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An Experimental Study on the Effect of AIGC on High School Students' English Words Memory

Youhan Liu

Foreign Studies College, Hunan Normal University, Changsha, 410081, China
*Corresponding author: fjkkkf@ldy.edu.rs

Abstract:

Vocabulary memorizing is the foundation of English learning, and improving students' vocabulary memorizing efficiency occupies an essential place in English learning. However, the current vocabulary teaching activities are stereotyped in design and superficial in practice and fail to achieve the teaching goal of improving students' vocabulary learning ability. With the development of AI, its function for learning is obvious. Therefore, based on AIGC, this study designs an experiment with 60 students from two parallel classes in grade one of a high school in Pingjiang County as the research object. The author adopts the literature method, investigation method, and experimental method. After referring to lots of related literature at home and abroad and conducting the investigation and analysis of the current situation of English vocabulary learning, the design principles and strategies for this experiment are put forward. At the end of the practice, the English vocabulary test and questionnaire survey were used as research tools to collect experimental data, and the SPSS27.0 software was used for statistics and analysis. The results show that AIGC can stimulate students' interest in vocabulary memorizing, promote memorizing efficiency, and enhance the ability to use the vocabulary.

Keywords: AIGC; English vocabulary memorizing; High school vocabulary teaching.

1. Introduction

Recently, Artificial Intelligence (AI) has seen many breakthroughs. With the rise of society's awareness about the new technology combined with education, people are increasingly concerned about the promising future of incorporating AI and education methods. As for senior high school students, English word learning is the most important and necessary part for them to learn English well [1]. Every student is supposed to master 3000 English words after finishing the required courses, and they ought to know the meaning in different contexts and how to use each word in particular contexts [2]. There are no independent vocabulary lessons in senior high school English classes; students learn and review words independently and ignore the efficiency of their word memory [3]. Teachers lack the direction of memory strategy. The method used most often is to cram and repeat, which is inefficient for students, leading to a lack of confidence in learning English [4]. As for the combination of AI and English teaching in senior high school, much previous research exists. AI can help to establish and improve students' online lessons with its rich resources and diverse methods [5]. With the help of AI, English listening and speaking lessons can help the traditional lesson set up a tool to get the students' real-time feedback [6]. AI+ tools can improve students' learning efficiency in sentence patterns and make the whole class concise and clear [7]. AI+ reading system can help students read more passages in a limited time [8]. ChatGPT can give critical and scientific feedback on students' writing [9]. However, the research on vocabulary learning with the combination of AI is insufficient, and it emphasizes the student's autonomy rather than the contribution of GAI [10]. In English word memory, GAI can generate numerous sentences using a particular vocabulary and give some responses to the learners, which can improve the enrichment and efficiency of the whole process of memorizing the words. This experiment allows junior school students and teachers to find a new way to memorize English words more efficiently. In some educationally underdeveloped areas, this method can promote educational equity. Additionally, this experiment can provide a new perspective on developing future English education policy. This experiment focuses on two questions: 1. What is the function of the GAI for senior high school students in memorizing English words? 2. What are the similarities and differences between GAI and traditional methods when evaluating memorizing English

words?

2. Method

The researcher mainly used experimental methods to verify the effect of the materials generated from AIGC. To have a more accurate understanding of the word memory problems and related reasons for the current high school vocabulary teaching, the author took the investigation and research methods. Students were taken as the survey objects, and the survey results were used as the reference basis. The survey is based on students and teachers at the school where the author teaches (a high school in Pingjiang County, Hunan Province). Anonymous questionnaires were distributed to students for survey respondents. The questionnaire survey has 12 questions and mainly focuses on high school students' vocabulary learning attitudes and interests, vocabulary learning methods, and strategies. A total of 120 students in two or three parallel classes of the school were the survey subjects. These students enter the school with a similar level of English. In addition, the English teaching level of our school is in the middle of the whole of Pingjiang County, so the questionnaire has a certain universality and representativeness.

