Receptive Vocabulary Size as a Predictor of Undergraduates' Overall Cumulative Grade Point Average With English as Medium of Instruction in Universities

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Abstract: Vocabulary size (VS) and English language proficiency (ELP) are acknowledged as important factors in students' overall cumulative grade point average (CGPA) in tertiary education. This study attempts to investigate the associations among vocabulary size, ELP, and CGPA. It also determines whether vocabulary size or ELP can better predict tertiary students' CGPA. The study sample is comprised of 96 undergraduates on four programs at a Malaysian public university. The students' vocabulary size was measured using a 20,000-word vocabulary size test, their ELP that was derived from their Malaysian University English Test scores, and their CGPA that was obtained from their academic transcripts. The correlational, comparative, and predictive analyses revealed a moderate and significant positive association among all the variables. In addition, vocabulary size emerged as a better predictor of CGPA than ELP, with a contribution of 25% to overall CGPA. The findings provide strong empirical confirmation demonstrating the significant function of vocabulary size in tertiary students' CGPA. As a result of these investigations, suggestions were identified for future research.

Keywords: vocabulary size, cumulative grade point average (CGPA), English language proficiency, second language acquisition, tertiary education, English-medium instruction (EMI), language testing

It is generally accepted that the academic achievement of tertiary students affects their employability and future opportunities to progress in their careers (Laidra et al., 2007). Therefore, in recent years, researchers in several disciplines around the world have shown an increased interest in identifying factors that influence students' academic performance (Beauvais et al., 2014; Fraser & Killen, 2003; Rimfeld et al., 2016). So far, vocabulary size,

ELP, word recognition skills, academic vocabulary, and intelligence have been addressed as being potentially important factors that most contribute to the academic achievement of university undergraduates studying English as a Second Language (L2) learners (Masrai & Milton, 2017; Milton & Treffer-Daller, 2013; Roche & Harrington, 2013; Nagy & Townsend, 2012).

Recent studies have shown that both native English-speaking countries and English as an L2

or English as a foreign language (EFL) countries (for instance, Malaysia, Indonesia, and Singapore), both private and public university students need an advanced level of English language proficiency (ELP) (Arkoudis et al., 2009; Singh & Choo, 2012). At present, a number of international schools and universities in the ESL context deliver their programs through English-medium instruction (EMI), and academic achievement is one of their main concerns. Thus, in Malaysia, the Ministry of Higher Education implemented the Malaysian University English Test (MUET), as a standardized test that measures the student's ELP to assess their suitability for admission to a first degree (undergraduate degree) program in Malaysian public universities and colleges (Nopiah et al., 2011). However, despite MUET having been in effect for several years, tertiary students still suffer from poor English language communication skills, especially in writing and speaking (Musa et al., 2012; Rashid et al., 2017). Recently, the Malaysian Education Blueprint 2015–2025 (Higher Education) has been implemented, which suggested that the admission requirement for Science, Technology, Engineering, and Mathematics (STEM) programs be raised from MUET Band 1 to Band 3 for Arts, from Band 1 to Band 2 for Social Sciences, and from Band 1 to Band 4 for Medical and Law programs (Ministry of Higher Education Malaysia, 2015). This raising of the bar is of some concern to public universities because they envisage a possible reduction in the number of students intending to get admission in their undergraduate programs across a range of disciplines. For instance, in a newspaper interview, the vice-chancellor of University Utara Malaysia stated that only 30% of their students were in Bands 3, 4, and 5, and the other 70% were in Bands 1 and 2 (Bernama, 2014). Based on these percentages, public universities may lose a large number of potential students when the new criteria are implemented. Moreover, the decision to increase the MUET band comes into question because earlier research (Daller & Yixin, 2017; Masrai & Milton, 2017) has reported several other contributing factors other than ELP, which have greater significance on tertiary students' CGPA. Furthermore, researchers have found that ELP contributes less than 10% to academic achievement (Kerstjens & Nery, 2000), whereas aspects like vocabulary knowledge (size) have been found to contribute between 33% and 96% to overall academic performance (Morris & Cobb, 2004; Daller

& Xue, 2009; Roche & Harrington, 2013; Daller & Phelan, 2013; Harrington & Roche, 2014a, 2014b; Masrai & Milton, 2017).

Regardless of the influence of these issues on overall academic performance, an inadequacy of investigations examining their (VS and ELP) significance on academic achievement with Malay tertiary students studying in an EMI context. Thus, the present investigation is an attempt to explore the relationship between VS, ELP, and CGPA. It also investigates the better predictor of CGPA between VS and ELP in an ESL context where the medium of instruction is English. Consequently, This prospective investigation is driven by both an aspiration to expand our insight into the predictors of academic achievement in broad-spectrum and in the EMI context in specific, and by the insufficiency of investigation in L1 Malay users studying at the tertiary level using EMI in a context where English is hardly spoken beyond the classroom.

Literature Review

ELP and Academic Success in an English-Medium Instruction of a University Program

Over the last two decades, there has been an increasing move from studying English as a foreign language (EFL) to implementing English as a medium of instruction (EMI) at the tertiary stage in many non-native English-speaking countries (Dearden, 2014; Harrington & Roche, 2014a; Kirkpatrick, 2011; Kyeyune, 2003; Tung et al., 1997). A large-scale study (Dearden, 2014) that has been performed across 55 nations, where English has been studied either as foreign language or second language, showed that 78.2% of the public universities adopt English as the medium of instruction. In contrast, their counterpart private universities use EMI about 90.9%. Accordingly, students of these universities highly rely on good English language efficiency in the four basic skills (reading, writing, listening, speaking). All the skills are essential for successful educational attainment.

