

English Needs Analysis of Electrical Engineering Students, Graduates, and Companies: A Step toward Employability¹

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Abstract

English for Specific Purposes (ESP) program constitutes a significant part of university curricula in most countries. Iran is no exception. To aid students to succeed in their academic studies and later in their future job, ESP courses should be based on their academic and professional language needs. Therefore, this study intended to investigate the English language needs of Electrical Engineering (EE) students and graduates from their own perspectives, along with the English language expectations of Electrical companies from the employers' point of view. To fulfill this end, a questionnaire was administered to three different groups of stakeholders, including 97 EE students, 62 EE graduates, and 39 EE employers from 15 well-reputed Electrical companies in Iran. Moreover, semi-structured interviews and observations were conducted. Having collected the required data, the researchers did content analysis and ran independent sample t-test for doing the statistical analyses. The results indicated that different aspects of 'reading', 'speaking', 'listening', 'writing', and 'study

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skills' with different degrees of emphasis were important for each group of stakeholders. Moreover, the findings revealed that EE companies expected their prospective EE graduates to be more proficient in 'reading', 'study skills', and 'speaking'. The findings have some implications for ESP curriculum developers so that they would consider the English requirements of relevant companies.

Keywords: ESP, Employability, Electrical Engineering, Needs Analysis.

1. Introduction

English for Specific Purposes (ESP) is defined as a language course or program in which the objectives and content of the course are decided by the specific needs of a particular group of students majoring in a specific field of study (Richard & Schmidt, 2010). More comprehensively and practically, the ability to use English in academic, professional and workplace setting is the significant characteristic of ESP programs (Mohammadi & Mousavi, 2013). Prominent scholars and experts in the field of ESP (Ataie, 2002; Dudley-Evans & St. John, 1998; Hutchinson & Waters, 1987; Kaewpet, 2009; Long, 2005; Robinson, 1991; Schutz & Derwing, 1981; Spence & Lui, 2013) put emphasis on the huge importance of conducting a thorough needs analysis before mapping out curriculum and syllabus designing.

Researches in the field of engineering, in particular, assert that English plays a significant role in the academic and professional areas of engineering students and graduates (e.g., Basturkmen, 1998; Pritchard & Nasr, 2004; Patil, 2005). Thus, students and graduates in the field of engineering need to be proficient enough in the English language in case they want to become successful and are interested in getting employed in one of the local or internationally well-reputed engineering companies. Knight and Yorke (2004) define employability as "a set of achievements, skills, understandings and personal attributes – that make individuals more likely to gain employment and be successful in their chosen occupations, which benefits themselves, the workforce, and the community and the economy" (p. 4). Patil (2005) suggests some global skills required by engineers such that two of them include foreign language proficiency and proper understanding of international market and workplace requirements are relevant to the topic of engineers' employability.

According to Robinson (1991), Engineering students have specific English requirements and a basic ESP principle is to equip them with these specific needs as much as possible. Moreover, since ESP is becoming increasingly pre-occupied with syllabus design, materials development, and pedagogy (Benesch, 2001), more attention should be drawn to the particular context in which students will be using ESP. Thus, in order to establish a fruitful educational setting and make students ready for their future workplace, promote the employability chance of engineering students and graduates, and bridge the gap between corporate/industry English language expectations and university syllabus and cur-

riculum offerings, implementing a thorough language needs analysis is of great importance before designing an effective language course.

The present study attempts to investigate, firstly, what the English language needs of Electrical Engineering (EE) students and graduates are and secondly, whether there is any difference between the English language needs of EE students and those of EE graduates. Moreover, this study seeks to find out what specific English language skills EE companies look for in their prospective employees and whether there is any difference between the English needs of EE graduates and the English requirements of EE companies.

