
| RESEARCH ARTICLE

The Effect of Vocabulary Learning Strategies on Vocabulary Learning Among Saudi EFL Female Students

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| ABSTRACT

This study investigated the vocabulary learning strategies (VLS) used by Saudi female EFL undergraduate students and their relationship to vocabulary size. A quantitative correlational design was employed with 112 participants from Al-Imam Muhammad Ibn Saud Islamic University. Data were collected using a 40-item VLS questionnaire ($\alpha = 0.78$) and a 90-item Vocabulary Levels Test ($\alpha = 0.95$). Descriptive statistics, independent-samples t-tests, and Pearson correlations were used to examine strategy-use patterns, group differences, and associations with vocabulary size. Results showed overall VLS use at a medium level ($M = 3.16$, $SD = 0.45$), with determination strategies most frequent ($M = 3.56$) and social strategies least frequent ($M = 2.52$). Deep-processing memory strategies—mental imagery ($r = .332$, $p < .001$), personal association ($r = .205$, $p = .030$), and sentence generation ($r = .339$, $p < .001$)—correlated positively with vocabulary size, while bilingual dictionary use showed negative correlations ($r = -.284$ and $-.252$, $p < .01$). Memory strategies were significantly more common among high-vocabulary learners ($M = 54.72$) than low-vocabulary learners ($M = 49.64$, $t = 2.22$, $p = .030$). These findings support the Depth of Processing framework and highlight the pedagogical value of cognitively engaging strategies over surface-level, L1-dependent approaches. The study contributes new evidence from a larger Saudi sample than previous research, guiding curriculum development toward strategic, autonomous vocabulary instruction.

| KEYWORDS

Deep-Processing Strategies; EFL; Saudi Female Learners; Vocabulary Learning Strategies; Vocabulary Size

| ARTICLE INFORMATION

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1. Introduction

The acquisition of vocabulary was an essential part of second-language/foreign-language learning activities and extremely important for communication and language development in general. Second-language (L2) acquisition has shown that vocabulary knowledge is a reliable predictor of L2 achievement: large L2 lexical size invariably correlates with high L2 reading comprehension, high communicative competence, and good academic achievement. To achieve fluency in a second language (L2), learners must know at least 80% of the words they encounter while reading. This knowledge allows them to accurately approximate the meaning of unknown words they come across (Gao, 2025; Sun et al., 2023). Despite the ongoing instruction in English, EFL learners in Saudi Arabia demonstrate a low overall level of proficiency in vocabulary usage. Lexical errors tend to be more prevalent than grammatical mistakes, and students who have spent six years studying English in secondary school may discover significant gaps in their vocabulary when they transition to university studies (Marjana Šifrar et al., 2025). Language skills alone do not ensure effective communication; there is a need for a structured approach to knowledge development in EFL classroom instruction.

A viable direction for improving predictions on how to improve vocabulary acquisition was to use the Vocabulary Learning Strategy (VLS), which includes the strategies used by learners when acquiring, recalling, and consolidating words. Students who used a wide range of strategies scored higher on their vocabulary than students who used a narrow range of strategies or shallow learning (Ayana et al., 2024; Jaikrishnan & Ismail, 2021). Typical strategies were: memorizing, using a dictionary, making guesses, making semantic associations, and interacting with peers/teachers. Research indicates that students prefer simpler modes of acquisition, like memorization or using bilingual dictionaries, which are useful for acquisition in the short term but are inadequate for long-term memory (Chibomba, 2026). The depth of processing theory (Craik & Lockhart, 1972) accounted for the observation that deeper-level semantic analyses (mental imagery, personal connections, and the creation of sentences) led to better and more accessible lexical memory than shallower ones.

One of the heralded differences in the vocabulary acquisition literature was that between incidental vocabulary learning and intentional learning. Activities that dealt with meaning (reading or listening comprehension) were also associated with incidental learning. In contrast, those that focused on lexical learning were purposive, form-focused, and resulted in intentional learning. Classroom settings, where instructional time was limited, became more significant, while intentional strategies in both forms were valued as important approaches to learning (Nie et al., 2022; Wei & Hu, 2025). It is unlikely that the amount of incidental exposure to words would lead to the acquisition of the depth and breadth of vocabulary students need for academic and communicative success. Learners, therefore, require strategies and tools that enable them to engage in purposeful deep processing to enhance their vocabulary acquisition within the limited contexts of instruction (Alsahafi, 2023; Nik Anuar & Abdul Aziz, 2024).