To date, several recent studies explored the relationships between ELP and CGPA in the Malaysian context. The study by Rethinasamy and Chuah (2011) offered probably the most comprehensive empirical analysis of ELP and CGPA among 2,884 undergraduates, and their multiple regression analysis showed that the reading and listening modules of the

MUET strongly correlate with learners' academic achievement. An investigation conducted by Othman and Nordin (2013) on the association between MUET and academic performance among 111 first and second-year undergraduates of Teaching English as a Second Language (TESL) program at a Malaysian government university showed a modest relationship (r = .435) between overall MUET and CGPA. Rahmat et al.'s (2015), study among the 225 undergraduate engineering students on the contribution of MUET over the CGPA demonstrated a moderate link (r=.368.) between CGPA and MUET and their regression analysis showed 18% predictive validity of MUET over CGPA. Zainoor (2014) found a modest relationship between ELP and CGPA in a Malaysian degree college, where the linear association suggests that undergraduates that are more competent in the English language have better final academic grades. Likewise, Juliana and Abu Bakar (2013) examined the precision of MUET as an anticipator of students' academic achievement and found that students' MUET band is a significant contributor to academic performance.

Maleki and Zangani (2007), in an Iranian university study, reported a statistically significant positive association (r = .48) between ELP and GPA of 50 English Translation major undergraduates. Fakeye and Ogunsiji (2009) also reported a modest association between ELP and academic achievement of Nigerian undergraduates. Sahragard et al.'s (2011) study in Iran showed that when learners have greater proficiency in English language usage, their academic achievement in their other subjects also improves, and consequently they get higher marks. Kaliyadan et al. (2015) also found a moderate association between ELP and academic performance among 103 first-year undergraduates. A longitudinal study by Patron (2016) was carried out among 862 undergraduates of three major faculties, namely business, education, and engineering, in a public university in the Philippine; it was found that English proficiency is significantly related to undergraduates' academic performance. Geide-Stevenson's (2018) study reported that English proficiency positively impacts overall CGPA of students studying in a dual degree undergraduate finance program in the United States.

Yet, many other studies (both inside and outside of Malaysia) have shown a weak or no relationship between ELP and academic achievement of university undergraduates. Studies conducted in different Malaysian colleges and universities (e.g., Su & Ow, 2004; Samad et al., 2008) on the relationship between the MUET band, which can be considered as a proxy for ELP, and academic achievement have found statistically significant but weak association between the two. Also, Nopiah et al. (2011), in their investigation on the association between MUET and academic achievement in Malaysia, found that the learners who obtained a score in MUET Bands 2 and 3 acquired a CGPA of between 2.50 and 2.99, whereas learners who obtained a score in MUET Bands 4 and 5 managed to achieve a CGPA of between 3.00 and 3.66. However, the correlation statistics showed a very low association between ELP and CGPA. In a case study on the association between MUET and CGPA in a Malaysian public university, Buniyamin et al. (2015) reported that students in MUET Band 2 have an average CGPA of 2.83 and those in MUET Band 3 have an average CGPA of 2.86, whereas those in Band 4 have an average CGPA of 3.1, which suggest that a marginal association exists between VS and CGPA. In a longitudinal study, Samad et al. (2008) tested 52 third-year Teaching English as a Second Language (TESL) tertiary students in Malaysia and found a weak correlation between the MUET band and CGPA. Their findings showed that the speaking component of the MUET band has a very low correlation with CGPA. Dev and Qiqieh (2016) explored the association between ELP and students' CGPA of 200 Abu Dhabi University undergraduates. They pointed out no significant relationship exists between ELP and CGPA. Addow, Abubakar, and Abukar (2013) arrived at the same conclusion, reporting that ELP has an insignificant relationship with a Somalian university undergraduates' overall academic achievement. Consequently, they argued that there is no substantial influence of ELP on students' final CGPA. In a recent study in Nigeria, Aina and Olanipekun (2013) investigated the influence of ELP on academic achievement among tertiary students studying Computer Science and Physics. They showed that there is a negative association between ELP results and students' achievement in their programs. Commenting on the inconsistent results in the literature, Harrington and Roche (2014b) argued that the use of general methods of measuring academic ELP, for example, the International English Language Testing System (IELTS), might be the ultimate cause of these inconsistent results. Dooey and Oliver (2002)

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stated that "little evidence for the validity of IELTS as a predictor of academic success" (p. 36). Elder and von Randow (2008) and Kerstjens and Nery (2000) found that proficiency in English can only account for 10% of overall academic achievement. Also, a large-scale study by Oliver, Vanderford, and Grote (2012) among international undergraduates in an Australian university context sought to determine the association between undergraduates' academic performance and their overall IELTS band scores. They have not found any statistically significant association between the two variables. However, a weak relationship (r.27) was reported between the reading sub-score and the overall GPA. Thus, students' ELP must not be considered as an absolute prerequisite for university success, particularly in an EMI context (Oliver et al., 2012).

Vocabulary Size and Academic Success in an English-Medium of Instruction in University Programs

Vocabulary knowledge has a significant contribution to overall language skills and academic success. If a tertiary student's knowledge of vocabulary is inadequate in a subject area, their performance in that subject area will be affected (Ismail, 2008). According to Coxhead et al. (2015), adequate vocabulary size is a prerequisite for academic success. Given the importance of vocabulary knowledge to L2 tertiary learners whose medium of instruction is English, it is noted that they need to have adequate vocabulary knowledge to develop their literacy skills as well as communication skills throughout their academic journey. Recent evidence suggests that a tertiary student needs an 8,000 to the 9,000-word family of vocabulary to achieve 98% lexical coverage (Dang & Webb, 2014; Nation, 2012). A word family comprises the base construct of a word or any word that can be derived from that base form, excluding compounds of morphemes (Nation, 2000).

