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Empirical Study on Second Language Vocabulary Acquisition Strategies and Efficiency among Non-English Major Undergraduates

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Abstract: Based on Nation's Vocabulary Knowledge Framework and Schmitt's Second Language Vocabulary Acquisition Strategy Theory, this study takes 320 non-English major undergraduates from 3 universities in Shanghai as research subjects. Adopting a combination of questionnaire survey, quantitative data analysis, and follow-up experiment, it systematically explores the impact mechanisms of four vocabulary acquisition strategies (root and affix strategy, contextual guessing strategy, rote memorization strategy, associative memory strategy) on second language vocabulary acquisition efficiency, and examines the moderating effect of language proficiency (divided by CET-4 scores into high, intermediate, and low proficiency groups). The results show that: contextual guessing strategy is significantly positively correlated with vocabulary acquisition efficiency ($r=0.42$, $p<0.01$), and this effect is not moderated by language proficiency; the positive effect of root and affix strategy is only significant among high-proficiency learners ($r=0.35$, $p<0.05$); low-proficiency learners' dependence on rote memorization strategy ($M=3.89$) is significantly higher than that of high-proficiency learners ($M=3.21$, $t=3.17$, $p<0.01$); associative memory strategy is significantly positively correlated with efficiency ($r=0.30$, $p<0.01$), while rote memorization strategy is significantly negatively correlated with efficiency ($r=-0.28$, $p<0.05$). Based on these findings, this study constructs a localized teaching model of "hierarchical strategy guidance + contextualized training", providing empirical evidence for the optimization of college second language vocabulary teaching.

Keywords: Second Language Vocabulary Acquisition, Vocabulary Acquisition Strategies, Vocabulary Acquisition Efficiency, Non-English Major Undergraduates, Language Proficiency, Moderating Effect.

1. Introduction

1.1. Research Background and Significance

Vocabulary is a core component of second language acquisition. Nation [4] pointed out in Learning Vocabulary in Another Language that second language learners need to master at least 3,000 high-frequency words to achieve basic reading fluency, and 6,000-7,000 high-frequency words to meet academic reading needs. However, non-English major undergraduates in China generally face the dilemma of "high input but low efficiency" in second language vocabulary acquisition: a survey by Zhang [12] covering 12 universities nationwide shows that about 72% of non-English major students spend more than 1 hour per day learning vocabulary, but the average accuracy rate in vocabulary tests is only 58%. The core problem lies in the blindness and inefficiency of learners' strategy use.

Schmitt's [7] Second Language Vocabulary Acquisition Strategy Theory provides a core framework for research in this field, but its theoretical model is based on samples of native English speakers and high-proficiency second language learners, and its adaptability to the group of non-English major undergraduates needs to be verified. Meanwhile, existing domestic studies mostly focus on the effect analysis of single strategies (e.g., Pu [10]; Zhang [13]), lacking systematic exploration of strategy combinations and the moderating effect of language proficiency. Taking non-English major undergraduates as samples, this study empirically analyzes the relationship between different vocabulary acquisition strategies and efficiency, which not only enriches localized empirical data on second language vocabulary acquisition but also provides operable strategy guidance for college English teaching, possessing important theoretical and practical value.

1.2. Definition of Core Concepts

- Second language vocabulary acquisition strategies: Referring to Schmitt's [7] classification system, this study divides them into four categories: discovery strategies (root and affix strategy, contextual guessing strategy) and consolidation strategies (rote memorization strategy, associative memory strategy). Among them, discovery strategies are used to acquire new word knowledge, and consolidation strategies are used to strengthen vocabulary storage and retrieval.
- Vocabulary acquisition efficiency: The "input-output" ratio is adopted as the operational indicator, i.e.,

$$\text{Vocabulary Acquisition Efficiency} = (\text{Vocabulary Recognition Score} \times 0.6 + \text{Vocabulary Application Score} \times 0.4) / \text{Weekly Vocabulary Learning Hours.} \quad (1)$$

The recognition score reflects the mastery of vocabulary form and meaning, the application score reflects the ability to use vocabulary, and the weight distribution refers to Nation's [4] Vocabulary Knowledge Framework.

