

Vocabulary Size and Learners' Performance across Levels of Text Comprehension: A Case of First-Year Students at the University of Dodoma

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ABSTRACT

This study examined the relationship between vocabulary size and learners' performance across the three levels of text comprehension among 230 first-year students from three programmes in the University of Dodoma (UDOM). The Vocabulary Size Test (VST) by Nation and Beglar (2007) and a Reading Test were used to answer three questions: (1) What is the vocabulary size of the sampled first-year university students at UDOM? (2) What is the performance of the sampled first-year university students across the three levels of text comprehension? (3) What is the relationship between the students' vocabulary size and their performance across the levels of text comprehension? The results showed that, on average, the students did not have adequate vocabulary size required to understand authentic texts; they had a moderate reading comprehension at the literal level while their comprehension of texts at inferential and critical levels was relatively low. The results depicted a strong positive relationship between vocabulary size and each level of text comprehension. Regression analysis indicated that vocabulary size was powerful enough to predict performance at each level of text comprehension. Therefore, it is suggested that university students should be assisted to promote their vocabulary size as the latter has an impact on text comprehension and university academic success.

Key terms: *vocabulary size, academic texts, reading comprehension, text comprehension levels, Vocabulary Size Test*

INTRODUCTION

Reading is a vital activity in academic life as it guarantees acquisition of knowledge and skills from texts. Thus, comprehension of texts is the heart of any reading activity. Consequently, it is common that scholars tend to use the term comprehension whenever explaining what reading is. For instance, Grabe (2009) asserts that “reading is centrally a comprehending process” (p.14). Ahmadi, Ismail, and Abdullah (2013) define reading comprehension as “the ability of readers to understand the surface and the hidden meanings” (p.238) while Cline, Johnstone and King (2006) define reading as a process of “decoding and understanding written texts” (p.2). Therefore, several studies (Akyol, Cakiroglu, & Kuruyer, 2014; McLean, 2014; Türkyılmaz, Can, Yildirim & Ateş, 2014) stress that, the key objective of reading is comprehension, and reading without text comprehension is useless.

In the academic context, reading is an indispensable tool that every student needs to own for academic success. Available literature (Cromley, 2009; Nyarko, Kugbey, Kofi, Cole, & Adentwi, 2018; Pretorius, 2002; Vacca, 2005) report that reading proficiency correlate significantly with academic success. For instance, in their study, Nyarko et al. (2018) report a correlation of .66 ($r(381) = .66, p < .01$) among lower primary school children in Ghana. In another study, Anggaraini (2017) investigated the relationship between reading comprehension and academic achievement among 79 students in the English education programme. The results depicted that reading comprehension contributed to academic achievement for about 5.6%, $p \text{ value} = .037 < 0.05$. Furthermore, Cromley (2009) studied the relationship between reading comprehension and proficiency in science. The result revealed that there was a strong correlation of .819 between the two variables. Likewise, Pretorius

(2002) investigated the relationship between reading skills and academic performance of undergraduate students. In his study, Pretorius found that all low achievers had a serious problem of reading comprehension. Thus, based on such research evidence, it can be concluded that the ability to read a text and infer correct messages is important for academic success. Researchers (Hamra & Syatriana, 2010; Pang, 2008; Razi & Grenfell, 2012) highlight the importance of linguistic knowledge for reading comprehension. Razi and Grenfell (2012), for example, report that weak linguistic competence was a challenge to reading comprehension among the participants of their study. In the other study, Hamra and Syatriana (2010) declare that lack of vocabulary and failure to make inference obstructed participants from comprehending texts.

Thus, Pang (2008) identifies three components of linguistics (knowledge of vocabulary, grammar and discourse) as essential for successful reading comprehension. Nevertheless, Barrot (2013) argues that in relation to other linguistic aspects, vocabulary is the primary of reading and comprehension because meaning is always carried by vocabulary. Myriad studies support Barrot's arguments by showing that vocabulary size is a good predictor of text comprehension. The study by Qian and Schedl (2004) that involved 207 students of English as a Second Language (ESL) showed that there was a correlation of 0.84 between vocabulary size and reading comprehension. The study by Huang (2006) reported the correlation of .71 between vocabulary size and reading comprehension after testing 24 ESL learners. In the other study, Mehrpour, Razmjoo and Kian (2011) reported the correlation of .717 between the two variables; while the study of Iranian ESL university students by Farvardin and Koosha (2011) depicted the correlation of .78. Despite the fact that substantial studies have

established a positive correlation between vocabulary size and reading comprehension, there are some areas which have been insufficiently examined. In particular, the correlation between vocabulary size and reading comprehension levels requires some research attention. Thus, there is a need to develop research based evidence on whether vocabulary size (Independent variable) correlates with each level of reading comprehension (dependent variable). This study makes an attempt to contribute on literature by assessing the statistical relationship between the two variables.

