary retention. By delving into the intricacies of these techniques and their effects, the study aims to provide valuable insights into optimizing language learning strategies for enhanced reading comprehension, as seen in the Figure 1.

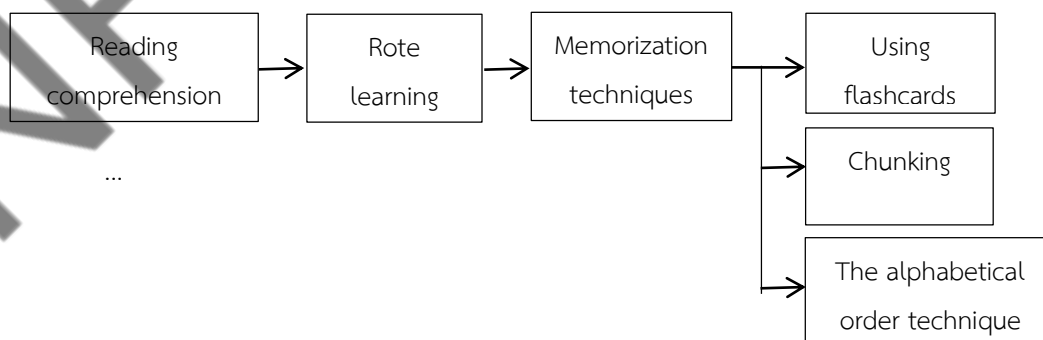


Figure 1 Conceptual Framework



Hypotheses:

H₁ : Memorization techniques can significantly improve students' reading comprehension.

H₂ : Students prefer using flashcards to learn and memorize vocabulary rather than chunking and the alphabetical order technique.

From the first hypothesis, memorization techniques can help students recall vocabulary. Therefore, the techniques may help students understand reading texts more efficiently. As for the second hypothesis, using flashcards is simple to apply for learning and remembering vocabulary. Thus, students may prefer to utilize this memorization technique than to utilize chunking or the alphabetical order technique.

Both teachers and students can gain benefits from this study. For teachers, they can design practice sessions involving the memorization techniques in this study. They can use the designed sessions to train their students correct ways of applying memorization techniques with learning materials in order to help them remember vocabulary. Regarding students, they can learn how to employ different memorization techniques from the study. When the students acquire suitable memorization techniques, they are likely to utilize the techniques to help them learn and recall vocabulary in reading texts.

Research Methodology

This section explains important information relating to participants of the study, the research instruments, data collection process, and data analysis.

Participants

In this study, participants were 51 Grade 11 students of Phokiratseuksa School, Pattani Province. These eleventh graders comprised 33 males and 18 females. They were considered as low-intermediate students because their test scores in Basic English as well as English Reading and Writing were at the lower average level. One of the problems they encountered in learning English was being unable to remember the meanings of target words in learning materials. They admitted that memorizing vocabulary was a difficult task. The participants took part in this study during the second semester of the academic year 2022. They attended six lessons which included vocabulary learning. The six lessons were as follows: Lesson 1 *Life Style and Ideal Job* (1); Lesson 2 *Life Style and Ideal Job* (2); Lesson 3 *Relative Pronoun* (1); Lesson 4 *Relative Pronoun* (2); Lesson 5 *What Are You Doing?*; and Lesson 6 *New Technology*. All the lessons were from a student's book *New Frontiers* for the eleventh grade. The whole lessons were taught by a Thai teacher who could use English well. In each week, she spent two hours to teach one lesson.

Through the six lessons, the participants were taught 50 new words selected from the students' book *New Frontiers* for the eleventh grade. Some of these words were *agreement, awkward, climate, crisis, device, environment, evidence, failure, government, information, launch, method, pollution, protocol, public, release, remarkable, situation, suggest, and well-known*.

The Research Instruments

This study applied both pre- and post-tests as the main research instruments. By using pre- and post-tests, quantitative data were collected to evaluate the participants' reading comprehension before and after receiving the treatment on applying memorization techniques of using flashcards, chunking, and the alphabetical order technique. The pre-test and the post-test contained the same questions involving three reading passages. The participants were required to understand main ideas of the passages in order to answer the questions correctly. Each passage had vocabulary which they had already learnt from the six lessons. Each passage included five questions, and each question included four multiple choices. In each question, the participants could only select one answer. Hence, both tests comprised 15 multiple choice questions with the total score of 15 points. For the test validity and the content validity of the pre- and post-tests, three experts in test development were asked to assess and approve them (Shrotryia and Dhanda, 2019). However, there was a slight difference between the pre-test and the post-test. The difference was that the post-test had an additional section for the participants to select which memorization techniques they preferred to utilize. They were required to select only one technique between using flashcards, chunking, and the alphabetical order technique. This section was not included in the pre-test because the participants received the treatment after completing that test.