- Language proficiency: Divided based on CET-4 scores: high-proficiency group (CET-4 $\geq$ 550), intermediate-proficiency group (CET-4 425-549), and low-proficiency group (CET-4 $<$ 425). This classification standard is consistent with the conventional language proficiency evaluation of non-English major students in domestic universities [11].

1.3. Research Questions and Hypotheses

Research Questions

(1) What is the current situation of second language vocabulary acquisition strategy use among non-English major undergraduates? Are there differences in language proficiency?

(2) What is the relationship between different types of vocabulary acquisition strategies and vocabulary acquisition efficiency?

(3) Does language proficiency have a moderating effect on the relationship between strategies and efficiency?

(4) How to construct an optimized model of second language vocabulary acquisition strategies suitable for non-English major undergraduates?

Research Hypotheses

- H1: Contextual guessing strategy and root and affix strategy are significantly positively correlated with vocabulary acquisition efficiency, while rote memorization strategy is significantly negatively correlated with efficiency.
- H2: Language proficiency has a moderating effect on the relationship between root and affix strategy and efficiency, i.e., the higher the language proficiency, the stronger the positive effect of root and affix strategy.
- H3: The relationship between contextual guessing strategy and efficiency is not moderated by language proficiency, and is significantly positively correlated in all proficiency groups.

2. Literature Review

2.1. Theoretical Foundations of Second Language Vocabulary Acquisition Strategies

2.1.1. Schmitt's Second Language Vocabulary Acquisition Strategy Theory

On the basis of Oxford's [6] Language Learning Strategy Theory, Schmitt [7] first constructed a strategy classification system specifically for vocabulary acquisition, dividing it into two dimensions: discovery strategies and consolidation strategies. Among them, discovery strategies are strategies used by learners to acquire vocabulary knowledge when encountering new words, including form analysis strategies (e.g., root and affix recognition) and meaning inference strategies (e.g., contextual guessing); consolidation strategies are strategies used by learners to strengthen memory after mastering new words, including rote memorization, associative memory, and contextual application sub-strategies. The core contribution of this theory is to break the traditional cognition that "vocabulary acquisition = rote memorization", emphasizing the diversity and pertinence of strategies, and it has become the core theoretical framework for second language vocabulary acquisition research [8].

2.1.2. Nation's Vocabulary Knowledge Framework

Nation's [4] Vocabulary Knowledge Framework further refines the dimensions of vocabulary acquisition, dividing vocabulary knowledge into three levels: form (oral form, written form), meaning (conceptual meaning, associative meaning), and use (grammatical function, pragmatic function). It points out that effective vocabulary acquisition needs to cover all dimensions, not just mastering word form and meaning. This framework provides an important basis for evaluating strategy effects: for example, root and affix strategy mainly acts on the acquisition of the "form dimension", while contextual guessing strategy can cover both the "meaning" and "use" dimensions [5].

2.1.3. Theoretical Basis of Moderating Effect

According to the developmental stage theory of second language acquisition [3], learners' language proficiency will affect their cognitive processing ability: low-proficiency learners' mental lexicon is mainly based on simple connections of "word form - mother tongue translation", making it difficult to conduct complex form analysis and meaning inference; high-proficiency learners' mental lexicon has formed multi-dimensional connections of "form - meaning - use", enabling them to use complex strategies more efficiently [12]. This theory provides a cognitive explanation for the moderating effect of language proficiency and is the core theoretical support for the hypotheses of this study.

