SEMARAK ILMU PUBLISHING

Semarak International Journal of Current Research in Language and Human Studies

Journal homepage:
https://semarakilmu.my/index.php/sijcrlhs/index
ISSN: 3083-9572

Vocabulary Learning Beliefs, Vocabulary Learning Strategies, and Receptive Vocabulary Knowledge of ESL Learners among Engineering UTM Undergraduates

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ARTICLE INFO

Article history:
Received 28 September 2024
Received in revised form 15 October 2024
Accepted 23 November 2024
Available online 30 December 2024

Keywords:
Vocabulary learning beliefs; vocabulary learning strategies; receptive vocabulary knowledge; ESL learners; engineering undergraduates

ABSTRACT

Vocabulary knowledge is crucial for English language learning as without effective beliefs and strategies, it may impede ESL learners' academic and professional growth. The research aims to identify vocabulary learning beliefs (VLB), determine vocabulary learning strategies (VLS) commonly used, and assess ESL learners' receptive vocabulary knowledge levels among engineering undergraduates at Universiti Teknologi Malaysia, UTM. However, there are limited studies on beliefs and strategies among engineering undergraduates in the Malaysian context. A Google Form survey consisting of a Vocabulary Learning Strategy Questionnaire adopted from Hadi and Guo (2020) and a Vocabulary Levels Test (VLT) established by (Nation, 1983; Schmitt, Schmitt, and Clapham, 2001) were used for data collection. The respondents were selected among 70 ESL learners of UTM engineering undergraduates through a random sampling approach and cross-sectional research design. The descriptive analysis revealed that they have a positive VLB. Likewise, they ranked the cognitive as the most commonly used VLS. Subsequently, VLT scores illustrated high mastery at the 2000 and 3000-word levels, intermediate mastery at the 5000-word and Academic Wordlist levels, and low mastery at the 10000-word level. The findings suggested that combining both VLBs could encourage effective vocabulary learning. At the same time, the overall percentages of each VLS showed moderate agreement, implying that the respondents do not highly employ the VLSs, possibly due to low awareness level, and even not reached independent levels as evidenced by substantial failure at the 10000-word level. The findings significantly elevate ESL learners' awareness of VLS among engineering undergraduates to enhance their receptive vocabulary knowledge and inform the lecturers to tailor language instructions.

1. Introduction

1.1 Research Background

Vocabulary is the backbone of language learning, alongside grammar and the four language skills. Malaysia's English curriculum is aligned with Communicative Language Teaching (CLT), emphasising

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https://doi.org/10.37934/sijcrlhs.1.1.5982b

these language skills to enhance students' communicative competence, as asserted by Tahir *et al.,* [1]. This aligns with the Malaysia Education Blueprint 2013-2025, which aims to develop bilingual students proficient in Bahasa Malaysia and English. Understanding and speaking any language requires a strong vocabulary; thus, mastering four basic language skills is crucial for vocabulary development, according to Sai [2]. However, communicative competence cannot be achieved with poor vocabulary. Krashen [3] noted that more vocabulary leads to greater spoken and written language input comprehension. Despite this, vocabulary teaching is often overshadowed by grammar, reading, and writing skills, as cited in Yang *et al.,* [4]. Vocabulary is implicitly taught with other language components in Malaysia's curriculum and syllabus. Wilkins [5] asserted, 'little can be conveyed without having enough knowledge of grammar, but nothing can be conveyed without vocabulary' as cited in Al-shujairi *et al.,* [6]. In Malaysia, English as a Second Language (ESL) is considered from the primary level to the tertiary level. Previous research indicates a positive correlation between vocabulary size and language proficiency, especially in reading comprehension and written expression, as cited in Ahmad *et al.,* [7]. Thus, effective use of vocabulary encourages ESL learners to master general, academic and professional life aspects.

Vocabulary knowledge is essential for effective communicative skills. Greater vocabulary allows more expressive communication [8]. As such, ineffective ESL learners struggle to communicate well, hindering their linguistic performance and reducing confidence as supported by Sai's [2] research. Previous studies illustrate that learners often have passive vocabulary knowledge than active vocabulary knowledge as they might be able to recognize the inputs but unable to produce outputs, as cited in Ahmad *et al.,* [7]. Numerous studies showed the effectiveness of explicit vocabulary teaching in enhancing learners' vocabulary breadth and depth. Several studies, as cited in Al-shujairi *et al.,* [6] explored the relationship between the size of vocabulary and VLS towards academic success. The research found that second-year tertiary students' vocabulary size can impact their cumulative grade point average by up to 25% [6]. As cited in Ahmad *et al.,* [7] found a correlation between vocabulary size and overall language proficiency; larger vocabulary sizes lead to better performance in various tasks. Language learning strategies (LLS) are essential for ESL learners to acquire language effectively. Many studies have explored the usefulness of vocabulary learning strategies (VLS), as cited in Hadi and Guo [9]. However, to the researchers' knowledge, there is mainly limited research conducted focusing on VLS employed by ESL learners using Gu's [10] Vocabulary Levels Questionnaire (VLQ), particularly in the Malaysian context. This paper aims to identify the vocabulary learning beliefs, determine the vocabulary learning strategies commonly used, and assess the word levels of English language receptive vocabulary ESL learners among engineering undergraduates at a high-ranking public university, Universiti Teknologi Malaysia, UTM.

1.1.1 Statement of problem

Receptive vocabulary knowledge helps language learners understand reading texts and contributes to utterance comprehension inferred by Ahmad *et al.,* [7]. Research indicates that learners with larger vocabulary sizes perform better in various language tasks, thus having a strong foundation of vocabulary knowledge will help ESL learners to excel in their academic settings as cited in Ahmad *et al.,* [7]. This study focuses on the vocabulary levels, beliefs and strategies in English for General Purposes (EGP), not English for Specific Purposes (ESP) which limits this research as the researchers are not experts in the engineering field. Vocabulary knowledge is crucial for English language learning; without effective beliefs and strategies, it may impede ESL learners' academic and professional growth. LLS are important and there are various kinds. A few previous studies suggest that Malaysian undergraduates across public and private universities have limited passive vocabulary

knowledge as cited by Ahmad *et al.,* [7]. However, there are limited studies on beliefs and strategies among engineering undergraduates in the Malaysian context. This research aims to close the gap by identifying the VLB, determining the VLS, and assessing the word levels of English language receptive vocabulary knowledge among engineering UTM undergraduates.

1.1.2 Theoretical framework

Figure 1 presents the theoretical framework emphasising three core aspects of effective language learning: vocabulary learning beliefs (VLB), vocabulary learning strategies (VLS), and receptive vocabulary knowledge (RVK). Gu [10] classified VLB as word memorisation and word utilisation, and VLS into three main categories: metacognitive, cognitive, and affective. Metacognitive strategies include self-initiation and selective attention, while cognitive strategies involve using the dictionary, inferencing, note-taking, rehearsal, encoding and activation. Affective strategies, as suggested by authors [11-14], involve managing emotions and motivations for effective vocabulary learning. Next, Nation's [15] theory highlights the interplay between receptive and productive vocabulary for its effective knowledge development. The figure illustrates the interconnectedness between VLB, VLS and receptive vocabulary knowledge, showing how VLB shapes VLS, which then influences the level of receptive vocabulary knowledge, and further contributes to effective language learning. Incorporating these variables promotes a holistic development of vocabulary learning and language proficiency.

