

Madesa or books! Using a Coverage Comprehension Model to Assess University Students' Ability to Comprehend Reference Books

Frida Alfred Mbwafu

The Open University of Tanzania

frida.mbwafu@out.ac.tz

John Misana Biseko

Department of Foreign Languages and Literature

University of Dodoma

Abstract

Studies on reading in a foreign language report that meaningful reading comprehension is determined by an individual's vocabulary size. A conclusion from these studies is that a vocabulary threshold of 8000–9000 words is compulsory for the reader to comprehend 98% of running words in academic texts and consequently achieve optimal comprehension of the materials. A threshold of 4,000–5,000 words can only assist readers to understand 95% of running words, which guarantees minimal comprehension. This study examines the relationship between the vocabulary size of undergraduate university students and the vocabulary coverage of reference books sampled from among those listed in their course outlines. This corpus-based and descriptive study used the Vocabulary Level Test (VLT) to assess the vocabulary size of 774 participants and a vocab profiler to analyze the vocabulary coverage of the nine sampled reference books. The results showed that, on average, the participants' vocabulary size would enable them to comprehend 95% of the running words in most of the books in the sample, but that size would not help them to understand 98% of the running words in any of the sampled books. These results suggest that, on average, no student in the sample could have optimal comprehension of the sampled reference books. Therefore, our study calls for the need to introduce serious reading programmes at the primary and secondary school levels so as to promote students' vocabulary size and reading comprehension ability.

Keywords: *Vocabulary, vocabulary coverage, vocabulary family, vocabulary size, reading comprehension*

INTRODUCTION

In recent years, there has been an increasing interest in studying the role of reading comprehension in academic achievement. Evidence from several studies suggests that reading comprehension is a fundamental pillar for academic achievement (Cromley, 2009; Goldman & Pellegrino, 2015; Kendeou et al., 2016; Smith et al., 2021). This finding is supported by systematic studies that have empirically studied the correlation between the two variables and indicate a moderate to strong relationship. For instance, Nyarko et al., (2018) reported a correlation of $r(381) = .66, p < .01$ among lower primary school children in Ghana. Cromley (2009) reported a correlation of .840 for the PISA 2000 data set, .805 for the PISA 2003 data set, and .819 for the PISA 2006 data set. Stoffelsma and Spooren (2019) reported a correlation of .78, $p < .001$ among 133 first-year science and mathematics students in a multilingual African community. Reri, Guill and Retelsdorf (2021) reported a correlation of .59 $p < .001$ among 2,051 German students from grade 10 to 11. The results from all these studies suggest that good readers have an advantage over struggling readers regarding academic achievement.

While the growing body of research in Western and non-western countries report that reading comprehension is a prerequisite for academic achievement, studies in sub-Saharan Africa report a challenge in reading comprehension among university students. For example, in Tanzania, the study by Biseko (2023) shows that some students are admitted to university with a low reading ability that does not support the university's reading demand. In Malawi and Zambia, Mkandawire and Walubita (2015) report on university students' inability to handle proficient and analytical reading. The same challenge is reported in South Africa. Using interviews with lecturers and students, Andrianatos (2019) reveals several reading challenges that were interfering with the academic performance of undergraduate students. In Namibia, Liswaniso and Mubanga (2019) uncover that students' poor academic performance at the Katima Mulilo Campus was partly a result of poor reading habits and poor reading levels. In Botswana, the study by Ntereke and Ramoroka (2017) reports on the critical reading comprehension challenge among first-year students at Botswana University. In this study, the results showed that only 14.2% of the sample were able to pass the reading comprehension test; 51.5% passed at a satisfactory level, but 34.3% had a level below what was expected.

Other studies in this region proclaim that a majority of university students rarely use authentic reference books that are listed in their course outlines. In Tanzania, Chachage (2006) and Kiondo and Matekere (2010) reveal that students prefer reading lecture notes or any summarised work popularly known as *madesa* to reading authentic original copies of reference books. Further, it is reported that students at this level normally tend to read for the sake of passing examinations and not acquiring knowledge; thus, most of them do not read beyond the scope of examinations (Mwantimwa et al., 2019). As a result, a majority of the students fail examinations when lecturers require critical responses about a topic covered in class (Chachage, 2006). The same phenomenon is reported in Ghana where Owusu-Acheaw and Larson (2014) and Stoffelsma and Spooren (2019) report that the majority of university students never read books but rather cover the contents of their course through listening to lectures and reading lecture notes. In South Africa, Andrianatos (2019) reports that lecturers had to provide some notes as reading support for students to comprehend the contents of the courses. In the same study, while answering the researcher's interview, students agreed that they were confused when reading books; they took longer to understand ideas, and they struggled to get the meaning of several words. Interestingly, one student blamed the authors when he said, "The authors want to look smart. They wrote with their level, not our level" (p. 5).

In Tanzania, two perspectives regarding students' preferences for *madesa* exist in literature. On the one hand, some researchers have a view that most of these students have been affected by a poor reading culture, which is a result of less exposure to reading activities from the time they were young (Mwantimwa et al., 2019; Wema, 2018). On the other hand, researchers like Biseko (2023) and Ndabakurane (2020) believe that students prefer *madesa* to books because they do not enjoy reading reference books as their language level does not match the language level of the books. Various studies have commented on the role of well-developed linguistic knowledge in the achievement of reading comprehension. Alderson (1984) emphasizes that EFL/ESL learners must reach a certain linguistic threshold level before they become competent readers in a foreign language. This argument is in accordance with the linguistic threshold hypothesis by Cummins (1976), which proposes that EFL/ESL learners must attain a particular level of linguistic competency before they can transfer L1 reading skills to aid comprehension in L2 reading. Thus, learners whose linguistic proficiency falls below the

defined threshold level cannot be able to read and comprehend (Cummins, 1976; Eskey, 2005).

