LEARN Journal: **Language Education and Acquisition Research Network**
ISSN: 2630-672 (Print) | ISSN: 2672-9431 (Online)
Volume: 16, No: 2, July – December 2023

Language Institute, Thammasat University
https://so04.tci-thaijo.org/index.php/LEARN/index

A Needs Analysis of English for Meeting Lessons for Thai Undergraduate Engineering Students

Piyatida Changpueng[a], Fasawang Pattanapichet[b,*]

[a]changpuengpiyatida@gmail.com, Faculty of Applied Arts, King Mongkut's University of Technology North Bangkok, Thailand
[b]fasawang.p@bu.ac.th, Business English Department, Bangkok University, Thailand
[*]Corresponding author, fasawang.p@bu.ac.th

APA Citation:
Changpueng, P. & Pattanapichet, F. (2023). A needs analysis of English for meeting lessons for Thai undergraduate engineering students. *LEARN Journal: Language Education and Acquisition Research Network, 16*(2), 603-623.

Received
05/04/2023

Received in revised form
21/06/2023

Accepted
27/06/2023

ABSTRACT

The present study explores the needs for English meeting lessons for Thai undergraduate engineering students. The participants consisted of 5 groups: 443 engineering students, 150 novice engineers, 224 experienced engineers, 4 ESP teachers, and 5 engineering teachers. Data were collected using 3 sets of questionnaires and semi-interview. Data analysis was conducted using percentage, means, standard deviation, and thematic analysis. The findings revealed that both novice engineers and engineering students have a high degree of difficulty when conducting meetings in English. In addition, it was found that there are three stages of the meeting process: preparation, participation, and post-meeting. Regarding types of meetings, the most common regular type of meeting was the problem-solving meeting. Furthermore, the results imparted the language details for the meeting participation stage that were identified based on each language function. The study discusses the main issues concerning the difficulties that Thai engineering students encounter, how the target language is used, as well as practical implications for solving issues, and proposes suggestions for developing English for meeting lessons and teaching materials. Finally, analyzing meeting discourse is recommended for further research.

Keywords: English for Specific Purposes, English for Engineering, English for Meetings, needs analysis, engineering students

Introduction

Proficiency in English is crucial for engineers to communicate effectively in a global context, allowing them to collaborate with international colleagues, write reports and emails, participate in meetings and discussions, negotiate with team members, and present their ideas to a wider audience. The English proficiency can also boost their credibility and competitiveness in the job market (Kaewpet, 2009; Kassim & Ali, 2010). However, the number of qualified engineers is insufficient to meet companies' needs. In 2006, more than 40,000 graduate engineers in Malaysia could not find a job and the main reason was their poor ability in English (Phang, 2006, as cited in Yusoff & Sumah, 2013). Reimer (2002) mentioned that graduate engineers' language ability cannot meet the communication standard of engineers. These studies reveal that English is important for engineers, but these engineers still need improvement in using English. As a result, many studies (e.g. Myles, 2009; Kaewpet, 2009; Kaneko et al., 2009; Kassim & Ali, 2010; Spence & Lui, 2013; Zaharim et al., 2009) have been undertaken to investigate the needs and problems of engineers and engineering students regarding English communication in their work contexts in order to create effective language courses to improve their English communication skills. According to a review of the literature and interviews with engineers, meeting skills are indicated as a job requirement for engineers (e.g. Cowling, 2007; Kassim & Ali, 2010, Rajprasit et al., 2014; Spence & Lui, 2013). However, it was found that Thai engineers, especially novice engineers, had difficulties attending meetings and writing the minutes of meetings (e. g. Changpueng & Pattanapichet, 2015; Kluensuwan et al., 2019; Rajprasit et al., 2014). In addition, there has been very little research on English for meeting lessons designed particularly for engineers.

The English for Engineers Course at King Mongkut's University of Technology North Bangkok (KMUTNB) in Thailand was introduced in 1992, but it did not initially cater to the needs of Thai engineers. In order to improve the course's quality, it is necessary for them to investigate and revamp the meeting lessons for engineering students, given their significance in facilitating collaboration, problem-solving, and decision-making (Kauffeld & Lehmann-Willenbrock, 2012). Therefore, a needs analysis for creating English meeting lessons for engineering students was needed as it was a required process in designing lessons or courses. This research aimed to gather data for creating meeting lessons for engineering students by investigating the English language needs of engineers in meetings. Moreover, the study also collected data regarding the meeting contexts, meeting situations, and the target language used in engineering meeting tasks, which is rarely explored in studies.

Literature Review

Needs Analysis

The terms and concepts of a needs analysis vary from researcher to researcher. However, there are some overlaps between those terms and concepts. This literature review will explore the ones that were selected as a framework for the study and will discuss relevant studies and articles. Hutchinson & Waters (2006) proposed a framework that focuses on target needs and learning needs. The framework is used to obtain information about three factors (necessities, lacks, and wants) together with information about learning needs (Hutchinson & Water, 2006). In order to gain insight into the information concerning the target needs and learning needs, two more frameworks were proposed as follows:

- A target situation analysis framework: Why is the language needed?, How will the language be used?, What will the content areas be?, Whom will the learner use the language with?, and Where will the language be used?

- A framework for analysis of learning needs: Why are the learners taking the course?, How do the learners learn? What resources are available? Who are the learners?, Where will the ESP course take place?, and When will the ESP course take place?

In order to create an ESP course, data regarding necessities, lacks, and wants are not enough as we need more information about meeting contexts and the meeting language (Rimkeeratikul, 2022). Thus, Huhta et al. (2013) offer the results of their project (CEF Professional Profiles Project) as another framework to gather information in needs analysis, especially for professionals working in companies or industries. The focus of the framework was placed on the details of the language and communicative event needs of professionals. There are six parts to be considered in collecting data as follows (Huhta et al., 2013):

- The target profession: general background information on a professional group for whom the ESP course is to be designed
- Occupational information: typical examples of a job description
- Context information: settings in which the communication takes place, persons who are involved in the communication situations, communicative situations, text, and discourse-types
- The most common situations: some of the most routine communication situations for the professions
- The most demanding situations: more details on complex responses and the interaction of most common communication situations
- Snapshots: a narrative of a day in the working life of a professional

In this study, needs analysis means an investigation process focused on collecting data in order to find out what engineers need concerning meeting tasks, together with the language used for the tasks. Necessities are the details of the meeting tasks of engineers at work. Lacks refers to the language skills that novice engineers and engineering students need to improve. Wants are what the stakeholders suggest to develop the lessons, including their expectations from the lessons. The target profession of this study was Thai engineers. Questionnaires and semi- structured interviews were used to collect the data from engineers. Attending meetings and conducting meetings comprised the target job description. The rest of the framework concerning context information, the most common situations, and the details of the most demanding situations will be investigated in this study. However, the details of the snapshots were not included in this study as their details were not very significant for developing the target lessons.