Literature Review

Vocabulary Size

Vocabulary size is one of the dimensions of vocabulary knowledge that refers to the number of approximated words that an individual knows, at least at the surface aspect of meaning (Qian, 2002). The term 'vocabulary size' denotes that every speaker of any language possesses a stock of words that are used when communicating. In the viewed literature, 'vocabulary size' is also referred to as the breadth of vocabulary or lexical breadth (Daller, Milton & Treffers-Daller, 2007). Researchers on this issue report that vocabulary size is a predictor of language competency and it affects individuals' language performance in all language skills (Schmitt, 2008). Further, substantial studies show that vocabulary size predicts school success (Biemiller & Boote, 2006; Bornstein & Haynes, 1998). Meara (1996) regards vocabulary size as the heart of "communicative competence" (p. 35). He declares that "All other things being equal, learners with large vocabularies are more proficient in a wide range of language skills than learners with smaller vocabularies" (p. 37). Generally, researchers in this area agree that everyone needs a satisfactory number of words to interact effectively with other users. Given the importance of

vocabulary size, several researchers have embarked on studying this aspect of language, in particular, among users of the English language (both native and non-native speakers). For instance, attempts have been made to establish the vocabulary size of native English speakers. Goulden, Nation and Read (1990), for instance, claim that on average, educated native English speakers have a vocabulary size between 15,000 and 20,000 word-families. Aitchison (2003) reports the vocabulary size of 60,000 word-families among educated monolingual speakers, while Treffers-Daller and Milton (2013) suggest that monolingual speakers of English have the vocabulary size of about 10,000 English word-families. Despite this daunting number of words reported for native speakers of English, non-native speakers need less than 10,000 word-families to use the language appropriately for different purposes (Nation, 2001).

Thus, studies that focus on determining vocabulary size among non-native speakers of English are currently common in educational programmes. These studies are important for pedagogical purposes as they inform instructors about the vocabulary level of their students, and whether, they need special programmes before being exposed to academic tasks which require a big vocabulary size (Schmitt, 2008). The fact that words differ in terms of use frequency/number of occurrences in different domains has influenced researchers to categorise English words into indefinite number of bands also known as word-families. These word families have 1,000 words each. For example, Nation and Beglar (2007) identify 14 word-families of 1,000 words each while the lexical profile at Nation's website¹ and at Cobb's website²

¹(<http://www.victoria.ac.nz/lals/staff/paul-nation/nation.aspx>)

²(<http://lextutor.ca>)

divide words in 20 word-families based on the British Nation Corpus (BNC). Thus, the first 1,000 word-family consists of words that are considered to have high frequency appearing in different domains of use, followed by the 2,000 word-family. Thus, Schmitt and Schmitt (2014) comment that the first 1,000 – 2,000 word-families are traditionally considered as high frequency word-families while from 2,001 word-families to 10,000 and beyond are referred to as low frequency word-families. It is therefore noteworthy that vocabulary size of individuals is approximated based on scores obtained from some standardized tests. Some of the commonly used tests are the Vocabulary Size Test (Nation & Beglar, 2007), the X-Lex test (Milton & Meara, 2003), and the Vocabulary Levels Test (VLT) (Nation, 1983) which was revised by Schmitt, Schmitt and Clapham (2001). Using the above tests, researchers in the field of English as a Second/Foreign Language (ESL/EFL) have established the vocabulary size of students in different educational programmes. For example, Putra (2009) reported an average of 5,388 word-families among university students in Indonesia. Nizonkiza (2005) reported 4,500 word-families among first year university students in South Africa while Huang (2006) reported 2,838 word-families among Taiwanese students.

Reading Comprehension

Different scholars have various definitions on reading comprehension. According to Klingner, Vaughn, and Boardman (2007), reading comprehension refers to a person's ability to understand what is read. Brassell and Rqsinski (2008) define the term as the ability to deduce meaning from written texts. Nunan (2006) assumes that reading comprehension refers to the process of searching for meaning while Snow and Sweet (2003) assert that

reading comprehension is the process of extracting meaning from texts. Based on the above attempts of defining the term, it can be deduced that comprehension is at the heart of any reading activity and whoever reads aims at constructing meaning from the text at hand (Durkin, 1993). Reading comprehension is a multifaceted process since its attainment depends on multiple abilities, including the reader's prior knowledge, his/her working memory, and his/her linguistic ability (vocabulary and grammatical knowledge). Other factors to consider are the ability to make inference, the effective use of strategic reading processes and the readers' ability of monitoring the flow of a text (Ntereke & Ramoroka, 2017).

