

Technical Vocabulary Size among Engineering Undergraduates According to Field of Study at Universiti Malaysia Pahang

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Abstract: English for Specific Purposes (ESP) was designed to appeal learners learning languages in specific disciplines. ESP concerns on lexical words that are designed explicitly or have their own definition in specific fields. As engineering students work with texts such as manuals and procedures that contain an abundance of technical terms that have specific meaning in the engineering field, the vocabulary knowledge of technical terms is crucial for them to understand the texts. Nevertheless, engineering students were found to have difficulties whenever they encountered texts filled with technical terms. Hence, this study aims to investigate the vocabulary size of technical vocabulary among engineering students at Universiti Malaysia Pahang. This research employs mixed method design as both quantitative and qualitative paradigms are involved in this research. The instruments used in this research are technical vocabulary test and semi-structured interview. The test was used in collecting quantitative data while the semi-structured interview was used in collecting qualitative data. The test was administered to 150 students majoring in five different engineering courses who were currently on their third and fourth year of study whereas the interview involved 12 students from five respective engineering courses. The findings show that there is a significant difference in technical vocabulary size among engineering undergraduates based on their field of study.

Keywords: Engineering Field, Engineering Undergraduates, English for Specific Purposes, Technical Vocabulary, Vocabulary Size, Vocabulary Test.

1. INTRODUCTION

English for Specific Purposes (ESP) is one of the area of English in which it is designed to cater to special or specific needs of the usage of the language. Engineering English is one of the areas that fall under the scope of ESP. It is essential for one to learn or acquire the vocabulary of their chosen professions before they involve themselves with the professions. According to [1], ESP has generally rejected literature, due in part to the genre's insufficient coverage of discipline-specific vocabulary. In Malaysia, ESP courses are starting to take the center of attention as the needs of English language courses related to learners' professions or careers are rising. Most students experience the issue of using English in communication which is crucial in both government and private sector [2], especially engineering undergraduates [3]. This issue happened mainly due to their lack of mastery in vocabulary knowledge.

Vocabulary knowledge can be defined as the component blocks that build or form a language [4]. Vocabulary knowledge is categorized into category; vocabulary breadth and vocabulary depth. Vocabulary breadth, according to [5], concerns on the number of words one has the knowledge of their own meaning. [6] supported the claim for vocabulary breadth can be defined as the number of words a person or individual has a knowledge on the meaning of the words. On the other hand,

vocabulary depth refers to the extent of a person knows the words. This includes the knowledge on the usage of the words, the synonyms and antonyms of the words and the collocations of the words. According to [7], it is crucial for one to have a deep knowledge of a word in order to fully understand the word and be able to use the word properly. [8] stated that it is the general vocabulary knowledge of the reader that best predicts how well that reader understands the texts.

Technical vocabulary refers to the vocabulary that are formed, created and designed specifically to be utilized in certain areas especially in technical fields. [9] defined that technical vocabulary is subject-related, occurs in a specialist domain, and is part of a system of subject knowledge. Certain fields or areas of study has their own vocabulary in which the meaning of the words can be different according to respective fields. Thus, it implies that people involved in technical fields or areas must equip themselves with adequate technical vocabulary in order to perform or execute tasks efficiently. According to [10], technical vocabulary knowledge is rising to one of the important knowledge to be mastered with the advances of numerous subject disciplines.

There were numerous researches that have been done in investigating on technical vocabulary. [9] compared four different ways or technique in classifying or identifying technical terms to help individuals in identifying words that belong to technical vocabulary. All four techniques were tested in identifying technical terms in an anatomy text used by first-year anatomy courses globally. First and foremost, rating scale technique were used while dictionary technique was used after the rating scale technique was done. Using context clues given in the text was the third technique to be used in finding the technical terms in the anatomy text. Last but not least, a computer software called Range was used to scan the technical words available in the anatomy text. [9] concluded that the most reliable technique to be used in identifying technical terms is the rating scale technique. However, this technique is time-consuming as the reader need to crosscheck every single word according to the rating scale before determining whether it is a technical term or just academic or general term.

A research investigating on technical vocabulary proficiency among university undergraduates was conducted by [11] at a university in Thailand. The participants of the research were engineering students that were currently undertaking English for Engineers course. The instruments of the research are technical vocabulary test and semi-structured interview. The technical vocabulary test was administered to 47 engineering undergraduates which were chosen by using selective sampling technique. The students were classified into two groups based on their previous high schools; general education stream and vocational stream. The findings of the research revealed that students with educational background in vocational stream scored higher in the technical vocabulary test compared to students with educational background in general education stream. It can be implied that students from vocational schools had adequate background knowledge in technical vocabulary. [11] added that this situation might be the result of students' exposure to technical terms as they were provided courses of English for Specific Purposes that prepare learners with working English in engineering context.

2. METHODOLOGY

This study employed mixed method design as it involves data collection from both quantitative and qualitative paradigm of research. [12] stated that mixed method research is a study that comprises both quantitative and qualitative approaches and it can take place in the philosophical or theoretical framework, methods of data collection and analysis, overall research design, and/or discussion of research conclusion.