In brief, the needs analysis conceptual framework of this study compiles the concepts of the target needs (necessities, lacks, wants) and learning needs (Hutchinson & Water, 2006), and the CEF Professional Profile Project (Huhta et al., 2013).

Needs Analysis of English Language Skills for Engineers in Meetings

English needs analysis helps to identify the language learning needs of engineering students, enabling educators to identify the specific language skills necessary for academic and professional success. Multiple studies have examined these needs and have mentioned the importance of English language skills for engineers. However, it seems quite very rare to find studies about the English language used in meetings for engineers. Most of the studies found are about the English needs of engineers in general. Among these studies, English skills used in meetings are mentioned. For example, Tinh (2015) conducted research on the English language needs of mechanical engineering students in the Vietnamese context and found that listening, speaking, reading, and writing skills were required for these students so that they can perform their duties effectively. Regarding meetings, listening to presentations and discussions in meetings, seminars, or

conferences has been shown to be one of the top ten most common communicative tasks for mechanical engineers. This is similar to the research results of Spence and Liu (2013), who studied Taiwanese engineers' job descriptions at a semiconductor company, and Rajprasit et al. (2014), who studied needs regarding the English language skills of a group of novice engineers in Thailand. The results indicated that listening to presentations and discussions in meetings was required for engineers. In addition, both works reported that engineers needed to be able to write the minutes of meetings and speaking skills in order to attend and lead meetings as participants and chairpersons. Although these meeting skills were important for engineers, they could not perform them as well as they should. This can be seen from the results of Rajprasit et al. (2014), who reported that novice engineers rated their oral proficiency regarding meeting skills (e.g. providing reasons, explaining opinions, and using both technical and general vocabulary) as being fair. In addition, Kluensuwan et al. (2019) examined the needs of 190 engineers, engineering operators, and administrative personnel working in the electronics industry in Phra Nakhon Si Ayutthaya and Pathum Thani in Thailand, and discovered that the participants had difficulty with listening, especially when listening to lengthy texts, presentations, discussions, and speeches. Problems happened when they needed to listen and take notes. Apart from that, they usually worried about making mistakes when speaking English and found it difficult to enter discussions. As for the needs analysis of engineering students, Rajprasit et al. (2015) investigated 130 fourth- year engineering students' language abilities in a public university after they performed some tasks related to engineering work and found that they rated themselves at a fair level in attending meetings and giving presentations, including listening during meetings and writing engineering documents.

In conclusion, the research results mentioned above illustrate that meeting skills are required for engineers, such as listening to presentations and discussions, sharing ideas, and writing the minutes of meetings. However, both engineers and engineering students encounter challenges in using English to perform their meeting tasks. Consequently, it is imperative to develop efficient instructional materials, and in order to accomplish this, a comprehensive understanding of meeting tasks, discourse patterns, and the language- related difficulties faced by engineers in meetings is essential. However, limited investigation has been undertaken in this domain. Therefore, the primary aim of this study was to conduct a needs analysis to acquire the crucial information required.

English for Engineers Course at KMUTNB

The English for Engineers Course is an elective course under the general education category in the bachelor's degree program for engineers, focusing on English communication skills in engineering/ technical contexts. The course includes reading, writing, listening, and speaking: articles, minutes, agenda, instructions, writing reports, writing emails, conversations in relation to engineering work; giving presentations; negotiation; phone calls, and meetings.

Methodology

This research employs a mixed-methods design (Long, 2005) to investigate the English language needs of engineers in meetings for the English for Engineers course. Quantitative data were collected using a questionnaire to investigate experienced engineers' meeting tasks, meeting language, and novice engineers' and fourth-year engineering students' difficulties in carrying out their meeting tasks. Interviews with all of the participants were conducted in order to gather in-depth information and for triangulation purposes to ensure the quality of the data (Cowling, 2007; Long, 2005; Piamsai, 2017; Wozniak, 2010).

Population

To ensure the generalizability of results, this study included five groups: fourth-year engineering students, novice and experienced engineers, ESP teachers from 11 universities, and engineering teachers responsible for curriculum design. Fourth-year students were selected for their background knowledge, novice engineers for their one to three years of experience, and experienced engineers for their 6+ years of experience. The industries included automotive, electronics, consumer products, construction and construction materials, petroleum and chemicals, and mechanics.

Subjects

All subjects were selected using the purposive sampling technique. The details of each group of subjects and the selection criteria are explained below.

Group 1:

This group of subjects included only fourth-year engineering students who are finishing their studies in 11 public universities and are about to enter the engineering industry. The recruitment criteria encompassed the following: (1) being enrolled in one of the 11 public universities in Bangkok and its vicinity, (2) voluntary participation in the study, and (3) pursuing a major in any field of engineering. The size of the population of this group was 7,333 in the academic year 2020. The sample size was derived from Yamane's sample size formula (1973), and the sample size was 380. A total of 443 engineering students responded to the questionnaire.

Group 2 and 3:

The population of the two groups of engineers was large and unknown, so it was difficult to find a specific sample size number. Therefore, the calculation of the sample size employed the formula of Cochran (1977). The calculation results were 400 for each group of engineers. A total of 150 novice engineers and 224 experienced engineers responded to the questionnaire. This showed the reliability of the sample size at 94% and 96% respectively for the unknown and large population sizes. In addition, Fraenkel & Wallen (2000) suggested that at least 100 subjects are the minimum number suitable for a descriptive study. The selection criteria were as follows:

1. Novice engineers can be defined as engineers that have worked in the field of engineering for about one to three years. Experienced engineers are engineers that have been working as engineers for at least six years. Both of them were recruited into the study voluntarily.
2. These two groups of engineers should be working for a multinational company as they are expected to use English in the workplace. In order to obtain the names of the target companies, a list of different groups of industries in Thailand provided by the Stock Exchange of Thailand (SET) was studied (Stock Exchange of Thailand, 2016). The list provided by the SET was chosen as it is clearly defined. Finally, the industries included automotive, electronics, consumer products, construction and construction materials, petroleum and chemicals, and mechanics.

Group 4:

Four ESP teachers that have taught ESP and English for engineering courses in universities for at least 10 years in Bangkok and the area surrounding Bangkok

Group 5:

Five engineering teachers that were responsible for designing the curriculum (academic vice deans of the faculty of engineers) from those 11 universities were the sample size of this study.