This paper focuses on one aspect of linguistic knowledge, which is vocabulary size. A number of studies (see Hirsch & Nation, 1992; Hu & Nation, 2000; Nation, 2006; Laufer & Ravenhorst-Kalovski, 2010; Schmitt et al., 2011) highlight the role of vocabulary size on reading comprehension. Thus, in his study, Biseko (2023) reports that a big challenge facing students' comprehension of books is the fact that some students are registered in universities with a low vocabulary size in comparison to the vocabulary demand of reference books. As a result, he argues that students' preference for *madesa* can partly be explained by students' level of vocabulary size, which in turn impedes comprehension of authentic academic texts. Despite the claim, Biseko's study did not analyse any reference books listed in university programmes. Neither his study did not compare students' vocabulary levels with the vocabulary coverage of the reference books. To develop evidence on the matter, a better understanding of the vocabulary level of the students and that of the books is needed so as to analyse the compatibility of the two variables. The present study, therefore, attempts to compare the two variables so as to uncover whether students' vocabulary level is sufficient for them to comprehend the vocabulary used in the reference books. This attempt is in line with Laufer (2013) who comments that "a text's lexical profile and learners' vocabulary size, for which quantitative measures are available, provide teachers with the necessary information about the lexical ease and difficulty of different texts for different learners" (p. 871).

Vocabulary Size and Reading Comprehension

Vocabulary size is one of the aspects of vocabulary knowledge that has attracted the focus of several systematic studies for decades. According to Coxhead et al. (2015), the term vocabulary size is known as an approximated number of words that an individual knows at least their meaning. The vocabulary size of EFL/ESL learners is calculated based on learners' scores in standardized tests. These are the Vocabulary Size Test (VST) by Nation and Beglar (2007), X-Lex by Milton and Meara (2003), and the Vocabulary Levels Test (VLT) by Nation (1983) and its revised version by Schmitt et al. (2001). In recent years, a considerable amount of research has reported the link between vocabulary size and reading comprehension among students in the English as a Foreign or Second Language (EFL/ESL) context. Among others, Zhang and Annual (2008)

proclaim that the total number of words that an EFL/ESL learner has determines one's achievement in comprehension tests. Likewise, Grabe and Stoller (2002) assert that the main factor that differentiates poor readers from good readers is the vocabulary size that one possesses.

There is plenty of research evidence that reports the correlation between vocabulary size and reading comprehension among EFL/ESL learners from different levels of education and geographical backgrounds. Laufer (1992) investigated the relationship between the two variables among 92 first-year university students in Israel. The participants' first languages were Hebrew and some Arabic. In that study, learners' vocabulary size was estimated using the scores they got in the Eurocentre Vocabulary Test by Meara and Jones (1989). The result showed a significant correlation between the two variables ($r = .75, p < .01$).

In another study, Mehrpour et al. (2011) conducted a study among sixty Iranian EFL university students. In that study, Vocabulary Level Test (VLT) was used for measuring vocabulary size and the Reading Comprehension Test (RCT), which was part of one version of the TOEFL test used for assessing participants' level of reading comprehension. The results showed that learners' vocabulary size was statistically correlated with reading comprehension scores ($r = .71, p < .01$). This implies that students who had more vocabulary scored better in reading comprehension than those with smaller vocabulary sizes. Further, regression analysis showed a Beta of .32, meaning that there was an increase in reading comprehension scores by .32 for every extra point in the level of vocabulary size. A similar study by Rashidi and Khosravi (2010) was also conducted to Iranian university students. Like Mehrpour, Razmjoo, and Kian this study also examined the relationship between vocabulary size and reading comprehension. In this study, a positive correlation between the variables was also reported ($r = .75, p < .01$). The results also showed that the correlation coefficient R^2 was .55, meaning that vocabulary size accounted for 55% of the variance in reading comprehension.

In the African context, some studies have reported the correlation of the variables. Among them is the study by Zano and Phatudi (2019) among thirty high school students in South Africa. To measure vocabulary size, researchers used the Vocabulary Level Test (VLT) by Nation (2001) and a Reading Comprehension Test that was developed by Cambridge

University was used to assess the participants' reading comprehension. The results showed that participants' vocabulary size was strongly correlated with reading comprehension ($r = .90, p < .01$). Further, the results showed a correlation coefficient of $R^2 = 81\%$. This implies that about 81% of the variance in reading comprehension was explained by vocabulary size. Another study was by Biseko (2023) in Tanzania among 256 EFL first-year university students. The study used a Vocabulary Size Test by Nation and Beglar (2007) and a Reading Comprehension Achievement Test (RCAT) that was developed by the researcher. The results showed a correlation of ($r = .75, p < .01$) and $R^2 = .565$ implying that 56.5% of the variance in reading comprehension was explained by vocabulary size. The last study in this review was by Dagnaw (2023) in Ethiopia, which involved 235 first-year students at Debre Markos University. The study used the updated version of the Vocabulary Level Test (VLT) by Schmitt et al. (2001) to assess vocabulary size and the Internet-Based Test (IBT) of the reading section of TOFEL (2009) for assessing reading comprehension. The results revealed a positive correlation of ($r = .74, p < .01$). Generally, the reviewed evidence from the literature reveals that the two variables are strongly correlated, with a correlation ranging between $r = .70$ and $.90, p < .01$ and $R^2 =$ ranging from 32% to 81%.

Approaches to Analysing Readability of School/College Books

Readability is a concept that relates to the level of comprehension of a text (Varzaneh & Darani, 2018). McLaughlin (1969) uses the term to mean the degree to which readers in a certain group consider a certain text compelling and comprehensible while Wissing et al. (2016) consider readability to be the linguistic features of a text that make it easy or difficult to read and comprehend content. In this literature review, the term is used to mean a degree of text comprehensibility based on the nature of the linguistic features like the length and types of sentences, nature of vocabulary (subject-specific, academic, or non-academic, level of frequency of use), grammar and discourse. Therefore, readability in this context is different from legibility, which is reserved for things like textual organisation, the selection of font styles, theme fonts, and font size. Therefore, in this text, readability is not detached from comprehensibility, as the main purpose of reading is to comprehend; as a result, all readability studies have been working on measuring the extent to which a piece of text is comprehended by readers.