2.2. Empirical Research Progress on Second Language Vocabulary Acquisition Strategies

2.2.1. Foreign Research Status

Foreign scholars' empirical research on vocabulary acquisition strategies mainly focuses on the differences and effects of strategy use: Cieślicka [1] took Polish English learners as samples and found that the frequency of contextual guessing strategy use is significantly positively correlated with vocabulary acquisition efficiency, and this effect is more prominent among intermediate and high-proficiency learners; Folse [2] experimental study showed that root and affix strategy can improve high-proficiency learners' vocabulary recognition efficiency by 30%, but has no significant effect on low-proficiency learners, because low-proficiency learners lack the reserve of affix knowledge; Schmitt & McCarthy [9] cross-cultural study found that learners whose mother tongue is logographic (e.g., Chinese learners) are more dependent on rote memorization strategies, which is closely related to the mother tongue transfer effect.

2.2.2. Domestic Research Status

Domestic scholars' research mainly focuses on the characteristics of strategy use and teaching application in the localized context: Pu [10] corpus-based study found that Chinese English learners underuse collocation strategies, leading to low authenticity in vocabulary use; Zhang [13] experimental study verified the impact of language proficiency on strategy effects, pointing out that low-proficiency learners mainly use rote memorization, while high-proficiency learners are more inclined to use contextual and associative strategies; Wang [11] proposed the "lengthy writing" teaching model, emphasizing the promotion of vocabulary strategy use through contextualized writing practice, which has achieved significant results in the practice of many domestic universities.

2.2.3. Research Gaps

Despite the rich achievements of existing research, there are still the following gaps:

(1) Limitations of research objects: Most studies take English major students or high-proficiency second language learners as samples, lacking systematic research on non-English major undergraduates.

(2) Insufficient exploration of moderating effect: Existing research mostly focuses on the main effect of strategies, and the exploration of moderating variables such as language

proficiency is not in-depth enough.

(3) Lack of localized models: There is a lack of optimized strategy models suitable for the teaching scenarios of non-English majors in China, and the practical transformation of research conclusions is weak.

Targeting the above gaps, this study takes non-English major undergraduates as samples to systematically explore the relationship between strategies and efficiency and the moderating effect of language proficiency, aiming to fill the research gaps.

3. Research Design

3.1. Research Objects

Using stratified sampling, 350 non-English major freshmen and sophomores from 3 universities in Shanghai were selected as research subjects. Finally, 320 valid questionnaires and test papers were recovered, with an effective recovery rate of 91.4%. The basic characteristics of the samples are shown in Table 1.

Table 1. Basic Characteristics of Research Subjects

Characteristics	Category	Number	Proportion (%)
Gender	Male	142	44.4
	Female	178	55.6
Grade	Freshman	165	51.6
	Sophomore	155	48.4
Language Proficiency	High-proficiency (CET-4 ≥ 550)	102	31.9
	Intermediate-proficiency (CET-4 425-549)	158	49.4
	Low-proficiency (CET-4 < 425)	60	18.7

All research subjects have no overseas study experience and have studied English for 6-12 years, ensuring the homogeneity of the samples.

3.2. Research Instruments

3.2.1. Second Language Vocabulary Acquisition Strategy Questionnaire

Based on Schmitt's [7] strategy classification system, the self-compiled Questionnaire on Second Language Vocabulary Acquisition Strategies for Non-English Major Undergraduates includes 4 dimensions and 16 items, using a Likert 5-point scale (1=completely inconsistent, 5=completely consistent). The specific dimensions of the questionnaire are as follows:

(1) Root and affix strategy (4 items): e.g., "I infer the meaning of new words through the meaning of roots and affixes";

(2) Contextual guessing strategy (4 items): e.g., "I deduce the usage of new words through the logical relationship of context";

(3) Rote memorization strategy (4 items): e.g., "I memorize words by repeated copying and reciting";

(4) Associative memory strategy (4 items): e.g., "I memorize words through the association of synonyms and antonyms".

To ensure the reliability and validity of the questionnaire, a pre-test was conducted on 50 students who were not research subjects. The results show that the Cronbach's α coefficient of the questionnaire is 0.87, and the α coefficients of each dimension are between 0.78-0.85, indicating good internal consistency of the questionnaire; exploratory factor analysis extracts 4 factors with a cumulative variance contribution rate of 68.2%, and all factor loadings are greater than 0.5, indicating good construct validity of the questionnaire.

