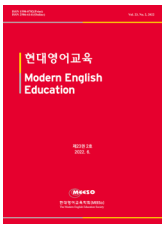
MEESO

Modern English Education

https://doi.org/10.18095/meeso.2022.23.2.22



An Exploratory Study on Vocabulary Size of Korean High School EFL Learners

Jung-eun Year
University of Seoul

ARTICLE INFO

Received: 30 April 2022
Revised: 29 May 2022
Accepted: 09 June 2022

Examples in: English
Applicable Languages: English
Applicable Levels: Secondary

KEYWORDS

vocabulary size/
lexical frequency/
Korean high school students
어휘크기/
어휘빈도/
고등학생 영어학습자

ABSTRACT

Year, Jung-eun. (2022). An exploratory study on the vocabulary size of the Korean high school EFL learners. *Modern English Education, 23*(2), 22-32.

The objective of this exploratory study was to investigate vocabulary size of Korean high school learners of English. The relationship between their vocabulary size and performance on English tests was also explored. With 97 Korean high school students of 10th and 11th grades, the Vocabulary Size Test (Nation & Beglar, 2007) was employed to measure their vocabulary size. Their performance on English tests was assessed through a school's English reading test and the Preliminary College Scholastic Ability Test. Results revealed that 10th and 11th graders knew an average of 3,282 and 3,733 word-families, respectively. These two groups showed a 451 word-family difference in vocabulary size, suggesting that high school students, at least for participants of the current study, gained around 451 word-families over a year. While a large number of students achieved a vocabulary size of 4,000 to 6,000 word-families, a significant number of students seemed to have difficulty in learning the most frequent 2,000 word-families. The study found that the vocabulary size played a crucial role in learners' English academic performance, most markedly in reading comprehension, in line with previous L2 vocabulary research.

I. INTRODUCTION

Second language (L2) vocabulary research has shown that vocabulary knowledge is one of the major factors contributing to an L2 learner's overall proficiency (Nation, 2001a; Zareva et al., 2005; Zimmerman, 2004) and perhaps the most significant predictor of reading comprehension (H. Ji & Y. Shin, 2017; Laufer & Sim, 1985; Schmitt et al., 2011). In particular, the vocabulary size of L2 learners, one important dimension of the multi-faceted nature of vocabulary knowledge, is found to play a key supportive role in the development of many aspects of L2 proficiency, most notably in L2 reading proficiency (Alderson, 2005; Stæhr, 2008). With the growing recognition of the importance of vocabulary size in L2 learning and use, L2 vocabulary researchers have gone to considerable lengths to develop reliable measures for accurate vocabulary size (Meara, 1996; Nation & Beglar, 2007; Schmitt et al., 2001) while researchers and teachers alike have sought ways to help students increase their vocabulary size, and subsequently improve their reading comprehension (Schmitt et al., 2011).

To date, there have been many studies reporting on the overall vocabulary size of L2 learners (Milton, 2009). However, there have been comparatively few studies examining the vocabulary size of Korean high school students learning English as a foreign language (EFL), specifically in relation to different word frequency levels (e.g., D. Shin et al., 2011). Such information is important because it can, at least partially, be used to differentiate learners of different proficiency levels and also predict the learners' ability to comprehend

Jung-eun Year (Visiting Professor)
Department of General English, University of Seoul, 163 Seoulsiripdaero, Dondaemun-gu, Seoul, 02504 South Korea
Email: jeyear1118@uos.ac.kr / ISNI: 0000 0001 2712 5928

reading materials (Nguyen & Nation, 2011). Moreover, at the time of this writing and to the best of the author's knowledge, no study thus far has attempted to document the difference in vocabulary size of different grade levels of the high school students. As a result, researchers and teachers have been left with very little information about how much and what vocabulary Korean high school EFL learners know and their vocabulary learning progress. Of course, it will certainly not be easy, or probably will be virtually impossible, to determine the exact size of individual learners' vocabulary. But getting an at least approximate estimate of the students' vocabulary size is of both practical and fundamental importance, because with such information teachers can provide instructional support for students' vocabulary learning and, by extension, for their English development. Given the gap in the existing literature, the present study, exploratory in nature, was carried out to estimate the English vocabulary size of Korean high school EFL students and chart their vocabulary growth over a year by analyzing and comparing the receptive vocabulary size of the students at two different grade levels. In addition, the study sought to examine the relationship between vocabulary size and performance on the English tests.

II. LITERATURE REVIEW

1. How Much Vocabulary Is Needed for Adequate Comprehension?

Vocabulary size, sometimes called breadth of vocabulary in the literature (Qian, 1999), refers to the number of words the learner knows in a language. Over the past two decades, this aspect of vocabulary knowledge has gained prominence among L2 vocabulary researchers and practitioners, as increasing research evidence demonstrates the strong predictive role of the vocabulary size in a wide range of language skills (Stæhr, 2008). One of the most consistent findings in L2 vocabulary research is that some measure of vocabulary knowledge is always highly correlated with reading comprehension, yielding moderate to strong correlations ranging from .50 to .85 (Laufer, 1992; Milton 2013; Stæhr, 2008). Certainly, there is now extensive evidence, both empirical and anecdotal, to suggest that a large vocabulary supports good comprehension and a small vocabulary likely leads to poor comprehension (Schmitt et al., 2011). The question then arises how large the vocabulary size needs to be in order to read English texts at an adequate level of comprehension. While the answer to this question will surely vary depending on the learning goals and proficiency levels of individual learners, L2 vocabulary researchers, drawing on two related strands of empirical research, have provided principled guidelines that can serve as a well-informed reference point for vocabulary learning goals.

