

THE EFFECT OF VOCABULARY SIZE ON READING COMPREHENSION OF IRANIAN EFL LEARNERS

Sasan Baleghizadeh
Shahid Beheshti University, G.C., Tehran, Iran
sasanbaleghizadeh@yahoo.com

Mohammad Golbin
Shahid Beheshti University, G.C., Tehran, Iran
mo_golbin@yahoo.com

Abstract

A large number of variables influence the way a learner comprehends a reading passage, one of which is vocabulary size. The studies which have focused on this seemingly important aspect, in some settings, are few and far between. This indicates the importance of running more research in this respect. The present study endeavored to examine this variable to discover its effect on reading comprehension ability of Iranian EFL learners. In so doing, 83 Iranian first-year university students (22 males and 61 females) were given a vocabulary size test (Nation 1990) and a reading comprehension test (TOEFL version 2004). The results showed a very significant correlation between vocabulary size and reading comprehension ($r = .84, p < .05$), which points out the necessity of improving the learners' vocabulary size in coping with reading passages. However, the high correlation found in this study calls for more replications to add to the precision of such a relationship.

Keywords: vocabulary size, reading comprehension, Iranian EFL learners.

1. Introduction

It is the firm conviction of many researchers in education that vocabulary knowledge and reading comprehension are closely connected and numerous studies have shown a strong correlation between the two (Nagy 1988, Nelson-Herber 1986). However, it took quite long for researchers to begin to realize that lower-level lexical processing indeed plays an important role in second language (L2) reading. One of the common beliefs about reading comprehension, particularly in Iran, is that using reading strategies and an adequate knowledge of syntax (grammar) can help learners' understanding of texts to a great degree and there is not much effort needed to grapple with words. Unfortunately, this shibboleth on downplaying vocabulary has disadvantaged many Iranian EFL learners, for when it comes to practice it has been an abandoned aspect by teachers in favor of the study of syntax and other language aspects. Nowadays, many reading teachers admit that

when their students face an unfamiliar text in the foreign language, the first challenge seems to be its vocabulary (Grabe and Stoller 2002).

According to Laufer and Yano (2001: 549), L2 learners in academic settings are expected to overcome a vast amount of reading materials intended for native speakers, and yet studies conducted across high schools and universities indicate that their vocabulary knowledge 'does not amount to a quarter of the vocabulary known by their native speaking peers.'

Having the above-mentioned issues in mind, the researchers believe that investigating vocabulary knowledge is a worthwhile enterprise in Iran, not only for pedagogical purposes but also for the insights it affords into the cognitive processes involved in reading and vocabulary acquisition. Any research that attempts to do so may advance our understanding of the nature of vocabulary knowledge and its relation to reading comprehension.

2. Vocabulary size and reading comprehension

The role of vocabulary in reading comprehension is a complex one. To understand text meaning, one must be able to decode the printed message (Adams 2004, Alderson 2000, Day and Bamford 1998). The presence of high density of unknown words in a text may seriously hinder comprehension (Curtis 1987, Nation, 2001). Fast and efficient word recognition, word encoding and lexical access are necessary for a higher level of meaning construction (Adams 2004, Just and Carpenter 1987, Lesgold and Perfetti, 1978). The main difference between skilled and less skilled readers lies in slower and inefficient lexical access and semantic processing (Bernhardt 2005, Grabe and Stoller 2002, Nassaji 2003, Segalowitz et al. 1991).

A number of studies have revealed consistent correlations between vocabulary and comprehension (Laufer 1992a, 1992b, Qian 1999, 2002, Nation 2001). Stahl (2003: 246) contends that studies from readability formulae have 'found that the most important factor in determining the difficulty of a text is the difficulty of the words.' Vocabulary size is thus a strong predictor of reading comprehension.

Within the context of L2 research in reading, findings on the reading processes and vocabulary threshold have consistently indicated the importance of vocabulary knowledge in reading comprehension (Fukkink et al. 2005, Garcia 1991, Koda 1994, Laufer, 1997, Zhang 2000, 2002a, 2002b; see Alderson 2000, Bernhardt 2005, Koda 2005 and Nation 2001, for reviews).