Data Collection

The duration of the study was eight weeks. In the first week, the participants ($n = 51$) were given the pre-test. After the test, they were introduced to three memorization techniques, namely using flashcards, chunking, and the alphabetical order technique to help them remember vocabulary in learning materials. The teacher guided the participants on employing all three memorization techniques to ensure that they could utilize the techniques correctly. From the second week to the seventh week, the participants learnt six English lessons which included vocabulary learning. The teacher encouraged the participants to apply any introduced memorization techniques to help them learn and remember vocabulary from the learning materials. The teacher also encouraged them to memorize vocabulary as a means to perceive texts. As for the eighth week or the final week, the participants had to take the post-test to evaluate their reading comprehension after receiving the treatment. The participants' scores from both the pre- and post-tests were further compared to measure the effect of the memorization techniques on their reading comprehension. In addition, the post-test was used to find which memorization techniques the participants preferred to apply for learning and remembering vocabulary.

Data Analysis

This study utilized a t-test to find the statistical significance of the results of the test scores. About the t-test, a paired samples t-test was selected to compare the participants' performance at two different time points; before and after receiving the treatment of utilizing memorization techniques. The study also applied X-bar as well as the standard deviation. X-bar (or \bar{X}) was employed to compare the mean scores between the data from the pre-test and the post-test. The standard deviation (or S.D.) was used to measure



the amount of variation of the obtained values through the difference between the values in the tests and the mean. Low values of the standard deviation indicated that test scores were related to the mean (Brown, 1988). In other words, the low values of the standard deviation reflected that each participant's test score was closely linked with the mean of the whole class. For data analysis, the statistical Package for Social Science or SPSS was utilized to find the mean, standard deviation, and the paired samples t-test. The p-value and the significance level were also measured to find a significant difference in the data. For this study, the significance level was 0.05. In the post-test's additional section, the aspect of the participants' preferred memorization techniques for learning and remembering vocabulary was analyzed. Each participant was required to choose only one from the three memorization techniques (i.e., using flashcards, chunking, and the alphabetical order technique) offered in the treatment to identify the usage of these techniques.

Results and Discussion

This section mentions data collected from the pre- and post-tests to show the effect of memorization techniques on students' reading comprehension. The collected data included the values of \bar{X} and S.D. of the pre- and post-tests. The data also showed the values of t-distribution (t) and degrees of freedom (df). The former could be used to evaluate the mean when the population standard deviation is unknown and the sample size is not large (Gelman et al., 2020), and the latter could be used to find the number of independent variables that may vary (Healey, 1990). Furthermore, the data included the significance level and the p-value to find if there was a statistically significant difference between pre-test scores and post-test scores. In this study, it aimed to examine two following aspects:

1. The study investigated the effectiveness of memorization techniques on students' reading comprehension by using the pre-test and the post-test to reflect the differences between the participants' scores before and after receiving the treatment of memorization techniques respectively. The scores of both tests were compared and presented in Table 1.

Table 1 Scores in the Pre-Test and the Post-Test

No.	Score (15 points)		Gained	No.	Score (15 points)		Gained
	Pre-test	Post-test			Pre-test	Post-test	
1	3	8	5	11	4	6	2
2	3	9	6	12	2	5	3
3	3	8	5	13	3	8	5
4	2	6	4	14	4	7	3
5	4	9	5	15	3	8	5
6	3	9	6	16	5	8	3
7	4	6	2	17	7	9	2
8	3	9	6	18	5	8	3
9	4	7	3	19	6	7	1

Table 1 (continue)

No.	Score (15 points)		Gained	No.	Score (15 points)		Gained
	Pre-test	Post-test			Pre-test	Post-test	
10	2	7	5	20	4	8	4
21	5	8	3	37	1	5	4
22	6	9	3	38	5	9	4
23	6	7	1	39	6	8	2
24	2	5	3	40	3	5	2
25	4	8	4	41	4	9	5
26	3	7	4	42	4	6	2
27	7	8	1	43	4	9	5
28	2	8	6	44	2	8	6
29	2	7	5	45	5	8	3
30	4	9	5	46	5	6	1
31	6	10	4	47	3	7	4
32	4	9	5	48	1	6	5
33	6	8	2	49	4	8	4
34	3	6	3	50	3	8	5
35	5	7	2	51	5	8	3
36	2	5	3	Mean	3.84	7.51	3.67