2. Method

2.1. Participants

A total number of 198 participants took part in this study. More specifically, the sample included three groups of stakeholders; that is, 97 EE students at four major universities in Iran, 62 EE graduates working in different Electrical companies, and 39 domain experts from 15 well-reputed Electrical companies who were in charge of recruiting EE graduates. The EE companies were located in four cities of Iran namely, Tehran, Isfahan, Shiraz, and Mahshahr. Moreover, the average age of employers was between 30-60 and their work experiences ranged from 5-30 years.

2.2. Instrumentation

For data collection, a triangulation approach including questionnaire, non-participant observation, and semi-structured interview were utilized to obtain the required data. The researchers developed one questionnaire, which was used in three slightly different versions. As far as some nuances, in their terminology, were concerned corresponding to the three groups of stakeholders. Moreover, one extra question was added to the questionnaire while addressing employers. It is worth noting that the three versions of the questionnaire were derived from the current perspectives in needs analysis which emphasize triangulation approach (Zhu & Flaitz, as cited in Atai & Shoja, 2011), and utilized the model of present situation analysis (PSA), target situation analysis (TSA), and lacks and wants (Dudley-Evans & St John, 1998; Hutchinson & Waters, 1987; Jordan, 1997; Hyland, 2006). All of the questionnaires were written and administered in Persian so that a better understanding of the participants would be guaranteed.

Additionally, the questionnaire versions were piloted with 60 representative samples of the corresponding participants and the items were further revised, and improved. Before piloting the questionnaires, in order to have more reliable and valid items, a sample from different groups of participants were asked to write down their English needs and expectations. The reliability coefficients of EE students', EE graduates', and EE employers' questionnaires were

calculated and the Chronbach's Alpha values for these two questionnaires turned out to be 0.93, 0.91, and 0.92, respectively. The content validity of the items in the questionnaires was checked by EFL, ESP, and Electrical Engineering experts.

A semi-structured interview protocol was developed for the three groups of participants in order to find out the lacks and necessities of present and target situation. All the participants had three interview questions in common and a small ($n=33$) number of them (10 students, 8 graduates, and 15 Electrical Engineering employers) were interviewed on these questions through random selection. The interview protocol was finalized based on the feedback received from ESP experts and EE professors. Moreover, in order to carry out a more direct and in-depth study of the context, non-participant observations of both present situation (i.e. Electrical Engineering students at university) and target situation (i.e. Electrical engineering graduates in the related company) were also done by the researchers. The observation of ESP courses was done based on an observation checklist adapted from Basturkmen's protocol (1998). The workplace observation protocol was developed by the researchers and its validity was checked by EFL and ESP experts.

2.3. Procedure

Data gathering from EE students were conducted during April and May 2016 at four of the major universities in Tehran and the three methods of data collection were conducted at the same time; in that, the researcher observed at least one session of ESP classes in each of the four universities. The total time allocated to classroom observation was six hours. During the observation, the researcher filled out the classroom checklist and took notes about other useful information. Then, the questionnaires were distributed among the EE students. At the end of some classes, the researcher had interview with some volunteer students.

Data collection from EE graduates and employers in different companies was done by an EE professor from University of Tehran who had already handled many research projects in different electrical companies in Tehran and other cities. Graduates' and employers' questionnaires were either given at their workplace or they were sent to them via e-mail. Moreover, interviews with engineers and employers, along with observation at the workplace was recorded and then reported to the researcher.

2.4. Data Analysis

All the answers to the questionnaires the participants provided were coded for quantitative and qualitative analyses. For the quantitative data analyses, descriptive statistics and inferential statistics including Independent sample t-test were employed. For qualitative data analyses including observation and semi-

structured interview analyses, the answers to open-ended questions were transcribed and analyzed.

3. Results

The results of questionnaires distributed among different groups of stakeholders are presented below followed by the results of interviews and observations.

