Jordan Journal of Modern Languages and Literatures Vol.15, No. 1, 2023, pp 327-345

JJMLL

Examining the Role of Breadth and Depth of Vocabulary Knowledge in Reading Comprehension of English Language Learners

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Received on: 22-6-2021 **Accepted on: 12-9-2021**

Abstract

This study explored the effect of English language learners' breadth and depth of vocabulary knowledge on their understanding and grades of reading English texts. Sixty-one Jordanian EFL undergraduates were assigned three tests, which were the Vocabulary Levels Test Version 2 (VLT), the Word Associates Test (WAT), and Academic International English Language Testing System (IELTS). The collected data was analysed utilizing Pearson correlation analysis and multiple linear regression. According to the empirical outcomes, breadth and depth of vocabulary knowledge correlated positively with each other and with reading comprehension. Further, the significant predictor of the overall variance of reading comprehension was vocabulary depth, while the breadth of vocabulary knowledge was the less significant one. The results demonstrate the importance of expanding and deepening EFL learners' vocabulary knowledge in classrooms.

Keywords: Vocabulary Depth, Vocabulary Breadth, Depth of Vocabulary Knowledge, Vocabulary Levels Test, Reading Comprehension.

1. Introduction

The lexicon has been commonly acknowledged to anticipate language learners' use and development, including proficiency (see Nation 2013; Uchihara and Clenton 2020; Wang-Taylor and Milton 2019). Besides, vocabulary testing provides a valuable function for analytical and testing purposes determined from the notion that knowledge of vocabulary language can predict language proficiency (Fitzpatrick and Clenton 2017; Nation 2013; Milton and Fitzpatrick 2013). Several empirical studies have investigated relationships between vocabulary assessments and L2 four skills, reading, listening, writing, and speaking (e.g., Milton, Wade, and Hopkins 2010; Qian 2002; Uchihara and Clenton 2020; Wang-Taylor and Milton 2019).

Further, vocabulary knowledge in foreign/second language contexts promotes learners' achievement in decoding various contextual information when reading texts or listening to others and their success in encoding their spoken and written communication. Therefore, vocabulary knowledge affects the overall performance of language learners, which sequentially impacts their success in school and at the workplace (Vermeer 2001, 221). Nation (2001, 36-37) contends that foreign or second language learners

* Doi: https://doi.org/ 10.47012/jjmll.15.1.17
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sometimes experience obstacles in expressing their intended meanings due to inadequate lexical knowledge. Vocabulary researchers agree that learning lexical items involve word knowledge that includes a set of features such as graphemic, phonemic, morphemic, semantic, syntactic, and collocational features (e.g., Nation 2001; Schmitt 2010; Read 2000; Wesche and Paribakht 1996). On the other hand, others describe lexical competence as having a wide range of lexical knowledge that is both receptive and productive (Henriksen 1999, 313). The taxonomy of word knowledge by Nation (2001, 573-574) includes form, meaning, and use, which conveys considerable resemblance to the term lexical knowledge in Perfetti's (2007, 380) hypothesis of the lexical quality. Lexical knowledge denotes the amount of learner's knowledge of a specific word that demonstrates its form, meaning, and the acquaintance of its pragmatic features.

Researchers generally agree that vocabulary awareness is an essential explicit element in reading comprehension as skilled reading requires good knowledge of vocabulary as indicated by the Lexical Quality Hypothesis (Perfetti 2007, 358) and the instrumentalist hypothesis (Anderson and Freebody 1981, 81). As Alderson (2000, 99) states, "vocabulary plays a very important role in reading tests, … and reading research has consistently found a word knowledge factor on which vocabulary knowledge loads highly" a significant amount of research has been performed in the field of reading assessment considering vocabulary knowledge as a vital aspect in reading. Numerous empirical studies have determined the affect L1 and L2 reading comprehension by the crucial part of word knowledge (i.e., Anderson and Freebody 1981; Bernhardt 2011; Beck et al. 2013; Laufer 1992; Nation 2001; Qian 1999, 2002; Read 2000). Nevertheless, many studies only measured a single dimension of vocabulary rather than the multidimensional construct of vocabulary knowledge (Kieffer and Lesaux 2008, 784).