Numerous studies have reported on the readability of English textbooks used in schools or colleges in EFL and ESL contexts. To achieve this purpose, studies have used different approaches. Three key approaches have dominated the field of textbook analysis: the use of readability formulas, the impressionistic approach, and the use of vocabulary coverage analysis. The first approach uses readability indices like the smog index, Gunning Fog score, Coleman-Liau index, and Flesch-Kincaid grade level to determine the ease or difficulty of comprehension of textbooks. Examples of such studies include Rahmawati and Sulistyono (2021), and Wang et al. (2019). In studies of this kind, readability formulas are used to calculate readability scores based on the nature of linguistic features in a text, for example, the average number of syllables per word or the average number of words per sentence. Based on the readability scores, the degree of difficulty of a textbook is determined. For example, the Flesch readability index provides a score of 0 to 100. A readability score of 0 suggests that the text is very difficult, while a score of 100 suggests that the text is very easy to read and comprehend (Flesch, 1948).

The second, impressionistic approach determines textbook suitability through descriptive qualitative analysis. In this approach, the assessor is concerned with a general impression of a book; thus, the book's strengths and weaknesses are examined (Cunningsworth, 1995). The analysis involves getting an impression of a textbook's cover and content design, including topics, language use, layout, typography, and illustrations. Accordingly, this approach involves assessing stakeholders' views about different EFL textbooks, and checklists are commonly used to collect such views on different features of the books (Cunningsworth, 1995). Examples of studies that used this approach are Solikhah (2020) and Sahin (2020). The last approach is a corpus analysis-based approach referred to as a vocabulary coverage approach. In this approach, corpus analysis software like Vocab profiler reveals percentages of different vocabulary families included in a book (Schmitt et al., 2011). Thus, a book that contains a high percentage of words from high-frequency vocabulary families is considered easier to understand compared to a book that consists of a high percentage of words from low-frequency vocabulary families. The later approach is the concerned of the present study.

Vocabulary frequency and families

Studies investigating the relationship between vocabulary knowledge and reading comprehension have introduced two notions: vocabulary frequency and vocabulary families. Vocabulary frequency denotes the fact that in the everyday use of words, some are used so frequently while others are rarely used (Milton, 2009). Based on the frequency phenomenon, the British National Corpus (BNC) has produced a list of words in descending order from the most frequent word to the least frequent word. Based on such lists, it has been possible to group the words into bands of 1,000 thousand words; these bands are known as vocabulary families. Thus, the first 1,000 words occupy the top 1,000 words in the BNC list. These are followed by the second 1,000 vocabulary family, the third 1,000 vocabulary family, and the list continues. Thus, according to Schmitt and Schmitt (2014), Vocabulary families are categorised into high-frequency vocabulary families, which consist of the first to third 1,000-word families, mid-frequency families (the 4th to 9th 1,000 families), and low-frequency vocabulary families (families beyond the 9th). The words in the high-frequency vocabulary families are regarded as the core vocabulary. These are the commonly used, popularly known, and frequently encountered words. In contrast, the words in the low-frequency groups are considered to be infrequently used words, non-common words, subject-specific words, and jargon. These words are not familiar to most EFL/ESL learners. Thus, the textbook that uses most of the words from the most frequent vocabulary families is considered simple, as learners encounter words that are commonly used. In contrast, a textbook that is dominated by words from low-frequency vocabulary families is regarded as difficult, as learners will be meeting more unfamiliar words.

Theoretical Framework

The present study was informed by the Coverage Comprehension Model (CCM) by McLean (2021). The model presupposes that there are vocabulary thresholds required by bilingual EFL learners to achieve meaningful reading comprehension (Biseko, 2023; Hu & Nation, 2000; Laufer & Ravenhorst-Kalovski, 2010; Masrai, 2019; Nation, 2006; Şen & Kuleli, 2015; Schmitt, Jiang, & Grabe, 2011). The model presents that a vocabulary threshold of 4000-5000 word families is required for a reader to comprehend at least 95% of running words in different authentic texts. A threshold of 8,000-9,000 word families is required for EFL readers to be sure of understanding 98% of running words in authentic and academic

texts. As a result, understanding 95% of running words in a text ensures a reader to achieve a minimum comprehension level also known as dependent level. This is because the 5 unknown words in a paragraph of 100 words obstruct the reader from comprehending the intended message to the extent that a reader requires an assistance of a dictionary. In contrast, a reader who understands 98% of a text is at an optimal level of reading comprehension (also known as independent level) as the meaning of the 2 unknown words in a paragraph of 100 words can be inferred from the context and no dictionary is required to comprehend the intended message. This model was useful for guiding this study as it informs the vocabulary thresholds required for EFL readers to achieve comprehension of texts. These vocabulary thresholds were a lens through them data collection, analysis, and interpretation were achieved.

Research Gap

Reviewed literature has provided valuable information regarding vocabulary knowledge, the comprehensibility of books, and the relationship between the two variables. However, it has been revealed/discovered that less has been said about the vocabulary coverage of university reference books in relation to students' vocabulary size. The few studies available (Biseko, 2023; Dagnaw, 2023; Zano & Phatudi, 2019; Nizonkiza & Van Dyk, 2015) focused on correlating scores of students' vocabulary size with those of comprehension tests. Since these studies did not analyse the vocabulary coverage of the reference books, it is inconclusive to argue that university learners lack the vocabulary knowledge required to comprehend the book.

The Present Study

This study complemented the previous ones on the relationship between vocabulary knowledge and reading comprehension among university students in sub-Saharan Africa, using the case of one university in Tanzania. Unlike the previous studies, the present study used a Vocabulary Coverage Model of Reading Comprehension to Assess whether university students in the sample had enough vocabulary to understand the reference books at either minimal or optimal comprehension levels. In that view, two research questions were addressed: (1) What is the average vocabulary size of the participants? (2) What is the vocabulary coverage/threshold of the sampled university reference books?

METHODOLOGY

Participants

Participants were 774 university students from three humanities departments at the University of Dodoma. These were the departments of History and Archeology ($n = 478$), Foreign Languages and Literature ($n = 111$), and Arts and Media Studies ($n = 185$). These students were from three programmes: B.A. History, B.A. English and B.A. Theatre and Film Studies. The participants were obtained through probability sampling, and Yamane's (1967) formula [$n = N / (1 + N (e)^2$)] determined the number of participants from registered students of each programme.

