PREPARING THAI MECHANICAL ENGINEERS FOR THE JOB MARKET: THE STUDENTS' AND EMPLOYERS' NEEDS

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Abstract- English education at tertiary level in Thailand has attracted substantial attention due to the ongoing trend of globalization and the emerging trend of regionalization, which can be quite daunting if Thai graduates are not well prepared for the job market. Because of Thai learners' unsatisfactory performance in English, they may not be able to compete regionally and internationally. The goal of this study is to prepare Thai mechanical engineering (ME) students to be successful English communicators in the workplace, addressing two objectives: 1) identifying the needs of English language skills and other relevant issues perceived by both 4th year ME students and Thai employers, respectively; and 2) highlighting the mismatch between the ME students' and the ME employers' needs. To address these two objectives, both groups of participants completed two parallel sets of questionnaires devised to elicit personal information, and assess their needs of English knowledge and related skills that possibly contribute to successful communication in the workplace. The analysis of the data revealed that both participant groups were aware of the utmost importance of English listening and speaking skills in workplace communication. However, certain differences prevailed. For example, while the ME students did not consider cultural knowledge and English pronunciation to have a tremendous impact on English communication, the employers considered them as important as listening and speaking skills. The analysis elucidates that, as articulated by the employers, effective use of English in the workplace requires more than a mastery of English language skills. In short, the curriculum for ME students in higher education needs to incorporate additional features essential for communication, to enable them to compete in regional and international job markets.

Index terms- Mechanical engineering, Employers, University students, English education, Thailand.

I. INTRODUCTION

Currently, the English language has been increasingly pivotal in all aspects of peoples' lives, be it business, travelling, politics, entertainment, or technology. The role of English in education across the entire paradigm is even more crucial and substantial, as an important means to acquire, exchange, and disseminate knowledge and research discoveries. However, recently, English education particularly at tertiary level or in higher education has attracted substantial attention from scholars for a number of reasons. First, due to the ongoing trend of globalization that impacts the entire world. English is one of the driving forces contributing to fast pace of communication, and the world has become smaller as a result. According to this trend, learners of English as citizens of the world are expected to be able to communicate across cultural and national boundaries [1]. Second, specifically in Southeast Asia, the impact of globalization highlighting the crucial role of English is substantiated or strengthened further by the emerging trend of regionalization that can be quite daunting if citizens are not well prepared. That is, in the ASEAN context (Association of Southeast Asian Nations), English has attained the status of the working language in the region. That is, English is chosen to be the language of communication among speakers who share neither a common native language nor a common national cultural background [2], [3]). Finally, AEC (ASEAN Economic Community) integration at the end of 2015 has brought a new chapter to the ASEAN region, resulting in, for example, a free market facilitating the free flow of goods and services, investments, capital, and skilled labor among the ten member nations of ASEAN. The implementation of this policy has potentially led us to speculate that the countries whose citizens are not proficient in English are likely to be at a disadvantage economically. Moreover, since multiple studies have shown that Thai citizens' English is not satisfactory [4], crucially, a development of Thailand's human resources is urgently needed.

The advent of AEC integration and the existing trend of globalization provide a clear indicative that Thai citizens must compete against other nations' members in national, regional, and international job markets in which candidates with satisfactory English proficiency are needed. For instance, studies conducted by [5], congruently reported that the foreign language used and demanded most in the business sector of Thailand is English, followed by Chinese and Japanese, respectively. Unfortunately, as reported by a number of studies and investigations, Thai university students' English performance across the entire paradigm has not been satisfactory [6], [7]. Moreover, other ASEAN countries have demonstrated that their citizens have a high level of English proficiency, which in turn can better satisfy the employers' demands. Therefore, this situation can be noted as a threat to Thais in general. This research aims to address the potential problem encountered by Thai citizens particularly in the context of engineering – one of the eight skilled occupations with free flow of services as stipulated by the AEC.

In addition, it is one of the careers that requires the use of English skills at in the workplace [8]. Given the multiple sub-disciplines of engineering and the possibility that English skills used may vary depending on the sub-disciplines of engineering and the context in which a work place is located, this project focuses on mechanical engineering (ME) in the context of Thailand. Moreover, since ME is one of the most common branches of engineering available at any academic institution offering an engineering degree in Thailand, this study should have a wide impact on higher education. The goal of this study is to prepare Thai ME students to be successful English communicators in the workplace. Specific objectives of this study include identifying 1) the needs of English language skills and other relevant issues perceived by both 4th year ME students and Thai employers; and 2) the mismatch between the ME students' perceived needs and employers' needs. It is anticipated that the findings generated from this study will allow stakeholders in higher education institutions in Thailand to be aware of the role played, by eliciting collaboration and participation from diverse groups of stakeholders in shaping an informed curriculum, leading to relevant and responsive higher education teaching and learning.