Researchers formulated distinctive concepts from different perceptions due to the combined multi-dimensional structure of word knowledge (see Anderson and Freebody 1981; Meara 1996; Nation 2013, 2001; Qian 2002; Read 2000; Schmitt, 2014; Vermeer 2001). The concept of breadth and depth of vocabulary knowledge, developed by Anderson and Freebody's (1981, 93) (Ehsanzadeh 2012; Qian 1999, 2002; Read 1993; Vermeer 2001; Wesche and Paribakht 1996), is one of the most well-known concepts of vocabulary knowledge. As stated by Nation (2001, 573), another term to refer to the depth of vocabulary knowledge is vocabulary size. Anderson and Freebody (1981: 93) define it "the number of words for which the person knows at least some of the significant aspects of meaning knowledge." Vocabulary breadth is essential for language learners to achieve the requisite level of lexical coverage for reading skills (Schmitt et al. 2011, 40). In contrast, vocabulary depth knowledge maintained by Anderson and Freebody (1981: 93) is "the quality or depth of understanding" and insinuates how well a learner knows the meanings of words (Ehsanzadeh 2012, 28; Qian 2002, 515). Vocabulary researchers have developed several concepts about vocabulary depth as it is a wide-ranging and diverse concept that cannot be measured by one test (Nation 2001; Qian 2002; Read 1993; Schmitt 2014). Qian (1999, 2002, 514) and Read (2004, 211) propose that several properties accommodate depth vocabulary knowledge are orthographic, phonological, morphological, syntactic, semantic, pragmatic, and collocational properties. The depth of vocabulary within this framework is apparent to include word association and

morphological awareness. Knowledge of word association is one of the various vocabulary depth components that assess the understanding of the specific connection that occurs among lexes. Collocation is the best illustration of word association, or words that appear together in texts.

1.1 Statement of the problem

The study aims to investigate the relationship between vocabulary knowledge and reading comprehension of English as a Foreign Language (EFL) learners and empirically explore the role of depth and breadth of vocabulary knowledge play in this relationship.

1.2. The significance of the study

The present study intends to fill the gap in reading literature caused by the lack of empirical studies on the correlation between vocabulary knowledge and reading comprehension in Jordanian students studying English as a Foreign Language (EFL).

2. Literature review

Reading comprehension involves the ability to efficiently recognize words, understand the meanings of sentences, use different metacognitive reading strategies, and deal with texts fluently over time (Grabe 2009, 59). Vocabulary knowledge is one of the variables connected with comprehending a written text. Language learners with sufficient vocabulary knowledge can meet the language requirements of reading comprehension (Stæhr 2008, 148 -149; Schmitt et al. 2011, 38-39). According to Laufer (1992, 130) and Qian (1999; 2002, 520), one of the major obstacles that hinders successful EFL/ESL reading comprehension is the dearth of appropriate vocabulary. As implied by Schmitt (2008, 331), a foreign or second language learner does not need to be hindered by unfamiliar vocabulary; 8,000-9,000 word families are needed to achieve an understanding of diversified authenticated content. Likewise, Horwitz (1988, 283) maintains that a significant percentage of language learners agree that the most important aspect of learning a foreign or second language is learning the vocabulary. The connection between vocabulary knowledge and reading comprehension has been the subject of a significant body of L1 and L2 research (see Anderson and Freebody 1981; Biemiller and Boote 2006; Beck et al. 2013; Laufer, 1992, 1996; Mezynski 1983; Qian 1999, 2002; Schmitt et al. 2011; Vermeer 2001).

The breadth and depth of vocabulary knowledge are interrelated empirically and conceptually, despite their different definitions. The significant correlations signify that breadth and depth are two connected aspects of vocabulary knowledge that contribute to one another as they are developed through prolonged language exposure (Read 2004, 222). Various empirical studies have found correlations between vocabulary depth and breadth. For instance, Schmitt and Meara (1997, 24-33) examined the connection between depth and breadth of vocabulary knowledge in a sample of 88 Japanese young adults studying English. They concluded that a significant correlation existed between the learners' vocabulary sizes at various levels and their knowledge of suffixes and word association. They concluded that there was a strong correlation between the learners' vocabulary sizes at different levels and their suffix and

word association knowledge. For productive knowledge ($r = .62$, $p < .05$) and receptive knowledge ($r = .61$, $p < .05$), the correlations between vocabulary size (vocabulary breadth) and word association (vocabulary depth) were moderately high. Another study by Vermeer (2001, 224-232) investigated Dutch monolingual and bilingual kindergarteners. It was reported that the correlation between vocabulary breadth and depth was 0.85 for Dutch monolingual kindergarteners and 0.76 for Dutch bilingual kindergarteners.

In research on the relationship between vocabulary knowledge and reading comprehension, more emphasis has been placed on vocabulary breadth than on vocabulary depth. Counting how many lexical items a learner recognizes (vocabulary breadth) might seem uncomplicated, whereas detecting vocabulary depth is challenging. Some researchers have chosen the breadth measure of vocabulary due to the difficulty in defining the depth construct. They also emphasized that lexical knowledge is considered necessary for reading as receptive knowledge in preference to productive knowledge insofar as learners merely want to comprehend what words mean in a given text (e.g., Ehsanzadeh 2012; Laufer and Aviad-Levitzk 2017; Nation 2006; Nguyen and Nation 2011).