Hogan, Bridges, Justice, and Cain (2011) divide these multiple abilities needed for reading comprehension into both lower and higher comprehension skills. Lower comprehension skills include linguistic knowledge, particularly grammar and vocabulary knowledge. Accordingly, lower comprehension skills provide a foundation for higher comprehension skills which are responsible for constructing the mental image of a text. As for higher comprehension skills, they include the ability to make inferences from texts and monitoring the text flow. Both the lower and higher comprehension skills are important to ensure that readers are able to attain maximum comprehension of the targeted text. However, text comprehension can be achieved at three levels (Yussof, Jamian, Hamzah, & Roslan, 2013). These include the literal, inferential and critical levels. The literal level enables a reader to understand information that is explained explicitly in the text. The inferential level is concerned with interpreting what the author wants to communicate though not explicitly explained. At the highest level of comprehension is the critical level of text

comprehension; that is an evaluative or judgemental level. It is a level of comprehension where a reader is supposed to judge some issues in the text, basing on the literal and inferential information available. At university level, students are required to have competency in all levels of reading comprehension so as to comprehend all important information from the textbooks used in each course. De-la-Peña and Luque-Rojas (2021) emphasise that it is necessary for university students to develop a critical ability of understanding texts for academic success. However, available studies (cited in De-la-Peña and Luque-Rojas, 2021) suggest that most of the students comprehend texts at the literal level compared to the two other levels (inferential and critical levels). In their study, Del Pino-Yépez, Saltos-Rodríguez and Moreira-Aguayo (2019) showed that students had an average score of 40% at the literal level, 40% at inferential level and 20% at the critical level. The study by Yáñez Botello (2013) showed that students' average scores in each level were 56.4% for the literal level, 43.5% at inferential level and 0% at the critical level. Finally, the study by Figueroa Romero, Castañeda Sánchez and Tamay Carranza (2016) depicted that the average scores of students at the literal, inferential and critical levels were 86.7%, 45.4% and 34.29% respectively. These findings suggest that there was a problem of text comprehension among students in higher learning institutions. In fact, the problem was more pronounced at both the inferential and critical levels.

Relationship between Vocabulary Size and Reading Comprehension

The prominent role that vocabulary knowledge plays to reading comprehension is without doubt acknowledged by different researchers. Several studies report that vocabulary size predicts

performance in reading and academic achievement in general (Farvardin & Koosha, 2011; Huang, 2006; Laufer & Goldstein, 2004; Nation & Meara, 2002; Qian & Schedl, 2004). In particular, there is consensus among researchers that students with large vocabulary size tend to score higher in text comprehension compared to students with low vocabulary size. For instance, Grabe and Stoller (2002) showed that the main difference between good and poor readers depends on how efficient one is in terms of lexical access and semantic processing. In this connection, it can be concluded that students who are competent in vocabulary knowledge are good at decoding and interpreting reading passages compared to their counterparts who are less competent in vocabulary knowledge (Nation, Clarke, Marshall, & Durand, 2004).

Several studies have declared the relationship between vocabulary knowledge and text comprehension. On the one hand, several quantitative studies have established a correlation between English language vocabulary knowledge and text comprehension. Stæhr (2008) studied the relationship between vocabulary size (breadth) and skills of reading comprehension, listening and writing. The results suggested that vocabulary size correlated significantly with the above three language skills. Another study by Chou (2011) revealed that students in the experimental group performed better than those in a control group. Likewise, Neemeh and Behzad (2015) depicted a strong correlation between vocabulary size and reading comprehension. On the other hand, qualitative studies have also revealed some evidences about the role of vocabulary in reading comprehension. For instance, Garcia, Ramayan, Sepe and Silor (2014) studied the challenges faced by students in reading comprehension. This study reported that the major challenge of learners was difficulties in understanding word meanings. The

same finding was reported by Zuhra (2015) who found that a problem of reading comprehension was associated with lack of vocabulary knowledge. In another study by Sasmita (2012) it was found that grammar and lack of vocabulary challenges were causes of learners' failure in comprehending texts. Other studies have also established that the vocabulary size ranging between 3,000 and 8,000 word-families provide appropriate size for ESL/EFL learner to read and comprehend texts. In this connection, Laufer (1992) reports that the first 3,000 word-families are required as a minimal vocabulary size to provide a threshold for someone to read and comprehend a text. A linear regression in that study showed that 3,000 word-families could enable learners to get a score of 56% in a comprehension test; similarly, 4,000 word-families would enable learners to score 63% while 5,000 word-families would enable learners to get 70%. In the above study, the author suggested that 5,000 word-families provide an appropriate level for learners to pass a comprehension test at university level.