Furthermore, the relationship between VS and academic achievement has been confirmed repeatedly in the present decade. Laufer et al. (2004) conducted a study among 100 L2 learners studying at the University of Auckland and the University of Melbourne and found that students' VS is the most significant element of their second language proficiency. Hence, Morris and Cobb (2004) were one of the first to explore the modest association between vocabulary profiles and academic performance of 122 Canadian TESL

undergraduates. They concluded that academic success occurs when learners possess the ability to access and use a wide range of vocabulary. A modest association also has been found by Lemmouh (2008) among Swedish university students from English and Science programs, and he concluded that the analysis of the direct association between tertiary learners' VS and academic achievement might provide valuable information regarding the extent to which VS contributes toward academic achievement. A study was undertaken by Milton and Treffers-Daller (2013) among 178 fresh undergraduates in the U.K., showing a modest relationship (.477) between vocabulary size and CGPA. Harrington and Roche (2014b) investigated the extent to which vocabulary predicts an overall GPA of 280 Omani undergraduates of different academic disciplines, showing that 25% of the variance in GPA can be explained by word accuracy. Research thus far has shown that a rich vocabulary seems to be a predictor of academic success (Harrington & Roche, 2014b; Masrai & Milton, 2017; Milton & Treffer-Daller, 2013; Alsager & Milton, 2016). In a study that set out to predict 60 Chinese undergraduates' academic achievement in the U.K., Yixin and Daller (2014) found that lexical richness could explain as much as 28% of tertiary students' academic achievement. Applying a combination of various assessments among 74 undergraduates mostly from European countries studying in the U.K., Daller and Phelan (2013) found that students' overall academic achievement can be explained as much as 33% to 96% based on their mastery to deal with vocabulary correctly and it appears to be one of the strongest anticipators of academic success. As a result, they argued that vocabulary knowledge is one of the fundamental elements that account for the entire final grades that the students achieve.

With regard to the studies discussed here, most of them found a moderate link between the ELP and the CGPA at the tertiary level. However, there has been scant research to demonstrate whether ELP or VS is a better contributor to academic achievement in the Malaysian context. The participants in the present study were admitted into university after the new stricter rules on the MUET band levels for tertiary education came into force in 2015. Therefore, the present study is timely in that it attempts to measure the extent of the relationship between VS and CGPA and between ELP and CGPA. Furthermore, the current investigation

assesses the performance of two language measures—vocabulary knowledge (as tested by a Vocabulary Size Test (VST) and an index of overall ELP (MUET band score) —as predictors of academic achievement (as measured by CGPA) in EMI undergraduate programs in a public university in Malaysia. Given the foregoing, the present study's research questions are as follows:

1. What is the correlation between vocabulary size and academic achievement of Malay EMI learners at tertiary level?
2. What is the relationship between English language proficiency and CGPA of Malay ESL learners at tertiary level?
3. What is the best predictor of CGPA between vocabulary size and English language proficiency of Malay EMI learners at tertiary level?

Methods

Research Design

This study set out to investigate the association between three variables—vocabulary size, ELP, and CGPA—by conducting a correlational analysis, rather than to attempt to establish a causal relationship. As the key objective of the current study was to determine the relationship between VS and CGPA, and ELP and CGPA, an explanatory research method was regarded to be the most appropriate design. Raw data were obtained from three primary sources: vocabulary size was measured through Nation and Beglar's (2007) VST, students' CGPAs were obtained from their academic transcripts, and students' MUET band scores were collected from the students.

Sample

To obtain the sample, the present study adopted Bryman and Bell (2015)'s theory of stratified random sampling techniques, which involves defining sub-groups within the broader population and then randomly or systematically sampling within them in order to ensure that each sub-group is adequately represented in the sample. To investigate the current objectives, the inclusive population in the selected high ranking public university was stratified and subcategorized into English-major and non-English-major programs. Then, the following four programs were selected: Bachelor of Arts in the English Language, Bachelor of Education (TESL), Bachelor of Engineering (Civil), and Bachelor of Economics. These four programs were chosen because the medium of instruction for most of the courses in these programs was English, and most of the course lecturers were Malaysians.

As the primary objective of the study was to administer correlation and regression analyses to explore the best predictor of undergraduate students' overall CGPA, the number of participants was based on the requirements of those approaches. Eighty-five participants are required, according to Cohen (1992), to observe a moderate size effect (r = .3) with the standard α-level of .05. Moreover, according to Creswell (2013) and Fraenkel and Wallen (2009), above 30 members are needed for a correlational investigation. Therefore, a total of 96 Malaysian undergraduates were recruited from the programs of study listed in Table 1. Distribution of the participants by programs and the academic year are shown in Table 1.

Table 1

Distribution of the Participants by Programs and Academic Year (N = 96)

Program type	Academic year	No. of participants
Bachelor of Engineering (Civil)	2nd	24
Bachelor of Economics	2nd	24
Bachelor of Arts in the English Language	2nd	31
Bachelor of Education (TESL)	2nd	17
Total		96

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Instruments

Vocabulary Levels Test (VLT) prepared by Nation (1990) is the most widely administered vocabulary size test in the ESL contexts. This VLT comprises vocabulary on four distinct frequency standards: 2,000, 3,000, 5,000, and 10,000. According to Schmitt (2010), the VLT is designed to diagnose students' vocabulary profiles for a placement test rather than providing an overall estimation of students' average VS. Hence, Nation and Beglar (2007) argued that there is a need for a more comprehensive test of vocabulary size because VLT does not cover several word frequency levels, for instance, 4th 1000 and 6th -9th 1,000-word frequency levels. Thus, the VST (Nation & Beglar, 2007) was adopted for assessing Malay undergraduates' average VS. Moreover, most of the reviewed earlier studies suggested that the 20k (Version A) VST introduced by Nation and Beglar (2007) is an up-to-date and useful tool that measures students' receptive vocabulary knowledge.

A variety of approaches are used in the literature to assess the reliability and validity of the VST (Nation & Beglar, 2007). In an investigation among 19 English as L1 and 178 of English as L2 learners, Beglar (2010) employed Messick's (1995) six traits of validity, which is comprised of content, substantive, structural, generalizability, external, and consequential validity to validate the 14k VST of Nation and Beglar (2007) and they concluded that the tested items in the 14k VST best fitted with the Rasch model.