From Table 1, the participants' scores of both pre- and post-tests are revealed. The total score of each test is 15. According to the results, the lowest score of the pre-test was 1 received by two participants, and the highest score was 7 received by two participants. As for the post-test, the lowest score was 5 acquired by five participants, and the highest score was 10 acquired by only one participant. In terms of the comparisons between pre- and post-test scores, all the participants ($n = 51$) achieved higher scores in the post-test. The most gained points were 6 accomplished by five participants. Furthermore, most of the participants gained 5 points ($n = 13$), followed by gaining 3 points ($n = 12$) and 4 points ($n = 9$) respectively. The mean score of the post-test was higher than the pre-test by 3.67. Therefore, the results proved that memorization techniques had a positive effect on developing the participants' reading comprehension. That is to say, memorization techniques could help the participants remember vocabulary from the reading texts more efficiently. This allowed them to understand the texts as they were able to recall the words in passages. The usage of memorization techniques could help the participants perceive the meaning of the reading texts. As the participants understood the texts, they would be able to point out the main ideas. This could imply that the participants' reading comprehension improved after applying memorization techniques.



The study also employed a paired samples t-test to analyze the data. It revealed the values of the mean (\bar{X}), standard deviation (S.D.), t-distribution (t), degrees of freedom (df), the significance level, and the p-value. The results obtained from the paired samples t-test are presented in Table 2.

Table 2 Results of the Paired Samples T-Test between Pre-Test and Post-Test

Test	N	\bar{X}	S.D.	t	df	Sig. (2-tailed)	p-value
Pre-test	51	3.84	1.49	-4.7	50	.00	2.3286 x 10 ⁻²³
Post-test	51	7.51	1.30				

According to Table 2, the data show the results from both the pre- and post-tests through utilizing the paired samples t-test. The mean score of the pre-test was 3.84 and the mean score of the post-test was 7.51. The higher mean score in the post-test indicated that the participants' reading comprehension improved after receiving the treatment concerning memorization techniques. As for the standard deviation, the value in the pre-test was 1.49 and the value in the post-test was 1.30. The values of S.D. in both tests pointed out that the participants' test scores were related to the mean scores (Brown, 1988). Regarding the t-distribution and the degrees of freedom, the values were -4.7 and 50 respectively. As for the significance level and the p-value, If the p-value is more than 0.05 (or $p > 0.05$), this means that the value is not statistically significant. On the other hand, the p-value which is less than 0.05 (or $p < 0.05$) means that the value is statistically significant. The p-value appeared to be less than 0.05 indicating that there was a statistically significant difference between the pre-test scores and the post-test scores. The results of the study reflected that the participants' reading comprehension significantly developed after using the memorization techniques provided in the treatment. This was in accordance with the first hypothesis assuming that memorization techniques could significantly develop reading comprehension of the students. Therefore, the utilization of memorization techniques helped the participants remember vocabulary in reading texts. This allowed them to be able to understand the reading texts and notice the main ideas resulting in the improvement of reading comprehension.

In accordance with the results, the low pre-test scores indicated that the participants had difficulty understanding the reading passages and finding the main ideas because they could not remember English vocabulary. This conformed to the study by Chiew and Ismail (2021), who stated that memorizing vocabulary is extremely challenging for L2 students. When the participants received the treatment, they could use memorization techniques to help them learn and recall vocabulary. Also, they were able to remember vocabulary in the reading texts more effectively. The utilization of memorization techniques had a positive effect on the participants' reading comprehension. All of them showed that their reading comprehension improved by achieving higher scores in the post-test. This complied with the study by Huang et al. (2018), who pointed out that the usage of memorization techniques allowed students to recall vocabulary. As students could remember more vocabulary through employing different memorization techniques, they improved their understanding of the reading texts in learning materials.

2. This study also searched for the students' preferred memorization techniques in remembering vocabulary which was learnt. In order to find the answer, the additional section of the post-test was analyzed. Each participant could select only one memorization technique from the list of three techniques – using flashcards, chunking, and the alphabetical order technique – to indicate which technique he/she preferred employing to learn and recall vocabulary. The results are shown in percentages to reflect the number of participants who preferred applying each memorization technique. The percentages of the preferred memorization techniques are presented in Table 3.