Elsewhere, Hirsh and Nation (1992) found that learners needed a vocabulary size of about 5,000 word-families to comprehend unsimplified novels. Another study by Nation (2006) found that in order to read a novel or a newspaper without external assistance, readers needed about 8,000-9,000 word-families. Further, the study by Laufer and Ravenhorst-Kalovski (2010) established two different lexical thresholds for students to comprehend and pass a university entrance comprehension test. The optimal threshold was set at 8,000 word-families and the minimal threshold was set between 4,000 and 5,000 word-families. While the students in the optimal level could read independently, those at the minimal level required some external assistance to comprehend texts. Currently, researchers agree that the two vocabulary thresholds can be used

as points of reference for data interpretation in both vocabulary size and lexical-coverage studies (Masrai, 2019; Nizonkiza & van Dyk, 2015).

Gaps in the Literature

The reviewed literature has covered three key areas: (1) lower reading comprehension skills and high reading comprehension skills (2) reading comprehension levels (literal, referential and critical/evaluative levels) (3) vocabulary knowledge as a predictor of reading comprehension. Despite this coverage, there is one other research area that seems to be inadequately explored, namely, understanding the relationship between ESL/EFL learners' vocabulary size and their performance across the levels of text comprehension (Yussof, et al. 2013). In fact, previous studies have exclusively focused on the relationship between vocabulary size and overall reading comprehension. Further, this study sought to inform whether the sampled university entrants at UDOM were ready to cope with the university reading demands. Thus, the present paper, aimed to contribute to this area by answering three questions (1) What is the vocabulary size of the sampled first year students at UDOM? (2) What is the performance of the sampled first year students across the three levels of text comprehension? (3) What is the relationship between the students' vocabulary size and their performance across the levels of text comprehension?

Theoretical Frame Work

The present study was propped by the instrumental hypothesis by Anderson and Freebody (1981). The hypothesis proposes that the competency level of vocabulary knowledge can facilitate or hamper reading comprehension. The hypothesis argues that there is a cause-effect relationship between vocabulary knowledge and comprehending written texts. Consequently, the more words the

reader knows, the more he/she comprehends the texts he/she reads. In that relationship therefore, vocabulary knowledge of the reader determines achievement in comprehension. This hypothesis is pertinent to the present study because it interprets the relationship between vocabulary knowledge and reading comprehension which is the concern of this study.

Methods

This section discusses issues related to methods guided this study.

Participants

This study involved 230 first-year students from the University of Dodoma (UDOM). These students belonged to three degree programmes in the humanities: Bachelor of Arts in History, Bachelor of Arts in English and Bachelor of Arts in Theatre and Film studies. The participants from the above degree programmes were sampled for this study because they were also participating as samples in another study of the same kind (M.A. research) which was carried out by one of the researchers. The sample size was determined by Yamane (1967) formula: $n = N/1 + N(e)^2$. It is worth mentioning that the students in the sample just like other students in Tanzania were users of English as a Foreign Language (EFL)³ and they had used English as a medium of instruction for six years of secondary school education.

³In view of Broughton, Brumfit, Flavell, Hill and Pincas (1980) and Crystals (2008), English is a foreign language in Tanzania since it is only taught in classrooms and used for educational functions. Outside the classrooms, the language has no essential role in people's social life as social conversations are dominated by Swahili in urban and native languages in rural areas.