Measures

This study used the Vocabulary Size Test (VST) by Nation and Beglar (2007) to measure the vocabulary size of the participants. The test is designed to test EFL/ESL learners' vocabulary size in each 1000-family as identified in the British National Corpus (BNC). The test consists of 10 questions from each vocabulary family, which makes it possible to estimate the vocabulary size of a test taker in each vocabulary family. However, this study tested the participants in only eight vocabulary families; thus, the test consisted of 80 multiple-choice questions. The reason to use a part of the test in this study was based on the presupposition of the Coverage Comprehension Model and the widely reported research finding that knowledge of the first to eighth vocabulary families (8000-word families) makes EFL learners competent to read varieties of authentic texts. They include academic and non-academic books (Hacking, Rubio, & Tschirner, 2018; Laufer & Ravenhorst-Kalovski, 2010; Nation 2006; Nation & Beglar, 2007; Nizonkiza & Van Dyk, 2015; Schmitt, 2008). Thus, the decision to test learners in the first 1,000 to 8,000 vocabulary families focused on assessing their readiness to read reference books listed in their course outlines.

Besides the VST, the study also sampled three reference books for each degree programme; the books were sampled from the titles listed in the course outlines of the degree programmes. For ethical purposes, however, the titles of these books are not identified. Instead, dummy names HS1, HS2, and HS3 are used to represent the three reference books for the History programme; EL1, EL2, and EL3 are used for English linguistics; and TF1, TF2, and TF3 are representing reference books for the theater and film programme. These books were required in this study for the sake

of analyzing the nature of the vocabulary they contain (vocabulary coverage).

Procedure

The test was administered to participants after receiving permission from the University management and participants' consent to volunteer for the study. Participants attempted 80 questions of the VST for 40 minutes as recommended by the test designers. They were encouraged to answer questions that they were aware of and leave unanswered questions that they were unsure of. This was important to reduce the guessing effect. To examine the vocabulary coverage of the sampled reference books, the researchers had to develop their own corpus from these books. To accomplish the process, four steps of corpus building were adopted from Alfraidi et al. (2022). The steps are: Document Collection, Optical Character Recognition (OCR), Data Cleaning, File naming, and saving. In the first step, researchers collected soft copies of the reference books, which were all in PDF format. All copies were downloaded from a free web library, www.libgen.org. In the OCR step, the key task was to convert PDF files into machine-readable/editable format (word files) using the OCR software known as Fine Reader. In the third step (cleaning), the task was to clean the documents by removing all features that were not important in the corpus analysis. These were features like pictures, tables, figures, and numbers. At this stage, only words remained on the pages of the books. Thereafter cleaning the books followed – all copies were saved and named, ready for analysis.

Data Analysis

Participants' VST scores were entered into the SPSS page, with scores from each vocabulary family in a separate column beside learners' dummy names. Thereafter, descriptive statistics were computed to depict participants' performances in each vocabulary family. Further, each participant's scores were multiplied by 100 to get the vocabulary size of each individual participant in a vocabulary family. On the other hand, the corpus data from each book was uploaded in a web software known as *Vocab profiler*. This software, therefore, interpreted the data by identifying the number of words in each book, percentage of words from each vocabulary family, and the number of words required for a reader to comprehend the book either at optimal or minimal comprehension level.

FINDINGS

The vocabulary size of the participants

The vocabulary size of the participants (N = 774) was computed based on the students' VST scores. As previously stated in the material section, participants were tested in eight vocabulary families, and each vocabulary family had 10 questions. Thus, the maximum score in a family was 10, which was multiplied by 100 to get a total vocabulary size of 1000 in each family. The summary of the participants' scores and subsequent estimated vocabulary size in each vocabulary family is presented in Table 1.

Table 1: Participants' VST scores and estimated vocabulary size

Vocabulary families	Minimum score	Maximum score	Mean score	Rounded mean	Average size per family
The 1 st 1000	1	10	8.45	8	8 x 100 = 800
The 2 nd 1000	1	10	7.49	7	7 x 100 = 700
The 3 rd 1000	1	10	6.76	7	7 x 100 = 700
The 4 th 1000	1	10	6.02	6	6 x 100 = 600
The 5 th 1000	0	10	4.47	4	4 x 100 = 400
The 6 th 1000	0	10	4.00	4	4 x 100 = 400
The 7 th 1000	0	10	4.01	4	4 x 100 = 400
The 8 th 1000	0	9	3.99	4	4 x 100 = 400
Total					4,400

Table 1 depicts that there were students who got right all ten questions in the 1st to 7th vocabulary families while some got right only 1 question (in the 1st to 4th vocabulary families) or did not get right any question in the 5th to 8th vocabulary families. The table also depicts that the best performance was in the 1st vocabulary family, in which the average performance was 8, while the poorest performance was in the 5th to 8th vocabulary families, in which the average score was 4. It should also be noted that the participants attained at least half of the scores in four vocabulary families only, in the 1st to 4th vocabulary families. This suggests that participants had developed more vocabulary competency in these four families than they did in the 5th to 8th families, where the average score was below 5. Further, the table reveals that the estimated vocabulary size of the participants was 4,400 words out of the expected 8,000 words. The data also show that the participants had acquired more vocabulary in the first vocabulary family. However, their average vocabulary decreased as they moved away from the first family.

The Vocabulary coverage/threshold of the sampled university reference books

This section sought to answer the second research question, which reveals (1) the percentage of running words from each vocabulary family contained in the reference books and (2) the sum of the families needed in each book so as to understand 95% and 98% of running words of the book. As the coverage comprehension model suggests, understanding 95% to 98% of running words in a book determines the compressibility of a book. Tables 2, 3, and 4 show these two features of the sampled books. In each table, the columns titled ‘running words’ depict a percentage of words from different vocabulary families in a sampled book, while the columns titled ‘cum.’ shows a cumulative frequency (summation) of percentages from different families so as to identify a specific family at which 95% and 98% of the running words are obtained.

