EFL LEARNERS' VOCABULARY CONSOLIDATION STRATEGY USE AND CORRESPONDING PERFORMANCE ON VOCABULARY TESTS

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ABSTRACT

This study describes English as a Foreign Language (EFL) learners' use of vocabulary consolidation strategies and explores the connection between strategy use and vocabulary learning outcomes. This study included 218 participants who were students from five freshman English classes at a university in Taiwan. Students' self-reports on their use of vocabulary consolidation strategies were collected using Schmitt's (1997) taxonomy, and their lexical competence, short-term vocabulary retention, and long-term vocabulary retention were measured using a vocabulary levels test, a post-test, and a delayed recall test, respectively. The study results demonstrated that the use of more vocabulary consolidation strategies, particularly memory strategies that involved the higher-order thinking skills of analyzing, synthesizing, and organizing, was related to higher vocabulary levels. Little evidence was found with regard to the link between strategy use and short-term vocabulary retention as well as the link between strategy use and long-term vocabulary retention. The findings of this study suggest that although the positive impacts of appropriate vocabulary consolidation strategy use may not be significant and immediate, these strategies could greatly benefit learners' long-term vocabulary acquisition.

Key Words: vocabulary, learning strategy, lexical competence, EFL

Research on vocabulary acquisition has demonstrated a positive connection between lexical competence and second/foreign language proficiency (e.g., Albrechtsen, Haastrup, & Henriksen, 2008; Alderson, 2005; Astika, 1993; Laufer, 1998; Laufer & Goldstein, 2004; Laufer & Nation, 1999; Qian, 2002). Given that vocabulary acquisition is crucial

for learners' second or foreign language skills (Richards, 1976; Schmitt, 2010; Zimmerman, 1997), increasing attention has been focused on vocabulary learning and instruction. One of the intriguing issues over the past decade in the field of second-language education is the question of how to best assist learners in acquiring vocabulary. To address this question, researchers have investigated the techniques and strategies learners use when they learn vocabulary to gain a thorough understanding of the complex learning process and to explore new ways to support learners in their endeavors to acquire a second/foreign language.

LITERATURE REVIEW

Much of the early strategy research attempted to list the learning strategies employed by successful language learners (e.g., Naiman, Frohlich, Stern, & Todesco, 1978; Rubin, 1975; Stern, 1975). Subsequent research (e.g., O'Malley & Chamot, 1990; Oxford, 1990; Rubin, 1981; Wenden, 1987) systemized these findings by identifying categories of learning strategies and grouping specific strategies into these categories. Significant progress has been achieved within the field of general strategy research, including identifying and classifying language-learning strategies. Using a variety of research methods and instruments, numerous descriptive studies have been conducted to elicit information that reflects learners' strategy use during the language-learning process.

Recently, concern has arisen within works on vocabulary acquisition research over learning strategies. Many attempts have been made to develop a taxonomy for vocabulary learning strategies (e.g., Fan, 2003; Gu & Johnson, 1996; Nation, 2001; Schmitt, 1997; Stoffer, 1995; Williams, 1985; Winke & Abbuhl, 2007; Zhang & Li, 2011). For example, using factor analysis, Stoffer (1995) proposed an inventory based on her empirical findings that clustered the 53 strategies in the survey into nine primary groupings, including strategies for authentic language use, strategies for creative activities, strategies for creating mental linkages, memory strategies, visual and auditory strategies, strategies for physical action, strategies for overcoming anxiety, and strategies for organizing words.

Gu and Johnson (1996) developed another taxonomy that consisted of 74 strategy items based on students' survey responses. The eight identified types of strategies were beliefs about vocabulary learning,

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metacognitive regulation, guessing strategies, dictionary strategies, note-taking strategies, rehearsal strategies, encoding strategies, and activation strategies. Nation (2001) proposed his notable taxonomy that distinguished aspects of vocabulary knowledge from sources of vocabulary knowledge and the learning process using the three general classes of planning, sources, and process.

Based on exploratory and confirmatory analyses of the vocabulary learning strategies reported by Chinese EFL learners, Zhang and Li (2011) proposed a vocabulary learning strategies classification theory. The theory identifies six broad strategy categories, including four factors related to the cognitive process of vocabulary learning (i.e., first encounter, building links, guessing, and word use), a metacognitive factor, and an affective factor. The empirical data suggest that the memory factor and the social factor, which have previously been identified as major factors (types) in language learning strategies (e.g., Oxford, 1990), do not exist independently in vocabulary learning strategies. Schmitt (1997) may have developed the most complete and comprehensive inventory of individual strategies. Schmitt's taxonomy is comprehensive, covering a wide array of learning behaviors. Furthermore, it was compiled from multiple sources, including learning strategy theories and empirical data. Schmitt' strategy inventory was organized based on Oxford's framework of general language learning strategies (1990), a well-established strategy classification system cited in Ellis (1994) and Nisbet, Tindall, and Arroyo (2005) and empirically validated by Hsiao and Oxford (2002). Because the majority of the strategy items were derived from the results of Schmitt's large-scale study, in which Japanese EFL learners from four distinct age groups were surveyed, the content of the taxonomy is assumed to be valid across age groups and to be applicable to language learners from culturally and linguistically diverse backgrounds. To date, Schmitt's inventory is the most frequently adopted inventory across cultures and languages (e.g., Catalán, 2003; Kudo, 1999; Lai, 2013; Schmitt, Schmitt, & Clapham, 2001; Yeh & Wang, 2004) and is generally acknowledged to be reliable (Catalán, 2003; Kudo, 1999). Schmitt's taxonomy, which includes 58 strategy items, was divided into two classes: discovery and consolidation. Discovery strategies are used to discover the meaning of an unknown word. In contrast, consolidation strategies are used to remember the meaning and other aspects of vocabulary knowledge of a newly learned word. The discovery dimension comprises the determination and social

categories, and the consolidation dimension comprises the social, memory, cognitive, and metacognitive categories. Determination strategies are strategies for discovering meaning on one's own, such as "guess from textual context" (p. 207). Social strategies involve discovering meaning by consulting or working with others, such as "study and practice meaning in a group" (p. 207). Memory strategies involve traditional mnemonic techniques, such as "associate the word with its coordinates" (p. 207). Cognitive strategies use mechanical means to memorize words, such as "written repetition" (p. 208). Metacognitive strategies allow learners to plan, control and evaluate their own learning, such as "continue to study word over time" (p. 208).