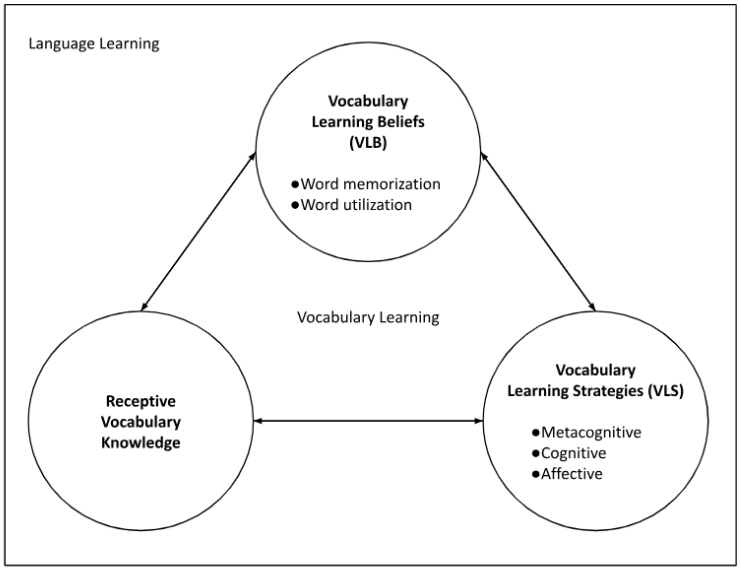

Fig. 1. Research theoretical framework

1.1.3 Conceptual framework

Figure 2 illustrates the research objectives explored in this study. This conceptual framework uncovers the interplay between beliefs, strategies, and knowledge of vocabulary among engineering students. By examining these factors, educators and ESL learners can enhance language learning. The researchers determined the extent of engineering students' vocabulary knowledge and its alignment with their current academic and professional needs. This research delved into the strategies employed by engineering undergraduates to enhance their vocabulary and language skills. The VLS included metacognitive, cognitive and affective strategies. Identifying effective strategies can

contribute to more efficient language learning outcomes. This research aimed to raise ESL learners' awareness of VLS adoption among engineering undergraduates, thereby enhancing their active vocabulary knowledge and guiding UTM lecturers in selecting the appropriate VLS.

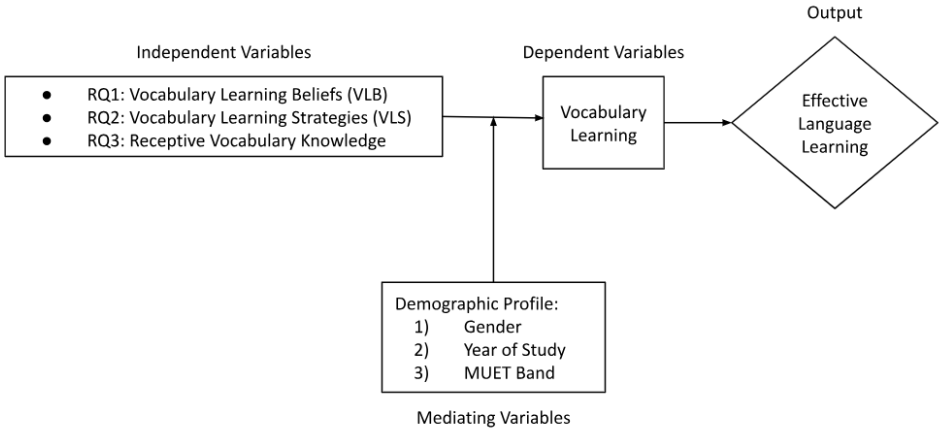

Fig. 2. Research conceptual framework

1.2 Literature Review

1.2.1 Definition and significance of Vocabulary Learning Strategies (VLS)

VLS, a subset of LLS, gained prominence in the late 1970s, said Rahmani [16]. O'Malley *et al.,* [17] defined VLS as "special thoughts or behaviours used by individuals to comprehend, learn, or retain information." Gu and Johnson [18] defined VLS as "a broad range of strategies used in the ongoing process of vocabulary learning". Schmitt [19] noted the importance of word frequency for lengthy retention, while Nation [20] asserted the importance of teaching learners' effective strategies for dealing with scarce words and promoting independent learning, as stated by Rahmani [16].

Several studies, as cited in Fan [21] asserted that victorious learners use diverse VLS with unique characteristics. Individual distinctions and knowledge contents can impact the use of VLS. Gu [10] as cited in Hadi and Guo [9], stated, "The appropriate choice and deployment of strategies can make a big difference in determining if vocabulary learning becomes an efficient or inefficient, and even pleasant or frustrating experience". Research indicates that the development of vocabulary and depth is a lifelong process for ESL or EFL learners, as cited in Hadi and Guo [9]. The emergence of VLS has improved student's vocabulary and knowledge, indicating a strong interest in learning English through effective vocabulary strategies. Awareness, particularly in training effective VLS in ESL learning, is essential for expanding the vocabulary size, level, and knowledge of these learners, as inferred by Benedict and Shabdin [22].

1.2.2 Classification of Vocabulary Learning Strategies (VLS)

Several scholars have classified VLS to understand its importance in facilitating vocabulary learning effectiveness among English foreign or second language learners. Firstly, O'Malley and Chamot [11] classify VLS into metacognitive, cognitive and socio-affective to distinguish between effective learners and ineffective learners. Effective learners used multiple learning strategies compared to ineffective learners to maintain an optimistic mindset and were motivated to learn vocabulary, as inferred by Hadi and Guo [9]. Next, Oxford [23] classified VLS into direct (cognitive, memory, and compensation) and indirect (affective, metacognitive, and social) strategies. Further, Rubin and Thompson [24] classified VLS into three categories: approaches of direct and indirect, plus

mnemonics. Meanwhile, Lawson and Hogben [25] classify VLS into four main categories which are simple elaboration and complex elaboration, word feature analysis, and repetition. Schmitt [19] classifies VLS into discovery strategies (learning new words) and consolidation strategies (solidifying the encountered words). He further categorized discovery strategies into determination and social, whilst consolidation strategies into social, memory, cognitive and metacognitive. On the other hand, Gu and Johnson [18] and Gu [26] classified VLS into beliefs, metacognitive, and cognitive strategies. Belief strategies include memorisation of words and utilisation of words. Next, metacognitive strategies include self-initiation and selective attention. While using the dictionary, inferencing, note-taking, rehearsal, encoding and activation are put under cognitive strategies. Lastly, Nation [20] classified VLS into three main components namely source, process and planning. Thus, these classifications indicate that VLS play a crucial role as a catalyst to enhance vocabulary teaching and learning.

1.2.3 Vocabulary Learning Questionnaire (VLQ6.4) by Gu [10]

Gu and Johnson's [18] classifications of VLS incorporate Vocabulary Learning Beliefs, Metacognitive Strategies, Guessing Strategies, Dictionary Strategies, Notes-taking Strategies, Memory Strategies (encoding and rehearsal), and Activation Strategies, as cited by Rahmani [16]. Gu's [10] VLS divisions are beliefs, metacognitive and cognitive. The metacognitive strategy comprises self-initiation and selective attention while the cognitive strategy comprises inferencing, using a dictionary, note-taking, rehearsal, encoding, and activation as cited by Hadi and Guo [9].

1.2.3.1 Vocabulary Learning Beliefs (VLB)

Beliefs shape behaviour and influence language learning decisions, actions, and learning outcomes as implied by Rahmani [16]. According to Hadi and Guo [9], learners strongly believe that practising pronunciation, spelling, understanding word structure, memorisation, retention, and extra reading can help them expand their vocabulary.

