



Beyond Memorization: Vocabulary Learning Strategies and Lexical Outcomes among Chinese Secondary EFL Learners

Pin'an Shen^{1,2}, Ya'nan Wu^{3*}

¹Institute for Language Materials Development, Shanghai International Studies University, Shanghai, China

²College of Humanities, Yeungnam University, Gyeongsan, South Korea

³School of International Education, Zhejiang Industry and Trade Vocational College, Wenzhou, China

Email: *2017840035@qq.com

How to cite this paper: Shen, P.A. and Wu, Y.N. (2026) Beyond Memorization: Vocabulary Learning Strategies and Lexical Outcomes among Chinese Secondary EFL Learners. *Open Access Library Journal*, 13: e14760.

<https://doi.org/10.4236/oalib.1114760>

Received: December 16, 2025

Accepted: January 11, 2026

Published: January 14, 2026

Copyright © 2026 by author(s) and Open Access Library Inc.

This work is licensed under the Creative Commons Attribution International License (CC BY 4.0).

<http://creativecommons.org/licenses/by/4.0/>



Open Access

Abstract

Vocabulary learning in Chinese secondary EFL classrooms has long been characterized by a strong reliance on rote memorization, despite increasing recognition of the role of vocabulary learning strategies (VLS) in lexical development. However, large-scale empirical evidence concerning how adolescent learners deploy different strategy types and how such strategies relate to vocabulary outcomes across educational stages remains limited. Drawing on data from 900 junior and senior high school EFL learners in eastern China, this study adopts a quantitative cross-sectional design to examine patterns of VLS use and their associations with receptive vocabulary size. Strategy use was measured using a validated VLS questionnaire, and vocabulary knowledge was assessed via the Vocabulary Size Test. Results revealed that memory strategies were reported most frequently across both educational stages, whereas senior high school learners demonstrated significantly greater use of cognitive, meta-cognitive, and inferencing strategies. Regression analyses further revealed that meta-cognitive and inferencing strategies emerged as the strongest predictors of vocabulary size, while reliance on rote memorization showed no significant association with lexical outcomes. These findings highlight clear developmental differences in strategic behavior and underscore the central role of strategic regulation and contextual inferencing in adolescent EFL vocabulary development. Implications are discussed for theory-driven vocabulary instruction beyond mechanical memorization.

Subject Areas

Language Teaching

Keywords

Vocabulary Learning Strategies, Vocabulary Size, Chinese EFL Learners, Secondary Education

1. Introduction

1.1. Research Background

Vocabulary knowledge is widely acknowledged as a core dimension of second language proficiency and a strong predictor of overall communicative competence. For Chinese learners of English as a foreign language (EFL), vocabulary learning is especially challenging due to limited exposure to authentic input, an examination-oriented instructional culture, and the continued dominance of rote memorization practices [1] [2]. Although national curriculum standards advocate strategy use and communicative competence, empirical studies show that junior and senior high school students typically rely on mechanical repetition, word lists, and rote rehearsal; such methods frequently result in poor long-term retention and limited productive use of vocabulary [3] [4].

In recent decades, research on vocabulary learning strategies (VLS) has expanded, studies indicate appropriate cognitive, meta-cognitive, and social strategies promote deeper processing, enhance long-term retention, and improve lexical competence [5]. Nevertheless, large-scale empirical evidence remains scarce regarding how Chinese adolescent learners at different educational stages deploy vocabulary learning strategies and how such deployment relates to measurable lexical outcomes. Much of the existing work targets university samples or small classroom studies, leaving a gap in large-scale, comparative research that focuses on learners in the formative junior and senior high school years [6] [7].

Addressing these gaps, the present study investigates patterns of vocabulary learning strategy use among Chinese junior and senior high school EFL learners and examines how different strategy categories predict receptive vocabulary size. By adopting a comparative and regression-based approach, the study aims to shed light on the strategic mechanisms underlying vocabulary development during a critical stage of EFL learning.

1.2. Research Questions

This study examines the relationships among strategy use, instructional context, and vocabulary acquisition outcomes in Chinese junior and senior high schools. The research questions are:

RQ1: Which vocabulary learning strategies do Chinese junior and senior high school learners use most frequently?