Table 2: Vocabulary thresholds of the sampled History reference books

Frequency level	HS1 (f)		HS2 (f)		HS3 (f)	
	Running words	Cum.	Running words	Cum.	Running words	Cum.
1,000	71.8	71.8	73.0	73.0	76.1	76.1
2,000	13.6	85.4	13.9	86.9	11.3	87.1
3,000	8.8	94.2	7.1	94.0	8.6	96.0
4,000	1.8	96.0	2.0	96.0	1.4	97.4
5,000	0.8	96.8	1.5	97.5	0.7	98.1
6,000	0.6	97.4	0.7	98.2	0.4	98.5
7,000	0.4	97.8	0.6	98.8	0.3	98.8
8,000	0.2	98.0	0.3	99.1	0.3	99.1
9,000	0.1	98.1	0.1	99.2	0.1	99.2
10,000	0.0	98.1	0.1	99.3	0.1	99.3
11,000	0.1	98.2	0.0	99.3	0.1	99.4
12,000	0.1	98.3	0.0	99.3	0.0	99.4
13,000+	0.3	98.6	0.5	99.8	0.4	99.8
Off-list	1.4	100	0.2	100	0.2	100

Table 2 depicts two important issues. First, the HS reference books in the sample were dominated by words from the first 1,000 vocabulary family which compose more than 70% of the running words in all three books. Second, the table shows that, to understand 95% of the running words in HS1, a sum of running words from the 1st, 2nd, 3rd, and 4th vocabulary

families are needed. This is to say, a reader must be competent in the first four vocabulary families, which equals 4,000 words. The same situation is true for HS2. However, to understand 95% of the running words in HS3, only knowledge of the first three vocabulary families (3,000 words) is needed. Table 2 also shows disparities among HS books as far as coverage of 98% of running words is concerned. While HS1 requires knowledge of the 1st to 8th families to attain 98%, HS2 requires knowledge of the 1st to 6th vocabulary families, and HS3 requires knowledge of the 1st to 5th vocabulary families to understand 98% of running words.

Table 3: Vocabulary thresholds of the sampled Theatre and Film reference books

Frequency level	TF1 (<i>f</i>)		TF 2 (<i>f</i>)		TF 3 (<i>f</i>)	
	Running words	Cum. Running words	Running words	Cum. Running words	Running words	Cum. Running words
1,000	64.8	64.8	74.3	74.3	74.1	74.1
2,000	17.6	82.4	11.6	85.9	12.4	86.5
3,000	12.6	95.0	8.4	94.3	7.1	93.6
4,000	1.8	96.8	1.6	95.9	1.9	95.5
5,000	0.3	97.1	1.0	96.9	0.9	96.4
6,000	0.5	97.6	0.4	97.3	0.6	97.0
7,000	0.1	97.7	0.2	97.5	0.4	97.4
8,000	0.2	97.9	0.2	99.7	0.5	97.9
9,000	0.2	98.1	0.1	97.8	0.3	98.2
11,000	0.1	98.3	0.0	97.9	0.1	98.4
12,000	0.0	98.3	0.0	97.9	0.1	98.5
13,000+	0.1	98.4	0.5	98.4	0.7	99.2
Off-list	1.6	100	1.6	100	0.8	100

Table 3 shows that the words from the first 1,000 vocabulary family dominate the vocabulary coverage of the three reference books, accounting for more than 70% of the running words in TF2 and TF3. The table also reveals that to comprehend the meaning of 95% of the running words in TF1, participants should be competent in the 1st to 3rd (3,000 words) vocabulary families, but to comprehend the same percentage of running words in TF2 and TF3, one needs a competency in the 1st to 4th (4,000 words) vocabulary families. In contrast, to understand 98% of the running words in TF reference books, knowledge from the 1st to 13th

(13,000 words) vocabulary families is needed in TF2, while TF1 and TF3 require only competency in the 1st to 9th 1,000 (9,000 words) vocabulary families to cover the same percentage of the running words.

Table 4: Vocabulary thresholds of the sampled English Linguistics reference book

Frequency level	EL1 (f)		EL 2 (f)		EL 3 (f)	
	Running words	Cum.	Running words	Cum.	Running words	Cum.
1,000	77.5	77.5	76.8	76.8	71.8	71.8
2,000	9.9	87.4	12.0	88.8	11.9	83.7
3,000	5.2	92.6	5.3	94.1	7.2	90.0
4,000	1.8	94.4	1.7	95.8	3.0	93.9
5,000	1.9	96.3	0.7	96.5	1.1	95.0
6,000	0.4	96.7	0.7	97.2	1.0	96.0
7,000	0.6	97.3	0.4	97.6	0.6	96.6
8,000	0.4	97.7	0.4	98.0	0.9	97.5
9,000	0.3	98.0	0.2	98.2	0.4	97.9
10,000	0.1	98.1	0.1	98.3	0.1	98.0
11,000	0.1	98.2	0.1	98.4	0.1	98.1
12,000	0.1	98.3	0.1	98.5	0.0	98.1
13,000+	0.3	98.6	0.5	99.0	0.8	98.9
Off-list	1.4	100	1.0	100	1.1	100

Table 4 shows that EL reference books in the sample are dominated by words from the 1st 1000 vocabulary family by more than 70%. It also shows that to comprehend 95% of the running words in EL1 and EL3, knowledge of the 1st to 5th vocabulary families (5,000 vocabulary size) is needed, while to comprehend the same percentages in EL2, one needs knowledge of the 1st to 4th vocabulary families (4,000 vocabulary size). In contrast, the table reveals that the participants require a vocabulary size between 8,000 and 9,000 (the 1st to 9th families) to comprehend 98% of the running words in these books.

DISCUSSION

The purpose of this study was to ascertain whether the participants' vocabulary size is sufficient for them to understand 95% or 98% of the running words of the analysed reference books. The study attempted to understand the matter based on the Coverage Comprehension Model

which proposes that there is a minimum vocabulary required for ESL/EFL readers to achieve meaningful reading comprehension of a text written in English. Thus, the analysis of the vocabulary size of the participants and the vocabulary coverage/thresholds of the sampled reference books revealed two key findings. First, the average vocabulary size of the participants is inadequate for them to comprehend academic textbooks at the optimal level as per the model. Second, the vocabulary threshold regarding understanding 98% of running words for optimal comprehension of the analysed books seems to be high for the participants in the study to reach.