In this experiment, the subjects of this study were from two parallel classes at a high school taught by the same teacher, with a total of 60 students. The students' English learning time and background are the same. Before this experiment, 60 students participated in a vocabulary test; SPSS27.0 was used to analyze the scores. The results showed no significant vocabulary difference between the experimental and control groups. They can be used as the research objects in this experiment. During the experiment, one group used the traditional way to memorize the words, while the other used AI-generated materials. Both of them had 40 minutes to memorize 25 words. After that, they attended another examination to test how much they knew about the words, both in spelling and usage.

In this experiment, a questionnaire survey and vocabulary test were used. The investigator distributed questionnaires to the experimental group before the experiment. The distribution aims to understand the vocabulary memorization strategies used by students and their acceptance of AIGC.

The questionnaire

To investigate the students' interest in memorizing words before the experiment, the researcher administered a questionnaire to the strategies used. The content is based on Craik and Lockhart [11] and adapted from some excellent dissertations [12]. It has 12 questions, and question numbers 1, 2, 3, 4, and 5 refer to the student's vocabulary learning condition. Question numbers 6 and 7 correspond to students' words memorizing strategies and opening attitudes to a new approach. Question numbers 8 and 9 refer to students' use of some apps to memorize words in their daily lives. Question numbers 10, 11, and 12 mainly focus on their future words memorizing adjustment.

Pre-study test paper

The vocabulary of the pre-study test paper is selected from the 2000-level vocabulary test paper and the Yilin version of high school English option I. The paper uses the vocabulary grade test by Norbert Schmitt [13]. The Vocabulary Levels Test consists of 10 questions, each set of 6 test words and the English definition of 3 words; the participant needs to choose three words from the six words on the left and match them with the right side. The six words taken were randomly ordered by the investigator, and the words used in the definition were always more common than the target words. Students are asked to complete a paper within 30 minutes during testing. This test paper is relatively simple, and the tester only needs to fill in the serial number of the corresponding word on the horizontal line and answer one question correctly 1 point is awarded, no points are awarded for incorrect or non-answering, and the total score is 30 points. Papers were collected, and the researcher marked them. Subsequently, the investigator performed an independent sample T of the students' pretest vocabulary test to determine the difference in level between the two groups and ensure the operability of the experiment.

Post-study test paper

The post-test paper is selected from the words of Unit 3 of High School English Option I of Yilin Edition, referring to the vocabulary-size test of controlled productive ability by Laufer & Nation [14, 15]. It has 36 questions, including spelling and using 18 words. The participants ought to finish the paper in 30 minutes.

3. Experimental process

3.1 AIGC Materials

The author tried different AI tools, including ChatGPT3.5, Poe, and Ernie Bot, to get the words memorizing materials. Through trying different prompts [16], the author got different materials. For example, when asked, "Help me memorize the word "landscape" easily and visually.", ChatGPT 3.5 answered with different impractical strategies to generate materials. When asked some specific "Please define landscape. And provide synonyms, antonyms, and examples of their usage in a sentence. Contextualize the word landscape: You can use the landscape in a sentence or provide examples of its use in different contexts. You will give me a better understanding of how landscape is used." ChatGPT3.5 gave some specific information, such as "Synonyms: Scenery, view. 1. Describ-

ing Natural Scenery: “The landscape in this part of the country is dominated by vast forests and serene lakes.” 2. Garden Design: “They hired a professional to landscape their backyard, turning it into a beautiful outdoor land.” 3. Photography: “She is good in landscape photography, getting images of nature.”4. Technology: “The tech landscape constantly evolves, with innovations appearing every year”. The author used this method to generate vivid and rich memorizing materials.

3.2 Data Collection

Data collection in this study is divided into two stages: pre-test and post-test data collection. The experimental and control group students were required to complete the pre-test paper within 30 minutes and the post-test paper in 30 minutes. the researcher supervised the students throughout the process to ensure the validity of the data. 60 test papers were sent out, and 60 test questions were recovered. The researcher photographed and archived all the recovered test papers, scored the collected vocabulary test papers, and input the test results into SPSS 27.0.

