Proceedings of the 3rd International Conference on Art, Design and Social Sciences
DOI: 10.54254/2753-7064/44/20240044

Research on the Influence of Retrieval Practice on ESL Vocabulary Memory

Qian Huang[1,a,*]

[1]*Guangzhou Xinhua University, Guangzhou, Guangdong Province, China*
a. janetyellow@163.com
**corresponding author*

Abstract: The approaches and methods that can maximize the teaching and learning efficiency in education settings tremendously interest teachers. Retrieval practice is not a way that produces learning, but also a retrieval event may represent a more fruitful and mighty learning activity than an encoding event. Based on this theoretical foundation, a pilot study has been designed and conducted to test the effectiveness of retrieval practice in vocabulary memorization in a university setting. In this study, 10 participants (from English Major and Business Major) have been voluntarily recruited from Guangzhou Xinhua University. According to the parallel contrast between the experimental and control groups, the differences in scores in the vocabulary tests were collected and greatly marked statistical significance. In this study, retrieval practice has been testified as an effective strategy in learners' long-term retention of vocabulary memorization. The findings support the theory that retrieval practice improves and strengthens learning by retrieval-specific mechanisms rather than simply elaborative study processes. Retrieval practice is an effective tool to enhance vocabulary learning and remembering in an ESL context.

Keywords: Educational psychology, Retrieval practice, Vocabulary memorization, Effectiveness of learning, Long-term retention

1. Introduction

Educators are always fascinated by the ways and strategies to increase teaching and learning efficiency. In English as A Second Language (ESL) classrooms, from syllables to vocabulary to sentences, and to grammatical structures, teachers sincerely hope all these knowledge can deeply imprint in learners' brains. Based on research conducted by scientists in the field of cognitive psychology, retrieval practice could be one of the strategies that teachers are seeking, which can enhance learners' memorization and reconstruction of the taught knowledge [1-3]. When learners are retrieving what has been stored in their brain, on the surface, they are taking the memory out; on the deeper side, they are enhancing their memory and firmly storing the knowledge in their brain. Some researchers have conducted experiments to test the effects of retrieval practice on learning. They have performed experiments in several educational contexts and educational settings. For example, biology lessons in a high school setting and neuroscience courses in a university setting were all the settings in which the experiments were carried out. Based on previous studies, few experiments of ESL setting have been conducted. The effects of retrieval practice could be tested and verified in this setting.

DOI: 10.54254/2753-7064/44/20240044

English majors and Business Majors in universities of China cover a great percentage of ESL learners. During their English learning process, both teachers and learners are struggling with the effectiveness of vocabulary memorization. This struggle is relatively common-seeing while learners try to lay a solid foundation for their major studying and especially when they are preparing for the relevant tests like Test for English Majors Band 4 (TEM 4), Test for English Majors Band 8, or other English tests they might be involved in, such as College English Test Band 4 (CET 4), College English Test Band 6 (CET 6), or even International English Language Testing System (IELTS) or Test of English as a Foreign Language (TOEFL). Retrieval practice advocates a method that can improve learners' long-term retention. If it can be verified as equally effective in vocabulary memorization, it will be an unexceptionable and superb message for both teachers and learners in ESL settings. This study aims to test the effects and impacts of retrieval practice on English vocabulary memorization in long-term retention.

2. Literature Review

Retrieval practice is a learning strategy with great simplicity and flexibility [4]. It improves learners' knowledge retention and academic performance. Spacing is especially beneficial for long-term studying [5]. It is a much better learning strategy than learning methods, such as re-reading, note-taking, listening to lectures, "cold-calling" (simple calling for response) or highlighting the texts. "Retrieval is not merely a read-out of the knowledge stored in one's mind; the act of reconstructing knowledge itself enhances learning. [6]" While in classrooms, to most extent, teachers focus on putting knowledge into learners' brains to achieve the goal of learning. However, retrieval practice is a process that is totally opposite from putting knowledge in. Instead, it triggers learning by taking learnt knowledge out of learners' brains. The procedure taking the learnt knowledge and information from the brain could be a process that learners are reconstructing the knowledge and information [6]. It could also be a process that learners are using metacognition to monitor the learning efficiency [7], in which they may make judgments about the knowledge or facts that they already know and don't know. It encourages learners to transfer acquired information into new knowledge. When learners retrieve the knowledge from memory, the effectiveness of learning is promoted. Because an efficient retrieval prompt allows learners to build upon their current organizational structure [8]. In order to let learners master their learning effectiveness, appropriate feedback needs to be provided [9], which greatly encourages learners' metacognition. They enhance and improve their learning effectiveness [10].

