SSRG International Journal of Humanities and Social Science
ISSN: 2394-2703/ https://doi.org/10.14445/23942703/IJHSS-V11I5P105

Volume 11 Issue 5, 28-38, Sep-Oct 2024

Original Article

A Study of the Effect of College Students' English Vocabulary Memory From the Perspective of Cognitive Nerve

Wu Ling

School of Foreign Languages, Sichuan International Studies University, Chongqing, China.

[1]*Corresponding Author : wuling502@qq.com*

Received: 11 August 2024 Revised: 20 September 2024 Accepted: 08 October 2024 Published: 23 October 2024

Abstract *- As the first step of foreign language learning, English vocabulary memory has become the first practical problem encountered by English learners. The 21st century evolution of English vocabulary instruction has made it a research topic to determine how to enhance the memory impact of vocabulary in English and enhance students' core literacy in English topics.*

This study employs a multidisciplinary approach to investigate the impact of college students' memory of English vocabulary on their cognitive neural vision. It does this by using both qualitative and quantitative research techniques, including literature analysis, questionnaire surveys, and introspective analysis.

The questionnaire survey was conducted from four dimensions: emotion, physiology, repeated memory, image, sound and contextual memory strategy. Following the collection of 83 valid questionnaires, SPSS data processing and analysis produced the following findings: (1) The commonly used memory strategy of college students was "image, sound and contextual memory strategy". (2) There was no significant difference in vocabulary memory strategies among college students' gender, domicile location, and class committee identity. (3) There was a significant difference in college students' age between the emotional dimension, physiological dimension, and repeated memory dimension. At the same time, it has no significant difference in image, sound, and context dimensions.

Keywords *- Cognitive Neuroscience; Educational Reform; English Language Acquisition; Learner Autonomy; Vocabulary Memory Strategies.*

1. Introduction

With the implementation of the "Double Reduction" policy and the new curriculum standard, English education in China has ushered in an unprecedented wave of reform. College students are indirectly affected by the "Double Reduction" policy and the reform of the new curriculum standard. In terms of English learning, college students may be influenced by the enrollment basis and teaching methods of the adjustment of the new curriculum standard, especially those who receive the new curriculum standard education in middle school. The "Double Reduction" policy may lead to the reduction of English teaching resources in some schools, which will affect the English learning environment and learning experience of college students. These changes not only bring new thinking in the teaching content and methods but also profoundly affect the way and effect of college English vocabulary teaching. As the cornerstone of English learning, the memory effect of English vocabulary is closely related to brain function, thereby highlighting the importance of effective vocabulary teaching methods in maximizing language proficiency.

In this context, it is particularly important to explore the connection between the brain and memory. The development of cognitive linguistics and neurolinguistics gives us a deeper understanding of memory mechanisms in the brain. Through deep research of brain structure and function, we can better understand the nature of English vocabulary memory and look for more effective teaching strategies. Therefore, the investigation and study of the English vocabulary memory strategies of college students can not only help to understand the mechanism of vocabulary memory but also provide important theoretical support for realizing the transformation of English vocabulary teaching.

This paper aimed to explore the relevant theories applicable to the English vocabulary memory of college students from the cognitive neural vision domain and proposed practical strategies to improve the memory effect. By combining the theories of cognitive science and linguistics, hoping to make a certain contribution to the improvement of college students' English vocabulary memory effect so as to reduce the pressure on students in English learning and promote college students' learning effectiveness and the improvement of their English level.

Despite the significant role of vocabulary in language proficiency, there is a notable gap in the literature regarding the impact of recent educational reforms on college students' English vocabulary learning. The efficacy of English vocabulary memory among college students, within the purview of cognitive neuroscience, represents a pivotal yet underexplored domain in educational research. This study marks a methodological departure from precedented investigations that have predominantly centered on the repercussions of educational reforms. Instead, it delves into the intricate relationships between cognitive neural mechanisms and vocabulary memorization strategies employed by college students. This study seeks to fill this gap by investigating the following research question:

What are the common English vocabulary memory strategies used by college students in the cognitive neural field? Do cognitive neural memory strategies differ for college students? What are the differences? Do cognitive neural memory strategies differ in college students' age? What are the differences?