Instruments

Two tests were used in this study. The first was the Vocabulary Size Test (VST) by Nation and Beglar (2007)⁴ which was used to assess students' vocabulary size and the second was a Reading Comprehension Test (RCT) which was developed by the researchers of the present study. The VST is a collection of 140 multiple choice items which are divided into 14 vocabulary families and each family is represented by 10 items. All items in this test were designed to measure the examinees' receptive vocabulary meaning. For purposes of this study, the first 80 items were selected. These items were from the 1,000 to 8,000 word-families. Items from these word-families were deliberately chosen based on the fact that researchers agree that ESL/EFL learners' competency in the 1,000 to 8,000 word-families is sufficient for reading and comprehending varieties of authentic texts including university textbooks, novels, scholarly articles, newspapers and reports of all kinds (Hacking, Rubio, Tschirner, 2018; Laufer & Ravenhorst-Kalovski, 2010; Nation 2006; Nizonkiza, & Van Dyk, 2015; Schmitt, 2008). It is worth noting that, VST was opted as a genuine test for this study because it is recommended as a valid and reliable assessment for measuring vocabulary size (Beglar, 2010; Laufer & Aviad-Levitzky, 2017; Leeming, 2014; McLean, Hogg & Kramer, 2014). Furthermore, VST scores are accurately reflected within the 14 vocabulary levels of the British National Corpus (BNC) since it measures the meaning recognition of words sampled from different BNC levels (Laufer & Aviad-Levitzky, 2017).

Thus, using VST, scores from test takers' can be easily interpreted and compared with scores attained by ESL/EFL learners from other areas. With regard to assessing students' knowledge of text comprehension levels, the RCT tool was developed by the researchers. It consisted of three texts copied from three books which were among the suggested references in the programmes

⁴downloaded from www.lex tutor.ca/test

where the samples belong. One reference book from each degree programme was therefore sampled for this purpose. The first text was a linguistics-based extracted from a book by Yule (2017), *The Study of Language*, the second text was taken from a history book by Helge (1996), *Ecology Control & Economic Development in East African History: The Case of Tanganyika 1850-1950*, and the third was a theatre-based text taken from the book by Kelly (2002) titled *Performing the Nation: Swahili Music and Cultural Politics in Tanzania*. Though there are several standardised tests of reading comprehension available for assessing English proficiency of non-native English speakers, the researchers decided to develop their own test for three reasons.

First, most of available tests had copyrights; for example TOEFL and IELTS. Thus, it was deemed unethical to manipulate them to reflect the needs of the present study. Second, it was considered that the use of passages from textbooks which are in lists of the suggested references would not only expose learners to passages of appropriate level but also reveal the ability of learners to comprehend textbooks recommended for their references. Third, it was necessary to develop the test with items covering three levels of comprehension (that is the literal, inferential and critical levels). The test consisted of thirty six (36) Multiple-Choice Questions (MCQ) distributed across three comprehension levels such that each level had twelve questions. The RCT underwent two validity tests (content and internal validity). The content validity was based on the method of content validation by Lawshe (1975). The researchers submitted the test to five experts for their opinions. Following the experts' opinions, seven questions were modified. To assess its internal validity, the test was assigned to 50 first year students from the Bachelor of Education (Arts) – 2021/2022. The students' responses to such questions were coded using SPSS version 21 and the test for reliability showed Cronbach alpha of .843. Nevertheless, two weak items from each comprehension level were dropped to remain with 10 items in each level.

Procedure

The participants sat for the two tests at different intervals. In the morning, the VST was administered for an hour and in the evening the RCT was administered. Guessing was discouraged and students were encouraged to answer only the questions that they were sure of. The two tests were marked manually by the researchers. With regard to VST, each correct answer was awarded one point while wrong answers and un-attempted questions were awarded zero. Thus, the maximum score of VST was supposed to be 80/80. On the other hand, each correct answer in RCT was awarded 10 points so that the maximum score was expected to be 100/100 at each text comprehension level.

Data Analysis

The data obtained in this study were quantitatively analysed. After marking the participants' tests, scores from the two tests were entered in SPSS (version 21) for analysis. Thereafter, descriptive statistics was computed to get the participants' mean scores for the two variables. This was important because it revealed the participants' performance in terms of vocabulary size and reading comprehension. On top of that, the formula by Nation and Beglar (2007) was used to compute the vocabulary size of each participant in the sample. Nation and Beglar suggest that VST scores obtained by each individual in each word-family should be multiplied by 100 to get the vocabulary size of an individual. This is due to the fact that 10 items in each word-family of the VST represent 1,000 words of the same band. Therefore, if a test taker scores all 10 items, it implies that he knows all the 1,000 words in that word-family ($10 \times 100 = 1,000$). Further, Pearson's product-moment correlation coefficient was computed to find the relationship of vocabulary size (independent variable) and each comprehension level (dependent variables). This parametric measure was selected

after carrying out the normality test which showed that the data were anomaly distributed.