II. LITERATURE REVIEW

1) AEC and Thailand

AEC integration towards the end of 2015 has exerted a number of impacts on Thailand in general – English education in particular. One of the consequences of AEC integration which is relevant to this study is the agreement among ASEAN member nations to allow a free flow of manpower for eight occupations: doctor practitioners, dental practitioners, accountancy services, engineering services, nursing services, architectural services, surveying, and tourism. This agreement, combined with promoting English to be the working language in ASEAN, yields both positive and negative impacts on Thailand and Thai citizens in particular. That is, the attained and promoted status of English has stimulated a number of attempts to improve English education in Thailand in order to compete with other member countries. In fact, the integration has brought about unexpected enthusiasm and serious attempts to develop human resources in order to drive the national economy forward. The negative impact of this AEC integration includes the painful fact that Thai citizens in general have not done, and are not doing, well in English language learning [4]-[7]. Based on this agreement, a number of occupations are impacted including engineering practitioners. It is expected that a maximum of 100,000 engineering practitioners from other ASEAN member nations will be able to freely come to Thailand to work, whereas only 25,000 Thai engineering practitioners will be able to go to work in ASEAN. This means that Thai engineering graduates have to be much more competent in English in order to secure a job even in Thailand, not to mention in ASEAN.

2) Thai learners' English

Based on a number of reports on Thai learners' English performance, be it measured by national tests or international tests, the results are similarly unsatisfactory. A series of previous studies on learning [4]-[7] have demonstrated that Thai learners of English are at a disadvantage as far as English performance is concerned.

The national O-NET (Ordinary National Education Test) is a test devised by NIETS (National Institute of Education Testing Service), a Thai organization commissioned to be responsible for producing tests to measure students' competence in all major subjects nationwide. O-NET is compulsory for Thai students of Grades 6, 9, and 12 to have their scholastic abilities assessed. For instance, in 2013, 414,688 Grade 12 students took the English O-NET. Of a total of 100 points, the mean score was 25.35 with the highest score being 98 and the lowest zero [9]. When scrutinizing the results, less than half of the test-takers reached the mean score, and many of them got zero in the English subject.

Another test under the responsibility of NIETS is GAT (General Aptitude Test), which is taken by Grade 12 students. This test is offered twice a year to assess if these Grade 12 students are ready for university education. Based on the GAT English scores over a 3-year period (2013, 2014 and 2015), from a total of 150 points, the mean scores were 52.98, 49.07, 53.63, 52.43, 59.26, and 49.91, respectively [10]. These scores indicate that Thai Grade 12 learners performed quite poorly in the tests. Although Thai learners' English unsatisfactory performance could be due to a number of possible factors including the quality of the tests (be they O-NET or GAT English), instruction received, learners' motivation, and the teaching and learning that can be vary considerably throughout the Kingdom of Thailand, these results have caused concern among scholars and educators. It is obvious that Thai learners, when competing with the other ASEAN nation members, are less likely to succeed in the job market.

To provide a global picture of Thai learners' English performance, a scrutiny of TOEFL scores can be quite insightful. For instance, based on the TOEFL iBT results (January 2012 to December) of test takers who are citizens of Asian nations, the average scores of Singaporeans were the highest, followed by those from India, the Philippines, and Malaysia. Other Asian test takers who performed better than Thais include those from Indonesia, Vietnam, and China. In fact, Thai test takers on average only performed better than those from Laos, Japan, and Cambodia [11].

Annual studies were conducted on non-native speakers of English by EF or Education First, the world's largest international private education company specializing in language training, educational travel, academic-degree programs and cultural exchanges. In 2011, Thailand was ranked 42 out of 44 countries in which English is not the mother tongue. In 2012, 52 countries participated in the study, and the test results showed that Thai participants performed badly and were ranked 51. In 2013, out of 60 countries, Thailand was ranked 55. In 2014, Thailand was ranked 48 from 63 countries. More recently, in 2015, of all 70 nations, Thailand was ranked 62 [12]. In comparison with the other 16 Asian nations, Thai test takers were ranked 14. Throughout the five-year period from 2011 to 2015, Thailand has been labeled as the "very low proficiency" group. A number of speculations were cast on the results, including the argument that the above reports focus on Thai adult learners, and the results need to be carefully interpreted. However, as indicated by O-NET, GAT English, and TOEFL iBT scores, it is impossible to deny that Thais' English proficiency, as well as English education, needs to be urgently improved.

