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Effects of Examination-Related Vocabulary Instruction on TOEIC Listening and Reading Test Performance among Taiwanese Learners

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ABSTRACT

For many Taiwanese EFL learners, preparing for the TOEIC Listening and Reading Test is challenging, particularly due to limited vocabulary knowledge. However, relatively little research has examined the effectiveness of memory-enhancement techniques in vocabulary instruction within TOEIC-oriented contexts. This study investigated an 18-week vocabulary course incorporating memory-enhancement techniques for fourth-year Taiwanese junior college students. A one-group pretest–posttest quasi-experimental design was employed. Based on pretest vocabulary scores, participants were classified into high-, intermediate-, and low-proficiency groups for comparative analysis rather than differential instruction, as all students received the same treatment. Data were collected through a pretest, 12 quizzes, a posttest, and a questionnaire. Results showed steady progress, higher posttest scores, and positive perceptions. The findings suggest that memory-enhanced vocabulary instruction effectively supports TOEIC preparation. This study contributes to the literature by providing empirical evidence of the effectiveness of long-term, memory-enhanced vocabulary instruction for TOEIC preparation in Taiwanese EFL contexts.

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The importance of vocabulary competence is difficult to dispute. As noted by social linguist Wilkins (1985, p. 111), “without grammar very little can be conveyed, without vocabulary nothing can be conveyed,” vocabulary is essential for the expression and communication of ideas. Moreover, several empirical studies conducted by educators (Agnes & Srinivasan, 2024; Derer & Berkant, 2020; Kurniarahman, 2023; Lestari & Yulia, 2018; Yang, 2024, 2025) have demonstrated that vocabulary competence is crucial for achieving learning goals.

English, long established as the primary foreign language in Taiwan, has more recently consolidated its prestigious status as a result of the 2030 Bilingual Policy, which aims to foster society-wide proficiency in both English and Mandarin Chinese by 2030 (National Development Council, 2018). Under this policy, English instruction is required at all education levels (Rüdiger et al., 2023; Wu & Lau, 2019). Certain universities require English proficiency for graduation, with some granting credit waivers based on English test scores. Similarly, certain private and public sector jobs require English proficiency (Chun Shin, 2025). In this social context, the public holds high expectations for English teaching, but simultaneously lacks confidence in the effectiveness of English teaching. The discordance between expectations and confidence has generated widespread anxiety about English learning, which is manifested in the prevalence of private cram schools known as *buxiban* (cram schools) (Chou & Yuan, 2011). Statistical data provide evidence of this trend. In 2018, 17,000 cram schools were operational in Taiwan, an increase of approximately 14,000 over 20 years (Tsai, 2020). These cram schools, as their name suggests, focus on short-term rote learning as opposed to genuine understanding. This view aligns with Chen et al. (2020), who claim that both students and their parents place emphasis on test results at the expense of comprehension and the application of foundational vocabulary, hindering both teaching and learning.

Researchers and policymakers, meanwhile, have endeavored to address the issue. Several studies have approached this issue from a broader

policy perspective (Chen et al., 2025; Smithsarakarn, 2024). The study by Smithsarakarn (2024) concludes that the implementation of Taiwan’s 2030 Bilingual Education Policy has led to several unintended consequences, such as increasing inequality, and suggests enhancing English teaching for specialized purposes, such as fulfilling workplace language proficiency requirements. The study of Chen et al. (2025) calls for the use of nationwide census data as a guide for decision-making and for improving future policymaking, and points out that teacher commitment, administrative support, and collaboration among teachers affect teaching outcomes.

Other researchers have sought to improve English-language performance through pedagogical approaches. Among these approaches, effective vocabulary instruction plays a pivotal role. Lai (2013) underscores the use of learning strategies to help students acquire vocabulary and establish positive learning habits. Huang (2014) suggests that proper learning strategies facilitate acquisition of new vocabulary, thereby affecting performance on language proficiency tests. Tu (2025) emphasizes the role of teachers in guiding students to develop vocabulary competence through learning selected words and practicing tasks.

Despite these efforts, one caveat remains concerning society-wide attempts to improve the teaching and learning of English: a paucity of empirical evidence regarding the effectiveness of selected teaching techniques. Addressing this gap, Yang (2024) examined the use of crossword puzzles in vocabulary instruction and demonstrated their effectiveness in improving students’ vocabulary knowledge and reading comprehension. In another empirical study, Yang (2025) integrated crossword puzzles with mnemonic devices in vocabulary teaching and likewise demonstrated the effectiveness of this instructional technique. However, relatively few empirical studies have examined whether memory-enhancement vocabulary instruction can effectively support TOEIC preparation among

Taiwanese tertiary EFL learners, particularly across learners of different proficiency levels.

Considering that students may be more motivated to learn when provided with a concrete and immediate goal to pursue (Chen et al., 2025; Smithsarakarn, 2024), the present study draws on social cognitive principles (Vygotsky, 1978; Wood et al., 1976), self-efficacy theory (Bandura, 1993), and memory-enhancement approaches (Yang, 2024, 2025) to examine the effectiveness of a teaching technique that incorporates memory-enhancement tools to help learners achieve a tangible and immediate objective, namely success in a high-stakes language proficiency test. Accordingly, the present study examined the effectiveness of an 18-week vocabulary course incorporating memory-enhancement tools for Taiwanese junior college EFL learners through a pretest–posttest design. Students' achievement data and questionnaire responses were used to evaluate learning outcomes as well as students' perceptions of the course, including its usefulness, motivational value, and perceived effectiveness. Specifically, the study addresses two research questions. *Research questions:*

Question 1. Does the teaching technique enhance students' learning effectiveness?

Question 2. Does the effectiveness of the instruction vary according to students' level of competence?

2. Literature Review

2.1. Previous Research on Vocabulary Teaching and Learning

Quite a few studies have examined the relationship between vocabulary instruction and students' general language performance or success in language proficiency examinations; however, most of these studies were conducted in other countries or linguistic contexts. Since the beginning of the twenty-first century, many educators from around the world have explored how specific instructional techniques can enhance student learning.

One notable approach is the incorporation of crossword puzzles into classroom instruction (e.g., Derer & Berkant, 2020; Lestari & Yulia, 2018;

Puspita & Sabiqoh, 2017). These studies reported that crossword puzzles were useful in motivating learners and improving vocabulary performance. Other studies have investigated the effectiveness of mnemonic-enhanced instruction and found it beneficial for vocabulary acquisition and retention (e.g., Agnes & Srinivasan, 2024; Amiryousefi & Ketabi, 2011; Farjami, 2007; Kurniarahman, 2023; Pillai, 2017).