Table 3 The Preferred Memorization Techniques

Rank	Memorization techniques	%
1	The alphabetical order technique	41.2
2	Using flashcards	35.3
3	Chunking	23.5
Total		100

Table 3 indicates that the participants preferred utilizing the alphabetical order technique the most (41.2%) followed by using flashcards (35.3%). This could imply that the alphabetical order technique became a suitable memorization technique for most participants. The percentage of using flashcards indicated that this memorization technique was useful for a number of participants as it might be a simple technique to remember vocabulary. The lowest percentage was chunking (23.5%) indicating that some participants preferred this technique because it helped them learn and memorize vocabulary more effectively. This could imply that the participants had their own personal thoughts on choosing the preferred memorization techniques. They might only consider that their preferred memorization techniques were the ones which helped them learn and remember more vocabulary in the reading texts. The participants' preferred memorization techniques were different from the second hypothesis assuming that they preferred using flashcards to learn and memorize vocabulary rather than chunking and the alphabetical order technique. The results of Table 3 reflect that the usage of different memorization techniques depends on the participants individually. Each participant tended to apply memorization techniques which suited them the most. All participants were able to employ their preferred memorization techniques to help them learn and remember vocabulary which had a positive effect on developing their reading comprehension.

Regarding the results, the participants applied different memorization techniques, especially the alphabetical order technique and using flashcards, to assist them in remembering vocabulary in texts which enhanced their reading comprehension. They were able to utilize memorization techniques suitable for them as everyone achieved a higher score in the post-test. This complied with the study of Hoque (2018) who mentioned that students try to remember learning materials through memorization techniques. They need effective techniques to enhance their learning.



Conclusion

1. From the first aspect, the study found that memorization techniques had a positive effect on students' reading comprehension. It could be concluded that the usage of the memorization techniques was able to improve students' reading comprehension. This was acknowledged from the improvement of the students' scores between the pre-test and the post-test. After the students received the treatment involving memorization techniques of using flashcards, chunking, and the alphabetical order technique, they gained higher scores in the post-test. This could imply that the students were able to remember more vocabulary than before receiving the treatment of memorization techniques. When the students memorized vocabulary in reading texts, they would be able to notice the main ideas. This was proven in the post-test as all of them achieved higher scores than in the pre-test. Therefore, the utilization of the memorization techniques in the learning process has a significant effect on developing students' reading comprehension.

2. As for the second aspect concerning students' preferred memorization techniques, it could be concluded that the alphabetical order technique was employed by most of the students, followed by using flashcards and chunking respectively. The preferred memorization techniques reflected that the students selected the techniques which were suitable for them the most to learn and remember vocabulary. Furthermore, the students were able to apply their preferred memorization techniques (using flashcards, chunking, or the alphabetical order technique) to enhance their reading comprehension as they accomplished higher scores in the post-test.

Contributions and Suggestions

Concerning EFL students' use of memorization techniques to enhance reading comprehension, teachers can employ the results from this study to create training courses for students. The training courses can include using flashcards, chunking, and the alphabetical order technique to help the students learn and memorize vocabulary more efficiently. The courses should give students opportunities to practice all provided memorization techniques. This can help students find some techniques that are suitable for them. As students possess their preferred memorization techniques, they will surely show better performances in recalling vocabulary and perceiving reading texts. In addition, they can apply memorization techniques to help them understand learning materials.

This study proved that the usage of memorization techniques had a positive effect on Thai EFL students' reading comprehension. The suggestions are that memorization techniques should be developed into lessons to support students in learning. As memorization techniques are usable in learning and remembering vocabulary, teachers can create lessons which focus on this aspect. In the lessons, students can learn how to apply memorization techniques to learn and recall vocabulary more effectively. Teachers should carefully guide students on employing memorization techniques correctly. When a new memorization technique is introduced, teachers need to show students the correct way of using it. The lessons should allow students to utilize various memorization techniques with learning materials. Students who take the lessons will discover which techniques are suitable for them. In order to carry out efficient

lessons, teachers need to know which memorization techniques are appropriate for their students' levels. For example, teachers can show Grade 10 students how to use flashcards in learning jargon and technical terms. This can make students become enthusiastic when learning English.