Research instruments

Questionnaires

Three questionnaires were employed in this study, all of which were written in Thai. Questionnaire 1 aimed to identify novice engineers' meeting-related problems and the need for education to prepare them for work. It was developed based on interviews with experienced and novice engineers and had three parts covering demographic info, meeting task details and problems, and lesson suggestions. The second part had 15 Likert items. Questionnaire 2, based on interviews with eight engineers, aimed to assess fourth-year students' readiness for attending meetings at work. It had three sections, with the second section having 15 Likert items. Questionnaire 3 aimed to investigate the language used by experienced engineers in meetings. Authentic meeting discourse was not used due to confidentiality, so the questionnaire was partially based on Handford's (2010) analysis of the corpus of authentic business meetings provided in the Cambridge and Nottingham Business English Corpus (CANBEC). The questionnaire consisted of three sections, with the second section containing a list of 24 functions of meeting expressions derived from a literature review and interviews with five engineers (Handford, 2010; Holmes & Stubbe, 2014; Koester, 2004). Sections 1 and 3 were similar to the other two questionnaires. The experienced engineers were asked to check the expressions they used during meetings. In addition, the subjects were asked to write in the provided space any expressions they used in authentic meetings that were not available in the questionnaire. All of the items in the three questionnaires were validated by three experts (two ESP instructors and one engineer) with an acceptable score of 0.7 or higher for the IOC. The Cronbach's alpha coefficient reliability results for Questionnaires 1 and 2 were 0.96. and 0.89, respectively. The questions in the third questionnaire were verified using KR 20, and the reliability was 0.94.

Semi-structure interview

This study included four semi- structured interviews with different purposes. Table 1 presents information on stakeholders, interview duration, and sample questions. The questions were validated by three experts in teaching and research (two ESP teachers and one English teacher), and subjects were selected using purposive sampling. See Table 1 for more details.

Table 1

Details of semi-structured interview

Number	Stakeholders	Purposes	Duration	Samples of questions
1	five Experienced engineers, three novice engineers	To ascertain the meeting tasks, situations, the problems of novice engineers, and the meeting language for each function	Before developing the questionnaire	What are the meeting tasks of engineers? What are the problems of novice engineers?
2	four ESP teachers, five engineering teachers	To obtain information for developing lessons	Before developing the lessons	What were your suggestions for

				developing meeting lessons? What did you think about your students' English background knowledge?
3	ten engineering students, six novice engineers	To investigate data concerning their causes of problems in conducting meeting tasks	After analyzing questionnaires 1 and 2	What kind of problems did you have concerning writing the minutes of meetings when you started working?
4	five experienced engineers	To obtain more information regarding meeting contexts, types of meeting, meeting topics, etc.	After analyzing all questionnaires and arranging the required content	What are the meeting contexts of engineers? What types of meetings do you use?

Table 2

The criteria for score interpretation

Mean range	Meaning
4.21-5.00	Most
3.41-4.20	High
2.61-3.40	Moderate
1.81-2.60	Little
1.00-1.80	Least

As for the qualitative analysis (semi-structured interview), the thematic analysis suggested by Willig (2013) was employed in this study.

Results

This section reports the results of the needs of engineers in using English for meetings based on the two frameworks.

Necessities

In order to obtain details on the meeting tasks, interviewing five experienced engineers and three novice engineers, and reviewing the literature, were conducted. The results showed that all of the engineers agreed that the main reason to have meetings in English was that they have foreign bosses and colleagues, including clients that work both in Thailand and abroad.

> Our headquarters is in Switzerland. We have to use English to communicate with foreign bosses, co-workers, and customers. We usually have online meetings with them. (Exp eng1)

The target languages were required for different tasks. The meeting tasks could be divided into three stages; namely, meeting preparation, meeting participation, and post-meetings. The details of the meeting tasks of each stage are as follows:

1. Meeting preparation: writing e-mails or calling to invite participants to attend meetings, to cancel or reschedule meetings

2. Meeting participation: discussion of topics (roles: chairperson, minutes writer, and participants)
3. Post-meeting: writing the minutes of the meeting

> When we need a meeting, we will have to invite the participants. We usually send an invitation email. Sometimes we will have to make a phone call to ask about their availability before sending out an official email invite. (Exp eng 2)
> When we are in the meeting, the chairperson will open the meeting once most of the participants are present. Then he will inform us of the meeting agenda. During the meeting, the chairperson will encourage us to discuss and share opinions. Once the meeting is adjourned, one of the participants will be assigned to write the minutes of the meetings. (Exp eng 3).

It is worth noting that engineers needed to understand the roles of the chair and participants. They need to be able to use language based on those roles to communicate during meetings effectively. Moreover, all of the interviewees indicated that they have problems with the following areas: writing e-mails and the minutes of meetings, lacking confidence in speaking, and listening for the gist.

Lacks

Questionnaires 1 and 2 asked the respondents to evaluate themselves regarding their English used for meeting skills. Questionnaire 1 was used to ask the novice engineers while Questionnaire 2 was used to ask the fourth-year engineering students. All of the questions were identical except the questions about demographic data. The details are reported in Table 3 below.

The demographic data of novice engineers

The data show that the majority of the subjects were male (72%) and most of them held a bachelor's degree (86%). The work experience ranged from 1-3 years and around half of them (52%) had three years of experience. Many of them worked in the automotive area (26.6%), construction (19.3%), consumer products (18%), and electronic parts (16%). In addition, 28% of novice engineers had meetings every month. They also had meetings every day (24.7%) and every week (16%). Normally, they had a meeting with colleagues in the same department (25.7%) and engineers from different departments (22. 9%). They sometimes had meetings with the management team (19.6%) and clients (15.5%).

The demographic data on the fourth-year engineering students

The data reveal that the majority of them were about 21-23 years old (91%), and most of them were male (62.8%). The first three highest responses were received from KNUTNB (46.5%), KU (13.5%), and KMUTL (10.8%). They expected to improve their listening skill to a high level (M= 4.09). Further, more than half of them (51.9%) practiced English themselves out of class and they thought that they were competent in reading (M= 3.58). The majority of them had internship experience (73.8%) and used English during that time (62.9%).

Table 3

Comparison between the levels of English skill difficulty with meeting tasks by novice engineers and those by fourth-year engineering students