Karami (2012) found a high level of reliability (.96) in an Iranian university context among 190 English as L2 learners while validating a bilingual Persian form of the 14k VST (Nation & Beglar, 2007). Based on the theory of classical test and item response, Zhao and Ji (2016) also found a high level of reliability and validity in a bilingual Mandarin form of the VST among 100 Chinese undergraduates.

The 20k Version A (Nation & Beglar, 2007) VST tests knowledge of the written lexical forms, the form-meaning association, and a slight perceptual understanding in English (Nation, 2013). It requires participants of the test to determine the finest interpretation of each form. The sample words are based on a comprehensive compilation of 20k word groups, and participants' test result is to be multiplied by 1 X 200. Regarding the normal distribution of students' overall vocabulary size (VS) of the present study (N96), a normality test was performed, which disclosed that the Kolmogorov-Smirnova is .066 whereas the power of Shapiro-Wilk is .987, which shows the normal distribution of the data. Future, it did the correlation test based on raw scores of the VST.

In this article, "academic achievement" and "CGPA" are used interchangeably. The students' academic achievement was measured according to their CGPA, which was obtained from the university study portal by logging in through respondents' cellphone or via a desktop in a classroom. In the undergraduate study, the categorization of CGPA has been defined into 11 distinct levels (see Appendix 6 for more details). However, only four categories are found among the participants of the present study, such as 3.75–3.99 (A-), 3.50–3.74 (B+), 3.00–3.49 (B), 2.75– 2.99 (B-). To observe the normality of the students' CGPA, a normality test was administered. The statistics showed that the Kolmogorov- Smirnov is .087, whereas the Shapiro-Wilk value is .975, which indicates a normal distribution of the data. Later, the correlation test was performed based on the raw values of CGPA.

In 1999, the Ministry of Higher Education implemented MUET, which is a standardized test that examines a student's ELP to assess their suitability for admission to a first degree (undergraduate degree) program in Malaysian and Singaporean public universities and colleges (Nopiah et al., 2011; Othman & Nordin, 2013). It consists of four components: listening (45 points), speaking (45 points), reading (120 points), and writing (90 points). The maximum score that can be achieved is 300. Scores are aggregated and converted into Bands 1 to 6, where Band 1 (a score below 100) represents an "extremely limited user," and Band 6 (a score of 260–300) denotes a "highly proficient user" (see Appendix 1 for a detailed specification of the MUET scoring system). An alignment between the Common European Framework of Reference or CEFR, which is adopted globally as the standard language proficiency, and MUET is presented in Table 2 (Abidin & Jamil, 2015). Although the MUET Band scores range from 1–6, there has not been found any student having MUET band 1 and 6 among the participants in the current investigation. A normality test of the proficiency scores (i.e., the MUET scores) was run to check the normal distribution of the data. It was found that the Kolmogorov-Smirnova is .209, and the value of Shapiro-Wilk is .856, which indicates the

normal distribution of the data. Hence, the correlation test was administered on the basis of the raw scores of MUET.

Data Analysis

Four levels of analysis were employed in the present study: descriptive, correlational, comparative, and predictive. Statistical control was attained through computational analysis employing the Statistical Package for the Social Sciences software program (SPSS), version 22. First, a normality test was administered to check whether the data of the selected variables (VS, CGPA, and MUET) are normally distributed or not. According to George and Mallery (2003), the cutoff point should be between ±1 or ±2 of the Kolmogorov-Smirnov and Shapiro-Wilk test results. The statistical analysis of the normal distribution is reported in Appendix 3. Second, correlational analysis of interval data was performed with Pearson's product-moment procedure and using a predetermined alpha level of .05 or less than indicative of statistical significance. Pearson's product-moment correlation test provides strength and direction for the relationship between vocabulary size and academic achievement. Next, a one-way analysis of variance (ANOVA) was run to investigate if there were any statistically significant variations among the four CGPA groups found in the current investigation. Finally, a stepwise multiple regression test was run for predicting students' academic achievement based on their vocabulary size and ELP. The Stepwise backward technique of multiple regression analysis is used to analyze this issue. In this method, the software places all the predictors in a model. This model calculates

the contribution of each independent variable on the dependent variable based on the t-test significance value for each predictor. Therefore, the model only keeps the statistically significant contributor/s, and it removes the other non-statistically significant predictors from the model (Davies et al., 2010; Field, 2009).

Results

The Association Between Vocabulary Size and Academic Achievement

A two-tailed Pearson's product-moment correlation analysis was administered to investigate the association between vocabulary size and academic achievement. Table 3 displays the summary statistics of the correlation test and shows a statistically significant, moderate, positive association between vocabulary size and academic achievement (r = .492, p < .01). Thus, it is evident that if a student obtains a high score in the VST, for example, at the 9,000 or 10,000-word family level, they would likely perform well in their program of study as well.

To measure the size and course of the linear association between the overall vocabulary size scores and academic achievement, Pearson's correlation (r) value was considered. The correlational statistics of these two variables is positive and moderate (r [94] =.492, p < .001). In addition, to calculate the magnitude of divergence in one variable that can be accounted for by the variance in the other variable, Pearson's r was adjusted (r² =.492*.492 = 24.20). Thus, the coefficient of determination equals 24.20%, which suggests that

Table 2

An Alignment Between the Common European Framework (CEFR) and Malaysian University English Test (MUET)

MUET	CEFR
6	C2
5	CI
4	B2, BI
3	A2
2	AI
1	-

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Table 3

Correlations Between Vocabulary Size and Academic Achievement (n = 96)

	Type	CGPA	Vocab size of 20,000 words
CGPA	Pearson's correlation	1	.492
	Sig. (2-tailed)		.000
Vocabulary size	Pearson's correlation	.492	1
	Sig. (2-tailed)	.000	

24.2% of the variability of the students' academic achievement can be interpreted by the variability in their overall vocabulary score.

