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Vocabulary acquisition in learning English as a second language: examining the involvement load hypothesis and language anxiety with Taiwanese college students

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VOCABULARY ACQUISITION IN LEARNING ENGLISH AS A SECOND
LANGUAGE: EXAMINING THE INVOLVEMENT LOAD
HYPOTHESIS AND LANGUAGE ANXIETY WITH
TAIWANESE COLLEGE STUDENTS

A Dissertation Submitted in Partial Fulfillment
of the Requirements for the Degree of
Doctor of Philosophy

Hsin-Chia Cheng

College of Education and Behavior Sciences
School of Educational Research, Leadership, and Technology
Educational Technology

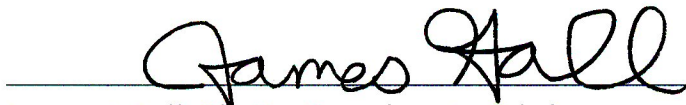May, 2011

This Dissertation by: Hsin-Chia Cheng

Entitled: *Vocabulary Acquisition in Learning English as a Second Language: Examining the Involvement Load Hypothesis and Language Anxiety with Taiwanese College Students*

has been approved as meeting the requirement for the Degree of Doctor of Philosophy in College of Education and Behavioral Sciences in School of Educational Research, Leadership, and Technology, Program of Educational Media and Educational Technology
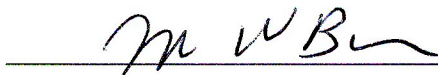
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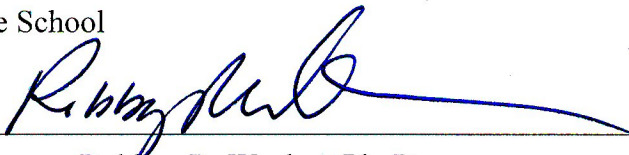_____

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ABSTRACT

Cheng, Hsin-Chia. *Vocabulary Acquisition in Learning English as a Second Language: Examining the Involvement Load Hypothesis and Language Anxiety with Taiwanese College Students.* Published Doctor of Philosophy dissertation, University of Northern Colorado, 2011

The purpose of this study was to investigate the impact on Taiwanese students' English vocabulary retention, task difficulty ratings, and task utility ratings under varied task load conditions (reading only, fill-in-the-blanks, writing) when controlling for level of trait anxiety. The task loads were based on the Involvement Load Hypothesis. The effects of task load on state anxiety were also examined. The participants in this study were 111 Taiwanese students, who were not English majors, from three English classes taught by the same teacher and using the same textbook at a university located in Northern Taiwan. The research findings included the following: students in the reading only group (with the lowest task load) generated higher vocabulary retention than the fill-in-the-blanks group (with a medium task load) when controlling for trait anxiety; after the learning tasks were completed, all students reported reduced state anxiety; the reading only group, which had the lowest task load, reported the highest difficulty ratings; students did not report higher utility ratings in higher task load conditions compared to lower ones when controlling for trait anxiety. One implication of this study is that the Involvement Load Hypothesis was able to distinguish between the lowest and highest

load tasks, but did not adequately describe the moderate task. Further research should

examine this and either revise or expand the model for more precision.

ACKNOWLEDGEMENTS

Though only my name appears on the cover of this dissertation, many people have contributed to its production. I owe my appreciation to all those people who have made this dissertation possible. I would especially like to thank my committee members Dr. Linda Lohr, Dr. James Gall, Dr. Jeff Bauer, and Dr. Michelle Low.

My deepest gratitude is to my advisor, Dr. Linda Lohr. I have been extremely fortunate to have an advisor who has given me the freedom to explore my research topic, and at the same time, the guidance to recover when my steps faltered. I am indebted to her for her continuous encouragement and support. I hope that one day I will become as good an advisor to my students as Dr. Lohr has been to me.

My co-advisor, Dr. James Gall, has been always there to listen and give me advice, and has taught me how to question thoughts, and express ideas. I am deeply grateful to him for the long discussions that helped me sort out the details of my study. I am also thankful to him for holding me to a high research standard and enforcing strict validations for each research result, and thus teaching me how to conduct research. His patience and support helped me overcome many crisis situations and finish this dissertation.

Dr. Michelle Low's insightful comments and constructive criticisms at different stages of my research helped me focus my ideas. I am also thankful to her for encouraging the use of correct grammar and consistent notation in my writings and for carefully reading and commenting on countless revisions of this manuscript.

I would like to thank the professor (Dr. Lin-Mei Pan) in the Applied Language Department of Ta Hwa Institute of Technology for offering her students as the participants in my study.

Lastly, I express my regards and blessings to all of those who supported me in all respects during the completion of the dissertation.

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INTRODUCTION

When learning a foreign or second language (L2), it is necessary to acquire

thousands of words in order to understand the reading contexts (Laufer, 2003). During the

past decade in Taiwan, learning English as a foreign language (EFL) has become a

national activity. From elementary school through college, all Taiwanese students should

take English classes as a core requirement. For learners in different age groups, many

continuous learning programs in Taiwan offer a variety of English course selections.

However, many researchers (Chen, 1997; Huang, Lin & Su, 2004) have found that

Taiwanese students' English vocabulary is limited. According to the 2007, 2008, and

2009 reports recently released by Educational Testing Service (ETS), of thirty countries

in Asia, Taiwanese students' overall English abilities has been ranked 18th, at the bottom

of the "Four Asian Tigers" (Hong Kong, Singapore, South Korea, and Taiwan) for three

consecutive years. Within this group, Taiwanese students' English reading abilities are the

worst. One of the main barriers that contribute to such a low English performance for

Taiwanese students may be the insufficient number of words in their English vocabulary.

Second Language Learning

With the development of digital computer technology, computer-assisted language

learning (CALL) has become a popular tool and strategy in learning L2. Nowadays,

CALL encompasses a wide range of media and it covers computer-mediated

communication (CMC), handheld electronic dictionaries, online dictionaries, online libraries, and many others. An online dictionary, one of the formats of CALL, is an Internet database containing a collection of words. Many online dictionaries provide a spell-check function. Students who enter partial or misspelled words can still get a suggestion list, select the correct word and then find the word meaning in their native language (L1) easily. A concordance is one of the types of online dictionaries that allow users to search not only word meanings but a collection of lexical usages (i.e. a corpus). For instance, students can use a concordance to explore examples of a specific word in a complete sentence and its grammar and syntactic rules. Likewise, teachers can edit English test questions by using a concordance to find out many practical and authentic sentence examples related to specific vocabulary. For EFL learners, whether conventional or online, monolingual (L2 words with L2 annotations) or bilingual (L2 words with L1 annotations) dictionary is the most common content format. Nation (2001) described that for EFL learners, using bilingual dictionaries can increase vocabulary retention over monolingual dictionaries. Many researchers (Laufer, 2000; Nation, 2001; Peter, 2007) indicate that online dictionary use does have positive effects for EFL students' L2 vocabulary.

Two common strategies are employed when learning English. The first strategy, intentional vocabulary learning, takes place when novice English students use vocabulary list, dictionaries, and mnemonics to learn new words. In this situation, students focus on specific word forms and meanings without context. The second strategy, incidental vocabulary learning, takes place when students learn language from reading the entire

context rather than just paying attention to specific words. For example, studying English literature, through the reading process, these students must figure out unfamiliar English words by consulting peers and dictionaries, or by guessing word meanings from the reading context. Under such circumstances, these students achieve their main goal of understanding content and acquiring new English vocabulary incidentally.

Some researchers (Hulstijn, 1992; Webb, 2008) have suggested that in English vocabulary learning, intentional learning strategies lead to better word acquisition results than incidental learning strategies. Based on the concepts of intentional vocabulary learning, there are many theories and mnemonic strategies that focus specifically on acquiring a greater number of English words during a short period of time. For example, many L2 learners use a rehearsal strategy where they recite a word repeatedly until it is learned. Another strategy is the Keyword Method (Hulstijn, 1997). The purpose of this strategy is to establish a strong connection between the target L2 word and a L1 keyword to enhance retention. This L1 keyword may have a similar pronunciation or word form associated with L2 target words. Learners also can use visualization strategies where a L1 keyword is imagined in a scenario with L2 target words. However, most learning occurs incidentally, rather than through intentional strategies such as rehearsal, key word, and visualization. For instance, the way babies learn basic language skills from mothers can be viewed as a type of incidental learning (Hulstijn, 1989; Nation, 2001). Francis, Schmidt, Carr & Clegg (2009) stated that learning new knowledge and skills without conscious or obvious guidance is incidental learning. For English vocabulary learning, the way most EFL students acquire L2 words incidentally takes place when reading

within a context, because learners pay attention to meaning, not word forms (Nation, 2001). Some researchers (Hulstijn, 2001; Laufer, 2001) have suggested that during a specific reading task, if the learners did not know they would be tested later, incidental learning would occur.

Based on the concept of incidental L2 vocabulary learning, Laufer and Hulstijn (2001) constructed the Involvement Load Hypothesis as a way to analyze EFL students' word retention. This hypothesis considers three involvement factors: need (a student's motivation), search (looking for meaning), and evaluation (selection of translation). The total involvement load can be measured by the presence or absence of each factor. For example, a vocabulary learning task with all three involvement factors present has a higher involvement load than a task with only two factors present. According to this hypothesis, higher involvement load in a vocabulary learning task should be related to better word retention. Although Involvement Load Hypothesis has been proposed, to date, only a few empirical studies (Hulstijn & Laufer, 2001; Kim, 2008) directly investigate it.

Anxiety and Learning

The American Psychiatric Publishing Textbook of Psychiatry (2008) defined "anxiety" as a disorder symptom that can coexist with other psychiatric disorders like depression, or may be the primary symptom of general anxiety disorder. General anxiety disorder can occur in any person's life cycle regardless of age. The *Diagnostic and Statistical Manual of Mental Disorders* (2000) classifies anxiety disorders as several types which usually accompany avoidance behaviors. For instance, agoraphobia is a type of anxiety disorder in which a person fears a specific environment from which he/she can

never escape. People suffering from social phobia are afraid of exposure in some social connection or public performance situation. With general anxiety disorder, people may maintain a continuous state of worry or anxiety for more than six months. There are many other types of anxiety disorders, some more documented than others.

Anxiety can influence the quality of an educational experience. For instance, learners who fear a test or feel that they may fail or earn a bad score on a specific test experience test anxiety. Chapell et al. (2005) stated that test anxiety will reduce students' learning performance. Students who resist learning mathematics or feel frustration about math have mathematic anxiety. L2 learning anxiety can also affect students. Horwitz, Horwitz & Cope (1986) identified that communication apprehension, test anxiety, and fear of negative evaluation were three factors of L2 learning anxiety.

Anxiety can be examined from the perspective of cognitive process. Baddeley (1986) divided working memory into three systems: (a) the central executive system organizes and integrates the incoming information, retrieves the existing information, and finally plans and makes decisions; (b) the verbal-phonetic system provides the space to store phonological information; and (c) the visual-spatial system is a space to allow people to store visual and spatial information. From a cognitive view, many researchers (Eysenck & Calvo, 1992; Eysenck, Derakshan & Calvo, 2007) suggested that when people feel anxious about a task, their attention control ability will decrease because they need to separate and use part of their attention to focus on the irrelevant stimuli that caused the anxiety. The unit in working memory to control human attention is the central executive. When one's attention has been diverted, the central executive will need to

allocate extra resources in order to resist un-related interference and shift the attention back to the primary task. The higher the anxiety level is the more resources from the central executive are consumed. Finally, anxiety impairs the working memory capacity and is a direct threat to student's word retention. Despite the attention anxiety gets in the literature, the involvement load hypothesis does not mention the influence of anxiety on learning language. The focus of this study will be to investigate the potential role that anxiety plays in the Involvement Load Hypothesis.

Purpose of the Study

This study will examine different English learning tasks with different involvement loads. For example, students will be exposed to reading scenarios that require different cognitive and motivational levels of effort. Some scenarios will include words and their precise meaning while other scenarios will require the students to search for meaning. Further, this study will introduce anxiety (low and high) as a potential fourth factor in the Involvement Load Hypothesis.

Research Questions

In this study, the primary research questions will be as follows:

Q1 Given English vocabulary learning tasks, will Taiwanese students generate better vocabulary retention in higher task load conditions compared to lower ones when controlling for trait anxiety?

Q2 When given English vocabulary learning tasks, will Taiwanese students experience changes in state anxiety and will task load conditions impact state anxiety?

Q3 Given English vocabulary learning tasks, will Taiwanese students report higher difficulty ratings in higher task load conditions compared to lower ones when controlling for trait anxiety?

Q4 Given English vocabulary learning tasks, will Taiwanese students report higher utility ratings in higher task load conditions compared to lower ones when controlling for trait anxiety?

Significance of the Study

The basic number of vocabulary words need to be learned is a debated topic. Some researchers proposed that 5,000 words is the minimum requirement for L2 students (Nation, 1990; Laufer, 1992). Hulstijn (2001) suggested 2,000 high frequency words are sufficient for L2 learners. The Ministry of Education in Taiwan proclaims a 2,000 English words list for Taiwanese junior high students and a 4,000 English words list for Taiwanese college students. The first step for many Taiwanese students to learn English as their second language is to grab conventional dictionaries or vocabulary lists to memorize new words. Nowadays, multimedia, online language learning programs and tools, or CALL offer students many benefits and convenience to learn L2 vocabulary. Most Taiwanese students own an electronic dictionary or use online dictionaries to assist them in acquiring English vocabulary intentionally or incidentally. Although intentional vocabulary learning may generate better word retention than incidental vocabulary learning, the incidental learning approach is most natural. The Involvement Load Hypothesis is an incidental vocabulary learning theory that quantifies vocabulary learning in order to predict students' performance. Even so, there is still a lack of empirical studies to support the Involvement Load Hypothesis.

Anxiety is a well-studied psychological factor. Horwitz et al. (1986) concluded that anxiety is a critical factor affecting L2 learning performance. Horwitz classified second language learning anxiety into three components: communication apprehension, fear of negative evaluation, and test anxiety. Acquiring L2 vocabulary is the basis of second language learning, but the role anxiety plays in L2 vocabulary learning needs to be investigated.

Successful vocabulary learning takes place when words from working memory are transferred to long term memory. If anxiety reduces the effectiveness of working memory, it will decrease L2 learners' word retention. Anxiety may be considered as an additional factor in the Involvement Load Hypothesis affecting L2 students' vocabulary retention.

Limitations of the Study

First, this study will use convenience sampling rather than random sampling from a larger population. This convenience sampling strategy is favored, because random sampling is not practical for most classroom intervention studies. The participants will be actual college students from Northern Taiwan at a single university. They will not be representative but of all college students studying English, they are an authentic population.

Second, although using intact groups provides less control from a research perspective, the nature of this study and its treatments necessitates the use of three intact classes. For the current research design, increasing the number of participants would require six or nine intact classes which is not feasible.

Third, Graddol (2004) stated that the top five most widely used languages globally are Chinese, English, Hindi, Spanish, and Arabic. As such Chinese native speakers learning English are assumed to be a relatively large group. Taiwanese students studying English are not representative of all L1/L2 combinations. Because Chinese (a Sino-Tibetan language) and English (an Indo-European language) do not originate from within the same language family, this combination provides unique learning challenges that are different from a combination within the same family. An example of the latter would be English-speaking L1 students learning Spanish as their L2, as both are Indo-European languages.

<div align="center">Definition of Terms</div>

EFL is an acronym for English as a foreign language. EFL learners learn English as their foreign language but they may have various first or native languages. For example, Taiwanese students speak Chinese as their first or native language but they learn English as a foreign language (Richards & Schmidt, 2002).

Evaluation is the third factor in the Involvement Load Hypothesis (Laufer and Hulstijn, 2001) which requires L2 students to compare and select appropriate words or meaning for specific contexts. According to the Involvement Load Hypothesis, the "evaluation" factor can be absent or present in moderate or strong levels (see Appendix A for more detail on assigning a value for evaluation).

Incidental vocabulary learning can be defined through various activities such as conversation, listening, reading, and writing, learning vocabulary without paying attention to the words themselves but acquiring the vocabulary as a by-product and

focusing on the meaning of the context (Nation, 2001; Hulstijn, 2001). Most L2 vocabulary is learned incidentally (Hulstijn, 2001) and incidental vocabulary learning is the more natural way for human to learn language. Researchers (Hulstijn, 2001; Peter, 2007; Peters, Hulstijn, Sercu & Lutjeharms, 2009) agreed and further explained the term "incidental" is that L2 students who are not aware of a test pre-announcement will learn vocabulary incidentally.

Intentional vocabulary learning can be defined as the vocabulary learning activities that focus on intentionally memorizing the word form, sentence structure, and grammar rules for a period of time (Hulstijn, 2001). One of the common methods that students use to learn L2 vocabulary intentionally is to make vocabulary cards or lists in order to rehearse the spelling, practice pronunciation, or embed some mnemonics to help them memorize unfamiliar words more efficiently. Hulstijn (2001) further suggested that L2 students who know they will have a test after their vocabulary learning task will learn words intentionally.

L1 can be defined as the first language, native tongue, or mother language that an individual learns from birth. For instance, the learners' first language in this study is Chinese. In language learning, learners' first language experiences are always included as a factor that influences their second language learning experience (Nation, 1990; Richards & Schmidt, 2002).

L2 is defined as a second language, which the individual learns after learning the mother tongue or first language. In this study, the L2 language for Taiwanese students is English (Richards & Schmidt, 2002).

Language anxiety can be defined as "the worry and negative emotional reaction when learning or using a second language" (MacIntyre, 1999, p.27).

Need is the first factor in the Involvement Load Hypothesis. Laufer and Hulstijn (2001) proposed that "need" in the Involvement Load Hypothesis is present in two different strength levels. For example, if students need to learn L2 vocabulary because teachers ask them to do that, the strength of the factor "need" is moderate (see Appendix A for more detail on assigning a value for need).

Search is the second factor in the Involvement Load Hypothesis (Laufer and Hulstijn, 2001). It means students may search for the meaning or L1 translation of L2 words by consulting a dictionary, peers, or teachers. During an L2 vocabulary learning task, the students' search behavior is absent if L2 words have the correct meaning or a translation is provided (see Appendix A for more detail on assigning a value for search).

The Involvement Load Hypothesis was proposed by Laufer and Hulstijn (2001). The main purpose of this hypothesis was to provide a method to predict L2 students' incidental vocabulary learning performance. This hypothesis states that incidental L2 learning tasks consist of three factors: 1) need, 2) search, and 3) evaluation. The absence, presence, and different strength levels of these three variables can be summed up and calculated as a total involvement task load. Students who learn L2 with higher involvement task load are predicted to have higher word retention.

CHAPTER II

REVIEW OF LITERATURE

This review explores literature related to the study of anxiety in incidental English

vocabulary learning tasks. This chapter is organized in four major sections. The first

section reviews the importance of learning a second language (L2). The second section

reviews the challenges in learning second languages and then explores the role of

self-efficacy, field independence/dependence, and anxiety in L2 vocabulary learning. The

third section reviews major theories, strategies, and approaches related to intentional and

incidental learning in L2 vocabulary. Finally, the fourth section reviews the tools (such as

conventional dictionaries, electronic dictionaries, etc.) that can help students to learn a

second language.

Why People Learn a Second Language

Currently, there are approximately 6,000 languages in use by various individuals

(Crystal, 2000). It is estimated that 90% of these languages will cease to be used in the

near future (Graddol, 2004). Grant (2006) suggested the Department for Children,

Schools and Families (DFES) in UK should develop and manipulate a second language

teaching and learning strategy with a global view. He pointed out two reasons for

learning a second language today. First, the world today is changing frequently and is

becoming more and more interconnected. Second, the fast development of new

technology creates job migration among different countries. Some manufacturing

industries have production lines in several countries that require multilingual abilities. Gallagher-Brett (2005) created an online database that generated seven hundred reasons for learning a second language. In general, education, career opportunities, and business negotiation purposes are the most common reasons for learning a second language.

Because English is one of the major global languages, it is often the first choice for non-English speaking people to learn as their L2. However, Graddol (1999) indicated that the total number of English native speakers is declining. He later predicted that the population who speak English as their first language will decline 5% (Graddol, 2004). However, the population around the world, especially in Asian countries, those who learn English as their L2 keeps growing (Kachru, 1998). More and more non-native English speakers understand the importance of learning a second language, and are willing to learn a second language to maintain their personal competitive advantage. Although English is still the major global language, demographic trends indicate that English may lose its domination in the modern language world (Gradual, 2004) as the world becomes more multilingual. To survive and gain more personal competitive advantage in this multilingual future, learning L2 is also important for native English speakers.

In order to further illustrate the importance of learning L2 more practically, Simon (1986) pointed out that about 200,000 Americans lose their jobs annually because they lack second language abilities. Cutshall (2004) stated that most business environments require L2 as a communication tool between clients and product or service providers. Many Americans erroneously think English is an international language. Unfortunately, these individuals stand to lose business opportunities to those who have second language

skills. Honig & Brod (1974) suggest that L2 ability should be viewed as a critical auxiliary in any career relevant.

Because this dissertation will involve Taiwanese learners, recent data from Taiwan are used. Since 2001, the Taipei city government in Taiwan has encouraged taxi drivers to learn a second language in order to provide better services for foreigners who travel in Taiwan (Chern, 2003). English as a second language for medical doctors in Taiwan is also an essential career tool. If they do not learn English as their second language, they will have difficulties in reading and writing prescriptions (Chia, Johnson, Chia & Olive, 1999). Furthermore, in Taiwan, second language abilities are the basic requirement for recruiting for jobs (Chia et al., 1999; Chern, 2003).