3. Vocabulary size as a predictor of reading success

A number of studies (e.g., Koda 1989, Laufer 1992a, 1996, Qian 1999) have used scores on vocabulary size to predict levels of academic reading comprehension. Laufer (1996) found significant correlations between different types of vocabulary size tests and reading comprehension tests in her studies. In one study with 92 first-year university students whose native language was either Hebrew or Arabic (Laufer 1992a), the correlation between the scores on the Vocabulary Levels Test (Nation 1983) and scores on reading comprehension was .50, and that between the scores on Eurocentres Vocabulary Test (Meara and Jones 1989) and scores on reading comprehension was 0.75. In another study involving 80 first-year university students of similar L1 backgrounds (Laufer, 1996), a

correlation of .71 was reported between students' scores on reading comprehension and those on the Vocabulary Levels Test.

Koda's (1989) study of 24 college students who were learning Japanese as a foreign language found equally strong correlations between a self-made vocabulary test and two reading tests, one being a cloze test and the other paragraph comprehension. Koda reported a correlation of .69 between the learners' scores on the vocabulary test and the cloze test, and a correlation of .74 between their scores on the vocabulary test and the paragraph comprehension test.

Research by Coady et al. (1993) with 79 students studying English in a university academic preparation program found that two experimental groups, which had received special training in high frequency vocabulary, achieved better ESL reading comprehension at the end of the experiments than did a control group which had not received such a treatment. The study was carried out to verify the proposition that 'there is a positive and significant relationship between knowledge of high-frequency words and reading proficiency. Based on the results of their study, Coady et al. (1993) argued that special training in the 2000 most frequent English vocabulary items could improve learners' reading proficiency.

Besides, investigating the impact of vocabulary on ESL reading, Qian (1999) found a high correlation ($r = .82$) between the scores on the Vocabulary Levels Test and scores on the reading subset of the TOEFL.

According to what was presented above and what great many of researchers including (Laufer 1996, Meara 1997, Nation 2001, Read 2000) and many more attest to, the significance of the role of vocabulary in reading comprehension is clearly acknowledged. What is missing is a blithe disregard for vocabulary in approaching reading comprehension, particularly in the EFL setting of Iran. This fact simply goes unnoticed by a host of Iranian teachers. Hence, working within this context, the present researchers deemed it indispensable to launch a study where vocabulary is paid little heed to in most reading comprehension courses. To this end, the study aims to answer the following research question: Does vocabulary size have any effect on reading comprehension of Iranian EFL learners?

4. METHOD

4.1 Design

The main intent of this study was to investigate whether there is any relationship between vocabulary size and reading comprehension ability of Iranian EFL learners. As such, the independent variable was the vocabulary size of the participants and the dependent variable was their reading comprehension ability. Since the study attempted to test and explore the relationship between the variables, and in addition, to enable us to make predictions, the design type was, by all means, correlational. Moreover, this study in terms of its time frame was cross-sectional.

4.2 Participants

The original participants in the current study were 83 EFL freshmen from Najaf Abad Azad University in Isfahan, Iran. Both genders were represented in the classes comprising 22 male and 61 female students, altogether. After tallying the results, three

participants were excluded, two of whom having done the test perfunctorily and randomly and the other handing in a blank answer sheet. Moreover, the participants, with an average age of 22, were at the intermediate level of English proficiency, as their teacher and later the results attested. The participants were all Iranian, Farsi native speakers, homogeneous in respect of nationality, mother tongue and both cultural and educational background.

4.3 Instruments

Two instruments were used to measure the variables of this study. The reading comprehension section of the internationally recognized TOEFL test (January 2004 version) was used to gauge the participants' L2 reading proficiency, and the Vocabulary Levels Tests (Nation 1990), which is among the best known vocabulary measurement tools to date, was selected to determine the size of the participants' vocabulary.