Additional research has focused on the relationship between vocabulary teaching strategies and students' performance on high-stakes language proficiency examinations. For example, Mizumoto and Takeuchi (2009) examined the relationship between vocabulary learning strategies and TOEIC performance, while Ichige (2016) and Kaneko (2017) investigated the impact of vocabulary size on TOEIC scores. Kaneko (2015) also explored the vocabulary size required for TOEFL iBT listening comprehension, whereas Anam (2019) examined the influence of vocabulary competence on TOEFL reading performance.

2.2. Research Gap Concerning the Taiwanese Student Population

Some Taiwan-based educators and scholars have paid attention to issues related to English instruction and learning among Taiwanese students. Several studies have attempted to make a contribution by providing insights into local learners' preferred learning strategies and societal expectations for English language curricula. Yeh and Wang (2004) reported that Taiwanese learners most frequently attempt to learn and memorize words in isolation rather than in context. Ting (2011) observed that vocabulary knowledge, attitudes, strategies, and language comprehension were significantly related among Taiwanese students. Pan (2014) reported that college students in Taiwan preferred traditional receptive learning activities, such as reading textbooks, memorizing vocabulary and grammar, and studying sentence patterns. Other studies have highlighted students' eagerness to obtain immediate benefits, as reflected in their focus on activities that may help them

achieve better scores on upcoming examinations (Chen et al., 2020; Huang, 2014; Liao, 2004).

Some studies, meanwhile, have examined the effects of metacognitive strategies on learning outcomes. Lai (2013) found that strategy training supported strategy use, with the strongest effects observed among less proficient students. Huang (2014) suggested that appropriate learning strategies could facilitate vocabulary learning and increase the likelihood of better performance on language proficiency tests. A study conducted by Tu (2025) found that students could achieve better learning outcomes through the use of metacognitive strategies and engagement in vocabulary tasks.

Since the promulgation of Taiwan's 2030 Bilingual Education Policy (National Development Council, 2018), scholars have increasingly examined these issues from broader policy perspectives. Representative examples include Chen et al. (2020, 2025), Rüdiger et al. (2023), and Smithsarakarn (2024).

Overall, research on English teaching and learning in Taiwan has tended to focus on broader social factors, metacognitive learning strategies, and national policy perspectives. However, relatively few studies have investigated the effectiveness of structured instructional techniques for vocabulary acquisition and retention (Yang, 2024, 2025). More importantly, little research has examined how such structured instructional techniques may influence performance on high-stakes language proficiency examinations.

2.3. Intellectual Foundations of the Current Research

Ausubel (1963) proposed the concept of meaningful learning, which involves learner motivation, intentional engagement, intellectual development, practice, and cognitive processing. This concept serves as the theoretical framework for the present study, and its rationale is discussed in the following four subsections.

Motivation and Self-efficacy

Maslow's theory of motivation posits that human behavior is driven by a hierarchy of needs, ranging from physiological and safety needs to social belonging, esteem, and self-fulfillment needs (Sergiovanni & Starratt, 1979). In education, motivation has attracted considerable attention. Hattie and Timperley (2007) regarded motivation as an affective process essential to the attainment of learning goals. According to Tseng and Schmitt (2008), motivated learners are more willing to engage in sustained self-regulated learning, thereby facilitating goal achievement. Filgona et al. (2020) likewise emphasized the role of motivation in directing effort toward learning objectives.

Self-efficacy is closely related to motivation. Bandura (1994) defined self-efficacy as individuals' beliefs about their capabilities to produce desired effects. Such beliefs are highly motivational and can encourage individuals to take action and persist when facing difficulties (Bandura, 1977, 1994). According to Bandura (1977), self-efficacy develops through mastery experiences, observing others' actions, social encouragement, and emotional states. Therefore, Bandura (1977, 1994) suggested that teachers have the responsibility to foster or sustain students' willingness to act and overcome difficulties by creating a learning environment conducive to success.

Teacher Guidance

The primary goal of teacher guidance is to develop learners' ability to recognize and reflect on their own strengths, weaknesses, and needs (Brown & Palincsar, 1989), while also supporting their confidence and problem-solving skills (Fisher & Frey, 2008). Under the theories of the zone of proximal development (Vygotsky, 1978) and educational scaffolding (Wood et al., 1976), an essential role of teachers is to support and challenge students according to their developmental needs. In both theory and practice, the scope and difficulty of instruction should remain within the zone between a student's actual and potential development (Vygotsky, 1978).

As instruction progresses, teachers should provide appropriate support (scaffolds) that matches students' current level of competence until their skills improve (Wood et al., 1976). Teachers should then gradually transfer responsibility for learning to students, while students assume increasing responsibility in order to remain appropriately challenged and avoid becoming bored or complacent (Lipscomb et al., 2010; Vygotsky, 1978).

This teaching model therefore aligns with Bandura's concept of self-efficacy. Bandura (1977, 1994) suggested that people who are confident in their abilities are more likely to act, persist, and take on more challenging tasks after successful performance experiences.

Learning Strategies

The use of learning strategies can significantly influence learning outcomes. Oxford (1990) identified six major categories of learning strategies: cognitive, mnemonic, compensatory, metacognitive, affective, and social. The usefulness of these strategies depends on learners' dispositions, sociocultural backgrounds, prior knowledge, task demands, and available learning resources (Teng, 2023).

Several studies have examined the role of learning strategies in language learning. Mizumoto and Takeuchi (2009) reported a significant relationship between learning strategies and TOEIC scores, and recommended aligning strategy use with students' motivation, study time, and situational demands to achieve better results. A study conducted by Ting (2011) found that strategy use was as important as knowledge and attitudes in achieving learning goals. A study by Lai (2013) suggested that vocabulary learning strategies could facilitate learning and that strategy training was particularly beneficial for less proficient students. Pan (2014) further suggested a connection between students' expectations, such as obtaining high scores on an upcoming test, and their use of learning strategies.

Vocabulary Knowledge

Vocabulary knowledge plays a crucial role in language learning and performance on proficiency tests. As Wilkins (1985) pointed out, vocabulary is an essential medium for expression and communication. Pedagogical studies by Masrai and Milton (2017) and Nation (1990) demonstrated that learning is more effective when students possess a sufficiently large vocabulary. Anam (2019) and Karami and Bowles (2019) further argued that vocabulary knowledge is the foundation for the development of the four major language skills. In studies focusing on language proficiency, Ichige (2016) and Kaneko (2017) showed that vocabulary knowledge can affect how students perform on tests.

2.4. Memory-Strengthening Curricula

Individuals frequently forget information that they have learned (Hartwig & Dunlosky, 2012; Roediger & Butler, 2011). Curricula should facilitate the long-term retention of learned information so that it can be applied to solve future problems. Study habits, testing, and training in knowledge retention and transfer strongly influence the achievement of this goal (Chi et al., 2010; Hartwig & Dunlosky, 2012; Roediger & Butler, 2011).