Flashcard, various question types (fact-based, conceptual, complex or higher order, etc.), clickers, index cards, bell work, and quick writing prompts are all ways for teachers to adopt to help learners to implement retrieval practice. While implementing retrieval practice in the real classroom, teachers can engage all learners in [11]. It is not a way of assessment. During the assessment of learning, such as quizzes, tests or examinations, students may frequently be under stress and anxiety. However, the research shows that the more retrieval practices learners have, the more confidence and less anxiety they have while doing tests.

3. Methodology

3.1. Participants

10 students (all were female), aged between 19 and 20, from the Guangzhou Xinhua University were recruited for this study. Participants were all randomly and voluntarily engaged in this study. Among these 10 students, all of them were sophomores. 8 of them were English majors; 2 of them were Business English majors. This research was conducted with the appropriated ethics review board approval by the Foreign Language Department of this university. Participants have granted their

DOI: 10.54254/2753-7064/44/20240044

written informed consent. After the test had been completed, the writer of this paper debriefed and expressed great thankfulness to all the participants.

3.2. Design and Materials

In order to test the effectiveness of retrieval practice in vocabulary memorization in the ESL context of the university setting, this study has been designed. In the vocabulary test, there were totally 50 words. These words were carefully selected and chosen from the Official Guide of GRE test (Graduate Record Examination by Educational Testing Service). Since all participants are either majoring in English or Business English. Compared with students from other majors, they already had a relatively large word-base. Like other sophomore English majors, they were preparing to take part in the TEM4. They were already familiar with the TEM4 vocabulary. This was why the 50 words in this experiment were selected and chosen from GRE vocabulary nearly brand-new to all participants.

There were 4 kinds of materials in this experiment-- a piece of printed material as remembering material which is the list of 50 words with English and Chinese translation; a piece of printed material as test material which is the list of 50 words with only English; 50 two-sided cue cards as tool for retrieval practice, in which one side was the English word itself, the Chinese translation and the relevant image of the word were on the other side of the card.

3.3. Procedures

There were 3 phrases in this design, in which all participants needed to do the vocabulary test 3 times. 3 vocabulary tests were identical, in which participants were instructed to write down the Chinese meaning according to the given English words.

At the first phrase of this experiment, all participants were invited to the classroom to do the vocabulary test before starting the experiment to set a baseline. After they finished the test, the number of correctness was checked and recorded. This showed the number of words in this experiment that participants might already know.

At the second phrase, all participants were given the printed material and pencil to recite and memorize all 50 words within an hour. This material provided both the English words and Chinese translation of the words. At this stage, all 10 participants only learnt and formed the memory of these 50 words by rote. 48 hours later, they were invited to do the test for the second time. After they finished the test, the number of correctness was checked and recorded for the second time.

At the third phrase of this experiment, 10 participants were randomly divided into two groups by drawing a lottery. 5 were in the control group; the other 5 participants were in the experimental group. All participants didn't know the rationale behind this setting to avoid the interferences of experimenters' or participants' effect on the accuracy of data. In the control group, the whole 5 participants were given the same materials and repeatedly did the same vocabulary memorization as in the second phrase. In the experimental group, participants were given the word cue cards as the tool of retrieval practice. At the beginning of this phrase, researcher demonstrated the way to use the cue cards: when taking out one card, they needed to look at English side first. Next step was "practice retrieval by freely recalling" [12], which means saying the Chinese meaning of the word out loud first according to their previous memory in this experiment; and then turning to the backside to check whether they correctly remembered and shouted the meaning. The setting here acted as the way for participants to retrieve the memory they had formed in the previous phrase. Both participants in control group and experimental group had one hour to memorize the words for the second time but with different strategies. According to observation, participants in the experimental group played retrieval practice by using cue cards for about two to 4 times each person.

DOI: 10.54254/2753-7064/44/20240044

One week later, all 10 participants returned to do the vocabulary test for the third and also last time. Like the first two tests, after they finished the test, the number of correctness has been checked and recorded.