3.1. The English Language Needs of Electrical Engineering Students and Graduates

EE students considered 'writing resumes and proposals' (M=3.70) as 'important', whereas this was a "moderately important" aspect for the graduates (M=2.73). Neither groups did consider writing project reports as important as the other aspects of the writing skill nor it was marked as 'slightly important' (M=2.20 for students, M=2.89 for graduates). However, both groups considered 'writing journal articles' and 'writing formal emails' as 'important' ones (M>3.50). Moreover, the self-assessed needs of the EE students and graduates to different aspects of the reading skills showed that EE students attached 'high importance' to aspects 1 and 3 which are 'reading discipline-related specialized texts' (M=3.96) and 'reading field-related information on the internet' (M=4.00) respectively, whereas they regarded the other two aspects as 'important' (M>3.50). On the other hand, the EE graduates considered the fourth aspect, i.e., reading datasheets and technical software, (M=4.40) as 'highly important', while it was only an 'important' aspect of the reading skill from the perspectives of the students (M=3.73). Regarding speaking skill, EE students and graduates both attached a 'moderate importance' to aspect 2 which is 'formal conversation via telephone or in person' (M=2.76 for students, M=2.89 for graduates). In general, speaking skill and its specific aspects were regarded as 'moderately important' for both students and graduates (M<3.50).

Regarding listening skill, EE students considered the fourth aspect of this skill as 'important' (M=3.58) which is 'listening to English radio and watching English movies', whereas graduates considered this aspect 'moderately important' and the least necessary aspect among the others (M=3.11). On the other hand, graduates believed that 'listening to specialized conversations with foreign friends and colleagues' was among their 'most important' listening needs (M= 3.54), whereas students considered this aspect of the listening skill 'moderately important' and the least important compared to others (M= 3.11).

Finally, the self-assessed needs of the EE students and graduates to different aspects of the study skills indicated that EE Graduates attached a 'high importance' to the first aspect which is 'translation of discipline-related texts' (M= 4.00), whereas students considered this aspect as 'moderately important' (M=3.49). In general, graduates regarded 'using mono-lingual or bilingual dictionaries' (M=3.80), 'Using discipline-related specific-purpose dictionaries' (M=

3.69) as 'important', and 'note-taking while reading discipline-related texts' as 'moderately important' ($M= 3.47$), whereas students considered all the aspects as 'moderately important' ($M<3.50$).

Moreover, in order to find the differences between the English needs of EE graduates and those of students in each of the four macro skills and study skills, an independent-samples t-test was employed with two variables; one categorical independent variable with two levels (EE students & graduates), and one continuous dependent variable which was the mean scores for each one of the four macro skills and study skills. Using a parametric measure to find the difference between the two groups, the normality of the distribution of data was computed.

As illustrated in table 1, the results of the independent-samples t-test revealed that the difference between the two groups was only significant in the reading skill ($t=-3.80$, $P<.05$, eta squared= .18) with a large effect size, and in the study skills ($t=-2.51$, $P<.05$, eta squared= .04) with a moderate effect size. This means that there was no significant difference between the needs of students and graduates in the listening, speaking, and writing skills. However, they had significantly different needs in the reading skill and study skills.

Table 1.
Comparison of the Mean Scores for the Self-Assessed Needs of EE Students and Graduates

Macro Skill	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Reading	-3.787	157	.000	-.48544	.11844
Writing	.022	157	.983	.00328	.14988
Speaking	1.658	157	.099	.27943	.16857
Listening	.904	157	.367	.12425	.13742
Study skills	-2.519	157	.013	-.31186	.12379

$P \leq 0.05$

3.1.1. Interview with EE Students

In the interview phase of the study, 10 EE students volunteered to be interviewed. Seven EE students asserted that they needed all four English macro-skills, namely reading, writing, speaking, and listening. Among the micro-skills or language components, learning technical and general vocabulary was regarded as their urgent need. The rest of students put more emphasis on reading comprehension as the most important macro skill in their major. They also mentioned that being proficient in grammar and vocabulary and finally reading skill can help them to pass MSc Entrance Examination. It also help them to know the way of writing articles. Furthermore, regarding the second question,

all the interviewed EE students stated the following problems they faced in learning English:

- Knowing limited technical and general vocabulary in reading.
- Lack of appropriate word choice and grammar in writing and speaking.
- Lack of coherent ideas in writing and speaking.
- Lack of self-confidence in speaking.
- Having difficulty in understanding different English accent.
- Having difficulty in the structure of formal writing.