1.2.3.2 Vocabulary Learning Beliefs (VLS)

i) Metacognitive Strategies

Metacognitive strategies help learner control and evaluate their learning as contended by Benedict and Shabdin [22]. Self-initiation strategy suggests that learners become independent learners by planning, monitoring, deciding and evaluating their learning progress which is in line with Schmitt [19]. On the contrary, the selective attention strategy suggests that identifying keywords is crucial for effective comprehension. Self-directed learners use various techniques to clarify vocabulary meanings as inferred by Rahmani [16].

ii) Cognitive Strategies

Cognitive strategies consist of six strategies for learning vocabulary through repetition and mechanical means. Firstly, inference strategies include guessing word meanings independently, rather than relying on dictionaries, so learners can learn without needing prior knowledge. Secondly, dictionary strategies involve looking up the meaning, related phrases, synonyms, and antonyms to confirm the correct use of specific words. The growing popularity of using an online dictionary among

learners due to its speed, accessibility, and convenience, making it a preferred strategy for quick word understanding, as cited in Rahmani [16]. Thirdly, note-taking strategies include creating the personalized structure of vocabulary notes either digitally or physically. Fourthly, rehearsal strategies include repetition and word lists. Fifthly, encoding strategies include visual, imagery, auditory, association, contextual encoding, semantic and analysis of word structures. Both rehearsal and encoding strategies belong to memory strategies. Rahmani [16] contended that memory strategies, also known as mnemonics, use imagery or grouping to connect new words to prior knowledge and improve retrieval. Lastly, activation strategies include practising the newly learned word knowledge in completing any academic tasks or daily conversations. Gu [10], as cited in Rahmani [16], claimed that activation strategies refer to the use of recently acquired words in sentences and real or imaginary situations.

iii) Affective Strategies

According to several authors [11-14], affective strategy is an important factor. Individuals can effectively learn vocabulary by taking breaks, remembering its importance, rewarding themselves for success, encouraging speaking, noticing tenseness, and discussing their feelings with others.

1.2.4 Vocabulary Levels Test (VLT)

Identifying breadth and depth as important dimensions for assessing learners' vocabulary knowledge as cited in Ahmad *et al.,* [7]. The depth of vocabulary knowledge (VK) refers to learners' understanding of a word in all its aspects (quality) as cited in Fan [21]. Breadth of vocabulary knowledge (VK) refers to learners' word knowledge and their meanings which can be measured by assessing learners' vocabulary size (quantity) [20, 27]. The VLT assess learners' word levels of receptive vocabulary through word-definition matching tasks, indicating learners' mastery at each level represents a specific breadth of vocabulary size as cited in Ahmad *et al.,* [7]. Tertiary-level learners must meet the suggested word levels in which a minimum of 9000-word mastery is required to prepare students for academic tasks according to Ahmad *et al.,* [7]. Hence, this study employed the VLT instead of the Vocabulary Size Test (VST) as it measures word levels instead of merely providing the overall estimation of receptive vocabulary size.

1.2.5 Past research related to vocabulary learning

For many years, plentiful research has been conducted by scholars to discuss vocabulary learning strategies and vocabulary levels. Research by Ahmad *et al.,* [7] investigated the English language receptive vocabulary knowledge of 111 Politeknik Malaysia (POLIMAS) engineering students using the VLT. The majority of students had a subpar level of receptive vocabulary, concluded that students were not linguistically prepared for tertiary-level education and suggested a need for vocabulary instruction improvement. Kehing *et al.,* [28] studied on LLS and motivation levels among 107 engineering students at Sarawak Polytechnic using a questionnaire adapted from Cohen *et al.,*'s [29] Language Strategy Use Survey. The findings revealed that students primarily used metacognitive strategies and had average motivation to learn speaking skills. The study recommends that educators and curriculum developers emphasise the importance of LLS and motivation in improving students' speaking skills and communicative competence.

One of the studies at the tertiary level in the Malaysia context by Othman *et al.,* [30] explored the LLS employed by 22 engineering undergraduates in Malaysia, particularly in oral presentation

skills. The result showed that the participants preferred cognitive and metacognitive strategies over affective and social strategies. Next, research by Azmimurad and Osman [31] scrutinised the VLS utilised by 150 engineering students for Industry 4.0 readiness focusing on the technical vocabulary used by adapting a VLS questionnaire from Puagsang [32] and conducting semi-structured interviews. The study found that the students used metacognitive and determination strategies most frequently, while cognitive strategies were the least frequently, with significant differences according to the year of study, with fourth-year students using VLS more frequently than third-year students. Tan and Goh [33] compared the effectiveness of incidental vocabulary acquisition, explicit vocabulary instruction, and gamification in improving tertiary students' academic vocabulary. The study on 180 diploma students concluded that direct vocabulary instruction with gamification was effective. Moreover, Al-shujairi *et al.,* [6] assessed the vocabulary size and VLS of 30 Chinese undergraduates studying at Universiti Putra Malaysia (UPM). The results showed that the students had inadequate vocabulary size at all word levels and used direct VLS, such as memory and cognitive strategies, more than indirect VLS, such as social and metacognitive strategies. It was deduced that student's vocabulary size was below the ideal level for academic success, and it suggested that they should be more aware of the benefits of using various VLS.

On the other hand, several studies are out of the context of Malaysia. Fan [21] investigated the use of VLS by Chinese EFL learners and its relationship to vocabulary knowledge (VK), particularly in terms of gender, competence, and study field. The results showed that guessing, attention, and socializing strategies significantly predicted VK, proficiency mediated, and gender and discipline moderated the VLS–VK relationships. Hadi and Guo [9] examined the VLB and VLS of 177 Afghan EFL students at Shaikh Zayed University. The findings revealed that learners preferred using words over memorisation, could identify and select important words, relied on dictionaries, guessing, repetition, and auditory encoding, and managed their emotions during vocabulary learning. Meanwhile, Rahmani [16] studied the VLB and VLS of Afghan EFL undergraduate students at three public universities by employing a survey questionnaire adapted from Gu [10] and analysed data using descriptive statistics. The results revealed positive attitudes towards vocabulary learning and a variety of VLS. Activation, guessing, and dictionary use were the most employed strategies while taking notes was the least popular.

In contrast, a few past studies investigated how high and low-proficient ESL and EFL learners used VLS. Benedict and Shabdin [22] investigated the VLS used by Malaysian pre-university students and revealed that high achievers used metacognitive, determination, memory, and cognitive strategies more frequently than low achievers, whereas low achievers relied on social strategies. Ghalebi *et al.,* [8] research on 218 English as a Foreign Language (EFL) students discovered significant differences in the VLS used by high and low vocabulary learners. High-vocabulary learners employed more complex and meaning-focused strategies, whereas low-vocabulary learners relied on determination and social strategy. The study recommends that EFL teachers and curriculum developers create materials and activities to help students improve their vocabulary learning. The findings have implications for vocabulary teaching and strategy training in EFL settings.

1.2.6 Gap of the research

The abovementioned studies have explored the significance of VLS and vocabulary levels in different levels of education, levels of proficiency, gender, and country. Though there is an increment of interest in assessing vocabulary knowledge, vocabulary levels and vocabulary size among ESL learners, the availability of the VLS employed by Malaysian tertiary engineering undergraduates is still scarce in the literature. Ergo, this was an opportunity for the researchers to expand the horizons of VLS theory, particularly among ESL learners of engineering undergraduates at UTM. The findings of this research discovered word levels of English language receptive vocabulary knowledge, VLB, and common VLS used by ESL learners among engineering UTM undergraduates. Benedict and Shabdin's [22] study, on vocabulary coverage of Malaysian University English Test (MUET) reading texts discovered that students need at least 8000 words to understand 98% of the texts, implying that mastery of 9000 words is critical for academic tasks as inferred in research by Ahmad *et al.,* [7] on 111 Politeknik Malaysia (POLIMAS) engineering students using the VLT. This vocabulary threshold level is essential for reading comprehension and academic success.