This thesis used a thorough strategy in conjunction with theoretical analysis and empirical investigation to meet its research goals. First, a series of questionnaires were conducted to understand the main strategies and methods adopted by college students to memorize English vocabulary. By gathering and examining a vast quantity of data, it will be possible to discern how students' recall of terminology varies from one another and what memory techniques they find most useful.

Secondly, from the perspective of cognitive neuroscience and linguistics, they are closely related to the mechanism of the brain in vocabulary memory. The impact of various memory techniques on the activation of brain memory regions and the influence of lexical memory will be investigated through a review of the literature and theoretical analysis. Meanwhile, focus on the brain regions related to language processing and memory, such as the hippocampus and frontal cortex, to explore the functions and mechanisms of these regions in lexical memory.

Finally, combining the results of empirical research and theoretical analysis, a set of feasible English vocabulary memory strategies was proposed to improve the effect of vocabulary memory on college students. It is expected that by adopting these strategies, college students will achieve significant improvement in vocabulary memory, ease students' learning pressure to some extent, and improve their English proficiency and academic performance.

In conclusion, this study aimed to explore the relevant theories and strategies of undergraduate English vocabulary memory and provided theoretical and practical support for improving the effectiveness of undergraduate English learning. It is expected that this research can make some contribution to the development of English vocabulary teaching and promote the continuous improvement and promotion of English education.

This thesis established the following research design: The study's introduction, a concise synopsis of the study, and a synopsis of the study's importance and research background comprise the first section. The concepts and theoretical underpinnings of cognitive nerves and memory, as well as research from both local and international sources, are introduced in the second section of the review of the literature. In the third part of the research design, a questionnaire survey was designed to collect data from college students by reviewing relevant literature. In the fourth part, this thesis will use SPSS and other related software to analyze and discuss the data based on the data results so as to understand the types, existing problems, and influencing factors of English vocabulary memory strategies in this group. The fifth part concludes that based on the results and combined with the latest research results, recommendations for the application of innovative memory strategies are proposed.

2. Literature Review

2.1. The Concepts of the Cognitive Nerve and Memory

2.1.1 Cognitive Nerve

In this thesis, the cognitive nerve is studied from both cognitive science and neuroscience. From the branch of linguistics, it can be divided into cognitive linguistics and neurolinguistics. Cognitive linguistics is a discipline in the acquisition and use of language, emphasizing the study of individual cognitive processes and psychological mechanisms of language. It integrates the theories and methods of linguistics, psychology and cognitive science, involving language acquisition, language perception and output, language memory, language cognition and brain, language and thinking, aiming to understand the psychological basis of human language ability. Neurolinguistics is an interdisciplinary field, investigating the biological basis of language, particularly the aspects related to the anatomy and physiology of the brain. Neurolinguistics combines theories and methods from linguistics, neuroscience, and psychology designed to gain insight into the neural mechanisms of language processing. The key areas of focus are the interaction between language and the brain, brain regions, neuroplasticity, language impairment, and brain damage, the application of brain imaging technology, language and cognition.

According to Cui (2015), A subfield of contemporary linguistics known as "neurolinguistics" is an interdisciplinary field that combines the study of neuroscience and linguistics to investigate the relationship between language and brain function. Its goals include understanding human language, as well as the production, acquisition, and learning of neurological and psychological mechanisms and the acceptance, storage, processing, and extraction of language information.

In China, neurolinguistics research status and outlook on the existing problems and weak links put forward the future to expand the molecular and cellular level language brain mechanism and faces the next generation of artificial intelligence language brain mechanism and other key research areas, to promote and lead the linguistics and neurolinguistics related disciplines continuously to science frontier. (Yu, 2021).

