Journal Of Communication In Scientific Inquiry (JCSI)
Vol. 3, Issue 2, December 2021
E-ISSN : 2710-6594

An Analysis of English Language Needs: A Reflection from Electrical and Civil Engineering Students of College of Industrial Technology and Management, RUTS

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ABSTRACT

This paper reports on the results of a needs analysis on English topics for engineering undergraduate students. The data were collected from 44 electrical and 65 civil engineering students of College of Industrial Technology and Management, Rajamangala University of Technology Srivijaya (RUTS) in the academic year 2019. The study employed a questionnaire for data collection. The data were analyzed by using frequency, percentage, mean, and standard deviation (S.D.) The findings revealed that all English topics for engineering were required by both electrical and civil engineering students at high level. Regarding the needs of English topics for electrical engineering, it was found that writing an engineering project ($\bar{x}$= 4.57, S.D. = 0.545) was the highest needed and then it was followed by tools, equipment, and machines ($\bar{x}$= 4.55, S.D.= 0.589) and engineering materials ($\bar{x}$= 4.52, S.D. = 0.505). In terms of the needs of English topics for civil engineering, it was found that safety at work ($\bar{x}$= 4.29, S.D.= 0.655) was the highest needed and then it was followed by describing a procedure or process ($\bar{x}$= 4.29, S.D. = 0.631), engineering materials ($\bar{x}$= 4.26, S.D.= 0.644), and writing an engineering project ($\bar{x}$= 4.26, S.D.= 0.644) respectively. Another important result was that the researcher also came up with the realization that contents combined with English for Specific Purpose and online learning formats should be highly considered when developing the instructional materials in teaching English for engineering students.

Keywords: needs analysis, engineering undergraduate students, English for Specific Purpose, online learning

1. INTRODUCTION

Globalization has increased the importance of communicating in English. English is a principal medium of science, technology, and engineering field (Pritchard and Nasr, 2004). Particularly, engineering students need English as a tool to help them read academic and technical documents in English and to communicate in various situations. They have to deal with the countless lectures, tutorials, labs, project reports, and papers in their classes.

During the job seeking or job interviewing, it is mandatory to achieve mastery in English proficiency (Latha, 2014). Today, command in English language is a basic job description. Having good English skills is a plus point. It can help us in cementing better job opportunities as compared to someone who has command in technical skills only. (Shamar,2019)

Additionally, according to the results of works of Ayokanmbi (2011), Gözüyeşil (2014), and Sureeyatanapas, Boonma and Thalangkan (2016) revealed that graduated global engineers need to have appropriate English skills and should be able to communicate effectively in the engineering workplace and multicultural society.

The need for mastering English communication skills and win the competition in the world of work become challenges and responsibilities of universities. Graduates are needed to equip with both skilled labors and sufficient English skills. Improving the competency of students can be done with emphasis on selection and design of appropriate course. English for Specific Purposes (ESP) course is considered a

good way to enhance engineering students' English communication skills. As Maria (2009) stated that the teaching of ESP for engineering students is designed to meet the specific needs of the learners and centered not only on the language (grammar, lexis, and register) but also on the skills and discourses.

Significantly, to develop engineering students' English competence and to enable them to use English communicatively, they have to be motivated and guided in the classrooms with a wide range of tasks. They can be helped to enhance their English skills by carefully selecting materials and designing tasks based on real-world workplace situations (Rajprasit and Hemchua, 2015). Moreover, the content of the course must focus more on all four language skills and also based on the needs of engineering students, stake holders, engineers, and the policy of the national education plan.

In order to design the ESP course, a needs analysis should be carried out as the first stage (Changpueng and Pattanapichet, 2015). To do this, the teachers need to seek fundamental information from a specific group of students and use the obtained information to revise, adjust, and develop the most appropriate language input and instructional materials that can be used in class.

Although engineering students are argued to have their own needs, the specific language needs are not defined in RUTS. A particular material emphasized the actual use of English in real working environment for engineering students are unavailable. Thus, a needs analysis to develop an ESP course is true to the current context. After an analysis of the data, the findings from this study can provide valuable information for designing an ESP course for engineering students of RUTS.