RQ2: In what ways do VLS patterns differ between junior and senior high school learners?

RQ3: What is the relationship between learners' strategy use and their vocabu-

lary acquisition outcomes (with a focus on vocabulary size)?

RQ4: Which strategies best predict vocabulary learning success among Chinese adolescent EFL learners?

This investigation provides empirical evidence about how Chinese adolescents acquire vocabulary beyond rote memorization. By comparing junior and senior high school cohorts, it clarifies developmental differences in strategy use and identifies strategies most strongly associated with vocabulary growth. The findings contribute to vocabulary acquisition theory, offer implications for curriculum design, and supply practical guidance for teachers working to cultivate strategic, autonomous learners. Moreover, the study expands the limited large-scale research base on VLS among Chinese teenagers in exam-driven educational contexts.

2. Literature Review

2.1. Vocabulary Acquisition in SLA

Vocabulary acquisition occupies a central position in second language acquisition (SLA) research, as vocabulary knowledge strongly predicts overall language proficiency [8]. Vocabulary knowledge is commonly conceptualized as comprising two dimensions: breadth and depth, as the former refers to the number of words learners know and the latter refers to how well those words are known in terms of meaning, collocation, register, etc. [9]. Breadth reflects the size of a learner's lexicon, while depth reflects richness of representation and usage knowledge. Accumulating evidence suggests that both dimensions are critical for communicative competence and academic performance [8] [10].

SLA research distinguishes between incidental versus intentional vocabulary learning pathways as well. Krashen's Input Hypothesis posits that meaningful exposure to comprehensible language input is crucial for incidental acquisition, whereas intentional learning involves conscious study of vocabulary items [11]. Intentional learning often uses explicit strategy instruction, particularly in educational contexts such as junior and senior high schools where learners are expected to meet curriculum standards through deliberate practice. Empirical studies show that intentional strategies can enhance retention, especially when combined with context-rich encounters and meta-cognitive awareness [8] [10].

2.2. Vocabulary Learning Strategies (VLS): Definitions and Models

The term vocabulary learning strategies (VLS) refers to the specific actions or techniques that learners employ to acquire, retain, and use new words. Early models by Oxford (1990) categorize VLS into broad families such as memory, cognitive, meta-cognitive, and social-affective strategies [12]. Memory strategies include mnemonic devices and rehearsal; cognitive strategies involve analysis and manipulation of target words; meta-cognitive strategies involve planning, monitoring, and evaluating learners' vocabulary learning; and social-affective strategies include peer interaction and help-seeking. Oxford's classification has served as a foundational framework for subsequent research on learning strategies in SLA.

Building on taxonomy development, Schmitt (1998) proposed a two-dimensional VLS model organized into determination strategies which are used to encounter and guess new words and consolidation strategies which are used to practice and retain learned vocabulary [13]. Determination strategies include guessing word meaning from context, using dictionaries, and analyzing word parts; consolidation strategies include semantic mapping, reviewing, and activation through use. This framework remains influential in recent empirical studies, especially in examining strategy patterns among learners at different proficiency levels.

Recent research also emphasizes the role of self-regulated and meta-cognitive strategy use. Studies find that learners who engage in planning, self-monitoring, and strategic review show better vocabulary retention and transfer to productive skills than those who rely mainly on rote memorization [8] [14]. Validated instruments assessing VLS have been recently developed, confirming the multidimensional nature of strategy use and its impact on learning outcomes.

2.3. VLS and Learning Outcomes

Across contexts, the relationship between strategy use and outcomes has been a focal research theme. Interventions that train students explicitly in VLS, particularly meta-cognitive and deep processing strategies, produce greater vocabulary gains than traditional memorization alone [15] [16]. For example, controlled experimental studies show that learners trained in strategic planning, monitoring, and contextual guessing outperform peers on vocabulary tests and motivation metrics. These results support the view that VLS play a causal role in successful vocabulary acquisition rather than merely correlating with proficiency.

Meta-analytic evidence indicates that deep processing strategies (e.g., contextual elaboration, semantic mapping) yield more durable retention than shallow strategies such as rote repetition [10] [17]. This aligns with cognitive psychology research on levels of processing, which posits that meaningful engagement with word meaning and usage leads to stronger memory traces.