The Saudi EFL environment presents challenges, such as teacher-centered instruction, limited peer interaction, and reliance on L1 tools. However, it offers opportunities through reading, media exposure, and potential interactive, strategy-based curriculum reforms that enhance vocabulary learning (Alfares, 2024). In the Saudi classroom, the focus was on teaching the four macro-skills while vocabulary teaching was more incidental and teacher-directed. There was often a lack of guidance in texts, such as suggesting meanings from words, and little learning autonomy in accessing and extending vocabulary (Al-Seghayer, 2021). This setting may have hindered social and interactive approaches to learning and discussion with peers, such as "negotiation", as well as consulting with a teacher. This environment may have inadvertently reinforced reliance on surface-level strategies, such as rote memorization and the use of bilingual dictionaries, rather than promoting deeper, cognitively engaging strategies like mental imagery, semantic association, or sentence generation. Moreover, the context and cultural factors, such as less exposure to real English outside the classroom, influenced learners' strategy preferences and the effectiveness of their strategies (Köseoğlu et al., 2023). This set of considerations pointed to the need to look not only at what strategies were employed but also at the linkage between the choice of strategy and measurable vocabulary gains in this group.

Although many research strategies for global EFL have been studied, limited research exists on Saudi university students, especially females. Previous research has mainly focused on the frequency of the use of determination strategies (such as context clues and working with the dictionary) and also explored the lack of use of deep memory strategies (Al-Ahmadi, 2024; N Dahmash, 2023). However, there are relatively few studies that have studied how various VLS types aided in overall vocabulary development in a systematic manner (AbdAlgane & Elmahdi, 2025; Al-Ahmadi, 2024). Therefore, knowing these relationships was crucial for creating pedagogical interventions that facilitated vocabulary acquisition in an autonomous, effective, and strategy-driven manner. The aim was to identify strategies associated with improved vocabulary outcomes to guide curriculum design and targeted instruction for enhancing students' vocabulary skills.

Therefore, the aim was to examine VLS by Saudi female college students in EFL and the relationship between the use of VLS and their vocabulary size in the EFL context. The study integrated Schmitt's taxonomy of VLS and the Depth of Processing framework with empirical data from applied linguistics research to provide evidence-based guidance for effective vocabulary acquisition. The results contribute to vocabulary acquisition literature by highlighting gaps in strategy use among Saudi female EFL learners and provide pedagogical guidance to enhance autonomous, cognitively engaged vocabulary learning.

1.2 Research Questions

- To what extent do Saudi EFL female undergraduate students employ VLS? Are they high, medium, or low-strategy users?
- Which strategy categories and individual strategies are most and least frequently used among these learners?
- Are there significant differences in VLS use between students with high and low vocabulary size?
- Do VLS significantly contribute to students' vocabulary size?

2. Theoretical Framework

This research was based on the VLS taxonomy proposed by Schmitt (1997) and the Depth of Processing Theory (Craik & Lockhart, 1972; Schmitt, 1997). The general theoretical framework was language learning strategies (LLS), which include cognitive, metacognitive, social, and affective perspectives that promote L2 learning and acquisition. Inferencing, memorization, and monitoring one's learning were among the cognitive strategies, and metacognitive strategies were planning, self-regulating one's work, and reflecting and revisiting material for effectiveness in research tasks. Social and affective strategies contributed to learning by interacting and collaborating with peers, and self-regulation (Lin et al., 2021; Pawlak et al., 2026). As part of the larger LLS construct, two types of strategies, namely ones dedicated to acquiring words and others dedicated to remembering and using words, were adapted into VLS, including discovery strategies and consolidation strategies.

Discovery strategies were determined strategies and social strategies, which were found to be contextual guessing, dictionary consultation, and asking for help from the knowledgeable teacher and peers. Memory strategies included imagery, association; memory cognitive strategies included repetition, note taking; memory metacognitive strategies included self-monitoring, review scheduling (Tamirat & Tekle, 2026). The relative effectiveness of these strategies was explained critically using the Depth of Processing Theory. This theory states that the depth of cognitive processing in the initial encoding of information would affect the durability of memory traces.