		The levels of English skill difficulty with meeting tasks by novice engineers			The levels of English skill difficulty with meeting tasks by fourth-year engineering students		
Meeting task skills	**Sub-skills**	**Mean**	**S.D.**	**Level**	**Mean**	**S.D.**	**Level**
Meeting preparation skills	Not knowing how to write invitation e-mails	3.49	1.28	High	3.40	0.93	Moderate
	Not knowing how to write e-mails to cancel or reschedule meetings	3.42	1.32	High	3.45	0.91	High
	Not knowing sentence structure, so it is difficult to write e-mails to invite, cancel, or reschedule	3.55	1.32	High	3.25	1.03	Moderate
	Not knowing how to speak face to face or on the phone to cancel or reschedule meetings	3.51	1.32	High	3.23	0.97	Moderate
	Not knowing how to speak face to face or on the phone to invite people to attend meetings	3.43	1.27	High	3.21	0.97	Moderate
Meeting participation skills	Attending meetings without problems	3.17	1.21	Moderate	3.46	0.87	High
	Being unable to catch the gist after listening	3.48	1.18	High	3.49	0.97	High
	Not knowing the words and expressions used in meetings	3.47	1.13	High	3.60	0.94	High
	Being unable to understand foreign accents	3.83	1.18	High	3.52	0.98	High
	Lacking knowledge of meeting processes	3.43	1.24	High	3.69	0.79	High
	Lacking confidence in speaking	3.56	1.33	High	3.57	0.98	High
Post-meeting skills	Not knowing how to write each part of the minutes	3.55	1.16	High	3.45	0.94	High
	Having inadequate vocabulary regarding the minutes of meetings	3.45	1.25	High	3.39	0.95	Moderate
	Being unable to write the minutes of meetings because of grammar problems	3.58	1.29	High	3.49	0.98	High
	Being unable to write the minutes of meetings because of sentence structure problems	3.59	1.29	High	3.39	0.98	Moderate
	Total	3.50	0.94	High	3.44	0.48	High

Table 3 illustrates that both novice engineers and fourth-year engineering students have problems at a high level in most stages of conducting a meeting (the total mean score of the difficulty rating by the novice engineers is (M=3.50, S.D.=0.94.) and the total mean score of the difficulty rating by engineering students (M= 3.44, S.D. =0.48). Out of 15 questions, all 8 questions (question number 2,7,8,9,10,11,12, and 14) received a 'high' rating from both novice engineers and engineering students.

However, the novice engineers and the engineering students gave different ratings for 7 questions (question number 1,3,4,5,6,13, and 15). Question number 3 and 15 ask the respondents to rate the degree of difficulty due to sentence structure problems when writing emails to invite and when writing the minutes of meetings, the novice engineers rated 'high' difficulty (M= 3.55, S.D. =1.32 and M =3.59, S.D. =1.29) respectively) while engineering students rated 'moderate

difficulty (M = 3.25, S.D. =1.03 and M= 3.39, S.D. = 0.98 respectively). Furthermore, different ratings were also found for question number 4 -speaking face to face and on- the phone to schedule meetings, number 5- inviting people to attend meetings, and number 13- having inadequate vocabulary regarding minutes of meetings. While novice engineers rated the difficulty of these tasks as 'high' (M = 3.51, S.D.=1.32 and M= 3.43, S.D.=1.27), engineering students rated the difficulty of these tasks as 'moderate' (M = 3.23, S.D.=0.97 and M= 3.21, S.D.=0.97). In addition, question number 13 asking both groups of respondents to rate the difficulty of writing minutes of meetings due to lack of vocabulary, the novice engineers rated the difficulty of this task as 'high' (M = 3.45, S.D.=1.25) while engineering students rated this task as 'moderate' (M = 3.39, S.D.=0.95).

Nevertheless, question number 6 asks the respondents to rate a degree of difficulty in attending meetings, novice engineers rated 'moderate' (M =3.17, S.D.=1.21) while engineering students rated 'high' (M=3.46, S.D.=0.87).

The interview with 6 novice engineers and 10 engineering students confirmed the results of the questionnaire and provide more clarification on certain points. The interviewees all agree that they had some English communication courses while studying at university, but they did not have lessons on meetings, as seen in the following:

> I took a course for English for communication but the course focused more on speaking practice in general. It wasn't related to engineering work. (N eng 1)
> The university provided an English for communication course but there was no specific content for engineering students. (N eng 5)
> The course I had was Communicative English. It covered English used in general, not in engineering contexts. I had the course with other students from different faculties. (S eng1 and S eng2)

Regarding writing issues, many of novice engineers and engineering students said that writing was difficult because they have grammar and sentence problems.

> I couldn't write well because I have problems with sentence structure and grammar points. (Nov eng 6), (N eng 2)
> Grammar points and writing sentences were my problems. And limited vocabulary was my problem as well. (N eng 3)
> Grammar is the most difficult part for me. (S eng3)
> Grammar and structure are my main problem. (S eng4)

Furthermore, they did not know how to write e-mails or the minutes of meetings. A response is presented below:

> Writing e-mails and the minutes of meetings was difficult because I'd never studied how to write either of them. I didn't know how to start writing and what I should write in each part. (N eng 4)
> I don't know how to write emails and minutes of meetings. We didn't have much practice in class. I remember writing a short email to introduce myself and apply for a job but I have never been taught to write other types of emails and I don't know what meeting minutes are. (S eng5)

For the listening part, they explained that listening was difficult for them. The main barrier was the various accents of speakers that blocked them from understanding. Excerpts from some of them are reported below:

> Usually, when we listen to audio clips in class, the recordings are made easy for us. I think they are native speakers of English talking. But, when I talk to foreigners who are not native speakers, I always have a hard time understanding them. (S eng 6)
> Japanese, Indian, and Filipino accents were difficult for me to understand, especially when engineers with those accents sat together in the same meeting room. (N eng 1)
> My listening problems were with the speed of how Indonesian and Indian engineers talked and their accents. It was so difficult to understand them. (N eng 2)

Because of problems with the listening part, they were afraid of speaking to share ideas or respond to questions since they were not sure if what they heard was correct or not:

> I was afraid of sharing ideas in meetings. I had to be sure that I understood things clearly so could I respond to them. (N eng 5)
> I was always silent during meetings at the beginning because I didn't understand what other people said. (N eng 3)
> Listening is problematic for me since I don't get to listen to English speaking. I cannot catch what the speakers are saying and that makes me very nervous. I always end up not knowing what to respond. (S eng 7)
> In real world, people don't talk as slow as the conversations we studied from the audio clips in class. In class teachers can pause and play the recordings many times for students. But, in reality they speak very fast and I don't know what to say to them. (S eng 8)

Another result regarding listening problems was taking notes during meetings. Since they did not jot down all of the important information, they could not write the minutes of meetings effectively.