In addition to exploring the possible vocabulary learning strategies that students might use to facilitate their learning, considerable progress has been achieved in investigating the role of learning strategies in vocabulary acquisition. A growing number of empirical studies on learners' vocabulary strategy use have shed light on the connection between strategy use and language achievement. The general conclusion related to vocabulary strategy research is consistent with the findings of previous general strategy research. The following conclusions can be drawn: more proficient learners use strategies differently than less proficient learners (Ahmed, 1989; Fan, 2003; Gu & Johnson, 1996; Kojic-Sabo & Lightbown, 1999; Lawson & Hogben, 1996; Nacera, 2010; Sanaoui, 1995), and the effective use of strategies might differ substantially from one successful learner to another (Gu, 2003). Although somewhat different results have been found (e.g., Lessard-Clouston, 1996), some major conclusions can be drawn. Successful learners use a variety of strategies (Ahmed, 1989; Fan, 2003; Gu & Johnson, 1996; Kojic-Sabo & Lightbown, 1999; Lawson & Hogben, 1996; Sanaoui, 1995), use those strategies frequently (Ahmed, 1989; Kojic-Sabo & Lightbown, 1999; Lawson & Hogben, 1996) and are aware of their strategy use (Ahmed, 1989; Sanaoui, 1995).

Although no general consensus has been reached regarding which individual strategies or strategy types are closely related to better learning achievement, some studies (e.g., Ahmed, 1989; Gu & Johnson, 1996; Kojic-Sabo & Lightbown, 1999; Nacera, 2010; Sanaoui, 1995) have generated certain strategy combinations or patterns that distinguish more proficient learners from less proficient learners. Gu and Johnson (1996) and others (e.g., Gu, 2003; Kojic-Sabo & Lightbown, 1999; Nacera, 2010; Sanaoui, 1995) concluded that metacognitive

self-regulation is crucial in vocabulary learning. In their studies, Gu and Johnson (1996) found a significant positive correlation between students' self-initiation in learning and their test scores. Kojic-Sabo and Lightbown (1999) reported that learners' self-initiated learning efforts and time spent in learning and practicing vocabulary were most closely associated with higher language achievement. Gu (2003) found that successful learners in the study had high levels of self-initiation in learning English. Sanaoui (1995) concluded that successful learners were more engaged in independent study and self-initiated a wider range of language learning activities. Nacera (2010) found that seeking reading opportunities was positively associated with vocabulary size. These findings support previous strategy literature demonstrating that metacognitive strategies are critical to effective language learning (Abraham & Vann, 1987; Bruen, 2001; Green & Oxford, 1995; Lai, 2009; O'Malley & Chamot, 1990; Park, 1997; Peacock & Ho, 2003; Wharton, 2000). As researchers seek effective learning strategies, it is important to bear in mind that many factors have been shown to affect strategy use (Oxford & Nyikos, 1989; Rubin, 1975), such as cultural background, national origin, proficiency level, learning stage, learning style, and language teaching methods. Therefore, it is possible that a single strategy pattern that benefits all learners for all language tasks and in all learning situations does not exist. Consequently, extensive investigation is needed to achieve a thorough understanding of the nature of learning strategies in vocabulary learning.

Although expanded research on vocabulary learning strategies has been conducted in recent years, most research has investigated learners' usage of certain individual strategies (e.g., Cohen & Aphek, 1980; Pressley, Levin, & Miller, 1982; Sagarra & Alba, 2006), specific strategy types (e.g., Atay & Ozbulgan, 2007; Hulstijn, 1997; Kato, 2005; Paivio & Desrochers, 1981; Philip & Philip, 2000) or strategies for certain language tasks (e.g., Gu, 2003; Lawson & Hogben, 1996; Nassaji, 2006). In comparison, fewer studies have illustrated the overall picture of learners' strategy use during vocabulary learning processes, and little research has examined the connection between vocabulary strategy use and lexical competence. Intervention studies with longitudinal designs that potentially capture learners' long-term learning are particularly desirable (Schmitt, 2010). The present study explores the relationship between vocabulary consolidation strategy use (i.e., strategies for remembering a newly learned word) and vocabulary size and vocabulary

knowledge gains by examining the strategies that Taiwanese English as a Foreign Language (EFL) undergraduate students apply to learn English vocabulary words.

RESEARCH QUESTIONS

1. What learning strategies do Taiwanese EFL learners use when studying and memorizing newly learned words?
2. What is the association between learners' reported consolidation strategy use and their vocabulary levels?
3. What is the association between learners' reported consolidation strategy use and their short-term knowledge gains with vocabulary items?
4. What is the relationship between learners' reported consolidation strategy use and their long-term knowledge gains with vocabulary items?

METHODOLOGY

Participants

The study was conducted across five mid-level freshman English classes held at a medical university in Taiwan. The participants were from sixteen academic majors and presented intermediate to upper-intermediate levels of English proficiency (equivalent to Level B1 of the Common European Framework of Reference for Languages (CEFR)). Proficiency was determined based on information the students provided regarding their English ability test scores. These tests included a General English Proficiency Test (GEPT) simulation test administered by the university as an English placement test and other standardized English language proficiency tests, such as the GEPT, TOEFL and TOEIC. This one-year, two-credit integrated skills course was designed to help students improve their writing, reading, speaking, and listening skills. The researcher, who also served as the class instructor, invited all students (N=242) to participate in the study. The students were informed that their participation was voluntary. They were also assured that their test scores and survey responses would be kept confidential and would not affect their course grades. After screening participants using the

pre-test and excluding participants with missing data, a total of 218 participants (132 females and 86 males) were included in the data analyses. This final set of participants included students with mixed academic majors whose ages ranged from 18 to 21 (M=18.40, SD= 0.70).

Instrumentation

The following instruments were used in the study: (1) a vocabulary consolidation strategy questionnaire; (2) a background information questionnaire; (3) Schmitt's Vocabulary Levels Test (2000); and (4) three vocabulary tests, including a pre-test, a post-test, and a delayed recall test. These instruments were presented in the participants' native language, Mandarin Chinese, to ensure that the questions and instructions were easy to understand and answer. A preliminary draft of the vocabulary consolidation strategy questionnaire was developed by the researcher. The researcher translated the 44 consolidation strategies (see the Appendix) extracted from Schmitt's (1997) taxonomy of vocabulary learning strategies.

Revisions were made to this draft based on feedback from three Taiwanese experts working in the field of English language teaching. To improve the clarity of the questions, the instruments were pilot tested and modified based on feedback from fifteen sophomore students from the same university before being presented to the participants.