The first finding is in relation to participants' vocabulary size. The result showed that the participants had an average vocabulary of 4,400 accumulated from eight vocabulary families. The result also revealed that students performed better in the 1st to 4th 1000 vocabulary families, where they achieved above half of the total score in each of those families. This suggests that they had an average of over 500 words in each of the families. The scores in the 5th to 8th vocabulary families showed that participants had an average of less than 500. Thus, in comparison to the Coverage Comprehension Model, the present result suggests that the participants can only understand 95% of the running words in the sampled academic books. This conclusion is based on the model and previous studies which affirm that EFL/ESL learners require a vocabulary size of 4000 to 5000 to comprehend authentic texts, including academic ones at a dependent level (Biseko, 2023; Masrai, 2019; Sen & Kuleli, 2015; Schmitt et al., 2011). Based on this result, it is argued that, on average, university students in the sample had not developed enough vocabulary to make them comprehend academic texts at the optimal level without depending on assistance and dictionaries. The present study, therefore, confirms the findings reported by Biseko (2023), who found that a majority (65%) of the university entrants had developed a vocabulary level between 4000 and 5000, which was only enough for a dependent reading and minimal comprehension level. On the other hand, 35% of his sample were below this level.

With regard to the second finding, the result showed that there was inconsistency regarding the vocabulary thresholds of the nine sampled reference books. However, these books can be grouped into three categories: In the first category, two reference books (HS3 and TF1) had 95% of the running words in the 3rd vocabulary family. In the second

category, another two books (EL1 and EL3) had 95% of the running words in the 5th vocabulary family, and in the third category, HS1, HS2, TF2, TF3, and EL2 had 95% of the running words in the 4th vocabulary family. Comparing this corpus analysis with the average vocabulary size of the participants (4,400 average words), it is certain that the participants could read the books in the first and third categories at a minimal comprehension level. However, they could not read the books in the second category even at the minimal level, as the books require someone with 5000 words to understand 95% of the running words and comprehend them at a minimal level. These results, therefore, inform that: first, the vocabulary coverage/threshold of university books in the humanities are not field-specific, as two books from one field, i.e., history, showed different vocabulary coverage/thresholds. Second, the results also inform us that, with consideration to the average vocabulary size of students in the sample, some reference books listed in course outlines are too difficult for the students to comprehend even at a minimum level. Third, the result of the present non-regression study supports previous regression analysis results in Biseko (2023), Laufer (1992), Laufer and Ravenhorst-Kalovski (2010), and Masrai (2019). It also supports the model that to understand 95% of running words in academic books, one needs knowledge of 4,000–5,000 vocabulary size or competency in the 1st to 5th vocabulary families.

Furthermore, the corpus analysis showed that, as far as understanding 98% of running words is concerned, the results from the sampled books can be divided into five groups. In the first group, there is HS3, which requires comprehension of 98% of the running words in the 5th vocabulary family. In the second group, HS2 had 98% of the running words in the 6th vocabulary family, while HS1 and EL2 in the third group had 98% of the running words in the 8th vocabulary family. In the fourth group, TF1, TF3, and EL1 had 98% of the running words in the 9th vocabulary family, while EL3 in the fifth group had 98% of the running words in the 10th vocabulary family. Lastly, TF2 in the sixth group had 98% of the running words in the 13th vocabulary family. In relation to the vocabulary size of the participants, the results suggest that, on average, no student in the sample would read any of the books at the optimal comprehension level as an independent reader. The present finding is in line with Biseko (2023), as no participant in his regression study could read a text at the optimal comprehension level as well. Nevertheless, this result challenges the argument in previous regression studies (Biseko,

2023; Laufer, 1992; Laufer & Ravenhorst-Kalovski, 2010; Masrai, 2019) that 8,000–9,000 vocabulary size is enough for EFL/ESL learners to understand 98% of the running words in authentic texts. This is not supported by the present study, which shows that some of the books in the sample required readers' competency above the 9th vocabulary family to comprehend 98% of the running words. Finally, the findings support other studies (Biseko, 2023; Mkandawire & Walubita, 2015; Andrianatos, 2019; Ntereke & Ramoroka, 2017; Liswaniso & Mubanga, 2019) in Sub-Saharan Africa that have reported on the challenge of reading comprehension among university students.

CONCLUSION AND RECOMMENDATIONS

This study examined the ability of university students to comprehend reference books listed in their course outlines. The study used the Coverage Comprehension Model to complement other studies in Sub-Saharan Africa that had reported on reading comprehension challenges among university students. Further, the present study also complements other studies that used correlation methods to ascertain reading comprehension challenges among university students. The results have shown that, on average, participants' vocabulary size can support them to comprehend 95% of the running words in most of the sampled books, but no one could comprehend 98% of the running words in the sampled books. The findings imply that participants in the sample could read most of the books only at a minimal comprehension level as dependent readers. Based on their revealed vocabulary size and the corpus results, the participants must seek dictionary assistance after every 20 words to comprehend the meaning of difficult words. This frequent need for a dictionary definitely interrupts understanding of the message targeted. Therefore, the present study has the implication for the education sector that some of the students in universities have challenges in reading and comprehending reference books listed in course outlines. Thus, as an alternative, these students rely on *madesa* to comprehend the course content. Nevertheless, they lack a taste of academic arguments as they are presented in books. Consequently, it is hard for students of this nature to develop critical thinking and an inquisitive mind. To this end, it is suggested that more EFL/ESL reading programmes should be introduced in pre-university education systems, including primary and secondary schools. Further, the present study proposes another study to be conducted to examine the vocabulary size and analyse reference books for university students in non-humanities programmes.