EE students had some suggestions regarding general and technical English courses in their major. The most important ones almost common among all of them are listed below.

- Making general English courses more technical in order to prepare the background and foundation for the technical courses.
- Having more emphasis on technical vocabularies.
- Having both general and technical courses with native speakers.
- Having technical discussion with content professors in English.
- Extending the time and days of both general and technical courses.
- Having class activities in the four skills in an equal manner.
- Decreasing the number of students for better performance and output.
- Making virtual English learning compulsory.
- Watching more technical documents and having discussion with content professors.
- Generally, having more emphasis on speaking and listening.

3.1.2. Interview with EE Graduates at Their Workplace

The results of the first interview question with Electrical Engineers in different EE companies revealed that they all considered reading datasheets, technical document, and Electrical equipment standards as the most important macro-skills they need in their career. Among the English micro-skills, they highlighted that translation, grammar, and technical vocabulary play an important role in their job. Writing formal emails was also considered important. However, three EE graduates in three different companies asserted that in addition to all aforementioned English macro/micro skills, speaking, listening, and writing skills are considered very important for their companies, due to the fact that they used to have more international ties with foreign companies. They also expressed in their second interview question that they had more difficulty in English with speaking and listening to native and non-native speakers of English. Moreover, they all suggested that holding Electrical Engineering conferences, seminars, and workshops in English by EE companies not only can be helpful for EE graduates but also can make students aware of their future English needs.

3.1.3. Classroom Observation

Four different ESP classes with different instructors were observed by the researcher. In the first technical English class, the researcher noted that the ESP instructor use English more than Persian as a medium of instruction. The instructor was just using Farsi for more clarification. All the activities such as asking questions, asking for clarification, giving comments, discussion, and presentation were in English. The teacher used almost all the instructional aides such as over-head projectors, handouts, videos, etc. The instructor was working on all the four macro-skills along with micro-skills. The main English difficulty experienced by the students was speaking and sometimes listening comprehension. Although the teacher was trying to trigger students for giving comments and speaking, most of the students were not motivated to do so. The medium of instruction in the second class was merely English. The instructor of this class was just working on students' speaking and writing. In that, students were just giving lectures about an Electrical issue and then having discussion over that topic in the class. In the third and fourth classes, the medium of instruction was almost Farsi. Even most of the teachers' instructions in both classes were in Farsi. Most of the activities were carried out individually by the students as directed by the instructors. Reading skill and vocabulary knowledge was the main focus of these classes. As a different task, students were required to read journal articles and present brief oral summaries.

In practice, classroom observations indicated that speaking, listening, and academic writing activities are not taken seriously by students and some instructors. However, both students and instructors pay more attention to reading skill.

3.2. English Requirements of EE Companies

The next concern of the study is the EE companies' expectations of the macro-skills (reading, listening, speaking, and writing) and micro-skills (general vocabulary, technical vocabulary, pronunciation, grammar, translation, and note-taking) which their employees need in doing their job properly. As shown in the following figure, the mean scores of the data collected from the employers with regard to their expectations of the skills their employees need for their jobs revealed that they regarded reading macro-skill as 'very important' ($M= 4.72$) and the other three macro-skills as 'moderately important' ($M<3.5$). With regard to the six aforementioned micro-skills, the employers believed that technical vocabulary and translation were 'highly important' ($M>4.5$), and grammar and general vocabulary were 'important' ($M>3.5$). Note-taking skill and pronunciation were regarded as 'slightly important' by the employers.