The first strand of research, primarily focusing on the frequency distribution and range of words in the English language, emphasizes the need to prioritize a small set of high frequency words before low frequency words in vocabulary teaching (Read, 2004). Through decades of painstaking research, researchers have long known that a relatively small number of words occur so frequently that they make up the bulk of the words in any spoken and written text. Among these, the most frequent and wide-ranging 2,000 word families, categorized as high frequency vocabulary (Nation, 2001a) and most of which are largely congruent with the words of the General Service list (West, 1953), have been accorded special attention because of their disproportionately high coverage and ubiquitous occurrence in a broad range of texts. For instance, corpus-based studies show that they account for around 85% of running words in written texts (Nation, 2006). These high frequency words provide even a larger lexical coverage in everyday conversation where 90-95% of lexical resources are comprised of the most frequent 2,000 word families. It is thus clear that English L2 learners highly likely encounter the 2,000 word families with great frequency in both spoken and written discourse contexts on many different topics, leading Nation (2001b) to conclude that "if learners leave school without control of the high frequency words, then their learning will have for little purpose" (p. 176). More recently, Schmitt and Schmitt (2014) propose to raise the upper limit of high frequency vocabulary to the most frequent 3,000 word families on the empirical grounds that knowledge of the first 3,000 word families offers a more solid lexical basis for a range of spoken discourse. Moreover, they point out a vocabulary of this size constitutes the lexical threshold, that is the minimal vocabulary size, that allows learners to begin to read authentic texts (van Zeeland & Schmitt, 2013). Acknowledging the importance of frequency and range information of words, L2 vocabulary researchers generally agree that the most frequent 2,000-3,000 word families form the fundamental vocabulary of English and represent valuable lexical resources that all English L2 learners must acquire (Read, 2004).

The importance and usefulness of high frequency vocabulary notwithstanding, another relevant strand of research soon found that a vocabulary size of the most frequent 2,000-3,000 word families is not sufficient if learners are to engage in reading a range of unsimplified texts. This strand of research has centered on the question of lexical coverage – that is, what percentage of vocabulary in a given text L2 learners should know to gain adequate comprehension. With regard to reading comprehension, research findings suggest that 95-98% lexical coverage is necessary for reading comprehension to occur. For example, Hu and Nation (2000), based on both native and non-native speakers' reading data, assumed that 70% reading comprehension constituted the adequate level of comprehension for fluent independent reading and found that learners needed to know around 98% of the running words in a text to achieve this level of comprehension. In a later study, Nation (2006) took an issue a step further by analyzing a variety of English texts in order to estimate the vocabulary size needed to reach 98% coverage. His analyses showed that it would take 8,000-9,000 word families to reach this level of lexical coverage in written texts, which in turn indicates that L2 learners need to have the vocabulary size far beyond the 2,000-3,000 high frequency words to read authentic materials

independently. Laufer (1989), on the other hand, contended that L2 learners could gain reasonable comprehension with a more parsimonious level of lexical coverage in an instructional setting. In a study of university learners of L2 English in Israel, she found that the learners with 95% coverage were able to obtain 55% comprehension, a passing grade point at the university. In a recent study involving 745 participants, Laufer and Ravenhorst-Kalovski (2010) also reported that while 98% coverage was necessary for independent reading, 95% coverage provided a minimal level of lexical coverage that yielded substantial comprehension. The researchers, however, estimated that the learners needed to have the vocabulary size of 4,000-5,000 word families to reach 95% coverage, which again goes well beyond the most frequent 2,000-3,000 word families. Clearly, L2 vocabulary learning necessary for adequate reading comprehension involves arduous work of building a large number of vocabulary, and it is therefore not surprising that vocabulary learning has been one of the most challenging tasks facing many L2 learners.

2. How Much Vocabulary Do Korean High School Learners of English Need to Know?

What, then, should be the vocabulary learning goals for Korean high school EFL students? There are several possible ways to address this question. First, in light of what has been discussed above, students can first concentrate their study on learning the most frequent 2,000-3,000 word families which would supply an adequate amount of lexical resources for spoken discourse (Adolphs & Schmitt, 2003) and the minimal lexical threshold for comprehension of unsimplified texts. They can then set their sights on the most frequent 4,000-5,000 word families which would provide around 95% coverage of most reading texts (Nation & Anthony, 2013). If students at advanced levels are aiming high with ultimate goals to read a diverse range of authentic texts in English, a vocabulary size of 8,000-9,000 word families, which would provide 98% coverage of written texts, can be their desired learning goal (Nation, 2006).

Yet another, more practical, way of approaching this question might be to consider the vocabulary demands required of students at school. In 2015, the Ministry of Education in South Korea provided the updated version of the Korea Basic English Word List (KBEWL) of 3,000 words as the essential vocabulary list that students should be familiar with throughout their elementary, middle, and high school education (M. Lee & D. Shin, 2015; Ministry of Education, 2015). The KBEWL was drawn through a careful analysis of eight different corpora of one million words each, taking into account the frequency, familiarity and range of occurrence of words. Accordingly, the 3,000 words provided around 92% coverage in diverse corpora of spoken and written English, thereby establishing a useful vocabulary resource for the students. The list has also served as a major pedagogical vocabulary reference for teachers and textbook writers, with these 3,000 words comprising a large portion of the running words in the English textbooks (M. Lee & D. Shin, 2015). Interestingly, the majority of the KBEWL word families are from the first 3,000 word families in the BNC/COCA. This, in turn, attests to the importance of having a good knowledge of the most frequent 3,000 high frequency words in coping with the lexical demands of their English studies at school.

The importance of the most frequent 3,000 word families was also observed in the studies that analyzed the lexical profiles of the English textbooks of high school. J. Kim and D. Lee (2017), for instance, reported that the most frequent 3,000 word families made up around 95% coverage of the high school English textbooks, which indicated that students with knowledge of this vocabulary size would gain good comprehension with instructional support. However, their results went on to suggest that vocabulary knowledge of the first 5,000 word families was needed to reach 98% coverage, the lexical coverage necessary for unassisted reading (Nation, 2006).

It may be also worthwhile to consider the vocabulary demands required for the College Scholastic Ability Test (CSAT), a high-stakes national standardized test for university admission in South Korea, as almost 600,000 Korean high school students take the test every year. In a study that analyzed the lexical resources of the CSAT English sections performed from 2016 to 2018, J. Year (2018) found that students need to have a vocabulary size of 3,000 word families to reach 95% lexical coverage of the test, the vocabulary necessary for minimal comprehension which leads to a score of 55% or above on a reading test (Laufer, 1989; Laufer & Ravenhorst-Kalovski, 2010). This again underscores the importance of the 3,000 high frequency vocabulary for Korean high school ELF learners. J. Year (2018) further reported that students need to know a much larger vocabulary of 6,000 word families to understand 98% of words on the tests for a comprehension score of 70% and above. The vocabulary demands for the CSAT thus presents an extremely daunting and challenging task for the high school students.