Instruments:

This research uses two instruments in which each of them belongs to different paradigm of research. Vocabulary size test was used to collect the quantitative data while semi-structured interview was used to collect the qualitative data. The vocabulary level test format is a tool to measure the written receptive vocabulary knowledge, that is mainly the word knowledge required for reading [13]. The format of the vocabulary test was adopted from [14] whole the content of the test which are technical words was taken from Engineering English Word List developed by [15]. The test asks the students to choose six given technical words to match with three different meaning given in the test. The test consists of 42 questions. The interview questions were adapted from [16] and [17] that asks on the knowledge of the students on technical vocabulary.

Procedure of Data Collection:

The process of collecting the data involves a few phases. The selection of students needs to be done first based on specific characteristics. This study employs non-probability sampling technique which is purposive sampling as the participants of this research need to obey certain characteristics. The first characteristic is the student need to be studying in engineering field. In addition to the students need to be in their third or fourth year of study, the students that are eligible to be a part of this research need to finish English for Technical Communication course offered at Centre for Modern Languages and Human Sciences. Prior to the distribution of the test, a meeting with English lecturers was done to explain the procedures that will take place in the classroom. The test was distributed to the students in ten class session in which each session has at least 15 students that fulfill the requirements of participating in this research. 12 students were selected after the quantitative data collection after the test is done for interview sessions.

3. RESULT AND DISCUSSION

Research Question: What is the technical vocabulary size among engineering undergraduates?

Table 1: Technical Vocabulary Size Among Engineering Undergraduates

N	Mean	Std. Deviation
150	31.167	5.379

Based on Table 1, the mean score of technical vocabulary size among engineering undergraduates is 31.17. [18] stated that one need to score at the minimum of 80% of the test which equals to 34 in this test to be considered having adequate vocabulary size. The result implies that the engineering undergraduates do not have adequate technical vocabulary size as they only score 74% of the test. The result also implies that these engineering students are prone to have problems or difficulties in communicating using technical language as they do not have enough vocabulary.

Research Question: Is there any significant difference in technical vocabulary size among engineering undergraduates based on field of study?

Table 2: Mean Score of Technical Vocabulary Size According to Field of Study

Field of Study	N	Mean	Std. Deviation
Chemical Engineering	30	34.767	3.390
Civil Engineering	34	28.647	5.526
Electrical and Electronics Engineering	26	28.077	5.621
Manufacturing Engineering	27	32.000	4.377
Mechanical Engineering	33	32.242	4.912

Table 2 shows the technical vocabulary size test scores which represent the technical vocabulary size among engineering undergraduates according to their field of study. According to [18], a minimum score of 34 is needed for one to be considered having sufficient vocabulary. Based on the results, it can be seen that students from Chemical Engineering course passed the minimum mean score of 34 with 34.78. Students from Mechanical Engineering course ranked second followed by students majoring in Manufacturing Engineering with the score of 32.24 and 32.00 respectively. Students majoring in Electrical and Electronics Engineering and Civil Engineering scored the lowest among the five fields of study. Conclusively, only students from Chemical Engineering course is considered to be having adequate technical vocabulary size compared to other four fields of study with students majoring in Electrical and Electronic Engineering having the lowest mastery of technical vocabulary.

Table 3: Chi-Square Test

	Technical Vocabulary Size
Chi-Square	31.031
df	4
Asymp. Sig.	0.000*

International Journal of Novel Research in Education and Learning

Vol. 5, Issue 2, pp: (1-5), Month: March - April 2018, Available at: www.noveltyjournals.com

The significant difference of technical vocabulary size among engineering undergraduates was measured using Kruskal-Wallis Test as the data is not normally distributed. It was found that there is a significant difference in technical vocabulary size among engineering undergraduates according to field of study at 0.00 level when $p < 0.05$. Thus, it can be implied that the differences in technical vocabulary size among engineering undergraduates may be due to the use and focus of the technical words in certain engineering field. This is supported by the statements of the students from the interview session in which some of them stated that only certain words are used in their respective field of study. They also claimed that the words that are not used or being focused on in their field are not important to them resulting in them not paying attention to the meaning of the words.

4. CONCLUSION

The findings of the study showed that there is a significant difference in technical vocabulary size among engineering undergraduates according to their field of study. This suggests that the difference in the vocabulary size may be due to the focus of technical words in respective field of study, as stated by the participants of this research. It can also be implied that these differences are due to the words that are tested in the vocabulary size test may not be used heavily in certain engineering courses. [11] claimed that the differences in technical vocabulary knowledge happened due to the students' exposure towards the technical words and their differences in curriculum and courses. Further research needs to be done in providing the suitable alternatives in helping the students in learning and mastering technical vocabulary knowledge as technical vocabulary is needed in communicating technical knowledge among people in technical professions [19].

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International Journal of Novel Research in Education and LearningVol. 5, Issue 2, pp: (1-5), Month: March - April 2018, Available at: www.noveltyjournals.com

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