Vocabulary consolidation strategy questionnaire. Data on students' self-reported vocabulary consolidation strategy use were gathered using the vocabulary consolidation strategy questionnaire, which is based on Schmitt's (1997) taxonomy of vocabulary learning strategies. Schmitt's taxonomy was adapted to elicit the range and frequency of vocabulary consolidation strategies used by the participants in the current study because the taxonomy is comprehensive and detailed. This taxonomy has been widely used in vocabulary research (e.g., Catalán, 2003; Chen, 1998; Kudo, 1999; Schmitt et. al., 2001; Yeh & Wang, 2004) and is regarded as a reliable instrument (Catalán, 2003; Kudo, 1999).

Schmitt's (1997) taxonomy is organized into two major groups: strategies for the initial discovery of a word's meaning (i.e., discovery strategies) and strategies used to remember a word once it has been introduced (i.e., consolidation strategies). The 58 individual strategies in the taxonomy are further divided into five categories: determination (Items 1–9), social (Items 10–17), memory (Items 18–44), cognitive

(Items 45–53), and metacognitive (Items 54–58). In the current study, the strategies in the consolidation dimension (Items 15–58) were included in the questionnaire. Strategy items appearing on the vocabulary consolidation strategy questionnaire are listed in the Appendix. As shown in the Appendix, the vocabulary consolidation strategy questionnaire included four strategy subcategories with a total of 44 items. All questionnaire items were measured using a 5-point Likert scale of frequency, ranging from 1 ("never or almost never") to 5 ("always or almost always"). According to Cronbach's alpha coefficient, the reliability of the vocabulary consolidation strategy questionnaire was 0.89, indicating that the questionnaire has good internal consistency.

Background information questionnaire. The background questionnaire collected information on the students' characteristics. It elicited participant background information on variables such as age, gender, major, English language proficiency and English language learning experiences.

Vocabulary knowledge tests. The pre-test was administered to select target words and to screen participants to determine their suitability for this study. The Vocabulary Levels Test (Schmitt, 2000), post-test, and delayed recall test were used to assess the participants' vocabulary size, short-term vocabulary retention, and long-term vocabulary, respectively; the three tests provide information on a participant's lexical competence in relation to other participants in the study. The test results served as a basis for the placement of the participants into three ability groups (low, mid, and high) of approximately equal size.

Vocabulary levels test. Schmitt's (2000) Vocabulary Levels Test (Version 1) was adopted to measure the breadth of vocabulary knowledge (i.e., size) because of its high validity and reliability. Through a variety of analysis techniques, Schmitt et al. (2001) demonstrated that the Vocabulary Levels Test is valid and consistent in its measurement and has acceptable discrimination indices. Its validity has also been verified empirically by other researchers (e.g., Nation & Meara, 2002; Xing & Fulcher, 2007). The test has been widely used by researchers to assess English language vocabulary size (Schmitt et al., 2001).

Schmitt's (2000) Vocabulary Levels Test consists of five sections: a 2,000-word level, a 3,000-word level, a 5,000-word level, a 10,000-word level, and an academic vocabulary. In this study, students were tested using four frequency levels (i.e., 2,000, 3,000, 5,000, and 10,000 words). The academic vocabulary section was not included because academic

vocabulary does not fall within the scope of English instruction in Taiwanese high schools, making the test more applicable and appropriate for these participants. The grading criteria constructed by Schmitt were not adopted in the current study because the test was used to evaluate a participant's vocabulary competence in relation to others taking the same test. One point was awarded for each correct response, for a total score ranging from 0 to 120. Using Shapiro-Wilk's test of normality, the spread of the participants' test scores was found to be approximately normally distributed ($p > .05$)

Vocabulary tests. The tests were carefully developed to ensure that the test items were homogeneous in content, construct, and difficulty for each examinee. All test items used the same format. To ensure the content validity of the vocabulary tests, the target words were selected carefully. The researcher recruited fifteen university sophomores who had passed the high-intermediate level of the General English Proficiency Test, a test developed and administered by the Language Training and Testing Center in Taiwan, to help pre-select the study's target words. These students worked with the researcher to select 20 content words from an article in the course textbook based on the idea that the words would most likely be new to participants. These chosen words appeared in the pre-test.

Pre-test: The pre-test was administered to the participants during the first class session. The test required that the students write a synonym, definition, or translation for the 20 words listed. The following serves as a sample test item:

Please write a synonym, definition, or translation for the word "retrospect."

To ensure that most of the participants were unfamiliar with the target words on the post-test and delayed recall test, any words whose meanings were known by more than 10 percent of the participants were excluded. To reflect a range of word classes, the 12 chosen words included nouns (N=3), adjectives (N=6), and verbs (N=3), the most common parts of speech found in natural text. These words were as follows: retrospect, scarce, plateau, speculate, baffle, observatory, enigma, marvel, aerial, monument, defy, and intriguing. To further establish the reliability of the study results, participants who correctly responded to more than one test item on the pre-test were excluded from the study. As the correct pre-test answers (synonyms, definitions, or

translations of the tested words) were not presented to the participants, it is unlikely that participant pre-test exposure significantly affected the study outcomes.

Post-test and delayed recall test: The post-test and delayed recall test was designed to measure the students' short-term and long-term retention of the target words, respectively. Unlike the pre-test, which only required the test takers to provide a synonym, definition, or translation of the tested words, the post-test and delayed recall test included two sections that were provided on two separate pieces of paper. The first part of the test was a spelling test for which students were required to listen to and spell the words they heard as the instructor said them aloud. One point was given if the spelling was correct. For the second part of the test, Paribakht and Wesche's (1997) Vocabulary Knowledge Scale (VKS) and scoring categories were used to measure and score how well the students learned the target words (i.e., the dimension of vocabulary depth). Paribakht and Wesche's VKS elicits students' self-perceived and demonstrated knowledge of target words using a 5-point scale ranging from total unfamiliarity with the word to the ability to make a sentence using the word.