To recap, it is important to have a good knowledge of the most frequent 3,000 word families as they provide a wealth of the vocabulary resources required for everyday spoken communication and instructional reading. Knowledge of the most frequent 5,000 word families would allow students to manage to read the English textbooks independently. For those students who plan to take the CSAT, existing research suggests that knowledge of 6,000 word families would provide 98% coverage of the English section of the CSAT, optimal vocabulary coverage for academic texts. The vocabulary learning objectives then seem to bring Korean high school students within range of 3,000-6,000 English word families to grapple with the challenges of English for academic purposes at school.

3. Research Questions

To date, several studies have examined the overall vocabulary size of Korean high school EFL learners (H. Choi, 2013; Y. Kang et al., 2012). But very few studies have focused on their vocabulary knowledge at the different frequency levels (D. Shin et al., 2011), while even fewer have investigated the vocabulary progress of this population of

students. Building on previous work on L2 vocabulary research, the present study set out to assess the vocabulary size of Korean EFL high school students at 10th and 11th grade levels and the difference in their vocabulary sizes to estimate the vocabulary progress over a year. In addition, the study explored the relationship between the vocabulary size of the students and their performance on the English tests. The following two research questions guided the present study.

1) What are the average vocabulary sizes of Korean 10th and 11th grade learners of English?

2) To what extent does the vocabulary size of the high school students contribute to their performance on the English tests?

III. METHOD

1. Participants

The data were collected from a total of 105 Korean EFL learners at an all-boys high school which is a general public high school located in Seoul, South Korea. They comprised two groups of students. The first group consisted of 46 10th grade students from two intact classes, ranging in age from 15-16. The second group consisted of 59 11th grade students from two intact classes, ranging in age from 16-17. Of these, one 10th and seven 11th grade students were excluded from subsequent analyses because they missed at least one of three tests examined in the study. According to a background questionnaire completed on the first day of the study, the students in both groups were all native speakers of Korean, and none had lived outside Korea. Since public English education begins in the third grade of elementary school in South Korea, all the students had a minimum of 7-8 years of formal English language instruction at school. Their responses on the questionnaire, however, revealed that the majority of the students in both groups started to learn English through private institutions at an average age of 7.2 and 7.3, respectively. The 10th graders, therefore, had been learning English on average for about 8-9 years while the 11th graders had an average of 9-10 years of English learning in an EFL instructed setting.

2. Instruments

1) Vocabulary Measure

The students' vocabulary size was estimated using the Vocabulary Size Test (VST). The VST was developed by Nation and Beglar (2007) as a tool to measure the written receptive vocabulary size. The test has been increasingly used in recent years for various research and pedagogical purposes (Bundgaard-Nielsen et al., 2011), for its design offers a distinct advantage to assess vocabulary sizes at several frequency bands from a large number of learners in a relatively short span of time. The VST consists of 14 sections; each section contains ten test words that are sampled from each of the fourteen 1,000-word family frequency bands, as determined by the range and frequency information of words in the British National Corpus. The English monolingual version of the test is available for free download via Paul Nation's website (https://www.victoria.ac.nz/lals/about/staff/paul-nation). In addition, the bilingual versions of the test, including the English-Korean bilingual one, are created for learners at beginning or intermediate proficiency levels and also made available for free download and use from the same website.

Figure 1 illustrates the examples at the 2,000 frequency level in the monolingual and English-Korean bilingual versions of the VST.

maintain: Can they **maintain** it?	maintain: Can they **maintain** it?
a. keep it as it is	a. 유지하다
b. make it larger	b. 확대 시키다
c. get a better one than it	c. 더 나은 것을 얻다
d. get it	d. 얻다

FIGURE 1 Examples from the English Monolingual and English-Korean Bilingual Versions of the VST

As seen in Figure 1, the test uses a multiple-choice format with four answer options, and each test word is presented in a non-defining sentence context. The task for test-takers, therefore, is to choose the appropriate definition of the test word from the four answer options. For the Korean high school EFL participants, the current study employed the English-Korean bilingual version of the test and measured only the first 60 test items which were assumed to represent the 6,000 most frequent word families in English. This choice was made because, as aforementioned, knowledge of 5,000-6,000 word families is needed to reach 98% lexical coverage of the English textbooks and the English test of the CSAT (J. Kim & D. Lee, 2017; J. Year, 2018). In scoring, each correct word item received 1 point, and the total scores ranged from 0 to 60. Since each test word represents 100 word families from its frequency level, a vocabulary size of each student was computed by multiplying the total score by 100. Hence, if a student obtains 32 out of 60 on the test, their vocabulary size is 3,200 word families while the maximum possible vocabulary size in this study is 6,000 word families. The VST was given to the students during regular class hours.

2) Performance on the English Tests

Students' performance on the English tests was assessed through two measures. First, an English reading test administered as part of school achievement was used to measure students' reading comprehension. The test was designed to address a variety of reading skills, such as understanding the main idea of the passages, identifying specific details, making inferences, and understanding logical structure. For the 10th graders, the test was composed of 20 short passages and 28 multiple-choice questions. For 11th graders, the test contained 18 reading passages and 26 questions which included multiple-choice, sentence completions, table completion, and short-answer questions.

To gauge the reading difficulty level of the test, the reading passages and questions were evaluated using the Flesch–Kincaid grade level formula. The results showed that the passages from the 10th grade test had a grade level of 9.1, which indicated that the reading texts and questions would be comprehensible by an average student in 9th grade (around ages of 14-15 in the United States), whereas the reading passages from the 11th grade test had a grade level of 10.2, the texts appropriate for an average student in 10th grade (around ages of 15-16 in the United States). The students were allowed 50 minutes for the test, and the maximum possible score on the test was 100.

In addition, the scores of the Preliminary College Scholastic Ability TEST (CSAT) were used to measure students' academic skills in listening and reading. The Preliminary CSAT, which is designed to help high school students to prepare for the CSAT, comprises two sections, listening and reading. The listening section consists of a total of 16 listening passages with 17 multiple-choice questions while the reading section contains 25 reading passages and 28 multiple choice questions. The students were allowed 70 minutes for the test, and the maximum possible score on the test was 100. The reading comprehension test and the Preliminary CSAT were administered 2 weeks and 4 weeks before the vocabulary size test was given, respectively.

