Incidental Vocabulary Learning by Assessing Frequency of Word Occurrence in a Graded Reader: *Love or Money*

Feng Teng
Nanning University, China
tengfeng@uni.canberra.edu.au

Abstract

Twenty tertiary level EFL learners participated in a reading program exploring incidental vocabulary learning measured by 30 substituted nonwords within five groups of frequency level in a graded reader, *Love or Money*. Two nouns, verbs, and adjectives were included in each group of frequency level. A three-aspect measurement and a semi-structured face-to-face interview were used in this study. The findings showed that, overall, the acquisition order of the three aspects was first word form, then word meaning, finally word usage. Incidental vocabulary learning was affected by the frequency of word occurrence, and the learners showed a better proficiency in the words with a higher frequency level. It appeared that, to have a 50% chance of recognizing the word form, exposure to target words more than eight times was necessary. However, exposure to the word more than 14 times was needed for a 50% chance of recalling the word meaning and usage. For the new words that occurred only 1 time or up to 4-6 times, it would be very difficult for the learners to master the word knowledge. In addition, based on the learning outcome of word meaning and usage, the learning difficulties of nouns, verbs, and adjectives were found to vary. It appeared that learning the meaning and usage of verbs were easier than nouns, and nouns were easier to be learned than adjectives.

Keywords: frequency, word occurrence, graded reader, incidental vocabulary learning

Introduction

There is widespread consensus that learners can acquire vocabulary through reading. Likewise, the issue concerning how much incidental vocabulary uptake could be achieved from reading has received attention over decades, and much research has been devoted to the relationship between reading and incidental vocabulary learning. Some espouse the conclusion that vocabulary could be learned incidentally through repeated exposure to target words (Day, Omura, and Hiramatsu, 1991; Horst, 2005; Hulstijn, 1992; Pellicer-Sanchez and Schmitt, 2010; Webb, 2008; Webb, Newton, and Chang, 2013). However, the results varied and some of the learning gains were relatively small. For example, some studies by Hulstijn (1992) and Pellicer-Sanchez and Schmitt (2010) showed that vocabulary knowledge is a complex construct, and it requires more than incidental reading. In other words, the process of incidental vocabulary acquisition is not yet understood to any substantial degree (Schmitt, 1998, 2010), and therefore, it is necessary to probe more into the controversial issue of incidental vocabulary learning.

With an aim to further elaborate on this issue of incidental vocabulary learning, this study focuses particularly on a variable that is confirmed to affect vocabulary acquisition, i.e., the frequency of word occurrence in the simplified book: *Love or Money*. Past research mainly concentrated on acquiring word meaning through reading, however, according to much research (Lessard-Clouston, 2013; Nation, 2001; Schmitt, 1998, 2000, 2010), simply

knowing the word meaning cannot be purported as knowing a word. The aim of this study is to measure the effectiveness of word frequency in written input on the acquisition of word form, meaning, and usage, which is more inclusive in English as a foreign language (EFL) incidental vocabulary acquisition.

Literature Review

Incidental learning is defined as the by-product of learning something else (Nation, 1990). In terms of incidental learning of vocabulary, although some tasks or exercises might be imposed on them, the tasks or exercises may not be directly related to learning vocabulary. The frequency of word occurrence that is needed for recognizing a word is one of noteworthy issues in conducting research of incidental learning. Numerous findings have shown that high-frequency words are easier to be learned and remembered, and learners can make vocabulary gains incidentally from reading if they receive enough exposure to the target words (Day, Omura, and Hiramatsu, 1991; Horst, Cobb, and Meara, 1998; Pellicer-Sanchez and Schmitt, 2010; Pigada and Schmitt, 2006; Rott, 1999; Teng, 2014a; Waring and Takaki, 2003). However, different results were shown in different studies, e.g., Rott (1999) concluded that six encounters of a target word was the number needed for word learning. Waring and Takaki's (2003) study showed that the meanings of words that were met fewer than 8 times would not be retained after three months, which is consistent with the study of Horst, Cobb and Meara (1998). In Pigada and Schmitt's (2006) study, when the words were met with 4-5 encounters, the improved knowledge of the spelling was 39%, grammar was 27%, and meaning was 27%. With 20 or more exposures, the results were 67%, 80%, and 60% respectively. In Pellicer-Sanchez and Schmitt's (2010) study, the learning of words that were read more than 10 times were significantly better than the words that were seen 1-8 times (spelling: 76% vs. 28%, word class: 63% vs. 12%, word meaning: 84% vs. 36%). Teng (2014a) also proposed that 10 times of seeing the word is necessary for recognizing the word form and meaning incidentally. The research mentioned above provided data regarding how to determine the likelihood that a word could be learned after seeing it a number of times. In the above mentioned research, part of vocabulary dimensions framework (Nation, 2001) was used to explore the incidental vocabulary learning, fundamentally, spelling, meaning, grammar, and word class. In the current study, the three aspects of vocabulary dimensions framework were measured, namely, word, meaning, and usage.