Results

This section presents the findings of this study.

Vocabulary Size of the Sampled First Year University Students

The concern of the first research question was to estimate the vocabulary size of first year students in the sample measured at 8,000 word-families. As presented in 2.1, the estimation of vocabulary size was based on the scores obtained from the VST. Table 1 below summarises the participants’ scores in the VST and their estimated vocabulary size after multiplying 100 to each individual’s scores according to Nation and Beglar (2007).

Table 1: Descriptive Statistics for Vocabulary Size (n = 230)

Minimum		Maximum		Mean	
VST Score	Vocabulary Size	VST Score	Vocabulary Size	VST Score	Vocabulary Size
30	3000	65	6500	45.2	4520

Table 1 shows that the participants’ minimum score in VST was 30/80 while the maximum score was 65/80 and the mean was 45.6. The VST scores suggest that the participant with the lowest vocabulary size had 3,000 word-families measured at 8,000 bands, the highest participant had 6,500 word-families and on average these participants had a vocabulary size of 4,500 word-families.

Students’ Performance at each Level of Text Comprehension

This was a concern of the second research question. In response to this question, descriptive statistics was computed to depict the

performance of participants at different levels of text comprehension as Table 2 below reveals:

Table 2: Descriptive Statistics for Levels of Text Comprehension

Variable	N	Minimum	Maximum	Mean	Std. Deviation
Literal	230	20.0	80.0	55.130	15.6861
Inferential	230	10.0	90.0	47.130	17.8917
Critical	230	.0	70.0	35.487	15.4580

Table 2 depicts that, on average, the participants' results were good at the literal level with a mean score of 55.13, SD = 15.69. The performance at the literal level was followed by the performance at inferential level with a mean score of 47.13, SD = 17.89. The participants' performance at the critical level was the last in the list with a mean score of 35.49, SD = 15.46. However, it was necessary to justify whether the mean differences among the three variables were either significant or attributed to chance. To achieve this objective, a paired samples t-test was computed. Table 3 below shows the inferential statistics for that comparison.

Table 3: Paired Samples Test (n = 230)

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval				
					Lower	Upper			
Pair 1	Literal - Inferential	8.0000	12.0189	.7925	6.4385	9.5615	10.095	229	.000
Pair 2	Literal - Critical	19.6435	14.1999	.9363	17.7986	21.4884	20.980	229	.000
Pair 3	Inferential - Critical	11.6435	15.6577	1.0324	9.6092	13.6778	11.278	229	.000

Table 3 shows that the differences among the three means in Table 2 were statistically significant as the p-value was less than 0.05 in all the three tests. Further, Table 3 depicts that the mean scores in literal comprehension was statistically significantly higher than the inferential comprehension at $t(229) = 10.09$, $p = .000$ at 5% level of significance. Likewise, the above table shows that the mean difference between literal and critical comprehension was statistically significant at $t(229) = 20.98$, $p = .000$ at 5% level of significance. Lastly, the results in Table 3 depict that the inferential comprehension had higher significant mean scores than the critical comprehension scores at $t(229) = 11.28$, $p = .000$ at 5% level of significance. Generally, the paired t-test justified that the learners' mean scores in the three comprehension levels were different, and that, performance at the literal level was above the other two levels, followed by performance at the inferential level while the lowest performance was demonstrated at the critical level.

Relationships between Vocabulary Size and Each Level of Text Comprehension

In answering the third research question, the Pearson correlation was calculated to ascertain the direction and strength of a linear relationship between vocabulary size and performance at each level of text comprehension. Thereafter, a linear regression was computed to depict the impact of vocabulary size on each level of reading comprehension. However, it should be noted that before finding the Pearson R correlation coefficient, the data had shown that it was normally distributed. Table 4 presents the relationship between the independent variable (vocabulary size) and the dependent variables (levels of text comprehension).