1. Cognitive Neuroscience
1.1. Neurolinguistics
1.2. Vision
1.3. Hearing
1.4. Attention
1.5. Memory
2. Systemic Neuroscience
3. Behavioral Neuroscience
4. Developmental Neuroscience
5. Cellular Neuroscience
6. Others

1. Psychology
1.1. Psychometric
1.2. Experimental Psychology
1.3. Psycholinguistics
2. Linguistics
3. Computer Science
3.1. Computational Linguistics
3.2. Artificial Intelligence
4. Philosophy
4.1. Epistemology
4.2. Logic
5. Neuroscience
6. Others
6.1. Anthropology
6.2. Decision Theory
7. Linguistics+Neuroscience = Neurolinguistics

Fig. 2-2 Overview of the branches of Cognitive Science(Cited from Cui, 2015: 2)

2.1.2. Memory

In General Psychology, It has been suggested that memory is the mind's psychological process of gathering and retaining unique experiences. It is the method by which the brain gathers, stores, and decodes information from the outside world. The brain uses biochemical and neuroelectrical impulses to store and retrieve information during the process of memory, which includes sensory, short-term, and long-term memory. Encoding, storing, and retrieving information are all components of memory, a cognitive activity. (Peng, 2019)

Within the visual horizon of cognitive neurons, the theories related to memory involve many fields, including neuroscience, cognitive psychology, and linguistics.

Three Major Systems of Memory

The combination of sensory memory, short-term memory, and long-term memory is also referred to as a multi-channel storage model. Under the cognitive neural vision, the connection between the brain and memory is explored mainly through brain imaging technology and the study of neuronal activity.

Hippocampal and Memory

The creation and retrieval of long-term memory are significantly influenced by the hippocampal region, according to research conducted in the cognitive neural visual domain. Hippocampal and spatial memory are closely related to factual memory.

Neural Plasticity

Emphasizing neuroplasticity in the brain, learning and memory formation are related to synaptic connections between neurons.

The Interaction between Emotion and Memory

Emotion can affect memory storage and retrieval. The amygdala controls emotions, and therefore, the brain controls the effects of memory.

2.2. Previous Research on Cognitive Nerve and English Words Memory

2.2.1. Previous Research Abroad

In recent years, foreign scholars have been increasingly working on memory, and their research focus has gradually focused on the neurocognitive field and the challenges and opportunities it brings. McGonigal mentioned that different brain areas of the brain control different physiological functions. Understanding and deliberate practice can help us to persist and solve difficulties. Therefore, it can be seen that the cultivation of willpower plays a decisive role in adhering to vocabulary memory (McGonigal, 2011).

Building on this, Taylor et al. examined why specific terms are more likely to be recalled than abstract ones in order to determine whether context usability explains the impact of word concreteness in tests, including object

recognition tasks. The specificity effects in memory were not eliminated even when embedding words into a sentence context affected performance, indicating the given setting accessibility is insufficient to explain the specificity effects in explicit memory (Taylor et al., 2019).

Additionally, Laurino et al. explored the changes in learning after a new word definition through cue-induced memory repetition. The results show that memory reproduction enhances the memory and semantic integration of the new meaning and helps to modify the new meaning. It also points to the consistency of prior knowledge and consolidation time on the effect of memory reproduction. These results imply that long-term word memory's plasticity and permanence are influenced by memory reproduction (Laurino et al., 2021).

The results of Chaudhary's study, which examined the effects of intense physical activity on students' working, long-term, and short-term memory, were unexpected. It showed that physical activity improved long-term memory while negatively affecting working and short-term memory (Chaudhary, 2022).

Finally, German pointed out the complexity and flexibility of the brain and two kinds of neuronal mechanism-consciousness (vocabulary) and consciousness (words); it revealed that by hearing a word, seeing an object, and saying a word, the activation of the neuronal route was different, this explains why we can say a word, but not necessarily in reading is to recognize the meaning of the word; thus, we can conclude that the necessity of multi-sensory participation in English vocabulary memory (German, 2022).