In the case of the recent concern of the study, the differences between the needs of EE graduates ($n=62$) and employers ($n=39$) in each one of the four macro skills, namely reading, writing, speaking, listening, and also study skills are dealt with. Table 2 presents the descriptive statistics for the two groups in each of the five aforementioned skills.

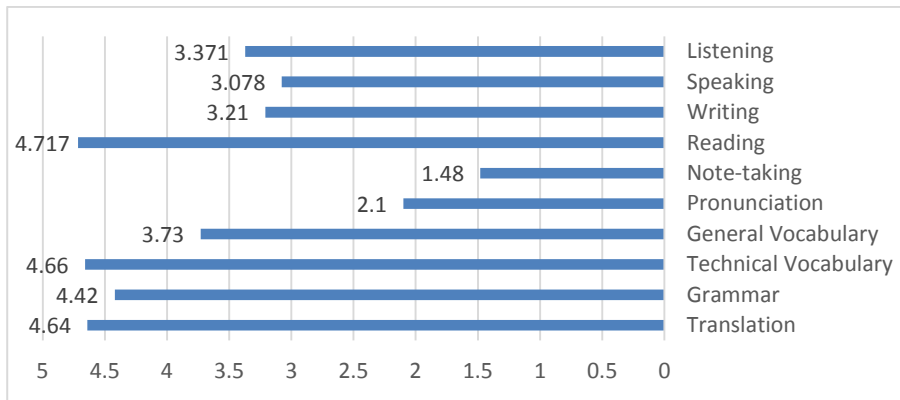


Figure 1.
Language skills Electrical Engineering Companies Look for in Their Prospective Employees

Table 2.
Descriptive Statistics for Five Macro Skills in Two Groups of EE Graduates and Employers

Macro-skill	group	N	Mean	Std. Deviation	Std. Error Mean
Reading	Graduates	62	4.5282	.56377	.07160
	Employers	39	4.7179	.21597	.03458
Writing	Graduates	62	3.0766	.80418	.10213
	Employers	39	3.2115	.71759	.11491
Speaking	Graduates	62	2.4113	.80355	.10205
	Employers	39	3.0321	.95831	.15345
Listening	Graduates	62	3.2056	.77158	.09799
	Employers	39	3.3718	.69979	.11206
Study skills	Graduates	62	3.7500	.73132	.09288
	Employers	39	4.1282	.44007	.07047

In order to find out about the possible differences between the needs of EE graduates and those of EE employers in each of the five macro skills, an independent-samples t-test was performed with two variables; one categorical independent variable with two levels (graduates & employers), and one continuous dependent variable which was the mean scores for each of the five macro skills. Moreover, the one sample K-S and Shapiro-Wilk Test were run to determine the normality of the distribution of data collected.

As illustrated in table 3, the results of the independent-samples t-test revealed that the differences between the two groups were only significant in the reading skill ($t=-2.39$, $P<.05$, $\eta^2=.05$) with moderate effect size, in the speaking skill ($t=-3.51$, $P<.05$, $\eta^2=.11$) with a large effect size, and in

the study skills ($t=-2.91$, $P<.05$, $\eta^2=.07$) with a moderate effect size. This means that there was not any significant difference between the needs of graduates and employers in the listening and writing skills. However, they had significantly different needs in the reading skill, speaking skill, and study skills.