<center>Challenges in Learning Languages</center>

Learner's Self-efficacy and Second Language Learning

Self-efficacy (also referred to as perceived self-efficacy), was first proposed by Bandura (1977), as one of the important factors influencing learning behaviors and overall performance. He suggested that a person's learning behavior may be changed because of two concepts related to self-efficacy: outcome expectation and efficacy expectation. He defined outcome expectation as a "person's estimate that a given behavior will lead to certain outcomes" and efficacy expectation is defined as "the conviction that one can successfully execute the behavior required to produce the outcomes" (Bandura, 1997, p.193). He defined perceived self-efficacy as "people's judgments of their capabilities to organize and execute courses of action required to attain designated types of performances" (Bandura, 1986, p.391). He further defined perceived

self-efficacy as "people's beliefs about their capabilities to produce designated levels of performance that exercise influence over events that affect their lives" (Bandura, 1994, p. 71). Still later, he gave perceived self-efficacy a more precise definition: "Self-efficacy is the belief in one's capabilities to organize and execute the courses of action required to manage prospective situations" (Bandura, 1995, p. 2). Perceived self-efficacy will affect human's behaviors in two levels. In the initial level, when people feel fear or try to avoid a threatening circumstance that they believe exceeds their coping abilities, they will change their choices or behaviors and get involved with specific tasks or activities that they judge themselves to be able to handle. After the initial level, self-efficacy continues to affect human's behaviors. If a learner has strong self-efficacy, he will put more efforts in an activity (Bandura, 1977).

Bandura (1977, 1982, 1986, and 1994) has consistently stated that self-efficacy can be a predictor related to learners' academic performance. In order to complete a specific task, people's confidence will be the critical factor that influences the failure or success for this task. In education, academic achievements are students' main tasks. Many researchers likewise found self-efficacy to be positively related to students' academic performance. Schunk (1985) conducted a study to explore the relationship among self-efficacy, motivation, and students' performance. He found that self-efficacy and motivation were positively related. Self-efficacy was also positively related to students' performance because repeat academic success can increase the level of self-efficacy. Multon, Brown, and Lent (1991) performed a meta-analysis from 1977 (the year Bandura first proposed the concept of self-efficacy) to 1988. The results supported their original

hypothesis that self-efficacy beliefs are positively correlated with students' academic

performance. The result is similar to that of Schunk (1985). Pintrich and DeGroot (1990)

reported a correlational study between academic self-efficacy and both cognitive strategy

use and self-regulation through use of cognitive strategies. According to their research,

academic self-efficacy was correlated with semester and final year grades, in-class

seatwork and homework, exams and quizzes, and essays and reports. Pintrich and

DeGroot concluded that students need to have both the *will* and the *skill* to be successful

in classrooms and self-efficacy played a *facilitative* role in the process of cognitive

engagement. In other words, increasing self-efficacy beliefs might lead to increase in

academic performance.

Self-efficacy is also an important factor in second language learning. Pajares &

Johnson (1994) investigated the relationship among self-efficacy in writing, writing

outcome expectations, writing apprehension, personal self-efficacy, and writing

performance. They concluded that self-efficacy is positively related to students'

performance, which is consistent with prior studies. Furthermore, they found higher

personal self-efficacy increased students' writing self-efficacy and writing performance.

In their study, writing apprehension reduced the strength of writing self-efficacy.

Huang & Chang (1998) conducted a qualitative study to explore the relationship

between self-efficacy and students' achievement for ESL. They found participants'

self-efficacy level did not positively correlate with their overall English performance

achievement. However, this study revealed that when all participants had higher ability

perceptions, their English writing and reading achievements were also higher. Second, if

students had more interest in some topics, their self-efficacy was higher. Third, the role of teachers and tasks can be important for improving or impeding students' self-efficacy. This study also concluded that students' performance, fear of peer comparisons, the nature of language learning tasks, and the amount of effort that students put in tasks were critical factors influencing learners' self-efficacy.

Tilfarlioglu & Cinkara (2009) believed there should be a solid relationship between learning and self-efficacy, but found that studies focusing on language learning self-efficacy were limited, especially in the English as a Foreign Language (EFL) field. Therefore, they used an EFL self-efficacy questionnaire (EFL-SEQ) from Mill (2004) to determine the relationship between students' EFL self-efficacy level and their end-of-the-year GPA grades. Their results indicated that EFL students' self-efficacy level is positively correlated with their GPA performance. This means when EFL students have higher self-efficacy levels, their English performance will also be better. Furthermore, Ehrman (1996) conducted a study and tried to explore the relationship among self-efficacy, motivation, and anxiety within 1,109 adult language learners. The author found that language learners' self-efficacy was only correlated with intrinsic motivation but not correlated with extrinsic motivation. In this study, language learners' self-efficacy is positively correlated with students' reading and speaking performance.

However, anxiety is likely to reduce language learners' motivation and self-efficacy level. Foreign language learners with higher self-efficacy generate better language learning performance. However, if learners feel anxious, motivation and

self-efficacy might be reduced. Anxiety also reduces the cognitive resources used in language learning efforts.

In summary, many research studies have suggested that self-efficacy in language learning is related to students' academic performance. Self-efficacy in language learning is also a factor related to students' motivation and anxiety. When synthesizing all of these factors together, it is reasonable to assume that self-efficacy will be positively or negatively affected by students' language learning environment. Therefore, in a second language classroom, teachers can promote language learning outcomes by building in-class activities that can increase learners' self-efficacy.

Field Independence & Field Dependence

The concepts of field independence and field dependence were first proposed by Witkin (1954). In his studies, he investigated self-consistency in perception and differentiated it as field-of-a-whole (field dependence) and part-of-a-field (field independence). In order to realize the difference between these two types of perceptions, Witkin designed experiments in three approaches: tests of space orientation, tests of body action, and perceptual tests.

For tests of space orientation, the most well-known is the rod-and-frame test (See Figure 1). In this test, the visual field is completely dark except for a glowing and moveable rod and luminous and tilted frame that can be turned clockwise or counterclockwise. The participant's task is to place this glowing and moveable rod in a true perpendicular position in relation to the floor. Compared with field dependent persons who easily align the rod with the frame margins, field independent individuals

were much more successful at placing the rod vertically, because their perceptions have

the strong emphasis on "keeping-item-and-field-separate" (p.36). For field dependent

persons, their perception will be influenced by the rotating frame and can not fully

separate the rod (item) from the frame (field).

      For tests of body action, researchers conducted the body-adjustment test (See

Figure 2). In this test, the room could be rotated by researchers and participants sitting in

a rotating chair. The subjects' tasks were to try to align his or her body in a perpendicular

situation with the ground. Subjects who were better at keeping their body vertical were

more field independent. On the contrary, if a person tried to move his or her body to

match the rotating room, he or she was more field dependent.

      The embedded figures test (EFT) or group embedded figures test (GEFT) is a

typical perceptual test (See Figure 3). In this test, each complex figure includes an

embedded simple figure. The participant's task is to identify the embedded figure located

inside the complex diagram as quickly as possible. Field independent persons spend less

time identifying the embedded graph than field dependent persons (Witkin, Dyk,

Faterson, Goodenough & Karp, 1962).
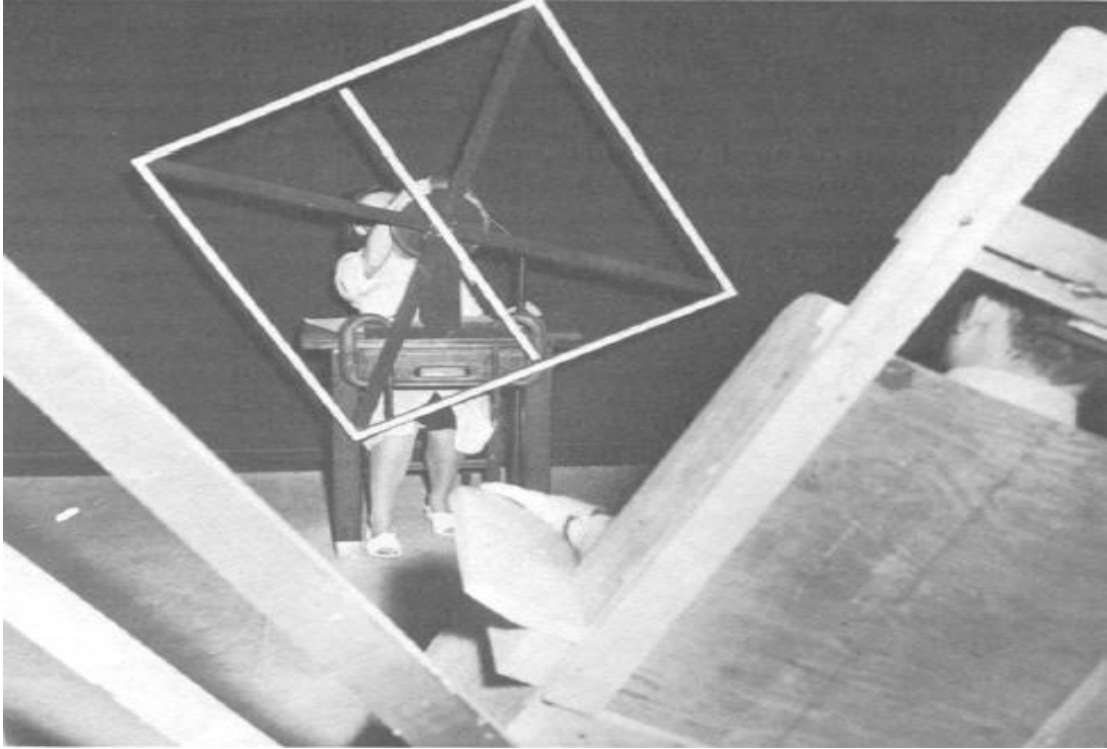
Figure 1. Rod-and-Frame Test (Witkin, Moore, Goodenough & Cox, 1977, p.4)
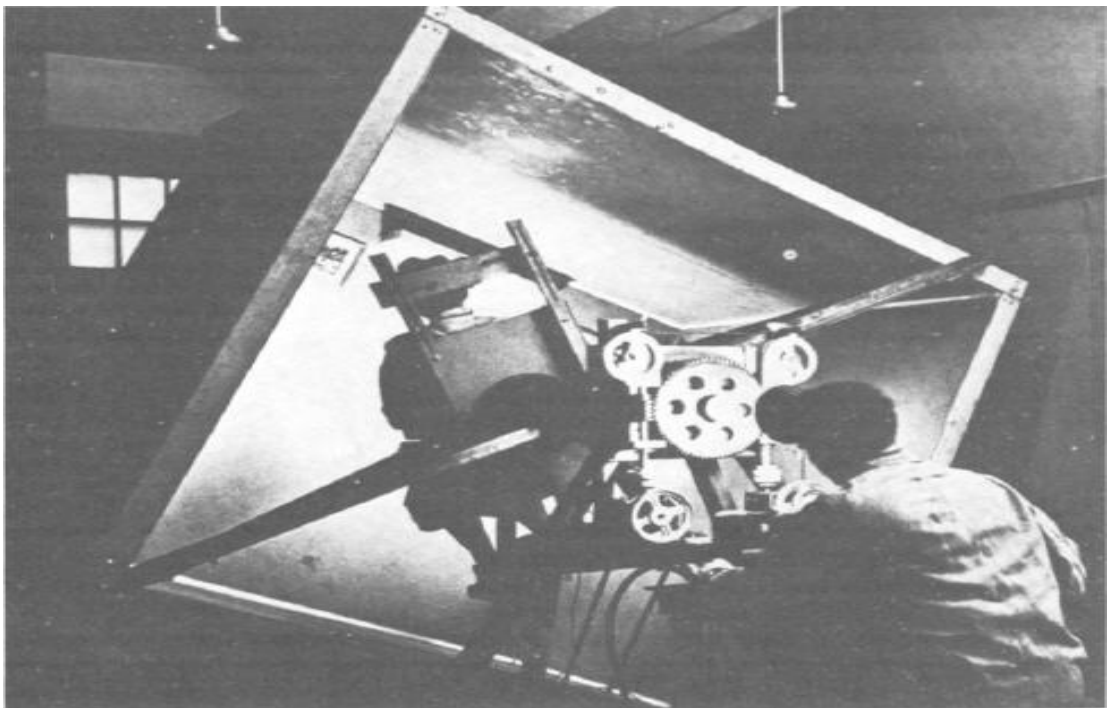
Figure 2. Body Adjustment Test (Witkin et al., 1977, p.3)
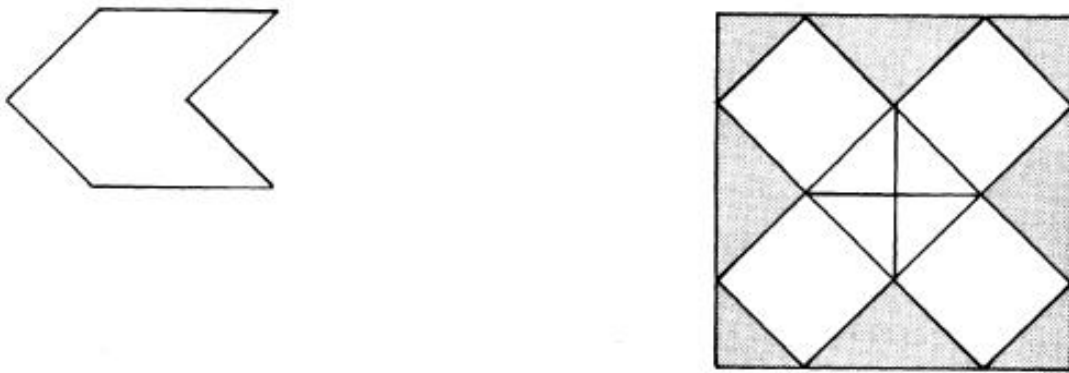
Figure 3. Embedded-Figures Test (Witkin et al., 1977, p.5)

Field independence and field dependence has been studied in the context of cognitive styles as well. Witkin & Moore defined cognitive styles as "the individual's way of handling a wide range of perceptual and intellectual tasks" (1974, p. 2). They proposed that individuals can be categorized as one of two types of cognitive styles, field independent and field dependent. For field independent persons, no matter how strong the outside field is organized, their perceptions are isolated and independent from the outside environment. For field dependent persons, their perception is highly broad, because they are easily guided by outer surroundings. For example, field dependent individuals have stronger social sensitivity and more easily develop social skills. Field independent subjects are typically interested in impersonal and abstract affairs within a specific environment. Based on Witkin's theory, Garger and Guild (1984) illustrated persons' learning styles as field dependent and field independent and summarized the major characteristics for each learning style. Table 1 shows the differences between field dependence and field independence in learning styles according to their work.

Table 1

The Difference between Field Dependence and Field Independence in Learning Styles (Garger & Guild, 1984)

Field dependent learning styles	Field independent learning styles
Perceives globally.	Perceives analytically.
Experiences in a global fashion, adheres to structures as given.	Experiences in an articulate fashion, imposes structures of restrictions.
Makes broad general distinctions among concepts, sees relationships.	Makes specific concept distinctions, little overlap.
Social orientation.	Impersonal orientation.
Learns material with social content best.	Learns social material only as an intentional task.
Attends best to material relevant to own experience.	Interested in new concepts for their own sake.
Requires externally defined goals and reinforcements.	Has self-defined goals and reinforcements.
Needs organization provided.	Can self-structure situations.
More affected by criticism.	Less affected by criticism.
Uses spectator approach for concept attainment.	Uses hypothesis-testing approach to attain concepts.

Ehrman (1996) extended the concept of field dependence and field independence based on his second language teaching experience. He defined field independence as being either high or low, with field dependence being the equivalent of having a low level of field independence. Ehrman also classified learners as having either high or low field sensitivities. Table 2 illustrates the classification of field independence and field sensitivity. Each quadrant represents a different type of second language learner.

Table 2

The Relationship between Field Independence and Field Sensitivity (Ehrman, 1996)

	Field Sensitivity	
Field Independence	High	Low
High	Type 1	Type 2
Low	Type 3	Type 4

For second language learners, Type 1 is assigned when high field independence and high field sensitivity are both present. ESL students with high field sensitivity show strong preferences to join group discussions, simulations, and any contextual activities in the classroom. High field independence traits allow students to focus on specific language tasks, easily decide learning priorities, and successfully understand information perceived from class activities. This type of ESL learner can easily adapt to multiple teaching methods and learning environments, and they consequently encounter less language learning difficulties. Type 4 ESL learners are assigned low field independence (field dependence) and low field sensitivity. This type of ESL learners lack analytic abilities, have difficulty prioritizing language learning, and have trouble managing, structuring and synthesizing complex instructional materials in class. To help this type of ESL students and minimize the gap between them and Type 1 students, interventions are necessary. Scaffolding, appropriate instructional strategies, teachers' feedback, well-organized instructional materials, and regular evaluations are essential. Type 2 ESL learners are field independent and have low field sensitivity. This type of learner is good at analyzing languages but have a hard time using languages in social settings. In other

words, they are tend to be good classroom learners, but do not perform as well outside the

classroom. The most common phenomena for Type 2 ESL students are the fear of making

mistakes when speaking second languages in public. In contrast, Type 3 ESL learners are

field dependent and have high field sensitivity. Because this kind of ESL learner

perceives cues from the outside environment, they view second language as a

communication tool and do not care as much about making mistakes and like to speak out

in public. However, Type 3 ESL learners have difficulties in learning correct grammar

structure, sentence order, and precise vocabulary spelling or pronunciation.

Many researchers examine ESL learners' second language performance in relation

to field dependence (FD) and field independence (FI), and many of them conclude that FI

students perform better than FD students. For instance, Hansen & Stansfield (1981, 1982,

and 1983) used group embedded figures test (GEFT) as a measuring tool of FD and FI

and they found FI scores were correlated with ESL learners' academic performance

positively. From their studies, the results indicated FI ESL students performed better in

final exams, oral evaluations, and ESL cloze tests than FD students. Furthermore, ESL

students with FI instructors achieved better performance than ESL students with FD

instructors. Chapelle & Roberts (1986) also found the FI variable was positively related

with L2 performance for adults. However, Johnson, Prior & Artuso conducted a study in

2000 and disagreed with these findings. Their research applied group embedded figures

test (GEFT) in the five-minute time limit as an index number. The first half of GEFT

scores represented field independence and the second half of GEFT scores belonged to

field dependence. Also, in order to increase the construct validity, they added block

design (Wechsler, 1981) to measure FD and FI. The data showed vocabulary test scores were not correlated with GEFT scores, but the GEFT score was negatively correlated with several communication scores. This study indicated that FI ESL learners did not perform better than FD ESL learners in traditional vocabulary tests. On the contrary, for social-oriented activities such as L2 communication class, FD ESL learners had better performance than FI ESL learners. Salmani-Nodoushan & Ali (2007) first used the group embedded figures test (GEFT) as a tool to categorize 1,743 ESL Iranian college students as field dependent (FD) or field independent (FI). Second, both FD and FI groups took the 1990 version of International English Language Testing System (IELTS) and were divided into four proficiency levels (low-proficient, semi-proficient, fairly proficient, and proficient) according to their test scores. Third, The Task-Based Reading Test (TBRT) was given to all ESL students in this study. This study found, in all proficiency levels, the FD students outperformed FI students. For each section of the test such as true/false, sentence-completion, mean outlining, mean scanning, and mean elicitation, the results showed statistically significant advantages for FD ESL learners over FI ESL learners. However, when comparing FD/FI ESL learners in each proficiency level, for FD/FI groups, neither group consistently performed better than the other. This study showed that while field dependence and field independence had an impact on ESL learners' performance, FI students did not always perform better than FD students in L2 acquisition.

To summarize, Ehrman (1996) indicated there is still no instrument that can precisely and definitely separate and measure "field dependence" and "field

independence". Most researchers commonly used embedded figures test (EFT) and group

embedded figures test (GEFT) as tools to categorize L2 learners into field dependence or

field independence, but Johnson et al. (2000) described that the EFT or GEFT tests are

more likely to predict respondents' intelligence related performance (such as vocabulary

test, grammar test, cloze test, etc.) but cannot predict verbal performance (such as L2

conversation test). In other words, although field dependence (FD) and field

independence (FI) are critical factors that affect L2 performance, how to categorize

FD/FI more accurately and the contexts of L2 tasks are also essential issues that need to

be considered.

Language Learning Anxiety & Performance Anxiety

In this study, the term "anxiety" will focus on its effect on a learner's cognitive

performance rather than understanding anxiety from a clinical perspective. Anxiety is a

type of emotional phenomena that often occurs in threatening situations. In the past, the

methods psychologists used to determine the strength of anxiety varied. Examples

include the Zuckerman Inventory of Personal Reaction (ZIPERS: Zuckerman, 1977) or

combining the Wechsler Intelligence Scale (1981) with digit span scores. These anxiety

measuring instruments not only failed to distinguish between state anxiety and trait

anxiety, but were inadequate in comparing and illustrating respondents' anxiety

differences before and after suffering a specific event. Spielberger first categorized

anxiety into two situations: state anxiety and trait anxiety. He defined state anxiety as

"consisting of subjective feelings of apprehension and concern and heightened autonomic

nervous system activity" and trait anxiety as "individual differences in the disposition to

respond with high levels of state anxiety under stressful circumstances" (Spielberger, 1969, p.430). Furthermore, Spielberger, Gorsuch, Lushene, Vagg & Jacobs (1983) developed a self-report questionnaire named the State-Trait Anxiety Inventory (SATI) in order to better clarify respondents' (e.g. high school students, college students, and adults) state and trait anxiety levels.