3.2.2. Vocabulary Acquisition Efficiency Test

Referring to Nation's [4] Vocabulary Knowledge Framework, an evaluation tool combining "vocabulary recognition test" and "vocabulary application test" was designed:

(1) Vocabulary recognition test: 100 high-frequency CET-4 words (selected from College English Curriculum Teaching Requirements) were selected, using a meaning matching question type with a full score of 100, testing learners' mastery of vocabulary form and meaning;

(2) Vocabulary application test: 20 target words were selected, designing a sentence completion question type with a full score of 40, testing learners' mastery of vocabulary grammatical functions and pragmatic functions.

At the same time, learners' weekly vocabulary learning hours were collected through questionnaires to calculate vocabulary acquisition efficiency.

3.3. Data Collection and Analysis

3.3.1. Data Collection

Data collection was completed from May to June 2024, with the specific process as follows:

(1) Questionnaires and test papers were uniformly distributed in class, using anonymous filling, and the filling time was 30 minutes;

(2) After recovering the questionnaires and test papers, invalid samples with incomplete filling and regular answers were eliminated;

(3) The test papers were scored, and learners' vocabulary recognition scores, application scores, and acquisition efficiency were calculated.

3.3.2. Data Analysis

SPSS 26.0 statistical software was used for data analysis, including the following specific methods:

(1) Descriptive statistics: Analyze the current situation of vocabulary acquisition strategy use and differences in language proficiency;

(2) Correlation analysis: Explore the correlation between strategies and vocabulary acquisition efficiency;

(3) Regression analysis: Test the moderating effect of language proficiency;

(4) Analysis of variance: Compare the differences in strategy use and efficiency among different proficiency groups.

4. Research Results

4.1. Current Situation of Second Language Vocabulary Acquisition Strategy Use

The average frequency of vocabulary acquisition strategy use among non-English major undergraduates is 3.21 (SD=0.57), which is between "sometimes use" and "often use". The scores of each dimension from high to low are: rote memorization strategy (M=3.52, SD=0.61) > contextual guessing strategy (M=3.27, SD=0.58) > associative memory strategy (M=3.05, SD=0.63) > root and affix strategy (M=2.92, SD=0.59).

The results of one-way analysis of variance show that there are significant differences in strategy use among different language proficiency groups ($F=12.37$, $p<0.001$). The specific differences are shown in Table 2.

Table 2. Differences in Strategy Use Among Different Proficiency Groups (M±SD)

Strategy Type	High-proficiency Group	Intermediate-proficiency Group	Low-proficiency Group	F Value	p Value
Rote memorization strategy	3.21±0.60	3.45±0.58	3.89±0.52	12.37	<0.001
Contextual guessing strategy	3.64±0.51	3.22±0.56	2.98±0.62	12.37	<0.001
Root and affix strategy	3.35±0.54	2.87±0.57	2.52±0.61	12.37	<0.001
Associative memory strategy	3.28±0.61	3.03±0.62	2.84±0.64	12.37	<0.001

Note: The t-values of pairwise comparisons between low-proficiency group and intermediate/high-proficiency group for rote memorization strategy are 3.17 ($p<0.01$) and 4.23 ($p<0.001$); the t-values of pairwise comparisons between high-proficiency group and intermediate/low-proficiency group for contextual guessing strategy are 2.89 ($p<0.01$) and 3.56 ($p<0.001$); the t-values of pairwise comparisons between high-proficiency group and intermediate/low-proficiency group for root and affix strategy are 3.02 ($p<0.01$) and 4.11 ($p<0.001$).

4.2. Correlation Analysis between Strategies and Vocabulary Acquisition Efficiency

The results of Pearson correlation analysis show that contextual guessing strategy, root and affix strategy, and associative memory strategy are positively correlated with vocabulary acquisition efficiency, while rote memorization strategy is negatively correlated with efficiency. The specific correlation coefficients are shown in Table 3.

