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English proficiency requirements for engineering graduates at private organizations in Thailand

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Abstract

A primary goal of world class universities is teaching and producing talented graduates who exceed the expectations of their chosen industry. English proficiency is one of the most important requirements for global companies as it is the common medium for international communication in any industries. The purpose of this research is to investigate English proficiency skills required for engineering graduates to communicate and work with private industrial organizations in Thailand. A questionnaire was developed in order to investigate requirements of private engineering companies based upon four English skills including listening, speaking, reading, and writing. The questionnaire was also used to evaluate the levels of satisfaction on English proficiency of engineering graduates who have been working in their organizations. At the end of the survey period, 129 questionnaires were returned (46% response rate from 280 delivered questionnaires) from various industries covering Thai and international companies located in Thailand. Results indicate that the employers have different requirement levels on each English skill. The four skills can be ranked from the most to least important as reading, listening, writing, and speaking, respectively. The results also show that the proficiency in the four English skills of Thai engineering graduates has not met the employers' requirements. The results of this research can be used to develop English courses for Thai engineering students in response to their lack of English skills.

Keywords: English proficiency, Engineering English, Proficiency requirement, English for Science and Technology (EST)

1. Introduction

The emergence of the ASEAN Economic Community (AEC) in 2015 was an important milestone as all ASEAN countries formed a single market and production base of US$2.6 trillion and over 622 million people, creating the third largest economy in ASIA and seventh largest in the world. One of the most important elements of AEC is free flow of skilled labor, which would mostly affect seven occupations including engineers. In general, workers who possess an advanced level of English proficiency tend to acquire well-paid job position as the language is widely accepted for international communication. Since the establishment of AEC, Thai engineers have been facing tough competition for job position as they would be evaluated against workforce from ASIAN countries such as Singapore, Malaysia, and Philippines, whose standard of English are generally higher. Therefore, strong English skills are becoming much more crucial for Thais workers.

The aim of producing engineering graduates who do not only meet but also exceed the need of industries has always been a challenge for universities around the country. Although they are required to pass several English classes throughout their compulsory nine-year, further, and higher education, many employers are not completely satisfied with their poor English skills. In order for Thai universities to develop courses that are able to improve English skills of engineering students, it is quite obvious that English proficiency requirements of global companies must be acknowledged and understood.

This paper presents an investigation and analysis of English proficiency skills required for engineering graduates to work with private industrial organizations in Thailand. The study was conducted with various industries covering both Thai and international companies. The results can be used in designing and developing engineering English courses for Thai universities.

2. Literature review

English language is without a doubt an important tool in engineering field because it is the principal medium of science and technology [1-2]. Also, most engineering works require engineers to be able to understand and communicate within a business contexts and networks. Poor English skills could result in graduate unemployment or employer dissatisfaction [3]. Therefore, it is utterly important for engineering students, especially those who graduate from a country where English is not their mother language, to have competent English before graduation.

Many surveys and studies have reported the lack of English skills among fresh graduates and workers from

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various industries [4-8]. In general, there are four attributes, i.e. listening, speaking, reading, and writing, that identify English proficiency. Importance of these skills may differ from country to country depending on type of job and location where the company is located [9].

In Malaysia, English communication skills were important and taken into accounted for both recruitment and promotion. Early studies reported a lack of English skills, especially writing and speaking, among young engineering graduates [4-5]. Kassim et al. [10] investigated the importance of English communication skills and events from ten multinational chemical companies across the country. From this, speaking appeared to be more important than writing skills. It was also found that the most important communication events for engineers were teleconferencing, network meeting, and giving presentation.

In Australia, engineer's English communication stills were considered and measured mostly during promotion rather than recruitment. It should be noted that, in Australia, English is the first language (rather than a second language as in other countries e.g. Malaysia). Also, English was ranked sixth among 64 generic competencies required for engineering works [11].

Engineers in Taiwan have faced English communicative events similar to those in other Asia-Pacific countries. Writing and reading email/memo/report, as well as speaking during meeting/teleconference/presentation, were found to be essential for engineers. Also, the need for these skills was found to increase with advancement in engineering career [9].

In Thailand, a previous study reported that, based on engineering students' viewpoints, the needs of the four English skills were not significantly different. It also indicated that graduating from different departments did not have any effect on the need of English skills at 0.05 significant level [12]. Kaewpet [13] studied the needs of English skills by focusing on civil engineering students. According to this, reading manuals, writing reports, listening and understanding daily tasks and duties, and communicating with customers via telephone and email were found to be the important skills for Thai civil engineers.