2.4. VLS Research in China

Although international SLA research has enriched theoretical understanding, China-specific investigations on VLS have expanded only recently. A notable study surveyed 418 high school learners in China and found a general weakness in metacognitive strategy use but broad reliance on simpler memorization techniques [18]. This suggests a potential mismatch between strategy complexity and learners' self-regulated capability.

A growing body of empirical research conducted in Chinese educational contexts further illustrates several emerging trends containing investigations into the relationship between strategy use and vocabulary breadth and depth; meta-cognitive strategy prevalence; and comparative analyses of junior versus senior secondary students. These studies collectively highlight contextual factors, such as curriculum demands, exam orientation, and resource access, as influential in shaping

strategy use patterns.

Despite the growing body of research on vocabulary learning strategies in the Chinese EFL context, several methodological limitations can be identified. First, at the sampling level, many studies rely on learners from a single school or a single grade, which limits the generalizability of findings and obscures potential developmental differences across educational stages. Systematic comparisons between junior and senior secondary learners remain relatively rare.

Second, at the analytical level, existing studies tend to emphasize descriptive statistics or bivariate correlations, offering valuable but limited insights into strategy use patterns. Fewer studies employ regression-based or model-oriented analyses to examine the relative contribution of different strategy categories to vocabulary learning outcomes.

Finally, at the theoretical level, while widely accepted strategy taxonomies are frequently adopted, less attention has been paid to distinguishing which types of strategies are most strongly associated with measurable vocabulary development in the Chinese exam-oriented context. As a result, the mechanisms through which strategy use translates into vocabulary gains remain under-explored.

These methodological gaps point to the need for large-scale, comparative research that integrates multiple strategy dimensions with objective vocabulary measures. The present study addresses this need by comparing junior and senior high school learners and by employing correlational and regression analyses to identify strategies that meaningfully predict vocabulary acquisition outcomes.

3. Methodology

3.1. Research Design

This study adopted a quantitative, cross-sectional research design to investigate the relationship between the use of VLS and vocabulary acquisition outcomes among Chinese junior and senior high school learners. A survey-based approach was employed, combining a vocabulary learning strategy questionnaire, a standardized vocabulary size test, and statistical modeling to examine group differences and predictive relationships.

Specifically, the study followed a comparative design, contrasting junior high school students from grade 7 to grade 9 with senior high school students from grade 10 to grade 12. This design enables a systematic examination of developmental differences in strategy use patterns and vocabulary outcomes across educational stages, an area that remains under-explored in the Chinese EFL context. Furthermore, multiple regression analysis was applied to explore the extent to which different categories of VLS predict learners' vocabulary size, beyond descriptive comparisons.

3.2. Participants

A total of approximately 900 students participated in the study. The sample consisted of 450 junior high school students and 450 senior high school students,

drawn from three typical public schools in eastern China. These schools follow the national English curriculum and represent mainstream EFL instructional settings.

Participants were selected through convenience sampling with administrative consent. Efforts were made to ensure gender balance and comparable learning backgrounds across groups. All participants had received formal English instruction for at least three years, and none reported extensive overseas study experience. The relatively homogeneous educational background helped control for extraneous variables related to curriculum exposure and instructional intensity.

3.3. Instruments

To examine learners' strategy use and its relation to vocabulary knowledge, two complementary instruments were employed. A self-report Vocabulary Learning Strategy Questionnaire captured the frequency and types of strategies learners used, while a standardized Vocabulary Size Test provided an objective estimate of receptive vocabulary knowledge. These tools allow the study to link reported strategy patterns with measurable vocabulary outcomes; such tools have been widely validated and frequently adopted in both international and China-based studies.