Qian (1999, 285-302) investigated the connection between the breadth and depth of 80 Canadian ESL undergraduates' vocabulary knowledge in light of these circumstances. The Word Association Test (WAT), the Reading Test (TOEFL), and the Vocabulary Level Test (VLT) were the tools used to gauge vocabulary depth. He concluded that there was a strong correlation between the subjects' results on the three tests, $r = .78$-$.82$. Furthermore, when predicting reading comprehension, the depth of vocabulary knowledge measure explained 11% more variance than the breadth of vocabulary knowledge (3%). Vocabulary knowledge in both of its facets predicts reading comprehension in ESL.

Likewise, Qian (2002, 520-534) conducted a study to evaluate the importance of Depth of Vocabulary Knowledge (DVK) besides investigating the role of breadth and depth vocabulary knowledge in reading comprehension. 217 ESL university students who spoke 19 different languages served as the subjects. His findings indicated strong correlations between TOEFL reading, the VLT (breadth test), and the DVK (depth test), ranging from $r = .68$ to $r = .82$. Additionally, the DVK test found that the depth component explained 13% more variance in reading comprehension than the breadth component (8%). According to both of Qian's studies, the depth of vocabulary knowledge made a unique contribution to reading comprehension, and both pieces of knowledge were informative in predicting ESL reading comprehension.

Results from Rashidi and Khosravi's (2010, 89), Mehrpour et al.'s (2011, 98-101), and Li and Kirby's (2015, 21) studies supported the findings of Qian's (1999, 2002); found that both the breadth and depth aspects of vocabulary knowledge intercorrelated significantly with the reading scores and that the depth of vocabulary knowledge contributed more than the breadth of vocabulary knowledge.

3. Objectives of the study

The current study had two objectives: (a) to investigate the relationship between the depth and breadth of vocabulary knowledge of English language learners and their reading comprehension, and (b)

to investigate the respective contributions of the two vocabulary dimensions on the prediction of reading comprehension scores.

4. Research questions

The following research questions were the focus of this study:

1. What relationships exist between EFL students' scores on reading comprehension, vocabulary depth, and vocabulary breadth?
2. How do the depth and breadth of vocabulary knowledge scores affect the prediction of reading comprehension scores for EFL learners?

5. Method

5.1. Participants of the study

The participants of the current study were 61 first- and second-year students from various higher education institutions in the Jordanian province of Amman. They had all studied the English Language 1 during the first semester in their universities, equivalent to the Common European Framework of Reference's upper-intermediate, B2. The sample of the participants included 38 females and 23 males, which had a 17–21 age range and an average age of 18.64 years. Their first language is Arabic, and they have spent roughly 12 years in primary and secondary school in the same educational system where English is taught as a foreign language (FL). The study was performed according to the institutions' ethical standards, and participation was voluntary.

5.2. Instruments

Three quantitative instruments were utilized to collect data for the current study: the Vocabulary Level Test (VLT), the Word Association Test (WAT), and the Comprehension Test (RC).

5..2.1. The Vocabulary Levels Test (VLT)

The Vocabulary Levels Test (VLT) Version 2 by (Schmitt et al. 2001) was the first test instrument used to gauge the participants' vocabulary size. The VLT measures the breadth of the participants' vocabulary knowledge, which is the vocabulary size of learners. The required written receptive vocabulary for reading is measured by the VLT (See Nation 2008; Mehrpour et al. 2011; Schmitt et al. 2001; Rashidi and Khosravi 2010; Read 2000; Uchihara et al. 2020). It assesses the vocabulary of ESL/EFL learners using the Academic Word List (AWL) and four English word family frequency levels (2,000, 3,000, 5,000, and 10,000). It can be found at www.norbertschmitt.co.uk, Norbert Schmitt's website. Each level of the VLT is composed of 30 items with multiple-word definitions; test takers must write the correct word's number next to its definition. This format lessens the likelihood of guessing by grouping the items into ten groups of three each, with six answer options that must be matched with three definitions. According to Schmitt (2010, 385), the choices are words rather than definitions because the test asks candidates to identify the form rather than the meaning. The highest score is 150 points because

each correct word match receives a score of one. From the Vocabulary Levels Test (VLT) (Schmitt et al. 2001), the example below is taken.

2,000 Level

1. birth
2. dust
3. operation -----5----- game
4. row -----6----- winning
5. sport -----1------ being born
6. victory

The reliability coefficient of the VLT is in the range of 0.91 to 0.96, as stated by Schmitt et al. (2001, 71-77), and Read (2000, 121-123) reported that Cronbach's alpha values were in the range of 0.84 to 0.95.