2.2.2. Previous Researches at Home

Some scholars discussed the factors affecting vocabulary memory. For example, Sun studied the influence of emotion on the efficiency of English vocabulary memory of college students, and the promoting effect of positive emotion on the efficiency of vocabulary memory was obtained (Sun, 2011). Zheng et al. concluded that the implicit extraction of autobiographical memory information was affected by the emotions of memory itself, and the extraction of negative autobiographical memory information required more resources (Zheng et al., 2012). Liu concluded that the picture/animation/image presentation mode had an obvious effect on vocabulary memory and output, and there was no significant difference in the influence of vocabulary and incidental context presentation mode (Liu, 2014). Gong et al. concluded that emotional regulation was better than the recall, recognition, interaction, and vocabulary scores of the no-strategy group (Gong et al., 2015). Liao et al. showed that language and emotion are related to each other and influence each other. Neurolinguistics has shown an emotional turn, and emotional neurolinguistics has also emerged at the historic moment (Liao et al., 2021). You et al. studied the causality of memory, analyzed the traditional causality theory and disadvantages, and finally pointed out that the study of memory causality oriented by mechanism interpretation is a new paradigm in the study of contemporary memory causality (You et al., 2021).

Some scholars used the rules of brain memory to assist English vocabulary teaching. For example, Ge used the characteristics of memory rules, forgetting rules, and English vocabulary in cognitive psychology to explain how to improve English vocabulary teaching from three aspects: "phonetic form", pattern block and random examination (Ge, 2007). Liang used the forgetting curve of Aibinhaus to break through the difficult memory of the words. According to the forgetting curve of the memory of the words, the memory of Aibinhaus became interesting. In terms of learning time, she used the skill of high-frequency repetition and memory to break through the difficult memory of the words (Liang, 2009). Zhang et al. used the quality of vocabulary acquisition as the study's subject. They used learners' vocabulary acceptance and output ability to examine the relationship between long-term working memory capacity and the quality of vocabulary acquisition. Researchers conclude that checking the vocabulary ability of learners with long-term working memory ability can effectively help them improve their learning quality (Zhang et al., 2010). Pei et al. proposed that to be able to improve the efficiency of memorizing words; teachers must understand the psychological process and neural activity process of memorizing words so as to better mobilize students' consciousness and enthusiasm in the process of memorizing words (Pei et al., 2011).

Some scholars also investigated the current situation of existing students' vocabulary memory. For example, Li et al., based on Wen Qiufang's learning strategy theory, used the vocabulary test paper and the questionnaire of vocabulary learning questionnaire and concluded that the more memory strategies, the better the memory effect (Li et al., 2010).

In conclusion, domestic research on English vocabulary memory, either from the memory strategy to explore the influencing factors or empirical research from the perspective of emotion, combined with the study of learners' own neurocognitive structure is rare; it needs to involve certain neurolinguistics, emotional neurolinguistics, general psychology, cognitive linguistics theory.

Following an assessment of the state of research on vocabulary memory methods both domestically and internationally, the study discovered that the majority of domestic research on the topic concentrates on vocabulary memory strategy use and infrequently applies advancements in the emotional and cognitive neural domains; the foreign research focuses on studying vocabulary memory strategies from the cognitive neural field and makes many achievements, but the research results may not be applicable

to Chinese students. Therefore, it should be the focus of future research to study the effect of English vocabulary memory and to explore the memory strategies suitable for Chinese foreign language learners.

2.3. Summary

In the cognitive neural visual horizon, understanding the neural mechanisms of vocabulary memory helps to explore more effective memory strategies. Through the activity of neurons and the synergistic effect of different brain regions, a more scientific vocabulary memory method can be explored more effectively.

- Comprehensively improve the student's English level.

The theory of memory under the cognitive neural visual horizon has opened a new path for English learning. Targeted teaching strategies aim to increase listening, speaking, reading, and writing skills overall by taking into account how the brain processes language.

- Strengthen students' foundation in English and establish the groundwork for their capacity for lifetime learning.