IV. RESULTS

Prior to the results related to the two research questions, the internal consistency of the VST was calculated, yielding the Cronbach's alpha measure of 0.87.

The first research question investigated the vocabulary size of 10th and 11th grade high school learners of English and measured the difference in their vocabulary sizes to estimate vocabulary gains over a year. To answer the first research question, the two groups of students were compared on the VST scores. Table 1 summarizes the means, standard deviations, and score ranges of the VST for 10th and 11th grade groups. Overall, the 11th grade group attained a higher average score of vocabulary size (M = 37.33, SD = 10.78) than the 10th grade group (M = 32.82, SD = 8.52). This means that out of the most frequent 6,000 word families, the 11th graders knew 3,733 word families while the 10th graders knew about 3,282, with the difference of 451 words in their vocabulary knowledge. An independent samples t-test revealed that this vocabulary size difference was statistically significant, $t(95) = -2.26$, $p = .026$, indicating marginally significant vocabulary growth from the 10th to the 11th grades. The effect size for this analysis was small ($d = .46$). As reflected in the large standard deviations and the range of score (min = 15 and max = 51 for 10th graders; min = 14 and max = 58 for 11th graders), both groups displayed a wide spread of scores, suggesting sizeable individual differences in their vocabulary size.

To probe students' vocabulary knowledge in more detail, the vocabulary size scores of the two groups at each 1,000-frequency band were analyzed. Table 2 presents means, standard deviations, and t-test results, and Figure 2 graphically compares the mean scores of the VST at the six different frequency levels for the two groups.

Several observations can be made from Table 2 and Figure 2. First, the students in both grades performed better at higher frequency levels than at lower levels, indicating the students generally learned high frequency words before low-frequency words. For example, the 11th graders scored 8.52 at the 1,000 level, 7.65 at the 2,000 level, 6.83 at the 3,000 level, 5.81 at the 4,000 level, 5.23 at the 5,000 level, and 3.29 at the 6,000 level. Again, these figures imply that the 11th graders knew about 852 word families of the first 1,000 frequency band, 750 word families of the second 1,000 frequency band, 650 word families of the third 1,000 frequency band, and so on. The similar decreasing stair-step pattern was observed for the 10th graders where the mean scores gradually dropped with a decrease in word frequency: 7.96 at the 1,000 level, 6.87 at the 2,000 level, 5.38 at the 3,000 level, 5.16 at the 4,000 level, 4.56 at the 5,000 level, and 2.91 at the 6,000 level. These results lend support to the findings of previous research that vocabulary learning broadly mirrors the frequency of occurrence of words in a language.

A second notable observation in Table 2 and Figure 2 was that the 11th graders scored higher than the 10th graders at each frequency level, suggesting vocabulary growth from 10th to 11th grade. The data shown in Table 2 reveal that the 11th grade students knew, on average, 56 more words than the 10th grade students at the 1,000 level and 78 more words at the 2,000 level, and the difference between the two groups at each frequency level was marginally significant (at the first 1,000 level, $p = .07$, and at the second 1,000 band, $p = .06$). The greatest and statistically significant difference between the two groups was present at the 3,000-frequency level where the 11th graders knew 145 more words than the 10th graders ($t = -3.40$, $p = .001$). This in turn suggests that high school learners, on average, made significant gains of vocabulary at the most frequent 3,000 word families from 10th to 11th grades. From the 4,000 to 6,000 levels, the difference between the two groups size was not significant; there was nevertheless a consistent trend towards the 11th graders achieving higher scores than the 10th graders at these frequency levels.

A careful analysis of the individual profiles of the VST further revealed that students in both grades exhibited considerable variation in their vocabulary size. For the 10th graders, one student achieved a score of 51, indicating a vocabulary size of 5,100 word families, and 24 percent (11 out of 45) had a vocabulary size of 4,000-5,000 word families. About 38 percent of the 10th graders (17 out of 45), how-

TABLE 1
Descriptive Statistics for the Vocabulary Size Test for Grade 10 and Grade 11 Students

	Grade 10 (n = 45)				Grade 11 (n = 52)			
	Mean	*SD*	Min	Max	*Mean*	*SD*	Min	Max
Total	32.82	8.52	15	51	37.33	10.78	14	58

Note. The total score of the test is 60.

ever, had a vocabulary size of less than 3,000 word families with two students having a vocabulary of 1,500 word families. Individual differences in vocabulary size were more pronounced among the 11th graders. 13 percent of the 11th graders (7 out of 52) had a fairly large vocabulary size of 5,000-6,000 word families, while 29 percent (15 out of 52) achieved a vocabulary size of 4,000-5,000 word families. On the other hand, 25 percent of the 11th graders (13 out of 52) scored lower than 30, a score that represents the knowledge of 3,000 word families, with two students having a vocabulary size of 1,400 word families.

The second research question was concerned with the extent to which vocabulary size is related to the scores of the reading test and the Preliminary CSAT. Table 3 gives the descriptive statistics for each group's performance on the VST, the reading test, and the Preliminary CSAT.

To examine the relationship between vocabulary size and the reading test scores, and between vocabulary size and the Preliminary CSAT scores, a series of Pearson correlations were carried out. In addition, multiple linear regression analyses were conducted to assess how much of the variance in the reading test and the Preliminary CSAT can be attributed to students' vocabulary size; these results are presented in Table 4.

Correlation analyses revealed that the VST had moderate correlations with the scores on the reading test (r = 0.504, p = .001) and the Preliminary CSAT (r = .462, p = .001) for the 10th graders, suggesting that students with a larger vocabulary size performed better on both tests. As illustrated in Table 4, regression analyses reinforced the correlations results; the adjusted R square showed that the VST scores alone accounted for 25.4% of the variance in the reading scores and 21.3% of the variance in the Preliminary CSAT scores. A similar trend of results was obtained for the 11th graders. The correlation results indicate that the vocabulary size scores of the students had moderate correlations with their reading comprehension scores (r = 0.691, p = .000) and the scores of the Preliminary CSAT (r = .615, p = .000). Regression analyses found that the VST scores explained 47.7% of the variance in the reading scores and 37.8% in the scores of the Preliminary CSAT.