4.2.2. Word Association Test (WAT)

The Word Association Test (WAT), created by (Read 1993, 1998) and developed by Qian (2002), served as the second testing tool. The depth of vocabulary knowledge (DVK); required for reading comprehension, is measured by WAT in its receptive component (Mochizuki 2012, 47). Test questions assess candidates 'knowledge of the tested words' paradigmatic (synonyms) and syntagmatic (collocational) usage. The format of Read (1998), available from the website of Tom Cobb (https://www.lextutor.ca/tests/wat/), served as the basis for the WAT test used in this study. The WAT consists of 40 vocabulary items. For each item, the examinees must choose four correct associates from a list of four possible synonyms for one aspect or the entire meaning of the stimulus word in one box. The accepted response may contain one synonym and three collocates, two synonyms and two collocates, three synonyms and one collocate, or any other combination. Such a test design feature lowers the possibility of guessing (Zhang and Koda 2017, 12). For purposes of scoring, each correct response earns one point, resulting in a maximum test score of 160. Below is a format example taken from Read (1998:46). Possible synonyms and collocate options for the word *sudden* are shown in the boxes on the left and right, respectively. Correct responses are bolded.

Sudden

beautiful quick surprising thirsty	**change doctor noise school**

According to Batty (2012, 74), the WAT's Cronbach alpha coefficient was (α= 0.89), and Qian (2002, 528) reported that the test's reliability coefficient was (α= 0.88). Furthermore, Mochizuki (2012, 73) and Qian (2002, 529-530) noted that the VLT and WAT results significantly correlated, indicating that a large portion of the variance was shared by the two tests.

5.2.3. Reading Comprehension Test (RC)

The final testing tool used in this study was a reading comprehension test. The test was a modified version of academic IELTS 15, created by the Cambridge University Press, which consists of 40

questions and awards one point for each correct response. The three lengthy texts were included in the test, ranging in genre from factual to discursive to descriptive. Matching headings, giving succinct answers to open-ended questions, multiple-choice questions, sentence completion based on the provided texts, and matching information were among the task types that participants had to complete.

6. Procedure

The three tests were piloted with 12 participants from outside the study's sample to highlight any potential difficulties the participants might face and to ensure they could comprehend the tests. The Cronbach–Alpha (α) value was applied to the data to determine the reliability coefficient of the three tests' results. The reliability of the VLT was 0.903 (α = 0.903), the reliability of the WAT was 0.851(α= 0.851), and the reliability of the RC was 0.829 (α= 0.829), indicating that all of the tests were internally consistent. As a result, the testing methods in this study proved to be valid, reliable, and appropriate. The data collection sessions for the study were given to students during their English Language II classes. Data collection took place over the course of two hours and fifty minutes. The participants took the VLT and WAT tests in the subsequent session after finishing the RC test. Additionally, a background survey was given to the participants to gather demographic data about them, such as their age, L1, year of study, and major at the start of the first session.

6.1. Data analysis

The data from this study were analysed using a quantitative approach. The collected data were statistically analysed using SPSS Version 25 (Statistical Package for Social Sciences). First, the results of the three tests (VLT, WAT, and RC), which the participants had to perform, were described using descriptive statistics. The results of the participants' scores on the VLT, WAT, and RC were then intercorrelated using two-tailed Pearson correlations. The first research question was addressed using Pearson correlation analysis. The three variables are the VLT, WAT, and RC scores. Finally, exact multiple regression analysis was executed to identify the more effective predictor of RC from the two variables (VLT and WAT) in order to address the second research question. Using the participants' scores on VLT and WAT (independent variables) as a starting point, multiple regression analyses were primarily used to predict the participants' scores on the RC (dependent variable).

7. Results

7.1. Descriptive statistics of participants' performance on VLT, WAT, and RC tests

The participants' results performance on the VLT, WAT, and RC tests are analysed using descriptive statistics, as shown in Table 1. The figures also show the maximum possible scores in addition to the means, standard deviations, and ranges of the score on the three tests.

Table 1: Descriptive Statistics of the Participants' VLT, WAT, and RC Tests (*N=61)*

Test	MPS*	$\bar{x}$	SD	Range Score
VLT	150	78.61	18.77	68-134
WAT	160	91.86	17.85	37-149
RC	40	23.08	11.51	12-37

*Maximum Possible Score

According to Table 1, the lowest score on the VLT was 68, on the WAT was 37, and on the RC was 12. While the mean score on the RC test was ($\bar{x}$ = 23.08), the mean score on the WAT was higher ($\bar{x}$ = 91.86) than the mean score on the VLT ($\bar{x}$ = 78.61). Before identifying any potential relationships between the three variables (i.e., breadth of vocabulary knowledge, depth of vocabulary knowledge, and reading comprehension), preliminary analyses were carried out to ensure no violation of the assumptions of normality, linearity, and homoscedasticity. Pearson correlation analysis was performed to do this.