2. LITERATURE REVIEW

General English and English for Specific Purposes (ESP) courses

Based on the curriculum implemented in engineering fields, students need to study both General English (GE) and English for Specific Purposes (ESP) courses. In GE, it focuses on basic knowledge of language systems, vocabulary, grammar, syntax, phonology, morphology, and so on. Students were taught to learn and recite a variety of topics covering common everyday matters. However, in ESP, it oriented towards the subject content or a particular professional field that the students are engaged in. The contents, vocabulary, grammar, functions of language, and communicative needs are covered and narrowed only topics and discourse needed for specific disciplines or fields of study.

By nature, English for engineering is considered as one of ESP. To achieve the goal of ESP course, teachers have to plan the course they teach and provide the materials for it. Sometimes, it is rarely possible to use a particular textbook without the need for supplementary material and no really suitable published materials exist for certain learners' needs. Thus, the role of ESP teachers involves choosing suitable published materials from a variety of reliable and valid sources, adapting materials when published ones are not suitable, and even writing new materials if nothing suitable exists. The awareness of learners' needs is an essential component since it will provide important information for the design of the course.

ESP courses and a needs analysis

Many scholars have proposed the concept and process of conducting a needs analysis. Hutchinson and Waters (1987) gave the definition and details on the term of a needs analysis. It is the process of determining the needs for which learners or groups of learners require a language and arranging the needs according to priorities. In addition, a needs analysis can be used as a basis for setting the goals and objectives of the course.
In addition, Graves (2000) offered a definition of a needs analysis which focuses on process. It is a systematic and ongoing process of collecting information about the students' needs and preferences, information interpretation, and designing the course based on the results of the needs analysis. According to Graves' definition, the needs analysis can be conducted not only before starting the course but it can be undertaken during the course as well depending on the aims of teachers.

Apparently, a needs analysis is the highlight of ESP, as it is a factor to help teachers make decisions about developing a course. This is because the needs analysis results provide them with the data concerning the required content, target situations, etc.

A needs analysis in ESP has been extensively studied. The works by researchers have also contributed to the investigation of ESP needs analysis. Research on needs analysis conducted by Cowling (2007) at Mitsubishi Heavy Industries, Japan to prepare an English intensive course. The results of need analysis were really useful in designing a syllabus that suits the needs of learners. Materials, manuals for teachers, and textbooks can be developed by focusing on the aspects that the learners desire. According to Cowling, a needs analysis can also be used as a reference to place the learners on the right levels such as elementary, lower intermediate, and upper intermediate.

In addition, the study of Habbash and Albakrawi (2014) is one of examples of research investigating needs in ESP. They identified the English language needs of the engineering students at University of Tabuk, Saudi Arabia. The sample of the study consisted of 154 students and 12 teachers from the University of Tabuk. The data was collected by using a questionnaire. The findings revealed the majority of the sample members agreed with designing ESP texts with topics related to the students' needs, so as to familiarize the students with the vocabulary used in their future jobs and that will also enable them to have ability in understanding concepts in their study. According to teachers' perceptions, the need showed that ESP teachers should acquire a scientific approach to language teaching and should experiment with new techniques and procedures based on the learners' language needs. This requires cooperation with teachers of engineering courses, other ESP teachers, and administrators in order to provide the necessary resources.

Meiristiani and Ekawati (2018) conducted a need analysis to find out Mechanical Engineering students' needs and problems in learning English in Indonesian university. The results show that English subject is important in Mechanical Engineering Study Program. The materials of listening, speaking, reading, writing, pronunciation, grammar, vocabularies on mechanical engineering, and English application letter are extremely needed.

Another study was conducted by Thepseenu (2020). She investigated civil engineering students' English language learning needs and perceptions of their English for Specific Purposes (ESP) course. The sample comprised 85 third-year Thai students, majoring in civil engineering at University of Phayao, Thailand. A

mixed-methods research design was employed. The findings revealed students' high demand of communicative topics particularly speaking and listening in work-related situations. A combination of pair and group work for in-class activities and out of class assignments was preferred over working individually. A mixture of Thai and English as a language of instruction was also needed. Pedagogical implications for ESP course designers and teachers of other fields of engineering are put forward to highlight the crucial role of needs analysis in ESP course development.

As presented by many researchers, it can be concluded that in teaching ESP, a needs analysis conducted by a teacher is a need. It is not only a convenient way to gather information on the ways in which learners prefer to learn but also it enables teachers to gather information about their learners' wants, lacks, and needs to be able to prepare the appropriate ESP course.
However, a need analysis conducted by different researchers or teachers in different setting about different perspectives in the needs of English in the specific field are somehow contradictory with each other. Before conducting a need analysis, teachers should plan carefully.