Limitations

While the study's findings regarding Grade 11 students provide valuable insights, it is important to acknowledge that the effects of memorization techniques could vary among students of different grades. In order to ensure that the memorization techniques of using flashcards, chunking, and the alphabetical order technique have positive effects on reading comprehension of students from different grades, future studies may investigate their effects on elementary school students or secondary school students to find how younger students utilize them to retain vocabulary in learning materials. Future studies may also examine the effects of memorization techniques on university students to find how the students apply different techniques to help them remember vocabulary in academic lectures. In the part of research instruments, this study mainly employed pre- and post-tests to assess students' reading comprehension before and after receiving the treatment involving memorization techniques. The post-test was also utilized to find the students' preferred memorization techniques. Future studies can gain profound information by adding interviews. Students can be interviewed about their usage of different memorization techniques in learning. Data collected from interviews can reveal how each student utilizes memorization techniques clearly. Moreover, the collected data from interviews are qualitative data which provide a deeper understanding of students' approaches to using memorization techniques. As for the students' higher scores in the post-test, it might not truly mean that the students memorized vocabulary more effectively. They might recognize the test since it was similar to the pre-test. Future studies should apply dissimilar pre- and post-tests to prevent students from memorizing the tests. By utilizing dissimilar tests, it would mitigate the possibility of students simply recognizing and memorizing the test content.

The study provided information concerning the effect of using memorization techniques on students' reading comprehension. It may encourage teachers to create lessons which include various memorization techniques. Teachers can guide or demonstrate how to apply the techniques so students can employ them in learning. For example, teachers can apply flashcards after the lesson to help students remember difficult vocabulary. In addition, teachers may show students how to make their own flashcards in class.

References

- Afzal, M. (2019). A Study on Vocabulary-Learning Problems Encountered by BA English Majors at the University Level of Education. *Arab World English Journal*. 10(3),81-98. doi:<https://dx.doi.org/10.24093/awej/vol10no3.6>
- Alghonaim, A. S. (2020). Impact of Related Activities on Reading Comprehension of EFL Students. *English Language Teaching*. 13(4),15-27. doi:10.5539/elt.v13n4p15



- Atikah, D. and Rezki, A. (2018). Repetition Facilitates Retrieval Opportunity in Vocabulary Learning. *IOP Conference Series: Earth and Environmental Science*. 175(1),1-7. doi:10.1088/1755-1315/175/1/ 012148
- Azaimi, T. (2018). *The Effectiveness of Rote Learning Strategy Implemented by Male Students in Speaking Ability at Mts Assa'adah 1 Bungah Gresik (Unpublished undergraduate's thesis)*. Universitas Muhammadiyah Gresik, Jawa Timur, Indonesia
- Brown, J. D. (1988). *Understanding Research in Second Language Learning: A Teacher's Guide to Statistics and Research Design*. London : Cambridge University Press.
- Chiew, M. T. L. and Ismail, H. H. (2021). Exploring Vocabulary Learning Strategies in a Second Language Setting: A Review. *International Journal of Academic Research in Business and Social Sciences*. 11(12),1298-1309. doi:10.6007/IJARBS/v11-i12/11376
- Foer, J. (2011). *Moonwalking with Einstein: The Art and Science of Remembering Everything*. New York : The Penguin Group.
- Fountain, S. B. and Doyle, K. E. (2012). Learning by Chunking. In N. M. Seel (Eds.), *Encyclopedia of the Sciences of Learning*. (pp. 1814-1817). Boston, MA : Springer US. https://doi.org/10.1007/978-1-4419-1428-6_1042
- Gelman, A., Carlin, J. B., Stern, H. S., Dunson, D. B., Vehtari, A. and Rubin, D. B. (2014). *Bayesian Data Analysis*. (3rd ed.). Boca Raton, FL: CRC Press.
- Harmer, J. (2001). *The Practice of English Language Teaching*. (3rd ed). Harlow : Longman.
- Healey, J. F. (1990). *Statistics: A Tool for Social Research*. (2nd ed). Belmont, CA : Wadsworth.
- Hoque, E. (2018). Memorization: A Proven Method of Learning. *The Journal of Applied Research* 22(3), 142-150. Retrieved October 2020, from https://www.researchgate.net/publication/330825027_Memorization_A_Proven_Method_of_Learning/link/5c555b4ba6fdccd6b5dbf0b0/download
- Huang, J., Kerdphol, S. and Inthong, W. (2018). Comparing the Effectiveness of Rote Learning and Meaningful Learning on English Vocabulary Memorization for 7th Grade Students at Padoongrasdra School. *Humanities and Social Sciences Journal of Pibulsongkram Rajabhat University*. 13(1),295- 304. Retrieved from <https://so01.tci-thaijo.org/index.php/GraduatePSRU/article/view/127823>
- Jo, G. (2018). *English Vocabulary Learning with Wordlists vs. Flashcards; L1 Definitions vs. L2 Definitions; Abstract Words vs. Concrete Words (Unpublished master's thesis)*. St. Cloud State University, Minnesota, USA
- Langan, J. (2010). *Ten Steps to Advancing College Reading Skills*. New Jersey: Townsend Press.
- Lehmann, R. G. (2012). How Many Letters Needs an Alphabet? The Case of Semitic. In A. de Voogt & J. F. Quack (eds.). *The Idea of Writing: Writing Across Borders*. Leiden: Brill.
- Lin, C., McDaniel, M. A. and Miyatsu, T. (2018). Effects of Flashcards on Learning Authentic Materials: The Role of Detailed Versus Conceptual Flashcards and Individual Differences in Structure-Building Ability. *Journal of Applied Research in Memory and Cognition*. 7(4), 529-539. doi:10.1016/j.jarmac.2018.05.003
- Maxwell, R. J. and Meiser, M. J. (1997). *Teaching English in Middle and Secondary Schools*. (2nd ed). New Jersey, USA : Prentice-Hall.