In order to arrive at dependable, reliable and valid measurement of the participants' reading comprehension proficiency, the reading comprehension section of the TOEFL test (January 2004 version), was chosen. The reason for selecting this test was the high correlation of this test with Vocabulary Levels Test (Nation, 1990) confirmed by many researchers. Qian (1999) found a high correlation ($r = .82$) between the scores on the Vocabulary Levels Test and scores on the reading subset of the TOEFL. In another study involving 80 first-year university students of similar L1 backgrounds, Laufer (1996) reported a correlation of $.71$ between students' scores on the TOEFL reading comprehension and those on the Vocabulary Levels Test.

As for the vocabulary size test, Vocabulary Levels Tests (Nation, 1990) (the 3000 word level test) was used. This test has been widely used to measure the students' range of vocabulary as precisely as possible. Its reliability is reported to be (Cronbach's $\alpha = .95$ and Rasch reliability estimate = $.97$). Due to its well-documented reliability and high correlation with the reading comprehension section of the TOEFL, this test was used to provide an estimate of the number of words the participants knew.

The test is tailored for different levels (1000, 2000, 3000, 5000, and the 10,000 word level) plus a test developed solely to gauge the academic vocabulary of testees and not the size of their vocabulary. For the purpose of this study, the second researcher needed to know which level would best meet his requirements. So, after discussing the point with the professor who taught the participants, the 3000 word level test was selected.

As for the format of the test, it is a lexical matching test which requires test takers to match a word with its definition. There are 30 question words and 60 word options with 30 minutes allocated time for answering the questions. Each three words has six options on the opposite. The test taker's task is to find the best three options to match the three given questions. Reflecting on the distribution of these words, they are from a stratified sample tending to fall into a 3 (noun): 2 (verb): 1 (adjective) ratio. This ratio was maintained in the test, with each section containing three noun clusters, two verb clusters and one adjective cluster. The following illustrates the format of a noun cluster:

You must choose the right word to go with each meaning. Write the number of that word next to its meaning.

1 concrete
2 era circular shape

3 fibertop of a mountain
4 hipa long period of time
5 loop	
6 summit	

Each cluster was written with the following considerations in mind:

- 1) The options in this format are words instead of definitions.
- 2) The definitions are kept short, so that there is a minimum of reading, allowing for more items to be taken within a given period of time.
- 3) Words are learned incrementally, and tests should aim to tap into partial lexical knowledge (Nagy et al. 1985). The Levels Test was designed to do this. The option words in each cluster are chosen so that they have very different meanings. Thus, even if learners have only a minimal impression of a target word's meaning, they should be able to make the correct match.
- 4) The clusters are designed to minimize aids to guessing. The target words are in alphabetical order, and the definitions are in order of length. In addition, the target words to be defined were selected randomly.
- 5) The words used in the definitions are always more frequent than the target words. The 2000 level words are defined with 1000 level words and, wherever possible, the target words at other levels are defined with words from the GSL (essentially the 2000 level) (for more details, see Nation 1990: 264). This is obviously important as it is necessary to ensure that the ability to demonstrate knowledge of the target words is not compromised by a lack of knowledge of the defining words.
- 6) The word counts from which the target words were sampled typically give base forms. However, derived forms are sometimes the most frequent members of a word family. Therefore, the frequency of the members of each target word family was checked, and the most frequent one attached to the test.
- 7) As much as possible, target words in each cluster begin with different letters and do not have similar orthographic forms. Likewise, similarities between the target words and words in their respective definitions were avoided whenever possible.

4.4 Procedure

The data needed for this study were collected from two classes at Najaf Abad Azad University in Isfahan, Iran. In both classes the two instruments were administered in a single testing session. The first phase of the study was the administration of the Vocabulary Levels Tests (the 3000 word level test) and the latter was reading comprehension section of the TOEFL (January 2004 version), which took 30 and 55 minutes respectively. The reason to give the vocabulary test first was quite clear: there was a possibility that the participants would accidentally learn some vocabulary from the reading passages and this could affect the vocabulary test due to some potential coincidences.