Theoretically, VLS that facilitated deeper treatment of catch, like mental imagery, personal association, and sentence generation, were expected to generate a stronger and more well-formed representation of the words than mere surface strategies such as rote memorization or using bilingual dictionaries. Based on this, it was hypothesized that the deep-processing memory strategies would yield the highest correlation with learners' vocabulary size in this research. The conceptualizations used in the research were theoretical explanations concerning the integration of Schmitt's taxonomy and the Depth of Processing framework into the research design and the results' interpretations of the effect of the use of the strategies on English vocabulary learning by Saudi female EFL learners (Schmitt, 1997).

3. Literature Review

Empirical research on VLS affirms their critical importance in EFL contexts, demonstrating that strategy choice significantly impacts vocabulary acquisition outcomes (Fahad Aljurbua, 2021; Ng Li Wen & Rosli, 2023; Nouf, 2025; Schmitt, 1997). The research demonstrated the positive relationship between metacognitive strategies and vocabulary learning in the context of East Asian languages and situations. At the same time, bilingual dictionaries served hardly in the context of contextualized situations. How learners try to learn Japanese has been reported by various researchers (Ng Li Wen & Rosli, 2023; Nouf, 2025). Schmitt (1997), for example, discovered that while dictionary and repetition strategies were mainly used, deep-processing strategies like imagery and semantic grouping were not well employed by the Japanese learners. The Saudi male students preferred context-based learning strategies and disliked rote learning, the pathways of visual repetition and self-learning showing significant contributions in terms of vocabulary learning gains. The same quasi-experimental studies revealed that when explicit VLS training was applied to Palestinian students. It promoted their vocabulary achievement, and also that Jordanian students tended to use a combination of determination strategies, and a few of them combined them with metacognitive strategies (Fahad Aljurbua, 2021; Suliman, 2021).

One finding that was consistent across these studies was the absence of deep processing strategies, such as mental imagery, semantic association, and communicative use. These strategies were found to improve retention and retrieval, but were not used and were overlooked in favor of surface approaches. Factors such as structural and socio-cultural conditions added to this tendency in Saudi classrooms. The classroom-based, teacher-centered English lessons, low peer communication, and few authentic English examples outside class hindered students' use of social strategies and autonomous vocabulary learning (Rea et al., 2022). Learner characteristics such as learner attitudes towards language learning, age, gender, and motivation were also found to impact the strategies adopted (Alqarni, 2023). More motivated learners and women learners tended to be more strategic, using a more diversified repertoire of VLS, while less motivated or younger learners resorted to shallow approaches. Previous studies observed the use of determination strategies, but few studies addressed the relationship between types of strategies and measured vocabulary size in this population (Alqarni, 2023; Rabab'ah et al., 2022). Incidental and intentional strategies complement each other, with intentional strategies providing structured learning and incidental strategies reinforcing vocabulary through exposure and repeated encounters. However, classroom limitations required strategies that were deliberate and focused on form that were cognitively engaging to students and had the potential for long-term retention to occur (Bobkina et al., 2025). This work complements the existing knowledge in EFL research since it systematically analyzed both strategy use patterns and their predictive relationship with vocabulary size, filling a significant gap in the EFL field and providing pedagogically relevant information to the context.

Notably, findings regarding the direction of the VLS–vocabulary size relationship have not been uniform across the Saudi context. Alahmad (2020) investigated VLS use and its relation to vocabulary size among Saudi female undergraduate EFL learners at a single Saudi university, drawing on a sample of 41 students in their final year of study. Contrary to the predominant pattern reported across the broader literature, that study reported a negative overall relationship between VLS use and vocabulary size, a finding that stands in contrast to the positive associations typically documented for deep-processing strategies (Alahmadi et al., 2018; Alnan & Abd Halim, 2024). This discrepancy may be attributable to differences in sample size and composition, as Alahmad's (2020) sample was restricted to a single cohort at one academic stage, which limits the statistical power available to detect strategy-specific effects and may obscure the differential contributions of individual strategy types. It is also possible that the instrument used organized strategies by stage of the vocabulary learning process rather than by cognitive depth, thereby conflating strategies of differing processing depth within single composite scores. The present research addresses this gap by drawing on a considerably larger and more academically diverse sample ($N = 112$) spanning three academic levels, and by anchoring its analysis in the Depth of Processing framework (Craik & Lockhart, 1972) to distinguish explicitly between deep-processing and surface-level strategies. As detailed in the Results and Discussion sections, this approach yielded a more differentiated pattern: positive correlations for deep-processing memory strategies and negative correlations for reliance on bilingual dictionaries, rather than a uniform negative relationship. This suggests that the direction of the VLS–vocabulary size relationship may depend heavily on how strategies are categorized and analyzed, underscoring the value of a theory-driven, strategy-specific approach such as the one adopted in the current study.