3) Needs analysis

In any context of language teaching and learning, one of the initial stages is needs analysis. Needs analysis provides diverse pieces of information regarding learners' needs, attitudes, motivation, awareness, personality, learning styles, and expectations. The data obtained from needs analysis are used to gauge pedagogical practices in individual contexts. In language learning, needs refer to the differences between the language skills learners achieve from classroom learning and the skills they are expected to have in the actual workplace. Therefore, needs analysis is crucial in determining how learners' expectations can be satisfied. Pedagogically, the data generated from needs analysis can help determine the course contents, language tasks, and language activities. Moreover, they can help satisfy the demands of the target community [13].

Needs analysis results vary according to disciplines [14]. For example, discussion of a legal problem integrating a conceptual framework related to an issue in law is secure, whereas in economics and business, analysis of case studies are preferred so that the students can have experience in classroom discussion. These examples illustrate that disciplinary preference is discernible. With the teachers' awareness of this disciplinary variation, they will be able to design language tasks or activities that are authentic, and allow them to accomplish the goal of the course [15].

In this regard, a myriad of needs analysis studies have focused on diverse disciplines and workplace contexts. For instance, the language use of 15 hotel practitioners and 15 bankers proficient in English and Arabic with 5 to 20 years working experience was examined [16]. The two groups agreed that they needed to use English for communication to a large extent. This study suggests that the personnel in tourism occupations needed to use English much more than the bankers in all of the four skills. The need to use English of engineers in Nigeria, Egypt, Turkey, Germany, and Poland was studied [17]. The questionnaires and interviews showed that they had positive attitudes towards English and enjoyed reading. For them, listening was the hardest skill. Finally, a study was conducted on an English needs analysis of process integration engineers (PIEs) at a leading semiconductor manufacturing company in Taiwan [18]. The analysis demonstrated that oral skills were in particular demand for customer visits and relationship building.

In the context of Thailand, needs of English in executing their routine work, problems of using English, and needs for training tourist police officers were investigated. The findings demonstrated that these police officers were aware of the importance of English and needed to improve the four English skills. However, listening seemed to pose the greatest difficulty. Other major problems lie in the tasks of phone conversation, giving directions, listening to complaints, using the right vocabulary, and not understanding certain English accents [19].

Finally, a study focusing on the needs analysis of English and the listening skills of tourist police officers in Bangkok was conducted. Listening and speaking were the most important skills, especially in one to one conversation including greeting, offering help, asking for personal information, giving information regarding accommodation, giving directions and advice, and giving orders regarding safety. With regard to listening, the variety of English accents, because of different nationalities posed the greatest challenge to them [20].

The studies reviewed above led to a conclusion that each context and discipline has its own characteristic needs. However, needs analysis conducted on language learners, though meaningful, might not provide a comprehensive picture of the identified needs. That is, these learners might not be fully aware of the needs required in the workplace because of their limited experience and exposure. Therefore, additional studies are needed to accurately determine what the workplace demands. This study aims to focus on the needs of English in the discipline of ME because of the high volume of students pursuing a bachelor's degree in engineering, and it being one of the eight occupations entitled for a free flow of skills and services in ASEAN. To ensure that this study is beneficial and the findings are accurate and thorough, this study focuses on two parties or ME stakeholders: 4th year students and employers. It is expected that analysis of data collected from these two parties will

help prepare Thai ME students for the job market, be it national, regional, or international.

III. THE STUDY

1) Objectives

The goal of this study is to prepare Thai ME students to be successful English communicators in the workplace, addressing two specific objectives: 1) identifying the needs of English language skills and other relevant issues perceived by 4th year students and employers, and 2) highlighting the mismatch between the ME employers' and students' needs. To address these two objectives, first, both groups of participants completed two parallel sets of questionnaires devised to elicit personal information and assess English knowledge as well as related skills that possibly contribute to successful communication in the workplace. Then, the questionnaire results were compared.

2) Participants

The participants of this study consist of two groups: 4th year ME students and ME employers. The 4th year students in the 2015 academic year were from two medium-sized public universities in Thailand located in Nakhon Pathom and Mahasarakham Provinces in the central and northeastern parts of Thailand, respectively. The ME employers are members of ASHRAE Thailand Chapter, an established organization in Thailand focusing on the development of ME knowledge and technology (e.g., heating, refrigerating, air-conditioning, and ventilating).