Taken together, the receptive vocabulary size of both

TABLE 2
Descriptive Statistics for the Vocabulary Size Test for Grade 10 and Grade 11 Students at Six Frequency Level

	Grade 10 (n = 45)		Grade 11 (n = 52)				
	Mean	*SD*	*Mean*	*SD*	Mean difference	*t*	*p*
1K	7.96	1.69	8.52	1.33	0.56	-1.84	.07
2K	6.87	2.13	7.65	1.91	0.78	-1.92	.06
3K	5.38	2.05	6.83	2.13	1.45	-3.40	.00*
4K	5.16	1.78	5.81	2.38	0.65	-1.51	.14
5K	4.56	2.23	5.23	2.61	0.67	-1.36	.18
6K	2.91	2.11	3.29	2.50	0.38	-.80	.43

Note. The total score at each frequency level is 10.

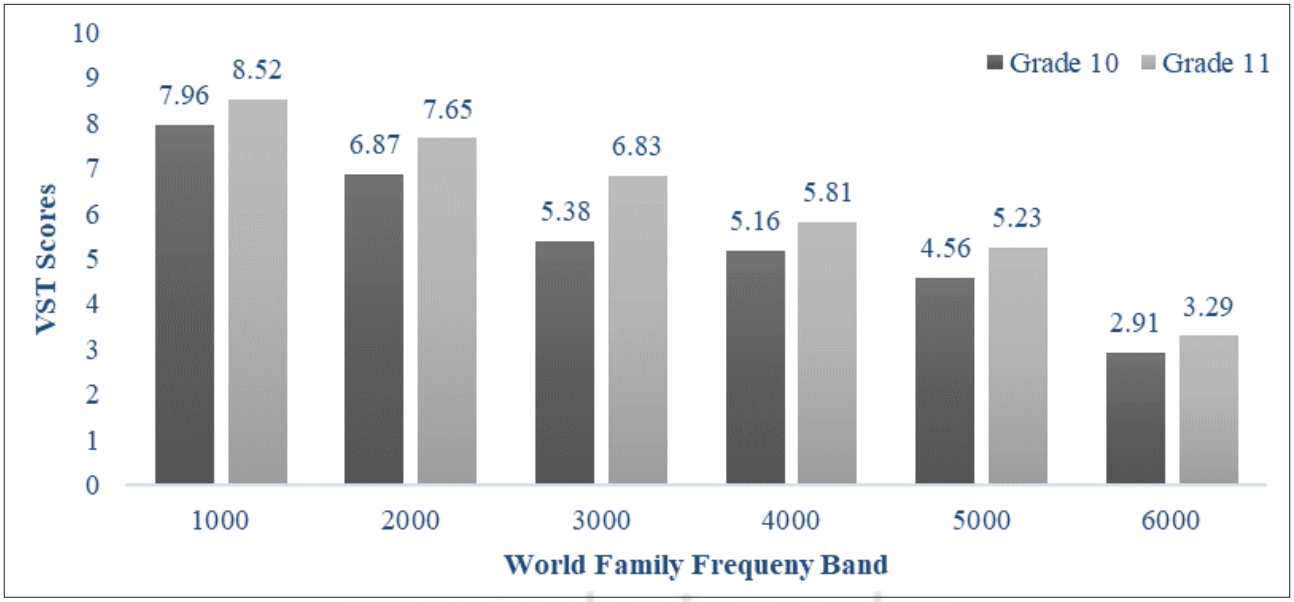


FIGURE 2 The Vocabulary Size of the Students by Frequency Levels

TABLE 3
Means, Standard Deviations (SD), and Score Ranges for the Vocabulary Size, Reading and Preliminary CSAT Tests

	Grade 10 (n = 45)				Grade 11 (n = 52)			
	Mean	*SD*	Min	Max	*Mean*	*SD*	Min	Max
VST (*60)	32.82	27.5	15	51	37.33	10.78	14	58
Reading test (*100)	53.06	23.89	3.40	100	54.23	28.31	9.40	98.50
Preliminary CSAT (*100)	55.02	8.52	19	98	57.56	23.91	12	98

*Maximum possible score

TABLE 4
Regression Analyses: Variance Explained by the Vocabulary Size in the Scores of the Reading Test and Preliminary CSAT by Groups

		R	*R squared*	*Adjusted R*	*F*	*Sig*
Grade 10 (n = 45)	Reading test	.504	.254	.236	11.66	.001
	Preliminary CSAT	.462	.213	.195	20.29	.001
Grade 11 (n = 52)	Reading test	.691	.477	.466	43.75	.000
	Preliminary CSAT	.615	.378	.363	25.51	.000

group's students was found to be significantly correlated with the scores of the reading test and the Preliminary CSAT. Each group displayed slightly higher correlation values with the reading scores than with the Preliminary CSAT scores; and the vocabulary sizes of the 11th graders had higher correlations with the scores of both tests compared with the results of the 10th graders.

V. DISCUSSION

This study aimed to contribute to existing work on L2 vocabulary research by estimating how many words, of the most frequent 6,000 word families, Korean high school learners of English know and assessing their vocabulary growth over a period of a year. To this end, the English-Korean bilingual version of the Vocabulary Size Test (Nation, 2001a) was administered to students of Grades 10 and 11. To investigate the role of vocabulary size in their performance on the English tests, the study also looked into the extent to which learners' vocabulary size predicts the scores on their reading comprehension and Preliminary CSAT tests.

With regard to the first research question concerning the vocabulary size of the participants, the study found that, out of the most frequent 6,000 word families, the 10th and 11th graders had average vocabulary sizes of 3,282 and 3,733 word families, respectively. When compared with the results of previous studies, these students seem to have vocabulary sizes somewhat larger or comparable to those of other EFL high school students: 1,600 words for 10th graders and 3,500 words for 11th graders in Israel high schools (Laufer, 1998), and 3,500 word families for Greek high school EFL learners at an advanced level (Milton, 2009). The results of the VST also confirmed a strong frequency effect in the learning of foreign language vocabulary, which means that L2 learners generally acquire more frequent words before less frequent words.