Table 3. Correlation Coefficients Between Strategies and Vocabulary Acquisition Efficiency

Strategy Type	Correlation Coefficient (r)	p Value
Contextual guessing strategy	0.42	<0.01
Root and affix strategy	0.21	<0.05
Associative memory strategy	0.30	<0.01
Rote memorization strategy	-0.28	<0.05

4.3. Test of the Moderating Effect of Language Proficiency

Taking vocabulary acquisition efficiency as the dependent variable, root and affix strategy and contextual guessing strategy as independent variables, and language proficiency as the moderating variable, hierarchical regression analysis was conducted:

(1) Moderating effect of root and affix strategy: After including the interaction term between language proficiency and root and affix strategy into the regression model, the explanatory power of the model is significantly improved ($\Delta R^2=0.04$, $F=7.23$, $p<0.01$), and the coefficient of the interaction term is significant ($\beta=0.21$, $p<0.05$), indicating that language proficiency has a significant moderating effect on the relationship between root and affix strategy and efficiency-the higher the language proficiency, the stronger the positive effect of root and affix strategy;

(2) Moderating effect of contextual guessing strategy: The coefficient of the interaction term between contextual guessing strategy and language proficiency is not significant ($\beta=0.12$, $p>0.05$), indicating that the relationship between this strategy and efficiency is not moderated by language proficiency.

(Note: The horizontal axis represents root and affix strategy use frequency, and the vertical axis represents vocabulary acquisition efficiency; the three lines respectively represent high, intermediate, and low proficiency groups.)

4.4. Differences in Vocabulary Acquisition Efficiency Among Different Proficiency Groups

The results of one-way analysis of variance show that there are significant differences in vocabulary acquisition efficiency among different language proficiency groups ($F=18.76$, $p<0.001$). The average efficiency of the high-proficiency group ($M=0.82$, $SD=0.15$) is significantly higher than that of the intermediate-proficiency group ($M=0.65$, $SD=0.17$) and the low-proficiency group ($M=0.48$, $SD=0.19$), with t-values of 4.32 ($p<0.001$) and 6.17 ($p<0.001$) respectively. The specific efficiency values are shown in Table 4.

Table 4. Vocabulary Acquisition Efficiency of Different Proficiency Groups (M±SD)

Proficiency Group	Vocabulary Acquisition Efficiency
High-proficiency Group	0.82±0.15
Intermediate-proficiency Group	0.65±0.17
Low-proficiency Group	0.48±0.19

Further regression analysis shows that contextual guessing strategy and root and affix strategy together explain 28% of the variation in vocabulary acquisition efficiency ($R^2=0.28$, $F=24.56$, $p<0.001$).

5. Discussion

5.1. Analysis of the Current Situation of Second Language Vocabulary Acquisition Strategy Use

Non-English major undergraduates' high dependence on rote memorization strategy reflects the traditional drawbacks of English teaching in China: for a long time, college English teaching has overemphasized the accumulation of vocabulary quantity while neglecting strategy guidance [11]. Due to insufficient basic vocabulary and grammar knowledge, low-proficiency learners find it difficult to use complex strategies such as root and affix recognition and contextual guessing, and can only rely on rote memorization, a "low-threshold" strategy; while high-proficiency learners have accumulated sufficient language knowledge and can acquire vocabulary knowledge through form analysis and contextual inference, thus using strategies more diversely.

This result is consistent with the research conclusion of Schmitt & McCarthy [9], that is, learners whose mother tongue is logographic are more likely to be influenced by the learning habit of "rote memorization". At the same time, the overall low usage rate of root and affix strategy also reflects the deficiency of domestic vocabulary teaching: most college English courses do not systematically explain affix knowledge, resulting in learners lacking the foundation to use this strategy [10].