> It was not easy to catch the gist after listening and taking notes at the same time. I was always worried if I got the correct information or not. So, I couldn't write the minutes if I was not sure. (N eng 5)
> I don't know how to take notes. I don't understand what it's being said and I have difficulty to write some words down because I don't know what the words are. (S eng 9)

Regarding the speaking problem, many of them were not confident in speaking English:

> What I worried most about was making mistakes in speaking. (N eng 1,6, 2)
> Speaking English makes me very nervous. (S eng 10)

Wants

The semi-structured interviews and short answer section from the questionnaire asked the stakeholders to suggest what they expected to be included in the course. All of the stakeholders agreed that meeting lessons are useful for engineering students and that they should learn about meetings as a part of the curriculum. The information can be divided into four parts: activities, contents, teaching methods, and assessment. As for the activities, all of the stakeholders agreed that practicing meetings through simulation and authentic situations was suitable. For instance,

> Students should learn from simulation using authentic situations to help them get real experience in meetings. (Eng. T 4)
> I would like to have a lot of practice through real group meetings. (S eng. 20)

In addition, more listening practices with various accents were also suggested. With respect to the content, all of the stakeholders offered various content for the lessons; namely, presentation

skills, vocabulary related to meetings and writing e-mails, taking notes, and meeting expressions for each meeting task, as they reflected:

> Presentation skills are part of meetings, so engineers have to know how to give presentations. (N eng. 3)

Furthermore, the students thought that practicing four language skills was crucial as the background for them to study group meetings, writing minutes, and invitation e-mails. Many ESP and engineering teachers were concerned about the meeting manners, including using appropriate language for meeting contexts. Regarding the teaching method, many students suggested how to teach the lessons. For example, they preferred hybrid classes. They thought that they could learn the content through e-learning, while practice speaking could be conducted onsite. For instance,

> I would like to learn and review the lessons from the VDO, and go to class to practice. (S eng 2)

However, some of them preferred studying only on-site. The ESP teachers agreed that practice with a lot of group meetings was required, with feedback from teachers being given. In addition, content should be developed using the corpus-based approach. Finally, all stakeholders advocated using real group meetings as the main test task, with clear rubrics. Many engineering students offered that they did not want grading from the meeting tasks; they only required feedback from teachers. Some of them preferred many quizzes to test their abilities. Similarly, novice engineers also agreed that students should learn by doing quizzes.

Huhta et al.'s (2013) Framework

This part reports the results regarding the framework of Huhta et al. (2013), consisting of the target profession, occupational information, context information, most common situations, and most demanding situations. Most of the details were received from interviewing experienced engineers, except for the information from the discourse part, which was collected from experienced engineers using Questionnaire 3. The results of the study are as follows shown in table 4.

Table 4

The needs analysis results regarding Huhta et al.'s (2013) framework

Content		Details
Target profession	Thai engineers: experienced and novice engineers Collecting information plan: questionnaires, interview questions	
Occupational details	Attending meetings and leading meetings in English	
Context information	**Location**	Companies/ factories
	Person	Meetings: among engineers (same or different departments) Between engineers and clients or vendors Between engineers and colleagues in the same company Between engineers and superiors
	Communication situations	The situations depend on the types of meetings. ***Types of meetings*** **Participants:** internal or external meetings **Purposes:** meetings for kick-off, reviewing, planning, solving problems, following-up, training, brainstorming **Frequency:** daily, weekly, monthly, yearly

		Note: internal meetings are the meetings that occurred between engineers and their colleagues in the same department or in different departments of the same company (e.g. managers and managers, engineers and engineers, and senior engineers and novice engineers). Generally, external meetings were set between engineers and clients and engineers and vendors.
	Texts	Invitation e-mail and minutes of meetings were required. See the results of the genre analysis: invitation e-mail, minutes of meetings (Changpueng and Patpong, 2021)
	Discourse	Meeting discourse: See more details below.
Most common meeting situations	Solving problem situations	
Most demanding situations	Example 1: Situation: A steel company received a complaint from a customer regarding a stain on the steel, so the engineers from the departments (e.g. production, QC, research, and development) had a meeting to find the root cause and solutions in order to inform the customers of the meeting results. Example 2: Situation: A customer ordered a new product from an automobile company. The deadline to submit the product is about one month, but the production line has its own routine busy production schedule. The new product also needs to be tried out before the actual production. In addition, one of the machines could not run at full speed because some machine parts have not been changed. Thus, the engineers from the departments (e.g. production, process, logistics, and maintenance) had a meeting to figure out the problem.	

Please note that the term 'discourse' was not used in the results section as the collected information was not directly gathered by analyzing the meeting discourse of Thai engineers. The discourse data were confidential, so the data were obtained by asking the engineers to choose the meeting expressions that they usually use in meetings in the questionnaire. Therefore, the term 'language' and the term 'expressions' were used instead. The details of the language for meetings are presented below.

The demographic data of the experienced engineers presented that more than half of them were male (79%), the majority of whom completed a bachelor's degree (59.4%). Most of them had work experience of about 6-20 years. They worked in various industrial areas, especially electronic parts (22.7%) and petroleum & chemicals (28.5%). They had meetings in many ways; the highest frequency was every day (31.7%). In addition, they had meetings with various interlocutors such as colleagues in the same department (19.1%) and colleagues in different departments (21.6%), including their bosses (24%).

Language details for the meeting participation stage

It should be noted that normally there was more than one purpose in a meeting because sometimes there were many agenda items to discuss. In addition, there were various factors influencing how engineers use language in meetings; namely, the language for internal and external meetings (formal and polite language normally used in an external meeting), unequal status in their workplaces (e.g. manager, senior engineers, and novice engineers), meetings issues, and social distance between them (how well they know each other). These factors can lead to a different power in working and how to use language in meetings. The details of the target language that the experienced engineers used in each language function during the meetings are shown in the samples in Table 5-10 below. For the details of all 24 functions (opening a meeting, introducing agenda, identifying objectives, asking for opinions, introducing opinions, showing agreement, showing disagreement, asking for suggestions, making suggestions, explaining reasons, keeping the discussion on track, summarizing the meeting, closing the meeting, focusing, summarizing ideas,

clarifying one's own position, checking to understand, being vague, hedging, signaling obligation, seeking clarification, hypothesizing, backchannels), go to the following link: https://docs.google.com/document/d/1GmzoYYXZ2Xf5ZsmWw17LyAZlM4Y4oT9/edit?usp=sharing&ouid=116360366627031786619&rtpof=true&sd=true

Please bear in mind, the total number of responses in each function was greater than the number of respondents because they were asked to identify all of the expressions they used.

Table 5

Examples of opening meeting expressions

Opening the meeting remarks	Number	Percentage
Shall we start?	179	79.9
Let's get started	156	69.6
Shall we begin?	116	51.8

Table 5 provides some examples of opening meeting expressions. 'Let's get started' and 'shall we start?' were ones that the engineers normally used. The interview results found that the formal opening of the meeting (usually occurring in external meetings) involved opening remarks by the chairs, and then he/she introduced him/herself and the participants. After that, the chairs stated the agenda and purpose of the meetings. For the internal meetings, the opening of the meeting was quite short. The engineers may only say 'start?' or 'shall we start?' and then talked about the agenda before beginning the discussion. As for using formal or polite language, this was found in turn taking as well. Again, it usually happened in external meetings, for example, when the chairs asked the participants to provide information about something, to share opinions, or ask questions. Below are statements from the engineers.