Of all the reading materials available, graded readers are the most useful for EFL vocabulary learning as the materials are specifically written with high frequency words. In addition, the coverage, density, and repetition of vocabulary in graded readers are statistically measured (Nation & Wang, 1999). A variety of studies have demonstrated incidental vocabulary learning through reading graded readers (Brown, Waring, and Donkaewbua, 2008; Horst, 2005; Pigada and Schmitt, 2006; Waring and Takaki, 2003). For example, Horst (2005) used four 20-page extracts of graded readers. In Pigada and Schmitt's (2006) study, the participant selected four interesting pocket-size books (228 pages in total) from the seventeen titles of the Level 1 series. Waring & Takaki (2003) used the 400 word graded reader, *A Little Princess.* In the current study, *Love or Money,* a reader-friendly simplified book, was used as the reading resource. This simplified reader, which was written with words that the participants had known, and then 30 target words of different frequency level were substituted with nonwords. This is a meaningful method of determining how incidental vocabulary learning could occur, and a three-aspect measurement will add to the understanding of how well the learners have mastered the words. In addition, a semi-structured face-to-face

interview was used to ensure the data collected was reliable (Pellicer-Sanchez and Schmitt, 2010; Schmitt, Schmitt, and Clapham, 2001).

Rationale for the Research Design

Features of previous research design were summarized and the rationale for a new research design was introduced in this section.

Materials

The factor of coverage of known words determines whether learners could achieve successful guessing (Nation, 2001). Laufer (1989) suggested that 95% of lexical coverage be needed for adequate reading comprehension. Hu and Nation (2000) suggested that 98% coverage level of known words is the prerequisite, and adequate reading comprehension could not be achieved at 80% level. Van Zeeland and Schmitt (2012) pointed out 95% lexical coverage is sufficient for adequate comprehension of narrative texts. Although the optimal rate seems to be different, the researchers all agreed that the higher the level of lexical coverage, the more adequate comprehension level the learners achieve. The best way for choosing materials with high lexical coverage is to use graded readers, which are written with high frequency words and simplified language structures (Nation and Wang, 1999). The problem is how to select an appropriate graded reader that meets learners' current levels.

Nation and Beglar's (2007) Vocabulary Size Test (VST) was used in this study to measure the learners' vocabulary level. The reliability of this test was verified in Beglar's (2010) study, and positive feedback about this test has been discussed in Lessard-Clouston (2013). The test includes a version of 14,000 words levelled with 140 multiple-choice items. There are 10 items from each 1000 word family levels. One of the test items in the first 1,000 is as follows:

SEE: They saw it
a. cut b. waited for c. looked at d. started

The *c* option has a similar meaning with *saw*. The learner will achieve one point for choosing the right item. A learner's total score needs to be multiplied by 100 to get their total receptive vocabulary size. The results of the test are shown in Table 1.

Table 1. Results of VST

	Lower than 10	10-19	20-29	30-39	Above 40	M	S.D.
						24.66	6.22
Number	0	4	20	6	0		

As shown in Table 1, there were 20 participants whose score was from 20-29 points; their total receptive vocabulary size was 2,000-2,900 when multiplied by 100. In the current study, *Love or Money,* which is a graded reader published by Oxford University Press, was used. Based on the findings that 95% lexical coverage is sufficient for adequate

comprehension (Van Zealand and Schmitt, 2012; Van Zealand & Schmitt, 2013), and in order to make sure 95% of lexical coverage, the *vocabulary profile* software on the Compleat Lexical Tutor Website (Cobb, n.d.) was used in the current study. All the words in the book were confirmed to be within the 2000 frequency band. Therefore, it was assumed that the learners, with a vocabulary size between 2,000-2,900, would not encounter great lexical problems while reading this book. It could also be reasonably assured that the surrounding context for the target words were known to the learners, and, based on testing the target words, the frequency rate that is needed in acquiring the words could be measured.