Similar to these studies on anxiety, early research on L2 learning recognized that increasing students' attention level had an impact on L2 learning achievement. Gardner and Lambert (1959) proposed that second language achievement was not only related to language aptitude but also to attitude (lower motivation). Before the potential types of L2 learning anxiety had been identified by Horwitz (1986), many linguists employed the relationship between L2 learning motivation and unitary anxiety factor to predict L2 learners' performance. Gardner (1985) conducted a factor analysis study to identify motivation variables in L2 learning, and included anxiety in one of the scales to illustrate its relationship with foreign language achievement. This study indicated that achievement rating, orientation index, attitude scale, and motivational-intensity all had high factor loads in the same factor category. From four regression analyses in speaking, reading, writing, and comprehension aspects, MacIntyre, Noels & Clement (1997) calculated residual values in order to determine the relationship between students' perceived L2 proficiency and their actual L2 proficiency. The results showed that in the group of high anxiety students, the residual values between perceived proficiency and actual proficiency in four L2 aspects were all negative. This indicated that high anxiety L2 students underestimated their actual ability. In contrast, the residual values between

perceived proficiency and actual proficiency in four L2 aspects were all positive for low anxiety students. This also indicated that low anxiety L2 students overestimated their actual ability. MacIntyre, Baker, Clement & Donovan (2003) pointed out that this result implied that some related encouraging strategies were essential in order to raise high anxiety students' potential performance and accomplish their tasks successfully. Eysenck et al. (2007) stated that anxiety was an inverse state of motivation, and that minimizing anxiety can increase motivation. Based on this body of research, foreign language anxiety can have a negative impact on L2 learners' performance.

In order to further classify various types of L2 learning anxiety and predict the relationship between anxiety and L2 students' performance, Horwitz et al. (1986) first categorized test anxiety, communication apprehension, and fear of negative evaluation as three components of L2 learning anxiety. She then developed the Foreign Language Classroom Anxiety Scale (FLCAS) in order to help teachers have a better understanding of students' anxiety in foreign language classrooms. Based on the test anxiety aspect of Horwitz's research, Oh (1992) conducted a study to examine Korean college students' anxiety levels in three types of English reading tests. The first English reading test was comprehension and recall. In this task, students were given two English reading texts, which were followed by several comprehensive tests and a written recall task. After one week, the second English reading task was a cloze test. One week later, students were given the third task, in which they were asked to read an English text and then recall and "think aloud" about the information in this text after completing the reading. Students' anxiety levels were measured by Sarason's (1978) Cognitive Interference Questionnaire.

Both cloze test and think aloud tasks generated higher anxiety levels than comprehension and recall tasks. The results indicated that having an L2 test was a critical factor in provoking the learners' anxiety level, a result similar to that of Horwitz et al. (1986). Moreover, students who were not familiar with the content nature of specific English testing tasks generated higher levels of anxiety. The level of difficulty of English assessments was also a factor in raising L2 students' anxiety. In general, it is considered good practice for L2 teachers' to explain the nature of a specific testing task in detail before testing to allow students to have more opportunities to practice and become familiar with the specific types of tests in order to lower L2 learners' anxiety.

Based on Horwitz's FLCAS framework, Aida (1994) examined the relationship between learning Japanese as an L2 and students' anxiety levels. In the first analysis, he found L2 anxiety and students' overall performance were correlated negatively. In his second analysis, a two by two ANOVA was conducted. In this factorial design, anxiety (high and low) and gender (male and female) were independent variables and students' final grade was the dependent variable. The data showed that anxiety-gender had no interaction in the students' grades. However, anxiety and gender both had a significant main effect on students' grades. In other words, it indicated that higher L2 anxiety levels produced lower L2 test grades. Also, although female L2 students performed better than male students in this study, under the same anxiety level, there were no differences between female and male students' final grades.

MacIntyre et al. (1997) found that three factors (idea expressing, output quality, and self-rated proficiency) in four L2 aspects (speaking, reading, writing, and

comprehension) were all correlated negatively with language anxiety. The data illustrated that students' L2 performance will be lower if they had higher anxiety, and anxiety had the greatest negative impact on L2 communication achievement.

Kurt & Atay (2007) compared L2 writing anxiety between peers' feedback group and teachers' feedback group in Turkey. A total of 86 L2 learners participated in this study. A control group of 42 subjects wrote an essay with teachers' feedback and experimental group of 44 subjects also wrote an essay with peers' feedback. The length of this study was eight weeks and used Second Language Writing Anxiety Inventory (SLWAI) (Cheng, 2004) as a tool to measure writing anxiety before and after the experiment. In the beginning of this study, the t-test result did not show a significant difference between these two groups. However, after eight weeks, the post-SLWAI scores had a significant difference between control group (M =73.73) and experimental group (M =65.56). The results indicated that writing an L2 essay with the assistance of peer feedback decreased writing anxiety more than the assistance of teacher feedback only.

Aydin (2008) conducted a study to identify the relationship between test anxiety, communication apprehension, and fear of negative evaluation in the FLCAS questionnaire and L2 students' anxiety level of 112 Turkish L2 students. First, he found that all three factors were critical components stimulating L2 students' anxiety levels, with apprehension of communication with teachers provoking the highest anxiety level. Second, gender and test anxiety were correlated. This study indicated female L2 students' felt more anxious in L2 tests than male students. Third, students' age was correlated with

interaction activities in the classroom. So, younger L2 students had higher anxiety than their older counterparts in communicating with teachers or peers. Finally, L2 students' overall performance was negatively correlated with communication apprehension, test anxiety, and negative attitudes in learning L2. In a follow-up study, Aydin (2009) conducted a literature review to synthesize study results that identified the role of test anxiety among L2 learners. He concluded that time limits, gender, test format, difficulty level, exam procedures, and environmental factors were all correlated with L2 learners' test anxiety.

A study by Pichette (2009) examined the anxiety level between beginning and advanced L2 students in traditional classrooms and distance learning environments. The results from three independent t-tests indicated that classroom and distance L2 learners' anxiety levels had no significant difference in oral, reading, and writing performance. However, three different t-tests showed beginning L2 learners had significant higher anxiety levels than advanced L2 learners in oral, reading, and writing performance. This result is similar to that of Aydin (2008).

To summarize, before Horwitz et al. (1986) categorized anxiety in the L2 field, many researchers tried to connect motivation with anxiety to predict the impact on second language learning performance. Their findings suggested that motivation and anxiety are negatively correlated to each other, and both also have a negative relationship with students' L2 performance. After Horwitz et al. proposed test anxiety, communication apprehension, and fear of negative evaluation as the three factors that are negatively

related to L2 performance, many consequent studies provided solid results that paralleled

Horwitz's finding.

Strategies to Reduce Second Language Learner Anxiety

Many studies have made recommendations about how L2 instructors and learners

can decrease L2 learning anxiety level. For example, Young reviewed the literature and

"identified six sources: 1) personal and interpersonal anxieties, 2) learner beliefs about

language learning, 3) instructor beliefs about language teaching, 4) instructor-learner

interactions, 5) classroom procedures, and 6) language testing" (1991, p. 427) that affect

language anxiety. First, for personal and interpersonal anxieties, she suggested that

instructors might ask students to write down their personal anxiety types on cards or on

the blackboard. Participation in relaxation activities, working with peers, and joining a L2

language club were also helpful. Second, instructors should carefully discuss or

communicate with L2 learners and convey the positive core value of learning L2 in order

to strengthen learners' self-confidence and reduce their L2 anxiety. Third, in order to

decrease language anxiety based on teachers' conviction, L2 instructors could join L2

teaching conferences/workshops and look for opportunities to evaluate one's teaching

behaviors to correct possible errors. Fourth, to reduce anxiety based on instructor-learner

interactions, Young recommended teachers have a good sense of humor and give students

positive reinforcement or rewards. Fifth, to decrease language anxiety in the classroom,

this study suggested language teachers help L2 learners form study groups, play games or

have some activities that can use L2 to solve real life problems. Sixth, L2 students always

feel anxiety about specific test items. In order to decrease language test anxiety, L2

teachers might work with the language teaching department together to develop a fair test that can actually reflect L2 learners' performance.

In addition to Young's work, other studies also provide recommendations to reduce student anxiety in L2 learning. For example, Aydin (2007) summarized several studies and suggested that test anxiety was the center of L2 anxiety and that teachers play a key role in providing more feedback and information related to the test in order to reduce learners' anxiety. Ozturk & Cecen (2007) conducted a study in Turkey that asked L2 students to create personal portfolios by completing five writing tasks. The mixed methods results revealed that a portfolio can have an advantage in assisting L2 learners to overcome writing anxiety. Also, in this study, 100% of the participants wanted to apply the portfolio as a tool to help L2 students lower their L2 writing anxiety if they became a language teacher in the future. De Los Arcos, Coleman & Hample (2009) invited seven volunteers from learning Spanish as a second language courses and allowed them to use a synchronous audio-graphic conferencing system to explore their language anxiety level. The interview results showed that L2 students using the synchronous audio-graphic conferencing system had higher anxiety in the beginning, because they needed to speak L2 as a target language. However, this study found that over time L2 students diminished their anxiety unconsciously through the use of this tool.

In summary, many studies have illustrated that anxiety is a critical factor and consistently has a negative impact on L2 learning. Although language teachers have long recognized that anxiety affects learning, it has been difficult to distinguish language anxiety adequately and determine its specific effect on language learning (Horwitz et al.,

1986). Young (1991) stated that language anxiety was a complicated phenomenon and might vary according to L2 learners' personality, background, prior language experience, and learning environments. According to the literature shared in this chapter, the relationship between L2 learning and anxiety deserves further study.

<div align="center">Research on Second Language Learning</div>

Implicit Learning and Explicit Learning

In the field of cognitive psychology, many researchers have suggested that there are two ways in which people receive knowledge from the outside environment, consciously and unconsciously (Berry & Broadbent, 1988; Dienes, Broadbent & Berry, 1991; Reber, 1967, 1969, 1989, 1993). Although there is no scientific method to classify conscious and unconscious learning, researchers have still tried to make a distinction between them (McLaughlin, 1990). For example, Krashen (1979) proposed that conscious learning was a controlled *learning* process, and unconscious learning was an automatic *acquisition* process. Schmidt (1990) suggested that conscious learning was when learners pay attention to learn, and unconscious learning was when the learners are unaware of learning. Some researchers (Krashen, 1979; McLaughlin, 1990) prefer to use the term unconscious rather than subconscious. Because the level of consciousness is difficult to establish, some researchers prefer the term implicit and explicit learning.

Reber (1967, 1969) first proposed the concept of implicit and explicit L2 learning by conducting a series of artificial grammar learning experiments. He suggested that implicit learning can not be verbalized and is similar to perceptual learning, which produces intuitive knowledge by a complex interaction with the outside environment. He

further pointed out that implicit learning was an unconscious process to yield abstract

knowledge from the stimulus environment (Reber, 1989). Implicit learning enables

people to achieve specific tasks or acquire skills (Reber, 1993). In contrast, explicit

learning can easily be verbalized and is the process that an individual uses to acquire

rules, knowledge, and skills in a sequence of steps, consciously from the outside

surroundings. Based on Reber's works, Ellis (1994, 1995) made a more clear distinction

for both implicit and explicit learning in second language learning. He defined implicit

learning as the "acquisition of knowledge about the underlying structure of a complex

stimulus environment by a process which takes place naturally, simply and without

conscious operations", and explicit learning as "a more conscious operation where the

individual makes and tests hypotheses in a search for structure" (Ellis, 1994, p. 1).

However, this theory of implicit and explicit learning in L2 originates from a

manipulation of grammar learning, which some researchers feel is not adequate to

sufficiently explain L2 vocabulary acquisition (Hulstijn, 1989; Ellis, 1994, 1995; Laufer,

2001). Hulstijn (1989) described that implicit leaning can occur without teacher

instruction and without learner intention. However, a student who learns L2 vocabulary

implicitly will still need to pay attention to word forms and word meaning, making it

simultaneously an explicit process. Ellis (1994) stated that many issues related to implicit

and explicit L2 learning remain unsolved. For example, what types of L2 vocabulary can

be learned implicitly and explicitly? What are the precise criteria for and limitations of

implicit learning? What are the different L2 instructional strategies for explicit learning?

What are the specific neurological functions involved in implicit/explicit processes? He

further argues that the nature of implicit/explicit learning should still be viewed

psychologically, and the only distinguishable factor is the absence or presence of learners'

consciousness. If students learn L2 vocabulary in context and their goal is to understand

the text itself, the process of acquiring vocabulary is neither entirely implicit

(unconscious) nor entirely explicit (conscious). Laufer (2001) had a similar argument in

applying implicit/explicit learning to explain L2 vocabulary learning. She claimed that

the pronunciation rules of certain English word structures were always learned implicitly.

Learning L2 vocabulary meaning was explicit because students need to pay attention to

the words themselves. Rieder (2003) stated that because the nature of L2 vocabulary

acquisition was different form learning grammar, implicit and explicit learning in

vocabulary retention were always blurred. Therefore, studies of implicit/explicit learning

that mainly aim at L2 vocabulary retention are limited.

Intentional and Incidental Learning

A refinement of implicit/explicit learning that specifically addresses L2

vocabulary is intentional and incidental learning. Hulstijn (1989) stated that people who

learn L1 from their mothers during their childhood represent typical incidental learning.

Schmidt (1990) postulated the absence or presence of learners' attention may be a critical

discrimination between intentional and incidental learning. Ellis (1994) pointed out that

the notions of incidental/ intentional learning can not be equated with implicit/explicit

learning. He stated that implicit learning can only occur incidentally, but that explicit

learning can occur both incidentally and intentionally. Many researchers agree that L2

vocabulary is often acquired incidentally (Ellis, 1994; Hulstijn, 2001; Laufer, 2001;

Nation, 2001). For example, Laufer (1992) stated that in a L2 reading passage, if 95% of the words in the entire article are familiar, students can guess the meaning of new words from the context without any assistance. Similar to Laufer's study, Nation (2001) stated that L2 students can infer the meaning of new words without any help if the familiar word density in a L2 article was 98%. Incidental vocabulary acquisition is generally defined as the "learning of vocabulary as the by-product of any activity not explicitly geared to vocabulary learning" and is contrasted with intentional vocabulary learning, defined as "any activity geared at committing lexical information to memory" (Hulstijn, 2001, p. 271).

Laufer & Hulstijn (2001) argued that intentional L2 vocabulary acquisition studies have difficulty in establishing treatments. They pointed out that in a specific vocabulary learning task, it was difficult for teachers or researchers to control the factors that affect students' memorizing. For example, if teachers decide to apply the keyword method to help students increase their word retention performance, students may still use some other memorizing strategies with which they are more comfortable, such as focusing on word form or conjugations. They claim that by using the incidental L2 vocabulary learning design, greater control over some factors can be established to improve students' L2 vocabulary retention achievements. However, no research methodology is free of potential bias or control issues. Since it is impossible to know exactly what an individual's mental processes are, therefore the conclusion of their study remains unsubstantiated.

Research on Incidental Vocabulary Learning

One type of research related to incidental vocabulary learning is focused on acquiring unfamiliar L1 words through L1 reading tasks. Nagy, Herman & Anderson (1985) conducted a study to examine unfamiliar L1 word learning performance through reading in context. They found students who learned unfamiliar words through reading texts have higher learning rates than students who learned words from word lists. Nagy, Anderson & Herman (1987) further divided the new words into four difficulty levels and then compared students' word learning achievements through four natural reading tasks. The result indicated that at difficulty levels one, two, and three, students who read the text generated better word learning rates than those using the word lists. For difficulty level four, the mean value of students who learned new words by reading the text was slightly higher than students who used the word list, although this difference was not significant. Herman, Anderson, Pearson & Nagy (1987) used exposition as the reading context to explore middle school students' unfamiliar words learning performance and found that students who read exposition learned more words than students who used word lists. This result is similar to that of Nagy et al. (1985).

Peter (2007) conducted a study to compare L2 vocabulary retention achievement in both intentional and incidental learning groups. The average mean data indicated that students who learned L2 vocabulary intentionally performed better than those who learned L2 vocabulary incidentally in context tests, immediate L2 vocabulary tests, and delayed L2 vocabulary tests.

Another type of study of incidental vocabulary learning is to examine the impact of L1 glosses in learning L2 vocabulary. For example, Lomicka (1996) designed three levels of online annotation levels (full L1 gloss, partial L1 gloss, and no L1 gloss) to examine students' L2 reading comprehension level. The results indicated there were no significant differences among these three groups. Al-Seghayer (2001) compared the effects of text-only gloss, text plus picture gloss, and text plus video gloss on students' incidental L2 vocabulary acquisition. The data showed text plus video gloss was the most effective way to assist students learned L2 vocabulary. Yoshii (2006) conducted an incidental vocabulary study to compare the impact of text-only gloss and text plus picture gloss on students' L2 vocabulary learning in a multimedia environment. He found students using the text plus picture gloss performed better both in immediate L2 vocabulary tests and delayed L2 vocabulary tests than students using text-only glosses.

Some studies of incidental vocabulary learning examined the effectiveness of the usage of different types of dictionaries. Aust, Kelley & Roby (1993) compared the use of online dictionary and paper-based dictionary. They found that using online dictionaries to learn L2 vocabulary were more efficient than using conventional dictionaries. However, the data pointed out that there was no differences between using online dictionaries and paper-based dictionaries in incidental L2 word retention performance. Song & Fox (2008) conducted a qualitative study and used a built-in PDA (Personal Digital Assistant) dictionary to examine its effect on undergraduate students' incidental L2 vocabulary performance. They concluded that all students had positive attitudes in using the built-in PDA dictionary to help them acquire L2 vocabulary. Additionally, they also used the

built-in PDA dictionary as a supplement to computer and other technologies (such as online dictionaries, e-mail, mobile phones, etc.) to improve their L2 vocabulary learning.

In summary, many studies related to incidental L2 vocabulary learning are focus on various contextual reading tasks and word acquisition activities. Although their purpose is to determine several factors that may have the positive or negative impact on students' L2 word retention performance, it is difficult to formulate or establish a unified template to predict students' incidental L2 vocabulary learning achievement. Seeing the need of lacking the applicable measurement criteria related to incidental L2 vocabulary retention in the literature, Laufer & Hulstijn (2001) constructed Involvement Load Hypothesis in order to allow researchers have a tool to manipulate, predict, and measure students' incidental L2 word retention achievement.

The Involvement Load Hypothesis

The Involvement Load Hypothesis proposed by Laufer & Hulstijn (2001) was a motivational-cognitive construct of task-induced involvement. The task involvement load consisted of three basic components: need, search, and evaluation. The hypothetical level of total task involvement load was based on the absence or presence of each component. The level of task involvement load and students' L2 vocabulary retention were positively correlated in this study. In other words, if students had higher task involvement load in learning L2 new words, they generated better L2 vocabulary retention performance. Laufer and Hulstijn suggested that their hypothesis could better predict and explain learners' success in vocabulary retention than traditional incidental L2 learning theories.

The *need* factor in the Involvement Load Hypothesis focuses on students' motivation and it represents the demand to achieve the L2 vocabulary learning tasks. It can either be externally imposed by the teacher or instructional materials or self-imposed by learners. For example, Laufer and Hulstijn proposed that when the teachers assigned L2 reading tasks for students to learn new L2 vocabulary, the need was assumed to be moderate. However, when learners themselves were interested in specific topics and reading L2 texts actively, the need was strong.

The *search* factor in the Involvement Load Hypothesis is focused on the students' cognition and how they seek the meaning or concepts for new L2 vocabulary. In L2 vocabulary learning tasks, the common way to find the meaning of the new L2 vocabulary is to consult either monolingual or bilingual dictionaries.

The *evaluation* factor in the Involvement Load Hypothesis represents the comparison of L2 word meanings or multiple L2 word combinations in order to fit the context. If a new L2 word has multiple meanings and learners need to select one of the best meanings to fit the context, the evaluation is moderate. When learners need to use one new L2 word and combine it with other words to form a L2 sentence or article, the evaluation is strong.

In order to better illustrate the role of need, search, and evaluation factors in the Involvement Load Hypothesis, Laufer & Hulstijn (2001) gave seven tasks as examples. Table 3 is the summary of the task involvement load of these seven different L2 vocabulary learning tasks that they hypothesized. For a detailed explanation of the Involvement Load Hypothesis table, see Appendix A.

Table 3

The Task Involvement Load of Seven Different L2 Vocabulary Learning Tasks (Laufer &
Hulstijn, 2001)

Task	Status of target L2 vocabulary	Need	Search	Evaluation	Involvement load index
1. Reading and answering comprehension questions	New words are glossed	+	-	-	1
2. Reading and answering comprehension questions	New words are not glossed	+	+	-/+	2/3
3. Reading and comprehension questions are fill-in-the blanks	New words are glossed.	+	-	+	2
4. Writing a L2 sentence	New words are explained by teachers	+	-	++	3
5. Writing a L2 composition	Teachers select writing topic. Target words are glossed in L1.	+	-	++	3
6. Writing a L2 composition	Teachers select writing topic. Target words are not glossed.	+	+	++	4
7. Writing a L2 composition	L2 writers select the writing topic.	++	+	++	5

Note. The symbol − represents the absence of each component (a value of zero). The
symbol + represents the moderate presence of each component (a value of one). The
symbol ++ represents the strong presence of each component (a value of two). The
involvement load index is a summation of the three hypothetical scores.

In order to test the Involvement Load Hypothesis, Hulstijn & Laufer (2001) conducted two experiments to investigate EFL students' word retention in the Netherlands and Israel. The participants were first-year EFL students in the Netherlands and advanced EFL students in Israel. In each country, students were randomly divided into three groups.

For the first group, the students in both countries were assigned a reading task followed by ten multiple-choice comprehension questions. In the reading text, ten target L2 words were highlighted and glossed under the words with the precise meaning in L1. This task required moderate need, no search, and no evaluation.

For the second group, students in both countries were assigned the same reading tasks, but instead of ten multiple-choice questions, the ten target words were replaced with blanks in the text. On a separate page, there was a word list that contained fifteen words glossed with both L1 and L2 explanations. Students had to select the correct ten words to fill in the ten blanks in the reading text. This task required moderate need, no search, and moderate evaluation.

For the third group, students in both countries were asked to use these target ten words to write a L2 composition. The word explanation and usage example for each of the ten words were given by the teachers. This task required moderate need, no search, and strong evaluation. According to the Involvement Load Hypothesis, the third group should have the best performance in word retention than other two groups because the task in this group had the highest involvement load.