4. Conceptual Framework and Hypotheses

In this research, the conceptual framework assumed that the VLS were IVs that affected the size of the learner's vocabulary for Saudi female undergraduate learners. Determination strategies, Social strategies, Memory strategies, Cognitive strategies, and Metacognitive strategies were part of VLS; each played with different degrees in the development of vocabulary. In accordance with the Depth of Processing Theory, a large effect size was expected for deep-processing memory strategies (mental imagery, semantic association, sentence generation) for providing the highest levels of cognitive engagement (Fahad Aljurbua, 2021; Suliman, 2021). Strategies were effective depending on learner and contextual variables, e.g., motivation, environment, and norms. The effects of deep processing strategies were found to be better with higher levels of motivational factors and also with interactive courses (Navío et al., 2023).

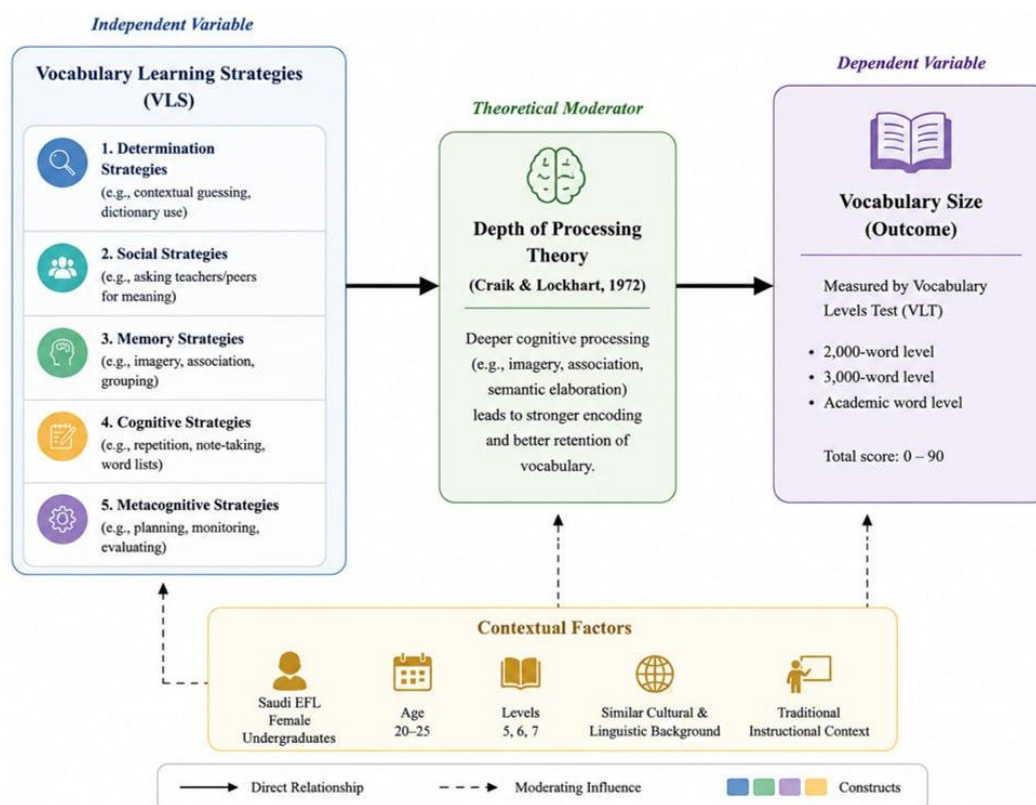


Figure 1: Conceptual Framework (Source: Author)

In contrast, conventional teacher-centered courses did not provide as many social strategies as desired. Included questionnaires, vocabulary tests, and the evaluation of the relationship between semantic improvement across decreasing and increasing word knowledge and strategy use, which constituted a holistic framework for the analysis and planning of interventions for word knowledge.

Based on the theoretical and conceptual frameworks, the research posits the following hypotheses:

- H1: Saudi EFL female learners vary in vocabulary strategies, using determination strategies most and social strategies least.
- H2: Learners with higher vocabulary size use deep-processing strategies, like mental imagery, personal association, and sentence generation, more often than those with lower vocabulary size.
- H3: Deep-processing memory strategies boost vocabulary, but overusing bilingual dictionaries hinders it.
- H4: Learner motivation, pedagogy, and socio-cultural context influence how VLS use affects vocabulary outcomes, impacting strategy effectiveness.