5. Results

To answer the research question, the results of each test were measured and then were correlated with each other to analyze the correlation between vocabulary size and reading comprehension. Tables 1 and 2 illustrate the results of vocabulary size test and reading comprehension test, and Table 3 delineates the correlation between the two.

n	Minimum	Maximum	M
80	550	3000	1808

Table1. Descriptive Statistics for the Vocabulary Size Test

n	Minimum	Maximum	M
80	9.00	43.00	24.76

Table2. Descriptive Statistics for the Reading Comprehension Test

To explore the relationship between reading comprehension and vocabulary size, a correlation test involving these factors was run. A two-tailed Pearson Product Moment correlation analysis was conducted and the reading comprehension scores were correlated with participants' scores on vocabulary size. A significant and strong correlation was found between reading comprehension and vocabulary size, $r = 0.84$, $p = .001$. The SPSS analysis of this correlation is displayed in Table 3.

	n	M	SD	df	r	Sig
Vocabulary size	80	1808	608	78	.84*	.001
Reading comprehension	80	24.76	9.31			

$p < .05$

Table3. Correlation between Vocabulary Size and Reading Comprehension

In addition, Figure 1 clearly delineates how the two variables are correlated graphically. As seen in this figure, vocabulary size and reading comprehension are

discordant for participants knowing less than 1000 vocabulary but as the vocabulary size goes over 1000 and approaches 2000 and over, the trend becomes meaningful and debatable.