Through the memory theory under the cognitive neural visual horizon can better understand the process of students' initial construction of English knowledge. Establishing a firm English foundation should cultivate students' deep language thinking ability and lay a foundation for students' lifelong learning ability.

- Improve students' learning and memory ability, and promote their all-round development.

The theory of memory under the cognitive neural horizon emphasizes the interconnection of learning and memory. Optimizing the education method can mobilize the initiative of students in learning, not only promoting the learning of English but also promoting the study of other subjects, promoting the all-round development of students, and laying the foundation for future academic development.

3. Research Design

3.1. Research Questions

From the perspective of cognitive nerve, through reading a large number of relevant literature to have a better understanding of the current research status of the memory effect of English vocabulary at home and abroad, the following three research questions are proposed.

- What are the common English vocabulary memory strategies used by college students in the cognitive neural field?
- Do cognitive neural memory strategies differ for college students? What are the differences?
- Do cognitive neural memory strategies differ in college students' ages? What are the differences?

3.2. Research Subjects

The survey was conducted from freshmen to seniors in SUSE. There were 83 students in total. Among them, there were 28 boys, 55 girls, 29 in towns, 54 in rural areas, 42 as class committees, and 41 without class committees. Their mean age was concentrated at the age of 18 – 23 years old.

Table 1. Research subjects

Sex	**Male (28)**	**Female (55)**
Age	18 – 23 years old	
Effective sample size	83	
Place of domicile	Cities (29)	Village (54)
Whether to serve on the class committee	Yes（42）	No（41）

3.3. Research Tools

This survey adopted the online questionnaire survey, and there were 16 questions about vocabulary memory methods. Through the reliability and validity analysis, the questionnaire has reliability and validity.

Students' responses to each question were divided into five types: A. firmly disagree; B. disagrees; C. cannot be certain; D. agree to firmly agree. In this survey, 83 questionnaires in total were distributed, and 83 valid questionnaires were gathered.

3.4. Data Collection

In this study, 83 questionnaires in total—83 valid questionnaires—were distributed, yielding a 100% efficiency rate.

Before the start of the questionnaire, the validity of a small sample was tested, and the results had validity.

Table 2. Validity test

Test item		**Result**
Reliability analysis	Clone Bach of Alpha	0.901（number of terms ： 16）
Analysis of validity	KMO	0.848
	Test for Bartlett sphericity	Estimate the chi-square 591.249 free degree： 120 conspicuousness： 0.000

Confidence analysis results: The clonal Bach Alpha coefficient was 0.901, which exceeded the commonly accepted threshold (usually 0.7), indicating good internal consistency or high reliability.

Validity analysis results: The KMO test result was 0.848, greater than the usual acceptance threshold (usually 0.7), indicating the high suitability of the sample, which was conducive to the factor analysis. Because the significance was less than the standard significance level, the questionnaire data was deemed adequate for factor estimation.

The approximate chi-square value was 591.249, the degrees of freedom were 120, and the significance was 0.000 (usually 0.05).

Considering the above results, it can be concluded that the questionnaire has good reliability and validity and is suitable for research and survey purposes.

4. Results and Discussion

4.1. About the Common English Vocabulary Memory Strategies

The descriptive statistics in SPSS were used to analyze the collected data when students used four dimensions (including mean and SD). Second, the memory methods of gender, domicile, class committee, and performance were tested using an ANOVA with a one-way design.

The association between high and low grouping in four dimensions was then found using the correlation analysis.

The following table is the average of the rank order of the four memory strategies.

Table 3. The average of the rank order of the four memory strategies

Strategy dimension	Mean	Standard deviation	Grade ranking
Image, sound, and context dimensions	13.99	3.288	1
Repeated memory dimension	12.41	3.272	2
Emotional dimension	11.18	3.125	3
Physiological dimension	10.30	2.925	4

The following table shows that visuals, sounds, and context are the most often utilized memory techniques among college students. This is followed by repeated memory, then the emotional dimension, and finally, the physiological dimension of memory strategies.