6.2. Correlation between vocabulary depth, breadth, and reading comprehension, (Research Question 1)

The first research question, to determine the relationship between breadth and depth of vocabulary knowledge with reading comprehension, was addressed by the results of the two-tailed Pearson correlations analysis. The findings of the two-tailed Pearson correlations analysis for the three variables VLT, WAT, and RC are shown in Table 2.

Table 2: Two-Tailed Pearson Correlations of RC, VLT and WAT Scores (*N=61*)

Test		RC	VLT
RC[1]	Pearson Correlation	1	.491**
	Sig. (2-tailed)		.000
VLT[2]	Pearson Correlation	.491**	1
	Sig. (2-tailed)	.000	
WAT[3]	Pearson Correlation	.510**	.539**
	Sig. (2-tailed)	.000	.000

**. Correlation is significant at the 0.01 level (2-tailed); 1. Reading comprehension test, 2. Breadth of vocabulary knowledge test, 3. Depth of vocabulary knowledge test.

Reading comprehension (RC), breadth vocabulary knowledge (VLT), and depth vocabulary knowledge (WAT) scores showed positive intercorrelations, which were all statistically significant, as shown in Table 2's two-tailed Pearson correlation analyses. The VLT and RC had a moderately positive correlation coefficient ($r = .491$, $p < .01$). The medium correlation between WAT and RC was also discovered to be present ($r = .510$, $p < .01$). Similar to this, there was a significant positive correlation between WAT and VLT ($r = .539$, $p < .01$). Accordingly, the moderately positive intercorrelations between the three variables were revealed by the correlational analyses. The first research question was addressed by these findings.

7.3. Reading comprehension (RC) is predicted by vocabulary knowledge (VLT) and vocabulary depth (Research Question 2)

The second research question was addressed by the results of exact multiple linear regression analysis, which confirmed that the participants' performance on the VLT and WAT was an effective indicator of RC. This test was designed to show how well reading comprehension scores could be predicted by a learner's breadth and depth of vocabulary knowledge. The reading comprehension test

(RC) was the dependent variable, and the two vocabulary knowledge tests (VLT and WAT) served as the independent variables (predictor variables). Given that WAT had a stronger correlation (r =.510, p<.01) with RC than VLT (r =.491, p<.01) with RC, as indicated in Table 2, WAT was chosen to be the first variable entered into the regression equation, followed by VLT. When the predictor variables WAT and VLT were entered into the regression equation first and second, the results are shown in Table 3. Table 4 tabulates the results of the two factors' coefficient on reading comprehension.

Table 3: Results of Multiple Linear Regression Using RC, VLT, and DVK Scores (*N=61*)

Step	Predictor variable(s)	R^2	Adjusted R^2	R^2 Change
A)				
1	WAT	.244	.231	-
2	WAT, VLT	.312	.300	0.68
B)				
1	VLT	.192	.182	-
2	VLT, WAT	.312	.300	.120

Table 4: Multiple Linear Regression Analysis with Parameter Estimates of Using the Independent Variables VLT and WAT

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	CI
		B	Std. Error	Beta			
1	(Constant)	-4.028	2.682		-1.361	.139	-2.523 4.621
	VLT	.273	.101	.278	3.027	.002	3.914 7.273
	WAT	.368	.020	.311	3.810	.000	4.977 6.282

a. Dependent Variable: Reading comprehension

The multiple linear regression analysis findings are shown in Table 3, which features a significant regression equation. It signifies that the dependent variable RC is significantly correlated with the linear combination of the independent variables VLT and WAT (F (1,95) =19.134, p<.000, CI 4.977 6.282). In particular, it was found that VLT and WAT demonstrated a significant amount of RC variance. Figures for the predictors (VLT and WAT) were entered into the analysis in accordance with the enter method used in the regression equation, as shown in Table 3, as previously mentioned.

When WAT was entered first into the regression equation, as shown in the first section of Table 3 (marked A), the coefficient of determination or R^2 value and the adjusted R^2 value were, respectively,.244 and.231. The fact that WAT has a value of.244 indicates that WAT alone increased the explained variance in the dependent variable RC by a statistically significant 24.4%. The adjusted R^2 demonstrated a 23.7% increase in the RC's explained variance when WAT was considered along with other variables. The R^2 value changed to.312 with a change of 0.68 when VLT was added second to the regression equation while WAT remained in the equation. Consequently, the addition of VLT altered the size of R^2 to 0.68, demonstrating a statistically significant addition of 6.8% of the reading comprehension explained

variance to the 24.4% variance provided by WAT. Later, the adjusted R^2 value changed to.300. VLT and WAT, the two predictor variables, accounted for 31.2% of the RC's explained variance.