Table 3.
Comparison of the Mean Scores for the Self-assessed Needs of EE Graduates and Employers

Macro Skill	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Reading	-2.386	85.327	.019	-.18972	.07951
Writing	-.855	99	.395	-.13493	.15780
Speaking	-3.506	99	.001	-.62076	.17704
Listening	-1.091	99	.278	-.16615	.15223
Study skills	-2.912	99	.004	-.37821	.12988

$P \leq 0.05$

3.2.1. Workplace Observation and Interviews with Employers

To cross-check questionnaire data, interviews and observations were conducted, too. The results of interview with employers indicated that the amount of English language requirements of Engineers in different EE companies totally depends on whether the company handles common projects with other countries or not. Therefore, based on the first interview question, the researchers classified the 15 EE companies into three groups. In the first group, EE companies such as *Edsab*, *Metanir*, *Arianir*, and *GTEDC* expect Electrical Engineers to be good at reading skill (i.e. reading software guide, reading articles occasionally and when it comes to their projects).

The second group of EE companies, such as *Moshanir*, *Tavanir*, *ESFA*, *Ghods Nirou*, *Montazeri Power Plant*, *Arvand Petrochemical*, and *Fajr Petrochemical Company* needed English skills more than the first group. The employers of each mentioned company expressed the following English wants:

- Reading field-related articles and books in English.
- Reading the technical documents of the Electrical equipment of foreign manufacturers.
- Reading standards related to the design or test of equipment.
- Preparation of technical documents in English for the international manufacturers in order to participate in the tender offer and to buy Electrical equipment or designs.
- Listening to the presentation of international manufacturers when they hold technical workshop or training in English.

The third group of EE companies, namely *IGMC, HSA, Monenco, and Nirou Trans* were considered among those international EE companies which needed English in all four macro-skills and also English sub-skills. Therefore, according to the employers of these companies, EE graduates were expected to have the following English abilities:

- Meeting with international EE companies, such as ABB, Siemens, Schneider, Mikro, Smit transformer, ZTR, and AREVA in order to trade and do know-how transfer.
- Having contractual and legal negotiations in English.
- Listening and understanding the contractual, legal and technical negotiations in English.
- Writing the minutes and project reports in English.
- Translation of product specification from Farsi to English.

All the EE employers expressed that most of the employees face difficulty in speaking, listening, and writing skills. Moreover, they suggested that formal speaking and writing should be emphasized at the university level.

The results of the Electrical workplace observation were in line with the results of the interview with Electrical Engineering employers. As mentioned earlier, EE companies are classified into three groups in terms of the extent they use English for their daily job purposes. The first group only needed reading skills. The second group expected engineers to be good at reading and writing skills. Finally, the third group asked its employees to be proficient at all language skills, particularly speaking and writing.

4. Discussion

The findings obtained through the English needs analysis of EE students and graduates clearly showed that both groups considered English quite important for academic studies in their discipline and important for future career as well. The results of the independent-samples t-test of the second question revealed that the differences between the two groups were only significant in the reading skill and study skills. Moreover, the mean scores obtained from both EE students and graduates revealed that they had similar views regarding the priority of their English skills. In other words, reading skills and Study skills stand in the first and second place respectively, according to the both groups; Listening, Writing, and Speaking stand in the third, fourth, and fifth place respectively.

According to the results of the interview, both students and graduates asserted that reading skills was very essential for their studies and work. On the other hand, both groups had great difficulty in writing and speaking skills. This finding can be supported by Yamat, Yunus and Azman (2002) who indicate that students and graduates may be able to listen and read well. They have less problems in the receptive skills, but they are not competent enough to use the

language for communication purposes. The results of the observation and interview also supported the idea that both EE students in their ESP classes and EE graduates at their workplace were facing difficulty in productive skills, namely speaking and writing. This might be related to the curriculum purposes, which concentrate on practicing reading skills and vocabulary knowledge in the course syllabuses. Atai and Nazari (2011) also found the same view in which knowledge of reading skill and knowledge of field-specific terminologies were considered important for students' academic studies. According to the findings, the second important English skill chosen by the two groups was 'study skills' in which 'translation of discipline-related texts' was considered as 'highly important' for EE graduates and this task were rated as 'moderately important' for EE students. However, this finding contradicted with the results of two studies (Eslami, 2010; Rostami & Zafarghandi, 2014) in which both asserted that 'speaking skill' is the second important skill on the part of students and graduates.