The Vocabulary Learning Strategy Questionnaire, which was adapted from Schmitt's (1998) vocabulary learning strategy taxonomy and Gu and Johnson's (1996) vocabulary strategy framework [19], consisted of five strategy dimensions, including memory strategies, cognitive strategies, meta-cognitive strategies, social strategies, and dictionary or inference strategies. Given the overlap between Schmitt's (1998) and Gu and Johnson's (1996) strategy taxonomies, the present study adopted a functional integration approach rather than a direct replication of either framework. Strategy categories were consolidated based on shared underlying processes rather than surface labels. Memory, cognitive, and meta-cognitive strategies correspond to rehearsal, processing, and regulatory functions common to both models. Social strategies reflect interaction-based learning behaviors recognized in both frameworks. Inferencing strategies represent a synthesis of Schmitt's determination strategies and Gu and Johnson's strategies for discovering word meaning, which both emphasize contextual and analytical inference during initial word encounters. Items of the questionnaire were rated on a five-point Likert scale ranging from 1 (the frequency of NEVER) to 5 (the frequency of ALWAYS), indicating the frequency of strategy use.

Learners' vocabulary knowledge was assessed using the Vocabulary Size Test (VST) developed by Nation and Beglar (2007) [20]. The VST is a widely used standardized instrument designed to estimate learners' receptive vocabulary size.

It should be noted that the present study focuses on receptive vocabulary size rather than vocabulary depth. Although depth of vocabulary knowledge is widely recognized as an important dimension of lexical competence, its reliable measurement in large-scale secondary school settings presents practical challenges, including test length, cognitive demands on younger learners, and constraints imposed by school schedules. Given these considerations, vocabulary size was adopted as

an initial and feasible indicator to examine the relationship between strategy use and vocabulary outcomes in this study.

Depending on school constraints, either the 100-item or 140-item version was administered. Each test item consists of a target word followed by four multiple-choice definitions. Based on learners' correct responses, the test generates an estimated vocabulary size score, representing the approximate number of word families known by the learner.

The internal consistency of the Vocabulary Learning Strategy Questionnaire was examined using Cronbach's alpha. The overall reliability coefficient reached an acceptable level ($\alpha > 0.80$), with all subscales demonstrating satisfactory internal consistency (α ranging from approximately 0.72 to 0.86). These results indicate that the instrument reliably captured learners' reported strategy use in the present sample.

In terms of construct validity, the questionnaire was grounded in well-established VLS frameworks proposed by Schmitt (1998) and Gu and Johnson (1996), which have been widely validated across EFL contexts, including studies involving Chinese learners. Given the primarily confirmatory orientation of the present study and its primary focus on examining relationships between strategy use and vocabulary outcomes, additional factor analysis was not conducted.

3.4. Data Collection and Analysis

Data collection was conducted in three stages. First, a pilot study was administered to a small group of students to check item clarity, test length, and internal consistency of the questionnaire. Minor revisions were made based on pilot feedback.

Second, the main data collection took place during regular class hours with permission from school administrators and English teachers. The entire session lasted approximately 50 minutes, including instructions, completion of the questionnaire, and administration of the vocabulary size test. All participants were informed that the study was for research purposes only and that their responses would remain anonymous.

Finally, completed questionnaires and test responses were coded and entered into statistical software. Data were screened for missing values and outliers before formal analysis.

Data analysis was conducted using SPSS 24.0 and Jamovi. Several analytical procedures were employed. Descriptive statistics were used to examine overall patterns of strategy use and vocabulary size across groups. Independent-samples t-tests were conducted to compare junior and senior high school students in terms of VLS use and vocabulary size. Pearson correlation analyses explored relationships between strategy categories and vocabulary size scores. Multiple regression analysis was used to determine the predictive power of different VLS dimensions on vocabulary size, controlling for educational level. Reliability analysis was performed using Cronbach's alpha to assess internal consistency of the questionnaire scales. These analytical procedures enabled both the group-level comparison and

the examination of strategy-outcome mechanisms.

4. Results

The following are the quantitative findings of the study. Results are organized into four sections: overall patterns of vocabulary learning strategy use, differences between junior and senior high school learners, relationships between strategy use and vocabulary size, and the results of multiple regression analyses examining predictors of vocabulary knowledge.

4.1. Overall Strategy Use Profiles

Descriptive statistics were calculated to examine the overall frequency of vocabulary learning strategy use among Chinese junior and senior high school learners. Strategy use was measured on a five-point Likert scale (1 = never, 5 = always). **Table 1** summarizes the mean scores and standard deviations for each strategy category.

Table 1. Descriptive statistics of VLS use (N = 900).