Target Words

The frequency of word occurrence was measured by using *frequency*, one of the computer software programs on the Compleat Lexical Tutor website (Cobb, n.d.). The results showed that the total tokens and types were 6,199 and 565 in the book, *Love or Money.* In order to further ensure 95% of lexical coverage, 30 words with six items in five bands of frequency of occurrence, which was no more than 5 % of total words, were chosen from nouns, adjectives, and verbs. The 30 words were substituted with non-words which were created with the online ARC Non-word Database (Rastle et al., 2002). Details are shown in Table 2.

Table 2. Details of the 30 Target Items

		Original word		**Substituted word**
30 test items	6 items (only once)	Walk	verb	plage
		Visit	verb	loax
		Yellow	Adjective	belleful
		Quick	Adjective	bicky
		Accident	noun	staice
		Singer	noun	buttor
	6 items (4-6 times)	Remember	verb	prait
		Move	verb	loove
		Dark	adjective	taddy
		Young	adjective	voundy
		Coat	noun	voet
		Clock	noun	zock
	6 items (8-10 times)	Watch	verb	vedge
		Stop	verb	zob
		Black	adjective	pitful
		Beautiful	Adjective	drack
		Farm	Noun	gelm
		Village	Noun	welch
	6 items (14-16 times)	See	verb	zie
		Kill	verb	pirre
		Hot	Adjective	gotty
		Loved	Adjective	powed

	Original word		**Substituted word**
	Table	Noun	padle
	Police	Noun	booer
6 items (18-20 times)	Talk	verb	dolk
	Like	verb	piede
	Angry	Adjective	emddy
	Sad	Adjective	pobful
	Door	Noun	poot
	Garden	Noun	porbem

Measurement instruments

An in-depth framework describing word knowledge was provided, however, in the current study, three aspects of word knowledge from Nation's framework was measured (Nation, 1990, 2001, 2008). Specifically, participants' knowledge of form, meaning, and usage were measured with the three tests described below. Examples of the three tests are shown in the Appendix.

Form Recognition Test

A multiple-choice recognition test was used to measure the improvement of form recognition (Day, Omura, and Hiramatsu, 1991; Dupuy and Krashen, 1993; Pitts, White, and Krashen, 1989). This receptive test format is considered scientific because it measures the recognition ability of the written form that the learners need to know for reading. Researchers who conducted experiments in incidental learning with multiple-choice form recognition tests as the instrument have either used some distracters that are quite similar to the target words (Chen and Truscott, 2010; Webb, 2005, 2007) or some distracters that are dissimilar to the target words (Van Zealand and Schmitt, 2013). If the distracters are similar to the key word, choosing the correct answer reveals a higher level in vocabulary knowledge. In contrast, distinguishing the correct answer from the dissimilar distracters reveals smaller gains of recognition ability (Bruton, 2007). However, in considering the participants' current vocabulary size of 2,000-2,900 words, presenting similar distracters might be difficult for the participants; therefore, dissimilar distracters for the multiple-choice recognition test were designed in this study.

For each test item, participants read four different non-word options with each preceded by A, B, C, or D. One of the non-words appeared in the book. They were asked to circle either A, B, C or D, or to choose the "*I don't remember any of these"* option if they think they have no memory of these words.

Meaning Recall Test

A semi-structured one-on-one interview was conducted to measure the learners' ability of recalling the meaning of target words. The interview, although time-consuming, was found to be a reliable tool for eliciting true responses from participants (Pellicer-Sanchez and Schmitt, 2010; Schmitt, Schmitt, and Clapham, 2001). In considering that the words were previously encountered by the learners in a written context, 30 cards were prepared, with

each card containing one of the words, along with the word in a contextual sentence. The given sentence, however, is not in a defining context, which could directly give the answer by guessing the meaning. The learners were encouraged to say anything they wanted about the meaning of the word, while the interviewer wrote down the comments. If the learners did not remember the word, the interviewer would encourage the learners to use the prompted sentence to guess the meaning. The interviewer also tried to encourage the participants to give more information if they did not remember the meaning, encouraging them to not to give up immediately.

Word Usage Test

A semi-structured one-on-one interview was also conducted to measure the learners' ability to use the words in a sentence. The interviewer prepared 30 cards, each with one item and three sentences. The interviewer encouraged the learners to give more information about which sentence is the most appropriate one concerning the usage of the targeted word. The interviewer also tried to encourage the learners to give more information about why they think other sentences are wrong.