- Mayer, R. E. (2002). *Teaching for Meaningful Learning*. Upper Saddle River, NJ: Prentice-Hall.
- Miyatsu, T., Nguyen, K. and McDaniel, M. A. (2018). Five Popular Study Strategies: Their Pitfalls and Optimal Implementations *Perspectives on Psychological Science*, 13(3), 390-407. doi:10.1177/1745691617710510
- Morton, Z. (2011). *Constructivism or Rote Learning: Promoting Greater Academic Achievement*. Georgia: LaGrange.
- Nasution, R. F., Harida, E. S. and Rambe, S. (2018). Reading Strategies Used by Successful Readers of English Department Students of State Institute for Islamic Studies Padangsidempuan. *TAZKIR: Jurnal Penelitian Ilmu-ilmu Sosial dan Keislaman*, 4(2),263-280. doi:10.24952/tazkir.v4i2.1116
- Nation, I. S. and Webb, S. A. (2011). *Researching and Analyzing Vocabulary*. Boston, MA : Heinle, Cengage Learning.
- Nordlund, M. and Norberg, C. (2020). Vocabulary in EFL teaching materials for young learners. *International Journal of Language Studies*, 14(1), 89-116.
- Pressley, M. (2000). What Should Comprehension Instruction Be the Instruction of? In M. Kamil, P. Mosenthal, P. Pearson & R. Barr (Eds.), *Handbook of Reading Research*. (3rd ed). Mahwah, NJ: Lawrence Erlbaum.
- Reutzel, D. R. and Cooter, R. B. (1992). *Teaching Children to Read: From Basals to Books*. New York, USA : Macmillan.
- Risnawati. (2019). *Students' Strategy to Maintain Their Memory in Reading Comprehension (Unpublished master's thesis)*. Muhammadiyah University of Makassar, South Sulawesi, Indonesia
- Robinson, A. (1993). *What Smart Students Know*. New York : Three Rivers Press.
- Sek, S., Katenga, J. and Mushunje, A. (2021). Reading Comprehension of Thai Students Improved by Extensive Reading When Learning English as a Foreign Language. *Human Behavior, Development and Society*. 22(3),95-104.
- Shrotryia, V. K. and Dhanda, U. (2019). Content Validity of Assessment Instrument for Employee Engagement. *SAGE Open*, 9(1),1-7. doi:10.1108/MBE-07-2019-0071
- Suppawittaya, P. and Yasri, P. (2021). The Comparison of Chunking Methods to Enhance the Cognitive Capacity of Short-term Memory to Retain Textual Information among High School Students. *International Journal of Research in STEM Education*. 3(1),27-35.
- Surmanov, S. and Azimova, M. (2020). Analysis of Difficulties in Vocabulary Acquisition. *The Journal of Legal Studies*. 6(1),144-153.
- Van de Lint, R. and Bosman, M. (2019). 69 Mnemonics versus Cramming. Learning Can Be Effective, Efficient and Fun. A Systematic Review Studying Memorization Techniques in Education. *CNS Spectrums*, 24(1),212-212. doi:10.1017/S1092852919000543