The results of the employers' questionnaire showed that they all considered 'Reading skills' as the most important English macro-skill that electrical engineers should be equipped with. In the same line, results of the interview with employers also confirm that engineers should be able to read and understand field-related articles and books in English, to read and understand the technical documents of the Electrical equipment of foreign manufacturers, and be able to read standards related to the design or test of equipment. Moreover, the findings of interview with EE companies such as *IGMC, HSA, Monenco, and Nirou trans* which have more industrial ties with foreign countries revealed that they expect their prospective employees to be proficient in all the four English macro-skill, particularly speaking and writing.

The results of Khairi Izwan's study (as cited in Othman, et al., 2011) found to be highly compatible with the results of the present study. In this study, it was shown that companies complain about their employees' insufficient communication skills while interacting with English speaking clients. He continues that graduates' poor writing skills in reports, letters and minutes of meetings have led to extensive revision and have caused administrative delays and loss of time. He further points out that graduates often face difficulty when communicating with English-speaking customers and due to this; the companies miss several business opportunities.

In the same vein, the study on the Academic Achievements and Employability of Graduates (Morshidi et. al, as cited in Othman et. al, 2011) revealed that English language skills have considerable effects on employability. Moreover, Feedback from local and international employers showed that communication skills in English is considered as important attribute in prospective employees.

The findings of Bodmer et al. (as cited in Goel, 2006) in the final report of the SPINE (Successful Practices in International Engineering Education) project revealed four types of competency in which the second type is in line with the findings of the present study. The importance of various competencies was classified as follows:

1. Methodological skills, engineering proficiency, and problem-solving skills were rated among the most conspicuous competencies.
2. Communication and English language skills along with teamwork abilities were regarded as very important general professional competencies
3. Competencies of social skills, business process management, and administration were labeled as medium important.
4. Other competencies received a low rating.

In addition to English macro-skills, this study revealed some findings regarding English Micro-skills that EE employers look for in their prospective employees. The results of both the questionnaire and interview indicated that employers attached "high importance" to translation and technical vocabulary. Moreover, grammar and general vocabulary were considered as 'important'. According to the last version of IEEE Standards Style Manual in 2005, Grammar is very crucial in reading and writing Electrical standards and documents. With regard to this manual, for example, the word *shall* is used to show mandatory actions strictly to be followed in order to conform to the standard which no deviation is allowed (*shall equals is required to*). The word *must* shall not be used when stating mandatory requirements; *must* is used only to indicate unavoidable situations.

The findings of this study also indicated that translation as an important study skill or micro-skill on the part of all groups of stakeholders is considered as an important skill, particularly when it comes to the translation of Electrical documents and standards. For example, the result of workplace observation showed an egregious translation mistake in one of their documents. They translated 'bus bar' as 'میلہ اتوبوس', while its exact technical translation in Persian is 'شیننه'. In Electrical power distribution, bus bar is a metallic strip or bar (typically copper, brass or aluminum) that conducts electricity within a switchboard, while it was translated literally in Persian. Thus, this finding is supported by Wilden (2011) who believes that translation can be extremely useful especially in ESP courses. However, Ghaemi and Sarlak (2015) deprecated Grammar Translation Method in ESP classes. Here, the noticeable point is that ESP classes should not ignore the use of translation skills, especially when it comes to the technical texts, books, and papers for the graduates entering their related job market. On the other hand, ESP teachers should not be overwhelmed with translation skills either. Hayati (2008) asserted that most of the ESP teachers in Iran are preoccupied with translating the texts and giving their equivalent meaning in Persian while the students are writing down the translations offered by the teachers.