Scoring System

The Form-Recognition Test was scored dichotomously with one point for a right answer and 0 points for a wrong answer. The total possible score for the Form-Recognition Test is 30 points. For the Meaning-Recall Test, the learners will get one point when they directly express the meaning of the targeted word. However, if they can express the complete meaning in Chinese, which is their native language, they can also get one point. In order to collect more information from the learners, if they succeed in expressing partial meaning of the target word, they can get a half point. The total possible score for the Meaning-Recall Test is also 30 points. For the Word Usage Test, the learners will get one point when they can directly choose the correct answer from the three sentences. However, even if they chose the wrong one, but they can give some information about why another sentence is wrong, they can also get a half point. The total possible score for the Word Usage Test is also 30 points.

Methodology

Participants

As mentioned above in Table 1, originally 30 students volunteered to take part in this study, and after taking Nation and Beglar's (2007) Vocabulary Size Test (VST), 20 students with a vocabulary level from 2000-2900 were selected as the participants in this study. The reason for choosing these particular 20 students was because they were at a vocabulary level beyond 2,000, and reading a graded reader that is within the 2,000 word level, which would not present lexical problems for them. They were all from a vocational college in Nanning, China, with ages from 20-22, and Chinese is their first language (L1). When the learners have the same background of speaking Chinese as L1, the discrepancy between L1 and EFL are assumed to facilitate them less in guessing the word meaning. The author told the learners that they would take three tests after reading the book, but they were not told any detailed information about the tests.

Procedures

The book was presented to the participants, and they were told to read this book for pleasure without paying any special attention to any of the words. The length of time to read the book is one week, which is assumed to be sufficient for them. It turned out that no one mentioned any stress in finishing this book in one week. As the substituted words are nonwords, which are totally new to the learners, a test on measuring whether they knew these words previously was not necessary.

Because completing the one-to-one interview is time-consuming and delayed tests might affect the results, the test and the interview were finished in a strict order within 3 days after completing this book. The interviews were conducted by the author in Chinese, which was assumed to be easier for the learners to understand directions. Although the interviews were conducted in a classroom, the learners were told to be relaxed. There was no time limit for the interview section; the average interview time for one student was about one hour. The interviews, conducted in this manner, allowed the interviewer to understand more about the participants' knowledge of target words.

Research questions

To achieve the research purpose, four questions were posed for measuring the incidental vocabulary learning in the current study. These questions were:

1. To what extent does reading a graded reader with 95 % lexical coverage of known words lead to gains in three word knowledge aspects of form, meaning, and usage?
2. To what extent does frequency of word occurrence have an effect in incidental vocabulary learning?
3. How many exposures are optimal in facilitating learners to recognize form, meaning, and usage?
4. Does difficulty of learning nouns, verbs, or adjectives vary with each other? If so, which one is easier to acquire?

Findings

To answer Question 1,"To what extent does reading a graded reader lead to gains in the three aspects of form, meaning, and usage?" the overall learning outcome of the three different word knowledge aspects with different frequencies of occurrence were analyzed and shown in Table 3.

Table 3. Overall Scores by Different Word Knowledge Aspects with Different Frequency Rates

Frequency Rate	Form Recognition Test (correct words and percentage)	Meaning Recall Test (correct words and percentage)	Word Usage Test (correct words and percentage)	All word knowledge aspects (correct words and percentage)
1	2.5(8.3%)	1.5(5%)	1(3.3%)	1.7(5.5%)

Frequency Rate	Form Recognition Test (correct words and percentage)	Meaning Recall Test (correct words and percentage)	Word Usage Test (correct words and percentage)	All word knowledge aspects (correct words and percentage)
4-6	8.5(28.3%)	6.5(21.6%)	5.7(19.1%)	6.9(23%)
8-10	16.2(54.1%)	12.2(40.8%)	10.7(35.8%)	13.1(43.6%)
14-16	22.7(75.8%)	20.5(68.3%)	18.2(60.8%)	20.5(68.3%)
18-20	27.5(91.6%)	21(70%)	20.2(67.5%)	22.9(76.4%)
Mean number of correct words (Max.=30)	10.3(34.3%)	8.2(27.3%)	7.4(24.6%)	8.6(28.7%)

As shown in Table 3, there were measurable learning improvements of 28.7% concerning the 'all word knowledge' aspects. In other words, 8.6 out of the 30 target words were learned incidentally, which demonstrated that incidental vocabulary learning did occur from reading this graded reader with 95 % lexical coverage of known words. This type of incidental vocabulary learning was also found in other research (Horst, 2005; Horst, Cobb, and Nicolae, 2005; Pellicer-Sanchez and Schmitt, 2010).