3. RESEARCH METHODOLOGY

This study is a survey research aimed to explore the needs of English topic for civil and electrical engineering students. In this part, the researcher outlines the participants, research setting, the method of data collection and the data analysis.

The study did not approve by the Human Research Ethics Committee of the institution. At RUTS, we are in the process of establishing the formal Human Research Ethics Committee. However, the researchers participated in the training course of Ethical Conduct in Human Research organized by the university in 2020 and earned a certificate.

To conduct the research in an ethical manner, before gathering the data, the researcher informed that the participation in this study did not affect participants' studying evaluations. During the study, the researcher properly protected all participants with their rights and wellbeing throughout the research project.

3.1 Participants

In this study, a group of engineering students of College of Industrial Technology and Management, RUTS in the academic year 2019 which were selected to be the participants by a purposive sampling method, due to, there were limited number of participants who can contribute to the study.

Applied to this study, the researcher selected participants that can provide the needed information as identified in the research question. The participants shared specific characteristics. They were the same in terms of major of studying and campus. Research participants included 109 engineering students. They were first-, second-, third-, fourth-, and fifth year students.

3.2 Research setting

This research was conducted at College of Industrial Technology and Management, Nakhon Si Thammarat, Thailand. RUTS is a public university in the south of Thailand. The majority of engineering students were from the southern part of Thailand, aged between 19-22 years old. They had similar educational backgrounds. The majority of them were from technical college and some of them were from secondary school.

At RUTS, engineering students needed to enroll General English courses and English for Specific course. These courses included English for Everyday Use, Communication in English, and English for Work. The objectives of these courses were to develop students' everyday life and career-related vocabulary and expression, ability to communicate in the workplace, and awareness of the importance of English for their future careers.

Before completing the bachelor's degree, engineering students are required to take RMUTSV test as an exit exam. Although, the test results will not appear in the educational transcripts but they could be used in employment applications and for further education. Importantly, having sufficient English proficiency is a graduation requirement of the university.

3.3 Research instruments

Data was collected through a questionnaire. It was written in Thai in order to prevent language barriers. It was divided into 3 parts.

Part I was the participants' demographic data. This part of the questionnaire focused on general information of participants. They were asked to identify the information about their gender, year of study, engineering majors, and English proficiency. Their experience of using electronic media was also elicited in the first part.

Part II consisted of English for engineering topics. In this part, participants were asked to evaluate their requirement for the English topics. Checklist, five-point Likert scales anchored by 5 (highest need) and 1 (lowest need) was used as the form of responses in this part.

In Part III, one open-ended question was provided in this part to give the participants opportunities to express their suggestions and expectations about the other English topics.

Before employing the questionnaire, the validity and reliability of the questionnaire were examined by 3 experts (2 English lecturers that had worked in the field of English for Specific Purposes and an engineer). The value of the IOC index was 0.8.

In order to ease the collection of data, the researchers created a questionnaire in a google form. Before sending out the online form, the researchers contacted the students through LINE application and Facebook and informed the QR Code for them to access the survey link.

3.4 Data analysis

The data obtained were analyzed by using frequency, percentage, mean, and standard deviation (S.D.). One-way ANOVA was used to examine the significance of the differences in the need of English topics for engineering among civil and electrical engineering students.

In the questionnaire, responses to the level of need of English topics for engineering were scored as: the lowest = 1; low = 2; moderate = 3; high = 4; and the highest = 5. The mean scores were interpreted as follows.

4.51 - 5.00 = English topics were needed at the highest level.
3.51 - 4.50 = English topics were needed at high level.
2.51 - 3.50 = English topics were needed at moderate level.
1.51 - 2.50 = English topics were needed at low level.
1.00 - 1.50 = English topics were needed at the lowest level.

4. ANALYSIS AND RESULTS

4.1 The participants' demographic data

Table 1 The demographic data of the participants

		Data Frequency %
1. Gender		
Male	Electrical engineering	
Female 93 16	**4. Self-assessment of**	13 21 64 11
	English ability	11
85.3 14.7	Proficient users	41.3 25.7 15.6
2. Year of studying	Intermediate users	6.4
The first year	Basic users	
The second year	Poor users	40.4 59.6
The third year		
The fourth year	12 45 28 17 7	11.93 19.27 58.72 11.09
The fifth year		
3. Engineering majors	44 65	
Civil engineering		

In Table 1, most of the participants were male (93 or 85.3 %) and 16 (14.7%) were female. Nearly half of the participants were second year students (45 or 41.3%), while 28 or 25.7 %, 17 or 15.6 %, and 12 or 11% were third-, fourth-, and first year students respectively. Only 7 or 6.4 % were fifth year students. They were representatives from 2 engineering majors: electrical engineering (65 or 59.6%) and civil engineering (44 or 40.4%). As for their English ability, the participants rated themselves as 13 proficient users (11.93%), 21 intermediate users (19.27%), 64 basic users (58.72%), and 11 poor English users (11.09%).