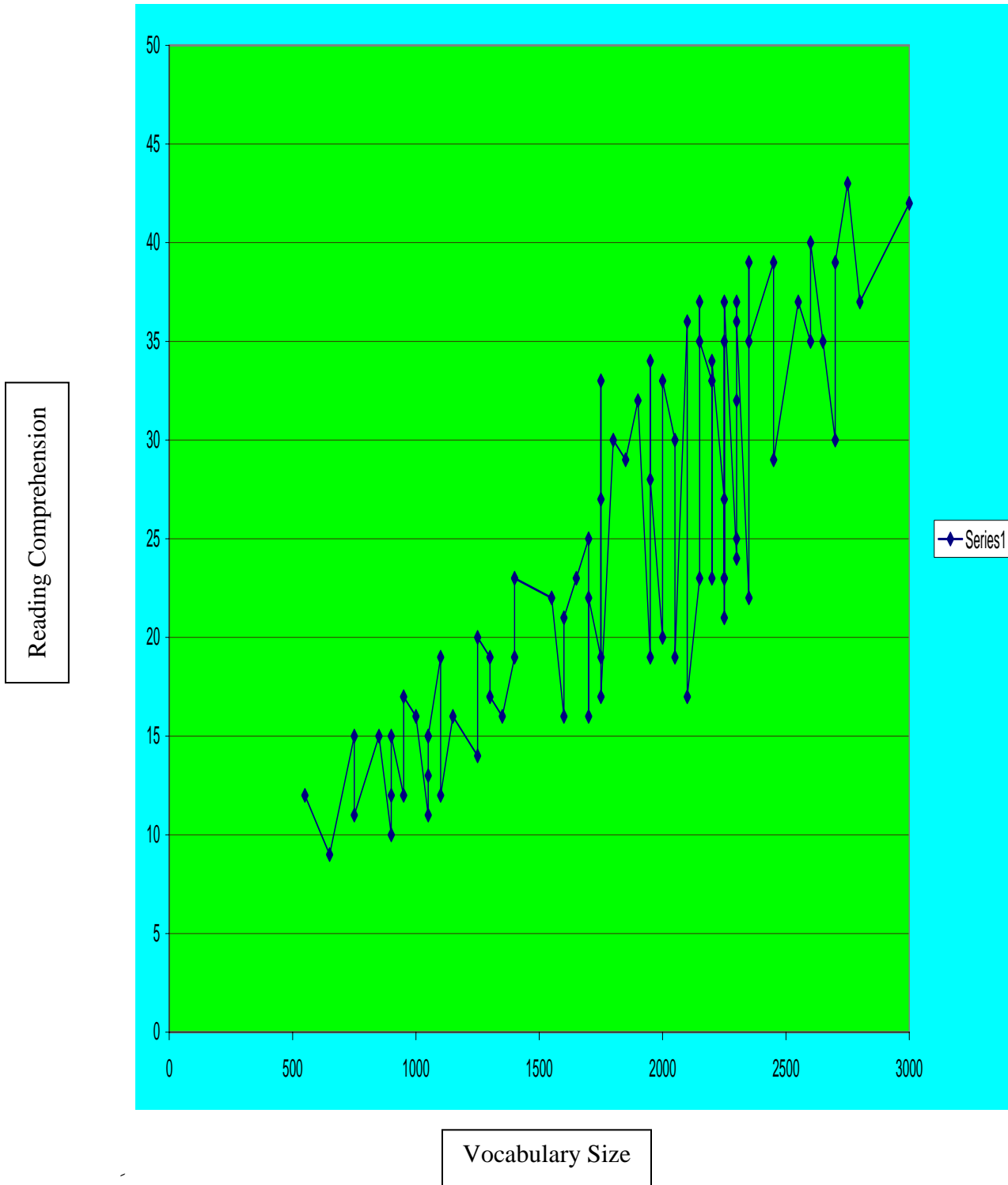


Figure1. Correlation between Vocabulary Size and Reading Comprehension

6. Discussion

In the light of the results of the Pearson correlation analysis, a significant and strong correlation was found between reading comprehension and vocabulary size ($r = 0.84$, $p < .05$), which is analogous to the prior findings by Qian (1999), who found a high correlation ($r = .82$) between the scores on the Vocabulary Levels Test and scores on the TOEFL reading comprehension test and Laufer (1989, 1992a, 1996) whose extensive research on different types of vocabulary size tests and reading comprehension tests has shown high correlations between vocabulary size and reading comprehension. In another study involving 80 first-year university students of similar L1 backgrounds, Laufer (1996) reported a correlation of .71 between students' scores on reading comprehension and those on the Vocabulary Levels Test.

Furthermore, close examination of the results, especially Figure 1, revealed some surprising findings. A finer look at the curves of the chart indicates that knowing 500 to 1000 words does not have any effect on the reading comprehension score of the participants. This may denote that knowledge of only 1000 words or less might be ineffectual when grappling with reading passages which is, to some extent, supported by Meara (1997). As we move ahead in the chart from 1000 to 2000 vocabulary size, we observe a significant effect on reading comprehension scores which could be consistent with studies by Laufer (1989) and Nation (2001) suggesting that with a vocabulary size of 2,000 words a learner knows almost 80% of the words in a text, which is sufficient to allow reasonable comprehension of a text. The scrutiny of reading comprehension scores for the vocabulary size of 2000 to 3000 while showing many inconsistencies displays a mild upward trend in effect of the vocabulary size on reading comprehension. The best reference to advocate for the slight level-off of the curve in this size range could be the Brown Corpus, which is a very diverse corpus of over 1,000,000 running words in English, as well as its table on vocabulary size and text coverage. According to this corpus, knowing 1000 vocabulary enables 72% text coverage (knowing 72% of the words in any given text), 2000 vocabulary allows for 79.7% text coverage, and 3000 words makes up for 84% text coverage. The percentages indicate that the add-up of a thousand words in 1000-2000 vocabulary range is more influential than that in 2000-3000 vocabulary range, the former having around 8% change in coverage while the latter shows 5% of change.

Although a very high correlation was found in this study, it should be remembered, however, that correlation does not prove causation. Bearing this point in mind, we assume a cautious stance, limiting this finding to Iranian context and waiting for other researchers to take up the issue.

7. Conclusion

The purpose of this study was to explore the effect of vocabulary size on reading comprehension performance of Iranian EFL learners. To achieve this goal, the researchers conducted a study, consisting of 83 participants from two coed classes of males and females. Two tests were given in a row, the first being the vocabulary test using Vocabulary Levels Tests (Nation 1990) (the 3000 word level test) and the second the reading comprehension section of the TOEFL test (January 2004 version), the former

to gauge vocabulary size and the latter to assess reading comprehension. Finally, the results of all participants were obtained and correlated.