5. Methodology

5.1 Research Design

The present research used a quantitative correlational design to examine the relationship between the use of the VLS and the size of the Saudi female EFL learners' vocabulary. The independent variable (IV) was the use of the VLS, measured using a structured questionnaire, and the dependent variable was vocabulary size, measured using the Vocabulary Levels Test (VLT) (Alsharif, 2022; Suliman, 2021). This research design allowed the general strategy patterns to be examined as well as statistically analyzed against measurable vocabulary outcomes.

5.2 Population and Sample

Participants were drawn from a population of female undergraduates enrolled in the Department of English Language and Translation at Al-Imam Muhammad Ibn Saud Islamic University. A total of 112 students, aged 20 to 25, took part in the study, representing three academic levels: Level 5 ($n = 29$), Level 6 ($n = 61$), and Level 7 ($n = 22$). All participants shared a broadly similar linguistic, cultural, and geographical background, having studied English as a compulsory foreign language from the primary stage onward. To enable subgroup comparisons of strategy use, students scoring in the top quartile of the VLT ($\geq 75/90$) were classified as the high-vocabulary-size group ($n = 33$), while those in the bottom quintile ($\leq 45/90$) formed the low-vocabulary-size group ($n = 39$).

5.3 Data Collection Instrument

5.3.1 Vocabulary Learning Strategies (VLS) Questionnaire

Data on learners' strategy use were collected using a 40-item VLS questionnaire adapted from established taxonomies. The questionnaire included five categories: determination (7 items), social (5 items), memory (16 items), cognitive (7 items), and metacognitive (5 items). Responses were recorded on a 5-point Likert scale ranging from "never" (1) to "always" (5). To capture additional strategies and learner challenges, two open-ended questions were also included. This instrument allowed a detailed assessment of which strategies learners employ and their frequency.

5.3.2 Vocabulary Levels Test (VLT)

Learners' vocabulary size was measured using a researcher-adapted VLT consisting of 90 target words across three frequency levels: 2,000-word, 3,000-word, and academic words. Each level contained 10 sections of six words, with three target words and three distractors. Each correct match was awarded 1 point, for a maximum score of 90. The VLT enabled correlation of vocabulary breadth with strategy use, providing insights into which strategies are most effective in supporting lexical development.

5.4 Validity and Reliability

The instrument had been initialized for its content validity by three PhD professors of Applied Linguistics, relevance to content, cultural relevance, and alignment with theory constructs. There had been some changes, such as the inclusion of an English-Arabic dictionary entry and a change of Japanese items to Arabic equivalents. Reliability had been validated in a pilot study conducted with 30 EFL female students from King Saud University; their Cronbach's alpha coefficients were 0.78 for the VLS questionnaire and 0.95 for the VLT, respectively, indicating satisfactory internal consistency for both questionnaires (see Table 1).

Table 1: Reliability of Data Collection Instruments

Instrument	Items	Strategy Categories / Levels	Alpha (α)	Notes
VLS Questionnaire	40	Determination (7), Social (5), Memory (16), Cognitive (7), Metacognitive (5)	0.78	Modified for cultural appropriateness; included two open-ended items
Vocabulary Levels Test (VLT)	90	2,000-word, 3,000-word, Academic word levels	0.95	Researcher-adapted version of Schmitt (2001); high reliability in pilot research

5.5 Data Analysis

The SPSS version 18.0 software was used to analyze the data. The average and standard deviation (SD) values were computed as descriptive statistics for overall and category-level strategy use. Pearson correlation coefficients were calculated for each strategy to assess its relationship with word count. An independent-samples t-test was used to compare differences between the high and low vocabulary size groups on strategy category and by individual item at the $p < 0.05$ significance level.

6. Results

6.1 Descriptive Statistics

6.1.1 Research Question 1: Overall Strategy Use

Overall strategy use was in the medium range ($M = 3.16$, $SD = 0.45$), indicating that participants employed VLS with moderate frequency, as summarized in Table 2. Students were classified as medium users of the strategy. This finding suggests limited awareness of the full repertoire of available VLS and/or insufficient strategic repertoire, consistent with findings from other Arab EFL contexts.