> Meetings require polite and formal language, especially in external meetings. The parts where we normally use formal language are opening the meeting and turn-taking. For turn taking, it can be asking questions or inviting the participants to explain something. (Exp eng 3)
> The opening for internal meetings is short. Generally, the meeting leaders just greet the participants and say 'start' with high intonation. After that, the details of the agenda and the purpose of the meeting are mentioned. Then, they start the discussion. (Exp eng 2)
> Meetings with Japanese engineers is strict in the opening part, the order of the issues in the agenda, and the table setting. The seats must be arranged based on order of seniority. Self- and team introduction are required in the meeting opening. (Exp eng 5)

Table 6

Examples of expressions showing disagreement

Disagreeing	Number	Percentage
I'm not sure.	165	73.7
I'm sorry but I don't agree.	139	62.1
I'm afraid I can't agree with that.	119	53.1

Table 7

Examples of backchannel phrases

Backchannel	Number	Percentage
Right	187	83.5
Yeah	164	73.2
Hmm	123	54.9

Table 8

Examples of hedging expressions

Hedging	Number	Percentage
I think.	188	83.9
I don' think.	142	63.4
I guess.	140	62.5

Table 6 explains how engineers show disagreement with interlocutors. The expression that they used a lot was 'I'm not sure'. Then, they needed to provide reasons or suggest ideas. The interview results also confirmed that most of the engineers did not say I disagree with you' or I don't agree because they were aware of face-threat. Face-threat was important for both internal and external meetings, as indicated in the following:

> Avoiding face threats is very important for all meeting levels, especially if you do not agree with the ideas of the seniors. You cannot say 'disagree'; you need to avoid that expression. You need to say something to avoid direct disagreement, such as 'I'm not sure' and then provide the reasons why you don't agree. Also, you can propose your ideas. (Exp eng 1)
> You need to be careful about face threats because if a conflict occurs during a meeting, the meeting atmosphere will be worse. It will be difficult to continue the meeting. (Exp eng 2)

The unequal status of participants influenced how participants use language to show their disagreement as well. See more explanation below.

Furthermore, engineers also used backchannels (short responses made by listeners to signal that they are listening, that they do not want to take the turn to talk, or that they are supporting the speaker) and hedging as feedback to show disagreement in order to avoid face-threat (Table 7 and 8). 'Right' and 'yeah' are used quite frequently in backchannels, while 'I think' is employed a lot in hedging. Possibly, engineers use both hedging or backchannels at the beginning and then say the sentences that they want or use the expressions from Table 6, as seen in the following sample dialog:

> Chair: What do you think about his idea?
> Novice engineer: Right, I'm not sure. I think I partly agree with him (a senior engineer), but it may take too long a time to solve the problem. May I suggest something?

Table 9

Examples of expressions showing hypothesizing/ speculating

Hypothesizing/speculating	Number	Percentage
I think if we…	186	83
If you	174	77.7
If I	147	147

Table 9 presents how engineers offered ideas to do something. It can be seen that 'if' was used to provide more choices for interlocutors. Also, it was a way to tell the participants what may happen if the team made a decision in a certain way. They do not want to force them to decide. An example from an interview script is shown below:

> Using 'if' is good since it means that we don't force them to make a decision. We talk about what can happen later. However, using 'if' is also quite risky because other participants may not agree with our idea and may offer another choice when they hear the word 'if'. Therefore, it won't be easy to end the discussion. (Exp eng 4)

Table 10

Examples of expressions used for signaling obligation

Signaling obligation	Number	Percentage
We should	199	88.8
We need to	170	75.9
We can	160	71.4

Table 10 illustrates using modality in order to suggest engineers to do something. 'Should and need to' are employed quite highly in this case as they are used to giving suggestions and not forcing. Samples of engineers' ideas are presented below:

> A meeting is a means for discussion, for people to suggest ideas to do something. Using 'should' or 'need to' is important. I never use 'must' or 'have to' maybe because I normally have meetings with clients, so offering them choices is a part of my work. (Exp eng 3)
> I love using 'shall we?'. I feel comfortable using this expression since it means that I'm not forcing them to do something. Although I am a manager and I can force them to follow my directions, I don't do it. (Exp eng 4)

Discussion and Implications

This section discusses the results of the needs (necessities, lacks, wants) of engineers according to Hutchinson and Walter's (2006) and Huhta et al.'s (2013) framework, particularly the language details used in meetings that align with the tasks that engineers commonly engage in, the skill areas that require improvement, and their expectations regarding the English for Engineers course. Moreover, it explores the classroom implications that specifically concentrate on the advancement of English for Meeting lessons tailored to the needs of engineers.

Necessities, Lacks and Wants

The findings from the study shed some light on the necessities, lacks, and wants of engineers when having a meeting. As for necessities, engineers are required to perform three stages of the meeting process, the preparation, participation, and post-meeting tasks. They are required to use English to perform each role in the meeting. This discovery is consistent with previous research on the genre of business meetings (Bargiela-Chiappini & Harris, 1997; Handford 2010; Holmes & Stubb, 2014). Among the three stages of meeting tasks, it was found that meeting participation and post-meeting tasks are the most problematic areas for engineers since the two stages require English speaking, listening, and writing skills, which are common issues for non-native English speakers (Jarupan, 2013; Kasim & Ali, 2010; Spence & Liu, 2013). The subsequent section addresses the challenges faced by Thai engineering students and novice engineers in terms of English language proficiency during meetings, as well as their desire for the development of English meeting lessons in the following domains:

Vocabulary and expressions

Technical vocabulary is important in Engineering English, but engineers and engineering students struggle with it, according to several ESP studies as well as the results from the questionnaire and interviews. They have difficulties with technical jargon and vocabulary, as well as formal language use in meetings. Using appropriate words or terms to explain technical concepts and writing meeting minutes require formal language skills, which are also a challenge for them.

Grammar and sentence structure

Both students and novice engineers had main problems in grammar and sentence structure, both in speaking and writing skills in those three stages of the meeting, and this led to communication problems. Studies by Jarupan (2013), and Sinturat et al. (2002) have examined these difficulties with Thai students and engineers.

Accents and pronunciation

The study found that engineering students and engineers struggle with understanding different English accents, especially those of non-native speakers. This can lead to miscommunications and awkward moments during meetings. The interviewees felt that the listening materials provided in class did not reflect real-life listening situations and were often spoken in a clearer and slower manner than real-life speech. They also mentioned that they were not exposed to other accents, as the listening practice materials usually presented native-speaker accents.

Speaking and listening

The two groups of respondents have difficulties in speaking and listening skills. This is similar to the studies by Rajprasit et al. (2014), Rajprasit et al. (2015) and Kleunsuwan et al. (2019). This problem may be caused by lacking confidence in speaking since they worry about making mistakes in speaking. As for listening, cannot catching the gist is another concern since this causes another problem in taking notes and writing minutes.

Regarding wants, they expected to study meeting lessons that provide them with authentic materials using real scenarios of meetings and meeting language to teach them. Practice speaking using simulation and group discussion was suggested, and focusing on various accents in the listening materials, and more practicing on presentations, grammar, and sentence structure, were required.