For the Netherlands study, the results indicated that the reading group did not have a significant difference in word retention performance than the fill-in-the-blank group, but the composition group had significant higher word retention scores than the other two groups. For the Israel study, the data showed statistically significant advantages for the composition group over the other two groups and the fill-in-the-blank group also had significantly higher word retention scores than the reading group. The conclusion of this empirical study pointed out that although the Israel study fully supported the Involvement Load Hypothesis, the results of the Netherlands study only partially supported it.

Kim (2008) conducted another two empirical experiments to examine the Involvement Load Hypothesis. In his first experiment, he replicated Hulstijn & Laufer's (2001) study but selected his participants from two different L2 proficiency levels. One group was international undergraduate students at an American university, and the other group was international students from the same university enrolled solely in ESL classes. After each L2 vocabulary learning task, both immediate vocabulary tests and delayed tests held after two weeks were conducted. The results indicated that in both proficiency levels and in both immediate and delayed tests, the composition groups had significantly higher word retention scores than the reading group and the fill-in-the-blank group. There was no significant difference between the fill-in-the-blank group and the reading group in the immediate vocabulary test. However, the fill-in-the-blank group had significantly higher scores than the reading group in the delayed vocabulary test.

This result is similar to that of Hulstijn & Laufer (2001). In terms of this result, Kim argued that although Hulstijn & Laufer hypothesized need, search, and evaluation factors were equivalent, it might not be adequate to assume each factor with the same index number has equal contribution to the overall involvement load. For example, in a specific L2 vocabulary task, strong evaluation might have a greater influence in students' word retention than a strong need factor. Therefore, more studies are required in order to investigate whether it is reasonable to weigh each task load factor equally in the theoretical Involvement Load Hypothesis.

Kim's second experiment was to examine L2 students' word retention performance in two different tasks but with same amount of theoretical task involvement load. Similar to his first experiment, two proficiency levels of students were separated into two groups and each group was randomly assigned a task (sentence writing or composition). According to the theoretical Involvement Load Hypothesis, if the target L2 words were glossed in L1 and the writing concept was provided and explained by teachers, sentence writing and composition had the same task involvement load (moderate need, no search, and strong evaluation) and would generate identical word retention performance. The results showed that there were no significant differences in word retention achievement between sentences writing and composition groups in both proficiency levels. Although this is consistent with the Involvement Load Hypothesis, looking for and finding no difference adds methodological challenges.

Although the Involvement Load Hypothesis was first proposed in 2001, according to Kim (2008), there is a lack of sufficient empirical study to support or refine the theory.

The Involvement Load Hypothesis mainly focuses on word meaning in L2 vocabulary acquisition, but there are many other aspects of learning new words. For example, learning L2 word forms is also important in L2 vocabulary acquisition. Moreover, the original study assumes that the three involvement load factors (need, search, and evaluation) are equal to each other. It may be that these factors are important but contribute unequally.

As previously discussed, anxiety is an additional factor that may impact vocabulary acquisition. In the current study, it is considered along with its relationship to need, search, evaluation.

Tools to Help Second Language Learning

Over the past several years, second language teachers have used a range of tools in order to help students learn L2. With the development of new technologies, many digital devices have played an important role in education. Digital technologies are also applied widely to second language learning all over the world. Davies (2007) listed many important digital technological devices (such as computers, CD/DVD players, electronic dictionaries, mobile phones, PDAs, projectors, radios, televisions, videocassette recorders, etc.) that were commonly used by teachers as tools to help L2 learners.

With the computer and Internet becoming more widespread in homes and schools today, computer-assisted language learning (CALL) is also popular for teachers and researchers in L2 learning. For example, Ellis (1995) stated that word definitions and usage examples provided by CALL tools, such as on-line dictionaries, could help L2 students promote their L2 vocabulary acquisition. Learning L2 words under the tutoring

of CALL could also assist students to better develop meta-cognitive and cognitive skills for inferring the L2 vocabulary meaning from a context. Warschauer (1996) categorized CALL in second language learning according to three stages: behavioristic, communicative, and integrative. Table 4 summarizes the three stages of CALL in second language learning (Warschauer, 2004).

Table 4

Three Stages of CALL in Second Language Learning (Warschauer, 2004, p.21)

Stage	1960s-1970s: Structural CALL	1980s-1990s: Communicative CALL	21st Century: Integrative CALL
Technology	Mainframe	PCs	Multimedia & Internet
L2 Teaching Paradigm	Grammar-Translation & Audio-Lingual	Communicative language teaching	Content-based, ESP/EAP
View of Language	Structural (a formal structural system)	Cognitive (a mentally-constructed system)	Socio-cognitive (developed in social interaction)
Principal Use of Computers	Drill and Practice	Communicative exercises	Authentic discourse (to perform real-life tasks)
Principal Objective	Accuracy	Fluency	Agency

Note. ESP = English for specific/special purposes; EAP = English for academic purposes.

For structural CALL, the technology served as the vehicle that delivers L2 learning material to students and tutoring learners as well. The CALL during the 1960s and 1970s was focused on a structural and behavioristic approach. Drill and practice programs were a good example of structural CALL. For communicative CALL, the technology served as an interactive learning tool to help individual L2 students develop

mental linguistic systems and allowed individuals to have greater control or choice in using the personal computer to assist them in learning. For example, during the 1980s and 1990s, students might use word processing programs with spell and grammar check functions as assistance in writing compositions in L2. They might also use hand-held electronic dictionaries to help them acquire the meaning and usage of L2 new words. The distinction between communicative CALL and integrative CALL was the emergence of multimedia and the Internet. The benefit of multimedia in learning L2 was that it combined reading, writing, listening, and speaking in one single task. Moreover, the combination of multimedia and the Internet allowed students to build the asynchronous or synchronous communication with their teachers or peers while learning L2. The role of integrative CALL was to expose students in a L2 learning community, allow them interact with their outside environment, and accomplish real life L2 learning tasks.

Many researchers have suggested that integrating CALL in L2 learning tasks could have a positive impact on increasing learners' motivation and vocabulary retention performance as well as reducing their learning anxiety.

For example, in terms of the experience of developing CALL programs for L2 learning, McKay and Robinson (1997) concluded that the "computer can increase students' motivation and provide opportunities for active learning" (p.13). Van Aacken (1999) conducted a case study to explore L2 students' motivation by using CALL to learn 1,000 basic Chinese characters. She found that all the students showed a high desire to use CALL and believed that it could be a useful tool to help them learn L2. Although one student had a neutral attitude toward using CALL to learn L2, the rest of the students all

had positive attitudes. However, the student with the neutral attitude had the most significant improvement in his Chinese character performance. He stated that using CALL decreased his learning anxiety and he believed that using CALL had a positive effect on learning L2. Laufer (2000) integrated new word explanations both in L1 and L2 with sound files of the L2 pronunciation into a CALL dictionary program and then investigated the relationship between the use of the CALL dictionary and word retention for L2 students in Israel and Hong Kong. Prior studies (Knight, 1994; Hulstijn, Hollander & Greidanus, 1996) indicated that the average word retention for L2 students who used paper-based dictionaries as a learning tool was from 20% to 25%, but Laufer's study showed that in the paper-based posttest, the word retention for the Hong Kong group (62%) and the Israel group (33.3%) outperformed prior studies. For both groups, the result of using the CALL dictionary indicated a significant positive effect on L2 students' word retention performance. In a similar study, De Los Arcos et al. (2009) used a synchronous audio-graphic conferencing system as the CALL program to explore students' anxiety level during learning L2. These interview results also indicated that after using the system, L2 students' anxiety levels decreased.

In contrast, some researchers have suggested that integrating CALL in L2 learning tasks might decrease learners' motivation and vocabulary retention performance as well as increase their learning anxiety.

For example, Lewis and Atzert (2000) developed a project-oriented CALL class and observed the students at University of Melbourne who learned German as their L2 for three consecutive years (1997, 1998, and 1999). These students were observed using

the Internet, an HTML editor, and word processing to read, listen, and write in a second language. In 1997, most students did not use the Internet as the tool to help them learn L2. In 1998, many students were using these new technologies. In this study, all students agreed that it was important to use these technologies to help people learn L2. However, one student stated that learning L2 was the main purpose of the activity rather than learning how to use new technologies. Another three students stated that using computers to learn L2 was wasting their time and making them feel stressed and frustrated. This study indicated that in a practical situation, integrating unfamiliar new technologies into a CALL program had a negative impact on students' L2 learning. In other words, Lewis and Atzert concluded that computer anxiety and technophobia for new CALL technologies would reduce L2 students' learning motivation and increase their anxiety level.

Rather than focus on the impact of CALL for L2 students, Lam (2000) conducted a qualitative study to determine if L2 teachers were more likely to experience technophilia or technophobia for new CALL technologies. The interview results showed that most L2 teachers tended to experience technophobia but not technophilia. However, fear of using computers or lacking confidence to use computers was not a factor for L2 teachers who experienced technophobia. Lam concluded that most teachers thought technologies were useless in learning L2 and did not believe that using new technologies would generate any L2 benefit for students. Zapataa and Sagarra (2007) conducted a study to examine the impact of an online workbook and paper workbook on 927 American college students' L2 vocabulary learning. After two computer screen tests and

four vocabulary tests, the results indicated the online workbook group had no significant

results in all six tests. In other words, students who used CALL program to assist learning

a L2 do not have better performance than the students who use paper-based instructional

materials in learning L2.

The Advantages and Disadvantages of
Computer-assisted Language Learning

Many researchers have discussed advantages of CALL in learning L2. For

instance, Lee (2000) pointed out several benefits of CALL in language learning. First, he

suggested that CALL, especially the World Wide Web, can help L2 students construct

their own learning strategies through interacting with the computer or other peers on the

Internet. Second, CALL can help L2 students increase their motivation. Third, web-based

L2 learning materials allow students access from remote sites at any time while also

decreasing the cost of learning. Fourth, those L2 students who fear talking in public can

communicate or learn collaboratively with peers through the Internet. Finally, web-based

CALL programs can increase L2 learners' global understanding. Han (2008) stated that

because a computer does not tire, L2 students can access the L2 instructional materials

repeatedly. Therefore, CALL can help students learn L2 more independently when

teachers are not available.

In contrast, Lai (2006) listed several disadvantages for CALL programs. First, he

described that the cost was the main limitation of CALL programs. Currently, there are

still many low budget schools that cannot afford to build complete CALL programs.

Additionally, many low income students do not have personal computers at home.

Second, the rapid change of new technologies requires constant training of both L2

teachers and students. Third, the CALL program remains imperfect and needs to integrate more artificial intelligence or interactive functions such as voice input/output, grammar correction, sentences analysis, and evaluation/feedback system in order to increase the L2 learning flexibility of students.

To summarize, Aydin (2007) pointed out that CALL is limited because it cannot include all L2 teaching and learning behaviors. In other words, the traditional teachers, instructional materials, and learning environments for learning L2 cannot wholly be replaced by CALL. Before applying CALL programs in learning L2, both instructors and students also need more training in how to use it. Some studies indicated using CALL can have a positive impact on L2 learning; however, a poorly designed CALL program may affect L2 students' learning negatively. Therefore, there is still no solid conclusion as to the actual impact of CALL in L2 learning.

CHAPTER III

METHODOLOGY

The present study examined the relationship between learning task involvement load and L2 vocabulary retention using a quasi-experimental approach. Moreover, this research examined anxiety as a potential fourth factor in the Involvement Load Hypothesis (in addition to need, search, and evaluation) and investigated its potential effect on Taiwanese students' L2 word acquisition. Finally, this study attempted determine whether L2 task load and anxiety level interact in effecting Taiwanese students' L2 vocabulary retention achievement.

This chapter discusses the methodology used to address the research questions introduced in Chapter 1. The following four sections are covered: (a) Research Setting; (b) Independent and Dependent Variables; (c) Materials; (d) Data Collection Procedures; and (e) Statistical Data Analysis.

Research Setting and Participants

In Taiwan, as part of their general education requirements, all college students must take a minimum of four credit hours of College English. The participants in this study were 111 Taiwanese students from three English classes taught by the same teacher and using the same textbook at a university located in Northern Taiwan. It is a private institution of about 11,000 students. All of the students were non-English majors. They came from a variety of disciplines. This was not analyzed, but it is assumed that they

were typical of students from this institution. Because of the limitations of budget and time, this study employed a convenience sample of intact classes.

All personal data of participants were kept confidential. Each participant was asked to write down the last five digits of their student numbers on the treatment materials.

<p style="text-align:center">Independent and Dependent Variables</p>

The first independent variable in the present study is the English vocabulary learning task load, and it was represented by three different tasks: (a) reading only; (b) reading and fill-in-the-blanks questions; and (c) reading and writing short essays. Laufer and Hulstijn (2001) hypothesized that given an appropriate level of vocabulary; higher learning task loads will elicit higher L2 word retention performance. The L2 students' anxiety level was measured by the State-Trait Anxiety Inventory (STAI). Trait anxiety was used as a covariate for multiple research questions. State anxiety was used as an repeated measure in one research question.

The dependent variables in the present study were the L2 students' vocabulary retention performance, difficulty ratings, and usability ratings. These may all be affected by L2 students' anxiety level. Each of the variables is described in more detailed in the following sections.

Learning Tasks

Based on the concept of the Involvement Load Hypothesis, this present study investigated three different levels of task involvement load.

For Task 1, subjects (n = 37) were given a reading task that included an L2 (English) article with all new target words highlighted. On a separate page, there was a list of the new vocabulary with precise L1 (Chinese) glosses for each. According to the Involvement Load Hypothesis, this task involved only a moderate need factor and had the lowest hypothesized vocabulary learning task load.

For Task 2, students (n = 36) were given a different version of the same L2 (English) reading. In this task, all new target words were replaced with blanks in the English passage. On a separate page, there was a list of the new words, but without glosses. All participants used an electronic dictionary in order to complete the fill-in-the-blank activity (i.e. inserting the word listed into the appropriate blanks in the reading). According to the Involvement Load Hypothesis, this task involved moderate need, the presence of search, and moderate evaluation factors, and had a medium hypothesized vocabulary learning task load. In this case, the completed task worksheets were collected.

For Task 3, students were given the complete L2 (English) article with new target words highlighted and the list of new target words without L1 (Chinese) glosses. They then were asked to use the new target words to write L2 (English) sentences (using each new word in a different sentence). The participants needed to use their electronic dictionaries to find the word meaning in order to write a complete sentence. They were told each sentence must contain at least three other words in addition to the target word. The student received one point for using the new word in a complete sentence with no grammatical errors. The student received an additional point if the word was used in an

appropriate context. This task involved moderate need, the presence of search, and strong

evaluation factors, and had the highest hypothesized vocabulary learning task load in the

present study.

State-Trait Anxiety Inventory (STAI)

The State-Trait Anxiety Inventory (STAI) was designed as a research instrument

to measure anxiety (Spielberger, Gorsuch, Lushene, Vagg & Jacobs, 1983). State anxiety

refers to short periods of emotional state such as the feelings of tension or apprehension

stimulated by specific incidents. In contrast, trait anxiety refers to a general response

anxiety when an individual perceives threats in the environment. The STAI is a

self-report questionnaire and includes two separate sections in order to measure

individuals' state and trait anxiety (see Appendix E). For state anxiety measurement, the

STAI state scale (STAI-S) focuses on an individual's current emotion and includes 20

four-point Likert scale items. For example, participants were asked to respond to

statements such as "I feel nervous" with "not at all," "somewhat," "moderately so," and

"very much so." For trait anxiety measurement, STAI trait questions (STAI-T) focused

on an individual's general emotional state and also included 20 four-point Likert scale

items. For example, participants were asked to respond to statements such as "I feel

pleasant" with "almost never," "sometimes," "often," and "almost always." The scores of

both STAI-S and STAI-T scales ranged from 20 to 80, and the higher total STAI scores

indicated higher state and trait anxiety levels. Both the STAI-S and the STAI-T scales had

high internal reliability, alpha coefficients of .83~.92 (Spielberger et al., 1983). Because

the target participants in the present study were Taiwanese L2 students, in order to ensure

they fully understood the questionnaire, a Chinese translation of the STAI scale published

by Mind Garden, Inc. was used (See Appendix F). This translation of the STAI-S scale

had also demonstrated a high internal reliability, Cronbach's alpha of .898 (Chung and

Long, 1984). Its test-retest reliability yielded an r =.737. The Chinese translation of the

STAI-T scale has a Cronbach's alpha of .859 and its test-retest reliability is .755. This

indicates that the STAI scale is a reliable instrument in measuring adult anxiety, and that

the Chinese translation is trustworthy.

Vocabulary Test

In the present study, in order to measure Taiwanese L2 students' word retention,

all participants were given the same vocabulary test. The vocabulary test was conducted

in the normal classroom setting, and the time limit for the test was the same as a regular

English class period, 45 minutes.

For the vocabulary test, the participants were presented with 30 English words,

each accompanied by a Vocabulary Knowledge Scale. There were 25 words from the

treatment materials. For the purpose of comparisons, five of the words represented the

same level of the difficulty, but were not part of the treatment materials. The order of all

target words was randomized. Table 5 illustrates the Vocabulary Knowledge Scale (VKS)

from Wesche & Paribakht (1996). It was used in a modified form in this study.

Table 5

Vocabulary Knowledge Scale (Wesche & Paribakht, 1996)

I	I don't remember having seen this word before.
II	I have seen this word before, but I don't know what it means.
III	I have seen this word before, and I think it means_____. (English synonym or translation)
IV	I know this word. It means_____. (English synonym or translation)
V	I can use this word in a sentence in English. (Write a sentence in English) (If you do this level, please also do English synonym or translation of level IV)

The VKS is a five-point instrument that combines self-report with knowledge demonstration. "The scale ratings range from complete unfamiliarity, through recognition of the word and some idea of its meaning, to the ability to use the word with grammatical and semantic accuracy in a sentence" (Wesche & Paribakht, 1996, p.29). Higher total VKS scores indicate higher word retention levels. The VKS is suitable for measuring students' word retention in this study because the purpose of this scale "is not to estimate general vocabulary knowledge, but rather to track the early development of knowledge of specific words in an instructional or experimental situation" (Wesche & Paribakht, 1996, p.33). A reliability test of VKS was conducted in 1992 for a summer program at a Canadian university. Wesche & Paribakht (1996) used a list of 32 words from the text and administered the test-retest for 93 students from six proficiency levels. The Pearson test-retest correlation was .82~.89. For the current study, a decision was made to combine levels III and IV because the confidence in meaning was considered less important than the actual meaning provided. Also, the students were asked to provide a translated meaning and not an English synonym. Students selecting level III were asked to provide

the word in an English sentence. These changes were predicted to make it easier to interpret the results while maintaining the essence of the scale (see Table 6).

Table 6

Revised Vocabulary Knowledge Scale

_____	I don't remember having seen this word before.
_____	I have seen this word before, but I don't know what it means.
_____	I have seen this word before, and I think it means_____.
	(Please write the Chinese translation)
	If you know the meaning of the word, please use it in a written English sentence.

In its original form, the modified VKS scale combined two self-perceived levels (I and II) and two knowledge demonstration levels (III and sentence generation). For each English word, the student selected the level that best corresponds to his/her knowledge of that word. In level III, the student must provide a meaning for the word. When this level was selected, the student was also asked to generate a sentence containing the word. Each item was scored as follows:

1. Level I: This was a self-perceived level and if a student chose it, he/she received one point, indicating that he/she did not know the specific L2 word.

2. Level II: This was also a self-perceived level. If a student selected it, he/she received two points, indicating that he/she was familiar with the specific L2 word but didn't know its meaning.

3. Level III: For this level, students needed to demonstrate their knowledge of the specific L2 word in writing. This level had two possible scores (two or three points). If a student chose this level but he/she made a mistake in explaining this L2 word in translation, he/she received two points, essentially

a Level II response. If a student chose this level and given a correct translation

for the L2 word, he/she received the full three points.

4. Sentence Generation: This level represented the highest understanding of a

specific L2 word. There were two possible scores, three or four points, for this

level. If a student provided a correct translation for Level III, the sentence was

evaluated. If the translation was not correct, the student's response was worth

two points and the sentence was ignored. If the student made a mistake in the

sentence, he/she received three points. In order to receive the full four points,

the student needed to correctly use the target word in a short sentence. As long

as the usage of this target word was grammatically and semantically correct,

the student still received four points even if other parts of this sentence had

errors. For example, if the target word is "material," a student could produce

the sentence "Glass is one of the strongest materials known by man."

Although "to man" is more correct, the student would still receive four points.

The test in all three learning tasks consisted of a four-point Vocabulary

Knowledge Scale (VKS) for the 25 target words and five control words. The VKS scores

in all three L2 vocabulary learning tasks ranged from 25 to 100 for the target words, and

the higher scores indicated better word retention. There was also a score from five to 20

for the control words.

Neither the scoring mechanics nor the scores of the tests were reported to students.

After the test, all testing materials were collected by the teacher and the scores were not

reported to students. After the study was completed, the teacher made an announcement

to the participants that the scores of the vocabulary test in the experiment did not count toward their final semester grade.

Difficulty and Utility

Although vocabulary retention was the primary dependent variable in this study, it was desirable to ask the participants how difficult and useful they felt the learning tasks were. Due to the limited time with the participants, the assessment of difficulty and utility were addressed with one question each. For difficulty, participants were asked to use a four-point Likert scale (strongly disagree, disagree, agree, strongly agree) to rate the statement, "This learning activity was difficult." For utility, participants were asked to use the same scale to rate the statement, "This activity was useful for learning English vocabulary." In both cases, a more extensive instrument could have provided a wider range of scores and additional detail. However, using single items allowed for group comparisons and could be administered in a limited amount of time. Both questions also had high face validity, i.e. it was assumed that participants would be able to make good relative rating of difficulty and utility with little effort.

<center>Materials</center>

The reading material and target vocabulary were selected from a study book that represented the college students' level of intermediate General English Proficiency Test (GEPT) (The Language Training & Testing Center, 2008). Hand-held electronic dictionaries provided by participants were used in the English vocabulary learning tasks.