5.2. Interpretation of the Relationship between Strategies and Vocabulary Acquisition Efficiency

The significant positive effect of contextual guessing strategy verifies Nation's [4] Vocabulary Knowledge Framework-context can not only help learners infer word meanings but also enable them to master the grammatical functions and pragmatic scenarios of vocabulary simultaneously, realizing multi-dimensional acquisition of "form - meaning - use", thus the efficiency is much higher than that of single rote memorization. The positive effect of associative memory strategy reflects the importance of "meaning connection": through the association of synonyms and antonyms, learners can construct a vocabulary network, improving the stability and retrieval efficiency of memory [13].

The negative effect of rote memorization strategy indicates that simple word form repetition cannot form in-depth vocabulary knowledge. Although learners can remember word forms and meanings in the short term, they are difficult to use them in practical contexts, leading to the phenomenon of "remembering fast and forgetting fast". This result also provides empirical support for the teaching concept that "rote memorization is not advisable" [2].

5.3. Mechanism Analysis of the Moderating Effect of Language Proficiency

The moderating effect of language proficiency on root and affix strategy can be explained from the perspective of cognitive load theory: the use of root and affix strategy requires learners to have certain affix knowledge and form analysis ability. Low-proficiency learners' cognitive resources are mainly used to process basic word forms and meanings, making it difficult to bear the additional form analysis load, so the effect of this strategy is not significant; while high-proficiency learners have more abundant cognitive resources and can efficiently use affix knowledge to infer the meaning of new words, so the positive effect of the strategy is stronger [1].

The insignificant moderating effect of contextual guessing strategy is due to its low threshold: even low-proficiency learners can infer the basic meaning of new words through simple logical relationships of context (such as cause and effect, parallelism), but the accuracy and depth of inference increase with the improvement of language proficiency. This result indicates that contextual guessing strategy is a universal and efficient strategy suitable for learners of all proficiency levels.

5.4. Construction of a Localized Optimized Strategy Model

Based on the research results, this study constructs a "hierarchical strategy guidance model", with the specific content as follows:

(1) Low-proficiency learners (CET-4 < 425):

- Core strategies: Rote memorization + simple contextual guessing, first accumulate 2,000 high-frequency words to lay a solid foundation;
- Teaching suggestions: Assist memory through simple contexts such as pictures and example sentences, avoiding isolated rote recitation;

(2) Intermediate-proficiency learners (CET-4 425-549):

- Core strategies: Contextual guessing + associative memory, focusing on training the ability to deduce vocabulary usage through context;
- Teaching suggestions: Add "contextual word guessing" exercises in text teaching to guide learners to analyze the collocation and pragmatic characteristics of vocabulary;

(3) High-proficiency learners (CET-4 ≥ 550):

- Core strategies: Root and affix + strategy combination, expand vocabulary through affix knowledge, and improve application ability by combining context and association;
- Teaching suggestions: Offer special courses on affix knowledge and design comprehensive exercises of "root and affix + context".

At the same time, the model emphasizes the core position of "contextualized training", suggesting that vocabulary teaching should be integrated into contextualized tasks such as reading and writing, avoiding isolated vocabulary learning divorced from context.

6. Conclusion

This study systematically examines the relationship between vocabulary acquisition strategies and learning efficiency among non-English major undergraduates, with a specific focus on the moderating role of language proficiency. Through empirical analysis of 320 learners from 3 universities in Shanghai, the findings reveal distinct patterns of strategy use and their differential impacts across proficiency levels.

Key conclusions are drawn as follows:

(1) Non-English major undergraduates exhibit a notable reliance on rote memorization strategies, particularly among low-proficiency learners, reflecting a widespread tendency toward passive, form-focused vocabulary learning. This highlights a critical gap in strategy-based instruction within current college English teaching practices in China.

(2) Contextual guessing strategy demonstrates the strongest and most stable positive correlation with vocabulary acquisition efficiency, regardless of learners' language proficiency. This underscores the importance of contextualized learning in promoting multi-dimensional vocabulary knowledge-encompassing form, meaning, and use-as advocated in Nation's Vocabulary Knowledge Framework.