In evaluating the vocabulary sizes of the participants, the vocabulary size of the 11th graders in the current study was found to be smaller compared with the results of D. Shin et al. (2011), the only empirical study that, like this experiment, examined the vocabulary size of Korean high school students focusing on 11th graders at different levels of frequency. D. Shin et al. (2011) reported that their 11th graders had a larger average vocabulary size of around 4,400 word families than 3,733 word families of the 11th graders of the present study. The difference in these results can be attributed to two factors. First, D. Shin et al., while employing the same format of the bilingual version of the VST (Nation, 2010), excluded the culture-bound words from their VST and used different vocabulary items. Second, the larger vocabulary size of the 11th graders in D. Shin et al. is probably in part due to the higher English proficiency level of the learners. According to the Preliminary CSAT reported in their study, the 11th graders achieved a mean score of 68.4 whereas the 11th graders of the present study obtained a mean score of 57.56 on the Preliminary CSAT. This may suggest that D. Shin et al.'s (2011) participants have the higher levels of English proficiency, which is consistent with the general findings of L2 vocabulary research showing higher proficiency learners likely have larger vocabulary sizes. Such a direct comparison of the results, however, may not be entirely appropriate as the two studies employed the different versions of the Preliminary CSAT. Clearly, therefore, future research would benefit from examining the English vocabulary size of Korean high school students at varying levels of proficiency, as currently few studies have addressed this issue.

The results of the present study also indicated that there was a 451 word family difference in vocabulary size between the 10th and 11th graders. This may allow for speculation

that the students, at least for the participants of the current study in this high school context, added around 451 word families over a year. This annual growth rate is broadly well-aligned with previous research findings which suggest that EFL learners learn, on average, 300-500 word families in a year (Milton, 2009). More importantly, the results of the vocabulary size at each frequency level revealed that the high school students of the present study made the greatest gains of around 145 word families at the 3,000 frequency level. An analysis of individual data appeared to support the significant vocabulary growth at this level. If we set a score of 9 and above as having a good knowledge of a given frequency level, only 4.4% of the 10th graders (2 out of 45) received these scores at the 3,000 level. On the other hand, 27% of the 11th graders (14 out of 52) earned 9 or 10 points at this frequency level. This finding is of practical significance for students, as the most frequent 3,000 word families account for around 90-95% of the running words in the English textbooks (J. Kim & D. Lee, 2017; M. Lee & D. Shin, 2015) while providing a lexical threshold which allows learners to begin to read authentic texts and understand spoken English (Schmitt, 2008). If the students can increase their vocabulary at the rate of around 450 word families per year with the greatest gain at the 3,000 level, this would suggest a reasonable vocabulary learning goal for explicit learning. One important implication for vocabulary instruction, then, is that teachers can ensure or facilitate students' vocabulary learning at the 3,000 level through explicitly guided vocabulary instruction (Schmitt & Schmitt, 2014).

A fine-grained analysis of individual data further observed a considerable individual variation in vocabulary size. As presented in the results section, around 27% of the 10th graders and 42% of the 11th graders had a vocabulary size of between 4,000-5,800 word families. In contrast, 38% of the 10th graders and 25% of the 11th graders had a vocabulary size smaller than 3,000 word families. Moreover, the results indicate that many students received 7 or lower scores at the first 2,000 frequency levels. This finding may suggest that even after 700-800 hours or more of English instruction, a large number of students had difficulty learning the most frequent 2,000 word families and made a limited vocabulary learning progress. This should come as no surprise, though, to those familiar with L2 vocabulary research showing many EFL learners do not master high frequency words, even after 1,000 hours or more of English learning (Laufer, 2000). Given that approximately 80-90% of spoken English and 70-80% of written English come from these high-frequency words, a lack of knowledge of these words would severely limit L2 reading and listening comprehension for academic purposes, thereby delaying overall language development (Nation & Anthony, 2013). Taking these together with a range of individual variation in vocabulary sizes, there is certainly a need for a principled vocabulary program focusing on teaching high-frequency words up to the 2,000-3,000 frequency level, on the one hand; and on the other, carefully designed vocabulary instruction is necessary to meet the vocabulary needs of students with larger vocabulary sizes (Schmitt & Schmitt, 2014).

With regard to the second research question which examined the contribution of learners' vocabulary size to their performance on the English tests, the study found significant correlations between vocabulary size and the scores on the English reading test. The study finding is compatible with previous research which reports that the students with higher scores on the reading test appeared to have larger vocabulary sizes than those with lower scores. The study went on to find significant correlations between vocabulary size and the scores of the Preliminary CSAT, and yet, its correlations were slightly lower than those with the reading comprehension test scores for each grade. This result may be partially attributable to the listening comprehension questions of the test. As explained previously, the Preliminary CSAT test consisted of 17 listening questions in addition to 28 reading comprehension questions. L2 vocabulary research has shown the vocabulary size generally has a lower correlation with listening than with reading skills. For example, Staer (2008), in a study investigating the relationship between vocabulary size and the skills of listening and reading, found that the vocabulary size accounted for 39% of variance in the listening scores whereas it explained as much as 72% of variance in the reading scores. The relatively lower correlations with the Preliminary CSAT, thus, reaffirmed the greater importance of vocabulary size in reading than in listening comprehension.

Another issue worthy of consideration is that the vocabulary size seems to have the stronger predictive power for the scores of the 11th graders on the English tests than those of the 10th graders. Results of correlation and regression analyses indicate that the relationship between vocabulary size and the scores of the English tests was stronger for the 11th graders than the 10th graders. Given that the 11th graders had the larger vocabulary sizes at every frequency level, these results can be interpreted as suggesting that having a larger vocabulary size contributes, to some extent, to the development of depth of knowledge (how well individual words are known) (Qian, 1999; Schmitt & Meara, 1997). That is, learners with larger vocabulary sizes not only know more words, but they also have a good knowledge of grammatical properties, discourse features, different meanings, and pronunciation, etc. of the words, all of which play a part in fluent reading and good comprehension of academic texts (Qian, 1999). In a sense, then, this observation could provide partial support for Schmitt et al.'s (2011) claim that "more vocabulary is better, and it is worth doing everything possible to increase learners' vocabulary knowledge (p. 39).