Reading Materials

The 4,000 Essential English Words List was published by Taiwan's Ministry of Education in 2003, and established a base level of English vocabulary required for all Taiwanese college students who do not major in English (Chen, 2002). This present study used the 4,000 Essential English Words List as a reasonable norm for English learning tasks and vocabulary tests for Taiwanese college students.

Selecting English reading materials that were suitable for Taiwanese L2 college learners in this present study in terms of content and level of difficulty was a primary consideration. In order to help adults learn English as part of their lifelong education program and to encourage Taiwanese students to learn English as their major L2, in 1999, the Taiwanese Ministry of Education asked the Language Training & Testing Center (LTTC) to design the General English Proficiency Test (GEPT) to determine English proficiency levels (Roever & Pan, 2008). The GEPT was categorized into five levels: (a) Elementary; (b) Intermediate; (c) High-Intermediate; (d) Advanced; and (e) Superior. The intermediate level of the GEPT was suitable for Taiwanese senior students or Taiwanese college L2 students whose major was not English. The 4,000 Essential English word list made up the elementary and intermediate levels tested by the GEPT.

In this study, the reading materials were randomly selected from a study book that represented the intermediate level of the GEPT test. These readings had been specifically constructed with new vocabulary embedded in text passages that used more familiar lower level English. There were a number of study books for the intermediate level of GEPT. For the purpose of this study, one was selected and all the materials taken from it.

New vocabulary in the material was highlighted by the researcher. Ten Taiwanese

college students at roughly the same English proficiency level as the participants, assisted

in a pilot study to help identify any possible problems in the use of the materials.

Target Vocabulary

In this study, 25 target words were selected. To minimize the likelihood that the

participants knew the target words, the words were chosen according to the following

criteria. First, ten undergraduate non-English major students at the same level and at the

same university were recruited. The researcher randomly selected ten readings from a

study book that represented the intermediate level of the GEPT test. Each reading

included five new vocabulary words, so there were 50 new words in the selected

readings.

Second, the researcher randomized the order of these 50 new words and used

them to make a word list. The ten recruited students were asked to review the entire word

list. If a student had seen a specific word before, he/she needed to indicate it on the word

list. If a specific word had not been seen before by the student, he/she indicated that it

was not familiar. The students did not need to provide a meaning for a word. They only

needed to indicate whether it was familiar or not.

Third, the researcher collected all ten of the word lists. The number of students

recognizing each word was recorded, creating a score from 0 to 10. The higher final

scores represented more students knowing a specific word. Then, the total scores for the

five words from each reading were also calculated. The scores for the five new words in

one reading ranged from 0 to 50. The lower scores represented fewer students knowing

the five new words in a reading. For the study, the six readings with the lowest total

scores were selected. The word and total scores for the selected readings are reported in

Appendix M. Five of these readings were used in the treatment conditions. One of the

readings with moderate scores provided control words for testing purposes.

In the reading only task (Task 1), the 25 target English words were highlighted in

the five reading passages. In both the fill-in-the-blanks task (Task 2) and the writing task

(Task 3), the new vocabulary list also consisted of the same 25 new words for

participants to accomplish their learning tasks.

Electronic Dictionaries

Hand-held electronic dictionaries are highly popular CALL devices in Taiwan for

students learning L2 vocabulary. Jian, Sandnes, Law, Huang & Huang (2009) stated that

82.8% of Taiwanese college students owned electronic dictionaries. There are several

electronic dictionary manufacturers in Taiwan, and the product most widely used by

Taiwanese L2 students is Besta (Fang, Huang & Lu, 2007) (See Figure 4). Other leading

brands in Taiwan are Instant, Lexicomp, and Global View (See Figure 5).

Figure 4. Besta CD-885 hand-held electronic dictionary

Figure 5. Instant MD7000 hand-held electronic dictionary

Most hand-held electronic dictionaries in Taiwan integrate sound files of English

pronunciations for all vocabulary and have full explanations in L1 for all English words

(such as Chinese translations of English words, classifications of the words into the eight

parts of speech, basic usages of English words, sentence examples, etc.). This present

study required participants in two of the groups to use their own hand-held electronic

dictionaries in the English vocabulary learning tasks. Although the amounts of additional

functions among various hand-held electronic dictionaries vary, subjects in this study

were required only to use the basic word searching function to evaluate the correct word

meaning of the new vocabulary in the learning tasks. A number of extra electronic

dictionaries were available during the learning day of the study if a student did not have

one. However, every participant in the study had an electronic dictionary and none of the extra devices were used. For all three groups, no other reference materials were allowed. The percentage of various hand-held electronic dictionaries used by participants in this study is reported in Appendix L.

Data Collection Procedures

Although randomly sampling participants is more desirable from a statistical perspective, the nature of this study and its treatments necessitated the use of intact classes. Prior to conducting this study, the instructor designated three classes for this study from the eight she teaches, and the participants in these classes were asked to volunteer. This selection was made in order to meet the needs of the study while minimizing the potential disruption to the normal English class schedule at the research site. A consent form in both Chinese and English was delivered to all participants and they were asked to sign and date it if they wished to participate.

Participants came from three different English classes taught by the same teacher. Each intact group was randomly assigned a different task (reading only had 37 participants, fill-in-the-blanks had 36, and writing had 38). Table 7 shows the order of data collection procedures for the study.

Table 7

Data Collection Procedures

20 Minutes	STAI-S and STAI-T questionnaires
5 Minutes	5 minute presentation of the instructions and the tasks by the teacher
45 Minutes (One Class Period)	Vocabulary learning task
10 Minutes	STAI –S questionnaire and two four-point Likert questions
40 Minutes	VKS vocabulary test

The English vocabulary learning treatments, STAI questionnaires, and the vocabulary test were administered by the class teacher and completed on the same day in two consecutive periods. Use of electronic dictionaries was not allowed for the reading only group. In the fill-in-the-blanks group and in the writing group, participants used their own hand-held electronic dictionaries to help them accomplish the tasks. The class instructor ensured that all participants in both groups had electronic dictionaries. The type of electronic dictionary used by each student was recorded and is presented in Appendix L.

At the start of the study, the 40-item, four-point Likert-style, STAI anxiety instrument consisting of both state and trait anxiety scales in Chinese was distributed to all the participants. Participants were asked to write down the last five digits of their student numbers on the questionnaire. They were required to fill out the self-report questionnaire according to their current emotional state within 20 minutes. They were informed that the teacher wouldn't see the results. After all the participants had finished the questionnaires, they were collected by the researcher.

The English teacher then gave a 5-minute presentation of the instructions and the tasks.

All English vocabulary learning tasks were completed within 45 minutes. All English vocabulary materials were distributed and all participants were asked to write down the last five digits of their student numbers on the learning materials. After 45 minutes, the researcher collected all vocabulary learning materials and put them in an envelope for later review. For the fill-in-the-blanks and writing groups, the task work was evaluated by the researcher.

After completing the vocabulary learning tasks, a 20-item, four-point Likert-style, STAI-S anxiety scale in Chinese and two four-point Likert questions, "This learning activity was difficult." and "This activity was useful for learning English vocabulary." were distributed to all the participants. They were also asked to write down the last five digits of their student numbers on these materials. They were required to fill out the self-report questionnaire according to their current emotional state within 10 minutes. All participants were again informed that the teacher wouldn't see the results. After all the participants had finished the questionnaires, they were collected by the researcher.

Then, without any pre-announcement, all participants were given the same vocabulary test to complete during the remaining 40 minutes. The vocabulary test was a Vocabulary Knowledge Scale (VKS) test that consisted of 30 questions that asked the participants to rate their understanding of the 25 target words and five control words. The control words were randomly inserted into the test and were not identified differently from the target words. The English vocabulary tests were also finished within the 40

minute time limit, one normal class period. Participants were asked to write down the last five digits of their student numbers on the test sheets. Later, the class teacher and a second English teacher each blindly evaluated the participants' tests. Two evaluators were used in order to assess the reliability of the test results. The scores from both evaluators were sent back to the researcher for data analysis. Once all materials were collected, the participants were debriefed and told the purpose of the study.

At the end of the entire experiment, the researcher gave all participants in this study a small gift, less than one US dollar, and thanked them for their participation. The class teacher also announced to all subjects that all vocabulary learning tasks and tests were treated as regular in-class activities and the scores of the vocabulary test were not counted toward their final grades.

<center>Statistical Data Analysis</center>

Prior to discussing specific statistical tests, it is necessary to consider the statistical power in the study. In general, more power is better, but there are limits as to what is feasible.

Gall, Gall & Borg (2007) concluded that there are four factors that can improve statistical power. These are: 1) increasing the sample size can automatically raise the level of statistical power; 2) increasing the level of significance (α) can increase statistical power; 3) conducting a one-tailed test, rather than a two-tailed test, can increase statistical power; and 4) greater effect sizes can have more statistical power than smaller ones (so a researcher can look to treatments and settings that may yield better results). In Taiwan, an average class has 30 to 40 students. Due to the nature of the treatments, three

intact classes were required. Increasing the sample size would necessitate six or nine intact classes. However, this would have created an undue burden on the teacher and school.

The level of significance (α) is generally set at .05. Raising it to .10 would increase the study's power. In other words, the Type II error rate would be reduced. However, the Type I error rate is doubled. In this case, the three treatments have little to no side effects and are roughly the same in terms of cost and involvement, so the risk of falsely promoting one over the others if there was no difference is minimal.

In the current study, both two-tailed and one-tailed tests were used as appropriate. Lastly, there is little that can be done directly regarding effect size. It was hoped that the study's design was appropriate for detecting changes in the various measures.

The three learning tasks represented one independent variable. STAI-T was a covariate. STAI-S was treated as a repeated measure with time of administration (before task and after task) as the within subjects factor.

Data analyses were conducted on the various dependent variables: the vocabulary test and the difficulty/utility measures.

The Vocabulary Knowledge Scale (VKS) variable consists of 25 five-point questions asked at the conclusion of the vocabulary learning tasks. A one-way ANCOVA was conducted with the learning task (reading only, fill-in-the-blanks, and writing) as the independent variable and the STAI-T (Trait subscale of the Anxiety Inventory) as the covariate and the VKS as the dependent variable.

The difficulty variable consisted of one four-point Likert question asked at the conclusion of the vocabulary learning task. A one-way ANCOVA was conducted with the learning task (reading only, fill-in-the-blanks, and writing) as the independent variable and STAI-T as the covariate and the difficulty question as the dependent variable.

The utility variable consists of one four-point Likert question asked at the conclusion of the vocabulary learning task. A one-way ANCOVA was conducted with the learning task (reading only, fill-in-the-blanks, and writing) as the independent variable and STAI-T as the covariate and the utility question as the dependent variable.

A repeated measures 3x(2) ANOVA was conducted with the learning task (reading only, fill-in-the-blanks, and writing) and the STAI-S (State subscale of the Anxiety Inventory) (before and after task) as the repeated measure.

All the data analyses were computed by SPSS 15.0.

CHAPTER IV

RESULTS

The following four sections cover: (a) the relationships between Taiwanese students' vocabulary retention, task load conditions, and level of trait anxiety; (b) the effects of state anxiety on task load conditions; (c) the relationships between difficulty ratings, task load conditions, and level of trait anxiety; and (d) the relationships between utility ratings, task load conditions, and level of trait anxiety.

Q1: Given English Vocabulary Learning Tasks, Will Taiwanese
Students Generate Better Vocabulary Retention in Higher
Task Load Conditions Compared to Lower Ones
When Controlling For Trait Anxiety?

The first research question sought to exam the differences in the mean values of the vocabulary retention scores in three different task load conditions when controlling for differences in trait anxiety.

The descriptive statistics for the vocabulary retention scores for the three different learning tasks are shown in Table 8.

Table 8

Vocabulary Retention Scores and Trait Anxiety by Task

Learning Tasks	N	Covariate Mean (Std. Deviation)	Retention Mean (Std. Deviation)	Adjusted Retention Mean (Std. Error)
Reading Only (Lowest Load)	37	46.59 (7.03)	64.84 (24.08)	66.08 (3.19)
Fill-in-the-blanks (Medium Load)	36	41.22 (6.71)	59.97 (16.62)	58.60 (3.24)
Writing (Highest Load)	38	44.24 (6.80)	68.68 (15.60)	68.78 (3.07)
Total	111	44.05 (7.13)	64.58 (19.30)	64.58 (1.83)

Note. Vocabulary retention scores were measured by a four-point Vocabulary Knowledge Scale (VKS) for the 25 target words. The possible VKS scores in all three L2 vocabulary learning tasks ranged from 25 to 100 for the target words, and the higher scores will indicate better word retention. Five control words were also measured, the overall average for these was 5.90 (SD = 1.90), or roughly 1.18 per word. Trait anxiety was measured by a 20 item, four-point Likert-type state anxiety scale. The possible scores of trait anxiety ranged from 20 to 80, and the higher scores indicated higher trait anxiety levels.

A one-way ANCOVA was conducted to determine the relationships among the independent variable (the three learning tasks), the covariate (trait anxiety), and the dependent variable (vocabulary retention scores). The overall alpha level was set at .10.

Prior to performing an ANCOVA, a researcher should examine the assumptions of independence, normality, equality of variances, and homogeneity of regression. In this case, the independence of data are most threatened by the intact classes. However, this is a common situation in educational research. The value of the authentic educational setting far outweighed the potential statistical concern. The vocabulary retention scores were tested for normality using Shapiro-Wilk, $p = .003$. Although non-normal, ANOVA and by extension ANCOVA are robust to violations of this assumption (Glass & Hopkins,

1996). According to Levene's Test of Equality of Error Variances, $F (2, 108) = 11.69$, p = .000, the groups did not have equal variances. Normally, this would affect Type I error rate. However, the three groups with unequal variances are roughly the same size ($n_1 = 37$, $n_2 = 36$, $n_3 = 38$), so the impact is minimal (Hinkle, Wiersma & Jurs, 1988). A preliminary analysis was used to evaluate the homogeneity-of-regression (slopes) assumption. The result indicated that the assumption was not violated and the ANCOVA test could be conducted, $F (2, 105) = .11$, $p = .896$.

For the ANCOVA test, there was a significant main effect, $F (2, 107) = 2.69$, p = .072. This indicated that the means of the vocabulary retention scores adjusted for trait anxiety would have at least one significant difference among the three treatment groups. Post hoc tests using the Bonferroni adjustment were conducted to evaluate pairwise differences among the adjusted means. The pairwise comparison results indicated that the adjusted mean score of vocabulary retention for the reading group ($M = 66.08$) was not significantly different than the fill-in-the-blanks group ($M = 58.60$), $p = .334$. The mean score of vocabulary retention for the reading only group ($M = 66.08$) was not significantly different than the writing group ($M = 68.78$), $p = 1.000$. However, the mean score of vocabulary retention for the fill-in-the-blanks group ($M = 58.60$) was significantly lower than the writing group ($M = 68.78$), $p = .075$. When controlling for trait anxiety, participants in the writing group performed significantly better than those in the fill-in-the-blanks group.

Q2: When Given English Vocabulary Learning Tasks, Will Taiwanese
Students Experience Changes in State Anxiety and Will
Task Load Conditions Impact State Anxiety?

This research question examined differences in the mean values of state anxiety

scores measured before and after the classroom activities, that varied regarding task load.

The descriptive statistics for the state anxiety measures are shown in Table 9. The key

comparisons are shown in Figure 6.

Table 9

State Anxiety by Time and Task

		Before Activity	After Activity	Overall
Learning Tasks	N	M (SD)	M (SD)	M (SD)
Reading Only (Lowest Load)	37	45.62 (7.34)	43.03 (7.14)	44.32 (6.85)
Fill-in-the-blanks (Medium Load)	36	40.94 (6.40)	39.06 (8.41)	40.00 (6.89)
Writing (Highest Load)	38	43.63 (6.45)	41.76 (8.94)	42.70 (6.54)
Total	111	43.42 (6.95)	41.31 (8.30)	42.36 (6.93)

Note. State anxiety was measured by a 20 item, four-point Likert-type state anxiety scale.
The possible scores of state anxiety ranged from 20 to 80, and the higher scores indicated
higher state anxiety levels.
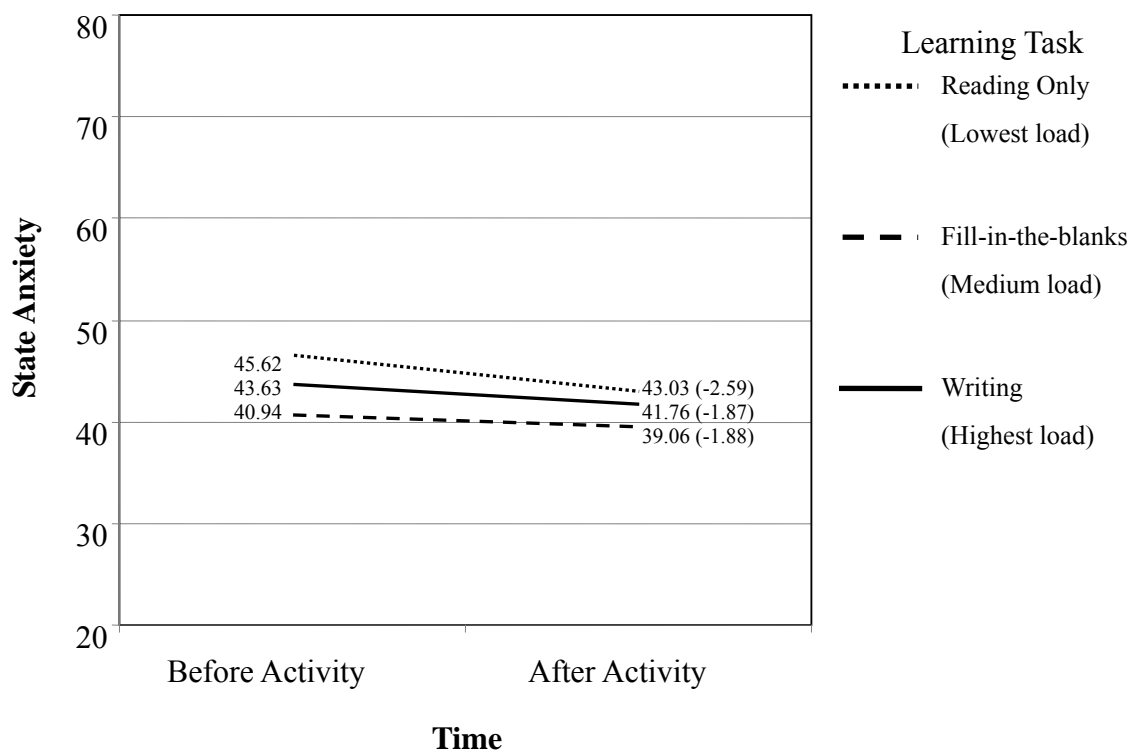
Figure 6. The effects of three different task load conditions on state anxiety

A repeated measures ANOVA was conducted to examine the effect of the task load conditions (reading only, fill-in-the-blanks, and writing) on state anxiety (before and after the activity). The overall alpha level was set at .10.

Prior to performing a repeated measures ANOVA, a researcher should examine the assumptions of independence, normality, equality of variances, and sphericity. In this case, the independence of the data were most threatened by the intact classes. However, this is a common situation in educational research. The value of the authentic educational setting far outweighed the potential statistical concern. The state anxiety (before) was tested for normality using Shapiro-Wilk, $p = .651$. The state anxiety (after) was also tested for normality using Shapiro-Wilk, $p = .647$. The results indicated that the normality

assumption was not violated. According to Levene's Test of Equality of Error Variances, the results of state anxiety (before), F (2, 108) = .33, p = .723, and state anxiety (after), F (2, 108) = 1.23, p = .296, indicated the groups had equal variances, and the assumption was not violated. Because there were only two levels in the repeated factors, sphericity is not an issue (Glass & Hopkins, 1996).

The results of the ANOVA are displayed in Table 10. There was a significant main effect for task load, F (2, 108) = 3.81, p = .025. A post hoc analysis was performed using Tukey's HSD test to identify the specific significant contrast. The analysis, as Table 11 shows, revealed that the reading only group had significantly higher anxiety than the fill-in-the-blanks group, p = .020. No other significant differences were found for this main effect.

The ANOVA also revealed a significant main effect on the repeated measure of state anxiety, F (1, 108) = 11.57, p = .001. The average before activity state anxiety (M = 43.42) was significantly higher than the average after activity state anxiety (M = 41.31). The interaction effect of learning task and state anxiety was not significant, F (2, 108) = .15, p = .863.

Table 10

ANOVA Summary Table of State Anxiety by Time and Task

Source	Df	Mean Square	F	p
Between subjects				
Learning Task (L)	2	347.60	3.81	.025*
Error	108	91.33		
Within subjects				
State Anxiety (S)	1	248.68	11.57	.001*
S × L	2	3.17	.15	.863
Error	108	21.50		

*p < .10

Table 11

Tukey's HSD Comparison for Vocabulary Learning Tasks

Learning Tasks Pairwise Comparisons	Mean Difference	SE	p
Reading Only vs. Fill-in-the-blanks	4.32	1.58	.020*
Reading Only vs. Writing	1.63	1.56	.552
Fill-in-the-blanks vs. Writing	-2.70	1.57	.204

*p < .10

Q3: Given English Vocabulary Learning Tasks, Will Taiwanese Students Report Higher Difficulty Ratings in Higher Task Load Conditions Compared to Lower Ones When Controlling For Trait Anxiety?

The third research question sought to exam the differences in the mean values of the difficulty ratings in three different task load conditions when controlling for differences in trait anxiety.

The descriptive statistics for the difficulty ratings for the three different learning tasks are shown in Table 12.