However, when making further observations of the findings, it was discovered that different word knowledge aspects presented different vocabulary learning outcomes. The largest gains lay in the Recognition of Form, with participants acquiring about 10.3 words out of 30 target words. The second largest gains were in the Meaning Recall Test, with participants acquiring about 8.2 words out of the 30 target words. In contrast, for the Word Usage part, only 7.4 out of 30 target words were acquired. It is interesting to note that the best learned Word Knowledge aspect was Word Form, when 34.3% of the word forms were recognized. The next best learned Word Knowledge aspect was Word Meaning, when 27.3% of word meaning was recalled. The most difficult Word Knowledge aspect for the learners to remember was word usage, with only 24.6% of word usage remembered. The acquisition order for the three aspects is as follows:

- Word Form 34.3%
- Word Meaning 27.3%
- Word Usage 24.6%

It is interesting to note that this acquisition order was consistent regardless of the word frequency rate.

It is also suggested that the learners acquired the three word knowledge aspects better for the words with a higher frequency level. The subjects picked up a very small amount of

words that appeared only one time, and this does not seem to have significant difference in acquiring the words with 4-6 occurrences. There is a significantly noticeable difference in acquiring the words that occurred more than 8 times. In addition to this, moving to 20 occurrences was found to continually improve the incidental vocabulary-learning outcome. Details are shown in Table 4.

Table 4. Details of Knowledge Aspects with Different Frequency Rate

Word Form	1<4-6<8-10<14-16<18-20
Word Meaning	1<4-6<8-10<14-16<18-20
Word Usage	1<4-6<8-10<14-16<18-20

Note: < means a less-than-sign; vocabulary gains of the former one is less than the latter one

As shown in Table 4, there was always a difference in acquiring the three-Word Knowledge aspects between the different frequency bands. There was also a very substantial jump for incidental learning when there were more exposures to the target words.

To further probe into Question 2, "To what extent does frequency of word occurrence have an effect in incidental vocabulary learning?" the Kruskal-Wallis analysis of measuring non-normal data between the different frequency bands was used. There were significant differences among each aspect of Word Knowledge with different frequency bands. These were:

- Word Form ($p<0.001$)
- Word Meaning ($P<0.001$)
- Word Usage ($P<0.001$)

These statistics showed that incidental vocabulary learning in the three aspects of form, meaning, and usage were significantly affected by the frequency of word occurrence.

To answer Question 3, "How many number of meetings are needed for learning a new word?" it is clear from the data in the above Table 3 that it is very difficult to conclude an exact number. The incidental learning process seemed to be more complex than expected, and different results were yielded with regard to the three different word knowledge aspects. The results in Table 3 draw a conclusion that, to have a 50% chance of recognizing the word form, exposures to target words fewer than 8 times were quite difficult. In other words, EFL learners need to meet a new word at least 8 times to recognize the form. However, for recalling the word meaning and usage, meeting a new word 8 times only provides the learners with a 40 % chance of recalling the word meaning, and a 35 % chance of recognizing word usage. This suggests that learning word meaning and usage requires more word exposures than form, e.g., meeting a word for 14 times is the least number for recognizing word meaning and usage in this study. This is rather disappointing because it is suggested that, although incidental vocabulary learning did occur, it mainly depends on the repeated exposures to the new words. If the new words were not met sufficient times, e.g., only 1 time or up to 4-6 times, it would be very difficult for the learners to master the target word knowledge, even if they had read a simplified book with 95 % coverage of known words.

To answer Question 4, "Does difficulty of learning nouns, verbs, or adjectives vary with each other?" the incidental learning outcome of nouns, verbs, and adjectives were analysed respectively in Table 5.

Table 5. Total Scores by Nouns, Verbs, and Adjectives with Different Frequency Group

Frequency rate	Word Form			Word Meaning			Word Usage		
	Noun %	Verb %	Adjective %	Noun %	Verb %	Adjective %	Noun %	Verb %	Adjective %
1	7.5	8.5	5	7.5	7.5	0	5	5	0
4-6	32.5	27.5	25	22.5	27.5	15	20	25	12.5
8-10	55	50	57.5	45	52.5	27.5	37.5	45	25
14-16	75	80	72.5	72.5	77.5	55	65	72.5	45
18-20	92.5	90	92.5	72.5	82.5	55	67.5	80	55