In practice, testing and quizzing help students retrieve information, improve learning outcomes, and motivate them to study more consistently (Roediger & Butler, 2011). Nonetheless, it is worth noting that intensive repeated study is often less effective than practice or appropriately spaced tests (Roediger & Butler, 2011; Voice & Stirton, 2020). Another issue concerns the selection and application of learning strategies most suitable for students. As indicated by Oxford (1990), there are six major types of learning strategies, each effective under certain circumstances. Among them, mnemonic strategies have been identified as useful tools for promoting deeper learning, enabling students to recall relevant information when needed (Teng, 2023). Mnemonic devices such as pictures, diagrams, and photos are often used as

aids in achieving these outcomes (Amiryousefi & Ketabi, 2011; Kurniarahman, 2023; Pillai, 2017).

3. Methods

3.1. Participants

This study included students of an EFL course taught by the researcher and additional group of students involved in questionnaire development. A total of 52 fourth-year students in the EFL program of a five-year junior college division formed the experimental group. These students had an education level equivalent to first-year university students and were enrolled in a course titled *Elite TOEIC 900*, which was taught by the researcher. An additional group of 62 students enrolled in the same EFL program responded only to the preliminary study questionnaire. Their responses served as input for questionnaire revision in the creation of the final version. These students were a year older than those in the experimental group and had taken the same course.

3.2. Learning Materials

The following learning materials were used in this study: a textbook, a supplementary TOEIC vocabulary book, a TOEIC Listening and Reading test, 12 vocabulary quizzes, and a questionnaire.

The textbook, titled *Success with the New TOEIC Test 2* (Tracy, 2019), contains two complete sets of listening and reading questions. The vocabulary book, titled *Ultimate TOEIC Vocabulary for the New TOEIC Test* (Yang, 2019), contains high-frequency words and phrases. The TOEIC test was taken from the *TOEIC Listening and Reading Test: Official Test-Preparation Guide. V.7* (ETS, 2022) and used in both the pretest and posttest. The test questions were not subjected to additional reliability and validity tests because they were developed by ETS. Weekly quizzes were administered during class. The quiz questions were retrieved from sentences provided in the supplementary TOEIC vocabulary book. The researcher developed the “Questionnaire on Self-reported Factors Affecting English Learning Approaches and TOEIC Performance among

Students,” which participants completed after taking the posttest. Items were rated on a 5-point Likert scale. The questionnaire was developed through a two-step process. First, a 46-item preliminary questionnaire was distributed to 62 students, whose responses and feedback were examined through exploratory factor analysis. Valid factors were extracted through principal component analysis. Only factors with an eigenvalue greater than 1.0, as determined based on Kaiser Oblimin rotation, were included as constructs to be measured through the questionnaire. Through this technique, 41 items were selected and unevenly distributed across the four factors identified as valid, representing four principal categories of influence: vocabulary knowledge, motivation, learning strategies, and teacher guidance. These factors collectively accounted for 69.966% of the observed variance. The Kaiser–Meyer–Olkin value of the factor analysis was .726 ($p < .001$), indicating these effectively explain the data. A Cronbach’s α of .981 was attained, indicating the high internal consistency and excellent reliability of these factors.

3.3. Instructional Intervention

This study was conducted over one semester (18 weeks) during the 2022 academic year. The study employed a one-group pretest–posttest quasi-experimental design, as all participants received the same instructional treatment and no control group was included. During the study, student participants received instruction in examination-related vocabulary knowledge. The instructional approach also incorporated mnemonic strategies designed to facilitate vocabulary retention through meaningful associations, visual imagery, and structured memory cues.

At the beginning of the study, students were administered a vocabulary knowledge pretest. Students were then assigned to one of three groups (high, intermediate, and low scorers) based on their pretest results. These proficiency groupings were used for comparative analysis to examine whether learners with different initial levels of

vocabulary knowledge demonstrated similar or different patterns of progress following the intervention. All students remained in their original cohort and received the same instruction in the components of words (prefix, root, suffix). Students were encouraged to connect prefixes, roots, and suffixes with mnemonic devices such as keyword associations, word structure analysis, and visual memory aids.

This in-class instruction and the required self-study component were designed as complementary parts of a single integrated instructional intervention. Additionally, students were required to study lessons from the supplementary TOEIC vocabulary book at home. The course met once per week for approximately 100 minutes per session over 18 weeks, providing a total of approximately 32 instructional hours, excluding self-study time. Within the first 30 minutes of a class session, a quiz was administered covering the unit assigned to students in the previous week.

Throughout the course duration, students completed 12 quizzes administered at uniform intervals. The weekly quizzes also served as a means of monitoring students' engagement with the assigned vocabulary materials and their progress throughout the course. At the end of the semester, students received a posttest containing the same set of questions as the pretest and responded to the questionnaire.

3.4. Data Processing

This study employed a one-group pretest-posttest quasi-experimental design. All participants received the same instructional treatment, and pretest, quiz, posttest, and questionnaire data were collected to evaluate the effectiveness of the intervention. Statistical analyses were conducted with SPSS for Windows 28 to (1) determine students' initial vocabulary

knowledge and group them accordingly, using descriptive statistics and pretest score rankings to classify learners into high-, intermediate-, and low-proficiency groups, (2) evaluate the effect of the instructional intervention on learning outcomes, using paired-samples t tests to compare students' pretest and posttest scores, (3) identify intergroup differences in learning outcomes, using one-way ANOVA to compare gain scores among the three proficiency groups. Although all participants received the same instructional treatment, group comparisons were conducted to examine whether learners with different initial vocabulary levels showed similar or different patterns of progress following the intervention, and (4) examine students' questionnaire responses, using descriptive statistics (means and standard deviations) to summarize responses, with reliability analysis conducted using Cronbach's alpha where appropriate.

4. Findings

4.1. Initial Vocabulary Knowledge and Grouping of Students

Students were ranked according to the percentile of their pretest score. Students in the top 27% of their class were categorized as high scores (15 students), those in the middle 46% as intermediate scorers (23 students), and those in the bottom 27% as low scorers (14 students). The mean scores obtained were 742.3333, 549.1304, and 426.7857 in the high, intermediate, and low scoring groups, respectively (Table 1). An intergroup analysis of variance (ANOVA) revealed an F value of 112.872, with ($p < .001$), indicating significant intergroup differences in initial performance (Table 2). Furthermore, the result of a Scheffé test likewise confirmed significant differences between groups (Table 3).