5. Conclusions and Implications

English as an international language has had a great impact on science and technology and of course on the field of Engineering. Moreover, it is of great

importance to notice that proficiency in English is considered as one of the employability skills. Therefore, this triangulated study has helped the researchers identify the English skills engineering students and graduates need in order to be successful as students at university level and as professional engineers at the workplace in future.

Based on the findings of the self-assessed English needs of EE students and graduates in different tasks of the four English macro-skills, it can be concluded that both EE students and graduates consider 'writing journal or conference articles' and 'writing formal emails' as important, while the findings of interview with EE employers show that EE companies are looking for engineers who can not only write formal emails but also write the minutes, project reports and Electrical standards in English. In listening skill, students are motivated to 'listen to English radio and watch English movies' and they rated this task as 'very important'. However, EE graduates share the same view with EE employers who both indicate that listening to specialized conversations with foreign friends and colleagues and understanding them is the most important task in listening skill. Therefore, it can be concluded that employers and engineers in the workplace both agree that listening and understanding technical negotiations do matter for an Electrical company.

The results of the present study regarding speaking skill revealed that this skill is only 'moderately important' for both students and graduates. According to class observation and interview with both students and graduates, lack of self-confidence; lack of appropriate word choice, grammar, coherent ideas; and lack of class time specified to English courses result in poor speaking skill on the part of both groups. Moreover, ignoring the importance of speaking skill in the university curriculum and syllabus design may lead to training students who are not fully prepared to face the challenges of the target situation. Thus, the findings of this study also revealed that EE companies as the target situation of Electrical engineers expect their prospective employees to be proficient in this skill in order to do more technical negotiations with foreign companies, to do know-how transfer, and generally to expand more industrial ties with other countries.

Furthermore, the results of this research indicated that EE graduates need 'reading skill' and 'study skills' more than EE students. Thus, there exist significance differences between these two groups. More specifically, students regarded 'reading discipline-related specialized texts' and 'reading field-related information on the internet' as highly important, while graduates attached high importance to 'reading datasheets and technical software'. It can be concluded from this finding that both groups feel the conspicuous role of reading skill in their education and career, yet with different degrees of emphasis. Selecting reading skill as an urgent need on the part of students may date back to their traditional reading-based pedagogy in high schools and the importance of 'reading comprehension' part in University Entrance Examination. For EE graduates, reading skill is ranked first due to the fact that most of the books, papers, documents, reports, software guide, standards, etc., is available in Eng-

lish and they should be proficient in reading skill and translation. Speaking of translation which is regarded as one of the study skills, the findings show that graduates expressed their urgent need in study skills, particularly translation of discipline-related texts.

In addition to the results of the differences between English needs of EE students and graduates, the findings also revealed significant differences between the English needs of EE graduates and employers, that is, employers put more emphasis on reading skill, study skills, and speaking skill than graduates do. Moreover, the results of interview with employers indicated that students' formal speaking and writing should be emphasized at the university level and this is not possible without a change in syllabus and curriculum. Furthermore, English micro-skills sound very important for EE employers; in that; they consider technical vocabulary and translation as highly important and grammar and general vocabulary as important.

Some implications may arise from the findings of this study. As the first step, a drastic change should be implemented in ESP curriculum designing in order to equip students with those English skills which are demanded at the workplace, especially oral communication skills. Paying special attention to speaking skill, curriculum developers can bridge the existing gap between what students learn in their ESP classes at university and what they really require at the workplace and industry. According to the finding of this study, EE workforce is required to be more concerned about the translation of Electrical standards and documents in which grammar and technical terminologies are of great importance. Therefore, working on these micro-skills according to the latest version of IEEE Manual (2005) in ESP classes is highly important. All in all, this study makes EE students more aware and ready towards employability with a focus on English competency as an attribute to employability. Further studies can discuss the content of the current ESP textbooks and investigate the details of their activities and tasks and compare them both with the students' real language needs and the needs of their future job. Moreover, the English language needs of EE students and graduates from ESP teachers' point of view can be investigated by other researchers.

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