Strategy Category	Mean (M)	SD
Memory strategies	3.71	0.64
Cognitive strategies	3.28	0.61
Meta-cognitive strategies	3.12	0.67
Inferencing strategies	3.05	0.63
Social strategies	2.89	0.70

As shown in **Table 1**, memory strategies were the most frequently used strategy category among participants, indicating a strong reliance on repetition, word lists, and rote memorization techniques. In contrast, meta-cognitive strategies and inferencing strategies were used less frequently, suggesting limited engagement in planning, monitoring, and contextual guessing during vocabulary learning.

This pattern was observed across both junior and senior high school groups, although differences emerged when the two groups were analyzed separately.

4.2. Group Differences between Junior and Senior High School Groups

Independent-samples *t* tests were conducted to examine differences in strategy use between junior high school learners (grade 7 to grade 9, *n* = 450) and senior high school learners (grade 10 to grade 12, *n* = 450). **Table 2** presents the comparison results.

The results indicate statistically significant differences between junior and senior high school groups in cognitive, meta-cognitive, and inferencing strategies. Senior high school students reported significantly higher use of these strategies (*p* < 0.001). In contrast, no significant differences were found in memory strategies

($p > 0.05$), suggesting that reliance on rote memorization remains stable across educational stages.

4.3. Correlations between VLS and Vocabulary Size

Pearson correlation analyses were conducted to examine relationships between strategy use and vocabulary size, as measured by the Vocabulary Size Test. **Table 3** reports the correlation coefficients.

Table 2. Independent-samples t tests for strategy use by school level.

Strategy Category	Junior High M (SD)	Senior High M (SD)	t	p
Memory strategies	3.68 (0.66)	3.74 (0.62)	1.12	0.263
Cognitive strategies	3.15 (0.59)	3.41 (0.60)	4.78	<0.001
Meta-cognitive strategies	2.89 (0.65)	3.35 (0.64)	7.12	<0.001
Inferencing strategies	2.87 (0.61)	3.23 (0.62)	6.08	<0.001
Social strategies	2.84 (0.71)	2.94 (0.68)	1.54	0.125

Table 3. Correlations between strategy use and vocabulary size.

Strategy Category	r
Memory strategies	0.05
Cognitive strategies	0.28
Meta-cognitive strategies	0.41
Inferencing strategies	0.35
Social strategies	0.12

Note. $p < 0.01$.

The results show that vocabulary size was moderately correlated with meta-cognitive strategies ($r = 0.41$, $p < 0.01$) and inferencing strategies ($r = 0.35$, $p < 0.01$). Cognitive strategies also demonstrated a positive but weaker correlation. In contrast, memory strategies showed a negligible and non-significant correlation with vocabulary size, indicating that frequent use of rote memorization alone was not associated with larger vocabulary knowledge.

4.4. Multiple Regression Analysis

To identify which strategy categories significantly predicted vocabulary size, a multiple regression analysis was conducted with vocabulary size as the dependent variable and the five strategy categories as independent variables. Prior to analysis, assumptions of normality, multicollinearity, and homoscedasticity were checked and met. (See **Table 4**)

The overall regression model was statistically significant, $F(5, 896) = 72.18$, $p < 0.001$, explaining approximately 38% of the variance in vocabulary size (R^2

= .38). Meta-cognitive strategies emerged as the strongest predictor ($\beta = 0.42$, $p < 0.001$), followed by inferencing strategies ($\beta = 0.31$, $p < 0.01$). Memory strategies did not significantly predict vocabulary size.

Table 4. Multiple regression predicting vocabulary size.

Strategy Category	β	t	p
Memory strategies	0.04	0.89	0.374
Cognitive strategies	0.18	3.42	0.001
Meta-cognitive strategies	0.42	7.86	0.001
Inferencing strategies	0.31	5.74	<0.01
Social strategies	0.07	1.41	0.159

5. Discussion

5.1. Interpretation of Findings

The findings of this study indicate that senior high school learners demonstrate significantly higher use of meta-cognitive and inferencing strategies than junior high learners, and that these strategies are the strongest predictors of vocabulary size. This pattern can be interpreted through the lens of cognitive development and self-regulated learning theory. As learners progress through secondary education, they gradually acquire greater capacity for planning, monitoring, and evaluating their learning processes, which enables more strategic engagement with vocabulary learning tasks.