3.3 Data Analysis

In the early stage of the experiment, the researcher collected 118 questionnaires and 60 pre-test papers. The researcher handed out the AIGC materials to all the students during the experiment. Later in the experiment, the researchers collected post-test papers. The researcher scored the vocabulary scores of this experiment. Analytical statistics were performed with SPSS27.0 before and after the experiment.

4. Results and discussion

Before the experiment, the students were surveyed using questionnaires. A total of questionnaires were distributed 120, and 118 questionnaires were returned. The questionnaire’s questions mainly involved students’ vocabulary learning attitudes and interests, vocabulary learning methods and strategies, and opinions and suggestions on vocabulary teaching activities carried out by teachers. The analysis is based on charts and column charts.

Table 1. Results of the Survey on Learning Interests and Attitudes

	Strongly agree	Agree	Somewhat agree	Somewhat disagree	Disagree
1. I believe vocabulary is very important and is the foundation of learning English.	58.9%	29.37%	3.88%	1.96%	2.88%
2. After class, I spend time on self-directed vocabulary learning.	10.76%	25.41%	36.29%	17.73%	9.8%
3. I find it slow to memorize new words and I easily forget them.	23.53%	27.45%	29.41%	15.69%	3.92%
4. I think memorizing vocabulary is boring and uninteresting.	11.76%	15.69%	39.22%	21.57%	11.76%
5. The biggest problem in reading and writing is not knowing the words.	35.29%	41.18%	13.73%	5.88%	3.92%

As seen from Table 1, most students think vocabulary learning is very important and is the basis for learning English well. Students use some spare time to learn vocabulary independently, showing thatthey have a certain enthusiasm for vocabulary learning. However, it can be seen from Q3, Q4, and Q5 that most students have difficulties

learning vocabulary, such as memorizing vocabulary, not being interested in it, being frustrated in not knowing the words, etc. Students need more appropriate vocabulary learning methods, and teachers should provide more targeted guidance to help students overcome the difficulties in vocabulary.