Huhta et al.'s (2013) Framework

The results showed that engineers need to know how to use English in the three stages of the meeting process. There were various meeting situations that they had to attend, e.g., between engineers and colleagues, and between engineers and superiors. Therefore, they should carefully use polite language in order to avoid problems in meetings, such as face threats. This is similar to the study of Holmes and Stubbe (2014), which discussed using polite language in meetings. In addition, the results emphasized the language details used in engineering meetings. As mentioned in the methodology, the researcher was curious to know if Thai engineers use meeting language similar to that of other professionals in business areas, and the study found that Thai engineers use meeting expressions similar to those of other business communities and countries. This is consistent with previous studies (Bargiela-Chiappini & Harris, 1997; Handford, 2010; Holmes & Stubbe, 2014). Koester (2004) points out that a meeting is a business communication involving a specific lexis, technical jargon, and a structure of business interactions relevant to the participants' working roles and meeting topics.

Implications

The findings of the present study illustrate that conducting meetings is complex and requires specific tasks and language use. This has implications for pedagogical and administrative aspects as follows.

The findings suggest that a specific and sufficient number of lessons with authentic examples of meeting tasks, meeting situations, and language use are necessary for students to practice. The lessons should be divided into three lessons based on the three meeting stages. Applying the results of this study to the design of lessons is recommended, such as providing various accents of speakers in the listening materials. Further, a situational, text-based, or integrated-skills task-based syllabus is suggested (Boonteerarak, 2021, Loganathan & Paul, 2019; Namtapi, 2022). A task-based syllabus is suitable for designing lessons, as the results showed that there were various meeting tasks that engineers need to do, so asking students to practice English for meetings by doing tasks. For example, role-play tasks and group discussion tasks are recommended. Students should be given enough time for real practice on each task, and teacher feedback is also required.

The results additionally indicate that the stakeholders were in consensus about the importance of ample practice utilizing simulated scenarios and real-world situations, as well as resources. In order to create effective lessons, English for engineering meetings should be a separate course, as the results implied that there are many meeting tasks that engineers need to practice. Thus, more practice time can be provided for students if the lessons are created for English for engineering meeting course.

Furthermore, collaboration between educational and industrial sectors is needed from the beginning stage until the end of the course development in order to ensure the course's effectiveness. This is because the results showed that it was difficult to create authentic teaching materials without asking for information from experienced engineers. This idea is consistently discussed in many ESP studies. For example, Tiongson (2018) highlights the importance of interdisciplinary collaboration between language teachers and content specialists in the field of English for Specific Purposes (ESP). Hassan and Mostafa (2016) emphasize the urgent need to establish a university-level resource center that supports ESP professional development. They further emphasize the importance of ESP teachers collaborating with subject matter specialists. Ahmad et al. (2018) propose CETIF, a collaborative ESP testing framework that involves English lecturers, engineering lecturers, and industry personnel to enhance assessment efforts.

This study struggled with time constraints since the researcher needed the data to develop the course and materials for teaching in the coming semester. The study had to be completed

within about two months. This might have restricted the research's depth and breadth of data collection and analysis. Thus, it is imperative for further study to extend the duration of the data gathering period to longer than a few months in order to obtain a substantial dataset. Further study is suggested in the area of analyzing the meeting discourse of Thai engineers, as it was another limitation in this study because the data had to be kept confidential. Asking for cooperation between universities and industries is a channel for obtaining permission in order to explore the data. Finally, this study was conducted during the COVID-19 pandemic situation, and this caused substantial difficulties in accessing the participants and time management when collecting data.

Acknowledgements

We extend my heartfelt gratitude and appreciation to the faculty of Applied Arts at KMUTNB. Special thanks are also extended to Associate Prof. Dr. Pinkanok Wongpinpetch, Dr. Bruce Leeds, and Dr. Karnchanoke Wattanasin, as well as the engineers and engineering students. Their invaluable contributions played a crucial role in the successful completion of this research project.

About the Authors

Piyatida Chnagpeung: An associate professor in the Department of Languages, the Faculty of Applied Arts at King Mongkut's University of Technology North Bangkok. She obtained her Ph.D. (English as an International Language) from Chulalongkorn University. Her research interests include ESP, course development, and teaching using the Genre-based approach.

Fasawang Pattanapichet: A full-time faculty member in the Department of Business English at Bangkok University International. She obtained her Ph.D. (English as an International Language) from Chulalongkorn University. Her research interest includes English Course Development, English for Specific Purposes and Teaching English for Careers.

References

Adams, R., Mann, L., Jordan, S., & Daly, S. (2009). Exploring the boundaries: Language, roles and structures in cross-disciplinary design teams. In J. McDonnell & P. Lloyd (Eds.), *About: Designing* (pp.339-359). Taylor and Francis Group. https://www.researchgate.net/publication/284900673_Exploring_the_Boundaries_Language_Roles_and_Structures_in_Cross-Disciplinary_Design_Teams

Ahmad, N., Muhammad, M., & Jamil, A. (2018). The Potential use of Collaborative SPE Testing Implementation Framework (CETIF) in addressing underlying issues in ESP curriculum and testing faced by English lecturers teaching engineering students. *International Journal of Modern Languages and Applied Linguistics, 2*(4), 10-19.

Bargiela-Chiappini,F. & Harris,S. (1997). *Managing language: The discourse of Corporate Meetings*. John Benjamins Publishing Company.

Boonteerarak, P. (2021). The development of a communicative English training curriculum for Thai counter clerks in convenience stores. *LEARN Journal: Language Education and Acquisition Research Network*, *14*(2), 115–142.

Changpueng, P., & Pattanapichet, F. (2015). An analysis of English in the workplace: The needs of engineers in writing in English. *Silpakorn University Journal of Social Sciences, Humanities, and Arts, 15*(3), 151-176.

Changpueng, P., & Patpong, P. (2021). Genre analysis of minutes of meetings conducted in English by Thai engineers. *Indonesian Journal of Applied Linguistics, 11*(1), 134-145.

Cochran, W. G. (1977). *Sampling techniques*. John Wiley & Sons.

Cowling, D. (2007). Needs analysis: Planning a syllabus for a series of intensive workplace courses at a leading Japanese company. *English for Specific Purposes, 26,* 143-167.

Fraenkel, J. R., & Wallen, N. E. (2000). *How to design and evaluate research in education (4th ed.).* McGraw Hill.

Goh, C., & Burns, A. (2012). *Teaching speaking: A holistic approach.* Cambridge University Press.

Jarupan, S. (2013). The English oral communication competency of Thai engineering students. *International Journal of Scientific Publications, 3*(3), 1-9.

Handford, M. (2010). *The language of business meetings*. Cambridge University Press.