A sample test item for the second part of the test is presented below:

Test Item: retrospect
A. Word meaning: Please check the box that best describes your understanding of the word.
   (1). I don't remember having seen this word before.
   (2). I have seen this word before, but I don't know what it means.
   (3). I have seen this word before, and I think it means _____ (Please write a translation, definition, or synonym).
   (4). I'm certain that I know this word, it means: _____ (Please write a translation, definition, or synonym).
B. Sentence composition: Please create a sentence that includes the word. If you provide an answer for this section, please also complete section A-(4) (provide a word meaning).
   Sentence: _____

The test-retest reliability of VKS estimated in Paribakht and Wesche's study indicates that the instrument is reliable for measuring students' vocabulary knowledge. In this study, students' total possible scores on the post-test and delayed recall test, the sum of the scores in Part I and Part II, ranged from one to six. The Spearman Brown

reliability coefficient and the Cronbach's alpha reliability coefficient for the post-test were .84 and .87, respectively, suggesting good internal consistency. The test results of the post-test and the delayed recall tests were further analyzed to determine the variability of the scores. A one-way ANOVA demonstrated statistically significant differences in the test scores for the post-test and the delayed-recall test (including the entire test and two subsections) among the three ability groups (see Table 3 in the Results section for more detail). This result suggests that the tests could distinguish between participants with differing lexical competence.

As the participants were told that there would be a quiz (the post-test) and pop quiz (the delayed recalled tests) and that they would be tested on the targeted words on the midterm exam during the ninth week of the semester, they were required to study the 12 targeted words. The above-described tests ensured that the participants, to a certain degree, consolidated the targeted words, thereby rendering testing of their short- and long-term memory of the target words meaningful.

For each of the three above-mentioned vocabulary assessments (i.e., the Vocabulary Levels Test, the post-test, and the delayed recall test) and for the subsections of the post-test and the delayed recall test, the participants were re-categorized as low-, mid-, or high-level. In other words, each participant was assigned a proficiency level based on each of the seven test scores that they earned on the three vocabulary assessments. Seven test scores were collected: the overall Vocabulary Levels Test score, the overall post-test score, the overall delayed recall test score, the post-test spelling sub-score, the post-test vocabulary knowledge sub-score, the delayed recall test spelling sub-score, and the delayed recall test vocabulary knowledge sub-score.

Data Collection

The study was conducted over a period of eight weeks during the fall semester. The following procedures were used for data collection.

At the beginning of the first class session, the participants were given informed-consent-to-participate forms. The Vocabulary Levels Test and the pre-test were subsequently administered, which took approximately 40 and 20 minutes, respectively.

During the second class session, as part of the normal classroom regime, the students and instructor (the author simultaneously served as

the instructor and researcher) read and discussed the pre-selected text with the target words. The instructor highlighted target words, provided context-related definitions, and guided the students to work on textbook exercises. At the end of the class, the instructor announced that there would be a quiz on the new vocabulary words that they had encountered that day. A list of 20 words, including the 12 designated target words in the study, was given to the participants. They were also informed of the quiz format.

During the third class session, the post-test was administered to evaluate the students' development of target word knowledge. Immediately after the spelling test session (Part I of the quiz), the test papers were collected, and then the test papers for the second part were distributed. The post-test took 25 minutes.

During the eighth class session, students were given a pop quiz testing their long-term retention of the target words. This delayed-recall pop quiz was the same as the post-test, although the sequence of the words differed. The duration of the delayed recall test was 25 minutes. An introductory strategy session in the students' first language was held prior to the survey administration to ensure that the participants fully understood the strategies listed on the questionnaire. The participants learned when, why, and how to use the learning strategies. This session included a 20-minute presentation in which all 44 strategies were presented and explained and a follow-up 5-minute discussion session. No strategy instruction was given to the participants while the study was being conducted.

The time to complete the vocabulary consolidation strategy questionnaire and background questionnaire was approximately 40 minutes. The participants were told to respond to the strategy questionnaire questions based on how they had studied newly learned vocabulary words introduced through the course (including the 12 target words) over the past eight weeks.

Data Analysis

Analysis of the quantitative data was conducted using SPSS statistical software. Although research questions 2, 3 and 4 appeared to be suitable for analysis with a multivariate analysis of variance, the actual data did not meet that assumption. Because the dependent variables were not significantly correlated with one another, separate

one-way ANOVAs were conducted on each of the dependent variables instead of performing a single MONOVA.

A one-way ANOVA was used to examine the effect of learners' lexical competence on their vocabulary consolidation strategy use, to test whether significant differences existed among participants' strategy use in the four strategy subcategories, and to determine whether the three ability-based groups differed significantly in terms of performance on each of the vocabulary knowledge tests. To determine significance, a standard of $p<.05$ was used. The Scheffe post-hoc test and the Games-Howell post-hoc test were used to identify significant differences.

Significant variations in the mean strategy use across the entire strategy inventory, the four strategy categories and each of the 44 strategy items in relation to vocabulary ability (e.g., vocabulary size, short-term vocabulary retention, and long-term vocabulary retention) were determined using a one-way ANOVA. Likewise, participants' strategy use in relation to their subsections (i.e., spelling and vocabulary knowledge tests) on the post-test and the delayed recall test were examined using a one-way ANOVA.

Students at all three ability levels were compared to understand their amounts of strategy use. Learners' strategy use (i.e., overall strategy, four strategy subcategories, and 44 individual strategy items) was set as the dependent variable, and lexical competence (i.e., vocabulary size, short-term vocabulary retention, and long-term vocabulary retention) was set as the independent variable.

RESULTS

Strategy Use for the Entire Group of Participants

Research Question 1: What learning strategies do Taiwanese EFL learners use when studying and memorizing newly learned words?

The overall mean (44 strategy items), the four strategy category means and the means for each of the 44 strategy items were calculated. The overall mean of the participants' strategy use was 2.85 (SD=0.44). The mean scores of the four strategy subcategories were compared using a one-way ANOVA. The results indicated significant differences among the means of the four strategy subcategories, F (3, 868) =219.96, $p<.001$ (see Table 1).

Table 1

Strategy Use Frequency of All Participants

Strategy category	*M*	*SD*	Ranking	Comment
Social	2.08	0.62	4	Cognitive>Metacognitive>
Memory	2.65	0.48	3	Memory>Social[**]
Cognitive	3.50	0.66	1	
Metacognitive	3.25	0.74	2	

Note. [**]$p<.001$.

    Table 2 lists the 10 most and least frequently used strategy items. Tables 1 and 2 show that the students applied cognitive strategies most frequently. Of the nine cognitive strategies listed in the strategy survey, six were among the 10 most popular overall strategies. These six cognitive strategies included verbal repetition (Item 31), written repetition (Item 32), taking notes in class (Item 35), keeping a vocabulary notebook (Item 39), making word lists (Item 33), and use of the textbook's vocabulary section (Item 36). It was quite revealing that rote learning (Items 31 and 32) and paying close attention to the sounds and spellings of words (Items 17, 18, and 19) were used extensively.