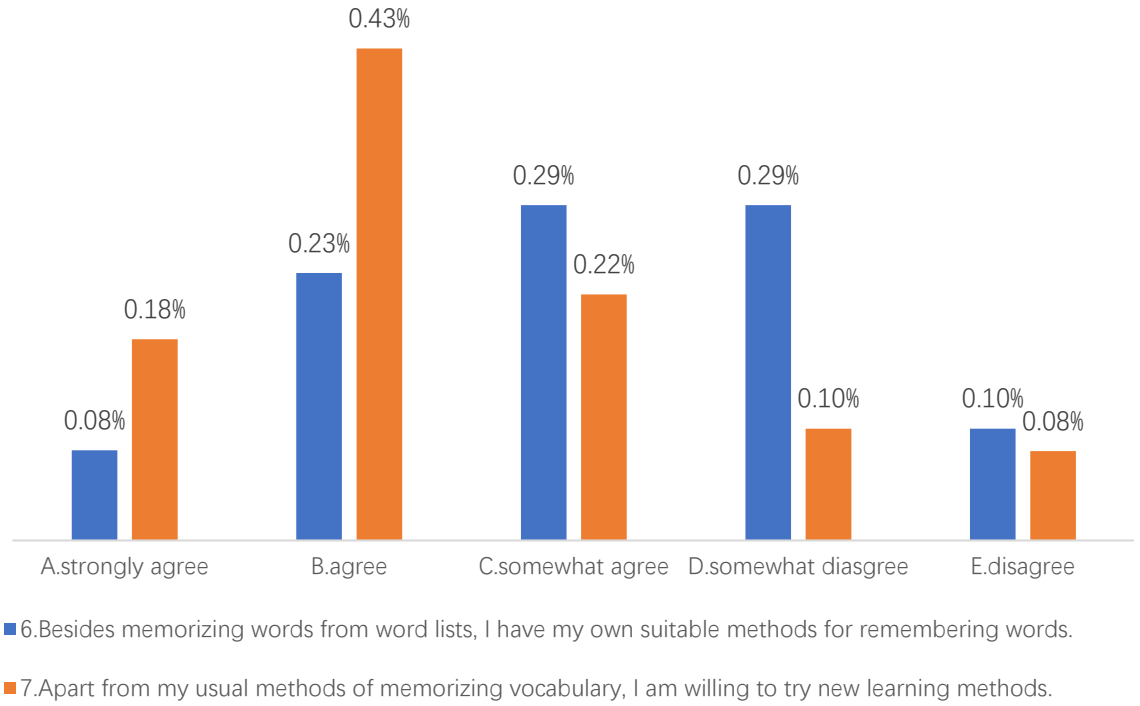

Fig. 1 Results of the Survey on Learning Methods and Strategies

According to Figure 1, about 60% of students memorize words with the word list and have some learning methods. However, about 40% of students lack autonomy in memorizing words and only memorize words according to the word list, which will lead to boring and easy to forget. As seen from Q7, about 85% of students are willing to try new methods of memorizing words and hold an open and positive attitude towards them, which is conducive to experiment.

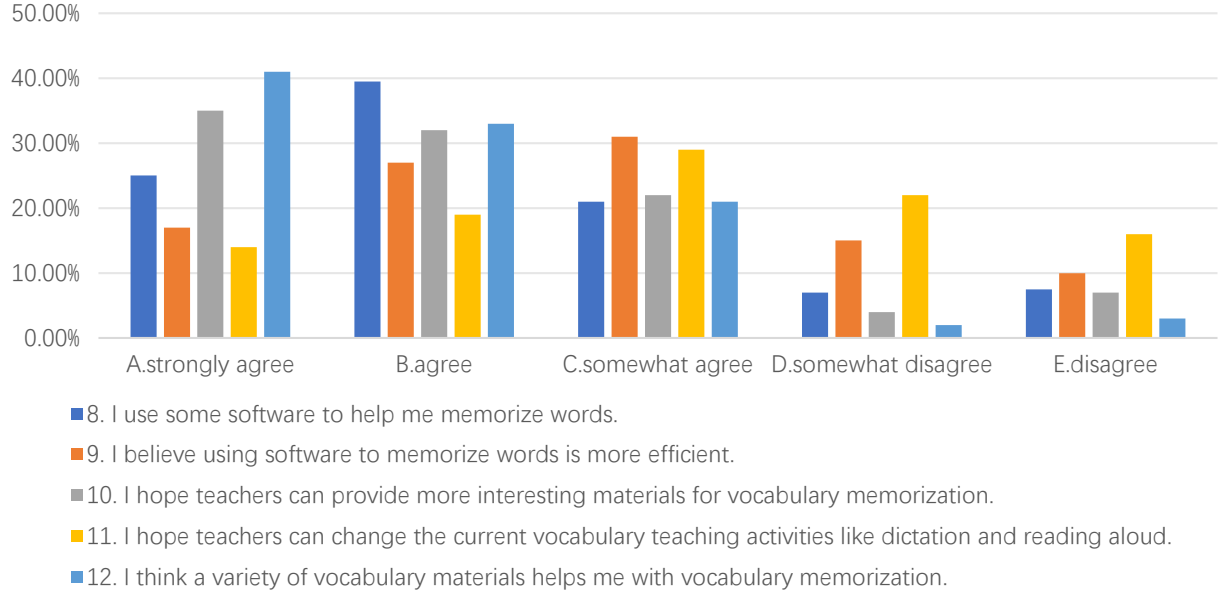

Fig. 2 Views and suggestions for using AI to help memorize vocabulary

As seen in Figure 2 Q8, most students use some software to memorize words, and they think it is efficient. At the same time, it can be seen from the data results of Q10-Q12 that most students hope that teachers can be suitable for changing the method of dictation, a slightly boring vocabulary detection, and carry out more interesting vocabulary teaching activities, and think that rich vocabulary materials can help them improve their vocabulary mastery ability.

To change the vocabulary performance into vocabulary, the vocabulary conversion formula, namely the receptive vocabulary = the total number of correct answer words test vocabulary 2000, which was adopted by multiple investigators [17]. To answer the first question in this study and ensure the validity and scientificity of the experimental data analysis, the researcher with SPSS27.0 analyzed the experimental group in the vocabulary, and the experimental group and control group vocabulary test independent sample t-test, the specific data are as follows.