The order of entry of the predictor variables (independent variables) into the regression equation was reversed, identifying the prediction added by VLT, as indicated in the second section of Table 3 (marked B). The R^2 and the adjusted R^2 values were.192 and.182 when VLT was entered on the first step, respectively. In this situation, VLT alone increased the explained variance in RC by 19.2%. The R^2 value enhanced to.312 after adding WAT to the regression equation in the second step, and the adjusted R^2 value decreased to.300.

A statistically significant increase of 12% of the explained variance in RC over and above the 19.2% variance provided by VLT is shown by the addition of WAT, which changed the size of R^2 to.120. When the results of these two analyses were compared using a reversed order, the findings indicated that WAT contributed significantly more variance (19.2%) to predicting reading comprehension performance than VLT 6.8%. Although the two of them together predicted 31.2% of the explained variance in RC, it was confirmed that WAT was a stronger predicator of RC than VLT. The second research question was addressed by these findings.

Table 4 represents the partial regression coefficient, which indicates the value of Coefficient **B**. This number indicates the expected increase in the dependent variable (the scores of RC) when the independent variable (the scores of VLT and WAT) increased by one unit. Table 4 shows the independent variable VLT had; the coefficient was.273. Therefore, if all other variables remained constant, a one-unit increase in VLT resulted in a.273 unit increase in the scores of RC. In addition, WAT had a coefficient of.368 while all the other variables remained constant, indicating that an increase in WAT will increase in RC scores of.368 units.

8. Discussion

The current study examines the contribution of vocabulary knowledge to reading comprehension among EFL learners. Regarding this goal, two research questions were addressed in this study. The first research question focused on the relationship between reading comprehension scores and the breadth and depth of vocabulary knowledge scores. The second research question focused on

the contribution of breadth and depth of vocabulary knowledge scores to predict reading comprehension scores.

The questions of this study have been addressed in light of the statistical analysis results. The correlations analysis revealed a relationship between vocabulary of depth and breadth and reading proficiency. Reading comprehension is better correlated with vocabulary depth than with vocabulary breadth. The results of the linear regression analysis confirm this order regarding the strength of the relationships and are consistent with the correlations. The R^2 values from the linear regression show that vocabulary depth, to a lesser extent than vocabulary breadth, can predict reading comprehension performance up to 24.4%.

8.1. Research question one

Pearson correlation analysis showed a significant positive correlation between the VLT (breadth vocabulary knowledge) and WAT (depth vocabulary knowledge) scores and the RC (reading comprehension) scores. The instrumentalist hypothesis put forth by Anderson and Freebody (1981, 110) that vocabulary knowledge is a fundamental determinant of reading comprehension is supported by this finding, which implied a significant relationship between vocabulary knowledge and reading comprehension.

The findings of other studies conducted in various contexts (See Anjomshoa and Zamanian 2014; Ehsanzadeh 2012; Qian 1999, 2002; Quellette 2006) are consistent with this study. Scores of VLT were moderately related to scores of RC with this established relationship ($r = .491$, $p < .01$). Similar to scores of RC, scores of WAT had a moderate correlation size ($r = .510$, $p < .01$). It is apparent that the relationship between WAT and RC is marginally better than that between VLT and RC

($r = .51$ vs. 49). This correlation indicates that the relationship between vocabulary depth and reading comprehension is stronger for depth than for breadth of vocabulary knowledge. This finding, which emphasized the importance of the breadth and depth of vocabulary knowledge for reading comprehension among EFL/ESL university and school students, appeared to be similar to the findings from other studies in different settings, including those by Mehrpour et al. (2011), Rashidi and Khosravi (2010), Şen and Kuleli (2015), and Tavanpour and Biria (2017).