As shown in Table 5, the data of Word Form were not consistent. The rank of learning outcome with one time occurrence is first verb (8.5%), then noun (7.5%), finally adjective (5%). For the words occurring 4-6 times, it turned out to be first noun (32.5%), then verb (27.5%), finally adjective (25%). For the words occurring 8-10 times, the rank order is first adjective (57.5%), then noun (55%), finally verb (50%). For the words occurring 14-16 times, the recognition order was first verb (80%), then noun (75%), finally adjective (72.5%). For the words occurring 18-20 times, the first was noun (92.5%), then adjective (92.5%), finally verb (90%). It seemed that the Word Forms that the learners recognized were not related to whether they were noun, adjective, and verb. It is assumed that the learners' recognition ability of Word Form was affected by the complexity of the substituted word form and the frequency level combined together. The data of showing the learners' ability of recognizing meaning and usage, however, was consistent. For the words that occurred one time, the recognition order was noun and verb equally first, and then adjective. For the words occurring more than 4 times, the recognition order was first verb, then noun, and finally adjective. It appeared that, concerning the two Word Knowledge aspects of the meaning and usage, verbs are easier to be learned than nouns, and nouns are easier to be learned than adjectives.

Discussions and Conclusion

Twenty participants' incidental vocabulary learning from reading a graded reader with 95% coverage of known words were delineated in this study, and it was demonstrated that incidental vocabulary learning did occur. The incidental vocabulary learning was validated in the following way: First, the learning of target words were achieved only by reading this graded reader, as there were no other opportunities for the participants to learn these substituted nonwords. Second, since 95 % of the reader's words were known by the learners, reading this simplified book would be a pleasure for them. Third, three basic aspects of vocabulary knowledge were covered in this study, which showed a basic comprehension of target words. Finally, semi-structured, face-to-face interview was a useful method for collecting true data (Schmitt, Schmitt, and Clapham, 2001).

The largest gains were found in the recognition of word form, which means that learners acquired form before they could acquire the meaning. The second largest gains were found in the improvement of word meaning, which also means that learners needed to understand the meaning of the word before they could use the word. The learners achieved a

maximum score of 91.6 % in recognizing the word form, 70% in recalling word meaning, and 67.5% in word usage, which is shown in Table 3, also showed the acquisition of word meaning and usage lag behind the recognition of word form. The learners in the study did not achieve a substantially high score in recalling word meaning and usage. Previous research has also pointed out it was difficult to achieve recall mastery of meaning only from incidental learning (Cobb, 2008; Schmitt, 2008). Therefore, it is suggested in this study that the acquisition profile of meaning and usage is more complex than word form, and explicit tasks on recalling word meaning and usage is necessary.

While this study demonstrated that a higher score in incidental vocabulary learning was yielded due to a higher frequency level of word occurrence, it also suggested that a critical threshold might exist. For example, for the words occurring only one time, it is very difficult for the learners to recognize the form, meaning, and usage. It seems that, for the words occurring fewer than 8 times, almost one half of the total number of word forms was forgotten, more than 60 % of word meaning and usage was forgotten. For the words occurring 14 times, only 25% of word forms, 32 % of word meaning, and 40 % of word usage were forgotten. It is suggested that, in this study, to have a 50% chance of recognizing the word form, exposure to target words more than 8 times was necessary However, to have a 50 % chance of recalling the word meaning and usage, meeting a word for at least14 times is required. It also appears that, although the learners showed an overall improvement in learning vocabulary, the total number of words that they learned was, incidentally, quite limited, and most of the new words that they learned were the result of repeated exposures to target words or a higher frequency of occurrence rates (Pigada and Schmitt, 2006; Teng, 2014a; Warring and Takaki, 2003).

Concerning the learning difficulties of nouns, verbs, and adjectives, it was found that there seemed to be an ambiguous relationship between word forms and the learning of nouns, verbs, and adjectives. In other words, the word forms that the learners recognized were affected more by the frequency of word occurrence, rather than by the difference of nouns, verbs, and adjectives. However, based on the learning outcome of word meaning and usage, the learning difficulties of nouns, verbs, and adjectives were found to vary. It appeared that learning the meaning and usage of verbs were easier than nouns, and nouns were easier to be learned than adjectives, which is in line with Zimmerman's (2009) observation that nouns and verbs are easier to learn than adjectives and adverbs.

By using a simplified graded reader with 30 substituted words accounted for less than 5% of total words, and a three-aspect word knowledge test battery, this study demonstrated that the incidental learning of nouns, verbs, and adjectives did occur. It is suggested that, graded readers, which is one kind of simplified reading material, could be used for improving EFL learners' vocabulary learning, and teachers should take the frequency of word occurrence into consideration while teaching reading or contriving reading materials. The recall mastery of meaning and usage, however, is a complex process, and requires more than incidental learning (Cobb, 2007; Nation, 2006). Therefore, teachers should supplement deliberate vocabulary teaching into classes to facilitate learners developing the depth and the breadth of vocabulary knowledge, so that they can improve learners' receptive and productive vocabulary. Direct vocabulary teaching was found to be empirically useful for learners of a low proficiency (Teng, 2014b). Therefore, in practical teaching, we teachers should give attention to particular words and "formulaic language" (Schmitt, 2010, p.117), use various types of direct vocabulary-enhancing activities or tasks in class, and give repeated attention to frequent, related words during class.