1.2.7 Significance of the research

At the tertiary level, English vocabulary plays a main role in ESL learners comprehending authentic materials and engaging with others. Indubitably, proficiency in English offers more employment opportunities. Exposure to higher-level English texts with jargon and terminologies is essential for students preparing for IR 4.0, particularly those majoring in technical fields according to Azmimurad and Osman [31]. UTM requires all undergraduates to enrol in the UHLB, English courses to graduate, preparing them with the necessary English language skills so they will become qualified candidates to be employed in their respective fields. Henceforth, the findings of this research aim to prove that high use of VLS supports effective second language learning. It is significant to increase awareness for ESL learners among engineering undergraduates to adopt VLS to support them to have rich receptive vocabulary knowledge and provide an outlook for the UTM lecturers in choosing the appropriate VLS according to the need analysis for the engineering field.

1.2.8 Objectives of the research

This research intended to achieve these objectives:

i) To identify the beliefs of ESL learners about vocabulary learning among engineering UTM undergraduates.
ii) To determine what are the common strategies of vocabulary learning used by ESL learners among engineering UTM undergraduates.
iii) To assess the word levels of English language receptive vocabulary knowledge of ESL learners among engineering UTM undergraduates.

2. Methodology

2.1 Research Design

This study implemented a quantitative method with a descriptive survey. The sample chosen was 70 non-English-major ESL learners of the first to fourth year at Universiti Teknologi Malaysia (UTM), majoring in engineering. A random sampling approach and cross-sectional research design to analyse

levels, beliefs and strategies of vocabulary learning within a specific subgroup during the 2023/2024 academic session which aligned with the research objectives. The target sample was easily accessible and various indicators useful for concluding were included in the descriptive design. The items on the test and questionnaire selected were relevant to gathering information to meet the research objectives. This design was chosen for its ease of use and accessibility, supported by the validity and reliability of similar questionnaire patterns of several past and present studies according to Ali *et al.,* [15]. Ethical considerations were employed to ensure the respondents' privacy.

2.2 Instruments

This online survey contained four sections: a) demographic information, b) VLB, c) VLS, and d) VLT. The first section gathered respondents' demographic background including gender, year of study, faculty, and MUET bands, to establish a representative sample. The next section was to determine the vocabulary learning beliefs of ESL learners among engineering UTM undergraduates. The following section was to determine which vocabulary learning strategies they use most and least frequently. The final section assessed their word levels of English language receptive vocabulary knowledge. While creating the VLQ items, the researcher considered that the target respondents belonged to non-major English fields. Data was collected and analysed through descriptive statistics.

2.1.1 Vocabulary Learning Questionnaire (VLQ)

To answer the research questions, a reliable and validated questionnaire called the Vocabulary Learning Questionnaire (VLQ) was employed which was developed by Gu [10]. Originally, this questionnaire consisted of 62 items, then later became 65 items after Hadi and Guo [9] adapted it in their research. Gu [10] first categorised this questionnaire into two sections: 1) VLB and 2) VLS composed of metacognitive and cognitive. Later, Hadi and Guo [9] removed three items (19, 48, and 52) due to their enigmatic sentence structures to be understood though had been explained numerous times. Next, they also added another strategy known as affective after considering [11-13] authors' views on its importance for vocabulary learning. Thus, following Hadi and Guo [9], the VLQ adopted in this research consisted of 65 items in total.

Table 1 shows the 65 items included in strategies and their sub-strategies in the VLQ. The belief strategy (10 items: two sub-strategies), the metacognitive strategy (7 items: three sub-strategies), the cognitive strategy (45 items: six sub-categories) and the affective strategy (6 items). To measure the frequency, the researchers utilised a scale ranging from 1 (Strongly disagree) to 5 (Strongly agree); a 5-point Likert Scale.

Table 1
VLQ descriptions and items number

Category	Strategies	Items
Belief	Memorisation of Word	1-6
	Utilisation of Word	7-10
Strategies	Sub-strategies	Items
Metacognitive	Selective Attention	11-13
	Self-initiation	14-17
Cognitive	Inferencing	18-23
	Using Dictionary	24-30
	Notes-taking	31-36
	Rehearsal	37-45
	Encoding	46-55
	Activation	56-59
Affective	Affective	60-65

2.1.2 Vocabulary Learning Test (VLT)

Next, this research aimed to assess word levels of English language receptive vocabulary knowledge of ESL learners among engineering UTM undergraduates. Thus, the VLT established by Nation [33]; Schmitt, Schmitt, and Clapham [34] was employed. The researchers utilised the VLT Version 2 to measure vocabulary scores and mastery at five-word levels: 2000, 3000, 5000, 10,000, and Academic Wordlist (AWL). According to Nation's [20] study, L2 tertiary students require a vocabulary of 9,000 words to comprehend academic texts. The test consisted of 60 vocabulary words and 30 meanings per level. Test-takers had 90 minutes to finish the test and were scored based on their ability to match vocabulary with meanings. A minimum score of 26 out of 30 (or 87% accuracy) indicated mastery of a specific vocabulary level similar to Ahmad *et al.,* [7] study. Table 2 illustrates a sample of the VLT items.

Table 2
Sample of VLT items

Words	Meanings
Business	___6__ a house part
Clock	___3__ four legs animal
Horse	___4__ writing tool
Pencil	
Shoe	
Wall	

2.3 Reliability and Validity

Though beliefs are not strategies per se, they are closely related to the selection and application of strategies. Valid, reliable, practical instruments are required for systematic studies of VLS. The most widely used VLS taxonomies have never undergone adequate validation, or the validation data has never been formally issued. Hence the researcher chose this validated VLQ6.4 on the taxonomy proposed by Gu [26] compared to other versions because it is an ESL-friendly instrument. Any technical terms and jargon have been clarified with examples, substituted, or eliminated and all statements are composed in basic sentences to indicate content validity. Construct validity was measured using Exploratory Fator Analysis (EFA) to examine whether the data's underlying structure aligned with the questionnaire's theoretical framework. Factor correlation matrix indicating good discriminant validity for VLQ6.4 collectively demonstrates convergent and discriminant validity.

Cronbach's alpha was utilised to assess the questionnaire's reliability and internal consistency, indicating that this VLS was a reliable instrument with a range of .70 to .80. Out of 15 strategies, only visual repetition had an alpha of.638.

2.4 Data Analysis

The VLQ (frequency and percentage), the VLT scores (mean, median, standard deviation, minimum and maximum) and VLT mastery (percentage) were obtained by data analysis through descriptive statistics using Microsoft Excel as depicted in Table 3.

Table 3
Analysis of data

Questions of Research	**1.** What are the beliefs of vocabulary learning of ESL learners among engineering UTM undergraduates? **2.** Which vocabulary learning strategies do ESL learners among engineering UTM undergraduates use most and least frequently? **3.** What are the word levels of English language receptive vocabulary knowledge of ESL learners among engineering UTM undergraduates?
Collection of Data	1. Vocabulary Learning Questionnaire (VLQ) adopted by Hadi and Guo [9] 2. Vocabulary Levels Test (VLT) established by Nation [33]; Schmitt, Schmitt, and Clapham [34]
Analysis of Data	Descriptive Statistics (Quantitative)

3. Results

3.1 Findings

This section delineates the utmost significance of this research through descriptive statistics. The respondents' demographic backgrounds, analysis of vocabulary learning beliefs, common vocabulary learning strategies, word levels of English language receptive vocabulary knowledge of ESL learners among Engineering UTM undergraduates are discussed in the next sub section.