However, this should not make one jump to the conclusion that the higher scores on the vocabulary measures would always ensure good reading comprehension. The results of the study showed that students' large vocabulary size was not always conducive to higher scores on their English tests; there were some, albeit a small number of, students with a large vocabulary size who obtained low scores on the tests. For example, two of the 10th graders with a vocabulary size of 4,000 and 4,300 word families were among those scored at the bottom 20 percent of the reading test and the Preliminary CSAT. Similarly, three 11th graders with a vocabulary size of between 4,000 and 5,200 word families turned out to have lower scores on both tests. These results, as has been

well- documented in the literature, may suggest that these students learned the words mostly from a word list without contextual support, one of the most common vocabulary learning strategies exploited by Korean high school learners. As a result, their vocabulary learning was limited to the form-meaning link of a word (Schmitt, 2014), and their large vocabulary size did not immediately translate into better comprehension scores. The lesson in all this is that teachers, while acknowledging different aspects of vocabulary learning, will do well to encourage their students to use a variety of vocabulary learning strategies including learning words through repeated exposures in different contexts.

VI. LIMITATIONS AND CONCLUSIONS

This paper attempted to call attention to the importance of measuring the vocabulary size of L2 learners as it is proportionally related to their general L2 proficiency and can be used as a significant predictor of their English academic performance, in general, and reading comprehension, in particular. Its results, however, should be interpreted with caution as the study is not without its limitations. The first limitation of the study concerns the small sample size, which would constrain the generalizability of the results to a larger population. As the study design used intact classes of two different grades at the high school, the researcher was allowed access only to the two classes of each grade with the limited number of the students. Second, the study lacks the representativeness of the target population as it collected the data only from the male students. As explained previously, the study was carried out in the all-boys high school and consequently could not gather corresponding data from female high school students. Furthermore, the study did not include the data from students of Grade 12, the final year of secondary school in South Korea. The study initially planned to recruit students of Grade 12 to provide a more comprehensive and well-rounded picture of vocabulary size and development progress of Korean high school EFL learners. However, as the study was undertaken during the fall semester when Grade 12 students were busy preparing for their university entrance exam, the researcher was not permitted to collect the data from these students. In future work, the researcher plans to examine the vocabulary size of all three grades of high school so as to gain a better and more complete picture of vocabulary size of both male and female high school learners and the rate at which English vocabulary is acquired.

Another methodological issue concerns the possible overestimation of vocabulary size of the learners. As a number of scholars have legitimately criticized (Kremmel & Schmitt, 2016; Stewart, 2014; Stewart & White, 2011), the test format of the VST, the multiple choice question with four options, may have generated inflated-estimates of vocabulary size due, in no small measure, to guessing effects. Several researchers indeed found that there is a 12-25% chance of learners guessing the answer in the multiple choice format of vocabulary measures (Kremmel & Schmitt, 2016; Stewart, 2014). To guard against this, the students of the present study were briefed on the purpose of the VST prior to the test, and they were also explicitly instructed to leave a question blank if they didn't know the meaning of the word. Accordingly, the present study found that many students generally left questions blank if they did not know the answer, especially at the 4,000 and 6,000 word levels, which, as a result, might have mitigated the problem of guessing. Future research, though, can circumvent the potential overestimation of learners' vocabulary knowledge, by including an *I-don't-know* answer choice for each item (D. Shin et al., 2011; Zhang, 2013).

Finally, the cross-sectional nature of the study design inevitably made the estimated vocabulary gains from the 10th and 11th graders of the study speculative at best. To provide a more valid and reliable measure of vocabulary growth of high school learners therefore, it would be desirable for future research to examine the vocabulary size of the target population through a longitudinal study, where data are repeatedly collected on the same individuals over time.

Empirical research investigating vocabulary size of L2 learners has often been questioned on a number of methodological grounds including the accuracy and precision of vocabulary measures (Stoeckel et al., 2021). Yet, for all methodological issues in difficulties measuring vocabulary size, as Nation (2011) recommends, it is crucial and even necessary for both teachers and students to know approximate estimates of students' vocabulary size, or at least their knowledge of the 3,000 high frequency words, by employing some sort of vocabulary size measures. Information about the vocabulary size of students will help teachers understand the difficulty of the task facing students. What's more, teachers can use such information as a starting point for planning and organizing materials tailor-made to the needs of the students. Students should also be made aware of their vocabulary size and progress in relation to language learning goals (Webb & Chang, 2012). Raising awareness of learners' current vocabulary knowledge will help them to see the value of and needs for vocabulary learning and enhance their motivation in L2 learning.

ACKNOWLEDGEMENTS

I am grateful to the anonymous reviewers for their helpful suggestions on an earlier version of this manuscript.

REFERENCES

Adolphs, S., & Schmitt, N. (2003). Lexical coverage of spoken discourse. *Applied linguistics*, 24(4), 425-438.

Alderson, J. C. (2005). *Diagnosing foreign language proficiency: The interface between learning and assessment*. A&C Black.

Bundgaard-Nielsen, R. L., Best, C. T., & Tyler, M. D. (2011). Vocabulary size is associated with second-language vowel perception performance in adult learners. *Studies in Second Language Acquisition*, *33*(3), 433-461.

Choi, Hye-Yeon. (2013). Effects of depth and breadth of vo-

cabulary knowledge on English reading comprehension among Korean high school students. *Language Research, 49*(2), 419-452.

Hu, M., & Nation, I. S. P. (2000). Unknown vocabulary density and reading comprehension. *Reading in a Foreign Language*, *13*(1), 403-430.

Ji, Heejeong, & Shin, Yousun. (2017). The effect of Korean university students' lexical size and coverage in reading comprehension in English. *Modern English Education, 18*(2), 25-43.

Kang, Yusun, Kang, Hey-seung, & Park, Jieun. (2012). Is it vocabulary breadth or depth that better predict Korean EFL learners' reading comprehension? *English Teaching, 67*(4), 149-171.

Kim, Jewoo, & Lee, Dong-ju. (2017). A corpus-based study on the use of vocabulary in high school English I·II textbooks, College Scholastic Ability Tests, and EBS materials. *The Journal of Linguistic Science*, *80,* 51-74.

Kremmel, B., & Schmitt, N. (2016). Interpreting vocabulary test scores: What do various item formats tell us about learners' ability to employ words? *Language Assessment Quarterly*, *13*(4), 377-392.

Laufer, B. (1989). What percentage of text lexis is essential for comprehension? In C. Lauren & M. Nordman (Eds.), *Special language: From humans thinking to thinking machines* (pp. 316-323). Multilingual Matters.