Table 2: Overall Vocabulary Strategy Use

Statistic	Value
N	112
Mean	3.16
Standard Deviation	0.45
Minimum	2.10
Maximum	4.40
Classification	Medium Strategy User

6.1.2 Research Question 2: Most and Least Frequently Used Strategies

At the category level, determination strategies were used most frequently ($M = 3.56$; classified as high use), followed by metacognitive ($M = 3.32$), memory ($M = 3.22$), and cognitive strategies ($M = 2.97$). Social strategies were employed least frequently ($M = 2.52$), as shown in Table 3.

Table 3: Frequency of Strategy Category Use (N = 112)

Strategy Category	M	SD	Classification	Rank
Determination	3.56	0.47	High	1
Metacognitive	3.32	0.53	Medium	2
Memory	3.22	0.61	Medium	3
Cognitive	2.97	0.71	Medium	4
Social	2.52	0.67	Medium	5

The most frequently used individual strategy was "pay attention to English words when someone is speaking English" ($M = 4.37$), followed by "guess meaning from context" ($M = 4.14$) and "take notes in class" ($M = 4.07$). The least frequently used strategy was "use flashcards to record new words" ($M = 1.91$), followed by "put English labels on physical objects" ($M = 2.10$).

6.2 T-test Analysis

6.2.1 Research Question 3: Differences Between High and Low Vocabulary-Size Groups

T-test analyses revealed a statistically significant difference between high- and low-vocabulary-size groups for memory strategy use ($t = 2.22$, $p = .030$), with the high-vocabulary group employing memory strategies more frequently ($M = 54.72$) than the low-vocabulary group ($M = 49.64$). No significant between-group differences were observed for determination, social, cognitive, or metacognitive strategies, as presented in Table 4.

Table 4: Between-Group Differences in Strategy Category Use (* $p < .05$)

Strategy Category	High Group M	Low Group M	t	p
Determination	25.36	25.10	0.34	.734
Social	13.89	12.48	1.79	.087
Memory	54.72	49.64	2.22	.030*
Cognitive	21.61	20.09	1.28	.204
Metacognitive	17.00	16.41	0.92	.359

At the individual strategy level, the high-vocabulary-size group used six strategies significantly more often than the low group: "guess meaning from context," "use English-English dictionary," "make a mental image of word's meaning," "connect the word to personal experience," "use new words in sentences," and "use English-language media." Conversely, the low group used five strategies significantly more frequently: "use Arabic-English dictionary," "use English-Arabic dictionary," "research new words with classmates," "make lists of new words," and "keep a vocabulary notebook."

6.3 Correlation Analysis

6.3.1 Research Question 4: VLS Contributions to Vocabulary Size

Pearson correlation analyses revealed twelve strategies significantly associated with vocabulary size. Positive correlations were strongest for deep-processing memory strategies, including "use new words in sentences" ($r = .339$, $p < .001$), "make a mental image of the word's meaning" ($r = .332$, $p < .001$), and "use English-language media" ($r = .353$, $p < .001$). Conversely, reliance on bilingual dictionaries, "Arabic-English" ($r = -.284$, $p < .01$) and "English-Arabic" ($r = -.252$, $p < .01$), was negatively correlated, suggesting that deep, semantically rich strategies enhance vocabulary growth, whereas L1-based tools may hinder it. These correlations are detailed in Table 5.

Table 5: Strategies Significantly Correlated with Vocabulary Size (* $p < .05$; ** $p < .01$)

Strategy	Category	r	p
Guess the meaning from context	Determination	.234	.013*
Use an English-English dictionary	Determination	.267	.004**
Use an Arabic-English dictionary	Determination	-.284	.002**
Use an English-Arabic dictionary	Determination	-.252	.007**
Make a mental image of the word's meaning	Memory	.332	.000**
Connect the word to a personal experience	Memory	.205	.030*
Associate with already-known words	Memory	.199	.035*
Use new words in sentences	Memory	.339	.000**
Write paragraphs using new words	Memory	.229	.015*
Say words aloud when first seen	Memory	.207	.028*
Repeat the word aloud many times	Cognitive	.247	.009**
Use English-language media	Metacognitive	.353	.000**

The table indicates significant relationships between specific VLS and vocabulary size among Saudi EFL learners. Memory-based strategies, including forming mental images, connecting words to personal experience, and using new words in sentences, show the strongest positive correlations ($r = .199$ -. 339 , $p < .05$), suggesting that deep processing enhances retention. Determination strategies using English-English dictionaries correlate positively, whereas the use of bilingual dictionaries correlates negatively. Cognitive repetition and metacognitive strategies, such as engaging with English media, also significantly support vocabulary growth, highlighting the importance of active, contextually rich learning methods.