3.1.1 Respondents' demographic backgrounds

The first section of the survey consisted of the demographic backgrounds of respondents as depicted in Table 4.

Table 4
Respondents' demographic backgrounds

Demographic Variables		Frequency (n)	Percentage (%)
Gender	Male	32	45.7
	Female	38	54.3
Year of Study	Year 1	13	18.6
	Year 2	25	35.7
	Year 3	19	27.1
	Year 4	13	18.6
Faculty of Engineering	Faculty of Chemical and Energy Engineering	30	42.9
	Faculty of Civil Engineering	15	21.4
	Faculty of Electrical Engineering	12	17.1
	Faculty of Computing	7	10
	Faculty of Mechanical Engineering	6	8.6
MUET Band	1	0	0
	2	0	0
	2.5	0	0
	3	10	14.3
	3.5	7	10
	4	40	57.1
	4.5	9	12.9
	5	3	4.3
	5+	0	0
	6	1	1.4
		70	100

3.1.2 Analysis of Vocabulary Learning Beliefs of ESL learners among engineering UTM undergraduates

The second section of the survey consisted of a questionnaire of 65 items. The first part contained items 1-10 to answer the first research question; what are the beliefs of vocabulary learning of ESL learners among engineering UTM undergraduates? The result indicated that UTM undergraduates have positive beliefs about vocabulary learning as shown in Table 5. To measure the data, the researcher utilised a 5-point Likert Scale ranging from 1-Strongly Disagree (SD), 2-Disagree (D), 3-Neutral (N), 4-Agree (A) to 5-Strongly Agree (SA). Analysis across items 1-6 depicted that 66.6% of respondents strongly agreed and agreed with VLB through word memorisation. As for items 7-10, 88.9% of respondents strongly agreed and agreed with VLB through word utilisation, indicating that the majority of learners believe that words should be acquired through utilisation compared to memorization.

Table 5
Vocabulary learning beliefs

I) Memorisation of word						
Item	Statements	SD	D	N	A	SA
1	"Once the English words of all my native language meanings have been remembered, English is learned."	1 (1.43%)	4 (5.71%)	14 (20.00%)	36 (51.43%)	15 (21.43%)
2	"The best way to remember words is to memorise word lists or dictionaries."	5 (7.14%)	16 (22.86%)	12 (17.14%)	28 (40.00%)	9 (12.86%)
3	"The purpose of learning a word is to remember it."	4 (5.71%)	12 (17.14%)	14 (20.00%)	25 (35.71%)	15 (21.43%)
4	"A good memory is all you need to learn a foreign language well."	1 (1.43%)	12 (17.14%)	15 (21.43%)	25 (35.71%)	17 (24.29%)
5	"Repetition is the best way to remember words."	0 (0%)	0 (0%)	4 (5.71%)	28 (40.00%)	38 (54.29%)
6	"You can only learn a large vocabulary by memorizing a lot of words."	4 (5.71%)	9 (12.86%)	13 (18.57%)	33 (47.14%)	11 (15.71%)
II) Utilisation of word						
Item	Statements	SD	D	N	A	SA
7	"The meanings of a large amount of words can be picked up through readings."	0 (0%)	0 (0%)	7 (10.00%)	27 (38.57%)	36 (51.43%)
8	"Learners should pay attention to expressions (e.g., pick up) and collections (e.g., heavy rain; strong wind) that go with a word."	0 (0%)	1 (1.43%)	4 (5.71%)	35 (50.00%)	30 (42.86%)
9	"Learners can learn vocabulary simply by reading a lot."	0 (0%)	3 (4.29%)	8 (11.43%)	26 (37.14%)	33 (47.14%)
10	"The least a learner should know about a word is its spelling, pronunciation, meaning and its basic usage."	4 (5.71%)	1 (1.43%)	3 (4.29%)	25 (35.71%)	37 (52.86%)

3.1.3 Analysis of common Vocabulary Learning Strategies used by ESL learners among engineering UTM undergraduates

The second section of the survey consisted of items 11-65 to answer the second research question; what are common vocabulary learning strategies used by ESL learners among engineering UTM undergraduates? The result indicates that the most used VLS by the respondents was 68.00% cognitive, followed by 55.71% metacognitive, and the least used was 50.23% affective as shown by the frequency and percentage in Table 6. To measure the data, the researcher utilised a 5-point Likert Scale ranging from 1-Strongly Disagree (SD), 2-Disagree (D), 3-Neutral (N), 4-Agree (A) to 5-Strongly Agree (SA).

Table 6
Vocabulary Learning Strategies: Metacognitive

Item	Statements	SD	D	N	A	SA
(I) Selective attention						
11	"I know whether a new word is important in understanding a passage."	0 (0%)	0 (0%)	9 (12.86%)	42 (60.00%)	19 (27.14%)
12	"I know which words are important for me to learn."	0 (0%)	9 (12.86%)	13 (18.57%)	28 (40.00%)	20 (28.57%)
13	"When I see a new word or phrase, I know clearly whether I need it or not."	2 (2.86%)	13 (18.57%)	11 (15.71%)	28 (40.00%)	16 (22.86%)
(II) Self-initiation						
14	"Besides textbooks, I look for others that fall under my interest."	0 (0%)	1 (1.43%)	8 (11.43%)	29 (41.43%)	32 (45.71%)
15	"I wouldn't learn what my English lecturer doesn't tell me to learn."	16 (22.86%)	22 (31.43%)	17 (24.28%)	9 (12.86%)	6 (8.57%)
16	"I only focus on things that are directly related to examinations."	10 (14.28%)	15 (21.43%)	19 (27.14%)	14 (20.00%)	12 (17.14%)
17	"I wouldn't care much about vocabulary items that my lecturer does not explain in class."	15 (21.43%)	17 (24.28%)	20 (28.57%)	12 (17.14%)	6 (8.57%)

The first VLS explored was the metacognitive strategy which consists of two substrategies namely selective attention and self-initiation. Based on the analysis across six items, the metacognitive strategy using selective attention was 72.86% agreement, which ranked higher than self-initiation with 42.86% agreement. Henceforth, the overall percentage agreement across items 11-17 revealed that 55.71% of respondents use metacognitive strategies to learn vocabulary.

The second VLS explored was the cognitive strategy which consists of items 18-59 including six sub-strategies; inferencing, using dictionary, notes-taking, rehearsal, encoding and activation as illustrated in Table 7.