That is to say, students' common memory strategies are "image, sound, and situational dimensions".

4.2. About Different Types of Memory Strategies Adopted by Different Participants

To explore whether different types of (physical and mental) neurocognitive memory strategies have different effects on college students. What distinctions exist? First, all three variables of gender, domicile, and whether to serve as the class committee were analyzed respectively.

Table 4. Gender influence

Strategy dimension	Gender	Mean	Standard Deviation	F	P
Emotional dimension	male（28）	10.75	3.273	723	398
	female（55）	11.40	3.303		
Physiological dimension	male	10.32	3.092	002	964
	female	10.29	2.865		
Repeated memory dimension	male	11.89	2.846	1.055	308
	female	12.67	3.464		
Image, sound, and context dimensions	male	13.32	3.422	1.944	167
	female	14.33	2.938		

Table 5. The influence of the household registration location

Strategy dimension	Place of domicile	Mean	Standard deviation	F	P
Emotional dimension	cities（29）	11.76	3.552	1.384	243
	village（54）	10.87	3.127		
Physiological dimension	cities	10.28	3.283	003	954
	village	10.31	2.746		
Repeated memory dimension	cities	12.14	3.563	305	582
	village	12.56	3.130		
Image, sound, and context dimensions	cities	14.76	2.984	2.769	100
	village	13.57	3.148		

Table 6. The influence of whether serving as a class committee

Strategy dimension	Whether to serve on the class committee	Mean	Standard deviation	F	P
Emotional dimension	**yes（42）**	11.33	3.136	181	671
	no（41）	11.02	3.468		
Physiological dimension	**yes**	10.19	2.491	121	729
	no	10.41	3.339		
Repeated memory dimension	**yes**	12.40	3.186	000	989
	no	12.41	3.398		
Image, sound, and context dimensions	**yes**	13.83	3.107	206	651
	no	14.15	3.175		

Table 7. The Influence of Age

		Quadratic sum	Variance	Mean square	F	P
Emotional dimension	**Interblock**	114.350	3	38.117	3.901	.012
	Within the group	771.939	79	9.771		
	Total	886.289	82			
Physiological dimension	**Interblock**	84.629	3	28.210	3.613	.017
	Within the group	616.841	79	7.808		
	Total	701.470	82			
Repeated memory dimension	**Interblock**	112.171	3	37.390	3.857	.012
	Within the group	765.902	79	9.695		
	Total	878.072	82			
Image, sound, and context dimensions	**Interblock**	45.541	3	15.180	1.587	.199
	Within the group	755.447	79	9.563		
	Total	800.988	82			

As can be seen from the above three tables, there was no significant difference in the choice of gender, domicile and class committee the significant difference in the four dimensions (P>0.05).

That is, there was no significant difference in vocabulary memory strategies between college students' gender, household registration, and class committee membership.

4.3. About the Significance Analysis between Participants' Age and Memory Strategies

Is there a significant difference between the use of cognitive neural memory strategies and the age of participants?

The table indicates that there is a significant difference (P<0.05) between ages among college students in the emotional, physiological, and repeated memory dimensions but not in the image, sound, or context dimensions (P>0.05).

In conclusion, college students' age can influence the choice of their cognitive memory strategies. There was a significant difference in college students' age between the emotional dimension, physiological dimension, and repeated memory dimension. At the same time, it has no significant difference with image, sound, and context dimensions.

5. Conclusion

5.1. Major Findings

Three points sum up the primary conclusions of this study:

- The most commonly used memory strategies for college students are Image, sound and context dimensions, followed by Repeated memory dimension, Emotional dimension and Physiological dimension. In the choice of English vocabulary memory strategies, college students tend to choose multi-dimensional and multi-multisensory participation strategies. It can be seen that college students widely accept the strategy of this dimension and have a good application background.