From the review of literatures, the number of English proficiency studies in Thailand is still limited. Most studies focused on specific field rather investigate engineering as a whole. Besides, these studies investigated the need of English proficiency from sample groups of engineering students which may not be comparable to actual requirement of industries or employers. This study aims to investigate the need of English proficiency from various global industries locating in Thailand. The results can be used in designing English courses that is able to improve English skills of engineering students according to industrial requirements.

3. Methodology

This study developed a survey questionnaire to investigate companies' requirements of the four English skills for engineering positions as well as satisfaction on their new hired engineers regarding the four skills. The target respondents for this study were management personnel, such as the Managing Director, Chief Executive Officer, Factory Manager, or Divisional/Department Manager. The questionnaire was divided into five parts. The first part asked the respondents about their job positions while the details of their organizations were discovered in the second part. The third part investigated the tasks that English is required. The next part explored the level of English requirement of each particular sub-skill within each main skill. For example, in terms of the speaking skill, the respondents were asked about the extent to which their engineers (i) are able to use technical words appropriately, (ii) have good communications in their everyday working life, (iii) speak with an accent that allows foreign listeners to be able to understand a message clearly, and (iv) are able to speak English with correct grammar and structures. The fifth part, finally, asked the respondents to rate their satisfaction on the English skills of their new hired engineers who have recently graduated from universities in Thailand. Similar to the fourth part, questions for the satisfaction were linked to several sub-skills belonging to each main skill. The 1-5 Likert scales, which define 1 = "Not necessary" to 5 = "Extremely necessary" and 1 = "Totally dissatisfied" to 5 = "Very satisfied", were employed for the fourth and the fifth parts, respectively. This allows the respondents to select the option which best match their perceptions. The Likert scale was used here since it is considered to be simple and understandable for the questionnaire respondents [14].

Prior to distributing the actual survey questionnaire, a pilot study was conducted to validate the questions and eliminate potential problems [15]. For this study, the draft version of the questionnaire was sent out to seven professionals, including six managers from two manufacturing companies and one academic lecturer from the Faculty of Education from a university in Thailand. They were asked to provide comments if they found ambiguous words or questions. This process enhances the reliability of the questionnaire by trying to ensure that different respondents interpret all questions in the same way. The seven specialists were also asked to provide feedback on the completeness of the questionnaire items, focusing on purposes of the uses of English in the companies as well as the comprehensiveness of sub-skills under each main skill. This can confirm the content validity of the study. Content validity is based upon judgements of experts in the field regarding the extent to which the measurement instrument is collectively exhaustive or it contains all items which truly represent what it is intended to measure [16]. Moreover, they were asked to comment on the appropriateness of the length and layout of the questionnaire. After receiving their responses, changes were made to unclear sentences. The order of some questions was rearranged, and certain questions were eliminated in order to make the questionnaire as concise as possible. Finally, for the actual survey, the questionnaires were sent out to 280 managers either by post or email. At the end of the survey period, 129 questionnaires were returned. Therefore, the response rate is 46%, which are acceptable when compared to other survey studies particularly in social sciences [17].

4. Results and discussions

From the returned questionnaires, 58.91% of the respondents were from Thai companies, following by Japanese, American, and European companies at 29%, 13%, and 6%, respectively. The respondents were also from various types of industries, which would be classified into 22 categories. The top three were the automotive, petrochemical, and electronics industries. More than 80% of the respondents stated that their engineers needed to be proficient in English to be able to communicate via email. Other tasks that were reported by more than half of the respondents include taking care of foreign guests (72.1%); having a phone conversation (71.3%); giving a presentation (70.5%); producing and understanding official documents

(69.8%); participating in training, seminars, or workshops (69.0%), and making a conference call (57.4%).

In terms of the companies' requirements of English proficiency and their satisfaction on the English levels of their new hired engineers, the data was analyzed based upon descriptive statistics. Hypothesis testing techniques were also used to infer a significant difference of the data. This section is divided into three sub-sections. Section 4.1 shows the results concerning the companies' requirements of English proficiency. Their satisfaction on the English levels of their engineers is then illustrated in section 4.2. The final part, section 4.3, compares the levels of requirement and satisfaction rated by companies' managers.