Importantly, the results suggest that heavy reliance on mechanical memorization, although still widely used at both educational stages, does not contribute meaningfully to long-term vocabulary development. While rote repetition may facilitate short-term recall, it appears insufficient for supporting durable retention or flexible use of lexical items. This pattern of strategy use may be partly shaped by the exam-oriented instructional context described in the Introduction, where vocabulary learning is often assessed through discrete-item tests emphasizing form recognition and short-term recall. In contrast, strategies involving inferencing, contextual analysis, and meta-cognitive regulation promote deeper lexical processing, leading to more robust vocabulary knowledge. It is important to clarify that the category of memory strategies examined in the present study primarily reflects surface-level rehearsal practices, such as repeated reading of word lists, mechanical repetition, and form-focused memorization, which were the most frequently endorsed items in the questionnaire. Although memory strategies as a broader construct may also include elaborative techniques (e.g., keyword methods or imagery-based associations), such strategies were reported far less frequently by participants.

Consequently, the absence of a significant association between memory strategies and vocabulary size in the present study should not be taken as a rejection of memory-based approaches in general. Rather, it reflects the limited effectiveness

of predominantly shallow rehearsal strategies, such as rote repetition, when they are not integrated with deeper elaborative processing. This interpretation allows the findings to be aligned with previous research showing that memory strategies can facilitate vocabulary development when they involve meaningful associations, imagery, or form–meaning integration, and when they are embedded within broader self-regulated learning processes. These findings support the argument that vocabulary acquisition is not merely a matter of exposure or repetition, but rather the outcome of strategically regulated cognitive activity.

5.2. Comparison with Previous Studies

The present results are consistent with a substantial body of international research demonstrating the superiority of deep processing and meta-cognitive strategies over surface-level memorization. Studies similarly found that learners who actively monitor their vocabulary learning and engage in contextual and semantic processing achieve greater vocabulary gains [19] [21]. More empirical and meta-analytic studies have further confirmed that explicit strategy instruction, particularly in meta-cognitive planning and inferencing, produces significant improvements in vocabulary achievement [15].

What this study adds to the existing literature is empirical evidence from the Chinese junior and senior high school context, a population that has received comparatively limited attention in prior research. Most strategy-outcome studies have focused on university learners, assuming that strategic competence emerges naturally at later stages. By demonstrating systematic differences between junior and senior high school learners, the present study highlights the developmental trajectory of vocabulary learning strategies and underscores the importance of early strategy cultivation within compulsory education.

5.3. Pedagogical Implications: From Memorization to Structured Use

The pedagogical implications of these findings are particularly relevant in examination-oriented educational contexts. The results suggest that vocabulary instruction should move beyond traditional list-based memorization and instead adopt a structured, strategy-driven approach aligned with both learners' cognitive characteristics and assessment demands.

From a pedagogical perspective, effective vocabulary instruction should be systematically aligned with examination task demands while remaining learner-centered. Rather than treating vocabulary as isolated items to be memorized, instruction should guide students through a structured sequence: spelling, pronunciation, part of speech, core meaning, rapid imagery-based encoding, and contextualized use. This progression supports both cognitive processing and exam performance by linking form, meaning, and use in an integrated manner.

Furthermore, the use of carefully selected example sentences and authentic test items enables the construction of a vocabulary learning system that is contextual-

ized, structured, and functional. Adhering to the principle that “words should not be separated from sentences, and sentences should not be separated from discourse,” vocabulary learning becomes embedded in real communicative and grammatical contexts. When lexical items are consistently tied to exam questions, everyday scenarios, and grammatical structures, learners are more likely to transfer vocabulary knowledge from receptive recognition to productive use.

This instructional orientation aligns closely with the present findings that inferencing and meta-cognitive strategies significantly predict vocabulary outcomes. Only when memory-based practices are embedded within inferencing, contextualized use, and meta-cognitive regulation can vocabulary knowledge move from short-term memorization to long-term retention and functional command. In this sense, the ability to use vocabulary becomes the key condition for truly remembering it, facilitating a shift from exam-oriented score gains to sustainable language competence.