Table 4: Correlation between Vocabulary Size and Comprehension Levels

Variable		Literal	Inferential	Critical
VST Scores	Pearson	.673**	.606**	.628**
	Correlation	.000	.000	.000
	Sig. (2-tailed)	230	230	230
	N			

** Correlation is significant at 0.01 levels (2 tailed)

Table 4 depicts the Pearson product-moment correlation coefficient results. The above table shows that there were strong, positive linear relationships between the independent variable (vocabulary size) and the dependent variables (levels of text comprehension) with the largest correlation appearing between vocabulary size and literal comprehension level ($r=.673$). This was followed by the relationship between vocabulary size and the critical comprehension level ($r=.628$). Lastly the correlation between

vocabulary size and inferential comprehension level was computed at ($r=.606$). In general, there were no big differences among the correlations of the independent and dependent variables. Table 4 also reveals that the linear relationship among the variables was significantly correlated ($p=.001$). The results suggested that the participants with large vocabulary size scored higher in all levels of RCT than the participants with a smaller vocabulary size. Nevertheless, to examine how well the independent variable affected the dependent ones, a linear regression was calculated and the results are presented in Table 5 below:

Table 5: Effect of Vocabulary Size on Levels of Text Comprehension (n = 230)

Dependent Variables	R ²	Unstandardized		Standardized	Sig
		B	SE	β	
Literal level	.452	1.557	.133	.673	.000
Inferential level	.368	1.601	.139	.606	.000
Critical level	.394	1.433	.118	.628	.000

As shown in Table 5 above, the participants' vocabulary size (independent variable) was strong enough to predict the participants' reading performance at all levels of reading comprehension. Based on the Beta values, the results suggested that the participants with more vocabulary attained good scores at all levels of text comprehension. Again, the r-square results showed that about 45% of the participants' scores at the literal level, 37% of the scores at the inferential level and 39% of the scores at the critical level were attributed to vocabulary size. These findings implied that, vocabulary size had a substantial contribution to text

comprehension at each of the three levels. Lastly, the results of non-standardized coefficient B supported the above arguments by showing that one unit increase in vocabulary size would increase scores of comprehension at all the three levels of text comprehension by 1.557 (literal level), 1.601 (inferential level), and 1.433 (critical level). Thus, a regression analysis helped to justify that the vocabulary size of the participants had an effect on the comprehension of texts at all the three levels under investigation.

Discussion

The present study examined the relationship between vocabulary size and performance in terms of reading comprehension at three levels of text comprehension (literal, inferential and critical levels). Three research questions were addressed in relation to this objective. The first research question focused at analysing the vocabulary size of the sampled first year university students at UDOM. The results showed that, on average, the participants in the sample had a vocabulary size of 4,520 word-families based on computed VST scores. Further, the results depicted that the student with the highest vocabulary size had 6,500 while the lowest student had 3,000 word-families. In relationship to the findings from previous studies (Laufer & Ravenhorst-Kalovski, 2010; Nation, 2006), it is suggested that a threshold of 8,000 word-families is needed by ESL/EFL learners to become proficient and independent readers capable of adequately reading and comprehending authentic texts (including academic ones) without any external assistance.

On the other hand, Laufer and Ravenhorst-Kalovski (2010) suggest that a threshold of vocabulary size ranging between 4,500 and 5,000 word-families can enable ESL/EFL learners to achieve a

minimal acceptable comprehension level of texts albeit with some external assistance like the use of dictionary to deduce meaning of some words. Thus, the present study found that the participant with the highest vocabulary size had a vocabulary size of 6,500 word-families. This suggests that there was no independent reader in the sample. Further, this study also found that the participant with minimum performance had 3,000 word-families. This also implies that some participants in the sample undertook university programmes while lacking even the minimum lexical threshold of between 4,500 – 5,000 word-families required for a minimal comprehension of texts. This finding therefore revealed that some university students at UDOM joined university programmes with a vocabulary size that was less than the expected lexical threshold needed to support adequate comprehension of texts. The second research question addressed the issue of the participants' performance at the three levels of reading comprehension. The essence of this question was to examine whether the participants' comprehension of academic texts varied across the levels. Using a paired t-test analysis, the results revealed that the participants' performance was significantly different from one comprehension level to another. In particular, the results showed that it was only at the level of literal comprehension that the participants scored above 50% (mean = 55.13, SD = 15.69). In other words, the participants had an average below 50% at the two other levels (mean = 47.13 and SD = 17.89) at inferential level and (mean = 35.49, SD = 15.46) at critical level. These results suggest that the participants' understanding of information explicitly communicated in the passages was at least above 50%. However, they failed to comprehend information that required them to make association of meaning of some parts of the texts with their personal experiences.