Table 1
Descriptive Statistics of Each Group

Groups	N	Mean	SD	SE	95% confidence interval of the Means		Mini	Maxi
					LL	UL		
High scorers	15	742.3333	79.32453	20.48151	698.4049	786.2618	650.00	905.00
Intermediate scorers	23	549.1304	40.97261	8.54338	531.4125	566.8483	485.00	635.00
Lower Scorers	14	426.7857	52.71867	14.08966	396.3469	457.2246	305.00	480.00
Sum	52	571.9231	133.10822	18.45879	534.8655	608.9806	305.00	905.00

Table 2
Intergroup ANOVA Results

Source of variation	$\sum x^2$	Df	MS	F	Significance
Inter-group	742451.393	2	371225.697	112.872	<.001
Intra-group	161156.299	49	3288.904		
Sum	903607.692	51			

Table 3
Scheffé Test Results

(I) Low, Moderate, and High Transformation	(J) Low, Moderate, and High Transformation	MD (I-J)	SE	Significance	95% confidence interval	
					LL	UL
1.00	2.00	193.20290*	19.03303	<.001	145.1538	241.2520
	3.00	315.54762*	21.31155	<.001	261.7463	369.3489
2.00	1.00	-193.20290*	19.03303	<.001	-241.2520	-145.1538
	3.00	122.34472*	19.44010	<.001	73.2679	171.4215
3.00	1.00	-315.54762*	21.31155	<.001	-369.3489	-261.7463
	2.00	-122.34472*	19.44010	<.001	-171.4215	-73.2679

Note. Mean difference at 0.05 significance level

4.2. Effect of Instructional Intervention on Learning Outcomes Between-Group Effects

By the end of the course, participating students collectively obtained a cumulative average of 66.48 points out of a maximum 100.0. Collective performance improved steadily from 58.69 on the first quiz to 64.69 on the seventh and 77.31 on the twelfth.

Students' pretest and posttest scores were converted into Z-scores. Next, posttest scores were compared with quiz and pretest scores through a

linear regression model ($F = 205.528, p < .001$, Table 4), which was confirmed to be significantly predictive. Analysis of the pretest Z-scores revealed $B = .981 (p < .001)$, indicating an increase of 1.0 point on the pretest resulted in an increase of .981 points on the posttest. When the influence of the pretest was excluded, $B = .116 (p = .017)$, indicating an increase of 1.0 point on the quizzes resulted in an increase of .116 points on the posttest (Table 5). The R^2 of the regression model was .893 (Table 6), indicating that the scores achieved on the 12 quizzes accounted for 89.3% of the variance in

the posttest scores, suggesting a strong predictive performance. relationship between quiz scores and posttest

Table 4
ANOVA^a

Model		$\sum X^2$	Df	MS	F	Significance
1	Regression	11674.235	2	5837.117	205.528	<.001 ^b
	Residual	1391.630	49	28.401		
	Sum	13065.864	51			

Note. a. Dependent variable: posttest scores
b. Independent variables: quiz and pretest scores

Table 5
Coefficient^a

Model		Non-standardized coefficient		Z-score coefficient	T	Significance
		B	SE	B		
1	Independent Variable	-1.914	3.266		-.586	.561
	Pretest	.981	.074	.833		
	Quizzes	.116	.047	.156		

Note. a. Dependent variable: posttest scores

Table 6
Model Summary

Model	R	R ²	Adjusted R ²	SE
1	.945 ^a	.893	.889	5.32922

Note. a. Independent variables: quiz and posttest scores

Pretest and the posttest scores were analyzed with a paired samples t-test, for which $t = -40.991$ ($p < .001$) (Table 7), indicating significant differences between pretest and posttest performance.

Table 7
Paired Samples t-Test of Pretest and Posttest Scores

Pair	Paired difference		SEM	95% confidence interval of difference		T	Df	Significance		
	Mean	SD		LL	UP			One-sided p	Two-sided p	
Pair 1	Pretest - Post	593.59615	147.67831	14.48105	-622.31590	-	-	103	<.001	<.001
	test					40.991				

Within-Group Effects

To facilitate intergroup comparison, an initial series of paired t-tests was conducted for each group. For high scorers, $t = -46.323$ (standard deviation [SD] = 91.04565, $p < .001$). For intermediate scorers, $t = -51.489$ (SD = 74.82762, $p < .001$). For low scorers, $t = -28.554$ (SD = 82.74883, $p < .001$). These results confirm the existence of significant within-group differences between pretest and posttest scores.

The Pearson correlation between quiz performance and posttest scores was determined

within each group. The high-scoring group had a nonsignificant coefficient of $r = -.115$ ($p = .684$) (Table 8). The intermediate-scoring group had a significant coefficient of $r = .603$ ($p = .002$) (Table 9). The low-scoring group had a significant coefficient of $r = .726$ ($p = .003$) (Table 10). Therefore, no significant differences existed between quiz and posttest performance in the high-scoring group, whereas a significant difference between quiz and posttest performance was observed in both the intermediate- and low-scoring groups.

Table 8
Correlation Within High-Scoring Group

Variables		Quizzes	Posttest
Quizzes	Pearson Correlation	1	-.115
	Significance (two-tailed)		.684
	N	15	15
Posttest	Pearson Correlation	-.115	1
	Significance (two-tailed)	.684	
	N	15	15

Table 9
Correlation Within Intermediate-Scoring Group

Variables		Quizzes	Posttest
Quizzes	Pearson Correlation	1	.603**
	Significance (two-tailed)		.002
	N	23	23
Posttest	Pearson Correlation	.603**	1
	Significance (two-tailed)	.002	
	N	23	23

Note. **Correlation reaching 0.01 significance level (two-tailed).

Table 10
Correlation Within Low-Scoring Group

Variables		Quizzes	Posttest
Quizzes	Pearson Correlation	1	.726**
	Significance (two-tailed)		.003
	N	14	14
Posttest	Pearson Correlation	.726**	1
	Significance (two-tailed)	.003	
	N	14	14

Note. **Correlation reaching 0.01 significance level (two-tailed).

These statistical analyses revealed key findings for the entire cohort. First, quiz scores suggested that regardless of initial vocabulary knowledge, students achieved uniform and consistent progress. Second, based on the contributions of initial vocabulary knowledge and quiz scores to posttest scores, both initial vocabulary knowledge and sustained and persistent learning efforts affected learning outcomes. Third, student performance improved significantly between the pretest and the posttest.

Within-group differences between pretest and posttest scores were observed. However, the

correlation between quiz and posttest performance was significant in the intermediate- and low-scoring groups but not in the high-scoring group.

4.3. Questionnaire Results

Questionnaire results were categorized according to four factors, with scores rated on a scale of 1–5 as follows: 1, strongly disagree; 2, disagree; 3, neutral; 4, agree; 5, strongly agree (Tables 11–14).