Further, Figure 1 provides a graphical illustration of the association between VS and CGPA. It can be observed that there is a downward trend in vocabulary size with a decrease in the participants' CGPA. Moreover, there is a huge discrepancy in vocabulary size between the participants in the highest (A-) and lowest (B-) CGPA groups, where the former has a vocabulary size of 12,600 and the latter a vocabulary size of 8,725, a difference of 3,875. Indeed, the outcome of the one-way ANOVA (see Table 4) demonstrates a statistically significant divergence in relation to undergraduates' vocabulary size among all the four achievement categories based on CGPA $(F (4, 96) = 7.945, p = .000.)$.
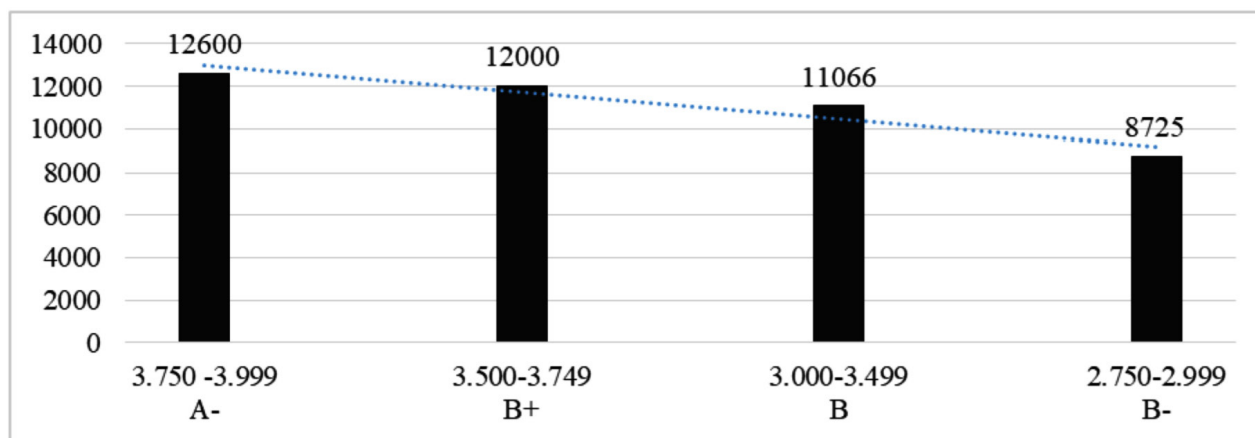

Figure 1. Association Between Vocabulary Size and Academic Achievement

Table 4

One-Way ANOVA Analysis

CGPA	N	M	SD	Highest	Lowest	df	F	Sig.
3.75-3.99 (A-)	6	12600	3217	16400	7400	3	7.945	.000
3.50-3.74 (B+)	31	12000	1751	15200	8600	92		
3.00-3.49 (B)	51	11066	1785	14400	7800	95		
2.75-2.99 (B-)	8	8725	1180	11000	6800			

Association Between English Language Proficiency and Academic Achievement

The direction and magnitude of the link between CGPA and the MUET band score shown in Table 5 suggest a moderate and statistically significant association (r = .429, p < .001) of Malay EMI learners at the tertiary level.

Furthermore, Pearson's r was squared to examine the effect size of ELP and CGPA (r² =.429*.429 = 18.40) and to measure the extent to which students' CGPA is explained by variance in the ELP. Thus, 18.40% of the variability in the CGPA can be explained by the variability in the MUET band score. Figure 2 provides a graphical illustration of the extent of the association between the MUET and the CGPA.

From Figure 2, it is apparent that the MUET scores have a modest linear association between CGPA and ELP, and students in Band 5 performed much better academically than those in the lower bands. Moreover, as also shown in Figure 2, there

is not much difference in academic achievement between the students in MUET Band 2 and MUET Band 3, or between those in MUET Band 4 and MUET Band 5. The average CGPA score is 3.19 for students in Band 2, 3.37 for students in Band 3, and 3.48 for students in Band 4, whereas that for Band 5 is 3.53. Perhaps the most striking outcome that emerged from the present investigation is that there is only a modest difference (3.19 & 3.37) in the CGPA between MUET Band 2 and MUET Band 3 students.

Vocabulary Size and ELP as Predictors of GGPA

A stepwise multiple regression analysis was performed to determine the magnitude to which the Malay tertiary undergraduates' receptive vocabulary size and ELP predicted their academic achievement when the two variables were considered in combination. To determine the dominant predictor of academic achievement, the vocabulary size score and the MUET

Table 5

Correlations Between ELP and CGPA (N = 96)

		MUET	CGPA
MUET	Pearson's correlation	1	.429**
	Sig. (2-tailed)		.000
	N	96	96
CGPA	Pearson's correlation	.429**	1
	Sig. (2-tailed)	.000	

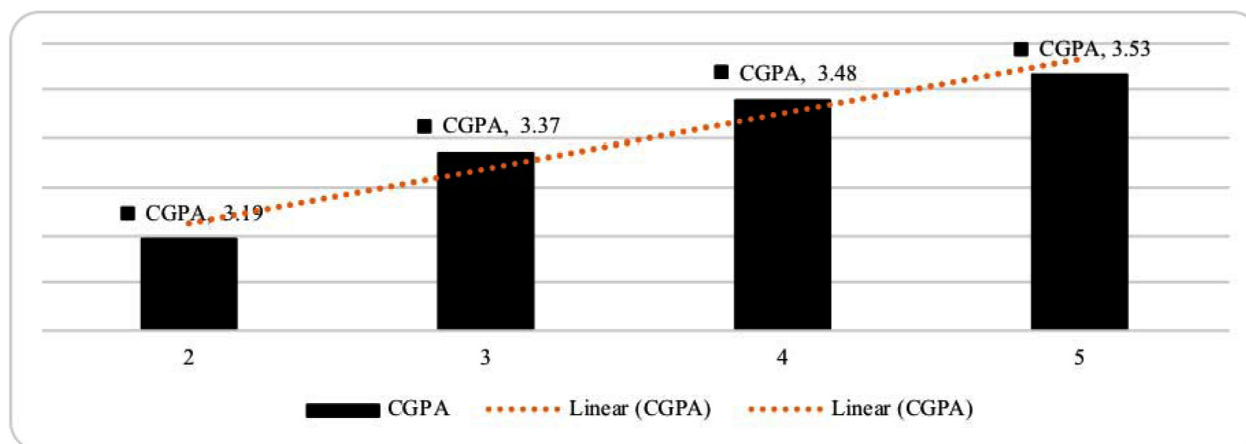Note: **: Correlation is significant at the 0.01 level (2-tailed).