Table 2

The Ten Most and Least Frequently Used Strategies

Ranking order	Item/Category/Strategy		*M*	*SD*
Ten most used				
1	19. MEM	Say new word aloud when studying	4.27	0.92
2	31. COG	Verbal repetition	4.24	0.84
3	18. MEM	Study the sound of a word	4.19	0.91
4	17. MEM	Study the spelling of a word	4.15	0.92
5	32. COG	Written repetition	4.07	0.99
6	35. COG	Take notes in class	3.99	0.97
7	33. COG	Word lists	3.85	1.17
7	39. COG	Keep a vocabulary notebook	3.85	1.05
8	36. COG	Use the vocabulary section in your textbook	3.72	1.07
8	44. MET	Continue to study word over time	3.72	1.07
Ten least used				
44	22. MEM	Configuration	1.28	0.61
43	30. MEM	Use semantic feature grids	1.47	0.88
42	11. MEM	Peg Method	1.49	0.87
41	9. MEM	Use semantic maps	1.50	0.75
40	12. MEM	Loci Method	1.67	0.96
39	16. MEM	Group words together within a storyline	1.71	0.92
38	38. COG	Put English labels on physical objects	1.83	1.06
37	21. MEM	Underline initial letter of the word	1.92	1.09
36	1. SOC	Study and practice meaning in a group	1.94	0.78
35	3. SOC	Interact with native speakers	1.98	0.94

Note. SOC = social strategy; MEM = memory strategy; COG = cognitive strategy; MET = metacognitive strategy.

Distribution of Participants According to the Three Vocabulary Tests

For each of the three vocabulary assessments (i.e., the Vocabulary Levels Test, the post-test, and the delayed recall test) and for the subsections of the post-test and the delayed recall test (focusing on spelling and vocabulary knowledge), each participant was assigned to one of three roughly equally sized groups (high-, mid-, and low-level) based on his or her test performance.

A one-way ANOVA was conducted to determine whether the three ability groups differed in terms of performance on each test. As illustrated in Table 3, the one-way ANOVA indicated significant differences in test performance among the three ability groups ($p<.001$) for all seven tests. Post-hoc comparisons using the Scheffe test or the Games–Howell test revealed that the mean scores for the high-level group were significantly higher than the scores for the mid-level and low-level groups for all of the tests. In addition, the mean scores of the mid-level group were significantly higher than those of the low-level group ($p<.001$). The results demonstrated that there were significant differences among the three groups for all tests in terms of performance.

A decreasing trend in participants' memory retention for newly learned words was detected. As shown in Table 3, for all three ability groups, the means of the overall score of the delayed-recall test were lower than the means of the overall score of the post-test. Likewise, the means of the two subscores (part I and part II) of the delayed-recall test for the three groups were lower than the respective means of the two subscores of the post-test.

Table 3

Distribution of Participants According to the Three Vocabulary Tests

Test	Group	N	M	SD	Range	$F(2, 215)$	Comments
Vocabulary Levels						525.72	High>Mid >Low**
	Low	72	54.40	5.79	39–62		
	Mid	75	67.48	2.86	63–72		
	High	71	79.34	4.72	73–95		
	Total	218	67.02	11.11	39–95		
Post-test						127.45	High>Mid >Low**
Overall	Low	77	53.69	7.37	29–61		
	Mid	67	64.69	1.67	62–67		
	High	74	69.68	1.30	68–72		
	Total	218	62.50	8.19	29–72		
						297.59	High>Mid >Low**
Part I	Low	62	7.15	2.06	2–9		
	Mid	96	10.58	0.50	10–11		
	High	60	12.00	0.00	12		
	Total	218	10.00	0.15	2–12		
						128.88	High>Mid >Low**
Part II	Low	77	45.27	5.64	27-51		
	Mid	71	54.41	1.47	52-56		
	High	70	58.51	1.06	57-60		
	Total	218	52.50	6.60	27-60		
Delayed Recall						666.45	High>Mid >Low**
Overall	Low	72	35.69	4.14	24-41		
	Mid	74	46.68	3.09	42-52		
	High	72	59.21	4.28	53-68		
	Total	218	47.19	10.33	24-68		

Table 3 (continued)

Test	Group	N	*M*	*SD*	Range	*F*(2, 215)	Comments
						585.28	High>Mid >Low[**]
Part I	Low	62	2.79	1.18	0-4		
	Mid	82	5.93	0.84	5-7		
	High	74	9.04	1.18	8-12		
	Total	218	6.09	2.69	0-12		
Part II						600.83	High>Mid >Low[**]
	Low	72	31.18	4.10	15-36		
	Mid	75	40.84	2.78	37-45		
	High	71	51.42	3.50	46-60		
	Total	218	41.10	8.92	15-60		

Note. The total score range for the Vocabulary Levels Test was 0 to 120; Part I=spelling test; Part II=vocabulary knowledge test; the total score range for both the post-test and the delayed recall test was 0 to 72; [**]$p<.001$.

Connection between Strategy Use and Vocabulary Size

Research Question 2: What is the association between learners' reported consolidation strategy use and their vocabulary levels?

Comparisons among students at different achievement levels in their strategy usage were performed using a one-way ANOVA. Table 4 presents the variation in the participants' strategy use based on vocabulary size. Statistically significant differences were observed when a one-way ANOVA was conducted to examine the effect of learners' vocabulary size on their strategy use overall as well as in the memory strategy subcategory.

A comparison of the three groups' use of the 44 individual strategies demonstrated significant differences in the way they applied their strategy (Items 6, 8, 10, 13, 24, 25, and 26). The strategy items all belonged to the memory strategy subcategory. Thus, it is apparent that the learning strategies that were associated with general vocabulary proficiency were learning skills related to systematizing and organizing in learning (Items 8, 10, 13, 24, and 25).