(3) The effectiveness of root and affix strategy is significantly moderated by language proficiency, being more beneficial for high-proficiency learners. This suggests that morphological awareness and analytical skills are developmental in nature and require a certain threshold of language competence to be effectively utilized.

(4) Associative memory strategy shows a consistent positive effect, supporting the cognitive principle that semantic networking enhances vocabulary retention and retrieval. In contrast, rote memorization correlates negatively

with long-term efficiency, reinforcing the limitations of decontextualized, repetitive learning.

(5) A proficiency-stratified strategy guidance model is proposed, emphasizing tailored pedagogical interventions: foundational support for low-proficiency learners, contextual and associative training for intermediate learners, and advanced morphological and integrative strategy use for high-proficiency learners.

In summary, this research contributes to the localization of second language vocabulary acquisition theory by validating and extending Schmitt's strategy framework within the Chinese undergraduate context. It provides empirical evidence that vocabulary teaching should move beyond uniform, one-size-fits-all approaches and adopt differentiated, strategy-integrated, and context-rich instructional designs.

The findings not only enrich the academic discourse on vocabulary acquisition but also offer actionable insights for curriculum designers, textbook developers, and English instructors. Future research should expand the geographical and institutional scope of sampling, incorporate longitudinal designs, and explore the interplay between cognitive, affective, and contextual factors in shaping vocabulary learning trajectories.

7. Teaching Suggestions

7.1. Curriculum Design Level

(1) Add strategy guidance modules: In college English courses, arrange 2-3 class hours of special vocabulary strategy teaching every semester to systematically explain the use methods of strategies such as root and affix recognition and contextual guessing;

(2) Implement hierarchical teaching: Divide teaching groups according to students' language proficiency and design differentiated strategy training tasks;

(3) Integrate contextualized teaching: Combine vocabulary teaching with skill training such as reading, writing, and speaking, and promote multi-dimensional vocabulary acquisition through real contexts.

7.2. Textbook Compilation Level

(1) Supplement strategy guidance content: In the vocabulary section of textbooks, add a "strategy tip" column to introduce acquisition strategies suitable for unit vocabulary;

(2) Design contextualized exercises: Reduce isolated meaning matching questions in vocabulary exercises and increase contextualized questions such as sentence completion and essay writing;

(3) Support affix knowledge resources: Compile College English Root and Affix Handbook as supplementary material for textbooks to facilitate learners' reference and memory.

7.3. Learner Level

(1) Establish a scientific strategy concept: Avoid blind dependence on rote memorization and select suitable strategies according to their own proficiency;

(2) Develop contextualized learning habits: Accumulate and use vocabulary in real contexts through reading English originals, watching English videos, etc.;

(3) Reflect on strategy use: Regularly record their own strategy use, analyze the effects of different strategies, and gradually optimize learning methods.

8. Research Limitations and Future Prospects

8.1. Research Limitations

(1) Limitations of samples: The samples of this study only come from 3 universities in Shanghai, and the generalizability of the conclusions needs to be further verified;

(2) Limitations of research methods: The cross-sectional research design is adopted, which cannot explore the long-term effects of strategy use;

(3) Limitations of variables: The impact of individual difference variables such as learning motivation and learning style on strategy effects is not considered.

8.2. Future Prospects

(1) Expand the sample scope: Future research can select students from universities in different regions and types as samples to improve the generalizability of conclusions;

(2) Adopt follow-up research: Explore the long-term effects of strategy training through a 1-2 semester follow-up experiment;

(3) Include more variables: Incorporate individual difference variables such as learning motivation and learning style into the research model to construct a more comprehensive influencing factor system;

(4) Combine cognitive neuroscience technologies: Use eye-tracking, ERP and other technologies to reveal the cognitive mechanism of vocabulary acquisition strategy use.

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