- The four dimensions showed a considerable difference, but there was no discernible variation in the choice of gender, residence, or class committee (P>0.05). It can be seen that the gender, residence of college students and whether they serve on the class committee are irrelevant variables for the choice of English vocabulary memory strategies for college students.
- The age of college students has a significant difference in the emotional dimension, physiological dimension, and repeated memory dimension (P<0.05). In contrast, it has no significant difference with image, sound, and context dimensions (P>0.05).

Therefore, in the cognitive neural vision domain, targeted training on the four dimensions can improve the efficiency of vocabulary memory of college students to a certain extent.

5.2. Implications

According to the results of Chapter 4, the following suggestions can be made:

- The habit of initially learning and memorizing English vocabulary

In English vocabulary teaching mode, such as teachers and professors, the phenomenon of students ' rote memorization is common. Due to the impact of the learning environment and learning resources on students' learning, there is a potential impact on students' memory effect. Secondly, students' awareness of self-learning. Students with a strong awareness of self-learning can have a positive impact on the process of vocabulary memory.

- The phenomenon of exam-oriented education is widespread

Although the "Double Reduction" policy has been promulgated, the influence of the education system on memory still exists due to the influence of academic pressure, and it has a negative impact on college students to form their own memory methods.

- Lack of training on relevant memory strategies

Under the background of exam-oriented education, teachers tend to make payments more, paying heed to the student's academic performance and disregarding the training of students' learning and memory ability. Students also ignore the importance of memory strategy for learning, not timely adjust their learning memory methods, so the students also lack the relevant memory strategy training.

To sum up, in the context of exam-oriented education, students lack the training of relevant memory strategies. Therefore, applying the relevant research results to actual English vocabulary teaching can improve the quality and efficiency of students' English vocabulary memory effect and lay a foundation for adapting to the reform of English teaching.

5.3. Limitations and Expectations

Based on the cognitive neural vision domain, the study explores the memory strategies that can improve the effect of English vocabulary memory in college students. Research reveals the direct effect of the memory strategies used by students on their performance. However, students have many miscellaneous vocabulary memory strategies, so there will inevitably be missing memory strategies in this study. Therefore, further scientific analysis is needed in order to obtain more accurate research results.

Besides, the study collected questionnaires with small samples and was not representative enough, which needs to be paid attention to in the future research process. In addition, exploring the influence of cognitive neural factors on the memory effect of English vocabulary also needs to be examined from the perspective of empirical research, which is why this study is not deep enough.

The cognitive nervous system still needs to be further researched in many different ways. For example, Chaudhary looked at the effects of intense aerobic activity on students' working memory, long-term memory, and short-term memory. He found that aerobic exercise promotes long-term memory and has a negative effect on working memory and short-term memory. The study also found that aerobic exercise has a significant effect on the neuroplasticity of the brain. However, there is still more work to be done in determining how to apply these findings to specific education and teaching measures, such as improving the memory effect of college students' English vocabulary (Chaudhary, 2022)

Hoping that this study can provide some reference and help for teaching and scientific research in this field.

Conflicts of Interest

The present investigation scrutinizes all aspects of the study, encompassing data collection, analysis, and interpretation, as well as manuscript composition and submission. After thorough consideration, we, the authors, declare the following:

- No author has any financial or personal relationships with other people or organizations that could inappropriately influence or bias the content of this paper.
- Regarding the publication of this manuscript, there are no conflicts of interest, and all authors have given their approval for the final version to be submitted.

Should there be any changes to this statement after the publication of this paper, we will promptly notify the journal's editor to update the record.

Regarding the release of this paper, the author states that there is no conflict of interest.

Funding Statement

The authors affirm that no particular funding was obtained for the purpose of conducting this research or publishing this paper.

Acknowledgements

I want to thank a lot of people for helping me finish my research. First of all, I would like to thank my mentor, Ms. Gan Xiaolan. Throughout the research process, Ms. Gan always gave me patient and professional guidance. From the way of finding information to the way of management, from the selection of the topic of the thesis to the summary of the literature review, I have benefited a lot from her expertise and encouragement.