Table 4

Summary of Strategy Items Showing Positive Variations According to the Vocabulary Levels Test

Dependent Variable	Low (N = 72)		Mid (N = 75)		High (N = 71)		F(2, 215)	Comments
	M	SD	M	SD	M	SD		
Overall strategy use	2.74	0.48	2.95	0.43	2.86	0.39	4.62	Mid>Low*
Memory strategies	2.49	0.50	2.75	0.47	2.69	0.41	6.20	High>Low* Mid>Low*
6. Connect word to a personal experience	2.32	1.09	2.71	1.04	4.04	0.99	4.77	High>Low*
8. Connect the word to its synonyms and antonyms	2.86	1.04	3.23	1.02	3.37	1.02	4.64	High>Low*
10. Use 'scales' for gradable adjectives	2.61	1.03	3.05	1.05	2.92	0.95	3.65	Mid>Low*
13. Group words together to study them	2.60	1.03	3.16	1.00	3.23	0.94	8.73	High>Low* Mid>Low*
24. Affixes and roots	3.04	1.19	3.53	0.98	3.25	1.09	3.78	Mid>Low*
25. Part of speech	3.32	1.20	3.83	0.86	3.86	0.82	7.01	High>Low* Mid>Low*
26. Paraphrase the word's meaning	2.46	1.17	2.89	1.13	2.89	1.29	3.12	High>Low* Mid>Low*

Note. $^*p < .05$; in the comments column, only groups showing significant differences in their mean scores are listed.

Connection between Strategy Use and Short-term Vocabulary Retention

Research Question 3: What is the association between learners' reported consolidation strategy use and their short-term knowledge gains with vocabulary items?

 The one-way ANOVA results yielded no statistically significant differences among the three ability groups in their overall strategy use and their strategy use in terms of the sub-strategy categories. Significant differences were only detected among the groups in their use of three strategy items (see Table 5), including two positive differences and one negative difference. Very little evidence of a positive link between test scores and strategy use emerged.

Connection between Strategy Use and Long-term Vocabulary Retention

Research Question 4: What is the relationship between learners' reported consolidation strategy use and their long-term knowledge gains with vocabulary items?

 No statistically significant difference was found among the three groups in the overall category and the four strategy subcategories for strategy usage, as determined by a one-way ANOVA. With regard to the three ability levels in their use of the individual strategies, some significant variations were observed. Table 6 summarizes the individual strategies that demonstrated significant variations according to the delayed recall test score. Item 43 ("Skip or pass new word") was the only item that demonstrated a negative association.

 When the test was divided into two sections and the connection between learners' frequency of strategy use and their scores in the spelling test section was examined, Item 19 ("Say new word aloud when studying strategy") was found to be used significantly more frequently by students with higher test scores.

 Examination of the link between strategies and the depth of vocabulary knowledge revealed that Item 30 ("Use semantic feature grids") was related to the long-term retention of vocabulary knowledge.

Table 5

Strategy Items Showing Positive Variations According to the Post-test

Dependent Variable	Low		Mid		High		$F(2, 215)$	Comments
	M	*SD*	*M*	*SD*	*M*	*SD*		
Spelling	(N = 62)		(N = 96)		(N = 60)			
17. Study the spelling of a word	3.89	1.09	4.24	0.88	4.27	0.73	3.56	High> Low[*]
Vocabulary Knowledge	(N = 77)		(N = 71)		(N = 70)			
1. Study and practice meaning in a group	2.12	0.78	1.89	0.80	1.81	0.73	3.12	High< Low[*]
18. Study the sound of a word	4.01	1.01	4.13	0.93	4.44	0.72	4.48	High> Low[*]
Overall Score	(N = 77)		(N = 67)		(N = 74)			
17. Study the spelling of a word	3.92	1.06	4.21	0.90	4.32	0.72	3.94	High> Low[*]
18. Study the sound of a word	3.96	1.06	4.21	0.86	4.41	0.72	4.69	High> Low[*]

Note. [*]$p < .05$. Part I: spelling; Part II: vocabulary knowledge; in the comments column, only groups showing significant differences in their mean scores are listed.

Table 6

Summary of Strategy Items Showing Significant Variations According to the Delayed Recall Test

Dependent Variable	Low		Mid		High		$F(2, 215)$	Comments
	M	*SD*	*M*	*SD*	*M*	*SD*		
Spelling	(N = 62)		(N = 82)		(N = 74)			
19. Say new word aloud when studying	3.95	1.17	4.43	0.77	4.35	0.77	5.44	Mid> Low*
Vocabulary Knowledge	(N = 72)		(N = 75)		(N = 71)			
5. Image word's meaning	2.01	1.03	2.45	1.09	2.24	1.09	3.09	Mid> Low*
30. Use semantic feature grids	1.25	0.62	1.60	1.01	1.56	0.91	3.59	Mid> Low*
43. Skip or pass new word	3.65	1.10	3.13	1.06	3.03	1.20	6.44	High< Low* Mid< Low*
Overall Score	(N = 72)		(N = 74)		(N = 72)			
30. Use semantic feature grids	1.22	0.59	1.68	1.02	1.51	0.90	5.21	Mid> Low*
43. Skip or pass new word	3.61	1.13	3.19	1.03	3.01	1.20	5.38	High< Low*

Note. *$p < .05$. Part I: spelling; Part II: vocabulary knowledge; overall: including two parts of the test; in the comments column, only groups showing significant differences in their mean scores are listed.

DISCUSSION

Patterns of Strategy Use for All Participants

The present findings seem to be consistent with those of Schmitt (1997), who found that Asian second/foreign language learners tended to rely on mechanical strategies when learning foreign/second languages. In the current study, nine of the ten most frequently used strategies belonged to the cognitive strategy category. Specifically, these were simple strategies involving repetition and rote learning. This finding concurs with the results from the studies conducted by Chen (1998) and Yeh and Wang (2004), who examined the vocabulary learning strategy preferences of EFL learners in Taiwan.

This group of students frequently used metacognitive strategies, which have been regarded as crucial in effective language learning (Abraham & Vann, 1987; Bruen, 2001; Green & Oxford, 1995; Lai, 2009; O'Malley & Chamot, 1990). The mean score of this strategy category was slightly lower than that of the cognitive strategy category.

The study findings also showed that this group of students reported that they frequently used metacognitive self-initiation and self-regulation strategies. These strategies included the following: "Continue to study the word over time" (M=3.72, SD=1.03; ranked 8th), "Use English-language media" (M=3.30, SD=1.11; ranked 11th), and "Testing oneself with word tests" (M=3.14, SD=1.21; ranked 16th). This finding suggests that students generally take the initiative and act independently in the learning process.

Another trend that emerged was that the participants' delayed-recall test scores were lower than their post-test scores. This finding is not surprising because the delayed-recall test was an unannounced quiz. If a newly learned word is not reviewed consistently, it will be difficult to retrieve and will eventually be lost in memory. To strengthen memory retention of newly learned vocabulary words, deliberate effort and considerable time must be devoted to reviewing vocabulary.