Table 11

Factor 1: Vocabulary Knowledge

Item	Average rating
8. Vocabulary knowledge is crucial to English proficiency.	4.4
9. Knowing more words will increase my English proficiency.	4.5
25. Greater knowledge of TOEIC vocabulary can help me understand the test questions and answer correctly.	4.5
27. Greater knowledge of TOEIC vocabulary can help me keep up with the speaker in the listening test.	4.5
28. Greater knowledge of TOEIC vocabulary can help me distinguish between similar words in the listening test and avoid confusion.	4.4
29. Greater knowledge of TOEIC vocabulary can improve my judgment when completing the photographs section of the listening test (part I) and therefore help me answer correctly.	4.6
30. Greater knowledge of TOEIC vocabulary can help me understand key words in the question-response section of the listening test (part II) and therefore answer correctly.	4.5
31. Greater knowledge of TOEIC vocabulary can help me understand the scenarios presented in the conversations section of the listening test (part III) and therefore answer correctly.	4.5
32. Greater knowledge of TOEIC vocabulary can help me understand the content of the short talks section of the listening test (part IV) and therefore answer correctly.	4.4
33. I feel more confident taking the listening test because of my increased vocabulary knowledge.	4.5
34. Greater vocabulary knowledge can improve my listening test performance.	4.5
36. Sufficient knowledge of TOEIC vocabulary can help me better understand the reading test questions.	4.6
37. Greater knowledge of TOEIC vocabulary can help me understand the sentences in the incomplete sentences section of the reading test (part V) and therefore answer correctly.	4.5
38. Greater knowledge of TOEIC vocabulary can help me understand the paragraphs in the text completion section of the reading test (part VI) and therefore answer correctly.	4.6
39. Greater knowledge of TOEIC vocabulary can help me understand the questions in the reading comprehension section of the reading test (part VII) and therefore answer correctly.	4.5
40. Greater knowledge of TOEIC vocabulary can improve my reading test performance.	4.5
41. Greater vocabulary knowledge can improve my overall performance on the TOEIC.	4.6

Table 12
Factor 2: Motivation

Item	Average rating
1. I am interested in learning English.	4.3
2. I consider fully understanding the contents of an English class to be important.	4.5
3. If I try hard enough, I can understand the content of an English class.	4.6
5. My interest in the people, events, and other aspects of English-speaking countries has motivated me to learn English.	4.3
6. I can achieve high English proficiency if I study hard.	4.6
7. I can boost my self-confidence by learning English.	4.6
12. I consider learning new words to be fascinating.	4.0
17. I can concentrate on memorizing words.	4.2
18. When learning, I confirm whether my objective has been accomplished.	4.0
19. When memorizing words, I avoid doing other things.	3.9

Table 13
Factor 3: Learning Strategies

Item	Average rating
11. I practice words I have recently learned or previously memorized.	4.1
14. I identify words I have not learned on the vocabulary list and consider learning these words to be my objective.	4.1
15. I repeatedly listen to the audio track included with the vocabulary book to learn new words.	3.9
20. I use multiple methods to memorize words, such as listening, spelling, or analyzing the word structure.	4.4
22. I memorize difficult or lengthy words separately from other words.	4.0
23. The information on the structure of TOEIC vocabulary provided in this class increased my vocabulary knowledge.	4.4
24. The weekly TOEIC vocabulary quiz helped me build vocabulary knowledge.	4.4
26. When encountering unknown words in the listening test, I try to guess their meaning.	4.3
35. When encountering unknown words in the reading test, I try to guess their meaning.	4.5

Table 14
Factor 4: Teacher Guidance

Item	Average rating
4. I consider learning the contents of an English class to be useful.	4.6
10. I allocate time to memorize words that will be included in the upcoming quiz.	4.3
13. I complete vocabulary homework assignments according to the quiz schedule.	4.2
16. I compile a list of important vocabulary each week.	4.2
21. I always strive to keep up with the vocabulary acquisition schedule.	4.3

The questionnaire results primarily reflect students' self-reported perceptions of the course, vocabulary learning, and related learning strategies rather than direct evidence of the effects of the instructional intervention. Among the 41 questionnaire items, only two received an average

rating below 4.0, indicating that students generally held favorable views toward the course and its learning activities. Therefore, the questionnaire findings should be regarded as supplementary descriptive data that provide contextual support for the quantitative results rather than as direct measures of treatment effects.

Specifically, in the vocabulary knowledge factor, most items received mean scores ranging from 4.4 to 4.6, suggesting that students generally perceived increased vocabulary knowledge as helpful for improving their performance on the TOEIC Listening and Reading Test. In the motivation factor, most items were rated between 4.0 and 4.6, indicating positive attitudes toward English learning, confidence that effort can lead to improvement, and willingness to monitor their own learning progress. In the learning strategies factor, most items received ratings between 4.0 and 4.5, suggesting that students reported using review strategies, contextual guessing, and multiple memorization techniques to learn vocabulary. In the teacher guidance factor, all items were rated between 4.2 and 4.6, reflecting positive views toward the weekly learning schedule, vocabulary assignments, and systematic instructional support.

With regard to the research questions, students' posttest scores were significantly higher than their pretest scores, indicating measurable improvement during the instructional period. Additionally, although students in all groups made progress, differences between pretest and posttest scores suggest that final learning outcomes were associated with learners' initial vocabulary levels. On the whole, these findings primarily address the first research question, namely whether the instructional intervention helped improve students' learning effectiveness.

Several limitations of the present study should be acknowledged. First, the study employed a one-group pretest–posttest design without a control group; therefore, causal interpretations should be made with caution. As such, the findings should be interpreted within the constraints of quasi-experimental classroom research, in which full control over extraneous variables is not possible. While students' out-of-class vocabulary learning could not be fully controlled, all participants were assigned the same materials and weekly tasks, and quizzes were used to monitor their engagement. However, the potential influence of external learning cannot be entirely excluded and is recognized as a limitation of the study.

Second, although the questionnaire provided useful supplementary insights, some items measured broader learner orientations rather than responses solely to the instructional intervention. Accordingly, the questionnaire findings should be interpreted as supportive evidence rather than direct measures of treatment effects. Future studies are encouraged to include control groups and use more intervention-specific instruments.