Table 7
Vocabulary Learning Strategies: Cognitive

Item	Statements	SD	D	N	A	SA
(I) Inferencing						
18	"I make use of the logical development in the context (e.g., cause and effect) when guessing the meaning of a word."	0 (0%)	1 (1.43%)	10 (14.28%)	36 (51.43%)	23 (32.86%)
19	"I check my guessed meaning in the paragraph or whole text to see if it fits in."	0 (0%)	1 (1.43%)	7 (10.00%)	36 (51.43%)	26 (37.14%)
20	"When I don't know a new word in reading, I use my background knowledge of the topic to guess the meaning of the new word."	0 (0%)	5 (7.14%)	12 (17.14%)	26 (37.14%)	27 (38.57%)

21	"I look for explanations in the reading text that support my guess about the meaning of a word."	1 (1.43%)	2 (2.86%)	10 (14.28%)	28 (40.00%)	29 (41.43%)
22	"I make use of the grammatical structure of a sentence when guessing the meaning of a new word."	2 (2.86%)	6 (8.57%)	10 (14.28%)	31 (44.29%)	21 (30.00%)
23	"I make use of the part of speech of a new word when guessing its meaning (e.g., noun, verb, adjective, etc)."	1 (1.43%)	4 (5.71%)	8 (11.43%)	35 (50.00%)	22 (31.43%)
(II) Using dictionary						
24	"When I see an unfamiliar word again and again, I look it up."	0 (0%)	2 (2.86%)	5 (7.14%)	27 (38.57%)	36 (51.43%)
25	"When not knowing a word that prevents me from understanding a whole sentence or even a whole paragraph, I look it up."	0 (0%)	3 (4.29%)	5 (7.14%)	27 (38.57%)	35 (50.00%)
26	"I look up words that are important to the understanding of the sentence or paragraph in which it appears."	0 (0%)	2 (2.86%)	5 (7.14%)	29 (41.43%)	34 (48.57%)
27	"I pay attention to the examples when I look up a word in a dictionary."	1 (1.43%)	1 (1.43%)	8 (11.43%)	24 (34.28%)	36 (51.43%)
28	"When I want to have some deeper knowledge about a word that I already know, I look it up."	0 (0%)	3 (4.29%)	9 (12.86%)	26 (37.14%)	32 (45.71%)
29	"When I want to know more about the usage of a word that I know, I look it up."	0 (0%)	2 (2.86%)	10 (14.28%)	24 (34.28%)	34 (48.57%)
30	"I check the dictionary when I want to find out the similarities and differences between the meanings of related words (synonyms and antonyms)."	0 (0%)	4 (5.71%)	10 (14.28%)	30 (42.86%)	26 (37.14%)
(III) Notes-taking						
31	"I make a note when I think the meaning of the word, I am looking up is commonly used."	6 (8.57%)	12 (17.14%)	14 (20.00%)	20 (28.57%)	18 (25.71%)
32	"I make a note when I think the word, I am looking up is related to my personal interest."	6 (8.57%)	8 (11.43%)	10 (14.28%)	27 (38.57%)	19 (27.14%)
33	"I make a note when I see a useful expression or phrase."	6 (8.57%)	9 (12.86%)	11 (15.71%)	25 (35.71%)	19 (27.14%)
34	"I write down the English explanations of the words I look up."	6 (8.57%)	16 (22.86%)	13 (18.57%)	23 (32.86%)	12 (17.14)

35	"I write down both the meaning in my native language and the English explanation of the word I look up."	5 (7.14%)	11 (15.71%)	12 (17.14%)	21 (30.00%)	21 (30.00%)
36	"I note down examples showing the usages of the word I look up."	6 (8.57%)	14 (20.00%)	9 (12.86%)	24 (34.28%)	17 (24.29%)
(IV) Rehearsal						
37	"I go through my vocabulary list several times until I remember all of the words on the list."	8 (11.43%)	11 (15.71%)	18 (25.71%)	18 (25.71%)	15 (21.43%)
38	"I make vocabulary cards and take them with me wherever I go."	20 (28.57%)	17 (24.29%)	12 (17.14%)	13 (18.57%)	8 (11.43%)
39	"I make regular reviews of new words I have memorised."	11 (15.71%)	12 (17.14%)	14 (20.00%)	23 (32.86%)	10 (14.29%)
40	"When I try to remember a word, I say it aloud to myself."	4 (5.71%)	11 (15.71%)	5 (7.14%)	29 (41.43%)	21 (30.00%)
41	"When I try to remember a word, I repeat its pronunciation in my mind."	0 (0%)	2 (2.86%)	7 (10.00%)	31 (44.28%)	30 (42.86%)
42	"Repeating the sound of a new word to myself would be enough for me to remember the word."	1 (1.43%)	4 (5.71%)	9 (12.86%)	30 (42.86%)	26 (37.14%)
43	"When I try to remember a word, I write it again and again."	6 (8.57%)	8 (11.43%)	11 (15.71%)	20 (28.57%)	25 (35.71%)
44	"I memorise the spelling of a word letter by letter."	3 (4.29%)	9 (12.86%)	16 (22.86%)	24 (34.28%)	18 (25.71%)
45	"I write both the new words and their translations in my native language again and again in order to remember them."	10 (14.29%)	10 (14.29%)	12 (17.14%)	17 (24.29%)	21 (30.00%)
(V) Encoding						
46	"I act out some words to remember them better (e.g., jump)."	10 (14.29%)	12 (17.14%)	10 (14.29%)	25 (35.71%)	13 (18.57%)
47	"I create a picture in my mind to help me remember a new word."	4 (5.71%)	6 (8.57%)	5 (7.14%)	26 (37.14%)	29 (41.43%)
48	"I put words that sound similar together in order to remember them (e.g., write and right)."	7 (10.00%)	11 (15.71%)	15 (21.43%)	17 (24.29%)	20 (28.57%)
49	"When words are spelled similarly, I remember them together (e.g., bank "a financial institution" and bank "edge of the river")."	3 (4.29%)	11 (15.71%)	19 (27.14%)	22 (31.43%)	15 (21.43%)
50	"When I learn new words, I pay attention to prefixes,	6 (8.57%)	12 (17.14%)	14 (20.00%)	20 (28.57%)	18 (25.71%)

	roots, and suffixes (e.g., inter-nation-al)."					
51	"I intentionally study how English words are formed in order to remember more words (e.g., "speaker" is a derived form of "speak+er")"	4 (5.71%)	10 (14.29%)	17 (24.29%)	25 (35.71%)	14 (20.00%)
52	"I memorise the commonly used roots and prefixes (e.g., "un" to "do" to form the word "undo", in which "do" is the root and "un" is a prefix)."	2 (2.86%)	9 (12.86%)	15 (21.43%)	25 (35.71%)	19 (27.14%)
53	"When I try to remember a word, I also try to remember the sentence in which the word is used."	2 (2.86%)	6 (8.57%)	13 (18.57%)	33 (47.14%)	16 (22.86%)
54	"I put words in set expressions or sentences in order to remember them."	3 (4.29%)	10 (14.29%)	16 (22.86%)	24 (34.28%)	17 (24.29%)
55	"I remember a new word together with the context where the new word appears."	3 (4.29%)	5 (7.14%)	17 (24.29%)	25 (35.71%)	20 (28.57%)
(VI) Activation						
56	"I make up my own sentences using the words I just learned."	4 (5.71%)	5 (7.14%)	16 (22.86%)	23 (32.86%)	22 (31.43%)
57	"I try to use newly learned words as much as possible in speech and writing."	0 (0%)	10 (14.29%)	15 (21.43%)	28 (40.00%)	17 (24.28%)
58	"I try to use newly learned words in real situations (e.g., shopping)."	1 (1.43%)	7 (10.00%)	15 (21.43%)	29 (41.43%)	18 (25.71%)
59	"I try to use newly learned words in imaginary situations in my mind."	1 (1.43%)	3 (4.29%)	12 (17.14%)	34 (48.57%)	20 (28.57%)

The first cognitive sub-strategy explored was inferencing revealed that the agreement was more than 70% based on the analysis across items 18-23. Ergo, the overall percentage agreement showed that 80.95% of respondents use cognitive strategies through inferencing to learn vocabulary. The second cognitive sub-strategy explored was using the dictionary, which revealed that more than 80% of respondents strongly agreed and agreed based on the analysis across items 24-30. The overall percentage agreement showed that 85.71% of respondents use cognitive strategies by using the dictionary to learn vocabulary, indicating the most used cognitive sub-strategies. The third cognitive sub-strategy explored was notes-taking revealed that more than 50% of respondents strongly agreed and agreed based on the analysis across items 31-36. The overall percentage agreement showed that 58.57% of respondents use cognitive strategies through notetaking to learn vocabulary, indicating the least used sub-strategies under cognitive strategy.