Table 2 Experience of using electronic media

Electronic mediasCivil engineering	**Electrical engineering**
	N % N %

1. Computer Assisted Instruction 24 20.2 17 16.2 2. Web-based Instruction 16 13.4 18 17.1 3. E-training 10 8.4 10 9.5 4. E-book 14 11.8 17 16.2 5. Open online course 15 12.6 9 8.6 6. Language learning application **36** 30.3 **29** 27.6 7. Augmented Reality 3 2.5 5 4.8 8. None 1 0.8 0 0.0

As shown in Table 2, both civil and electrical engineering students had a variety of using electronic media experience. According to the responses, the majority of them (36 or 30.3% civil engineering students and 29 or 27.6% electrical engineering students) used a language learning application.

4.2 Electrical and civil engineering students' needs on English topics

Table 3 Overall mean of electrical and civil engineering students' needs on English topics

English Topics **Level of need**

Mean ($\bar{x}$) **S.D. Results Rating**

1. Engineering materials 4.37 .603 high 3* 2. Measurement 4.25 .683 high 10 3. Tools, equipment, and machines 4.36 .660 high 5* 4. Safety at work 4.37 .676 high 3*
5. Reading a user manual 4.34 .641 high 6 6. Describing a procedure or process 4.38 .620 high 2* 7. Reading a table, graph, and diagram 4.28 .668 high 8 8. Reading an engineering article 4.31 .648 high 7 9. Organization structure 4.27 .741 high 9 10. Writing an engineering project 4.39 .622 high 1*

As seen in Table 3, the overall findings revealed that all English topics for engineering were needed by both electrical and civil engineering students at high level. According to the responses, writing an engineering project ($\bar{x}$= 4.57, S.D. = 0.545) was identified as the highest needed topic. Moreover, they are required to study about describing a procedure or process ($\bar{x}$= 4.57, S.D. = 0.545), engineering materials ($\bar{x}$= 4.57, S.D. = 0.545), safety at work ($\bar{x}$= 4.57, S.D. = 0.545), and then it was followed by tools, equipment, and machines ($\bar{x}$= 4.57, S.D. = 0.545) respectively.

Table 4 The comparison of electrical and civil engineering students' needs on English topics

Civil engineering Electrical engineering

English Topics

$\bar{x}$ **S.D. Rating** $\bar{x}$ **S.D. Rating t P**

1. Engineering materials 4.26 0.644 3* 4.52 0.505 3* -2.259 .026 2. Measurement 4.12 0.696 10 4.43 0.625 8 -2.366 .020 3. Tools, equipment, and machines 4.23 0.679 5 4.55 0.589 2* -2.501 .014 4. Safety at work 4.29 0.655 1* 4.48 0.698 7 -1.408 .162 5. Reading a user manual 4.23 0.656 5 4.50 0.591 4 -2.187 .031 6. Describing a procedure or process 4.29 0.631 1* 4.50 0.591 4 -1.730 .086 7. Reading a table, graph, and diagram 4.20 0.689 7 4.41 0.622 10 -1.615 .109 8. Reading an engineering article 4.18 0.659 8 4.50 0.591 4 -2.555 .012 9. Organization structure 4.15 0.712 9 4.43 0.759 8 -1.946 .054
10. Writing an engineering project 4.26 0.644 3* 4.57 0.545 1* .528 .011

As presented in Table 4, in terms of the needs of English topics for civil engineering, it was found that safety at work and ($\bar{x}$= 4.29, S.D.= 0.655) was the highest needed and then it was followed by describing a procedure or process ($\bar{x}$= 4.29, S.D. = 0.631), engineering materials ($\bar{x}$= 4.26, S.D.= 0.644), and writing an engineering project ($\bar{x}$= 4.26, S.D.= 0.644) respectively.
Regarding the needs of English topics for electrical engineering, it was found that writing an engineering project ($\bar{x}$= 4.57, S.D. = 0.545) was the highest needed and then it was followed by tools, equipment, and machines ($\bar{x}$= 4.55, S.D.= 0.589) and engineering materials ($\bar{x}$= 4.52, S.D. = 0.505).