The analysis and correlations of the obtained data clearly confirmed that vocabulary size can be regarded as a working factor in the way a learner comprehends a reading passage. Indeed, to be more precise, according to the results of the correlations, vocabulary size of beyond 1000 is what greatly influences reading comprehension. This could render a vocabulary size of less than a thousand nugatory and all otiose. Moreover, as previously confirmed by Laufer (1989) and Nation (2001), a vocabulary size of around 2000 is what takes effect in reading comprehension and lends more empirical support to vocabulary size as the leading factor in comprehension of reading passages.

Stemming from the above conclusions, this study identified a number of implications beneficial to pedagogical contexts, especially the ones in which EFL learners and teachers are involved.

This study sought to investigate vocabulary size as one of the issues believed to be involved in the reading process. The high correlation found in this study between vocabulary size and reading comprehension clearly corroborates the argument by Pressley (2000), who contends that instruction on developing reading comprehension should put word-level competencies in priority and then focus on activation of background knowledge and use of reading strategies. This means that L2 teachers will be better off if they consider the results of this study as a starting point from which to pay due attention to vocabulary size of their students.

One of the issues sadly institutionalized in the way some L2 teachers approach reading is that vocabulary is oftentimes ignored and students are continually asked to guess words as they run into them. This chronic attitude has led to the impoverishment of L2 learners' vocabulary size, which in effect has given rise to learners' difficulty in comprehending texts. As this attitude turns into a habit for students, their tendency to add up to their vocabulary subsides leaving them with a very poor vocabulary size. Entering colleges and universities later necessitates having the capability to comprehend reading passages. Now the flare-up of troubles is when, as White et al. (1990) assert, vocabulary problems of students who enter university with poor or limited word knowledge only worsen over time.

Given the impact of vocabulary size on reading comprehension, vocabulary size should receive much more attention in L2 classrooms. To do so, teachers can use materials including graded readers, word lists, vocabulary cards, definitions, and all pedagogically sound vocabulary activities to expand EFL learners' vocabulary size to assist their reading comprehension. Teachers are also recommended to develop extensive reading skills. This can be accomplished through incorporating graded readers series likely to lead to vocabulary expansion in an organized way. Graded readers, if practiced consistently to level 6, raise L2 learners' vocabulary size up to 3000, which is what most vocabulary researchers including Read (2000), Nation (2001), and Stahl (2003) believe to ensure effective comprehension of texts. Thus, reading teachers should educate their students about the role of extensive reading and assign large and balanced amounts of outside reading materials. Using incentives like extra credits, reading teachers can make sure that assigned materials are read in their entirety. It is widely believed that incorporating graded readers in the EFL curriculum will satisfy two important

instructional objectives: expanding vocabulary knowledge, and providing opportunities for extensive reading.

Since the results of this study have shown a high correlation of $r = .84$ between vocabulary size and reading comprehension, closely conforming to Qian's (1999) likewise research with $r = .82$, both having TOEFL reading comprehension as their test, it could have another implication for those who teach TOEFL courses to consider the role of vocabulary more than before.

As for materials writers, they are recommended to pay more attention to word power sections in designing their textbook and find more fascinating ways to acquaint learners with new words.

As the final word for this section, doing all the above-mentioned tips requires that educators and materials writers implement changes in classroom teaching, curriculum design, assessments, and educational policies. Only then can we claim that we have attained what we have intended.

Obviously, no research effort is exhaustive in and of itself, and further research is needed to confirm, validate, and expand upon its results. The participants of the current study were adult, intermediate learners studying English at university; replications should be made using participants of diverse age groups and proficiency levels studying different majors. The same basic design could also be carried out using tests of other versions and even learners of other languages.