The fourth cognitive sub-strategy explored was the rehearsal, based on the analysis across items 37-45; the respondents mostly used items 41, 42, and 40, moderately used items 43, 44 and 45, then least used items 39, 37 and 38. The overall percentage agreement showed that 60.16% of

respondents use cognitive strategies through rehearsal to learn vocabulary. The fifth cognitive sub-strategy explored was encoding revealed that more than 50% strongly agreed and agreed based on the analysis across items 46-55. The overall percentage agreement showed that 60.44% of respondents use cognitive strategies via encoding to learn vocabulary, slightly higher than rehearsal. Last but not least, the fifth cognitive sub-strategy explored was activation revealed that more than 60% of respondents strongly agreed and agreed based on the analysis across items 56-59. The overall percentage agreement showed that 68.21% of respondents use cognitive strategies through activation to learn vocabulary, ranked above encoding and rehearsal. To summarize, the most commonly used cognitive sub-strategy was using the dictionary (85.71%), followed by inferencing (80.95%), then activation (68.21%), subsequently encoding (60.44%), next rehearsal (60.16%), and the least was notes-taking (58.57%). Ergo, the overall percentage of both strongly agree and agree across 42 items, particularly the cognitive strategy was 68.00%.

The third VLS explored was the affective strategy which demonstrated half agreement percentage based on the analysis across items 60-65 as presented in Table 8 below. The overall percentage agreement showed that 50.23% of respondents use the affective strategy moderately.

Table 8
Vocabulary Learning Strategies: Affective

Item	Statements	SD	D	N	A	SA
60	"If I feel bored or frustrated while learning vocabulary, I give up."	8 (11.43%)	21 (30.00%)	22 (31.43%)	11 (15.71%)	8 (11.43%)
61	"If I feel bored or frustrated while learning vocabulary, I take a break or remind myself that vocabulary is important, and then I go on."	4 (5.71%)	6 (8.57%)	22 (31.43%)	29 (41.43%)	9 (12.86%)
62	"I give myself a reward or treat when I do well in vocabulary learning."	7 (10.00%)	9 (12.86%)	19 (27.14%)	23 (32.86%)	12 (17.14%)
63	"I encourage myself to speak English using the newly learned words even when I am afraid of making a mistake (usage mistakes)."	2 (2.86%)	5 (7.19%)	17 (24.26%)	29 (41.43%)	17 (24.26%)
64	"I notice if I am tense or nervous when I am studying or using words while speaking in English with someone else."	2 (2.86%)	8 (11.43%)	16 (22.86%)	25 (35.71%)	19 (27.14%)
65	"I talk to someone else about how I feel when I am learning vocabulary."	8 (11.43%)	12 (17.14%)	21 (30.00%)	17 (24.29%)	12 (17.14%)

3.1.4 Analysis of word levels of English language receptive vocabulary knowledge of ESL learners among engineering UTM undergraduates

The third section of the survey consisted of VLT to answer the third research question: what are the word levels of English language receptive vocabulary knowledge of ESL learners among engineering UTM undergraduates? The researcher used Microsoft Excel to analyze the mean, median, standard deviation (SD), minimum, and maximum scores of respondents' VLT scores and their mastery levels. The VLT contained English receptive vocabulary sequenced into five different

levels: 2000 words, 3000 words, 5000 words, 10000 words and Academic Wordlist (AWL) with 30 marks respectively. The statistical overview of VLT scores across five levels is depicted in Table 9.

Table 9
VLT scores

Word levels	Mean	Median	SD	Min	Max
2000-word	29	29	2.07	15	30
3000-word	27	28	2.88	14	30
5000-word	25	27.5	5.63	0	30
10000-word	20	23	8.96	0	30
Academic Wordlist (AWL)	26	27	4.50	7	30

Based on the data distribution analysis, this statistical overview of quantitative summary indicated that the higher the level, the harder it became for the respondents to score. Particularly for the 5000 words and 10000 words levels, the standard deviations are 5.63 and 8.96, respectively, revealing the tremendous gap between the highest and the lowest marks scored by the respondents. Likewise, it provided useful information concerning the characteristics of different groups; low, intermediate and advanced proficient levels as evidenced by their MUET band results.

Table 10 presented the mastery level of respondents based on the VLT. To master a level, the respondents were required to score at least 26 out of 30. Notably, the majority of respondents, 97% had successfully mastered the 2000 words level, while only 3% of respondents failed at this level. Similarly, at the next level of 3000 words, 83% of the respondents had successfully mastered it whilst the remaining 17% failed. Ascended to the 5000-word level, the number of students who mastered descended to 70%, and the rest of the 30% failed. However, elevated to the 10000-word level, the success rate of students critically declined to 37%, resulting in 63% failure. Lastly, the Academic Wordlist (AWL) level demonstrated substantial results with 64% of the respondents mastering the level while the other 36% failed. Thus, based on the word level analysis, the qualitative aspects assessed were the vocabulary range and mastery level among the 70 respondents, particularly their receptive vocabulary knowledge across different levels.

Table 10
VLT mastery

Word levels	Pass (87% and above)	Fail (Below 87%)
2000-word	68 (97%)	2 (3%)
3000-word	58 (83%)	12 (17%)
5000-word	49 (70%)	21 (30%)
10000-word	26 (37%)	44 (63%)
Academic Wordlist (AWL)	45 (64%)	25 (36%)

3.2 Discussions

3.2.1 Discussion on Vocabulary Learning Beliefs of ESL learners among engineering UTM undergraduates

The findings revealed that ESL learners among engineering UTM undergraduates had a positive vocabulary learning belief (VLB). It suggested that 88.9% of respondents agreed that words should be acquired through utilisation compared to memorisation, as indicated by a lower percentage agreement of 66.6%. This research aligns with the findings of Hadi and Guo [9] which depicted the same outcome. They asserted that the respondents preferred word utilisation by grasping the

fundamental use of vocabulary, phonological and orthographic over word memorisation from the dictionary as it is easily forgotten and difficult to apply in real situations. It also aligns with the theory of Gu and Johnson [18] which found that Chinese learners preferred meaning-oriented learning to rote learning, despite common assumptions about Asian learners. Effective learners frequently establish insightful beliefs about language-learning processes, while others with negative beliefs are hard to become autonomous learners due to their negative attitudes towards learning. Balancing both approaches by adjusting to individual learning styles could encourage active, intentional and deliberate vocabulary learning. This substantiated the implications of ESL learners' VLB for vocabulary learning development. Thus, this answered the first research question of identifying the VLB of ESL learners among Engineering UTM undergraduates.

3.1.2 Discussion on common Vocabulary Learning Strategies used by ESL learners among engineering UTM undergraduates

The findings demonstrated that the most common vocabulary learning strategy (VLS) employed by ESL learners among engineering UTM undergraduates was cognitive, followed by metacognitive, and the least was affective. The first VLS explored was the metacognitive strategies which respondents ranked selective attention higher than self-initiation. This research aligned with Hadi and Guo's [9] findings which proved the same result demonstrating that they could determine the significance of a new word in comprehending a text and actively seek other resources apart from textbooks that match their interest. Likewise, it aligned with Schmitt's [19] theory that accentuates the importance of metacognitive strategies for vocabulary learning including making decisions to design, observe and assess learning consciously. This affirmed that the implications of VLS of ESL learners among UTM engineering undergraduates, particularly metacognitive strategies help them to acquire receptive vocabulary knowledge effectively and consciously.