5. Discussion

Observed pretest–posttest comparisons indicated an improvement in vocabulary knowledge among participating students over the course of the study. All items for the vocabulary knowledge factor received an average score above 4.0. These responses reflect students' favorable opinion of the instructional intervention and belief that greater vocabulary knowledge can improve their English proficiency. These findings are consistent with previous studies. Laufer (1992) proposed the vocabulary threshold theory, which suggests that when the amount of learned vocabulary reaches a certain level, learners perform considerably better in reading tasks. More recent studies have continued to support the close relationship between vocabulary knowledge, lexical coverage, and reading comprehension (Ait Hammou et al., 2025; Ludewig et al., 2023; Pellicer-Sánchez, 2024). Likewise, Read (2000) emphasized that quick recognition of words or phrases and contextual reasoning is essential for test performance. Recent research has further shown that higher lexical coverage facilitates more efficient text processing and comprehension among L2 learners (Pellicer-Sánchez, 2024).

For the motivation factor, all questionnaire items except 19 received an average score above 4.0. The responses reflect the perceived usefulness of the classroom activities among students and their desire for self-improvement, willingness to track their learning progress, and belief in hard work and the positive effect of learning on self-confidence. These findings are consistent with those of previous studies. Bandura (1997) proposed self-efficacy theory, which suggests that self-

confidence can motivate learning behavior and support sustained learning efforts. According to Nation (2001), reading and listening skills bolster learners' confidence and abilities. Deci and Ryan (1985) and Dörnyei (2005) demonstrated a correlation between positive belief in one's own learning capacity and the ability to overcome learning difficulties and maintain learning momentum. The instructional intervention in this study was also motivational because students clearly understood its purpose, which can drive learners to accomplish related goals (Pan, 2014).

For the learning strategies factor, all items except 15 received an average score above 4.0. These responses reflect students' tendency to guess the meaning of unknown words through contextual analysis and willingness to follow the prescribed learning schedule, review and practice high-frequency words, and prepare for upcoming tests. Students also reported that explicit instruction in morphological rules, such as the analysis of prefixes, roots, and suffixes, enabled them to infer the meanings of unfamiliar words and facilitated the retention of newly learned vocabulary. Students often exercise their cognition and metacognition and use mnemonics as part of their learning strategies (Oxford, 1990; Teng, 2023), showcasing their learning flexibility. This finding is inconsistent with those reported in certain previous studies. For example, Sui (2011) found Taiwanese learners' decision-making and related actions among Taiwanese learners. Similarly, other studies have highlighted the prevalence of dependence on rote memorization among Taiwanese students (Chen et al., 2020; Huang, 2014; Liao, 2004).

For the teacher guidance factor, all questionnaire items received an average score above 4.0. These responses reflect students' ability to use cognitive, metacognitive, and mnemonic learning strategies, underscoring their adaptability and active mindset when learning. The instructional intervention implemented in this study differs from mere cramming, instead incorporating assignments structured around weekly quizzes and a final assessment. Under this instructional approach, students studied for a new

task (quiz) each week, received feedback from the teacher or through quiz scores, and practiced recalling information for the final assessment. New course content was presented each week, minimizing the time students spent reviewing vocabulary they had already learned. This approach is suited to students' cognitive processes (Karpicke & Roediger, 2008; Roediger & Butler, 2010; Voice & Stirton, 2020). This curriculum and teaching strategy eschewed cramming strategies that are often advertised by cram schools as a shortcut to quick results. Hartwig and Dunlosky (2012) suggested that mass review of course materials leads to low learning effectiveness, passive learning attitudes, and an inability or unwillingness to apply learning strategies. Similarly, Tsai (2020) suggested that cramming has resulted in passive learning attitudes and uncertainty regarding one's goals for adult life among young students in Taiwan.

Notably, although significant differences were observed between students' initial vocabulary knowledge and posttest performance, this pattern exhibited discrepancies between groups. The improvements between pretest and posttest scores were significant in the intermediate- and low-scoring groups but not in the high-scoring group. Why did the instructional intervention benefit high scorers less than intermediate and low scorers? The zone of proximal development theory (Vygotsky, 1978) and educational scaffolding theory (Wood et al., 1976) may explain this finding: course content and instructional approaches should match learners' development stage; otherwise, they may experience anxiety or reduced learning enthusiasm. The instructional intervention outlined in this study may have been suited to the lower- and intermediate-scoring groups but not the high-scoring group. This explanation aligns with Zhong's (2011) finding that "the need to learn or to catch up with peers" motivates individuals' actions (p. 122). Thus, the high scorers in this study may have felt no need to exert extra effort.

With regard to the first research question, the findings indicate that the teaching technique significantly improved students' learning effectiveness. Posttest scores were significantly

higher than pretest scores, while quiz performance improved steadily throughout the course, indicating continuous progress. The instructional intervention also contributed to better performance on the TOEIC Listening and Reading Test. Overall, these findings suggest that the structured vocabulary instruction effectively promoted students' learning outcomes.

In relation to the second research question, the findings indicate that students' initial competence levels lead to varied effectiveness of the instruction. Although all groups made progress, significant pretest-posttest gains were found only in the intermediate- and low-scoring groups. Additionally, the relationship between quiz and posttest performance was significant only for these two groups. These results suggest that students with higher initial competence did not benefit as much as those with intermediate or lower initial vocabulary competence.

6. Conclusion

This study has four main findings. First, the instructional intervention improved performance on the TOEIC Listening and Reading test. Second, this intervention also increased learning motivation and momentum. Third, an insufficiently challenging learning environment may compromise learning effectiveness. Fourth, curricula with appropriate structure and implementation may be suitable for those Taiwanese learners who depend on cram schools to bolster their educational competitiveness and excel in examinations. After-school instruction in cram schools is a financial burden to certain students and their families (Chou & Yuan, 2011), which may exacerbate educational inequality. Additionally, cram school learning decreases motivation among young learners and discourages them from exploration and learning on their own (Chou & Yuan, 2011).

This study demonstrated that a dedicated teacher and appropriately structured curriculum can promote effective learning among students during regular school hours without the need to seek supplementary instruction. However, student

participants in this study were not given the opportunity to share their perspective on learning improvement through social, affective, and compensatory strategies. Therefore, further research on this topic is recommended.

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Declaration

The author confirms that the manuscript is original, has not been published elsewhere, and is not under consideration by any other journal. The author has read and approved the final version of the manuscript for publication.

Ethical Statement

This study was conducted in accordance with ethical standards for educational research. The participants were informed of the purpose of the study, and their participation was voluntary. All data were used only for academic research purposes, and participants' identities were kept confidential.

AI Disclosure Statement

The author used AI-assisted tools only for language refinement and editorial checking during the preparation of the manuscript. The intellectual content, research design, data analysis, interpretation of results, and final responsibility for the manuscript remain entirely with the author.

Conflict of Interest Statement

The author declares that there is no conflict of interest related to this study.