Generally, the results showed that text comprehension was a challenge among the sampled first year university students at UDOM, particularly understanding information at both inferential and critical levels. The results of the present study corroborate Chachage (2006) and Kiondo and Matekere (2010) who observed that most of the students in universities preferred the use of lecture notes or summaries written by their fellows (popularly known as *madesa*) to reading authentic books in libraries since comprehending books is too demanding than reading lecture notes. Furthermore, the findings of the present study resonate with previous studies outside Tanzania in the area under study. For instance, reporting the reading comprehension challenge among first year university students in Botswana, the study by Ntereke and Ramoroka (2017) reported that only 14.2% of their sample passed the reading comprehension test fairly well, 51.5% achieved a satisfactory mark and 34.3% were below the expected level of reading performance at university level. The study also reported that participants in that sample performed poorly in comprehension of questions which were assessing higher levels of reading skills. De-la-Peña and Luque-Rojas (2021) conducted a meta-analysis study of seven articles with a total of 1,044 students in their sample. The results showed that 56% of the students passed a reading test at literal level, 33% passed at inferential comprehension level and 22% were able to pass at a critical level. Thus, the results of the present study complement previous studies by reporting the results which are more or less the same though the methodologies used were different. The third Research question sought to determine the relationship between the participants' vocabulary size and each level of text comprehension.

Pearson correlation coefficient results showed that there was a significant relationship between independent (vocabulary size) and dependent variables (levels of reading comprehension). Furthermore, regression analysis depicted that vocabulary size (independent variable) predicted significant variances at all the three levels of reading comprehension (dependent variables). These results suggested that vocabulary size is a good predictor of reading comprehension at all levels of text comprehension. In view of the theoretical framework of the present study (Anderson & Freebody, 1981), it can be argued that the present results support the theory that students with a large vocabulary size had an advantage of comprehending the RCT tool at literal, inferential and critical levels compared to those who had small vocabulary size. The above findings provide vital implications for education system in Tanzania. First, the findings inform that there is a need to plan for English language vocabulary development for pre-university education levels (both primary and secondary education). Currently, English language curricula, in the two educational levels, assume that vocabulary size is something that develops as learners use language. However, given the limited domains in which learners in primary and secondary schools use English, it is obvious that learners cannot acquire the needed vocabulary to carry out different tasks when they join the university education. Thus, it can be argued that special reading programmes should be introduced in Tanzanian primary and secondary schools to expose learners to varieties of vocabulary. The findings also inform that there is a need for universities in Tanzania to invest in pre-university English language programmes so as to assist students with low language proficiency. Lastly, it is suggested that reading activities in language classes from primary schools should be accompanied by questions equally distributed in the three levels of

text comprehension. This would help learners to become good readers capable of comprehending texts at any level of exposure.

Limitations and Suggestions for Further Research

The present study had some limitations. In fact, caution should be taken when generalising the results of the present study to first year university students in Tanzania and the University of Dodoma in particular. Specifically, the first limitation is that the present study was a correlation based-research that examined the relationship between vocabulary size and levels of reading comprehension. The results showed that vocabulary size can predict reading comprehension at all three levels (literal, inferential and critical). Thus, an experimental study with control and experimental groups is suggested in the future as a follow up strategy to examine the impact of the investigated independent variable on the dependent one. Second, the present study was limited by the use of few participants all of whom from degree programmes which fall under the humanities disciplines including B.A. English, B.A. History, and B.A. in Theatre and Film Studies. A follow-up study that would include students outside the field of the humanities or even students from different universities is suggested to examine the relationship of the same variables. Lastly, this study was limited by the fact that the reading test used had few questions at each level. It would be more practical if each text comprehension level had more questions. Nevertheless, the test used was useful in providing scores that enabled the researchers to infer some meaning about the relationship between the variables. Since there is no reading test (to the researchers' knowledge) that distributes questions based on the three comprehension levels, it is therefore advised that a more standardized test with more than ten questions at each level should be used for future studies.

Conclusion

The present study addressed the relationship between vocabulary size and the levels of text comprehension among sampled first year students at UDOM. The findings revealed that, on average, the students investigated had a vocabulary size that would enable them to function as dependent readers. Further, the results indicated that the students in the sample performed moderately in answering reading comprehension questions at the literal level but poorly at both the inferential and critical levels. On top of that, it was found that vocabulary size correlated significantly with each of the levels of text comprehension. Lastly, the regression analysis justified that vocabulary size (independent variable) was strong enough to predict performance at the literal, referential and critical levels (dependent variables). Based on the results of the present study, it can be concluded that efforts to develop large vocabulary size among university students is needed so as to promote their ability to read and comprehend texts at the three levels of text comprehension. Lastly, the results of this study inform English language teachers and teaching material developers that learners should be exposed to all levels of text comprehension. Thus, textbooks and classroom reading should cover not only the literal level but should also be extended to inferential and critical levels.

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