In the second VLS, the most commonly used cognitive sub-strategies were dictionary use, inferencing, activation, encoding, and rehearsal, while note-taking was the least common. As indicated from the findings, the cognitive sub-strategies that were most commonly used included dictionary use and inferencing, suggesting that the online dictionary is easily accessible for searching word definitions. However, contrary to the findings by Hadi and Guo [9], their respondents categorized note-taking strategies as the most commonly used while activation as the least employed strategies. Again, the respondents of this research illustrated that they used the encoding and rehearsal strategies moderately which differed from Hadi and Guo's [9] research where their respondents were less likely to employ those strategies. This also suggested that the ESL learners among UTM undergraduates preferred to use encoding strategies to enhance their memory retention and develop meaningful understanding rather than rehearsal strategies focusing solely on repetition but will decay. Indubitably, it aligned with their VLB which preferred word utilisation to word memorisation. This is consistent with John Sweller's [35] Cognitive Load Theory, which emphasises maximising memory retrieval and comprehension while including the necessity of cognitive effort for optimal learning. This confirmed the implications of VLS for ESL learners among UTM engineering undergraduates, particularly cognitive strategies that help them to learn vocabulary according to their learning preferences and needs.

Subsequently, the third VLS explored was the affective strategy which demonstrated moderate use, with half of the respondents depending on their emotions and motivations to maintain a positive learning atmosphere. Perhaps, this result occurred since vocabulary learning is not given enough priority like other language skills such as speaking, reading, listening and writing in language instruction as it is being taught implicitly. This differs with Hadi and Guo's [9] findings which ranked

affective higher than metacognitive, which claimed that their respondents are superb at handling their feelings, fear, and tension. However, it aligns with the Affective theory by Tomkins [36] that underscores how behaviours and cognitions are influenced by motivations and emotions. This asserted the VLS implications of ESL learners among UTM engineering undergraduates, particularly effective strategies aid the learners to improve their cognitive performances. Overall, the moderate use of VLS implies that the respondents do not highly employ the VLS as they might not be exposed to or aware of them, answering the second research question of determining the most common VLS used by ESL learners among engineering UTM undergraduates.

3.1.3 Discussion on word levels of English language receptive vocabulary knowledge of ESL learners among engineering UTM undergraduates

The VLT analysis that the majority of respondents mastered the 2000-word level and 3000-word levels, were average at the 5000-word level and the Academic Wordlist level, and weak at the 10000-word level. Interestingly, the VLT mastery for the AWL for this research was better compared to the previous research by Ahmad *et al.,* [7] on POLIMAS students as the majority of their respondents failed at this level. The massive gap between the highest and the lowest marks scored by the respondents at the 5000 and 10000-word levels illustrated that this sample was a heterogeneous group as evidenced by their various proficiency levels in MUET band results, resulting in higher mastery levels compared to the previous research. Overall, the findings suggest that the respondents have not reached independent levels according to the threshold levels for receptive vocabulary knowledge as evidenced by substantial failure at the 10000-word level. Poor receptive vocabulary knowledge would influence learners' productive vocabulary, aligning with Nation's [15] theory that emphasized the interplay between receptive vocabulary and productive vocabulary for the effective development of vocabulary knowledge. This substantiated the implications of improving the receptive vocabulary knowledge of ESL learners among UTM engineering undergraduates to excel academically and professionally. The intervention of vocabulary is necessary to bridge the gap in vocabulary range and facilitate the struggling learners to complete their university tasks or assignments. Thus, this answered the third research question regarding the word levels of English language receptive vocabulary knowledge of ESL learners among engineering UTM undergraduates.

4. Conclusions

4.1 Summary of Findings

The study discovered that respondents had a positive (75.57%) VLB, which answered the first research question about ESL learners' beliefs in vocabulary learning among engineering UTM undergraduates. Next, the findings revealed that the most commonly used VLS was cognitive (68.00%), followed by metacognitive (55.71%), and affective (50.23%), which answered the second research question about the common vocabulary learning strategies employed by the respondents. Specifically, the most used cognitive sub-strategy was dictionary use (85.71%), followed by inference (80.95%), activation (68.21%), encoding (60.44%), rehearsal (60.16%), and notes-taking (58.57%). Ultimately, the VLT analysis revealed respondents' mastery levels based on the vocabulary threshold for tertiary education answered the third research question about the word levels of receptive vocabulary knowledge among the respondents. The respondents successfully conquered the struggling level; the 2000-word level (97%) and the 3000-word level (83%) respectively. Likewise, the respondents moderately mastered the instructional level; specifically, at the 5000-word level (70%) and academic level (64%). However, the respondents depicted poor performance at the independent

level of the 10000-word (37%). This suggested that ESL learners' VLB and VLS influence their word levels of receptive vocabulary knowledge. From the findings, there are a few implications to be highlighted such as informing the policymakers to refine the curriculum design for vocabulary intervention in classroom pedagogy, encouraging an active collaboration among diverse stakeholders to integrate effective instructional materials and benefiting the readers to expand their wisdom about vocabulary learning.

4.2 Limitations of Research

To solidify the validity and reliability of this research, the researcher decided to define its focus and boundaries. Particularly, the scope of this research pivoted solely around vocabulary learning beliefs, vocabulary learning strategies and receptive vocabulary knowledge levels among the selected sample to concentrate on significant variables of the research questions. However, the researcher decided to exclude technical vocabulary, productive vocabulary knowledge, and vocabulary size as it would buffer the expected completion timeframe and require extra effort to analyse. It would also demand the respondents' time, readiness and honesty to respond to this online survey. Thus, setting clear standards for inclusion and exclusion allowed the researcher to control irrelevant variables which might complicate the data analysis. Next, this research was specified on 70 ESL learners exclusively among UTM undergraduates only from all engineering faculties within three months of data collection to improve its generalizability, accuracy, feasibility and relevancy. The researcher decided to select this sample to see what levels, beliefs and strategies of vocabulary learning were employed by this English non-major group. Thus, the findings may not reflect the whole engineering population in Malaysia. Henceforth, these limitations helped the researcher to dive into the research questions comprehensively and devise noteworthy insights to conquer the limitations of resources, time and sample size.

4.3 Recommendations for Extended Research

From the discussions, this research shows potential for follow-up research. Firstly, there was a population gap. Certainly, the respondents' backgrounds such as race or ethnicity, age and years of experience learning English affected their learning beliefs, learning strategies and receptive vocabulary knowledge. Therefore, expanding the scope to enhance its generalizability by adding those criteria into the demographic backgrounds and largening the sample size may offer different outcomes of the findings as those 70 respondents might not adequately represent the population. It would also be interesting to compare the VLB, VLS and receptive vocabulary knowledge among English non-majors and English majors such as TESL students from the School of Education as it could further validate the findings. Likewise, this research has a methodological gap such as focusing only on the quantitative method and conducted online via Google Form survey. Ergo, the next researcher, is recommended to merge quantitative and qualitative methods, specifically regarding their receptive and productive vocabulary knowledge, as it would help to enrich the findings and offer a more comprehensive understanding of the research problems. Lastly, it is suggested to employ longitudinal investigations along with vocabulary intervention to explore the development of the VLB, VLS and receptive vocabulary knowledge among the respondents throughout the timeline.

Acknowledgement
This research was not funded by any grant.

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