The significant effect of vocabulary size on reading comprehension found in the current study calls for a more comprehensive investigation of the reasons behind. Such investigations may also help educators understand some of the major causes behind the poor reading habits of many EFL learners.

Future research should also consider carrying out other studies exploring the effects of vocabulary size on other language skills. In addition, gender differences seem to be another virgin area to be investigated in relation to vocabulary size.

Another suggestion to offer is that more quantitative vocabulary studies are needed to evaluate the vocabulary size of English graduates. Such investigations will help EFL teachers and materials writers at the university level to provide their students with tools they need to succeed in their future career as English teachers, translators, or whatever future job they may take on.

References

- Adams, Marylin. 2004.** "Modelling Connections between Word Recognition and Reading." In *Theoretical Models and Processes of Reading*, eds. Robert B. Ruddell and Norman J. Unrau, 1219- 1243. Newark, DE: International Reading Association.
- Alderson, Charles. 2000.** *Assessing Reading*. Cambridge: Cambridge University Press.
- Bernhardt, Elizabeth. 2005.** "Progress and Procrastination in Second Language Reading" *Annual Review of Applied Linguistics* 25: 133-150.

- Coady, James, Magoto, Jeff, Hubbard, Philip, Graney, John, and Mokhtari, Kouider. 1993.** "High frequency vocabulary and reading proficiency in ESL readers." In *Second Language Reading and Vocabulary Acquisition*, eds. Thomas Huckin, Margot Haynes, and James Coady, 289-298. Norwood, NJ: Albex.
- Curtis, Mary 1987.** "Vocabulary Testing and Instruction." In *The Nature of Vocabulary Acquisition*, eds. Margaret G. McKeown and Mary E. Curtis, 37-51. Hillside, NJ: Lawrence Erlbaum.
- Day, Richard, and Bamford, Julian. 1998.** *Extensive Reading in the Second Language Classroom*. Cambridge: Cambridge University Press.
- Fukkink, Ruben, Hulstijn, Jan, and Simis, Annegien. 2005.** "Does Training of Second-language Word Recognition Skills Affect Reading Comprehension? An Experimental Study." *Modern Language Journal* 89: 54-75.
- Garcia, Georgia 1991.** "Factors Influencing the English Reading Test Performance of Spanish Speaking Hispanic Students." *Reading Research Quarterly* 26: 371-392.
- Grabe, William, and Stoller, Fredericka. 2002.** *Teaching and Researching Reading*. London: Pearson Longman.
- Just, Marcel, and Carpenter, Patricia. 1987.** *The Psychology of Reading and Language Comprehension*. Boston, MA: Allyn & Bacon.
- Koda, Keiko. 1989.** "The effects of transferred vocabulary knowledge on the development of L2 reading proficiency." *Foreign Language Annals* 22: 529-540.
- Koda, Keiko. 1994.** "Second Language Reading Research: Problems and Possibilities." *Applied Psycholinguistics* 15: 1-28.
- Koda, Keiko 2005.** *Insights into Second Language Reading: A Cross-linguistic Approach*. Cambridge: Cambridge University Press.
- Laufer, Batia. 1989.** "What Percentage of Text-lexis is Essential for Comprehension?" In *Special language: From Humans Thinking to Thinking Machines*, eds. Christer Lauren, and Marianne Nordman, 316-323. Clevedon: Multilingual Matters.
- Laufer, Batia. 1992a.** "How Much Lexis Is Necessary for Reading Comprehension?" In *Vocabulary and Applied Linguistics*, eds. Henri Bejoint, and Pierre J. Arnaud, 126-132. London: MacMillan.
- Laufer, Batia. 1992b.** "Reading in a Foreign Language: How Does L2 Lexical Knowledge Interact with the Reader's General Academic Ability?" *Journal of Research in Reading* 15: 95-103.
- Laufer, Batia. 1996.** "The Lexical Threshold of Second Language Reading Comprehension: What It Is and How It Relates to L1 Reading Ability." In

Approaches to Second Language Acquisition, eds. Kari Sajavaara, and C. Fairweather, 55-62. Jyväskylä: University of Jyväskylä.