From a strategy-theoretical perspective, the instructional practices described above can be understood as an operationalization of established VLS categories rather than isolated classroom techniques. Activities focusing on spelling, pronunciation, and word analysis correspond to cognitive strategies, while techniques such as imagery and form–meaning association reflect memory strategies with elaborative processing. More importantly, guiding learners to plan, monitor, and revise their vocabulary use in contextualized output tasks constitutes the deployment of meta-cognitive strategies.

Crucially, this structured output-oriented approach does not rely on a single strategy type but represents a form of strategy orchestration, in which multiple strategies are deliberately combined and sequenced. This integrative mechanism provides a plausible explanation for the present findings that meta-cognitive and inferencing strategies emerged as the strongest predictors of vocabulary size, as these strategies regulate and activate other strategy types in meaningful use contexts.

5.4. Implications for Junior and Senior High Instruction

The results also suggest the need for differentiated instructional focus across educational stages. At the junior high level, instruction should prioritize the development of basic strategy awareness and stable learning habits. Introducing simple planning routines, contextual guessing, and guided reflection can help learners form an early foundation for strategic vocabulary learning.

At the senior high level, instruction should place greater emphasis on deep processing, critical inferencing, and autonomous regulation of vocabulary learning. Given the increased cognitive maturity of senior high students and the complexity of assessment tasks, fostering advanced metacognitive control and contextual analysis becomes essential for achieving both exam success and communicative competence.

5.5. Limitations and Directions for Future Research

It should be noted that the cross-sectional design of the present study limits causal

interpretation of the observed relationships. While the findings indicate strong associations between meta-cognitive and inferencing strategies and vocabulary size, they do not establish the direction of causality. It is plausible that the relationship is bidirectional: learners with larger vocabularies may be better equipped to employ more advanced and self-regulated strategies, just as strategic engagement may facilitate vocabulary growth. Therefore, the present results should be interpreted as evidence of robust strategy-outcome associations rather than definitive causal effects.

From a theoretical perspective, vocabulary depth has been consistently highlighted as a crucial component of lexical competence, reflecting learners' ability to access, manipulate, and use word knowledge flexibly. However, in large-scale studies involving secondary school learners, the reliable assessment of vocabulary depth remains methodologically challenging. Depth measures typically require longer testing time, higher metalinguistic awareness, and more complex response formats, which may compromise data quality under school-based constraints.

In this context, the present study adopts vocabulary size as a pragmatic and theoretically justified indicator of learners' lexical development. Previous research has demonstrated that vocabulary size is strongly associated with overall language proficiency and provides a stable foundation for subsequent depth development. Focusing on the strategy-size relationship can therefore be viewed as a necessary first-step model, particularly for adolescent learners in exam-driven educational settings.

Future research is encouraged to build on this foundation by integrating multiple dimensions of lexical knowledge, including vocabulary depth, productive vocabulary measures, and task-based assessments, in order to capture a more comprehensive picture of how vocabulary learning strategies support lexical development across stages.

Conflicts of Interest

The authors declare no conflicts of interest.

References

- [1] Gu, P.Y. (2003) Vocabulary Learning in a Second Language: Person, Task, Context and Strategies. *Teaching English as a Second or Foreign Language*, 7, 1-25.
- [2] Li, X. and Cutting, J. (2011) Rote Learning in Chinese Culture: Reflecting Active Confucian-Based Memory Strategies. In: Jin, L. and Cortazzi, M., Eds., *Researching Chinese Learners: Skills, Perceptions and Intercultural Adaptations*, Palgrave Macmillan UK, 21-42. https://doi.org/10.1057/9780230299481_2
- [3] Fan, M.Y. (2003) Frequency of Use, Perceived Usefulness, and Actual Usefulness of Second Language Vocabulary Strategies: A Study of Hong Kong SAR Learners. *The Modern Language Journal*, 87, 222-241. <https://doi.org/10.1111/1540-4781.00187>
- [4] Guo, M. and Gan, X. (2024) A Survey of English Vocabulary Learning Strategies in Chinese Senior High Schools: Evidence from 418 Learners. *Frontiers in Educational Research*, 7, 128-136. <https://doi.org/10.25236/FER.2024.070521>
- [5] Schmitt, N. (2010) *Researching Vocabulary: A Vocabulary Research Manual*. Pal-

grave Macmillan.