3) Instrument: Questionnaire

Two sets of parallel questionnaires were devised, each consisting of four parts: Part 1 - personal information; Part 2 - respondents' English; Part 3 - English needs at the workplace; Part 4 – development needs. Overlapping questions in the two sets of the questionnaires allow comparison and contrast of the results generated by the two groups of participants to be possible. These four parts are mixed in nature, consisting of both closed and Likert scale questions.

IV. RESULTS AND DISCUSSION

Incomplete questionnaires were excluded, resulting in a total of 90 completed questionnaires to be statistically analyzed for descriptive statistics including frequencies, averages, percentages, etc. Subsequently, the data analyzed were compared and contrasted to identify incongruence across the two groups of respondents.

Part 1* : *Respondents' profile

Among the 90 student respondents, male students outnumber females; 67 and 23, respectively (74.44% and 25.56%). Their ages range from 20 to 25, with a mean age of 21.7. The majority of these 4th year students (56 students or 62.22%) started learning English in kindergarten. Only 10 out of 90 students (11.11%) had been exposed to the English used in ASEAN countries including Malaysia, Singapore, Korea, Cambodia, and Laos. In short, these ME students had had minimal exposure to the English language, indicating that the English classrooms were the major source of English input.

A total of 27 ME employers completed the questionnaire; their ages range from 26 to 63 years old, with a mean age of 34.3. At the time of the study, they worked in a variety of positions including entrepreneurs, managers, employers, human resources managers, CEOs, vice managers, university faculty members functioning as consultants, etc., and are collectively referred to as 'employers.' Due to their position and accumulated experience in the ME field, this group of respondents is quite influential, directly interacting with ME graduates, as well as determining the qualifications required of potential ME applicants.

Part 2* :*Respondents' English

With regards to how frequently the students use English in their daily life, 56 students or 62.22% admitted using English less than one hour a week, whereas most of the employers admitted using English 21-30 hours a week (7 employers or 25.93%).

In response to the question regarding the assessment of their English (a five-Likert scale question with the interpretations as follows: 1.00-1.80 = needs to be improved; 1.81-2.60 = fair; 2.61-3.40 = satisfactory; 3.41-4.20 = very satisfactory; and 4.21-5.00 = most satisfactory), most of them agreed that their English 'needs to be improved' (48 students or 53.33%), whereas 17 employers or 62.96% considered their English 'very satisfactory.' These findings suggest that the students are aware that they need to improve English and that English is the key to a successful career path in ME.

When asked to assess their own English skills, the students thought that all of the four skills are 'fair' with the mean scores ranging from 1.84 to 2.53 (speaking 1.84, listening 2.14, writing 2.27, and reading 2.53, respectively). At this juncture, their mean scores seem to suggest that these students are generally less confident with their oral communication skills. In other words, they seem to feel relatively more comfortable with reading and writing skills. As for the employers, they considered all these four English language skills to be 'very satisfactory' (4.00 for listening, speaking, and reading, but slightly lower for writing 3.81). The self-assessment of these two parties indicates that certain language skills are more crucial than others. Or to be precise, as the results demonstrate, writing in English is not needed as much as other English skills in the workplace.

***Part 3:** English needs in the workplace*

This part is divided into four sub-parts. The first sub-part is to elicit their general opinions towards the needs of four individual skills in the workplace (a five-Likert scale question with the range of mean

scores and their corresponding interpretations as follows: 1.00-1.80 = unimportant; 1.81-2.60 = slightly important; 2.61-3.40 = important; 3.41-4.20 = very important; and 4.21-5.00 = most important). The students considered the four skills 'very important' (listening 4.20, speaking and reading 4.14, and writing 3.98). All in all, despite certain slight differences, they perceived that all these four skills are 'very important' at the workplace. As for the employers, they agreed that listening, speaking, and reading are 'most important' (4.48, 4.52, and 4.22, respectively), whereas writing is 'very important' (4.00). This finding corroborates the findings yielded in Part 2 indicating that speaking and listening skills are essentially important in the workplace, and writing seems to play a minimal role in the ME workplace.