4. Results & Discussion

4.1. Effectiveness of Learning by Rote

After 3- phrase experiment, all data from both control group and experimental group have been collected. Each correct response in the word test equaled 1 point. For the whole 50-word test, there were totally 50 points. The results in the 3 tables below all refer to the results according to participants' performance in tests. The results of the control group appear in Table 1. For the first test at the beginning of the experiment, 5 participants' performance was relatively similar, which indicated that the chosen 50 words were nearly indeed totally new to them. After the first round of word memorization in the way of remembering the words by rote, the words that participants could remember apparently increased. In the one-week later test, after the second round of remembering the words by rote, there was a certain degree of increase in memory. However, one participant's score remained the same, while there was descend in one participant's score. This could indicate if students only memorized the words by simply and repeatedly looking at words themselves and the Chinese meaning, despite the fact the memory could be boosted in some cases, there were greater potential that there could be a fall in the memory after rise. In a small sample like this, there were cases in which vocabulary retention had been declined within 1 week. This proportion could be bigger in a larger sample within a longer time.

In previous studies, researchers pointed out that when learners are learning, if they simply try to keep the information or knowledge in mind, long-term memory might not effectively form [13]. The data in this experiment actually supported this hypothesis. Although learner differences play a role here, the tendency of forgetfulness is undeniable.

Table 1: Control group: Participants and their performance in 3 vocabulary tests

No.	Participant	Major	Result of 1st Vocabulary Test	Result of 2nd Vocabulary Test	Result of 3rd Vocabulary Test
1	YJY	English Major	0	16	24
2	WBL	English Major	2	34	41
3	OU'SY	English Major	1	48	50
4	HZH	Business English Major	1	39	39
5	ZYT	English Major	0	23	17

4.2. Effectiveness of Retrieval Practice

The data of the experimental group is shown in Table 2. All participants were randomly divided into two groups in the second round of word memorization. Compared with the control group, participants in the experimental group had a relatively lower starting point from average performance. They had an average lower score on the second test after the first round's word memorization. However, this trend had been counteracted in the last test. Their performance in the third vocabulary increasingly rose; even the test had been conducted one week later after they used retrieval practice to facilitate their words memorization. According to the observation, when students were using the cue cards of the words to assistant their memory formation, they did use some mnemonic cues created by

DOI: 10.54254/2753-7064/44/20240044

themselves to help with their memory recoding. When learners practice free recall, they actually construct their own knowledge organizational structure. When they are doing retrieval practice, they are using the constructed knowledge structure in their memory [14]. In this experiment, participants indeed were naturally doing the same thing as mentioned in the theory without knowing and understanding those theories. When participants were doing free recalling, they might reconstruct knowledge first, and then they said the meaning of the given words on the cue cards. In this process, they were shown how they formed a new memory of the new information and adapted it to the existing knowledge structure in their brain.

Table 2: Experimental group: Participants and their performance in 3 vocabulary tests

No.	Participant	Major	Result of 1st Vocabulary Test	Result of 2nd Vocabulary Test	Result of 3rd Vocabulary Test
1	ZCY	English Major	1	9	19
2	LQY	English Major	0	20	46
3	LSC	Business English Major	1	18	35
4	GJC	English Major	3	16	43
5	YLX	English Major	2	49	50

4.3. Contrastive Analysis

Table 3: Discrepancy between the 2n and 3rd tests in both control and experimental group

Participant in Control Group	Discrepancy between 2nd and 3rd tests	Participant in Experimental Group	Discrepancy between 2nd and 3rd tests
YJY	+ 8	ZCY	+ 10
WBL	+ 7	LQY	+ 26
OU'SY	+ 2	LSC	+ 17
HZH	0	GJC	+ 27
ZYT	- 6	YLX	+ 1

Based on the data in Table 3, a 2 Independent Means T-Test was carried out to reveal a significant effect of retrieval practice as the learning strategy on vocabulary memorization. The 5 participants who adopted retrieval practice during the second time word memorization (M= 2.20, SS= 128.80) compared to the 5 participants in the control group (M= 16.20, SS= 482.80) demonstrated significantly better scores in vocabulary test, $t(10)= -2.53168$, $p=.017582$. The result is significant at $p < .05$ reflecting the effectiveness of retrieval practice as a learning strategy in vocabulary remembering. To learners, practicing free recall of information is an especially efficient strategy. During free recall, learners set aside their learning materials, and freely and flexibly have knowledge reconstruction of as much of the material from memory as possible [8]. When learners adapt new information to the present knowledge structure, the new information has a better chance to imprint in learners' brains. Retrieval practice is a fruitful way to enhance and reinforce learning and transfer, not just for rote memorization [15-18]. This effect of learning could benefit learners not only from the vocabulary learning and remembering process, but also it could be used in their learning in other areas as well.