References

- Agnes, D., & Srinivasan, R. (2024). Redefining the association between memory, mnemonics and vocabulary acquisition— Reviewing paradigms in research. *Journal of Language Teaching and Research*, 15(3), 697–706. <https://doi.org/10.17507/jltr.1503.02>
- Ait Hammou, B., Zaafour, A., Nadif, B., & Zemrani, M. (2025). Vocabulary coverage and size in EFL critical reading. *Language Teaching Research Quarterly*, 47, 196–213. <https://doi.org/10.32038/ltrq.2025.47.11>
- Amiryousefi, M., & Ketabi, S. (2011). Mnemonic instruction: A way to boost vocabulary learning and recall. *Journal of Language Teaching and Research*, 2(1), 178–182. <https://doi.org/10.4304/jltr.2.1.178-182>
- Anam, M. K. (2019). The impact of vocabulary depth and breadth to the TOEFL reading subtest in Iain Kediri. *International Journal of Language Education*, 3(2), 49–57. <https://doi.org/10.26858/ijole.v3i2.9947>
- Ausubel, D. P. (1963). *The psychology of meaningful verbal learning*. Grune & Stratton.
- Baddeley, A. (2003). Working memory and language: an overview. *Journal of Communication Disorders*, 36(3), 189–208. [https://doi.org/10.1016/S0021-9924\(03\)00019-4](https://doi.org/10.1016/S0021-9924(03)00019-4)
- Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, 84(2), 191–215.
- Bandura, A. (1993). Perceived self-efficacy in cognitive development and functioning. *Educational Psychologist*, 28, 117–148.
- Bandura, A. (1994). Self-efficacy. In VS Ramachaudran. *Encyclopedia of human behavior*, 4(4), 71-81.
- Bandura, A. (1997). *Self-efficacy: The exercise of control*. W. H. Freeman.
- Brown, A. L., & Palincsar, A. S. (1989). Guided learning: The role of metacognition in the development of strategic thinking. In L. B. Resnick (Ed.), *Knowing, learning, and instruction: Essays in honor of Robert glase* (pp. 393–451). Lawrence Erlbaum.
- Chen, F., Kao, S. M., & Tsou, W. (2020). Toward ELF-informed bilingual education in Taiwan: Addressing incongruity between policy and practice. *English Teaching & Learning*, 44(2), 175–191. <https://doi.org/10.1007/s42321-020-00055-1>
- Chen, I. S., Liu, Y. T., Yorozuya, R., & Uchino, S. (2025). Bridging bilingual boundaries: Taiwan’s nationwide strategy for EFL transformation. *Humanities and Social Sciences Communications*, 12(585), 1–12. <https://doi.org/10.1057/s41599-025-04867-z>
- Chi, M. T. H., Bassok, M., Lewis, M. W., Reimann, P., & Glaser, R. (2010). Self-explanations: How students study and use examples in learning to solve problems. *Cognitive Science*, 13(2), 145–182. https://doi.org/10.1207/s15516709cog1302_1
- Chou, C. P., & Yuan, J. K. S. (2011). Buxibanin Taiwan. *The Newsletter*, 56(15), 1.
- Chun Shin. (2025). *TOEIC*. Chun Hsin Limited.
- Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behavior*. Springer.
- Derer, Ö. K., & Berkant, H. G. (2020). The effect of puzzle-based learning on secondary school students’ attitudes toward English lesson and self-efficacy beliefs in English. *Journal of Theoretical Educational Science*, 13(1), 205–231. <https://doi.org/10.30831/akukeg.564792>
- Dörnyei, Z. (2005). *The psychology of the language learner: Individual differences in second language acquisition*. Lawrence Erlbaum.
- ETS. (2022). *TOEIC listening and reading test official test-preparation guide, V. 7*. Chun Shin Limited.
- Farjami, H. (2007). Picture production and picture perception: Comparing two modes of practicing concrete vocabulary. *Iranian Journal of Applied Linguistics*, 10(1), 1–15.
- Filgona, J., Sakiyo, J., Gwany, D. M., & Okoronka, A. U. (2020). Motivation in learning. *Asian Journal of Education and Social Studies*, 10(4), 16–37. <https://doi.org/10.9734/AJESS/2020/v10i430273>
- Fisher, D., & Frey, N. (2008). *Better learning through structured teaching: A framework for the gradual release of responsibility*. Association for Supervision and Curriculum Development.
- Hartwig, M. K., & Dunlosky, J. (2012). Study strategies of college students: Are self-testing and scheduling related to achievement? *Psychonomic Bulletin & Review*, 19(1), 126–134. <https://doi.org/10.3758/s13423-011-0181-y>
- Hattie, J., & Timperley, H. (2007). The power of feedback. *Review of Educational Research*, 77(1), 81–112.
- Huang, Y. C. (2014). Formal vocabulary instruction in EFL context. *Journal of National Formosa University*, 32(2), 37–50. [https://doi.org/10.6425/JNHUST.201412_32\(2\).0004](https://doi.org/10.6425/JNHUST.201412_32(2).0004)
- Ichige, Y. (2016). Exploring the relation of vocabulary size to TOEIC reading scores. *CLEIP Journal*, 2, 41–48.