A moderate correlation ($r = .491$, $p < .01$) between reading comprehension and VLT was discovered, concerning the relationship between the two. This result is in line with the ($r = 0.566$, $p. < .01$) correlation values between VLT and reading comprehension in Miralpeix and Muñoz's study (2018, 13). Comparing the two correlation coefficients, the correlation obtained in this study is slightly weaker than the correlation coefficient found in the study of Miralpeix and Muñoz (2018). The findings of correlation found in this study between RC and VLT is lower than the results of earlier studies such as Qian (2002, 529), $r = .74$, Tseng and Schmitt (2008, 373), $r = .71$, and Milton et al. (2010, 93), $r = .68$; these values represent a relatively strong relationship between the two factors. The discrepancy in the outcomes of this study and other studies may be affected by the differences in context and students' backgrounds. Since English is one of the two official languages in Canada, along with French, where Qian's (2002, 522-523) study was conducted, one might assume that the participants already had a strong command of the language. As a result, it was discovered that vocabulary knowledge and reading comprehension have a strong relationship. Concisely, the results show a significant relationship between learners' breadth of vocabulary knowledge and reading comprehension, despite differences in the strength of correlation discovered between the studies.

In this study, WAT and RC also showed a moderate correlation coefficient ($r = .510$, $p < .01$). The outcome is lower than that of studies by Mehrpour et al. (2011, 116), $r = .74$, Qian (2002, 529),

$r = .77$, and Şen and Kuleli (2015, 555), $r = .81$, and others that used the same DVK test. The three studies showed values that vary from high to relatively high between the two factors ($r = .81$,

respectively). The difference in results can be attributed to the participants in the current study being exposed to less diverse language input than those in other contexts. Despite the slight differences in values between the four studies, the significant correlation realized in these studies reinforced the claim that learners' scores on the depth of their vocabulary knowledge are correlated with how well they read.

8.2. Research question two

Regarding the interrelatedness of breadth and depth of vocabulary knowledge, a significant positive correlation (.539, $p < .01$) was obtained between the two dimensions. This result proposes that the two components of vocabulary knowledge are interrelated and interdependent, which corresponds to previous studies (e.g., Qian 1999, 2002; Schmitt and Meara 1997; Vermeer 2001; Zhang 2012).

This outcome signifies that language learners with more in-depth word knowledge would link more lexicons together to increase their vocabulary size. They are also likely to be able to obtain more broad lexical networks to enhance their vocabulary depth. The partial construct partially overlaps with the two measures and explains the positive correlation between VLT and WAT. Primary meanings of words can occasionally be included in the knowledge of synonymy and can influence collocation, even though the depth of vocabulary knowledge tests investigates deeper aspects of words more than the breadth of vocabulary knowledge tests (Schmitt 2014, 914-920). Both dimensions develop as a result of repeated exposure to the target language.

The multiple linear regression analysis results revealed a significant overlapping variance between the VLT and WAT, which helped predict reading comprehension performance. Together, the two elements of vocabulary components accounted for 31.2% of the variance in RC. This finding implies that the depth and breadth of vocabulary knowledge predict reading comprehension performance. This outcome corroborates Perfetti's (2007, 372-375) lexical quality hypothesis and Anderson and Freebody's (1981, 110) instrumentalist hypothesis. Nevertheless, the impact of these two dimensions on reading comprehension scores varies.

Additionally, the results revealed that depth of vocabulary knowledge (24.4% vs. 19.2%) was a significantly stronger predictor of RC than the breadth of vocabulary knowledge. The results of earlier studies in this field (e.g., Mehrpour et al. 2011; Qian 2002; Quellette 2006; Rahman and Iqbal 2019; Şen and Kuleli 2015) are consistent with this one. These studies concluded that, although there was a significant overlap in the variance between the two dimensions of word knowledge that affected reading comprehension prediction, depth was a stronger predictor of reading comprehension than breadth.

The present study's findings, however, contradict those of other researchers, including those of Tannenbaum et al. (2006, 390-394) and Ouellette and Beers (2010, 199-204, who found that breadth of vocabulary knowledge accounted for a more share of the variance in reading comprehension than depth vocabulary knowledge.

The main point is that the two dimensions of vocabulary knowledge can be viewed as roughly equivalent in predicting reading comprehension, regardless of whether breadth or depth of vocabulary knowledge proves to be the strongest predictor in these studies. Yet, it is worthy of mentioning other elements that can influence reading comprehension with vocabulary knowledge. For instance, increasing

language learners' motivation and promoting reading across the curriculum rather than just in formal reading classes affects how well reading comprehension performance is predicted (Van Stade and Bosker 2014, 6-7). Besides, employing metacognitive reading strategies by students is essential, as their use of planning and monitoring strategies and skills of reading comprehension will undoubtedly predict their reading literacy achievement (Rabadi et al. 2020, 244). Another factor that influences the reading ability of language learners is their morphological awareness because it involves the recognition of lexical meaning (Rabadi 2019, 44).

9. Conclusion and implications

The study examined the intercorrelations between reading comprehension, depth vocabulary knowledge (word knowledge at paradigmatic and syntagmatic levels), and vocabulary size among EFL Jordanian university students. It also examined if reading comprehension performance was better predicted by vocabulary depth or breadth.