DOI: 10.54254/2753-7064/44/20240044

5. Conclusion

In this pilot study of 10 participants in two groups, retrieval practice has been tested as an effective way for learners to memorize new but complex vocabulary in the university setting for English and Business English majors. The crucial hypothesis was that participants in the experimental group would have a better effect by using retrieval strategy in their words remembering and this would lead to better long-term retention. The data in the experiment supported this previous prediction.

There are limitations in this study though. In this experiment, on the one hand, only small sample groups were included. Only the effectiveness of vocabulary memorization had been tested on the other hand. For the experiments that may come in the future, larger sample groups could be included to improve the objectiveness, reliability and validity of the experiment. Memory formation of vocabulary in long-run perspective is only one of the difficult issues in ESL setting, actually more educational settings associated with facts, statements or even theories learning could be further tested. In this experiment, the longest interval was only one week; in order to test the prolonged effect of retrieval practice in long-term memory retention; the longevity and continuous researches are necessarily needed. In the coming future, there are tremendous areas worth further researching and conducting real-classroom experiments.

References

[1] *Chan, J. C. K., McDermott, K. B., & Roediger, H. L. (2006). Retrieval induced facilitation: Initially nontested material can benefit from prior testing. Journal of Experimental Psychology: General, 135, 553–571.*

[2] *Roediger, H. L., & Karpicke, J. D. (2006b). Test-enhanced learning: Taking memory tests improves long-term retention. Psychological Science, 17, 249–255.*

[3] *Wheeler, M. A., & Roediger, H. L. (1992). Disparate effects of repeated testing: Reconciling Ballard's (1913) and Bartlett's (1932) results. Psychological Science, 3, 240–245.*

[4] *Agarwal, P. K., Roediger III, H. L., McDaniel, M. A., & McDermott, K. B. (2020). How to use retrieval practice to improve learning.*

[5] *Karpicke, J. D., & Roediger III, H. L. (2007). Expanding retrieval practice promotes short-term retention, but equally spaced retrieval enhances long-term retention. Journal of experimental psychology: learning, memory, and cognition, 33(4), 704.*

[6] *Karpicke, J. D., & Blunt, J. R. (2011). Retrieval practice produces more learning than elaborative studying with concept mapping. Science, 331(6018), 772-775.*

[7] *Bertilsson, F., Stenlund. T., Wiklund-Hornqvist, C., Jonsson, B., (2021). Retrieval Practice: Beneficial for All Students or Moderated by Individual Differences? Psychology Learning & Teaching, 20(1) 21-39. https://orcid. org/0000- 0002- 0709- 3647*

[8] *Smith, M. A., Blunt, J. R., Whiffen, J. W., & Karpicke, J. D. (2016). Does providing prompts during retrieval practice improve learning?. Applied Cognitive Psychology, 30(4), 544-553.*

[9] *Roediger, H. L., & Karpicke, J. D. (2006a). The power of testing memory: Basic research and implications for educational practice. Perspectives on Psychological Science, 1, 181–210.*

[10] *Karpicke, J. D., & Grimaldi, P. J. (2012). Retrieval-based learning: A perspective for enhancing meaningful learning. Educational Psychology Review, 24(3), 401-418.*

[11] *Pan, S. C., & Rickard, T. C. (2017). Does retrieval practice enhance learning and transfer relative to restudy for term-definition facts?. Journal of Experimental Psychology: Applied, 23(3), 278.*

[12] *O'Day, G. M., & Karpicke, J. D. (2021). Comparing and combining retrieval practice and concept mapping. Journal of Educational Psychology, 113(5), 986.*

[13] *McDermott, K. B. (2021). Practicing retrieval facilitates learning. Annual Review of Psychology, 72, 609-633.*

[14] *Raaijmakers, J. G. W., & Shiffrin, R. M. (1981). Search of associative memory. Psychological Review, 88, 93-134.*

[15] *Butler, A. C. (2010). Repeated testing produces superior transfer of learning relative to repeated studying. Journal of Experimental Psychology: Learning, Memory, and Cognition, 36, 1118-1133.*

[16] *Carpenter, S. K. (2012). Testing enhances the transfer of learning. Current Directions in Psychological Science, 21, 279-283.*

[17] *Jensen, J. L., McDaniel, M. A., Woodard, S. M., & Kummer, T. A. (2014). Teaching to the test or testing to teach: Exams requiring higher order thinking skills encourage greater conceptual understanding. Educational Psychology Review, 26, 307-329.*

DOI: 10.54254/2753-7064/44/20240044

[18] *Karpicke, J. D., & Aue, W. R. (2015). The testing effect is alive and well with complex materials. Educational Psychological Review, 27, 317-326.*