Connection between Strategy Use and Achievement Level

Overall, students with different test performance levels did not differ greatly in their learning strategy use. The results of the study demonstrated some positive associations between the participants' breadth of vocabulary and their use of the overall strategy inventory, the

memory strategy subcategory and certain individual strategies. Regarding the connection between strategy use and short-term retention as well as between strategy use and long-term vocabulary retention, only subtle differences were found.

Based on the findings, it seems reasonable to conclude that although the way learners choose and use learning strategies is not strongly related to their short-term and long-term vocabulary gains, appropriate use of certain effective strategies is of great value in developing long-term lexical competence.

When comparing strategy items found to be positively associated with scores from all three respective vocabulary tests, some important findings emerged. Regardless of which test measurements were used, all strategies showed significant variation based on the vocabulary ability levels in the memory strategy category.

The comparisons also revealed that the strategies that related to larger vocabulary size, better short-term vocabulary retention, and better long-term vocabulary retention differed. These "effective" strategies are synthesized as follows. The use of varied and numerous memory strategies, particularly those that involved the use of analytical and organizational skills (e.g., "Connect the word to its synonyms and antonyms," "Use 'scales' for gradable adjectives," "Group words together to study them," "Study affixes and roots," and "Paraphrase the word's meaning"), was associated with a larger vocabulary size.

Learning strategies that were found to be related to better short-term vocabulary retention ("Studying a word's sound and spelling" and "Studying a word's spelling") were simple strategies that did not require deeper levels of processing. Participants in all three ability groups favored these two strategies. However, the high ability group used them more intensively.

With regard to the strategies that were linked to better long-term vocabulary retention, the study results revealed that specific techniques that successful learners utilized to facilitate the memorization and recall of spelling included "Studying the spelling of a word" and "Saying the new word aloud when studying." A strategy that strengthened effective learners' ability to produce semantically and grammatically correct sentences was "Using semantic feature grids when learning vocabulary." As mentioned previously, this group of learners generally relied heavily on rote learning (e.g., "The use of verbal and written repetition") and simple memorization techniques (e.g., "Study a word's sound and

spelling," "Take notes in class," and "Keep word lists"). Strategies that were more complex and involved the manipulation of information (e.g., "Peg Method," "Use semantic maps," "Use semantic feature grids," and "Group words together within a storyline") were neglected or abandoned.

In general, learning activities that involve deep processing (Craik, & Lockhart, 1972) and the manipulation of lexical items (Hulstijn & Laufer, 2001) are believed to be more likely to enhance long-term memory retention (Schmitt, 2000). The current study supports this assumption. Specifically, the results reveal that some of these strategy types contribute to a stronger and more durable memory.

The findings in this study also indicate that the strategies that were connected to the students' overall lexical competence were primarily those that required the manipulation of information (e.g., "Connect the word to a personal experience" and "Paraphrase the word's meaning") and analytical and organizational skills (e.g., "Connect the word to its synonyms and antonyms" and "Study affixes and roots").

The findings also demonstrate that the creation of semantic feature grids has a significant positive connection with the depth of vocabulary knowledge. Engaging in these strategies involves a deeper degree of cognitive processing because learners have to actively search for information related to the target word, pay attention to the word's form and meaning, and associate and compare the word's meaning with other related lexical items.

As a whole, the group of students used some learning techniques (e.g., "Connect the word to a personal experience," "Paraphrase the word's meaning," and "Use semantic feature grids") relatively infrequently; the mean score was below the overall strategy use mean score for these techniques. However, the evidence demonstrates that infrequent usage differentiated more and less proficient learners in their long-term retention of lexical items. Hence, introducing these techniques and guiding students to make use of them are necessary, particularly for students who are learning at an intermediate level. As Cohen and Aphek (1980) suggested, learners from different learning levels require different strategies. These authors further indicated that intermediate- and advanced-level learners benefit more from engagement in learning activities that involve deeper learning strategies.

Another type of strategy that did not receive much attention was the strategy that required interaction with others. The techniques of studying

and practicing meaning in a group and interacting with native-speakers were rarely used; they were both among the 10 least used strategies. The reason for this was likely that the participants were not provided with opportunities for such interactions. If this is the case, it is very important, particularly in EFL contexts where English is not commonly used outside the classroom, that learners are given opportunities to learn cooperatively and are provided with access to interactions with native English speakers using technology as a tool (e.g., computer-mediated communication). Research has validated that practicing vocabulary through authentic interaction is crucial for effective vocabulary acquisition (Schmitt, 2008).

It is interesting to note that among the fourteen strategies that demonstrated a significant connection with test performance, only two demonstrated a negative association. It seems possible that this result emerged because the more proficient learners regarded these strategies as not useful or less effective or believed that they had negative effects on learning and thus ignored or avoided using them. Using the "Skip or pass new word" strategy as an example, advanced learners might regard studying every newly learned vocabulary word as important for increasing their vocabulary size. Therefore, ignoring new words they encounter would be counterproductive to their approach to learning.

Another strategy that higher-level achievers rarely used was "Study and practice meaning in a group." This low usage could possibly be attributed to higher achievers being more independent and confident in their ability to study by themselves when compared with their lower-achieving counterparts. Thus, working with others was not perceived as necessary.

The data gathered in the current study demonstrated a relatively weak association between test performance and strategy use when compared with previous similar studies (Ahmed, 1989; Fan, 2003; Kojic-Sabo & Lightbown, 1999; Lawson & Hogben, 1996). The reason for this weak association is not clear, but it might be due to the sample members' similarity in their relatively high level of general English language proficiency. This similarity may have resulted from their enrollment in intermediate to high-intermediate English classes at a medical university. They also had potentially similar English learning experiences because they were taught in the same cultural setting.

Age level is another intervening factor that should be considered. Some researchers have examined how different age levels affect the

strategy use of EFL learners. These researchers have observed a greater range of strategy use in younger learners and weaker variation in the strategy use of older learners (Magogwe & Oliver, 2007; Tragant & Victori, 2012).

All of the aforementioned factors may affect learners' choice of learning strategies. The similarities of this homogeneous group may have contributed to the similar way in which they approached the study of vocabulary.

CONCLUSIONS

The present study described the actions taken by Taiwanese college EFL learners when they approached vocabulary learning. Furthermore, this study compared learners with different levels of vocabulary test performance in an attempt to explore a possible link between strategy use and lexical competence. Unlike many previous strategy studies that demonstrated a strong, positive relationship between EFL/ESL learners' strategy use and their language learning achievement, the current study found relatively weak evidence to support such an association. Although the links between these two variables were not strong, particularly for strategy use and gains in the depth of vocabulary knowledge, several strategies that differentiated high achievers from lower achievers were identified.