7. Discussion

The participants' use of VLS showed that it was at the moderate level, confirming H1, which predicts that VLS use during applications would be expected to be higher for the determination strategy as compared to the social strategy. The most common strategies used to determine word meaning were determination strategies, such as consulting a dictionary and skimming the context, while using social strategies was the least frequent (Alnan & Abd Halim, 2024). This pattern was consistent with the teacher-centered approach, with less teacher-talk and less shared interaction with peers, and more use of available tools to clarify word meanings. The negative relationship between illiteracy and vocabulary size (Prichard & Atkins, 2023; Wang et al., 2025) also supported H1, as superficial strategies were accompanied by limited deep lexical processing.

Deep processing memory accesses, such as mental imagery, personal association, and sentence generation, distinguished significantly between high and low vocabulary size groups and thus supported H2. These strategies were utilized more often by high vocabulary learners, aligning with the Depth of Processing Theory that deeper and more meaningful kinds of processing (e.g., elaborative semantic rather than surface processing, L1 translation, and rote memorization) result in more enduring memory traces. The discovery has implications for the importance of deep processing strategies in language learning and confirms the use of the theoretical framework.

The results also partially supported H3, which proposed that deep-processing memory strategies boost vocabulary while overreliance on bilingual dictionaries is detrimental. Positive correlations for memory strategies (e.g., mental imagery, $r = .332$, $p < .001$; sentence generation, $r = .339$, $p < .001$) confirmed their effectiveness, whereas reliance on Arabic-English ($r = -.284$, $p = .002$) and English-Arabic dictionaries ($r = -.252$, $p = .007$) showed negative impacts. This indicates that learners who depended on L1 translation at the expense of cognitive elaboration exhibited slower vocabulary development.

This differentiated pattern also helps to reconcile the present findings with those of Alahmad (2020), who reported an overall negative relationship between VLS use and vocabulary size among Saudi female undergraduates. Rather than contradicting that finding outright, the present results suggest that an aggregate, undifferentiated measure of VLS use may mask opposing effects operating within different strategy categories: while deep-processing memory strategies were positively associated with vocabulary size in the current sample, reliance on bilingual dictionaries was negatively associated with it. A composite VLS score that does not distinguish between these categories could plausibly yield a null or even negative overall relationship, depending on the relative weighting of surface- versus deep-processing strategies within a given sample. The larger and more academically diverse sample examined here ($N = 112$ across three academic levels), together with the explicit theoretical anchoring in the Depth of Processing framework, may account for the more nuanced pattern of results obtained in the present study.

Finally, H4 was accepted, demonstrating that learner motivation, pedagogical context, and socio-cultural factors influenced the effectiveness of strategies. Social strategies were constrained by structural limitations, while incidental learning through English-language media ($r = .353$, $p < .001$) supplemented intentional strategy use, supporting vocabulary growth. These results confirm that both contextual and learner variables moderated the impact of VLS on vocabulary outcomes, underscoring the importance of interactive, cognitively engaging instruction.

8. Conclusion

The research illustrated that VLS was used at moderate levels by the Saudi female EFL learners, and determination strategies were the most frequently used, while the social strategies were the least used. Deep-processing memory strategies were positively correlated with greater word size, while being overly reliant on bilingual dictionaries negatively correlated with the strategies' influence on lexical development. Vocabulary development was accomplished through both incidental and intentional learning, with intentional strategies favoring academic vocabulary development. The results of this research underscore the importance of strategic and cognitively-engaged vocabulary instructional methods in improving learners' vocabulary competence in EFL contexts as well as guiding pedagogies for future EFL teaching and learning opportunities.

9. Limitations and Future Research

The respondents were female undergraduates from one Saudi university, so results may not apply elsewhere or to males. No classroom observations or qualitative interviews were conducted. For future studies, there is a need to increase the number of participants, including more institutions, more expertise levels, and males, to make the sample more representative. Longitudinal studies can determine strategy development and how strategy use affects vocabulary development as it progresses over time. Mixed-methods (interviews, classroom observations, think-aloud protocols) would give a richer understanding of the cognitive and social mechanisms involved in effective vocabulary-learning strategies and facilitate targeted pedagogical intervention.

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