REFERENCES

- Alderson, J. C. (1984). Reading in a Foreign Language: A Reading Problem or Language Problem? In J. C. Alderson, & A. H. Urqurhart (Eds.), *Reading in a Foreign Language*. Longman, pp. 1–27.
- Alfraidi, T., Abdeen, M., Yatimi, A., Alluhaibi, R. & Al-thubaity, A. (2022). The Saudi novel corpus: Design and compilation. *Applied Sciences*, 12 (1), 6648-6662.
- Andrianatos, K. (2019). 'Barriers to reading in higher education: Rethinking reading support'. *Reading & Writing*, 10(1), 241. <https://doi.org/10.4102/rw.v10i1.241>.
- Biseko, J.M. (2023). Vocabulary size and comprehension of academic texts by University students: An exploratory study. *Southern African Linguistics and Applied Language Studies*. <https://doi.org/10.2989/16073614.2023.2151480>.
- Chachage, C. S. (2006). The university as a site of knowledge: The role of basic research. *Journal of Higher Education in Africa*, 4(2), 47–67.
- Coxhead, A., Nation, P., & Sim, D. (2015). The vocabulary size of native speakers of English in New Zealand secondary schools. *New Zealand Journal of Educational Studies*, 50(1), 121–135.
- Cromley, J. (2009). Reading achievement and science proficiency: international comparisons from the Programme on International Student Assessment. *Reading Psychology*, 30, 89–118. <https://doi.org/10.1080/02702710802274903>.
- Cummins, J. (1976). The influence of bilingualism on cognitive growth: A synthesis of research findings and explanatory hypotheses. *Working Papers on Bilingualism*, 9, 1-43.
- Cunningsworth, A. (1995). *Choosing your coursebook*. Heinemann.
- Dagnaw, A. T. (2023). Revisiting the role of breadth and depth of vocabulary knowledge in reading comprehension, *Cogent Education*, <https://doi.org/10.1080/2331186X.2023.2217345>.
- Eskey, D. E. (2005). Reading in a second language. In E. Hinkel (Ed.), *Handbook of research on second language teaching and learning*. Lawrence Erlbaum, pp. 563- 580
- Flesch, R. (1948). A new readability yardstick. *Journal of Applied Psychology*, 32, 221-233. <https://doi.org/10.1037/h0057532>.

- Goldman, S. R. & Pellegrino, J. W. (2015). Research on learning and instruction implications for curriculum, instruction, and assessment. *Policy Insights from the Behavioral and Brain Sciences*, 2, 33-41.
- Grabe, W. & Stoller, F. L. (2002). *Teaching and researching reading*. Pearson Education. <https://doi.org/10.4324/9781315833743>.
- Hacking, J.F., Rubio, F. & Tschirner, E. (2018). The relationship between reading proficiency and vocabulary size: An empirical investigation. *The American Association of University Supervisors, Coordinators and Directors of Foreign Languages Programs (AAUSC)*, 58-77. <http://hdl.handle.net/102015/69782>.
- Hirsh, D. & Nation, P. (1992). What vocabulary size is needed to read unsimplified texts for pleasure? *Reading in a Foreign Language*, 8, 689-696.
- Hu, M. & Nation, I. S. P. (2000). Unknown vocabulary density and reading comprehension. *Journal of Reading in a Foreign Language*, 2(13), 403-430.
- Kendeou, P., McMaster, K. L. & Christ, T. J. (2016). Reading comprehension: Core components and processes. *Policy Insights from the Behavioral and Brain Sciences*, 3(1), 62-69. <https://doi.org/10.1177/2372732215624707>.
- Kiondo, E. Y. & Matekere Y. (2010). The relevance of Mwalimu Nyerere's philosophy in educational development: Search for missing links in the development of higher education in Tanzania. *UONGOZI Journal of Management and Development Dynamics*, Special Issue (2).
- Laufer, B. (1989). What percentage of text-lexis is essential for comprehension? In: Lauren, C. and Nordman, M., (Eds), *Special language: From human thinking to thinking machines*, Multilingual Matters, Clevedon, 316-323.
- Laufer B. (1992). How much lexis is necessary for reading comprehension? In: Bejoint, H. & ArnaudP (eds), *Vocabulary and applied linguistics*. Macmillan. pp. 126-132. https://doi.org/10.1007/978-1-349-12396-4_12.
- Laufer B. (2013). Lexical thresholds for reading comprehension: What they are and how they can be used for teaching purposes. *TESOL Quarterly*, 47(4), 867-872. <https://doi.org/10.1002/tesq.140>.
- Laufer B., & Ravenhorst-Kalvoski, G. C. (2010). Lexical threshold revisited: Lexical text-coverage, learners, vocabulary size and reading comprehension. *Reading in a Foreign Language* 22(1), 15-30.

- Liswaniso, B. L. & Mubanga, G. N. (2019). Examining the reading habits of university students: A study of students at the Katima Mulilo campus of the University of Namibia. *Electronic Journal of Foreign Language Teaching*, 16(1), 142-152.
- Masrai, A. (2019). Vocabulary and reading comprehension revisited: Evidence for high, mid and low-frequency vocabulary knowledge. *Sage Open*, 9(2), 1-13. <https://doi.org/10.1177/2158244019845182>.
- McLaughlin, G.H. (1969). SMOG grading: A new readability formula. *Journal of Reading*, 22, 639-664.
- Mclean, S. (2021). The coverage comprehension model, its importance to pedagogy and research, and threats to the validity with which it is operationalized. *Reading in a Foreign Language*, 33(1), 126–140.
- Meara, P. M., & Jones, G. (1989). *Eurocentres vocabulary test 10 KA*. Zurich, Switzer- land: Eurocentres.
- Mehrpour, S., Razmjoo, S.A. & Kian, P. (2011). The relationship between depth and breadth of vocabulary knowledge and reading comprehension among Iranian EFL learners. *Journal of English Language Teaching and Learning*, 2(222), 97-127.
- Milton, J. (2009). *Measuring second language vocabulary acquisition*. Multilingual Matters.
- Milton, J. (2013). Measuring the contribution of vocabulary knowledge to proficiency in the four skills. In C. Bardel, C. Lindqvist & B. Laufer (Eds.), *L2 vocabulary acquisition, knowledge and use: New perspectives on assessment and corpus analysis* (pp. 57-78): EUROSLA monograph 2.
- Mkandawire, M. T. & Walubita, G. (2015). Feedback study on developing critical literacy among Malawian and Zambian undergraduate university students using a Freirean praxis. *Journal of Education and Training Studies*, 3(2), 150-158.
- Mwantimwa, K., Mwabungulu, E. & Kassim, M. (2019). *Enhancing reading culture among university learners in Tanzania*. (Unpublished paper). Presented at the 2nd Annual Conference on Research and Inclusive Development, Bridging the Gap: Connecting Research to Policy, 14th-15th November 2019.
- Nation, I. S. P. (1983). Testing and teaching vocabulary. *Guidelines*, 5, 12-25.
- Nation, I. S. P. (2001). *Learning vocabulary in another language*. Cambridge University Press.
- Nation, I. S. P. (2006). How large a vocabulary is needed for reading and listening? *Canadian Modern Language Review/ La Revue*