The empirical findings revealed that reading comprehension, vocabulary breadth, and vocabulary depth had moderately positive intercorrelations. The outcomes indicated that the three variables are positively and significantly interrelated, which shows that the more words English language learners know, the deeper their vocabulary knowledge is, and the more they comprehend reading texts and become better readers.

According to the results, both the breadth and the depth of vocabulary knowledge can be considered predicators of reading comprehension performance. In addition, the depth of vocabulary knowledge was a stronger significant predicator of reading comprehension than the breadth of vocabulary knowledge.

The pedagogical implication of this study is that EFL learners can improve their proficiency and reading comprehension performance if they develop a large vocabulary and in-depth vocabulary knowledge. According to research by Anjomshoa and Zamanian **(**2014), Biemiller (2007), Laufer and Aviad-Levitzky **(**2017), Qian (1999, 2002), Ouellette (2006), and Tannenbaum et al. (2006), the breadth and depth of vocabulary are related and predict reading comprehension performance. Both vocabulary dimensions present a structure within which to reflect on vocabulary instruction. Some language instructors employ a shallow pedagogical approach to vocabulary teaching by choosing direct vocabulary teaching without aiming at deep vocabulary knowledge and have provided extensive vocabulary benefits (Biemiller 2007, 5-6; Biemiller and Boote 2006, 51-55). Conversely, other language teachers apply the deep but narrow pedagogical method in teaching vocabulary; they go beyond simply providing students with a definition of a word by forcing them to gain a thorough understanding of it (Beck et al. 2013, 12-14). As stated by Carlo et al. (2004, 203-204), studies confirmed that depth of vocabulary knowledge teaching increases vocabulary knowledge and comprehension of texts containing the learned words in the second language.

Instructors must focus on both vocabulary breadth and depth to assist students in developing their reading skills. When students recognize some words more deeply, mainly through morphology, they

explore new words to reinforce their additional breadth of vocabulary knowledge (Rabadi 2019, 45). Learners have to start with shallow knowledge about new lexical items (breadth vocabulary), but the earlier depth vocabulary is included, the better it is for students. Acquiring depth of vocabulary knowledge may be more demanding in foreign or second language learning because students lack contact with the learned language.

English foreign or second language syllabus or textbooks writers need to consider the two dimensions, depth and breadth of vocabulary, to improve learners' reading comprehension. Synonymy and polysemy of words added to the basic meanings of words have to be included in textbooks; additionally, books should present collocational relations of words.

Future studies might look into a few things that were not considered in this study, such as language skills like writing, listening, or speaking relationship with depth and breadth of vocabulary. This study focused on the impact of vocabulary breadth and depth on reading comprehension. In order to determine the effects that morphology, frequency, and register have on reading comprehension, it would be helpful to consider other factors in the study

دراسة دورعمق واتساع المعرفة بالمفردات في فهم القراءة لدى متعلمي اللغة الإنجليزيّة

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الملخص

هدفت الدراسة إلى استكشاف العلاقة بين اتساع وعمق معرفة المفردات وتأثيرها على أداء فهم القراءة لدى متعلمي اللغة الإنجليزيّة. كما بحثت في تحديد أيا من سمات معرفة المفردات - الاتساع أو العمق - في التنبؤ بنتائج فهم القراءة. تم إجراء ثلاث إختبارات لغويّة وهي اختبار مستويات المفردات واختبار توافق الكلمات واختبار لفهم القراءة الأكاديميّة في نظام اختبار اللغة الإنجليزيّة الدولي (IELTS) وتكونت عينة الدراسة من واحد وستون طالباً من الطلبة الجامعين الأردنيين ممن تعلموا اللغة الإنجليزيّة كلغة أجنبية. تم استخدام تحليل ارتباط بيرسون والانحدار الخطي المتعدد لتحليل البيانات. وقد أشارت نتائج الدراسة إلى وجود ترابط إيجابي بين اتساع وعمق معرفة المفردات مع فهم القراءة، ووجود علاقة إيجابيّة بين كل من أبعاد معرفة المفردات. وقد ساهم اتساع وعمق معرفة المفردات بنسبة معتدلة في تباين فهم القراءة. زيادة على ذلك، تم إثبات بأن عمق المفردات وليس اتساع المفردات هو المتنبئ الأقوى لفهم القراءة. وخلصت الدراسة إلى أهمية تطوير اتساع وعمق معرفة المفردات في الصفوف الدراسية لمتعلمي اللغة الإنجليزيّة كلغة أجنبيّة.

الكلمات المفتاحية: عمق المفردات، اتساع المفردات، عمق معرفة المفردات، اختبار مستويات المفردات، الفهم القرائي.

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