Hassan, K. M., & Mostafa, K. A. (2016). ESP and needs analysis: Teaching English to engineering students in Bangladesh. *MIST Journal of Science and Technology, 4*(1), 26-36.

Holmes, J., & Stubbe, M. (2014). *Power and politeness in the workplace.* Routledge.

Huhta, M., Vogt, K., Johnson, E., Tulkki, H., & Hall, D. R. (Eds.) (2013). *Needs analysis for language course design: a holistic approach to ESP.* Cambridge University Press (CUP).

Hutchinson, T., & Waters, A. (2006). *English for specific purposes: A learning-centered approach.* Cambridge University Press.

Kaewpet, C. (2009). Communication needs of Thai civil engineering students. *English for Specific Purposes,* 28, 266-278. https://doi.org/10.1016/j.esp.2009.05.002

Kauffeld, S., & Lehmann-Willenbrock, N. (2012). Meetings matter: Effects of team meetings on team and organizational success. *Small Group Research, 43*(2), 130-158. https://www.researchgate.net/publication/258187597_Meetings_Matter_Effects_of_Team_Meetings_on_Team_and_Organizational_Success

Kaneko, E., Rozycki, W., & Orr, T. (2009). Survey of workplace English needs among computer science graduates. *Proceedings of the IEEE International Professional Communication Conference* (pp. 1-6). IEEE. https://doi.org/10.1109/IPCC.2009.5208704

Kassim, G., & Ali, F. (2010). English communicative events and skills needed at the workplace: Feedback from the industry. *English for Specific Purposes,* 29, 168-182. https://doi.org/10.1016/j.esp.2009.10.002

Kluensuwan, P., Chaisiri, T., Poomarin, W., & Rungruangsuparat, B. (2019). Needs analysis of English for engineering staff in the electronics industry in Phra Nakorn Si Ayuttaya and Pathumthani, Thailand. *Nida Journal, 24*(36), 64-90.

Koester, A. (2004). *The language of work: Intertextuality in workplace discourse.* Routledge.

Kosashunhanan, K. (2016). The use of English for communication by Thai engineers: A case study of Japanese companies at Amata Nakorn Industrial Estate. *Suthiparithat, 30*(93), 146-159.

Long, M. (2005). Methodological issues in learner needs analysis. In M. H. Long (Ed.), *Second language needs analysis* (pp. 19-76). Cambridge University Press.

Loganathan, S., & Paul, S. (2023). Impact of task-based language learning among engineering students: A try-out. *Gedrag & Organisatie Review, 33*(2), 1144-1149.

Myles, J. (2009). Oral competency of ESL technical students in workplace internships. *TESL-EJ, 13*(1), 1-24. https://files.eric.ed.gov/fulltext/EJ898196.pdf

Mudraya, O. (2006). Engineering English: A lexical frequency instructional model. *English for Specific Purposes, 25*(2), 235-256.

Namtapi, I. (2022). Needs analysis of English for specific purposes for tourism personnel in Ayutthaya. *LEARN Journal: Language Education and Acquisition Research Network*, *15*(1), 409–439.

Piamsai, C. (2017). An investigation of Thai learners' needs of English language use for intensive English course department. *Pasaparithat,* (32), 63-96.

Promsupa, P., Varasarin, P., & Brudhiprabha, P. (2017). An analysis of grammatical errors in English writing of Thai university students. *HRD Journal, 8*(1), 93-104.

Rajprasit, K., Pratoomrat, P., Wang, T., Kulsiri, W., & Hemchua, S. (2014). Use of the English language prior to and during employment: Experiences and needs of Thai novice engineers. *Global Journal of Engineering Education, 16*(1), 27-33.

Rajprasit, K., Pratoomrat, P., Wang, T., Kulsiri, W. (2015). Perceptions and problems of English language and communication abilities: A final Check on Thai engineering undergraduates. *English Language Teaching, 8*(3), 111-120.

Reimer, M. (2002). Investigation into the development of English and communication skills for the modern engineer within a cultural context: A research scheme. *World Transactions on Engineering and Technology Education, 1*(1), 23-28.

Rimkeeratikul, S. (2022). Needs analysis on an English textbook entitled English for international business. *LEARN Journal: Language Education and Acquisition Research Network*, *15*(1), 748–774.

Ruangprapan, C. (1996). *Basic statistics: with sample analysis by MINITAB SPSS/PC+ and SAS/*. Bangkok: Khang Nana Wittaya. (In Thai)

Rus, D. (2020). Creative methodologies in teaching English for engineering students. *Procedia Manufacturing*, 46, 337-343.

Shresta, R., Pahari, B., & Awasthi, J. (2016). Importance of English in engineering for professional communication: A study in the Nepalese context. *Journal of the Institute of Engineering, 12*(1), 222-227.

Sinturat, T., Kosashunhanan, K., Iamiaor, A., Khunasathitchai, K., & Teptong, N. (2022). English speaking problems of engineering students: A case study of Rakamangala University Technology Thanyaburi. *Journal of Roi Kaensarn Academy, 7*(5), 1-9.

Spence, P., & Liu, G. (2013). Engineering English and the high-tech industry: A case study of an English needs analysis of process integration engineers at a semiconductor manufacturing company in Taiwan. *English for Specific Purposes,* 32, 97-109.

Stock Exchange of Thailand. (2016). Classification of industry group and sector.https://www.set.or.th/en/regulations/simplified_regulations/industry_sector_p1.html

Tinh, L. C. (2015). *Needs analysis of English for mechanical engineering students in the Vietnamese context* [paper presentation]. The 6th International Conference on Responding to Challenges of Teaching English for Communication, Ho Chi Minh city, Vietnam. https://www.researchgate.net/publication/298704361_Needs_analysis_of_English_for_mechanical_engineering_students_in_the_Vietnamese_context

Tionson, M. T. (2018). Interdisciplinary teacher collaboration for English for specific purposes in the Philippines. *University of Sydney Papers in TESOL*, 13, 29-62.

Willig, C. (2013). *Introducing qualitative research in psychology*. Maidenhead, Berkshire, England: Open University Press/McGraw-Hill Education.

Wozniak, S. (2010). Language needs analysis from a perspective of international professional mobility: The case of French mountain guides. *English for Specific Purposes,* 29, 243-252.

Yamane, T. (1973). *Statistics: An introductory analysis.* New York: Harper & Row.

Yusoff, M. & Samah, S.A.A.S. (2013). Exploring the Engineering Communicative Challenges amongst undergraduates. *Mediterranean Journal of Social Sciences, 4*(4), 59-64. https://www.mcser.org/journal/index.php/mjss/article/view/7

Zaharim, A., Mohamed, A., Yusoff, Y., Muhamad, N., & Omar, M. (2009). Engineering employability skills required by employers in Asia. *Proceedings of the 6th WSEAS international conference on engineering education*. ACM Digital Library. https://dl.acm.org/doi/10.5555/1864130.1864169