Limitations

Obviously, only participants with a vocabulary level of 2,000-2,900 cannot make claims for generalizations. If the study could involve more learners with a higher vocabulary level, e.g., 4,000-4,900 level, the results might be more reliable. In addition, Nation (2001) provided an in-depth framework describing word knowledge that goes well beyond meaning, association and usage. This study has only focused on the form, meaning, and usage, and it cannot say the learners have 'full command' of the words in their language. It can be argued that this study only measured partial knowledge of target words. Finally, the difficulties of learning nouns, adjectives, and verbs were discussed in this study, but the difficulties learning between abstract words and concrete words were not covered (Van Zealand and Schmitt, 2013).

Suggestions for Future Studies

Incidental vocabulary learning was found in the learners with a small vocabulary size, which encourages me to believe that reading with learners with a larger vocabulary size would yield more vocabulary gains. Future studies need to include more learners with different vocabulary levels to verify this assumption.

References

Beglar, D. (2010). A Rasch-based validation of the vocabulary size test. *Language Testing, 27*(1), 101-118.

Brown, R., Waring, R., & Donkaewbua, S. (2008). Incidental vocabulary acquisition from reading, reading-while-listening, and listening. *Reading in a Foreign Language, 20*(2), 136–163.

Bruton, A. (2007). Partial lexical knowledge in tests of incidental vocabulary learning from L2 reading. *The Canadian Modern Language Review, 64,* 163-180.

Chen, C., & Truscott, J. (2010). The effects of repetition and L1 lexicalization on incidental vocabulary acquisition. *Applied Linguistics, 31*(5), 693-713.

Cobb, T. (n.d.). The Compleat Lexical Tutor [Computer software]. Retrieved from http://www.lextutor.ca/.

Cobb, T. (2007). Computing the vocabulary demands of L2 reading. *Language Learning & Technology, 11,* 38–63.

Cobb, T. (2008). Commentary: Response to McQuillan and Krashen (2008). *Language Learning & Technology, 12,* 109–114.

Day, R., Omura, C., & Hiramatsu, M. (1991). Incidental EFL vocabulary learning and reading. *Reading in a Foreign Language, 7*(2), 541-551.

Dupuy, B., & Krashen, S. (1993). Incidental vocabulary acquisition in French as a foreign language. *Applied Language Learning, 4,* 55-64.

Horst, M. (2005). Learning L2 vocabulary through extensive reading: A measurement study. *The Canadian Modern Language Review, 61*(3), 355–382.

Horst, M., Cobb, T., & Meara, P. (1998). Beyond a *Clockwork Orange*: Acquiring second language vocabulary through reading. *Reading in a Foreign Language, 11*(2), 207-223.

Horst, M., Cobb, T., & Nicolae, I. (2005). Expanding academic vocabulary with an interactive on-line database. *Language Learning & Technology, 9,* 90-110.

Hu, M., & Nation, I.S.P. (2000). Unknown vocabulary density and reading comprehension. *Reading in a Foreign Language, 13*(1), 403-30.

Hulstijn, J.H. (1992). Retention of inferred and given word meanings: Experiments in incidental vocabulary learning. In P. Arnaud & H, Bejoint (Eds.), *Vocabulary and applied linguistics* (pp.113-125). London, England: Macmillan.

Laufer, B. (1989). What percentage of lexis is essential for comprehension? In C. Lauren & M. Nordman (Eds.), *Special language: From human thinking to thinking machines* (pp. 316–23). Clevedon, England: Multilingual Matters.

Lessard-Clouston, M. (2013). *Teaching vocabulary.* Alexandria, VA: TESOL International Association.

Nation, I.S.P. (1990). *Teaching and learning vocabulary.* Rowley, Mass.: Newbury House.

Nation, I.S.P. (2001). *Learning vocabulary in another language.* Cambridge, England: Cambridge University Press.

Nation, I. S. P. (2006). How large a vocabulary is needed for reading and listening? *The Canadian Modern Language Review, 63,* 59–82.

Nation, I.S.P. (2008). *Teaching vocabulary: Strategies and techniques.* Boston, MA: Heinle.