Laufer, B. (1992). How much lexis is necessary for reading comprehension? In H. Bejoint & P. Arnaud (Eds.), *Vocabulary and applied linguistics* (pp. 126-132). Palgrave Macmillan.

Laufer, B. (1998). The development of passive and active vocabulary in a second language: Same or different? *Applied Linguistics*, *19*(2), 255-271.

Laufer, B. (2000). Task effect on instructed vocabulary learning: The hypothesis of "involvement." *Selected papers from AILA '99 Tokyo* (pp. 47-62). Waseda University Press.

Laufer, B., & Ravenhorst-Kalovski, G. (2010). Lexical threshold revisited: Lexical text coverage, learners' vocabulary size and reading comprehension. *Reading in a Foreign Language*, *22*(1), 15-30.

Laufer, B., & Sim, D. D. (1985). Taking the easy way out: Non-use and misuse of clues in EFL reading. *English Teaching Forum*, *23*(2), 7-10.

Lee, Moon-bok, & Shin, Dong-kwang (2015). Development of the Korean basic English word list of the 2015 revised national curriculum of English. *Journal of the Korea English Education Society, 14*(4), 115-134.

Meara, P. (1996). The dimensions of lexical competence. In G. Brown, K. Malmkjaer, & J. Williams (Eds.), *Performance and competence in second language acquisition*, (pp. 35-53), Cambridge University Press.

Milton, J. (2009). *Measuring second language vocabulary acquisition*. Multilingual Matters.

Milton, J. (2013). Measuring the contribution of vocabulary knowledge to proficiency in the four skills. In C. Bardel, C. Lindqvist, & B. Laufer (Eds.), *L2 vocabulary acquisition, knowledge and use: New perspectives on assessment and corpus analysis* (pp. 57-78). Euro SLA.

Ministry of Education. (2015). English curriculum. Notification No. 2015-74 [Issue 14]. https://moe.go.kr/boardCnts/view.do?boardID=141&boardSeq=60747&lev=0&searchType=null&statusYN=W&page=20&s=moe&m=040401&opType=N

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

Nation, I. S. P. (2001b). How many high frequency words are there in English? In M. Gill, A. W. Johnson, L. M. Koski, R. D. Sell, & B. Wårvik (Eds.), *Language, learning and literature: Studies presented to Håkan Ringbom* (pp. 167-181). Åbo Akademi University.

Nation, I. S. P. (2006). How large a vocabulary is needed for reading and listening? *The Canadian Modern Language Review*, *63*(1), 59-82.

Nation, I. S. P. (2010). Vocabulary size test (bilingual English-Korean version). https://www.wgtn.ac.nz/lals/resources/paul-nations-resources/vocabulary-tests/the-vocabulary-size-test/Vocab-size-test-Korean.pdf

Nation, I. S. P. (2011). Research into practice: Vocabulary. *Language Teaching, 44*(4), 529-539.

Nation, I. S. P., & Anthony, L. (2013). Mid-frequency readers. *Journal of Extensive Reading, 1*, 5-16.

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

Nguyen, L. T. C., & Nation, I. S. P. (2011). A bilingual vocabulary size test of English for Vietnamese learners. *RELC Journal*, *42*(1), 86-99.

Qian, D. D. (1999). Assessing the roles of depth and breadth of vocabulary knowledge in reading comprehension. *The Canadian Modern Language Review*, *56*(2), 282-308.

Read, J. (2004). Research in teaching vocabulary. *Annual Review of Applied Linguistics*, *24*, 146-161.

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

Schmitt, N. (2014). Size and depth of vocabulary knowledge: What the research show. *Language Learning*, *64*(4), 913-951.

Schmitt, N., Jiang, X., & Grabe, W. (2011). The percentage of words known in a text and reading comprehension. *The Modern Language Journal*, *95*(1), 26-43.

Schmitt, N., & Meara, P. (1997). Researching vocabulary through a word knowledge framework: Word associations and verbal suffixes. *Studies in Second Language Acquisition, 19*(1), 17-36.

Schmitt, N., & Schmitt, D. (2014). A reassessment of frequency and vocabulary size in L2 vocabulary teaching. *Language Teaching, 47*(4), 484-503.

Schmitt, N., Schmitt, D., & Clapham, C. (2001). Developing and exploring the behaviour of two new versions of the Vocabulary Levels Test. *Language Testing*, *18*(1), 55-88.

Shin, Dongkwang, Chon, Yuah V., & Kim, Heejin. (2011). Receptive and productive vocabulary sizes of high school learners: What next for the basic word list? *English Teaching, 66*(3), 123-148.

Stæhr, L. S. (2008). Vocabulary size and the skills of listening, reading and writing. *Language Learning Journal*, *36*(2), 139-152.

Stewart, J. (2014). Do multiple-choice options inflate estimates of vocabulary size on the VST? *Language Assessment Quarterly*, *11*(3), 271-282.

Stewart, J., & White, D. (2011). Estimating guessing effects on the vocabulary levels test for differing degrees of word knowledge. *TESOL Quarterly*, *45*(2), 370-380.

Stoeckel, T., McLean, S., & Nation, P. (2021). Limitations of size and levels tests of written receptive vocabulary knowledge. *Studies in Second Language Acquisition*, *43*(1), 181-203.

van Zeeland, H., & Schmitt, D. (2013). Lexical coverage in L1 and L2 listening comprehension: The same or different from reading comprehension? *Applied Linguistics*, *34*(4), 457-479.

Webb, S., & Chang, A. (2012). Second language vocabulary growth. *RELC Journal*, *43*(1), 113-128.

West, M. (1953). *A general service list of English words*. Longman.

Year, Jung-eun. (2018). How much vocabulary is necessary for the English section of the college scholastic ability test? *Journal of the Korea English Education Society*, *17*(4), 47-72.

Zareva, A., Schwanenflugel, P., & Nikolova, Y. (2005). Relationship between lexical competence and language proficiency: Variable Sensitivity. *Studies in Second Language Acquisition, 27*(4), 567-595.

Zhang, X. (2013). The I don't know option in the vocabulary size test. *TESOL Quarterly*, *47*(4), 790-811.

Zimmerman, K. J. (2004). *The role of vocabulary size in assessing second language vocabulary*. Brigham Young University.