Table 12

Difficulty Ratings and Trait Anxiety by Task

Learning Tasks	N	Covariate Mean (Std. Deviation)	Mean (Std. Deviation)	Adjusted Mean (Std Error)
Reading Only (Lowest Load)	37	46.59 (7.03)	2.32 (1.00)	2.27 (.15)
Fill-in-the-blanks (Medium Load)	36	41.22 (6.71)	2.69 (.86)	2.75 (.15)
Writing (Highest Load)	38	44.24 (6.80)	2.50 (.73)	2.50 (.14)
Total	111	44.05 (7.13)	2.50 (.87)	2.51 (.08)

Note. Difficulty ratings were measured by a four-point Likert-type questionnaire. The possible difficulty ratings in all three L2 vocabulary learning tasks ranged from one to four, and the higher scores indicated higher difficulty ratings. Trait anxiety was measured by a 20 item, four-point Likert-type state anxiety scale. The possible scores of trait anxiety ranged from 20 to 80, and the higher scores indicated higher trait anxiety levels.

A one-way ANCOVA was conducted to determine the relationships among the independent variable (the three learning tasks), the covariate (trait anxiety), and the dependent variable (difficulty ratings). The overall alpha level was set at .10.

Prior to performing an ANCOVA, a researcher should examine the assumptions of independence, normality, equality of variances, and homogeneity of regression. In this case, the independence of data are most threatened by the intact classes. However, this is a common situation in educational research. The value of the authentic educational setting far outweighed the potential statistical concern. The difficulty ratings were tested for normality using Shapiro-Wilk, $p < .001$. Although non-normal, ANOVA and by extension ANCOVA are robust to violations of this assumption (Glass & Hopkins, 1996). According to Levene's Test of Equality of Error Variances, $F (2, 108) = 2.40$, $p = .096$, the groups did not have equal variances. Normally, this would affect Type I error rate.

However, the three groups with unequal variances are roughly the same size ($n_1 = 37$, $n_2 = 36$, $n_3 = 38$), so the impact is minimal (Hinkle et al., 1988). A preliminary analysis was used to evaluate the homogeneity-of-regression (slopes) assumption. The result indicated that the assumption was not violated and the ANCOVA test could be conducted, $F(3, 107) = 1.63$, $p = .187$.

For the ANCOVA test, there was a significant main effect, $F(2, 107) = 2.62$, $p = .078$. This indicated that the means of the difficulty ratings adjusted for trait anxiety would have at least one significant difference among the three treatment groups. Post hoc tests using the Bonferroni adjustment were conducted to evaluate pairwise differences among the adjusted means. The pairwise comparison results indicated that the adjusted mean score of difficulty ratings for the writing group ($M = 2.50$) was not significantly different than the fill-in-the-blanks group ($M = 2.75$), $p = .620$. The mean score of difficulty ratings for the reading only group ($M = 2.27$) was not significantly different than the writing group ($M = 2.50$), $p = .790$. However, the mean score of difficulty ratings for the fill-in-the-blanks group ($M = 2.75$) was significantly higher than the reading only group ($M = 2.27$), $p = .072$. When controlling for trait anxiety, participants in the fill-in-the-blanks group felt their learning activity was significantly more difficult than those in the reading only group felt about theirs.

Q4: Given English Vocabulary Learning Tasks, Will Taiwanese
Students Report Higher Utility Ratings in Higher Task
Load Conditions Compared to Lower Ones
When Controlling For Trait Anxiety?

The fourth research question sought to examine the differences in the mean values

of the utility ratings in three different task load conditions when controlling for

differences in trait anxiety.

The descriptive statistics for the utility ratings for the three different learning tasks

are shown in Table 13.

Table 13

Utility Ratings and Trait Anxiety by Task

Learning Tasks	N	Covariate Mean (Std. Deviation)	Mean (Std. Deviation)	Adjusted Mean (Std Error)
Reading Only (Lowest Load)	37	46.59 (7.03)	2.95 (.74)	2.92 (.13)
Fill-in-the-blanks (Medium Load)	36	41.22 (6.71)	3.03 (.70)	3.06 (.13)
Writing (Highest Load)	38	44.24 (6.80)	2.95 (.80)	2.95 (.12)
Total	111	44.05 (7.13)	2.97 (.74)	2.97 (.07)

Note. Utility ratings were measured by a four-point Likert-type questionnaire. The
possible utility ratings in all three L2 vocabulary learning tasks ranged from one to four,
and the higher scores will indicate higher utility ratings. Trait anxiety was measured by a
20 item, four-point Likert-type state anxiety scale. The possible scores of trait anxiety
ranged from 20 to 80, and the higher scores indicated higher trait anxiety levels.

A one-way ANCOVA was conducted to determine the relationships among the

independent variable (the three learning tasks), the covariate (trait anxiety), and the

dependent variable (utility ratings). The overall alpha level was set at .10.

Prior to performing an ANCOVA, a researcher should examine the assumptions of independence, normality, equality of variances, and homogeneity of regression. In this case, the independence of data are most threatened by the intact classes. However, this is a common situation in educational research. The value of the authentic educational setting far outweighed the potential statistical concern. The utility ratings were tested for normality using Shapiro-Wilk, $p < .001$. Although non-normal, ANOVA and by extension ANCOVA are robust to violations of this assumption (Glass & Hopkins, 1996). According to Levene's Test of Equality of Error Variances, $F (2, 108) = .24$, $p = .787$, the groups have equal variances and the assumption was not violated. A preliminary analysis was used to evaluate the homogeneity-of-regression (slopes) assumption. The result indicated that the assumption was not violated and the ANCOVA test could be conducted, $F (3, 107) = .478$, $p = .698$.

For the ANCOVA test, there was no significant main effect, $F (2, 107) = .33$, $p = .717$. There were no significant differences among the treatment group in the utility ratings adjusted for trait anxiety.

CHAPTER V

DISCUSSION

This chapter presents the findings of the research questions that were proposed in the study. These findings are also compared with the literature presented earlier. Recommendations for English teachers to improve Taiwanese students' English vocabulary learning experiences and for future study conclude the chapter.

Summary of Findings

The major results of the four research questions are as follows: (1) the statement, "Taiwanese students generate better vocabulary retention in higher task load conditions compared to lower ones when controlling for trait anxiety," was partially supported by results. The results from the reading only group did not support the hypothesis; however, the results from the fill-in-the-blanks and the writing groups did; (2) the statement, "Taiwanese students' state anxiety will be changed after they complete their vocabulary learning tasks," was fully supported by the results. The statement, "task load conditions will impact state anxiety" was partially supported. The reading only group had higher state anxiety than the fill-in-the-blanks group; (3) the statement, "Taiwanese students report higher difficulty ratings in higher task load conditions compared to lower ones when controlling for trait anxiety," was partially supported by the results. Again, the reading only group, which had the lowest task load, reported the highest difficulty ratings; and (4) the statement, "Taiwanese students report higher utility ratings in higher task load

conditions compared to lower ones when controlling for trait anxiety," was not supported. Taiwanese students did not report higher utility ratings in higher task load conditions compared to lower ones when controlling for trait anxiety.

<div align="center">Discussion and Conclusions</div>

Research Question One

The findings for research question one partially support the hypothesis that "Taiwanese students generate better vocabulary retention in higher task load conditions compared to lower ones when controlling for trait anxiety." The reading only group had the lowest task load condition, and according to the Involvement Load Hypothesis, students in this group should have generated the lowest vocabulary retention performance. The fill-in-the-blanks group had a medium task load condition, and students in this group should have generated a medium vocabulary retention performance. The writing group had the highest task load condition, and students in this group should have generated the highest vocabulary retention performance. The results revealed that students in the writing group had higher vocabulary retention performance than those in the fill-in-the-blanks group, but did not have significantly higher vocabulary retention performance than those in the reading only group. Then, the results of the reading only group and the fill-in-the-blanks group did not support the Involvement Load Hypothesis either. Although students in the reading only group (with the lowest task load) generated higher vocabulary retention scores than those in the fill-in-the-blanks group (with a medium task load), the two groups had no significant differences. These findings in the current study are similar to that of Hulstijn & Laufer (2001) and Kim (2008).

One consideration towards an interpretation of the findings in the current study is the role of anxiety. Although language anxiety is often viewed as a negative psychological factor that could influence L2 learners' vocabulary retention performance (Oh, 1992; Aida, 1994; MacIntyre, 1997; Kurt & Atay, 2007; Aydin, 2008; Pichette, 2009), some studies have argued and pointed out the potential benefit of anxiety in L2 learning (Mathews, 1996; Spielmann & Radnofsky, 2001). For example, Mathews (1996) argued that L2 learners feel nervous when speaking a foreign language with native speakers, but at the same time, most students will also agree this activity helps them learn a second language. Spielmann & Radnofsky (2001) described that language anxiety is an unstable phenomenon and each individual has different perceptions. They suggest that rather than using the quantitative method, language anxiety is best evaluated qualitatively and examined differently for cognitive tasks and affective tasks. They also suggest that L2 learners' productivity is not related to any teaching methods or instructional materials that help to reduce anxiety, but is correlated to the quality of instructional materials and learning activities.

Moreover, several studies (Eysenck & Calvo, 1992; Eysenck et al., 2007) pointed out that the higher the anxiety level; the more resources from short-term memory are consumed. Anxiety impairs short-term memory capacity and is a direct threat to student's word retention. However, if an easier learning task is assigned to a student with higher anxiety, although his/her short-term memory capacity is occupied to some degree by anxiety, the easier learning task requires fewer short-term memory resources. Under such circumstances, the impact of anxiety on students' vocabulary retention among different

difficulty levels of L2 learning tasks may become inconsequential. The results in the current study supported this issue.

Another consideration is that the presence of an L1 gloss could be a critical factor that resulted in a higher than expected vocabulary retention performance for the reading only group (they had the lowest task load, but the second highest retention score). According to the literature presented earlier, different types of glosses for new L2 vocabulary will generate different effects on L2 learners' word retention performance. Cheng & Good (2009) found that although students' reading comprehension ability did not improve, new L2 words with L1 glosses did help students learn and recall the new vocabulary. Therefore, the results in the current study might have been partially confounded, because the reading only group is the only one group that had a list of the new vocabulary with precise L1 (Chinese) glosses for each word. For the fill-in-the-blanks and the writing group, students had a list of the new vocabulary without L1 glosses, and they are asked to use their hand-held electronic dictionary to look up and evaluate the precise meaning for each word. Later, all three groups received the same vocabulary retention tests which emphasized word retention performance. With a word list that contained precise L1 glosses for each new word, the students in the reading only group, with the lowest task load condition, might more easily to retrieve the vocabulary information from their short-term memory and generate higher vocabulary retention scores than the fill-in-the-blanks group (with a medium task load).

The third consideration is that Kim (2008) described that the differential effects of certain low and high task load conditions (the reading only and the fill-in-the-blanks)

might not be observable immediately. He suggested that investigating the long-term effects of a specific L2 learning task in vocabulary acquisition is also critical and important.

Research Question Two

The findings on research question two supported the hypothesis that "Taiwanese students' state anxiety will change after they complete their vocabulary learning tasks." In fact, after the learning tasks were completed, all students' state anxiety was reduced.

An interpretation of these findings is that the level of learning task load conditions did not interact with students' state anxiety. This is similar to Spielmann & Radnofsky (2001) findings. The difficulty level of learning activity is not always connected with the level of learners' anxiety. Also, because state anxiety is a temporary change of individuals' emotion due to an outside stimulus, different classroom environments and the type of classes students had taken before they receive the L2 vocabulary learning tasks may have been influenced learners' state anxiety level.

Research Question Three

The findings on research question three partially support the hypothesis that "Taiwanese students report higher difficulty ratings in higher task load conditions compared to lower ones when controlling for trait anxiety." The fill-the-blanks group, which had a medium task load, reported higher difficulty ratings than the reading only group, which had the lowest task load. However, the writing group, which had the highest task load, did not report higher difficulty ratings than the other two groups (the reading only and the fill-in-the-blanks group).

Moreover, many researchers likewise have suggested that a L2 writing activity is more difficult and has a higher learning task load than a fill-in-the-blanks activity; therefore, in their studies, the writing activity generated a higher L2 vocabulary retention performance (Hulstijn & Laufer, 2001; Laufer, 2001; Laufer, 2003; Kim, 2008). However, DeKeyser (2005) described L2 grammar as the most difficult part of learning English as a second language. Folse (2006) suggested that the fill-in-the-blanks activity needed not only deep processing of many words as well as translation of those words, but also had a specific L2 grammar focus. For the writing activity, although students needed to use a dictionary to figure out the meaning of the target words, learners also had to organize all related words to construct a correct sentence. However, the grammar focus of sentence composition was not as specific as the fill-in-the-blanks activity. In other words, for the fill-in-the-blanks task, each blank may involve a specific L2 grammar concept. Thus, in the present study, if a student did not understand the specific grammar concept related to the blank, they might not have been able to use the appropriate vocabulary, and therefore did not receive points. For the writing task, although the target words or other words that were used in the sentence also involved some L2 grammar concepts, students themselves had the flexibility to avoid using the grammar they did not understand in the sentence. This can help to explain the reason why the fill-in-the-blanks group, under medium task load conditions, reported the highest difficulty rating in the current study.

Another possible explanation could be explained with Bloom's taxonomy (Driscroll, 2000). Bloom's taxonomy ranks learning tasks from low to high levels of complexity. When learning is complex (as with synthesis, creativity, and evaluation tasks)

the Bloom's ranking is high. Fill in the blank activities are considered a lower level of complexity, because they do not involve learner generation of ideas or synthesis activities. Results from this study, however, indicate that fill in the blank responses were considered by the participants as requiring stronger cognitive demands than did writing tasks. Writing typically is considered a higher form of learning on Bloom's scale because it involves synthesis levels of learning as well as some and creativity. One interpretation of this result might be that participants found it easier to write the gist of something than to remember a specific fact or word. In the fill-in-the-blanks task, the constraints regarding the use of a specific word within a given grammatical structure and context could have added unanticipated difficulty. This is supported by memory research that finds people are more likely to remember the key meaning over specific representation.

Research Question Four

The findings for research question four did not support the hypothesis that "Taiwanese students report higher utility ratings in higher task load conditions compared to lower ones when controlling for trait anxiety." Taiwanese students did not report significantly different utility ratings for higher task load conditions compared to lower ones when controlling for trait anxiety.

A possible interpretation of the findings is that the instrument used in the current study to assess the utility of the vocabulary learning task might not be sensitive enough. Students from the three groups had distinctly different L2 vocabulary scores. However, the findings for this research question revealed no significant differences among the three

groups. As a result, refining the utility instrument might be necessary in order to acquire a rating that is more precise.

<div align="center">Implications</div>

This present study has implications for both Taiwanese L2 learning practice and future research. As an extension of Hulstijn & Laufer (2001) and Kim's (2008) research, the findings of this study suggest that the Involvement Load Hypothesis can serve as a tool to estimate the load of certain activities. However, those estimated loads need to be examined empirically. The findings of this study should help other linguists refine the Involvement Load Hypothesis.

This study also revealed that the anxiety factor was not associated negatively with L2 learners' vocabulary retention performance as predicted. Similar to that of Hebb (1955), he proposed the theory of optimal level of arousal. In his theory, he suggested that any organism has a preferred optimal level of arousal to perform a task well. In other words, the appropriate arousal was optimal for performance. On the contrary, higher arousal will result in anxiety and lower arousal will result in boredom. Thus, both impaired the performance. The findings in this study supported Hebb's theory that appropriate anxiety level acts as a positive component, helping L2 students increase their motivation and promote their L2 learning achievement.

<div align="center">Recommendations for Future Research</div>

The researcher provides the following recommendations for future study.

One of the findings in this study agreed with previous research partially supported by the Involvement Load Hypothesis (Hulstijn & Laufer, 2001; Kim, 2008). Kim (2008)

questioned whether weighing each task load factor (need, search, and evaluation) equally in the theoretical Involvement Load Hypothesis should be re-evaluated. Therefore, further research should examine each task load factor separately, or add other potential factors that may influence L2 learning in the Involvement Load Hypothesis.

The findings in this study suggested that some anxiety could be beneficial to students' L2 word retention. Although the findings were parallel to several previous studies (Mathews, 1996; Spielmann & Radnofsky, 2001), the current study only focused on the examination of L2 learners' state and trait anxiety. By definition, state anxiety is temporarily affected by various stimuli from the outside environment. The state anxiety results in the current study did not indicate the types of outer stimuli that affect L2 learners' state anxiety. In order to further classify various types of L2 learning anxiety and examine the relationship between anxiety and L2 students' vocabulary retention performance, follow-up studies could apply the Foreign Language Classroom Anxiety Scale (FLCAS), designed by Horwitz et al. (1986). Furthermore, future research could also apply qualitative research methods to better understand the dynamics of anxiety when learning L2.

In the current study, hand-held electronic dictionaries were used as computer-assisted language learning (CALL) tools to help students learn L2 words. However, this study did not focus on investigating L2 students' preferences and experiences in using electronic dictionaries. This study also did not evaluate the effectiveness of different designs of electronic dictionaries on L2 learners' word retention performance. Future research might design various L2 learning tasks and further examine

the effectiveness of several mainstream models and functions of hand-held electronic

dictionaries on L2 vocabulary acquisition.

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APPENDIX A

EXPLANATION OF THE INVOLVEMENT LOAD HYPOTHESIS

This is identical to Table 3 in Chapter 2 of the text

Task	Status of target L2 vocabulary	Need	Search	Evaluation	Involvement load index
1. Reading and answering comprehension questions	New words are glossed	+	-	-	1
2. Reading and answering comprehension questions	New words are not glossed	+	+	-/+	2/3
3. Reading and comprehension questions are fill-in-the blanks	New words are glossed.	+	-	+	2
4. Writing a L2 sentence	New words are explained by teachers	+	-	++	3
5. Writing a L2 composition	Teachers select writing topic. Target words are glossed in L1.	+	-	++	3
6. Writing a L2 composition	Teachers select writing topic. Target words are not glossed.	+	+	++	4
7. Writing a L2 composition	L2 writers select the writing topic.	++	+	++	5

Note. The symbol − represents the absence of each component (a value of zero). The symbol + represents the moderate presence of each component (a value of one). The symbol ++ represents the strong presence of each component (a value of two). The involvement load index is a summation of the three hypothetical scores.

Task 1 in this table reflects students who where asked to perform a reading task. All new L2 vocabulary was glossed in L1, and the L1 glosses were clues that related to answering the reading comprehension questions. Because the reading materials were assigned by teachers, L2 students had a moderate need to read the texts. However, they didn't have to search for the meaning of new words and didn't select or evaluate the proper word meaning to fit in context. So, the involvement load index for Task 1 is one "+" sign (1+0+0).

Task 2 in the table is a similar scenario, but new L2 vocabulary was not glossed. In this task, L2 students had a moderate need in reading the texts, and they had to search for the meaning of the new words. If the new L2 vocabulary had only one meaning, it was not necessary to choosing the proper one to fit the context and the evaluation factor was absent. In contrast, the evaluation factor would present, if the L2 new vocabulary had multiple meanings. So, the involvement load index for Task 2 is two "+" signs (1+1+0) or three "+" signs (1+1+1).

Task 3 in the table was reading the same texts with all new L2 words glossed. Students were asked to select the proper words from a word list and fill the blanks in the context. This task had a moderate need and no search. Because students had to select an appropriate word from the word list to fill each blank, this task will generate a moderate evaluation. So, the involvement load index for Task 3 is two "+" signs (1+0+1).

Tasks 4, 5, 6, and 7 are related to L2 writing. Task 4 in the table had teachers explaining the meaning of the new L2 words, and then students were asked to use these new words in sentences. In this case, there was a moderate need and no search. However,

this task would generate a strong evaluation, because students had to evaluate each word in order to use it to construct a well-organized sentence. The involvement load index for Task 4 is three "+" signs (1+0+2).

Task 5 in the table asked students to use new L2 words in a written composition. The writing topic was provided and explained by teachers and the target L2 words were glossed with L1 explanations. In this task, there was a moderate need and no search because students did not have to look up the L2 word meaning. There was also a strong evaluation, because students had to evaluate each L2 word and use it to construct a well-organized context. The involvement load index for Task 5 is three "+" signs (1+0+2).

Task 6 in the table also had students use new L2 words to write a composition. The writing topic was provided and explained by teachers and the target L2 words were not glossed. In this task, there was a moderate need and a search because students had to look up the L2 word meaning. There was a strong evaluation, because students had to evaluate each L2 word and use it to construct a well-organized context. The involvement load index for Task 6 is four "+" signs (1+1+2).

Task 7 in the table asked students to select their own L1 topic, find the equivalent L2 words, and use them in writing a composition. In this task, there was a strong need, because the students selected their own L1 topic. Search and a strong evaluation were present. So, the involvement load index for Task 7 is five "+" signs (2+1+2).

APPENDIX B

ENGLISH LEARNING MATERIALS FOR TASK 1

1. 請閱讀以下英文文章。文章中粗體的英文單字在單字表中皆有中文字義(單字表在另一頁)。請利用單字表來幫助您閱讀並瞭解文章內容。

2. 請勿使用電子字典或其他參考資料。

3. 此學習活動的時間限制為 **45** 分鐘。

Unit 1

Helen had a **terrible** night last night. While she was doing her homework, the electricity went out. Even though she had a **flashlight**, she still couldn't see very well. In addition, she had to comfort her little sister, who was afraid of the dark. After Helen finally fell asleep, an **ambulance** came down the street and woke her up. Then, a **thunderstorm** started, so she had to get up and close her window. At 4:00, a baby started crying loudly and kept her awake for an hour. Then at 6:00, her **alarm** clock rang; it was time to get up and go to school.

Unit 2

Harry woke up **hungry** last Thursday because he had eaten dinner very early the night before. Even before getting dressed, he went into the **kitchen** to get something to eat. He decided to have cereal, but when he opened the **refrigerator**, he found there was no milk. Then he decided to have eggs and toast, but when he looked for the eggs, he wasn't able to find any. He only found two pieces of **bread**, so he decided to just make toast while he got dressed. However, when he came back to the kitchen, his toast was badly burned because the **toaster** was set on high. He looked around for something else to eat but only found several cookies, so he ate the cookies and went to school hungry.