Nation, I.S.P., & Beglar, D. (2007). A vocabulary size test. *The Language Teacher, 31*(7), 9-13.

Nation, I.S.P., & Wang, K. (1999). Graded readers and vocabulary. *Reading in a Foreign Language, 12*(2), 355-380.

Pellicer-Sanchez, A., & Schmitt, N. (2010). Incidental vocabulary acquisition from an authentic novel: Do things fall apart? *Reading in a Foreign Language, 22*(01), 31-55.

Pigada, M., & Schmitt, N. (2006). Vocabulary acquisition from extensive reading: A case study. *Reading in a Foreign Language, 18*(1), 1–28.

Pitts, M., White, H., & Krashen, S. (1989). Acquiring second language vocabulary through reading: A replication of the Clockwork Orange study using second language acquirers. *Reading in a Foreign Language, 5*(2), 271-275.

Rastle, K., Harrington, J., & Coltheart, M. (2002). 358,534 nonwords: The ARC nonword database. *The Quarterly Journal of Experimental Psychology, 55,* 1339-1362.

Rott, S. (1999). The effect of exposure frequency on intermediate language learners' incidental vocabulary acquisition through reading. *SSLA, 21*(1), 589-619.

Schmitt, N. (1998). Tracking the incremental acquisition of second language vocabulary: A longitudinal study. *Language Learning, 48,* 281-317.

Schmitt, N. (2000). Vocabulary in language teaching. Cambridge : Cambridge University Press.

Schmitt, N. (2008). Instructed second language vocabulary learning. *Language Teaching Research, 12*(3), 329–363.

Schmitt, N. (2010). *Researching vocabulary: A vocabulary research manual.* Basingstoke, England: Palgrave Macmillan.

Schmitt, N., Schmitt, D., & Clapham, C. (2001). Developing and exploring the behaviour of two new versions of the Vocabulary Levels Test. *Language Testing, 18,* 55–88.

Teng, F. (2014a, June). Assessing frequency of word occurrence in reading graded readers and EFL vocabulary Learning. *Paper presented at the 5th Hong Kong Association of Applied Linguistics (HAAL) Conference,* Hong Kong S.A.R., P. R. China.

Teng, F. (2014b, June). Vocabulary growth for low-proficiency students through reading graded readers. Paper presented at the 1st TRI-ELE International Conference, Bangkok, Thailand.

Van Zealand, H., & Schmitt, N. (2012). Lexical coverage in L1 and L2 listening comprehension: The same or different from reading comprehension. *Applied Linguistics, 34*(4), 457-479.

Van Zealand, H., & Schmitt, N. (2013). Incidental vocabulary acquisition through L2 listening: A dimensions approach. *System, 41,* 609-624.

Waring, R., & Takaki, M. (2003). At what rate do learners learn and retain new vocabulary from reading a graded reader? *Reading in a Foreign Language, 15*(2), 1–27.

Webb, S. (2005). Receptive and productive vocabulary learning: the effects of reading and writing on word knowledge. *Studies in Second Language Acquisition, 27*(1), 33-52.

Webb, S. (2007). The effects of repetition on vocabulary knowledge. *Applied Linguistics, 28*(1), 46-65.

Webb, S. (2008). The effects of context on incidental vocabulary learning. *Reading in a Foreign Language, 20*(2), 232–245.

Webb, S., Newton, J., & Chang, A. (2013). Incidental learning of collocation. *Language Learning, 63*(1), 91-120.

Zimmerman, C.B. (2009). *Word knowledge: A vocabulary teacher's handbook.* Oxford, England: Oxford University Press.

Appendix

Examples of the three tests used in this study.

Word form recognition test

Directions:

For each test item, participants read four different non-word options with each preceded by A, B, C, or D. One of the non-words appeared in the book. They were asked to circle either A, B, C or D, or to choose the *I don't remember any of these* option if they think they have no memory of these words.

e.g.,

A. Treddle B plage C terrisic D woddle E I don't remember any of these

Meaning recall test

Directions: Please tell the meaning of the word.

Interviewer showed the card to the participants, and the students were encouraged to give more information about the meaning of the target word.

The two detectives plaged back to the Clarksons' house through the garden. Try to express the meaning of the underlined word.

Word usage test

Directions：Please choose a sentence with the right word usage.

Interviewer showed the card to the participants, and the students were encouraged to give more information which sentence is the most appropriate one concerning word usage, or which sentence is the wrong one.

Plage 1. The inspector watched and then plaged slowly to his car. 2. Your idea is really plaged. 3. Thank you for your plage, you are a really nice person.