Furthermore, I want to convey my profound appreciation to the university students who participated in the online survey because they made my research possible. In addition, I want to express my gratitude to my friends and family for their unwavering encouragement and support during my research career, allowing me to devote myself to my research work and strengthen my future research path. Finally, I want to express my gratitude to all of the professors, students, and friends who have supported me during my research. They have added joy, color, and significance to my academic career.

This research is not just my effort and dedication but the result of the joint efforts of many people. At this point, I want to sincerely thank each and every one of you.

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Appendix

College Students' English Vocabulary Memory Strategy Survey

Dear student,

Hi there! In order to investigate practical approaches to improve college students' English vocabulary memory and teaching quality, we are conducting a survey on memory techniques for the language in order to ascertain the current state of students' vocabulary. Since each person memorizes information differently, there is no right or incorrect answer to this questionnaire. Please respond honestly and without reservation based on your real-world experiences and memorization of English vocabulary.

Private Data:
1. Gender: A. Male B. Female
2. Age: A. Under 18 B. 18-20 C. 21-23 D. 24-26 E. Over 26
3. Grade: A. Freshman B. Sophomore C. Junior D. Senior
4. Household Registration Location (Urban/Rural): A. Urban B. Rural
5. Are you a class committee member? A. Yes B. No
6. What is your latest CET-4 or CET-6 score?
A. Above 600 B. 550-600 C. 500-549 D. 425-499 E. Below 425

Please mark the appropriate option with a checkmark (✓)

Part One

(1) I memorize English words every day.

A. Strongly Disagree B. Disagree C. Not Sure D. Agree E. Strongly Agree

(2) I enjoy communicating with teachers and classmates in English.

A. Strongly Disagree B. Disagree C. Not Sure D. Agree E. Strongly Agree

(3) I actively participate in English-related activities (role-playing, English speeches, English corners, etc.).

A. Strongly Disagree B. Disagree C. Not Sure D. Agree E. Strongly Agree

(4) I am eager to communicate with foreigners in English.

A. Strongly Disagree B. Disagree C. Not Sure D. Agree E. Strongly Agree

Part Two

(1) I memorize words when I wake up in the morning.

A. Strongly Disagree B. Disagree C. Not Sure D. Agree E. Strongly Agree

(2) I memorize words after the lunch break.

A. Strongly Disagree B. Disagree C. Not Sure D. Agree E. Strongly Agree

(3) I review the words I have learned before going to bed at night.

A. Strongly Disagree B. Disagree C. Not Sure D. Agree E. Strongly Agree

(4) I memorize words (or do other exercises) immediately after running for 30 minutes every day.

A. Strongly Disagree B. Disagree C. Not Sure D. Agree E. Strongly Agree

Part Three

(1) I regularly review the words I have learned.

A. Strongly Disagree B. Disagree C. Not Sure D. Agree E. Strongly Agree

(2) I copy new words into my notebook and find time to memorize them.

A. Strongly Disagree B. Disagree C. Not Sure D. Agree E. Strongly Agree

(3) I learn English vocabulary by repeatedly reading and spelling new words in the book.

A. Strongly Disagree B. Disagree C. Not Sure D. Agree E. Strongly Agree

(4) I memorize new words through a lot of vocabulary practice.

A. Strongly Disagree B. Disagree C. Not Sure D. Agree E. Strongly Agree

Part Four

(1) I learn and memorize new words by associating them with the context.

A. Strongly Disagree B. Disagree C. Not Sure D. Agree E. Strongly Agree

(2) I learn English by watching English movies, listening to English songs, and reading English newspapers and other English materials.

A. Strongly Disagree B. Disagree C. Not Sure D. Agree E. Strongly Agree

(3) I memorize English words by reading, writing, and listening to the word audio at the same time.

A. Strongly Disagree B. Disagree C. Not Sure D. Agree E. Strongly Agree

(4) I memorize words according to a certain rhythm (hit-hit-hit).

A. Strongly Disagree B. Disagree C. Not Sure D. Agree E. Strongly Agree