Unit 3

A few summers ago, my 50-year-old neighbor started learning to play the **flute**. She wasn't very good at it, and she played the same two songs all the time. Secretly, I used to **laugh** at her, for even my little brother played well than she did. That fall, my family moved to a new **apartment** in another part of town, so I didn't hear my neighbor anymore. In fact, I almost **forgot** about her, until the day I saw her picture in the newspaper. To my surprise, my old **neighbor** was going to play her flute at the National Concert Hall. That day, I realized that you're never too old to learn something new.

Unit 4

While waiting for her bus to arrive, Yu-Mei found that all the other people at the bus stop were busy with their own **activities**. One woman was sending a text **message** on her cell phone. Each time she pressed a number, Yu-Mei heard a "beep." A man was reading one

of the morning newspapers. Yu-Mei guessed he was only reading the **headlines** because he was turning the pages very quickly. Another woman was trying to read the bus route information printed on the bus stop sign. Yu-Mei guessed that she **probably** didn't ride the bus often. When the bus finally **arrived**, everyone prepared to get on.

Unit 5

Recently our **science** class went on a filed trip. It was very interesting and lots of fun. We went to a **forest** to look at some trees and plants. Our teacher, Miss Lin, showed each of us a one-meter by one-meter area of **ground** and gave us a sheet of paper. She told us to draw everything we could see on the paper. Then we had to find out the names of all the things that we had drawn. There were so many names we didn't know. Everywhere classmates were calling, "Miss Lin, Miss Lin, I don't know what this is. What is it?" When we got back to school, Miss Lin put all the **drawing** on the wall in the **hallway**. Together, they made a big picture of all the things we had seen. It looked great.

Unit 1 的單字表

1. **terrible**[adj]: 可怕的，嚇人的。
2. **flashlight** [n]: 手電筒。
3. **ambulance** [n]: 救護車。
4. **thunderstorm** [n]: 大雷雨。
5. **alarm** [n]: 警報，警報器，鬧鐘。

Unit 2 的單字表

1. **hungry** [adj]: 飢餓的。
2. **kitchen** [n]: 廚房。
3. **refrigerator** [n]: 冰箱。
4. **bread** [n]: 麵包。
5. **toaster** [n]: 烤麵包機。

Unit 3 的單字表

1. **flute** [n]: 長笛。
2. **laugh** [v]: 笑，嘲笑。
3. **apartment** [n]: 公寓。
4. **forget** [v]: 忘記。
5. **neighbor** [n]: 鄰居。

Unit 4 的單字表

1. **activity** [n]: 活動。
2. **message** [n]:信息，消息。
3. **headline** [n]: 頭條新聞。
4. **probably** [adv]: 可能地。
5. **arrive** [v]: 抵達，到達。

Unit 5 的單字表

1. **science** [n]: 科學。
2. **forest** [n]: 森林。
3. **ground** [n]: 地面。
4. **drawing** [adj]: 繪畫，圖畫。
5. **hallway** [n]: 走廊，玄關。

APPENDIX C

ENGLISH LEARNING MATERIALS FOR TASK 2

1. 閱讀以下英文文章。請使用您的電子字典來幫助您查找單字表中粗體英文單字的精確中文字義。
2. 將單字表中的單字正確的填入各篇文章的空格中。
3. 此學習活動的時間限制為 **45** 分鐘。

Unit 1

Helen had a _____ night last night. While she was doing her homework, the electricity went out. Even though she had a _____, she still couldn't see very well. In addition, she had to comfort her little sister, who was afraid of the dark. After Helen finally fell asleep, an _____ came down the street and woke her up. Then, a _____ started, so she had to get up and close her window. At 4:00, a baby started crying loudly and kept her awake for an hour. Then at 6:00, her _____ clock rang; it was time to get up and go to school.

Unit 2

Harry woke up _____ last Thursday because he had eaten dinner very early the night before. Even before getting dressed, he went into the _____ to get something to eat. He decided to have cereal, but when he opened the _____, he found there was no milk. Then he decided to have eggs and toast, but when he looked for the eggs, he wasn't able to find any. He only found two pieces of _____, so he decided to just make toast while he got dressed. However, when he came back to the kitchen, his toast was badly burned because the _____ was set on high. He looked around for something else to eat but only found several cookies, so he ate the cookies and went to school hungry.

Unit 3

A few summers ago, my 50-year-old neighbor started learning to play the _____. She wasn't very good at it, and she played the same two songs all the time. Secretly, I used to _____ at her, for even my little brother played well than she did. That fall, my family moved to a new _____ in another part of town, so I didn't hear my neighbor anymore. In fact, I almost _____ about her, until the day I saw her picture in the newspaper. To my surprise, my old _____ was going to play her flute at the National Concert Hall. That day, I realized that you're never too old to learn something new.

Unit 4

While waiting for her bus to arrive, Yu-Mei found that all the other people at the bus stop

were busy with their own _____. One woman was sending a text _____ on her cell phone. Each time she pressed a number, Yu-Mei heard a "beep." A man was reading one of the morning newspapers. Yu-Mei guessed he was only reading the _____ because he was turning the pages very quickly. Another woman was trying to read the bus route information printed on the bus stop sign. Yu-Mei guessed that she _____ didn't ride the bus often. When the bus finally _____, everyone prepared to get on.

Unit 5

Recently our _____ class went on a filed trip. It was very interesting and lots of fun. We went to a _____ to look at some trees and plants. Our teacher, Miss Lin, showed each of us a one-meter by one-meter area of _____ and gave us a sheet of paper. She told us to draw everything we could see on the paper. Then we had to find out the names of all the things that we had drawn. There were so many names we didn't know. Everywhere classmates were calling, "Miss Lin, Miss Lin, I don't know what this is. What is it?" When we got back to school, Miss Lin put all the _____ on the wall in the _____. Together, they made a big picture of all the things we had seen. It looked great.

Unit 1 的單字表

6. **alarm**

7. **thunderstorm**

8. **ambulance**

9. **flashlight**

10. **terrible**

Unit 2 的單字表

6. **refrigerator**

7. **kitchen**

8. **toaster**

9. **bread**

10. **hungry**

Unit 3 的單字表

6. **laugh**

7. **flute**

8. **neighbor**

9. **forget**

10. **apartment**

Unit 4 的單字表

6. **headline**

7. **arrive**

8. **activity**

9. **probably**

10. **message**

Unit 5 的單字表

6. **hallway**

7. **forest**

8. **drawing**

9. **ground**

10. **science**

APPENDIX D

ENGLISH LEARNING MATERIALS FOR TASK 3

1. 閱讀以下英文文章。請使用您的電子字典來幫助您查找文章或單字表中粗體英文單字的精確中文字義。

2. 閱讀每篇文章後，請用單字表中的各個單字造一句與文章主題相關的英文短句。您所寫的每句英文短句中，除了必須包含一個粗體單字之外，最少需含三個其他的單字以上，換言之，每句包含一個粗體單字，最少共需四個字。

3. 此學習活動的時間限制爲 **45** 分鐘。

Unit 1

Helen had a **terrible** night last night. While she was doing her homework, the electricity went out. Even though she had a **flashlight**, she still couldn't see very well. In addition, she had to comfort her little sister, who was afraid of the dark. After Helen finally fell asleep, an **ambulance** came down the street and woke her up. Then, a **thunderstorm** started, so she had to get up and close her window. At 4:00, a baby started crying loudly and kept her awake for an hour. Then at 6:00, her **alarm** clock rang; it was time to get up and go to school.

Unit 2

Harry woke up **hungry** last Thursday because he had eaten dinner very early the night before. Even before getting dressed, he went into the **kitchen** to get something to eat. He decided to have cereal, but when he opened the **refrigerator**, he found there was no milk. Then he decided to have eggs and toast, but when he looked for the eggs, he wasn't able to find any. He only found two pieces of **bread**, so he decided to just make toast while he got dressed. However, when he came back to the kitchen, his toast was badly burned because the **toaster** was set on high. He looked around for something else to eat but only found several cookies, so he ate the cookies and went to school hungry.

Unit 3

A few summers ago, my 50-year-old neighbor started learning to play the **flute**. She wasn't very good at it, and she played the same two songs all the time. Secretly, I used to **laugh** at her, for even my little brother played well than she did. That fall, my family moved to a new **apartment** in another part of town, so I didn't hear my neighbor anymore. In fact, I almost **forgot** about her, until the day I saw her picture in the newspaper. To my surprise, my old **neighbor** was going to play her flute at the National Concert Hall. That day, I realized that you're never too old to learn something new.

Unit 4

While waiting for her bus to arrive, Yu-Mei found that all the other people at the bus stop

were busy with their own **activities**. One woman was sending a text **message** on her cell phone. Each time she pressed a number, Yu-Mei heard a "beep." A man was reading one of the morning newspapers. Yu-Mei guessed he was only reading the **headlines** because he was turning the pages very quickly. Another woman was trying to read the bus route information printed on the bus stop sign. Yu-Mei guessed that she **probably** didn't ride the bus often. When the bus finally **arrived**, everyone prepared to get on.

Unit 5

Recently our **science** class went on a filed trip. It was very interesting and lots of fun. We went to a **forest** to look at some trees and plants. Our teacher, Miss Lin, showed each of us a one-meter by one-meter area of **ground** and gave us a sheet of paper. She told us to draw everything we could see on the paper. Then we had to find out the names of all the things that we had drawn. There were so many names we didn't know. Everywhere classmates were calling, "Miss Lin, Miss Lin, I don't know what this is. What is it?" When we got back to school, Miss Lin put all the **drawing** on the wall in the **hallway**. Together, they made a big picture of all the things we had seen. It looked great.

Unit 1 的單字
11. terrible

_____

12. flashlight

_____

13. ambulance

_____

14. thunderstorm

_____

15. alarm

_____

Unit 2 的單字
11. hungry

_____

12. kitchen

_____

13. refrigerator

_____

14. bread

_____

15. toaster

_____

Unit 3 的單字
11. flute

_____

12. laugh

_____

13. apartment

14. forget

_____

15. neighbor

_____

Unit 4 的單字
11. activity

_____

12. message

_____

13. headline

_____

14. probably

_____

15. arrive

_____

Unit 5 的單字
11. science

_____

12. forest

_____

13. ground

_____

14. drawing

_____

15. hallway

_____

APPENDIX E

SAMPLE STATE-TRAIT ANXIETY INVENTORY

Sample State-Trait Anxiety Inventory for State Anxiety (STAI-S)

DIRECTIONS: A number of statements which people have used to describe themselves are given below. Read each statement and then select the one that indicates how you feel **RIGHT NOW**, that is, at this moment. There is no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe your present feelings best.	Not at All	Somewhat	Moderately So	Very Much So
1. I feel calm	1	2	3	4
2. I feel secure	1	2	3	4
3. I am tense	1	2	3	4

Note. Adapted from Spielberger et al. (1983). Sample items are printed with permission from Mind Garden, Inc. For further information and ordering information of STAI, contact www.mindgarden.com or (650) 322-6300

Sample State-Trait Anxiety Inventory for Trait Anxiety (STAI-T)

DIRECTIONS: A number of statements which people have used to describe themselves are given below. Read each statement and then select the appropriate circle to indicate how you **GENERALLY** feel. There is no right or wrong answers. Do not spend too much time on any one statement, but give the answer which describes how you GENERALLY feel.	Almost Never	Sometimes	Often	Almost always
1. I feel pleasant	1	2	3	4
2. I feel nervous and restless	1	2	3	4
3. I feel satisfied with myself	1	2	3	4

Note. Adapted from Spielberger et al. (1983). Sample items are printed with permission from Mind Garden, Inc. For further information and ordering information of STAI, contact www.mindgarden.com or (650) 322-6300

APPENDIX F

SAMPLE STATE-TRAIT ANXIETY INVENTORY (CHINESE VERSION)

自我評估量表 **(STAI-S)** 編製者: 斯比堡格·高沙·盧信·維格·傑柯堡

作答說明:下列列出一般人通常用來形容自己心情的一些句子，請仔細閱讀每一句，然後在右邊**圈選**最符合您目前心情中的一個。這種自我評估並無對錯之分，所以不需要花太多時間在同一題上鑽研。只要把最能描述您目前心理狀況的答案標明即可。

項目	毫無此感	稍有此感	頗有此感	深有此感
1. 我覺得內心平靜	1	2	3	4
2. 我有安全感	1	2	3	4
3. 我感到緊張	1	2	3	4

Note. Adapted from Spielberger et al. (1983). Sample items are printed with permission from Mind Garden, Inc. For further information and ordering information of STAI, contact www.mindgarden.com or (650) 322-6300

自我評估量表 **(STAI-T)** 編製者: 斯比堡格·高沙·盧信·維格·傑柯堡

作答說明:下列列出一般人通常用來形容自己心情的一些句子，請仔細閱讀每一句，然後在右邊**圈選**最符合您目前心情中的一個。這種自我評估並無對錯之分，所以不需要花太多時間在同一題上鑽研。只要把最能描述您目前心理狀況的答案標明即可。

項目	毫無此感	稍有此感	頗有此感	深有此感
1. 我覺得愉快	1	2	3	4
2. 我覺得神經質與慌張	1	2	3	4
3. 我對自己表示滿意	1	2	3	4

Note. Adapted from Spielberger et al. (1983). Sample items are printed with permission from Mind Garden, Inc. For further information and ordering information of STAI, contact www.mindgarden.com or (650) 322-6300

APPENDIX G

DIFFICULTY AND UTILITY QUESTIONNAIRE

Difficulty and Utility Questionnaire

DIRECTIONS: Please read each statement and then select the appropriate circle to indicate how you feel about the English vocabulary learning activity. There is no right or wrong answers. Do not spend too much time on any one statement, but give the answer which describes how you feel about the English vocabulary learning activity.	Disagree Strongly	Disagree	Agree	Agree Strongly
1. This learning activity was difficult.	1	2	3	4
2. This activity was useful for learning English vocabulary.	1	2	3	4

APPENDIX H

DIFFICULTY AND UTILITY QUESTIONNAIRE (CHINESE VERSION)

困難度與實用度問卷

　　請仔細讀完每個句子，然後根據你**對這個學習英文單字的活動**，**圈選**一個最適當的答案。答案沒有一定的對或錯，只要選出最符合你對這個學習英文單字的活動的感受即可，不必在同一題上花太多的時間。

項目	非常不同意	不同意	同意	非常同意
1. 這個學習活動是困難的。	1	2	3	4
2. 這個學習活動對學習英文單字是有用的。	1	2	3	4

APPENDIX I

VOCABULARY KNOWLEDGE TEST

單字知識量表

1.

針對 **terrible** 這個英文單字, 請勾選以下的選項
____	我不記得曾經看過這個字。
____	我曾經看過這個字，但我不知道這個字的意思。
____	我曾經看過這個字，而且我認爲它的意思是: _____ (請寫出其中文翻譯) 如果你知道這個英文單字的意思, 請用這個字寫一句英文句子。 _____

2.

針對 **hungry** 這個英文單字, 請勾選以下的選項
____	我不記得曾經看過這個字。
____	我曾經看過這個字，但我不知道這個字的意思。
____	我曾經看過這個字，而且我認爲它的意思是: _____ (請寫出其中文翻譯) 如果你知道這個英文單字的意思, 請用這個字寫一句英文句子。 _____

3.

針對 **flute** 這個英文單字, 請勾選以下的選項
____	我不記得曾經看過這個字。
____	我曾經看過這個字，但我不知道這個字的意思。
____	我曾經看過這個字，而且我認爲它的意思是: _____ (請寫出其中文翻譯) 如果你知道這個英文單字的意思, 請用這個字寫一句英文句子。 _____

4.

針對 **activity** 這個英文單字, 請勾選以下的選項
____	我不記得曾經看過這個字。
____	我曾經看過這個字，但我不知道這個字的意思。
____	我曾經看過這個字，而且我認爲它的意思是: _____ (請寫出其中文翻譯) 如果你知道這個英文單字的意思, 請用這個字寫一句英文句子。 _____

5.

	針對 **science** 這個英文單字, 請勾選以下的選項
____	我不記得曾經看過這個字。
____	我曾經看過這個字，但我不知道這個字的意思。
____	我曾經看過這個字，而且我認爲它的意思是: _____ (請寫出其中文翻譯) 如果你知道這個英文單字的意思, 請用這個字寫一句英文句子。 _____

6.

	針對 **crater** 這個英文單字, 請勾選以下的選項
____	我不記得曾經看過這個字。
____	我曾經看過這個字，但我不知道這個字的意思。
____	我曾經看過這個字，而且我認爲它的意思是: _____ (請寫出其中文翻譯) 如果你知道這個英文單字的意思, 請用這個字寫一句英文句子。 _____

7.

	針對 **flashlight** 這個英文單字, 請勾選以下的選項
____	我不記得曾經看過這個字。
____	我曾經看過這個字，但我不知道這個字的意思。
____	我曾經看過這個字，而且我認爲它的意思是: _____ (請寫出其中文翻譯) 如果你知道這個英文單字的意思, 請用這個字寫一句英文句子。 _____

8.

	針對 **kitchen** 這個英文單字, 請勾選以下的選項
____	我不記得曾經看過這個字。
____	我曾經看過這個字，但我不知道這個字的意思。
____	我曾經看過這個字，而且我認爲它的意思是: _____ (請寫出其中文翻譯) 如果你知道這個英文單字的意思, 請用這個字寫一句英文句子。 _____

9.

	針對 **laugh** 這個英文單字, 請勾選以下的選項
____	我不記得曾經看過這個字。
____	我曾經看過這個字，但我不知道這個字的意思。
____	我曾經看過這個字，而且我認為它的意思是: _____ (請寫出其中文翻譯) 如果你知道這個英文單字的意思, 請用這個字寫一句英文句子。 _____

10.

	針對 **message** 這個英文單字, 請勾選以下的選項
____	我不記得曾經看過這個字。
____	我曾經看過這個字，但我不知道這個字的意思。
____	我曾經看過這個字，而且我認為它的意思是: _____ (請寫出其中文翻譯) 如果你知道這個英文單字的意思, 請用這個字寫一句英文句子。 _____

11.

	針對 **forest** 這個英文單字, 請勾選以下的選項
____	我不記得曾經看過這個字。
____	我曾經看過這個字，但我不知道這個字的意思。
____	我曾經看過這個字，而且我認為它的意思是: _____ (請寫出其中文翻譯) 如果你知道這個英文單字的意思, 請用這個字寫一句英文句子。 _____

12.

	針對 **volcanic** 這個英文單字, 請勾選以下的選項
____	我不記得曾經看過這個字。
____	我曾經看過這個字，但我不知道這個字的意思。
____	我曾經看過這個字，而且我認為它的意思是: _____ (請寫出其中文翻譯) 如果你知道這個英文單字的意思, 請用這個字寫一句英文句子。 _____

13.

針對 **ambulance** 這個英文單字, 請勾選以下的選項	
____	我不記得曾經看過這個字。
____	我曾經看過這個字，但我不知道這個字的意思。
____	我曾經看過這個字，而且我認為它的意思是: _____ (請寫出其中文翻譯) 如果你知道這個英文單字的意思, 請用這個字寫一句英文句子。 _____

14.

針對 **refrigerator** 這個英文單字, 請勾選以下的選項	
____	我不記得曾經看過這個字。
____	我曾經看過這個字，但我不知道這個字的意思。
____	我曾經看過這個字，而且我認為它的意思是: _____ (請寫出其中文翻譯) 如果你知道這個英文單字的意思, 請用這個字寫一句英文句子。 _____

15.

針對 **apartment** 這個英文單字, 請勾選以下的選項	
____	我不記得曾經看過這個字。
____	我曾經看過這個字，但我不知道這個字的意思。
____	我曾經看過這個字，而且我認為它的意思是: _____ (請寫出其中文翻譯) 如果你知道這個英文單字的意思, 請用這個字寫一句英文句子。 _____

16.

針對 **headline** 這個英文單字, 請勾選以下的選項	
____	我不記得曾經看過這個字。
____	我曾經看過這個字，但我不知道這個字的意思。
____	我曾經看過這個字，而且我認為它的意思是: _____ (請寫出其中文翻譯) 如果你知道這個英文單字的意思, 請用這個字寫一句英文句子。 _____

17.

	針對 **ground** 這個英文單字, 請勾選以下的選項
____	我不記得曾經看過這個字。
____	我曾經看過這個字，但我不知道這個字的意思。
____	我曾經看過這個字，而且我認為它的意思是: _____ (請寫出其中文翻譯) 如果你知道這個英文單字的意思, 請用這個字寫一句英文句子。 _____

18.

	針對 **eruption** 這個英文單字, 請勾選以下的選項
____	我不記得曾經看過這個字。
____	我曾經看過這個字，但我不知道這個字的意思。
____	我曾經看過這個字，而且我認為它的意思是: _____ (請寫出其中文翻譯) 如果你知道這個英文單字的意思, 請用這個字寫一句英文句子。 _____

19.

	針對 **thunderstorm** 這個英文單字, 請勾選以下的選項
____	我不記得曾經看過這個字。
____	我曾經看過這個字，但我不知道這個字的意思。
____	我曾經看過這個字，而且我認為它的意思是: _____ (請寫出其中文翻譯) 如果你知道這個英文單字的意思, 請用這個字寫一句英文句子。 _____

20.

	針對 **bread** 這個英文單字, 請勾選以下的選項
____	我不記得曾經看過這個字。
____	我曾經看過這個字，但我不知道這個字的意思。
____	我曾經看過這個字，而且我認為它的意思是: _____ (請寫出其中文翻譯) 如果你知道這個英文單字的意思, 請用這個字寫一句英文句子。 _____

21.