One of the most significant findings of this study is that the impact of vocabulary consolidation strategy use may be gradual, and an extended period of time may be required before positive learning outcomes are achieved or observed. Specifically, little evidence was found for a link between strategy use and both short-term and long-term retention of lexical items. Nevertheless, equipping students with adequate learning strategies may produce greater long-term benefits, as reflected in learners' general lexical competence.

As the results of this study suggest, to help language learners efficiently acquire vocabulary and enlarge their vocabulary size, it is imperative to push them to explore available strategies, encourage them to use a variety of strategies and assist them in identifying those strategies that best assist them in learning and memorizing vocabulary words. As a general rule, strategy instructors should give special attention to effective strategies to improve vocabulary-learning efficacy. However, no consensus has been reached with regard to which strategies

or clusters of strategies are most effective. Therefore, identifying learners' strategy use prior to strategy training and making ongoing instructional adjustments based on students' needs or feedback during training are necessary.

With regard to implementing strategy training, embedding strategy instruction in regular language classroom activities is recommended because it is likely to allow learners to internalize strategies (Chamot & O'Malley, 1987; Oxford & Leaver, 1996). It is also important for students to realize that although positive outcomes brought about by strategy use may not be perceived immediately, persistence in the application of effective strategies may lead to long-term benefits in vocabulary development, particularly in expanding vocabulary size.

Finally, this study had several limitations. The conclusions should be interpreted with reference to the specific context and learner population because learners with different ability levels, age ranges, learning styles, and learning contexts may approach learning differently. Another limitation that may have compromised the validity of the findings is that the teacher also served as the researcher. Further, this study used self-reported behavior data, which is subject to the limited accuracy of self-report methods. The biases inherent in self-report measures are widely recognized (e.g., Donaldson & Grant-Vallone, 2002; Podsakoff & Organ, 1986). Using self-report methods to collect learners' strategy use may have influenced the accuracy of the study results. In the current study, the reliability of the survey responses may be limited by the participants' honesty and willingness to respond to the survey questions, their understanding of the strategies, their accuracy in recalling how they apply learning strategies when studying vocabulary, and their self-awareness of their strategy usage. It is impossible to determine whether the participants' responses reflected their actual strategy use and impossible to know the degree to which the response bias influenced the study results. These limitations should be considered when interpreting the findings. It is thus recommended that future studies on learner strategies use both self-report questionnaires and direct observations to generate more accurate data. Furthermore, only 12 vocabulary items were used to collect the data set in this study. It is possible that using a larger number of vocabulary items may have yielded more reliable results. Moreover, caution should be used when considering the causal direction of the association between strategy use and language proficiency because the relationship may be bi-directional (Bremner,

1999; Green & Oxford; 1995; MacIntyre, 1994; Rees-Miller, 1993). Strategies may be both the causes and the outcomes of improved language proficiency.

Research that addresses different learner variables is required to gain a deeper understanding of the role of vocabulary consolidation strategies in acquiring vocabulary. More studies using different research designs, measuring instruments and statistical methods are also needed to better understand the nature of the relationship between vocabulary learning strategy use and lexical competence. Future studies should also address the limitations of this study.

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APPENDIX

Strategy Items in the Vocabulary Consolidation Strategy Questionnaire

1. SOC   Study and practice meaning in a group
2. SOC   Teacher checks student's flash cards or word lists for accuracy
3. SOC   Interact with native-speakers
4. MEM   Study word with a pictorial representation of its meaning
5. MEM   Image word's meaning
6. MEM   Connect word to a personal experience
7. MEM   Associate the word with its coordinates
8. MEM   Connect the word to its synonyms and antonyms
9. MEM   Use semantic maps
10. MEM   Use 'scales' for gradable adjectives
11. MEM   Peg Method
12. MEM   Loci Method
13. MEM   Group words together to study them
14. MEM   Group words together spatially on a page
15. MEM   Use new word in sentences
16. MEM   Group words together within a storyline
17. MEM   Study the spelling of a word
18. MEM   Study the sound of a word
19. MEM   Say new word aloud when studying
20. MEM   Image word form
21. MEM   Underline initial letter of the word
22. MEM   Configuration
23. MEM   Use Keyword Method
24. MEM   Affixes and roots (remembering)
25. MEM   Part of speech (remembering)
26. MEM   Paraphrase the word's meaning
27. MEM   Use cognates in study
28. MEM   Learn the words of an idiom together
29. MEM   Use physical action when learning a word
30. MEM   Use semantic feature grids
31. COG   Verbal repetition
32. COG   Written repetition
33. COG   Word lists
34. COG   Flash cards

35. COG   Take notes in class
36. COG   Use the vocabulary section in your textbook
37. COG   Listen to tape of word lists
38. COG   Put English labels on physical objects
39. COG   Keep a vocabulary notebook
40. MET   Use English-language media (songs, movies, newscasts, etc.)
41. MET   Testing oneself with word tests
42. MET   Use spaced word practice
43. MET   Skip or pass new word
44. MET   Continue to study word over time

Note. SOC = social strategy; MEM = memory strategy; COG = cognitive strategy; MET = metacognitive strategy.

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以英語為外語學習者之字彙強化記憶策略使用與其字彙測驗表現之對應關係

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本研究描述以英語為外語學習者的字彙強化記憶策略之使用，並探討策略之使用和字彙學習成效兩者之間的關聯性。於臺灣某所大學，共計 218 名來自五個大一英文課程班級的學生參與此項研究。字彙強化記憶策略使用之自評量表以 Schmitt（1997）的理論架構作為基礎；字彙量、短期字彙記憶與長期字彙記憶則分別使用字彙量測驗、後測考試以及延遲後測考試作為評量工具。研究結果顯示，和高字彙量有明顯關聯性的學習模式為大量地運用學習策略，特別是涉及有關於分析、整理以及歸納的高階思維能力之記憶方法；而學習策略的使用和短期以及長期字彙記憶間的關聯性卻很薄弱。本研究發現顯示，雖然恰當地運用強化記憶策略來幫助學習字彙也許無法於短期內見到顯著與立即的效果，然而，其所帶來的正面影響，對於達成長期學習成效之目標能大有裨益。

關鍵詞：字彙、學習策略、字彙能力、以英語為外語