Laufer, Batia. 1997. "The Lexical Plight in Second Language Reading: Words You Don't Know, Words You Think You Know, And Words You Can't Guess." In *Second Language Vocabulary Acquisition*, eds. James Coady and Thomas Huckin, 20-34. Cambridge: Cambridge University Press.

Laufer, Batia, and Yano, Yasukata 2001. "Understanding Unfamiliar Words in a Text: Do L2 Learners Understand How Much They Don't Understand?" *Reading in a Foreign Language* 13: 549-566.

Lesgold, Alan, and Perfetti, Charles. 1978. "Interactive Processes in Reading Comprehension." *Discourse Processes* 1: 323-336.

Meara, Paul. 1997. "Towards a New Approach to Modeling Vocabulary Acquisition." In *Vocabulary: Description, Acquisition and Pedagogy*, eds. Norbert Schmitt and Michael McCarthy, 109-121. Cambridge: Cambridge University Press.

Meara. P., and Jones, G. 1989. *Eurocentres Vocabulary Test 10 KA*. Zurich: Eurocentres.

Nagy, William E. 1988. "Teaching vocabulary to improve reading comprehension." ERIC Document Reproduction Service No. ED 298471.

Nagy, William E., Herman, Patricia. A., and Anderson, Richard. C. 1985. "Learning Words from Context." *Reading Research Quarterly* 20: 223-253.

Nassaji, Hossein. 2003. L2 Vocabulary Learning from Context: Strategies, Knowledge Sources, and Their Relationship with Success in L2 Lexical Inferencing. *TESOL Quarterly* 37: 645-670.

Nation, Paul. 1983. "Testing and Teaching Vocabulary." *Guidelines* 5: 12-25.

Nation, Paul. 1990. *Teaching and Learning Vocabulary*. New York: Newbury House.

Nation, Paul. 2001. *Learning Vocabulary in Another Language*. Cambridge: Cambridge University Press.

Nelson-Herber, Joan. 1986. "Expanding and refining vocabulary in content areas." *Journal of Reading* 29: 626-633.

Pressley, Michael. 2000. "What Should Comprehension Instruction Be the Instruction of?" In *Handbook of Reading Research* (Vol. 3), eds. Michael L. Kamil, Peter B. Mosenthal, David Pearson, and Rebecca Barr, 545-561. Mahwah, NJ: Lawrence Erlbaum.

- Qian, David. 1999.** “Assessing the Roles of Depth and Breadth of Vocabulary Knowledge in Reading Comprehension.” *Canadian Modern Language Review* 56: 282-238.
- Qian, David. 2002.** “Investigating the Relationship between Vocabulary Knowledge and Academic Reading Performance: An Assessment Perspective.” *Language Learning* 52: 513-536.
- Read, John. 2000.** *Assessing Vocabulary*. Cambridge: Cambridge University Press.
- Segalowitz, Norman, Poulsen, Catherine, and Komoda, Melvin 1991.** “Lower-level Components of Reading Skill in Higher-level Bilinguals: Implications for Reading Instruction.” *AILA Review* 8: 15-30.
- Stahl, Stevens. 2003.** “Vocabulary and Readability: How Knowing Word Meanings Affects Comprehension.” *Topics in Language Disorders* 23: 241-247.
- Zhang, Lawrence 2000.** “Metacognition in L2 Reading Literacy Acquisition: The Case of Ten Chinese Students Learning to Read EFL.” In *English in Southeast Asia '99: Developing Multiliteracies*, ed. Adam Brown, 83-96. Singapore: Nanyang Technological University.
- Zhang, Lawrence. 2002a.** “Exploring EFL Reading as a Metacognitive Experience: Reader Awareness and Reading Performance.” *Asian Journal of English Language Teaching* 12: 65-90.
- Zhang, Lawrence. 2002b.** “Metamorphological Awareness and EFL Students’ Memory, Retention, and Retrieval of English Adjectival Lexicons.” *Perceptual and Motor Skills* 95: 934-44.