針對 **forget** 這個英文單字, 請勾選以下的選項	
____	我不記得曾經看過這個字。
____	我曾經看過這個字,但我不知道這個字的意思。
____	我曾經看過這個字,而且我認為它的意思是: _____ (請寫出其中文翻譯) 如果你知道這個英文單字的意思, 請用這個字寫一句英文句子。 _____

22.

針對 **probably** 這個英文單字, 請勾選以下的選項	
____	我不記得曾經看過這個字。
____	我曾經看過這個字,但我不知道這個字的意思。
____	我曾經看過這個字,而且我認為它的意思是: _____ (請寫出其中文翻譯) 如果你知道這個英文單字的意思, 請用這個字寫一句英文句子。 _____

23.

針對 **drawing** 這個英文單字, 請勾選以下的選項	
____	我不記得曾經看過這個字。
____	我曾經看過這個字,但我不知道這個字的意思。
____	我曾經看過這個字,而且我認為它的意思是: _____ (請寫出其中文翻譯) 如果你知道這個英文單字的意思, 請用這個字寫一句英文句子。 _____

24.

針對 **evaporate** 這個英文單字, 請勾選以下的選項	
____	我不記得曾經看過這個字。
____	我曾經看過這個字,但我不知道這個字的意思。
____	我曾經看過這個字,而且我認為它的意思是: _____ (請寫出其中文翻譯) 如果你知道這個英文單字的意思, 請用這個字寫一句英文句子。 _____

25.

針對 **alarm** 這個英文單字, 請勾選以下的選項	
_____	我不記得曾經看過這個字。
_____	我曾經看過這個字，但我不知道這個字的意思。
_____	我曾經看過這個字，而且我認為它的意思是: _____ (請寫出其中文翻譯) 如果你知道這個英文單字的意思, 請用這個字寫一句英文句子。 _____

26.

針對 **toaster** 這個英文單字, 請勾選以下的選項	
_____	我不記得曾經看過這個字。
_____	我曾經看過這個字，但我不知道這個字的意思。
_____	我曾經看過這個字，而且我認為它的意思是: _____ (請寫出其中文翻譯) 如果你知道這個英文單字的意思, 請用這個字寫一句英文句子。 _____

27.

針對 **neighbor** 這個英文單字, 請勾選以下的選項	
_____	我不記得曾經看過這個字。
_____	我曾經看過這個字，但我不知道這個字的意思。
_____	我曾經看過這個字，而且我認為它的意思是: _____ (請寫出其中文翻譯) 如果你知道這個英文單字的意思, 請用這個字寫一句英文句子。 _____

28.

針對 **arrive** 這個英文單字, 請勾選以下的選項	
_____	我不記得曾經看過這個字。
_____	我曾經看過這個字，但我不知道這個字的意思。
_____	我曾經看過這個字，而且我認為它的意思是: _____ (請寫出其中文翻譯) 如果你知道這個英文單字的意思, 請用這個字寫一句英文句子。 _____

29.

針對 **hallway** 這個英文單字, 請勾選以下的選項
____	我不記得曾經看過這個字。
____	我曾經看過這個字，但我不知道這個字的意思。
____	我曾經看過這個字，而且我認為它的意思是: _____ (請寫出其中文翻譯) 如果你知道這個英文單字的意思, 請用這個字寫一句英文句子。 _____

30.

針對 **mystery** 這個英文單字, 請勾選以下的選項
____	我不記得曾經看過這個字。
____	我曾經看過這個字，但我不知道這個字的意思。
____	我曾經看過這個字，而且我認為它的意思是: _____ (請寫出其中文翻譯) 如果你知道這個英文單字的意思, 請用這個字寫一句英文句子。 _____

APPENDIX J

INFORMED CONSENT FOR PARTICIPATION IN RESEARCH

UNIVERSITY *of*

NORTHERN COLORADO

Informed Consent for Participation in Research

University of Northern Colorado

Project Title: English Language Acquisition of Taiwanese Students

Researcher: Mr. Hsin-Chia Cheng, Department of Educational Technology
Phone Number: 1-970-301-9586
E-mail: chen8907@bears.unco.edu

Research Advisor: Dr. James E. Gall, Department of Educational Technology
Phone Number: 1- 970-351-1609
E-mail: james.gall@unco.edu

My name is Hsin-Chia Cheng and I'm currently a doctoral student at the University of
Northern Colorado. I do research regarding various strategies for learning English as a
second language. Your participation will help the researcher to realize barriers in learning
English as a second language for Taiwanese college students.

This study requires you to perform some English learning tasks. Then, you will be asked to
complete surveys and other instruments related to the goals of the research anonymously.

This research has minimal risk or danger. All personal data of participants will be kept
confidential. Participants will be asked to write down the last five digits of their student
numbers on the study materials but should NOT write their real names or any other
identifying information on the study materials. Your individual responses will not be
disclosed or distributed to other people. Benefits to the research participants could include
discovering different strategies for learning English vocabulary more naturally and more

efficiently.

Indirect benefits to the research participants will be: this study will provide a necessary addition to current academic literature on the perspectives and constraints that may impact the English learning experiences of Taiwanese students. Second, the result of this study will help the policy makers of English education, English curriculum makers, and English teachers in Taiwan, to better understand the potential factors that hinder Taiwanese learners' English learning. From the result of this study, they can design a better English curriculum or deliver a better instruction that help Taiwanese students learn English more efficiently.

Participation is voluntary. You may decide not to participate in this study and if you begin participation you may still decide to stop and withdraw at any time. Your decision will be respected and will not result in loss of benefits to which you are otherwise entitled. For example, if you decide not to take part or to skip some of the questions, it will not affect your current or future academic grade. Having read the above and having had an opportunity to ask any questions, please sign below if you would like to participate in this research. A copy of this form will be given to you to retain for future reference. If you have any concerns about your selection or treatment as a research participant, please contact the Office of Sponsored Programs, Kepner Hall, University of Northern Colorado Greeley, CO   80639; 1-970-351-2161.

_____

Student's Name (Printed)

_____   _____

Student's Signature   Date

_____   _____

Researcher's Signature   Date

APPENDIX K

INFORMED CONSENT FOR PARTICIPATION IN RESEARCH (CHINESE VERSION)

UNIVERSITY *of*
NORTHERN COLORADO

研究參與者同意書
美國北科羅拉多州立大學

研究名稱: English Language Acquisition of Taiwanese Students

研究者: Mr. Hsin-Chia Cheng (鄭新嘉), Department of Educational Technology

電話號碼: 1-970-301-9586

E-mail: chen8907@bears.unco.edu

研究者指導教授: Dr. James E. Gall, Department of Educational Technology

電話號碼: 1- 970-351-1609

E-mail: james.gall@unco.edu

我的名字是鄭新嘉。現爲美國北科羅拉多州立大學博士生。我現正進行的研究是不同學習策略對學習英文做爲第二外語的影響。因此，您的參加將會幫助研究者台灣大學生學習英文的障礙。

本研究需要您配合進行一些英文學習任務。接著，您會被請求以不記名的方式完成一些與本研究相關的問卷與量表。

本研究幾無任何風險與危險。所有參與者的個人資料會嚴加保密。參與者會被事先通知，他們不需在問卷上填寫姓名與任何其他個人敏感的資料。您個人的任何問卷回答也絕不會被任意公開或散佈給其他人。參與本研究的參與學生將會有益於他們發掘另一種更有效率及更自然的英文單字學習策略。

參與本研究的人將有助於提供更多可能影響英文學習經驗的學術研究成果。其次，本研究的成果也可以間接幫助台灣的英文課程制定者，英文學習政策制定者與英文老師瞭解台灣學生的英文學習障礙並幫助台灣學生更有效率的學習英文。

本研究採自願式參加。您可以選擇不參與本研究。在研究進行中,您仍可在任何時候決定中途停止參加本研究。您的決定將會受到尊重,且您不會喪失任何個人的權益。例如,如果您選擇不參加本研究或跳過任何問卷上的問題,這都不會影響您現在或未來任何的學業成績。如果您決定參加本研究,煩請在以下欄位簽名。本同意書的一份相同副本將會發給您個人存查。如果您有任何關於本研究的問題,請聯絡:Office of Sponsored Programs, Kepner Hall, University of Northern Colorado Greeley, CO 80639,或致電:1-970-351-2161。

_____   _____

學生簽名欄   日期

_____   _____

研究者簽名欄   日期

APPENDIX L

TYPES OF THE HAND-HELD ELECTRONIC DICTIONARY USED IN THIS STUDY

Types of the Hand-held Electronic Dictionary Owned by the Reading Only Group

5%

☐ Besta
■ Instant

* They were not used in this study   95%   n = 37
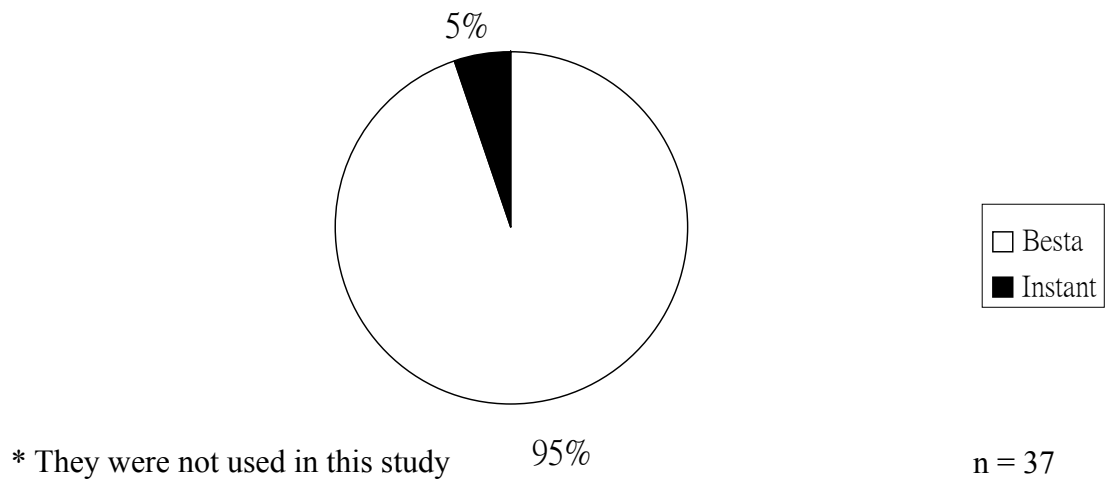
Types of the Hand-held Electronic Dictionary Used in the Fill-in-the-blanks Group

17%

☐ Besta
■ Instant

83%   n = 36

Types of the Hand-held Electronic Dictionary Used in the Writing Group

8%   3%

89%   n = 38

Besta
Instant
Global
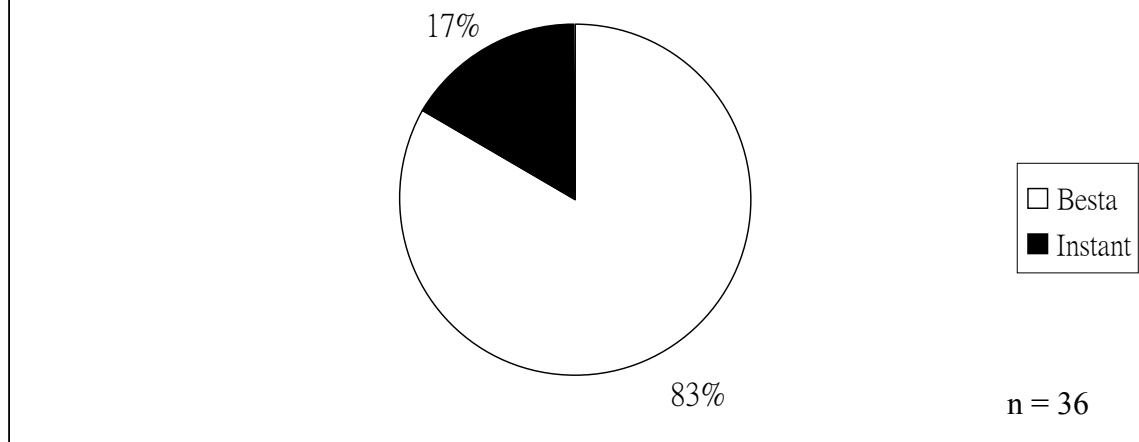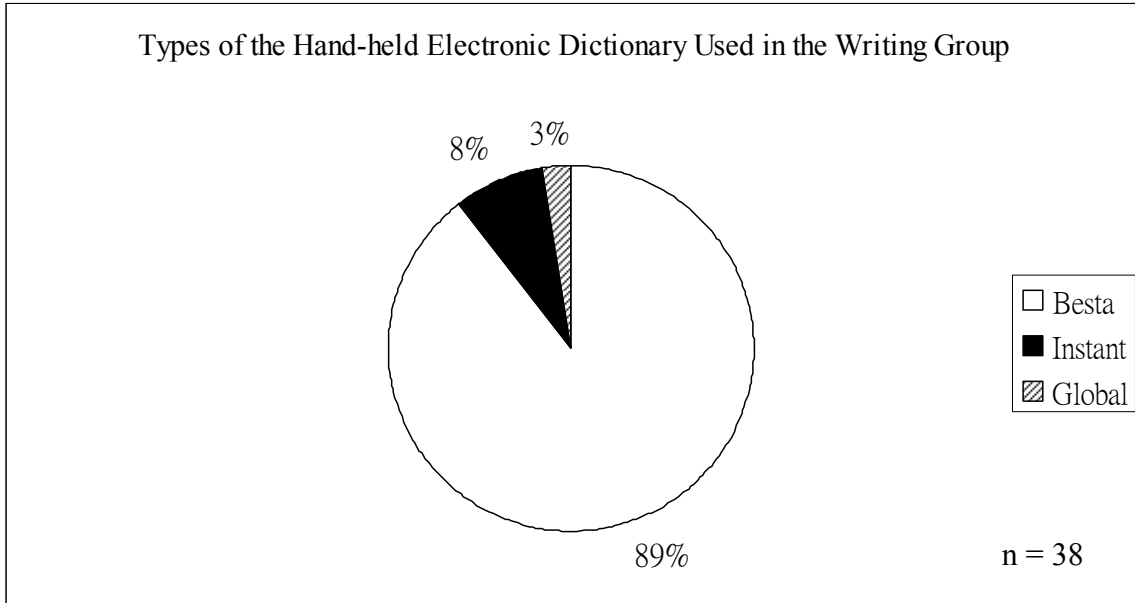
APPENDIX M

50 NEW WORDS OF TEN READINGS FOR PILOT STUDY

50 New Words of Ten Readings for Pilot Study

Vocabulary of reading 1	Number Recognizing
terrible	0
flashlight	0
ambulance	0
thunderstorm	0
alarm	0
Total	0

Note. Each reading included five new vocabulary words. Ten undergraduate non-English major students at the same level and at the same university were recruited and asked to review the new words. The number of students recognizing each word was recorded (creating a score from 0 to 10). The higher final scores represented more students knowing a specific word. The total scores for the five words from each reading were also calculated. The scores for the five new words in one reading ranged from 0 to 50. The lower scores represented fewer students knowing the five new words in a reading.

Vocabulary of reading 2	Number Recognizing
hungry	0
kitchen	0
refrigerator	0
bread	0
toaster	0
Total	0

Note. Each reading included five new vocabulary words. Ten undergraduate non-English major students at the same level and at the same university were recruited and asked to review the new words. The number of students recognizing each word was recorded (creating a score from 0 to 10). The higher final scores represented more students knowing a specific word. The total scores for the five words from each reading were also calculated. The scores for the five new words in one reading ranged from 0 to 50. The lower scores represented fewer students knowing the five new words in a reading.

Vocabulary of reading 3	Number Recognizing
flute	0
laugh	0
apartment	0
forget	0
neighbor	0
Total	0

Note. Each reading included five new vocabulary words. Ten undergraduate non-English major students at the same level and at the same university were recruited and asked to review the new words. The number of students recognizing each word was recorded (creating a score from 0 to 10). The higher final scores represented more students knowing a specific word. The total scores for the five words from each reading were also calculated. The scores for the five new words in one reading ranged from 0 to 50. The lower scores represented fewer students knowing the five new words in a reading.

Vocabulary of reading 4	Number Recognizing
activity	0
message	0
headline	0
probably	0
arrive	0
Total	0

Note. Each reading included five new vocabulary words. Ten undergraduate non-English major students at the same level and at the same university were recruited and asked to review the new words. The number of students recognizing each word was recorded (creating a score from 0 to 10). The higher final scores represented more students knowing a specific word. The total scores for the five words from each reading were also calculated. The scores for the five new words in one reading ranged from 0 to 50. The lower scores represented fewer students knowing the five new words in a reading.

Vocabulary of reading 5	Number Recognizing
science	0
forest	0
ground	0
drawing	0
hallway	0
Total	0

Note. Each reading included five new vocabulary words. Ten undergraduate non-English major students at the same level and at the same university were recruited and asked to review the new words. The number of students recognizing each word was recorded (creating a score from 0 to 10). The higher final scores represented more students knowing a specific word. The total scores for the five words from each reading were also calculated. The scores for the five new words in one reading ranged from 0 to 50. The lower scores represented fewer students knowing the five new words in a reading.

Vocabulary of reading 6	Number Recognizing
crater	0
volcanic	0
eruption	0
evaporate	0
mystery	0
Total	0

Note. Each reading included five new vocabulary words. Ten undergraduate non-English major students at the same level and at the same university were recruited and asked to review the new words. The number of students recognizing each word was recorded (creating a score from 0 to 10). The higher final scores represented more students knowing a specific word. The total scores for the five words from each reading were also calculated. The scores for the five new words in one reading ranged from 0 to 50. The lower scores represented fewer students knowing the five new words in a reading.

Vocabulary of reading 7	Number Recognizing
boat	0
builder	0
dragon	0
festival	0
midnight	0
Total	0

Note. Each reading included five new vocabulary words. Ten undergraduate non-English major students at the same level and at the same university were recruited and asked to review the new words. The number of students recognizing each word was recorded (creating a score from 0 to 10). The higher final scores represented more students knowing a specific word. The total scores for the five words from each reading were also calculated. The scores for the five new words in one reading ranged from 0 to 50. The lower scores represented fewer students knowing the five new words in a reading.

Vocabulary of reading 8	Number Recognizing
hill	0
healthy	0
energy	0
meanwhile	0
friend	2
Total	2

Note. Each reading included five new vocabulary words. Ten undergraduate non-English major students at the same level and at the same university were recruited and asked to review the new words. The number of students recognizing each word was recorded (creating a score from 0 to 10). The higher final scores represented more students knowing a specific word. The total scores for the five words from each reading were also calculated. The scores for the five new words in one reading ranged from 0 to 50. The lower scores represented fewer students knowing the five new words in a reading.

Vocabulary of reading 9	Number Recognizing
grandmother	1
abroad	0
clerk	0
embarrass	0
wonderful	0
Total	1

Note. Each reading included five new vocabulary words. Ten undergraduate non-English major students at the same level and at the same university were recruited and asked to review the new words. The number of students recognizing each word was recorded (creating a score from 0 to 10). The higher final scores represented more students knowing a specific word. The total scores for the five words from each reading were also calculated. The scores for the five new words in one reading ranged from 0 to 50. The lower scores represented fewer students knowing the five new words in a reading.

Vocabulary of reading 10	Number Recognizing
parrot	0
wooden	0
behind	0
sparrow	0
birdhouse	0
Total	0

Note. Each reading included five new vocabulary words. Ten undergraduate non-English major students at the same level and at the same university were recruited and asked to review the new words. The number of students recognizing each word was recorded (creating a score from 0 to 10). The higher final scores represented more students knowing a specific word. The total scores for the five words from each reading were also calculated. The scores for the five new words in one reading ranged from 0 to 50. The lower scores represented fewer students knowing the five new words in a reading.

APPENDIX N

VOCABULARY RETENTION SCORES AND ANOVA SUMMARY OF FIVE CONTROL

WORDS BY TASK

Vocabulary Retention Scores of Five Control Words by Task

Learning Tasks	N	Retention Mean (Std. Deviation)
Reading Only (Lowest Load)	37	5.84 (2.01)
Fill-in-the-blanks (Medium Load)	36	5.78 (2.09)
Writing (Highest Load)	38	6.08 (1.63)
Total	111	5.90 (1.90)

Note. Vocabulary retention scores were measured by a four-point Vocabulary Knowledge Scale (VKS) for the five control words. The possible VKS scores in all three L2 vocabulary learning tasks ranged from five to 20 for the control words, and the higher scores will indicate better word retention.

ANOVA Summary Table of Vocabulary Retention Scores of Five Control Words by Task

Source	Df	Mean Square	F	p
Between subjects				
Learning Task (L)	2	.95	.259	.772
Error	108	3.67		

*p < .10

APPENDIX O

VOCABULARY RETENTION SCORES BY WORD

Vocabulary Retention Scores by Word

Vocabulary	Retention Mean (Std. Deviation)
hungry	3.16 (.93)
kitchen	2.96 (.95)
message	2.95 (.99)
forget	2.95 (1.00)
terrible	2.88 (1.01)
bread	2.82 (.98)
laugh	2.77 (.95)
activity	2.72 (1.00)
apartment	2.71 (1.01)
drawing	2.68 (1.01)
neighbor	2.67 (1.11)
arrive	2.65 (.98)
science	2.59 (1.03)
refrigerator	2.53 (1.10)
forest	2.49 (1.01)
ground	2.45 (.92)
ambulance	2.43 (1.06)
probably	2.40 (.99)
flute	2.34 (1.01)
flashlight	2.33 (.98)
headline	2.32 (1.02)
alarm	2.29 (.98)
toaster	2.22 (.98)
hallway	2.16 (.98)
thunderstorm	2.10 (.92)
mystery	1.32 (.72)
crater	1.18 (.49)
volcanic	1.16 (.51)
evaporate	1.12 (.40)
eruption	1.12 (.42)

Note. Vocabulary retention scores were measured by a four-point Vocabulary Knowledge Scale (VKS) for each word. The possible VKS scores in all L2 learners ranged from one to four for each word, and the higher scores will indicate better word retention.
$N = 111$.