Figure 2. Comparison of CGPA and MUET Band Score

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Table 6

Stepwise Multiple Regression Using CGPA as the Criterion Variable and Vocabulary Size and MUET Band Score as the Predictor Variables

Model		Unstandardized coefficients		Standardized coefficients	t	Sig.	95.0% confidence interval for B	
		B	Std. error	Beta			Lower bound	Upper bound
1	(Constant)	2.64	.134		19.766	.000	2.377	2.907
	Vocabulary size of 20,000	000	.000	.492	5.479	.000	.000	.000
F(1,94) = 30.025			R = .492					
sig-F = .000			R² = .242					

Notes: a. Predictors: (Constant), VSTTOTAL20000LEVEL; b. Dependent variable: CGPA.

band score were considered to be the predictor (or independent) variables, and the CGPA was considered to be the criterion (or dependent) variable. The summary statistics for the stepwise multiple regression are shown in Table 6.

As can be observed from Table 6, MUET is removed from the model, with vocabulary size standing alone as the significant predictor explaining about 24.2% of the variability in CGPA (R2 =.24.2, F (1, 94) = 30.025, p < .01). Vocabulary size significantly predicts CGPA (p = .000). According to the results of the standardized Beta weights, it can be concluded that for every one-unit increase in vocabulary size, the participants' CGPA increases by .492 (β = .492, p < .05).

Discussion

The results reflect those of Morris and Cobb (2004) and Lemmouh (2008), who found a modest link between VS and academic success. The moderate association between VS and CGPA found in the present study broadly supports the result (r.477) of Milton and Treffers-Daller's (2013) study in this area linking VS with CGPA. Thus, Milton and Treffers-Daller (2013) stated that students who possess a larger VS comparatively perform more excellent in assignments and examinations than those with a smaller VS at the tertiary level. Although it can be argued that the association between VS and CGPA is not a direct relation because a university grading system is usually based on scores derived from the expertise of the particular subject area and interpretations of that

knowledge, it is likely that the overall VS has merely a marginal influence on students' CGPA (Milton & Treffers-Daller, 2013). Nevertheless, the moderate association between VS and academic achievement found in the present investigation cannot be considered accidental because most of the Malay EMI learners have an adequate receptive vocabulary size beyond 9,000-word family, which according to Dang and Webb (2014) and Nation (2012), is the benchmark required of EMI tertiary students for comprehension of academic texts.

This outcome is contrary to that of Alsager and Milton (2016), who found no significant association between VS and CGPA of Arabic undergraduates studying in an EMI context. A possible explanation for this might be that the word frequency used in the XK_Lex test (Milton & AlMasrai, 2009), which was administered by Alsager and Milton (2016) was outdated compared to the VST adopted in the present study (Nation & Beglar, 2007).

With regard to the association between MUET and CGPA, the present finding is consistent with the study results from Su & Ow (2004), Samad et al. (2008), Nopiah et al. (2011), and Buniyamin et al. (2015), which found a very weak association between the MUET and the CGPA in different Malaysian university contexts. Nevertheless, the students in MUET Bands 2 and 3 of the present study managed to obtain a higher CGPA of above 3, which denotes marks of 60–64% and 65–69%, respectively, whereas, in Buniyamin et al. (2015) and Nopiah et al. (2011), students in MUET Band 2 and 3 obtained a CGPA below 3 (marks of

55–59%). Therefore, it can be argued that students in MUET Bands 2 and 3 can perform well academically even if they are in Bands 2 (limited user) and 3 (modest user).

Although there is a general consensus among policymakers in Malaysia that the recent increase in the MUET band score required for admission into particular subjects will likely result in a huge rise in academic achievement as well as successful future employment Ministry of Higher Education Malaysia, 2015, 2015), the present findings show that this may not turn out to be the case as there is not much difference in the CGPA of students in MUET Band 3 and MUET Band 4 (3.37 and 3.48, respectively). This finding indicates that Band 3 students could also be accepted into certain programs rather than limiting the intake to Band 4 students and above. However, it should be added that students with a Band 3 MUET score might require additional language development support or tutorial support to improve their ELP. Therefore, it could be argued that instead of continuing with the recently implemented MUET Band 4 entry requirement for admission into Medical and Law programs in public universities in Malaysia, students in MUET Band 3 could also be accepted on these programs. However, it cannot be denied that undergraduates who are more proficient in English language usage will have a better understanding of the course materials and higher academic performance, and consequently, higher scores (Fakeye & Ogunsiji, 2009; Othman & Nordin, 2013; Rahmat et al., 2015; Sahragard et al., 2011; Samad et al., 2008). This outcome is contrary to that of Maleki and Zangani (2007), Fakeye and Ogunsiji (2009), Sahragard et al. (2011), Kaliyadan et al. (2015), and Patron (2016), who found a statistically significant association between ELP and CGPA among university undergraduates. This inconsistency is challenging to expound, but it may be linked with participants and their sample size.