Table 2. Experimental and control group pre-test independent sample t-test

Independent sample test								
F		Levine variance equivalence test		Mean equivalence t-test				
		Significantly difference	t	df	Sig.(2-tailed)	avg	sigma	
Pre-test scores	Assumed equal variance	170	682	377	58	708	433	1.150
	Equal Variances Not Assumed			377	57.934	708	433	1.150

As from Table 2, Sig0.682>0.05, Sig (2-tail)0.708>0.05, indicating that there was no significant difference in the vocabulary of the two groups before the experiment.

After the experiment, to specifically understand the influence of AIGC materials on English vocabulary acquisition of high school students, the post-test volume with consistent difficulty was designed for testing. For scores collected by post-test, the researcher conducted an independent sample t-test using SPSS27.0

Table 3. Independent sample t-test for post-test in experimental and control groups

Independent sample test								
F		Levine variance equivalence test		Mean equivalence t-test				
		Significantly difference	t	df	Sig. (2-tailed)	avg	sigma	
Post-test scores	Assumed equal variance	1.339	252	3.664	58	001	8.600	2.347
	Equal Variances Not Assumed			3.664	53.756	001	8.600	2.347

From Table 3, the Sig. (two-tailed) value is 0.001 <0.05, indicating that the post-test vocabulary scores of the two groups are significantly different, indicating that the AIGC materials positively impact vocabulary memorizing.

To further explore the influence of AIGC materials on vocabulary in the experiment, the scores of part 1 and part 2 in the post-test papers were collected in the experimental and control groups. The results are shown in Table 4 and Table 5.

Table 4. Statistics of the two parts in the post-papers

Group statistics					
	Group	Number of cases	average	Standard Deviation	SEM
Part 1	1	30	18.93	4.948	903
	2	30	18.60	4.492	820
Part 2	1	30	22.07	5.930	1.083
	2	30	13.80	3.978	726

From Table 4, the average scores in part 1 of the post-test paper show a very close between the experimental group and the control group, which is about the words' spelling. However, the average scores in part 2 of the post-test paper show a big gap between the experimental group and the control group.

Table 5. Independent sample t-test for two parts in the post-test paper

Independent sample test								
F		Levine variance equivalence test		Mean equivalence t-test				
		Significantly difference	t	df	Sig. (2-tailed)	avg	sigma	
Part 1	Assumed equal variance	315	577	273	58	786	333	1.220
	Equal Variances Not Assumed			273	57.467	786	333	1.220
Part 2	Assumed equal variance	1.708	196	6.341	58	000	8.267	1.304
	Equal Variances Not Assumed			6.341	50.700	000	8.267	1.304

From the Table 5, the Sig. (two-tailed) value in part 1 is 0.786 >0.05, indicating that the two groups show no significant difference, indicating that the AIGC materials have little impact on vocabulary spelling. However, the Sig. (two-tailed) The value in part 2 is 0.000 <0.05, showing that the two groups are significantly different, meaning that AIGC positively impacts students' ability to use vocabulary well.

5. Conclusion

This study has demonstrated that AIGC (Artificial Intelligence Generated Content) significantly enhances high school students' ability to remember English vocabulary. Compared to traditional rote memorization, AIGC provides materials that help students better grasp the usage of words in different contexts and more natural ways. Students who used AIGC in the experiment exhibited higher proficiency in word usage. The findings of this research offer new insights for high school English teachers on how to guide students in vocabulary memorization. AIGC materials can be particularly beneficial for improving vocabulary acquisition and usage, promoting educational equity, especially in underdeveloped regions. Traditional memorization methods, while effective in helping students remember word spellings and Chinese meanings, fall short in teaching students' authentic usage in a short period. Despite the promising results, this study has limitations due to the generally low English proficiency of the participating students. Additionally, the AIGC-generated materials were manually curated by the author, which introduces a level of subjectivity. Future research could address these limitations by improving technological capabilities, enabling students to use AI directly for vocabulary memorization without the need for secondary material curation.

This approach could further enhance the effectiveness and efficiency of learning.

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