- canadienne des langues vivantes*, 63(1), 59-82. <http://dx.doi.org/10.3138/cmlr.63.1.59>.
- Nation, I. S. P. & Beglar, D. (2007). A vocabulary size test. *The Language Teacher*, 31(7), 9-13.
- Ndabakurane, J. J. (2020). *Improving vocabulary and reading comprehension in English learning in Tanzania using English language supportive material (ELSM)* (Doctoral Thesis). The University of Dodoma.
- Neri, C.N., Guill, K. & Retelsdorf, J. (2021). Language in science performance: Do good readers perform better? *Eur J PsycholEduc*, 36, 45–61. <https://doi.org/10.1007/s10212-019-00453-5>.
- Nizonkiza, D. & Van Dyk. T. (2015). Academic literacy of South African higher education level students: Does vocabulary size matter? *Stellenbosch Papers in Linguistics*, 44, 147-174. <http://doi:10.5774/44-0-159>
- Ntereke, B. B. & Ramoroka, B.T. (2017). 'Reading competency of first-year undergraduate students at University of Botswana: A case study'. *Reading and Writing*, 8(1), 1-11.
- Nyarko, K., Kugbey, N., Kofi, C. C., Cole, Y. A., & Adentwi, K. I. (2018). English reading proficiency and academic performance among lower primary school children in Ghana. *SAGE Open*, 8(3), 1-10.
- Owusu-Acheaw, M. & Larson, A., G. (2015). Use of social media and its impact on academic performance of tertiary institution students: A study of students of Koforidua polytechnic, Ghana. *Journal of Education and Practice*, 6(6), 94-101.
- Rahmawati, L., E. & Sulistyono, Y. (2021). Assessment and evaluation on text readability in reading test instrument development for BIPA-1 to BIPA-3. *Asian Journal of University Education*, 17(3), 51-57.
- Rashidi, N. & Khosravi, N. (2010). Assessing the role of depth and breadth of vocabulary knowledge in reading comprehension of Iranian EFL learners. *Pan-Pacific Association of Applied Linguistics*, 14(1), 81-108.
- Sahin, S. (2020). Developing a checklist for English language teaching course book analysis. *International Journal of Education and Research*, 8(1), 107–120.
- Şen, Y., & Kuleli, M. (2015). The effect of vocabulary size and vocabulary depth on reading in EFL context. *Procedia - Social and*

- Behavioral Sciences*, 199, 555–562. <https://doi.org/10.1016/j.sbspro.2015.07.546>.
- Schmitt, N. (2008). Review article: Instructed second language vocabulary learning. *Language Teaching Research*, 12(3), 329-363.
- Schmitt, N., Schmitt, D. & Clapham, C. (2001). Developing and exploring the behaviour of two new versions of the vocabulary levels test. *Language Testing*, 18(1), 55-88.
- Schmitt, N., Grabe, W. & Jiang, X. (2011). The percentage of words known in a text and reading comprehension. *The Language Modern Journal*, 95(1), 26-43.
- Smith, R., Snow, P., Serry, T. & Hammond, L. (2021). The role of background knowledge in reading comprehension: A critical review. *Reading Psychology*, 42(3), 214–240. <https://www.tandfonline.com/doi/abs/10.1080/02702711.2021.1888348>.
- Solikhah, I. (2020). Evaluating EAP textbooks for Indonesian university students using impressionistic and in-depth assessment. *Indonesian Journal of English Language Teaching and Applied Linguistics*, 4(2) 395 – 411. <http://doi.org/10.21093/ijeltal.v4i2.606>.
- Stoffelsma, L. & Spooren, W. (2019). The relationship between English reading proficiency and academic achievement of first-year Science and Mathematics students in a multilingual context. *International Journal of Science and Mathematics Education*, 17(2), 905–922. <https://doi.org/10.1007/s10763-018-9905-z>.
- Varzaneh, M. M. & Darani, L., H. (2018). EFL textbook evaluation: An analysis of readability and vocabulary profiler of four corners book series. *International Journal of Foreign Language Teaching & Research*, 6(22), 47-57.
- Wang, Z., Zhao, X., Song, W. & Wang, A. (2019). Readability assessment of textbooks in low resource languages. *Computers, Materials & Continua*, 61(1), 213-225.
- Wema E. (2018). Investigating reading culture among students in higher learning institutions in Tanzania. *University of Dar es Salaam Library Journal* 13(1), 4–19.
- Wissing, G., J., Blignaut, A. S., & Van den Berg, K. (2016). Using readability, comprehensibility and lexical coverage to evaluate the suitability of an introductory accountancy textbook to its readership. *Stellenbosch Papers in Linguistics*, 46, 155-179. <https://doi.org/10.5774/46-0-205>.

- Zano, K. & Phatudi, N. (2008). Relationship between vocabulary knowledge and reading comprehension of South African EFAL high school learners, *Per Linguam*, 35(3), 16-28. <http://dx.doi.org/10.5785/35-3-830>.
- Zhang, L. J. & Annual, S.B. (2008). The role of vocabulary in reading comprehension: The case of secondary school students learning English in Singapore. *RELC Journal*, 31(3), 51-76.