4.1. The companies' requirements of English proficiency

Since the survey data was in the form of an ordinal scale, non-parametric testing techniques were employed for testing the significant difference among the requirements of the four main skills. For this case, the Mood Median test was conducted, at 0.05 significant level, through the Minitab software. The obtained p-value was 0.00 indicating that the companies' requirements of the four main skills were significantly different. Table 1 shows descriptive statistics for the requirements of the four main skills. Based upon an average basis, companies mostly needed their engineers to be proficient in reading while competent speaking seemed to be less necessary than the others. Speaking also received the least mode score. However, the mode of speaking, which obtained the score of 'three', was still considered to be a moderate score. This implied that most managers still required their engineers to be able to speak English, at least for communicating, but they did not need to speak fluently like a native speaker. The greater level of the reading requirement might be because most respondents are from Thai companies where English was merely needed for the technology transfer through the understanding of English manuals, work instructions, emails, and/or purchasing documents.

Table 1 Descriptive statistics for the requirements of English proficiency

Skills	Mean	Standard deviation	Median	Mode
Listening	3.85	0.796	4	4
Speaking	3.57	0.768	4	3
Reading	4.21	0.768	4	4
Writing	3.78	0.791	4	4

The requirements of sub-skills belonging to each main skill were then analyzed. The Mood Median test was employed to evaluate the listening, speaking, and writing skills since the number of sub-skills were more than two while the reading skill which was composed of only two sub-skills was analyzed by the Mann-Whitney test. The null hypothesis for the tests was that the levels of companies' requirement on different sub-skills were equal, or they were not significantly different. The results from the Minitab software are shown in Table 2.

For the listening skill, the p-value was less than 0.05, indicating that the null hypothesis was rejected. In other words, the levels of requirements of various listening sub-skills were not equal. The means indicated that the managers strongly needed their engineers to be able to understand technical terms and job-related vocabulary (the first sub-skill). This was followed by the ability to capture the main points when they are listening to English speakers (the fourth sub-skill); the understanding of words used in everyday life (the second sub-skill); and the understanding of messages spoke with various accents (the third sub-skill), respectively.

In terms of the speaking skill, again, the p-value was less than the significant level of the test. This meant the levels of requirements among speaking sub-skill were significantly different. According to the means, the first sub-skill (the ability to use technical words appropriately) seemed to outweigh the others, including the ability to have good communications in their everyday working life (the second sub-skill); the ability to speak with an accent that allows foreign listeners to be able to understand a message clearly (the third sub-skill); and the ability to speak English with correct grammar and structures (the fourth sub-skill), respectively. The median of the fourth skill was also less than the others. The analysis of the listening and speaking requirements indicated that most managers drew greater attention to technical communications rather than linguistic abilities such as a good accent or the correctness of grammar of their subordinates. This is in accordance with some previous studies [7, 18] who suggested that the English lessons provided to engineering students should be more linked to engineering terminology and industrial cases than general contents and language structures.

The p-value of the reading skill, on the other hand, was greater than 0.05. This indicated that the requirements of the two reading sub-skills (the understanding of machine manuals, work instructions, and other work-related documents; and the understanding of emails and letters) were not significantly different. Similarly, the p-value of the writing skill was also greater than the significant level of the test. That meant the requirements of the four writing sub-skills were at the same level. The four skills include the ability to produce a technical report in English; the ability to write emails and letters; the ability to use appropriate vocabulary; and the ability to use correct grammar and structures.

4.2. The companies' satisfaction on English skills of new hired engineers

Statistical techniques used to analyse the companies' satisfaction were all the same with the previous section. First of all, considering the differences among the satisfaction on the four main skills, the p-value from the Mood Median test was 0.00, which indicated that the managers were differently satisfied with each English skill of their engineers. As shown in Table 3, the mean scores showed that new hired engineers, who had graduated from universities in Thailand, seemed to be better at reading than listening, speaking, and writing, respectively. This indicated that Thai engineers had better receptive skills than productive skills. This might be a consequence of the deductive teaching approach, sometimes called the teacher-centred approach, which is still often employed in Thai schools. Based on the deductive approach, a concept or rule is straightforwardly delivered to students, and it is always followed by examples. This is in contrast to the inductive teaching, or the student-centred approach, where teachers present several examples until students could notice the rules themselves [19-20]. Interestingly, the means, medians, and modes of every skill were only around 'three', and this indicated that the English proficiency of young engineering graduates from Thai universities has not greatly satisfied their employers yet.