Findings of the study revealed that both civil and electrical engineering students needed a range of

English topics for their studying. All English topics were needed at a high level. Among the topics of English required by engineering students, safety at work topic was perceived as the highest need by civil engineering students and writing an engineering project has the highest priority by electrical engineering students.

5. DISCUSSIONS, LIMITATIONS, AND FUTURE DIRECTION

5.1 The power of a needs analysis

To this point, this current study, the researcher conducted a need analysis in the particular context. Although, in the context of English instruction, a needs analysis in ESP has been extensively studied, there is a significant gap between language education and job-related communication in the real world (Bouzidi, 2009; Rajprasit and Pratoomrat, 2012). Researchers, English language lecturers as well as the curriculum planners should consider and employ a needs analysis to gain in-depth information.

Based on the findings, it can be concluded that analyzing students' needs and problems especially before designing ESP syllabus are very essential. The ESP syllabus should be developed systematically and scientifically based on the results of a needs analysis which to determine the goals and objectives of the language learners (Soranastaporn, 2018).

5.2 Contents and language skills in ESP course

With regards to English topics needed by civil and electrical engineering in this study, all topics were needed at high level. Significantly, writing an engineering project was identified as the highest needed topic. It can be assumed that in order to cultivate English language proficiency and skills for engineering students, writing skills should be included in the course. The results are consistent with the study of Thepseenu (2020). Students suggested that the course should provide a topic of writing resumes and filling application forms. Writing work-related emails to communicate with suppliers and subcontractors as well as writing daily reports also mentioned by the students.

According to Ye (2020), with students' English proficiency level increased, they need to expose to specialized documents such as laboratory reports and research reports. Thus, they should be familiarized with important structural elements of technical texts such as the description of technical process, research proposals, literature reviews, data collection process, and data analysis methods.

When designing reading activity, ESP texts should be included with topics of physical and chemical properties of engineering materials and safety at work. Materials and their property are fundamental course for all engineering majors. Many an applied engineer whether civil and electrical engineering will be exposed to a design problem involving material. Besides, when preparing reading contents, it should be consisted of reading a safety signs, accidents and providing a first-aid administration. To do this, students will find it easier to comprehend reading text related to their field.

In addition, teachers should consider reading short texts or newspaper articles about advancement, innovation, and new technology in the area of engineering in order to gain new knowledge and vocabulary. Engineering students also need to know useful basic vocabulary for engineering which are technical. When they are familiarized with the vocabulary used in their future jobs, it can serve as a bridge to understand concepts in their study.
As suggested by Habbash and Albakrawi (2014), they pointed out that the reading activities that most

engineering students need in their educational or occupational life includes reading advertisements, instructions, brochures, tables, graphic charts, lists, and technical reports. Materials for reading activity can be selected from journals, newspapers, book chapters, and websites. This suggestion is similar to this study, reading a table, graph, and diagram is one of English topics that are needed at high level.

Furthermore, teachers should encourage engineering students to actively speak in groups, for presentation, or performance. Therefore, they will be excited if they are assigned to practice their speaking skill. One of the methods in order to encourage students to confidently perform is by training them to do a role play with peers / partners for short conversations (Meiristiani and Ekawati, 2018). As similar to Ardeo (2008), he proposed that in an ESP speaking course, students need speaking skills for oral presentations and classroom discussion.

5.3 The characteristic of instructional media and teaching methodology for engineering students

More importantly, as founded in this study, the majority of engineering students had experience of using electronic media. Most of them reflected that they used a language learning application. It can be assumed that the future trend of instructional media should be developed and included self-learning with available online tools. However, all of the contents and tasks need to be designed with regard to authenticity of language use in order to ensure students' engagement and enhance their learning motivation.

For future research, it is recommended that the researcher should collect more qualitative data by conducting in-depth interviews with different groups of students or other stakeholders to gain more in depth data which might better compliment data from questionnaires.

However, teachers cannot do ESP tasks alone, without any help from specialists in a particular area of engineering. Analytical revision and careful selection of the sources of information for ESP materials development can proceed with the cooperation of subject teachers. It will help ESP teachers to find out about the subject syllabus in an academic context and the tasks the students have to carry out in a work situation.

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