- Kaneko, M. (2015). Vocabulary size required for the TOEFL iBT listening section. *The Language Teacher*, 39(1), 9–14. <https://doi.org/10.37546/JALTTLT39.1-2>
- Kaneko, M. (2017). Vocabulary size targets for the TOEIC test. *JACET Journal*, 61, 57–67. https://doi.org/10.32234/jacetjournal.61.0_57
- Karami, A., & Bowles, F. A. (2019). Which strategy promotes retention? Intentional vocabulary learning, incidental vocabulary learning, or a mixture of both? *Australian Journal of Teacher Education*, 44(9), 25–43. <https://doi.org/10.14221/ajte.2019v44n9.2>
- Karpicke, J. D., & Roediger, H. L., III. (2008). The critical importance of retrieval for learning. *Science*, 319(5865), 966–968. <https://doi.org/10.1126/science.115240>
- Kurniarahman, I. (2023). Mnemonics and their effect on students' vocabulary memorization and recall: A quantitative study. *BATARA DIDI: English Language Journal*, 2(1), 10–24. <https://doi.org/10.56209/badi.v2i1.51>
- Lai, Y. C. (2013). Integrating vocabulary learning strategy instruction into EFL classrooms. *Taiwan Journal of TESOL*, 10(1), 37–76.
- Laufer, B. (1992). How much lexis is necessary for reading comprehension? In P. J. Arnaud & H. Béjoint (Eds.), *Vocabulary and applied linguistics* (pp. 126–132). Palgrave Macmillan.
- Lestari, N., & Yulia, Y. (2018). The use of crossword puzzle to improve vocabulary mastery of the fifth grade students of SD N Golo. *JELLT (Journal of English Language and Language Teaching)*, 2(2), 71–79. <https://doi.org/10.36597/jellt.v2i2.3275>
- Liao, Y. F. (2004). A survey study of Taiwan EFL freshmen's vocabulary learning strategies. *Journal of National Pingtung University*, 21, 271–288.
- Lipscomb, L., Swanson, J., & West, A. (2010). *Scaffolding*. In M. Orey (Ed.), *Emerging perspectives on learning, teaching, and technology* (pp. 226–238).
- Ludewig, U., Schroeders, U., & Colleagues. (2023). Vocabulary, text coverage, word frequency and the lexical threshold hypothesis. *Reading and Writing*, 36, 1–25. <https://doi.org/10.1007/s11145-022-10385-0>
- Masrai, A., & Milton, J. (2017). Recognition vocabulary knowledge and intelligence as predictors of academic achievement in EFL context. *TESOL International Journal*, 12(1), 128–142.
- Mizumoto, A., & Takeuchi, O. (2009). A close look at the relationship between vocabulary learning strategies and TOEIC scores. *TOEIC® Research Report*, 4, 1–42.
- Nation, I. S. P. (1990). *Teaching & learning vocabulary*. Heinle & Heinle Publishers.
- Nation, I. S. P. (2001). *Learning vocabulary in another language*. Cambridge University Press.
- National Development Council. (2018). *Blueprint for developing Taiwan into a Bilingual nation by 2030*. Executive Yuan.
- Oxford, R. L. (1990). *Language learning strategies: What every teacher should know*. Heinle & Heinle.
- Pan, Y. C. (2014). Learner washback variability in standardized exit tests. *The Electronic Journal for English as a Second Language*, 18(2), 1–30.
- Pellicer-Sánchez, A. (2024). How does lexical coverage affect the processing of L2 texts? *Applied Linguistics*, 45(6), 953–976. <https://doi.org/10.110.1093/applin/amae06>
- Pillai, N. R. (2017). Using mnemonics to improve vocabulary, boost memory and enhance creativity in the ESL classroom. *Melta*, 1–25.
- Puspita, N., & Sabiqoh, N. (2017). Teaching vocabulary by using crossword puzzle. *English Education: Jurnal Tadris Bahasa Inggris*, 10(2), 308–325. <https://doi.org/10.24042/ee-jtbi.v10i2.1753>
- Read, J. (2000). *Assessing vocabulary*. Cambridge University Press.
- Rüdiger, S., Leimgruber, J., & Tseng, L. (2023). English in Taiwan. *English Today*, 39(2), 153. <https://doi.org/10.1017/S0266078422000062>
- Roediger, H. L., III., & Butler, A. C. (2010). The critical role of retrieval practice in long-term retention. *Trends in Cognitive Sciences*, TICS-917, 15(1), 20–27. <http://dx.doi.org/10.1016/j.tics.2010.09.003>
- Roediger, H. L., III., & Butler, A. C. (2011). The critical role of retrieval practice in long-term retention. *Trends in Cognitive Sciences*, 15(1), 20–27. <https://doi.org/10.1016/j.tics.2010.09.003>
- Sergiovanni, T. J., & Starratt, R. J. (1979). *Supervision: Human Perspectives* (2nd ed.). McGraw-Hill Book Company.
- Smithsarakarn, P. N. (2024). *Taiwan's bilingual policy and English language teaching: Quality in higher education* [Research report]. Taiwan Fellowship, Ministry of Foreign Affairs.
- Sui, H. H. (2011). A study on junior high school students' behavior of after-school tuition. *Journal of Data Analysis*, 6(3), 136–172.

- Teng, F. (2023). Language learning strategies. In Z. Wen, R. Sparks, A. Biedroń, & F. Teng (Eds.), *Cognitive individual differences in second language acquisition: Theories, assessment, and pedagogy* (pp. 147–173). De Gruyter.
- Ting, A. (2011). A study on Taiwanese high school EFL learners' literacy performance. *Literacy Information and Computer Education Journal (LICEJ)*, 2(3), 416–423. <https://doi.org/10.20533/licej.2040.2589.2011.0058>
- Tracy, C. (2019). *Success with the new TOEIC test 2*. Cengage Learning Asia Pte.
- Tsai, L. H. (2020). Has educational reform succeeded in Taiwan? 4500-percent rise in cram schools over past 30 years. *Common Wealth Magazine*, 689.
- Tseng, W. T., & Schmitt, N. (2008). Toward a model of motivated vocabulary learning: a structural equation modeling approach. *Language Learning*, 58(2), 357–400. <https://doi.org/10.1111/j.1467-9922.2008.00444.x>
- Tu, H. S. (2025). Enhancing vocabulary acquisition efficiency through metacognitive strategies and vocabulary tasks: A study of EFL learners in a Taiwanese university of technology. *Journal of Language Teaching and Research*, 16(1), 89–96. <https://doi.org/10.17507/jltr.1601.10>
- Voice, A., & Stirton, A. (2020). Spaced repetition: towards more effective learning in STEM. *New Directions in the Teaching of Physical Sciences*, 15(1), 1–10. <https://doi.org/10.29311/ndtps.v0i15.3376>
- Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Harvard University Press.
- Wilkins, D. A. (1985). *Linguistics in language teaching*. Edward Arnold.
- Wood, D., Bruner, J., & Ross, G. (1976). The role of tutoring in problem solving. *Journal of Child Psychology and Child Psychiatry*, 17(2), 89–100. <http://dx.doi.org/10.1111/j.1469-7610.1976.tb00381.x>
- Wu, L. Y., & Lau, K. (2019). Language education policy in Taiwan. In A. Kirkpatrick & A. J. Liddicoat (Eds.), *The Routledge international handbook of language education policy in Asia* (pp. 151–61). Routledge.
- Yang, S. H. (2019). *The ultimate TOEIC vocabulary for the new TOEIC test*. Tunghua Publisher.
- Yang, Y. C. (2024). Improving English as a foreign language learners' vocabulary and reading comprehension through crossword-assisted teaching. *Journal of English and Education (JEE)*, 10(2), 95–110. <https://doi.org/10.20885/jee.v10i2.36336>
- Yang, Y. C. (2025). Teaching EFL vocabulary through analyzing the structure of words coupled with using crossword puzzles. *International Journal of TESOL & Education*, 5(2), 57–74. <https://doi.org/10.54855/ijte.25523>
- Yeh, C. Y., & Wang, Y. H. (2004). An investigation into vocabulary learning strategies used by senior high school students in Taiwan. *Taiwan Journal of TESOL*, 1(2), 1–44.
- Zhong, H. F. (2011). Learning a word: From receptive to productive vocabulary use. In *The Asian conference on language learning 2011 official proceedings, January 2011, Osaka, Japan*.