Table 2 Hypothesis testing results (p-values) and descriptive statistics for the requirements of sub-skills under each main skill

Main skills	p-value	Sub-skills	Mean	Standard deviation	Median	Mode
Listening	0.000	1	4.13	0.744	4	4
		2	3.73	0.789	4	4
		3	3.55	0.787	4	4
		4	3.98	0.744	4	4
Speaking	0.000	1	3.90	0.714	4	4
		2	3.59	0.728	4	3
		3	3.54	0.745	4	3
		4	3.24	0.747	3	3
Reading	0.692	1	4.19	0.770	4	4
		2	4.22	0.769	4	4
Writing	0.254	1	3.77	0.831	4	4
		2	3.94	0.826	4	4
		3	3.78	0.723	4	4
		4	3.62	0.754	4	4

Table 3 Descriptive statistics for the satisfaction on the English levels of new hired engineers

Skills	Mean	Standard deviation	Median	Mode
Listening	3.13	0.825	3	3
Speaking	3.06	0.828	3	3
Reading	3.34	0.767	3	3
Writing	3.01	0.856	3	3

Table 4 Hypothesis testing results (p-values) and descriptive statistics for the companies' satisfaction on engineers' sub-skills under each main skill

Main skills	p-value	Sub-skills*	Mean	Standard deviation	Median	Mode
Listening	0.396	1	3.25	0.781	3	3
		2	3.19	0.804	3	3
		3	3.03	0.819	3	3
		4	3.05	0.879	3	3
Speaking	0.347	1	3.18	0.819	3	3
		2	3.14	0.795	3	3
		3	3.00	0.847	3	3
		4	2.91	0.832	3	3
Reading	0.925	1	3.32	0.793	3	3
		2	3.35	0.743	3	3
Writing	0.862	1	3.01	0.867	3	3
		2	3.05	0.883	3	3
		3	3.07	0.782	3	3
		4	2.92	0.890	3	3

The next step is to investigate companies' satisfaction on the language proficiency of their engineers concerning each sub-skill. According to Table 4, the p-values of the four main skills were all greater than the significant level (0.05). This indicated that, within each main skill, the levels of managers' satisfaction on several sub-skills were not significantly different. The means, medians, and modes were around 'three' in every sub-skill and in every main skill, and this showed that most managers only felt moderately satisfied with the English levels of their engineers.

4.3. Comparison between the levels of requirement and satisfaction

In order to investigate whether the outcomes of English teaching from the Thai educational system can fulfil the industrial demand or not, the Man-Whitney test was performed for each main skill. As shown in Table 5, the p-values of every skill were all equal to 0.00 (less than the significant level). This indicated that there was a significant difference between the levels of requirement and satisfaction on every skill. The medians of the requirements received the score of 'four' while those of the satisfaction were only rated 'three'. Generally speaking, English skills of young engineering graduates from Thai universities did not meet the expectations of the employers. If Thai educational system does not make some changes by taking into account the importance of English as a compulsory language, Thai engineers may face a difficult situation getting a good job particularly after the establishment of the ASEAN Economic Community (AEC) where neighbouring engineers can easily transfer to Thailand.

Table 5 The Mann-Whitney test results (p-values and medians) concerning the differences between the levels of requirement and satisfaction

Main skills	p-value	Compared terms	Median
Listening	0.000	Requirement level	4
		Satisfaction level	3
Speaking	0.000	Requirement level	4
		Satisfaction level	3
Reading	0.000	Requirement level	4
		Satisfaction level	3
Writing	0.000	Requirement level	4
		Satisfaction level	3

5. Conclusions

This article presented Thailand-based global industries' requirements for English proficiency and their satisfaction on English skills of recent Engineering graduates. The results indicated that the most to least important skill were reading, listening, writing, and speaking, respectively. In terms of satisfactions of the companies on the four English skills, the most to least satisfied skill can be ranked as reading, listening, speaking, and writing, respectively. From our study, it is believed that English proficiency of Thai engineers has not met the required level of the employers. Engineering English course designers should emphasize the training according to the employers' requirements as shown above. Also, writing skill should be underlined more since it is ranked before speaking in term of companies' requirement but currently ranked behind speaking skill in term of satisfaction.

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