The next four sub-parts focus on the importance of the communicative events pertaining to each of the four language skills in the work place of ME: 6 communicative events for listening (i.e., listening to orders, ME information, personal conversations, phone conversations, oral presentations, and suggestions); 8 for speaking (i.e., personal conversations, phone conversations, self-introduction, showing visitors around a factory, asking for help, expressing opinions, delivering presentations, and progress report presentations); 7 for reading (i.e., reading textbooks, social media, letters, articles, contracts, regulations, and specifications); and 7 for writing (i.e., writing letters, ME information, contracts, articles, technical reports, proposals, and announcements). The students ranked all communicative events across the four sub-parts as 'very important', with the mean scores ranging from 3.40 to 4.20.

However, the employers were more scrupulous with their ranking. For listening, the employers ranked the three tasks of listening (listening to orders, ME information, and suggestions) as 'most important,' with the mean scores ranging from 4.37 to 4.44. For speaking, similarly, the employers considered three speaking activities (personal conversations, oral presentations, and progress report presentations) as 'most important,' with the mean scores ranging from 4.22 to 4.44. For reading, the employers considered five activities as 'most important' (reading textbooks, letters, articles, contracts, and specifications) with the mean scores of 4.22 to 4.56. The rest of the communicative events listed in the questionnaire were ranked by the employers as 'very important.' At this juncture, it is quite clear that the students did not seem to realize what is actually expected from them in the workplace as far as English is concerned, because they ranked all of the language skill communicative events at about the same level. However, they did realize the pivotal role of English, and thus ranked all these events 'most important.' In order for the students to serve the ME community more effectively and efficiently, it is imperative that they expand their limited experience and perspectives to obtain a more accurate understanding of what is required when working in the field of ME.

Finally, writing is the skill that was ranked less important than the others in the context of ME by the employers. Specifically, unlike the other three language skills, none of the seven writing tasks was ranked 'most important.' Only two tasks were ranked 'very important' (writing letters and ME information); the others were rated as 'important.' This finding is congruent with the employer's opinions asked in the first question of Part 1 and also in Part 2.

Part 4: Development needs

The last question asked in this questionnaire aims to elicit the students' and employers' opinions regarding development needs that are directly and indirectly connected with the English language in the ME workplace. Nine development areas include listening, speaking, reading, writing, grammar, vocabulary, pronunciation, culture, and body language. From their responses, both groups considered these nine areas either 'very important' or 'most important.' Compatible with the findings yielded in the previous parts, the three areas that were considered 'most important' include listening, speaking, and vocabulary. However, the two groups differed in four areas. That is, the students considered reading and writing skills 'most important' to be developed, whereas the employers rated them as only 'very important.' Finally, pronunciation and culture were regarded as 'most important' by the employers, but the students considered them 'very important.' The discrepancies in their opinions demonstrated how novices like ME students perceived the needs directly related to the English language. However, based on the responses, the employers seemed to have experienced communication difficulties triggered by non-linguistic factors. In fact, one of the employer respondents elaborated on how crucial pronunciation was in effective communication (personal communication). In the early years of his ME career, to overcome pronunciation obstacles, he managed to train himself to read transcriptions in a dictionary and to articulate English words with precision. Unfortunately, according the employer respondent, most of the English courses offered at universities emphasize the four major skills, leaving learners grappling with pronunciation problems by themselves. If possible, a course on English pronunciation should be on offer.

Another employer respondent kindly shared with us his personal experience of how cultural awareness could determine communication outcome. In the capacity of a CEO of a firm, he was invited to serve as a judge in one of the Worldskills competitions (Food Serving Competition). One of the contestants bowed while serving food to guests seated at a dinner table. One judge penalized the contestant

because such an act reflected the person's lack of confidence. However, the respondent, as well as the judges from Korea and Japan, did not perceive the message that way. To them, bowing is considered rather a manifestation of respect, and thus the contestant should not be penalized.

CONCLUSION

Needs analysis conducted on the students and the employers in the field of mechanical engineering in the context of Thailand has provided a number of crucial insights. First, the ME students encountered a substantial lack of English exposure, partly contributing to being not proficient in communicating in English. With a focus on the four skills, the students admitted that they were incompetent in oral communication skills, whereas the employers regarded oral communication skills more important than reading and writing. Among a number of communicative events pertaining to individual language skills used in the workplace, the students and the employers were quite different in their opinions. Moreover, the students seemed to overlook the significance of non-linguistic knowledge that could have an impact on communication. As demonstrated in this study and advocated by the employer respondents, pronunciation and cultural awareness need to be instilled in these ME students. Finally, this study highlights the role of employers in providing accurate and genuine input as well as keen and direct observations to needs analysis conducted in this study.

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