In the present study, vocabulary size has emerged as a contributing factor in undergraduates' CGPA. The elimination of the MUET band from the regression analysis can be explained in a number of different ways. Although some studies have shown that ELP and CGPA are closely connected (Fakeye & OgunsijI, 2009; Juliana & Abu Bakar, 2013; Kaur, 2006; Maleki & Zangani, 2007; Musa et al., 2012; Zainoor, 2014), other studies suggest that ELP is not a key factor in academic achievement (Oliver et al., 2012; Aina & Olanipekun, 2013; Harrington & Roche, 2014b; Dev & Qiqieh, 2016). These results mirror those of the earlier researches that have investigated the significance of English language proficiency measured by different standardized tests on undergraduates' overall CGPA and found no statistically significant association between ELP and CGPA (Kerstjens & Nery, 2000; Dooey & Oliver, 2002). Thus, Yixin and Daller (2014) rightfully claimed that "IELTS scores have the lowest predictive powers" (p. 9).

This study corroborates with the hypothesis of Laufer et al. (2004), who claimed that receptive or passive vocabulary size alone could be the most influential factor affecting academic achievement. The present study found that vocabulary can contribute as much as 25% on students' overall CGPA and this is very similar to the result reported in Harrington and Roche (2014b), who found that 25% of the variability of CGPA could be explained by word recognition measures among Omani EFL undergraduate students. It is also in agreement with Lemmouh (2008), which showed that Swedish tertiary students' receptive vocabulary size is a significant contributor to their academic achievement. Also, Roche and Harrington (2013) stated that the lower the vocabulary knowledge of learners, the worse they are expected to perform in terms of their academic ELP, which is instrumental to academic success. Thus, it could be argued that knowing adequate vocabulary (9000-word families) would help learners gain more depth of vocabulary knowledge (Schmitt, 2014). This also accords with earlier observations (Nation & Beglar, 2006; Schmitt et al., 2017). In all, undergraduates' adequate vocabulary size (beyond 9,000) can be a strong contributor to their academic success, and this suggests that vocabulary knowledge is the most influential factor in explaining their performance.

The findings of this study may have several implications. Firstly, as vocabulary was found to be the main predictor of CGPA, it is recommended that students in Band 2 (limited user) also be allowed to apply for admission to STEM programs in public universities across Malaysia. This suggestion challenges the newly implemented admission requirement of 2015, which requires that applicants for STEM programs should have a MUET Band 3 (modest user) score. This score that could decrease the pool of potentially promising STEM students who would

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otherwise be denied admission into a public university (Buniyamin et al., 2015).

Secondly, a key policy priority should be the assessment of tertiary students' vocabulary knowledge through the use of the Nation and Begler's (2007) VST for admission to STEM programs as a measure of students' readiness for these programs. The test should also be employed periodically in the continuous assessment of vocabulary knowledge to identify at-risk students. This may minimize the loss of potentially promising students who have a MUET band score that is below the entry requirement and may provide them with the opportunity to improve their ELP while at university. It should be noted that in Malaysia, a high number of public university candidates come from rural villages where there is inadequate contact with the English language and thus little chance of improving their ELP. These candidates may perform better in forthcoming semesters after exposure to an environment in which there are better and more widespread English language usage and teaching that would enable them to improve not only their English oral skills but also their writing skills. Hence, the decision made in the recent Malaysian Education Blueprint 2015–2025 (Higher Education) to increase the MUET score required for admission to certain programs ought to be reconsidered, not only because the present study findings show that vocabulary knowledge contributes a quarter of the overall CGPA score, but also to broaden access to tertiary education in Malaysia.

Moreover, in view of L2 tertiary students' vocabulary size, frequency is important in developing vocabulary knowledge because such knowledge is input-driven (Ellis, 2002), and it often relies on contextual cues (Webb & Nation, 2017). Thus, students need to read more books, articles, and websites so that they are exposed to more vocabulary more often. In a similar vein, according to Nation (2017), an ideal vocabulary learning strategy involves two fundamental conditions "Repetition (quantity of meetings with words) and good quality mental processing of the meetings" (p. 36). Paiman et al. (2015) suggested that another reasonable approach to increase students' vocabulary size is to provide direct instruction on morphemic analysis to tertiary Science students because this has been shown as the most convenient vocabulary gaining strategy in the Malaysian context.

Conclusion

Unlike previous studies that have mostly dealt with the association between VS and reading comprehension, the current findings clearly indicate the association between vocabulary size and academic achievement and between ELP and academic achievement. It also sought to determine whether vocabulary size or ELP was the best contributor to Malay tertiary undergraduates' academic achievement. To this end, a quantitative approach involving correlational, comparative, and predictive analyses were applied to a study sample of 96 Malay EMI learners on two English-major and two non-English-major programs in a Malaysian public university. The outcomes of this investigation have shown a significant moderate association between the overall VS and academic achievement and between ELP and academic achievement. It also found that around 25% of the CGPA of the study sample could be explained by the variability in vocabulary size. This implies that learners possessing bigger vocabulary sizes are about to perform better in their assignments and examinations than those with smaller vocabulary size.

However, the generalizability of these findings has at least three limitations. For instance, the population for the present study consisted only of Malay undergraduates from one university and only four study programs among a possible 17 programs offered at that university. Moreover, the present study aggregated the results across these four programs, despite literature suggesting that vocabulary size and ELP may broadly account for different percentages of variance in academic performance in different programs. Thus, different findings may have been produced if different programs had been studied, or the data had been de-aggregated. Also, the study investigated a small sample size (96 participants), so research on a large, randomly selected sample from a range of public and private universities across different programs would give more reliable results. Thus, further study with more sampling size is required. In further research, it will be interesting to consider additional variables, such as motivation, intelligence, and strategy use, in order to find out the best contractor of undergraduates' CGPA.

Declaration of ownership:

This report is my original work.

Conflict of interest:

None.

Ethical clearance:

This study was approved by the institution.