- [6] Gao, X., Liu, H. and Zhu, F. (2013) English Vocabulary Learning Strategy Use in a Chinese Key Middle School. *Chinese Journal of Applied Linguistics*, **36**, 87-106. <https://doi.org/10.1515/cjal-2013-0006>
- [7] Fu, S.J. (2021) Chinese EFL University Students' Use of Vocabulary Learning Strategies. *International Journal of Language and Linguistics*, **9**, 279-289. <https://doi.org/10.11648/j.ijll.20210906.12>
- [8] Sun, D., Chen, Z. and Zhu, S. (2023) What Affects Second Language Vocabulary Learning? Evidence from Multivariate Analysis. *Frontiers in Education*, **8**, Article 1210640. <https://doi.org/10.3389/educ.2023.1210640>
- [9] Nation, I.S.P. (2001) Learning Vocabulary in Another Language. Cambridge University Press, 126-132. <https://doi.org/10.1017/cbo9781139524759>
- [10] Teng, M.F., Mizumoto, A. and Takeuchi, O. (2024) Understanding Growth Mindset, Self-Regulated Vocabulary Learning, and Vocabulary Knowledge. *System*, **122**, Article ID: 103255. <https://doi.org/10.1016/j.system.2024.103255>
- [11] Krashen, S.D. (1992) The Input Hypothesis: An Update. In: Alatis, J.E., Ed., *Linguistics and Language Pedagogy: The State of the Art*, Georgetown University Press, 409-431.
- [12] Ghufuron, M.A. (2017) Language Learning Strategies Used by EFL Fluent Speakers: A Case in Indonesian Context. *IJET (Indonesian Journal of English Teaching)*, **6**, 184-202. <https://doi.org/10.15642/ijet2.2017.6.2.184-202>
- [13] Schmitt, N. (1998) Vocabulary Learning Strategies. In: Schmitt, N. and McCarthy, M. (Eds.), *Vocabulary: Description, Acquisition and Pedagogy*. Cambridge University Press, 199-277.
- [14] Chou, M. (2022) Validating the Vocabulary Learning Strategies Used by English as a Foreign Language University Students in Taiwan Region. *RELJ Journal*, **55**, 128-143. <https://doi.org/10.1177/00336882221074105>
- [15] Ayana, H., Mereba, T. and Alemu, A. (2024) Effect of Vocabulary Learning Strategies on Students' Vocabulary Knowledge Achievement and Motivation: The Case of Grade 11 High School Students. *Frontiers in Education*, **9**, Article 1399350. <https://doi.org/10.3389/educ.2024.1399350>
- [16] Al-Khasawneh, F.M. and AlHawamdeh, N.M.A. (2023) The Potential of Semantic Mapping Strategy to Enhance Vocabulary Learning. *Journal of Southwest Jiaotong University*, **58**, 924-934.
- [17] Ng Li Wen, W. and Muhammad Naim, R. (2023) Vocabulary Learning Strategies (VLS) in Second Language Acquisition (SLA): A Review of Literature. *International Journal of Language, Literacy and Translation*, **6**, 223-241. <https://doi.org/10.36777/ijollt2023.6.2.087>
- [18] Guo, M.Q. and Gan, X.L. (2024) A Survey of English Vocabulary Learning Strategies in Chinese Senior High Schools. *Frontiers in Educational Research*, **7**, 128-136.
- [19] Gu, Y. and Johnson, R.K. (1996) Vocabulary Learning Strategies and Language Learning Outcomes. *Language Learning*, **46**, 643-679. <https://doi.org/10.1111/j.1467-1770.1996.tb01355.x>
- [20] Nation, P. and Beglar, D. (2007) A Vocabulary Size Test. *The Language Teacher*, **31**, 9-12.
- [21] Mizumoto, A. (2013) Effects of Self-Regulated Vocabulary Learning Process on Self-Efficacy. *Innovation in Language Learning and Teaching*, **7**, 253-265. <https://doi.org/10.1080/17501229.2013.836206>