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APPENDIX

A.1. Malaysian University English Test (MUET) Specifications

Test Scores

Test scores are reported as follows:

Test Component	Maximum Score	Obtained Score
LISTENING	45	
SPEAKING	45	
READING	120	
WRITING	90	
AGGREGATED SCORE	300	
Band Achieved		

Description of Aggregated Scores

AGGREGATED SCORE	BAND	USER	COMMUNICATIVE ABILITY	COMPREHENSION	TASK PERFORMANCE
260 – 300	6	Highly proficient user	Very fluent; highly appropriate use of language; hardly any grammatical error	Very good understanding of language and context	Very high ability to function in the language.
220 – 259	5	proficient user	Fluent; appropriate use of language; few grammatical errors	Good understanding of language and context	High ability to function in the language
180 – 219	4	Satisfactory user	Generally fluent; generally appropriate use of language; some grammatical errors	Satisfactory understanding of language and context	Satisfactory ability to function in the language
140 – 179	3	Modest user	Fairly fluent; fairly appropriate use of language; many grammatical erros	Fair understanding of language and context	Fair ability to function in the language
100 – 139	2	Limited user	Not fluent; inappropriate of language; very frequent grammatical errors	Limited understanding of language and context	Limited ability to function in the language
Below 100	1	Very limited user	Hardly able to use the language	Very limited understanding of language and context	Very limited ability to function in the language

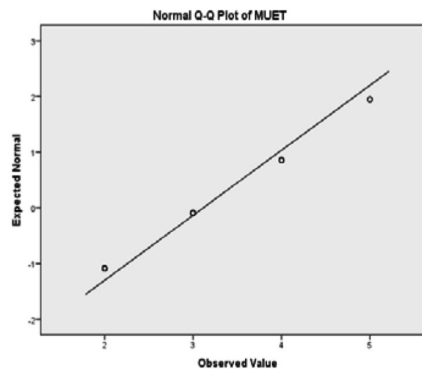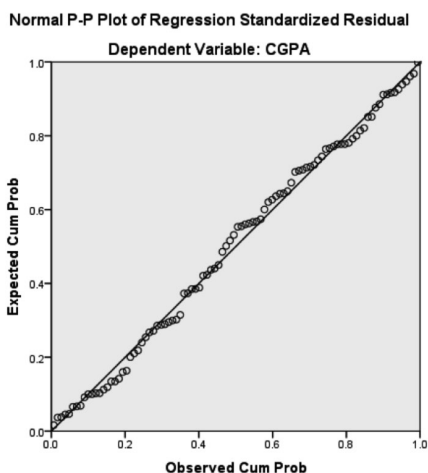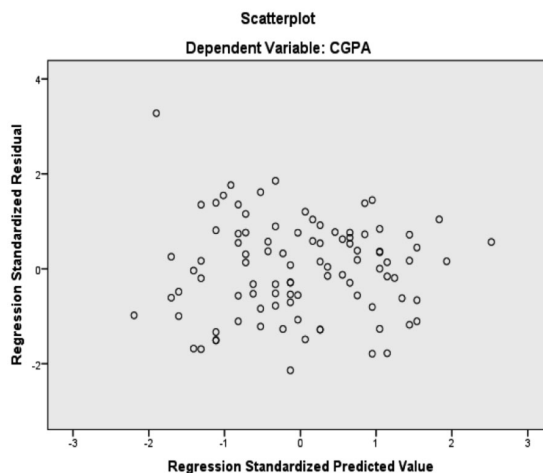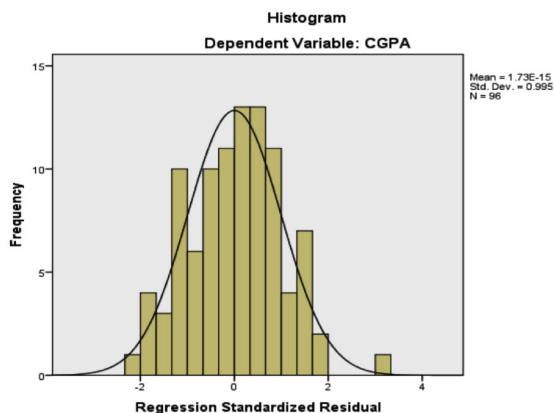Source: Ministry of Higher Education Malaysia (2015)

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A.2. (University Putra Malaysia) Undergraduate Grading System

Marks	Grade	Points	Explanation
80-100	A	4.000	Excellent
75-79	A-	3.750	Very Good
70-74	B+	3.500	Very Good
65-69	B	3.000	Good
60-64	B-	2.750	Good
55-59	C+	2.500	Satisfactory
50-54	C	2.000	Satisfactory
47-49	C-	1.750	Weak
44-46	D+	1.500	Weak
40-43	D	1.000	Very Weak
39 or less	F	0	Fail

Source: SKPSI1_Peraturan_Pengajian Siswazah_2003_Rev_2012-2013.pdf

Retrieved form http://www.sgs.edu.my/dokumen/SKPSI1_Peraturan_Pengajian_Siswazah_2003_Rev_2012-2013.pdf.

A.3. Correlation and Multiple Regression Analysis Assumption Tests

Histogram — Dependent Variable: CGPA

Scatterplot — Dependent Variable: CGPA

Normal P-P Plot of Regression Standardized Residual — Dependent Variable: CGPA

Normal Q-Q Plot of MUET

Multicollinearity Statistics Coefficient

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	2.642	.134		19.766	.000		
	VSTTOTAL20000LEVEL	6.397 E-005	.000	.492	5.479	.000	1.000	1.000
a. Dependent Variable: CGPA								

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
MUET	.209	96	.000	.856	96	.000

a. Lilliefors Significance Correction

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
CGPA	.087	96	.069	.975	96	.063

a. Lilliefors Significance Correction

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
VSTTOTAL20000LEVEL	.066	96	.200[*]	.987	96	.460

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction