Journal of Modern Research in English Language Studies
Vol. 4, No.4, pp.1-25, 2017

A Triangulated Study of Workplace English Needs of Electrical Engineering Students

Abbas Ali Rezaee
Associate Professor, University of Tehran
Samira Kazempourian*
MA in Applied Linguistics, University of Tehran

Abstract

English for Specific Purposes (ESP) is one of the considerable programs in the world of English language teaching and research since it pertains to specific needs of various specialties. Meanwhile, university students' ability to communicate effectively through English language can greatly affect their career development in the target situation, namely, in their future workplace. Moreover, ESP instructors play a conspicuous role in flourishing students' English achievements, as they need to be equipped with the knowledge and awareness of their students' English needs not only in the academic setting but also in the workplace environment. Thus, this study intended to investigate workplace English needs of Electrical Engineering (EE) students from ESP instructors' point of view, together with English requirements of EE employers in different Electrical companies in Iran. That said, data were elicited from 97 EE students, 39 EE employers from 15 well-reputed Electrical companies, and 15 ESP instructors. The results of t-test between instructors and employers indicated that ESP instructors were not fully aware of EE students' future workplace needs. Therefore, having the rudimentary knowledge of the technical content in English on the part of ESP instructors can raise their awareness toward EE workplace needs. Moreover, the findings of interview revealed that EE employers required their prospective workforce to be more proficient in speaking skills and to be more skilled in technical translation. The findings provide implications for ESP instructors and curriculum developers to be more aware of English needs of EE workforce.

Keywords: electrical engineering; ESP; instructors' awareness; workplace English needs.

* Technical English Lecturer at Electrical and Computer Engineering (ECE) School, University of Tehran, Tehran, Iran
Received: 27/04/2018 Accepted: 26/09/2018
Email: *s.kazempour@ut.ac.ir*

1. Introduction

English for Specific Purposes (ESP) came to the scene as a new trend in the 1960s as general English courses could not answer students' or employers' needs in the job market (Bracaj, 2014). Besides, Shukran, Hariyati Shariman, Soadah, and Noor Azlan (2006) suggest that employers' expectations of graduates' skills and abilities are usually beyond the mastery of academic subjects. Thus, knowing technical English can be regarded as one of the occupational/vocational skills and it can contribute to the employability chance of workforce.

In the same line, Patil (2005) emphasizes the key role of English language proficiency for engineers at the workplace and considers it as a global skill. Therefore, before designing technical English or ESP programs whose main purposes are to prepare students for the challenges and necessities of higher education and workplace, it is highly emphasized to conduct a comprehensive needs analysis of different groups of stakeholders (Dudley Evans & St. John, 1998; Hutchinson & Waters, 1987; Kaewpet, 2009; Long, 2005; Mohammadi & Mousavi, 2013; Pritchard & Nasr, 2004; Schutz & Derwing, 1981). In particular, Robinson (1991) suggests that needs analysis consists of Present Situation Analysis (PSA), focusing on the students' English language needs at the beginning of a course and Target Situation Analysis (TSA), aiming to recognize the students' language requirements pertaining to their target situation or workplace. However, many ESP courses have been found to be ineffective because they do not consider students' present and target situation needs (Sunder, 2012). The reason might be probably that ESP courses are based on the experiences and intuition of course designers (Atai & Shoja, 2011; Sunder, 2012).

Using a triangulation approach, the present study attempted to investigate, first, the amount of ESP instructors' awareness regarding the workplace needs of EE students and, secondly, the difference between the EE employers' and ESP instructors' viewpoints regarding the EE workforce English requirements at the workplace. The following research questions were raised in this study:

1. To what extent are ESP instructors aware of Electrical Engineering workforce English needs?
2. Is there any difference between English needs of Electrical Engineering students from ESP instructors' point of view and Electrical Engineering employers' point of view?

2. Literature Review

The acquisition of knowledge and the development of professional and academic skills occur as part of a process as students enter, progress through, exit higher education, and step into the world of workplace (Arkoudis, Baik,

Bexley & Doughney, 2014). In addition to having the technical knowledge, English as the international language of business, economy, science and technology is regarded as one of the employability skills. However, there are some studies showing that employers are not satisfied with their employees' English skills (Norback & Hardin, 2005; Pandian & Aniswal, 2005; Sarjit & Lee, 2006; Thomas, 2007).

Lee's (2003) study found that many employers of engineering graduates of Monash University in Malaysia expressed dissatisfaction with their hired engineering graduates and revealed that the majority of employers expressed dissatisfaction with engineering graduates' communication abilities and that these communication abilities range from poor written and oral communication skills to performances in their work. In her study, she further indicated that technical graduates were particularly poor in their oral communication, skills in the aspects of presentation, informal discussion, public speeches and interviews (as cited in Mehar Singh & Suan Choo, 2012). This finding accorded with the study of Teijeiro, Rungo, and Freire (2013) suggesting that curriculum of a certain program must be periodically assessed to ensure its relevance to the needs of the industry to prevent the mismatch between graduate competencies and those required by employers.

Moreover, a research was done by Spence and Liu (2013) in response to the lack of knowledge regarding the English skills needed by engineers in Taiwan's high-tech sector. The results showed that engineers face numerous English communicative events similar to other Asians, including highly frequent writing and reading events such as email, reports, and memos, while common oral events include meetings, teleconferences, and presentations.

Meanwhile, ESP instructors play a conspicuous role in making students familiar with their English requirements in academic and occupational setting (Koasar, 2014). According to Dudley-Evans and St John (1998), they need to do research and help students in understanding and constructing texts in their disciplines and to actively 'engage with the disciplines'. Koasar (2014) further continues that professional ESP teachers should be experts in teaching English of a specific major, and have enough expertise to design materials related to the content material presented by the professors, or domain experts in the subject. Whether these teachers have such an insight and awareness toward their students' target needs or whether they are skillful enough in the content of a particular subject is itself a controversial issue. Thus, teacher training is a serious problem that many ESP programs suffer from for a number of reasons (Mackay, 1981; Strevens, 1978). According to some studies (Estaji & Nazari, 2015; Nicoletas & Rus, 2012; Sierocka, 2008; Mohammed, 2012), most teachers who are teaching ESP lack specialist training. Thus, the problem arises when teachers feel technically inadequate to teach the technical materials and also they may not have a clear-cut view

of their students' academic and professional language needs. Hayati (2008) asserted that lack of teachers who are experts in the subject knowledge and methodology of teaching has greatly influenced ESP teaching. He, further, highlighted that knowledgeable teachers are those familiar with the English language (form), on the one hand, and the technical information, i.e., subject matter, on the other hand.

In the present study, we hoped that the gap between employers' English language expectations and university syllabus and curriculum offerings could be bridged.

3. Method

3.1. Participants

A total number of 151 participants took part in this study. More specifically, the sample included three groups of stakeholders; that was, 97 EE students at four major universities including University of Tehran, Amirkabir University of Technology, University of Shariati, and the Islamic Azad University, Research and Technology Branch, 39 domain experts who were in charge of recruiting electrical engineers from 15 reputable Electrical companies, and 15 ESP instructors who were teaching ESP at different Electrical Engineering colleges in Tehran. Among these 15 ESP instructors, five were ESP Teacher Assistants (TAs), three of them were subject-specific professors who were also teaching technical English, and the rest were ESP instructors. The EE companies were located in four cities of Iran namely, Tehran, Isfahan, Shiraz, and Mah-shahr. Table 1 shows the profile of recruiters in different companies.

Table 1

Profile of Recruiters in Different Companies

No.	*Company*	*No. of Participants*		*Age average*	*Job experience (Years)*
		Male	*Female*		
1	IGMC	3	0	35-55	10- 30
2	Tavanir	2	0	35-45	5-15
3	Moshanir	3	1	30-40	8-14
4	Arvand Petrochemical	3	0	35-45	5-15
5	Edsab	2	0	36-45	5-15
6	ESFA	2	0	30-40	5-15
7	Fajr Petrochemical	3	1	35-60	8-30
8	Niro Trans	3	0	30-50	5-20
9	Metanir	3	0	45-50	10-16
10	Ghods Nirou	2	0	40-50	10-25
11	Monenco	2	0	30-40	5-10
12	HSAC	1	1	35-45	8-15
13	Arianir	2	1	40-45	10-15
14	Montazeri power plant	2	0	35-55	10-25
15	GTEDC	2	0	35-45	8-18

3.2. Data Collection Methods

For the purpose of the data collection, a number of instruments including questionnaires, non-participant observations, and semi-structured interviews were employed in this study. The researchers developed three slightly different versions of a questionnaire. The differences were mainly in some nuances in the wording of the questionnaires so that each version would match each one of the three groups of stakeholders. The questionnaires were all based on 5-point Likert-scale ranging from 1 (Not important) to 5 (Highly important). There were four main parts in the questionnaires. Part one contained personal demographic information about participants. Part two consisted of 20 items related to the skills and sub-skills necessary for ESP language learners. In part three, both EE students and ESP instructors were required to mark those options which are considered as students' purpose(s) for learning English.

Finally, one extra item was added to the employers' and ESP instructors' questionnaire versions to ask about their ideas concerning the degree of importance of each specific English language skill and component expected from prospective employees at workplace environment. To avoid any misinterpretations, all questionnaires were rendered into Persian. It is also worth noting that two steps were taken for developing the items of the questionnaires. Firstly, electrical experts were consulted so that their views on the English requirements of electrical companies would be accommodated, and secondly, a number of EE students and graduates were asked to write down their English needs and their purposes for studying English. The content validity of the questionnaires along with relevance and clarity of the items were checked by EFL, ESP, and EE experts.

In addition, the three versions of the questionnaire were piloted on a sample of 60 participants from the three groups of stakeholders according to which the items were further revised, and improved. Moreover, the reliability coefficients of EE students', ESP instructors', and EE employers' questionnaires were calculated and the Cronbach Alfas turned out to be 0.93, 0.89, and 0.92, respectively.

A semi-structured interview protocol was developed for the three groups of participants in order to find out the lacks and necessities of their present and target situations. Thirty of the participants (10 students, 5 ESP instructors, and 15 Electrical Engineering employers) were randomly selected to be interviewed. The interview questions were mainly about the importance of English skills and components in the future carrier of EE workforce, the problems and difficulty they faced in learning English, and suggestions for making technical English courses more effectively. The interview protocol was finalized based on the feedback received from ESP experts and EE professors. Moreover, to carry out a more direct and in-depth study of the

context, non-participant observations of both present situation, i.e., students and ESP instructors at university, and target situation, that is, employers, were also done by the researchers. The observation of ESP courses was done using 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.

3.3. Data Analysis Procedures

As mentioned earlier, a number of instruments including questionnaires, observation, and semi-structured interview were utilized to collect the required data. Data collection was carried out during April and May 2016 and the triangulation of data collection was done at the same time; in that, one of the researchers observed four sessions of ESP classes. The total time allocated for classroom observation was six hours. During the observation, the researcher filled out the classroom observation checklist and took notes about useful information. Then, the questionnaire was administered to EE students after they were briefed how to fill out the instrument. At the end of some classes, the researcher had interviews with some volunteer students. Moreover, the interviews with ESP teachers were also done at the end of classes and their ideas were either recorded or written down.

One of the subject-specific professors at the University of Tehran (UT), with a very high profile in doing research in different electrical companies in Tehran and other cities and running many crash courses for Power engineers, was of great help in collecting the necessary data for the current study. The employers' questionnaire was either given at their workplace or it was e-mailed to them. Engineers performing their tasks and activities at the workplace were observed, too. This became possible with the help offered by the abovementioned UT subject-specific professor.

The results of the questionnaires were analyzed through descriptive and inferential statistics including Independent Samples *t-test*. For qualitative phase of the study, content analyses were done on the results obtained from observations and semi-structured interviews.

4. Results and Discussion

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

4.1. Results

4.1.1. Instructors' View of Electrical Engineering Workforce's English Language Needs

The researchers intended to find out about the Electrical Engineering ESP instructors' awareness of the skills needed for Electrical Engineers during

their career. They were asked to evaluate macro and micro skills from one to five, one being a "Not important" skill and 5 being a "highly important" skill by marking the relevant options in the questionnaire. The percentage of each response was calculated. The results are shown in Figure 1.

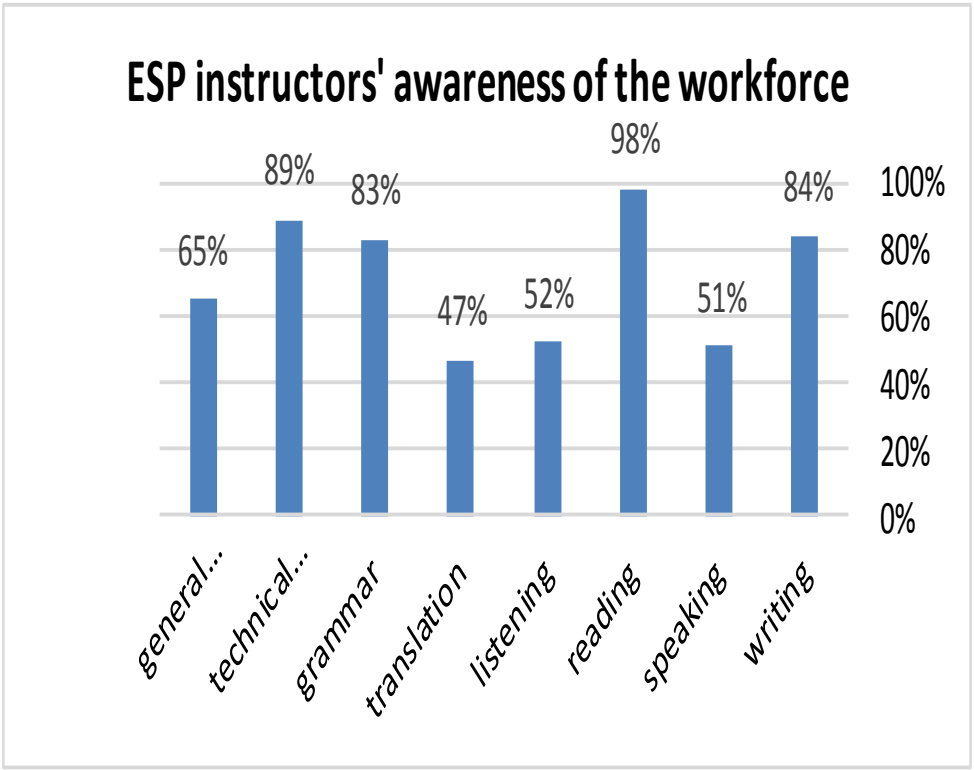

Figure 1. Electrical Engineering ESP Instructors' Awareness of the Workforce

As indicated in Figure 1, ESP instructors considered reading skill to be 98% important for the electrical engineers' occupational success. On the other hand, they regarded translation as the least important skill by giving only 47% value to it.

As illustrated in Table 2, in particular, ESP instructors indicated that EE students need all the four aspects of reading skill (i.e., 'reading discipline-related specialized text', 'reading instruction,' 'reading field-related information on the internet', and 'reading datasheets and technical software') as highly important ($M > 4.5$). Regarding the writing skill, they rated "writing journal article and conference" as highly important ($M > 4.5$). For the speaking and listening skills, they roughly consider all the aspects of the two skills as "moderately important" ($M > 3$). Note taking as a study skill is regarded as "slightly important" ($M < 2.5$).

Table 2
Electrical Engineering Students' English Needs to Different Skills According to ESP Instructors' Point of View

Skills	*Different Aspects of Skills*	*N*	*Mean Score*
Writing Skill	Writing journal or conference articles.	15	4.56
	Writing formal emails.	15	3.40
	Writing resume, proposal or formal letter to universities abroad.	15	3.01
	Writing project reports or answers to exercises.	15	3.12
Reading Skill	Reading discipline-related specialized texts	15	4.79
	Reading instructions, such as how to work with a system	15	4.55
	Reading field-related information on the internet	15	4.61
	Reading datasheets and technical software	15	4.48
Speaking Skill	Informal conversation via internet chat, telephone or in person	15	3.56
	Formal conversation via telephone or in person	15	3.23
	Asking questions in international conferences	15	3.14
	Having technical conversation with foreign friends or colleagues	15	2.98
Listening Skill	Listening to discipline-related news, audios and movies	15	3.03
	Listening to discipline-related lectures	15	3.12
	Listening to specialized conversations with foreign friends or colleagues	15	3.38
	Listening to English radio and watching English movies	15	3.80
Study Skills	Translation of discipline-related texts and articles	15	3.45
	Note-taking while reading discipline-related texts	15	2.24
	Using mono-lingual or bilingual dictionaries	15	3.31
	Using discipline-related specific-purpose dictionaries	15	2.23

4.1.2 Employers' View of Electrical Engineering Workforce's English Language Needs

An in-depth investigation of the next concern of the present study, i.e., the EE companies' expectations of macro-skills (reading, listening, speaking, and writing) and micro-skills (general vocabulary, technical vocabulary, grammar, translation) urgently needed by the employees, was also done. As shown in Figure 2, 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).

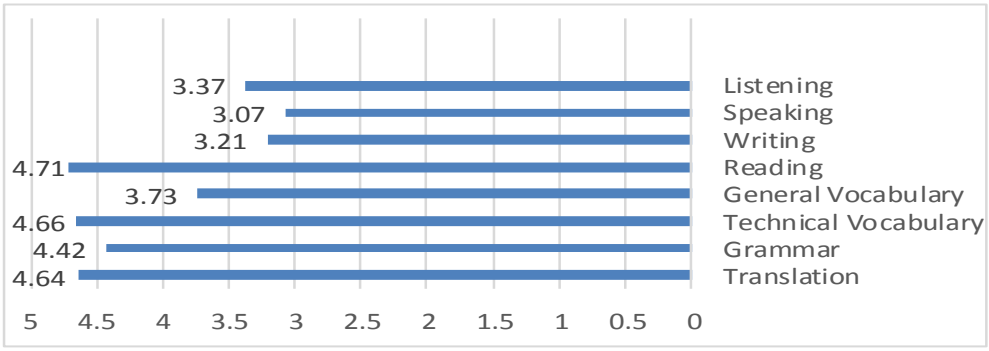

Figure 2. Language Skills Electrical Engineering Companies Look for in Their Prospective Employees

Moreover, the differences between the English needs of EE workforce from ESP instructors' viewpoints and those of employers in each of the four macro skills, namely 'reading', 'writing', 'speaking', and 'listening', as well as 'study skills' are dealt with. Table 3 presents the descriptive statistics for the two groups in each of the five aforementioned skills.

Table 3
Descriptive Statistics for Five Macro Skills in Two Groups of EE Employers and ESP Instructors

Macro Skills	*Group*	*N*	*Mean*	*Std. Deviation*	*Std. Error Mean*
Reading skill	EE Employers	39	4.7179	.21597	.03458
	ESP Instructors	15	4.2667	.54663	.14114
Writing skill	EE Employers	39	3.2115	.71759	.11491
	ESP Instructors	15	4.5000	.46291	.11952
Speaking skill	EE Employers	39	3.0321	.95831	.15345
	ESP Instructors	15	2.9667	.80659	.20826
Listening skill	EE Employers	39	3.3718	.69979	.11206
	ESP Instructors	15	3.8000	.96917	.25024
Study skills	EE Employers	39	4.1282	.44007	.07047
	ESP Instructors	15	3.0333	.63293	.16342

In order to find out the possible differences between the needs of the two aforementioned groups in each of the five macro skills, an independent-samples t-test was performed with two variables; one categorical independent variable with two levels (ESP instructors and employers), and one continuous dependent variable, which was the mean scores for each of the five macro skills.

As illustrated in Table 4, the results of the independent-samples t-test revealed that the differences between the two groups were only significant in

the 'reading', 'writing', and 'study skills'. This means that there was not any significant difference between the needs of ESP instructors and employers in the 'listening' and 'speaking' skills.

Table 4
Comparison of the Mean Scores for the Self-Assessed Needs of EE Students from ESP Instructors' Point of View and EE Employers

Macro Skill	*t*	*Df*	*Sig. (2-tailed)*	*Mean Difference*	*Std. Error Difference*
Eading	4.389	52	.000	.451	.102
Writing	-3.437	52	.000	-1.288	.200
Speaking	.234	52	.816	.065	.279
Listening	-1.803	52	.077	-.428	.237
Study skills	4.216	52	.001	1.094	.151

$P \leq 0.05$

4.1.3. EE Students' Purposes for Learning English

The researchers intended to find out the EE students' purpose(s) for learning English not only from students' perspectives but also from ESP instructors' viewpoints. In doing so, there were 10 items in the questionnaire asking about their purpose(s) for learning English and they could choose more than one item. It should be noted that the students and ESP instructors were required to read the items and write them down according to the priority of importance they would attach to them. Ten top of the items are listed below. The following is the list of the items ordered according to their degree of importance.

1. Reading field-related information on the internet.
2. Reading discipline-related specialized texts.
3. Giving lectures in national and international conferences.
4. Writing papers in prestigious journals such as IEEE and IET.
5. Being successful in both education and career.
6. Speaking fluently.
7. Speaking accurately.
8. Finding a good job.
9. Going abroad for work.
10. Going abroad for studies.

As shown in Figure 3, ESP instructors' perception regarding EE students' purposes for learning English has some subtle differences with students' priorities, that is, both students' and instructors' first priority was 'reading field-related information on the internet' (83% and 85% respectively). Students' second priority was 'reading discipline-related specialized texts' (81%) while instructors' second choice was 'writing papers in prestigious journals' (87%). With little difference from their first and

second priority, students' third preference was 'being successful in both education and career' (80%) and instructors rated this option at 82% as their fourth priority. In contrast, students and instructors regarded 'going abroad for work' (43%, 40% respectively) and 'giving lectures in national and international conferences' (34%, 30% respectively) as their last purposes for learning English.

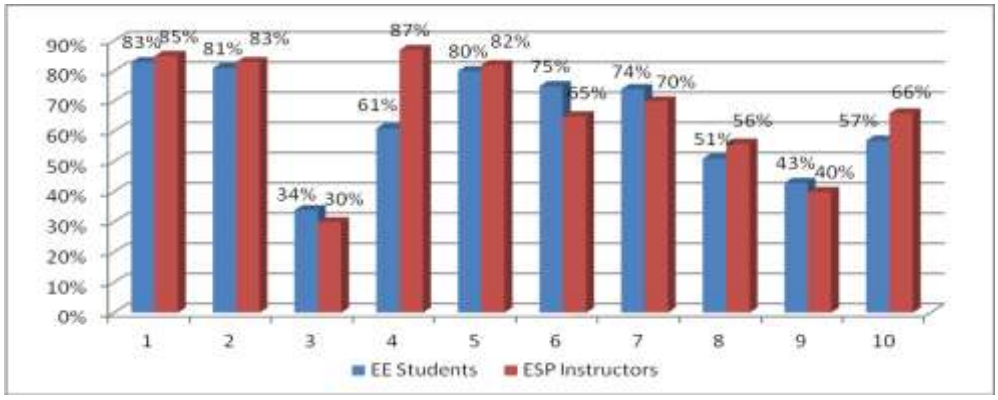

Figure 3. Students' Purposes for Learning English

4.1.4. Interviews with EE Students

Ten EE students volunteered to be interviewed. Almost all of them mentioned that reading skill is the most important English skill not only in their academic situation but also in their future job. Moreover, they all specified the following problems in learning English:

- Knowing limited technical and general vocabulary in reading: they were busy looking up their mobile dictionary for the meanings of general English words, or searching the technical words' meanings on internet.
- Lack of appropriate word choice and grammar in writing and speaking: They were complaining about the difficulty in choosing suitable words in academic contexts and employing formal grammar with correct punctuation, capitalization, conjunctions, etc. They used technical words with informal grammar in their writing.
- Lack of coherent ideas in writing and speaking: They usually brainstormed a proposed topic in Farsi, sometimes wrote down the supporting ideas and examples in Farsi and spent a lot of time on choosing words and grammar instead of focusing on how to state their ideas to express themselves clearly.
- Lack of self-confidence in speaking: They said that one of the key reasons for being absent from English classes or not participating in any speaking activities was the anxiety of getting embarrassed before other students, particularly the opposite sex.

- Having difficulty in understanding different English accents (e.g. British, American, Indian, Australian, etc.) while watching movies or video clips about their major.
- Having difficulty in the structure of formal writing: that is, how to report their research findings in a formal and academic structure.

4.1.5. Interviews with ESP Instructors

Four ESP instructors as well as three TAs were interviewed on the first question. Some of them suggested that EE students require being proficient in all the English macro and micro skills, both at university level and in the workplace. While others believed that EE students need to do well only in reading and writing skills which are useful both at university and workplace situations.

Moreover, ESP instructors stated the following problems EE students encounter in general and technical English courses:

- Lack of proper understanding of the use of English as an important skill in both university and workplace: One of the ESP instructors stated that some of the students do not have a roadmap for their future academic study or carrier and they do not know how English language can turn out to be as a challenge for them. Students consider technical English merely as a general course they have to pass!
- The absence of a proper basic English course when picking up technical English courses: A TA noted that students are stepping into university level with a very poor level of English, then attending to three-credit general English course cannot be of great help in boosting their English level. So, students pick up technical English with a very poor background!
- Lack of sufficient training for fluent and accurate speaking due to lack of course time,
- Lack of the ability for appropriate word choice and grammar in writing and speaking,
- Thinking in the first language (Persian) and writing in the second language (English) which in turn results in an inappropriate structure in the second language.
- Lack of self-confidence and motivation in learning English.

ESP instructors also had some suggestions for making general and technical courses more effective and practical:

- Placing students in different levels according to their English proficiency; in other words, having homogeneous classes in terms of students' language proficiency,

- Taking technical English courses more serious; it should not be considered solely as a single general course like other general courses.
- Developing more coordination between general and technical English courses.
- Devoting more time to ESP courses.
- Using authentic materials in all the four macro-skills.
- Providing a close coordination between language and subject-specific instructors in teaching technical English courses.

4.1.6. Interviews with EE Employers

The researchers classified the 15 EE companies into three groups according to level and degree of needs they have to English language skills. The results of interview with employers showed that in the first group, EE companies such as *Edsab, Metanir, Arianir, and GTEDC* expect Electrical Engineers just to be competent in reading comprehension (i.e. reading software guide, manuals, datasheets, field-related articles and books, and technical documents).

The second group of EE companies including *Moshanir, Tavanir, ESFA, GhodsNirou, Montazeri Power Plant, Arvand Petrochemical, and Fajr Petrochemical* required their prospective employees to be competent not only in reading skills but also in listening skills so that they can cope with the situation when international manufacturers hold technical workshops or special trainings in English. To be employed in this group of companies, employees are also required to be good at translating technical documents from Persian into English for the international manufacturers in order to participate in offers and be able to purchase their required Electrical equipment or designs.

Finally, the third group of companies such as *IGMC, HSA, Monenco, and Niroutrans* all of which have strong international ties with well-reputed international Electrical companies, such as ABB, Siemens, Schneider, Mikro, and AREVA, expect their prospective employers to be proficient in all the four skills. What these companies need can be categorized in the following list.

- Having technical, contractual, and legal negotiations in English with foreign companies; in that, engineers are required to know how to convince their foreign partners in the second language and how to avoid misunderstanding in a technical conversation.
- Understanding and following the contractual, legal and technical negotiations in English.
- Writing the minutes and project reports in English, knowing the structure of a technical report in English, observing the language

formality of minutes and reports, and generally conforming the style of reports and papers according to the latest version of Institutes of Electrical and Electronics Engineers (IEEE) manual.

- Translating product specifications from Persian into English in case an Iranian company wants to order a high-tech equipment/design, the technical specifications and requirements of that equipment/design should be translated from Persian into English.

4.1.7. Classroom Observation

Four different ESP classes with different instructors together with two technical English classes conducted by two TAs were observed. Only two of the ESP instructors used English, more than Persian, as a medium of instruction and had a good command of general English in all the four macro skills. At times, these instructors were just using Persian for shedding more light on some grammatical issues or some vocabularies which sounded more comprehendible in the first language. In these two classes, all the activities such as asking questions, asking for clarification, giving comments, discussion, and presentation were in English although some students were violating the rule and attempting to use their mother tongue. Moreover, the instructors utilized almost all the instructional aides such as over-head projectors, handouts, videos, etc. The instructors were working on all the four macro-skills along with micro-skills. However, only one of them (a core subject professor teaching ESP) was elaborating more on the content of the technical text when it came to the reading and speaking part. The other instructor as well as TAs could not do well in explaining and analyzing technical texts.

The medium of instruction in two other ESP classes together with TA classes was mainly Persian. Most of the activities were carried out individually by the students as directed by the instructors and just reading comprehension answers were being checked in groups and later confirmed by teacher. Reading skills and vocabulary knowledge were the main focus of these classes. As a different task, students were required to read journal articles and present brief oral summaries. Moreover, in the two latter classes and TA classes, instructors were not good at speaking; listening activities were totally ignored; and writing activities were just restricted to grammar practice by writing some isolated sentences using the new vocabulary items and grammar.

To put it in a nutshell, language skills such as speaking, listening, and writing activities were not taken seriously by most of the students as well as some instructors during the class sessions being observed.

4.2. Discussion

4.2.1. ESP Instructors' Awareness of the Skills Necessary for Electrical Engineers

As to the first research question, the researchers intended to find out about the ESP Instructors' awareness of the skills needed for Electrical Engineers during their career. According to the findings from the ESP instructors' questionnaire, almost all of them considered 'reading skills' and 'technical vocabulary' as highly important for EE students in their future job. Their views were precisely in line with employers in this study. Yet, they regarded translation as the least important skill, which, of course, was not consistent with employers' views as EE employers believed that their prospective employees should know how to translate technical documents from Persian into English for international manufacturers so that they would be successful in purchasing their required Electrical equipment or designs. The results of classroom observation showed that two technical English classes, each with a different teacher, were focusing on reading, writing, grammar, translation, and technical vocabulary. Moreover, two other classes, each with a different teacher, believed in having the integration of the four macro-skills while putting deemed emphasis on grammar and vocabulary. In the latter two classes, translation had no place at all. It seems that ESP instructors cannot make a balance between English skills and their components. That is, they either invest time and energy in, for example, translation and reading (Hayati, 2008), or they spend more time on students' productive skills, namely speaking and writing. However, it should be born in mind that learning a language is the integration of all skills. Almost all of the teachers in this study were unsatisfied with the number of credits and time allotted to ESP courses.

Regarding the ESP instructors, the results of the classroom observation of the first two classes along with the two TA classes revealed that these teachers are not competent in teaching ESP courses. That might be the reason why they frequently insist on reading, translation, grammar, and excessive use of their mother tongue. This finding is pretty consistent with Chandra Sekhar Rao (2014) who concluded that in classroom observation; most of ESP teachers in Engineering colleges have not been competent or skillful in teaching. He, further, added that they do not follow modern methods or techniques of teaching and the ESP class is completely teacher-centered. Moreover, the results of observation also showed that almost all the ESP teachers, but one being a subject-specific professor, were unable to scrutinize technical texts. Thus, they, in turn, could not motivate students to make comments on different aspects of a technical topic or text. According to Jendrych (2013), ESP instructors have to know and understand the basic facts, mechanisms and processes they discuss with their students, and they need to possess some rudimentary knowledge in the subject matter they

teach. She further continued that novice ESP instructors should try to learn the fundamentals of the subject matter they are going to teach. By the same token, ESP instructors need to find out the students' objectives in the target occupation or academic discipline and should make sure that the content of the ESP course works towards them (Basturkmen, 2010).

The findings of this study also indicated that translation skill is considered as a highly important skill on the part of employers, 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 "میله اتوبوس" while its exact technical translation in Persian is "شینه" that in the field of electrical power distribution, bus bar is a metallic strip or bar (typically copper, brass or aluminum) that conducts electricity within a switchboard. This finding supports Wilden (2011) who believes that translation can be extremely useful especially in ESP courses. However, Ghaemi and Sarlak (2015) deprecated translation in ESP classes. Here, the noticeable point is that ESP classes should not ignore usage 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 this skill, too. Hayati (2008) asserts that most of the ESP teachers are busy translating the texts, giving their overall meaning in Persian, while the students are busily writing down the translations offered by the teacher.

In addition to the previous findings of this study, the results of the independent sample t-test applied to the second research question showed that there was not any significant difference between EE students' needs from ESP instructors' viewpoints and those of EE employers regarding listening and speaking skills. However, they had significantly different needs in 'reading', 'writing', and 'study skills' as EE employers expect their employees to be more competent in 'reading' and 'translation'. Moreover, the results of workplace observation and interview with employers indicated that EE students are required to be competent in speaking skills if they are willing to be employed in well-reputed Electrical companies which have ties with international companies around the world.

4.2.2. EE Students' Purposes for Learning English

EE students were asked to pinpoint their purpose(s) for learning English. The findings revealed that after reading field-related information on the internet and reading discipline-related specialized texts, their mind is mainly preoccupied with the role of English in their education and future jobs. This finding is compatible with Atai and Asadi's survey (2013) on Railway Engineering students. They found that these students are concerned about their future career. Moreover, the findings showed that ESP instructors are

well-aware of their students' learning objectives; although they think students' second purpose for learning English is writing papers to be published prestigious journals.

5. Conclusion and Implications

ESP courses can be different from general English courses. ESP instructors need to have a special vision and understanding toward the requirements of their students' future profession and they should make a specific group of learners prepare themselves differently from those learning general English, because they need English for specific purposes rather than using it in general, everyday settings. With such awareness and knowledge on the part of ESP instructors, they need to make learning more relevant and meaningful to ease the transition of students from an academic setting to the workplace environment.

Based on the findings of the question regarding the ESP instructors' extent of awareness about EE workforce language needs, it can be concluded that ESP teachers consider reading skill as highly important for EE students in academic and workplace setting; however, EE employers demand more scrutiny of technical text. In other words, ESP instructors are expected to be more dominant over technical topics and texts in order to motivate students for more classroom participation and activity. Moreover, the findings revealed that ESP instructors postulate that 'translation' is the least important skill needed by EE companies, although employers emphasized on technical translation and rated this skill as highly imperative. Thus, it can be concluded that the some of the ESP instructors in this study and, possibly, some English teachers have a negative attitude towards translation and they believe that this skill should not be used in modern classes. However, some studies (Benabdallah, 2013; Kavaliauskienė & Kaminskienė, 2009; Lavisa & Cleverton, 2006; Mackay & Maountford, 1978) put emphasis on the role of translation in ESP classes.

Moreover, according to the results of observation and interview with some well-reputed EE companies which have international ties, employers are looking for engineers who are competent in communicative skills and, in particular, speaking in English. Thus, although ESP instructors believe that speaking is needed at the workplace for EE students, most of them do not put much time and energy on this skill, or if some of them take this skill seriously, they cannot go beyond the literal meaning of texts and meaning. In conclusion, ESP teachers are required to have some knowledge about the discipline they are teaching in order to urge students to make comments regarding their field.

Finally, with regard to EE students' purposes for learning English and ESP, it can be assumed that EE students are willing to be successful in both their education and their prospective carrier. Therefore, they are fully aware

that English is considered as one of the employability skills. Moreover, although ESP instructors believe that writing journal article is among the top objectives of students for learning English, many students do not take it seriously.

Several direct implications may arise from the findings of the present study. As a fundamental and preliminary step, close cooperation should be established among the different bodies, including policy makers, administrators at the workplace, subject-specific specialists, materials developers, language teachers, and students. The findings also imply that a thorough change should be implemented so as to embrace those skills the students will encounter at the workplace, especially oral communication skills. Special training for ESP instructors leading to their becoming more aware of the vocational/occupational English needs of students in highly recommended.

References

Atai, M. R., & Asadi, S. A. (2013). Assessing academic and professional English language needs of Iranian railway engineering students: A triangulated evaluation study. *ESP across Culture, 10*(1), 35-54.

Atai M. R., & Shoja, L. (2011). A triangulated study of academic language needs of Iranian students of computer engineering: Are the courses on track? *RELC Journal*, *42*(3), 305-323.

Arkoudis, S., Baik, C., Bexley, E., & Doughney, L. (2014). *English language proficiency and employability framework*. Melbourne: Centre for the Study of Higher Education.

Basturkmen, H. (1998). Refining procedures: A needs analysis projects at Kuwait University. *English Teaching Forum, 36*(4), 2-9.

Basturkmen, H. (2010). *Developing courses in English for specific purposes*. Basingstoke: Macmillan.

Benabdallah, A. (2013). Teaching ESP through translation: A key for teaching specialized communication. *English for Specific Purposes World, 37*(13), 1-9.

Bracaj, M. (2014). Teaching English for specific purposes and teacher training. *European Scientific Journal January, 10*(2) 40-49.

Chandra Sekhar Rao, V. (2014). English for science and technology: A learner centered-approach. *English for Specific Purposes World, 42*(15), 1-10.

Dudley-Evans, T., & John, M. (1998). *Developments in English for specific purposes. Cambridge*: Cambridge University Press.

Estaji, M., & Nazari, N. (2015). Exploring instructors' conceptions about EGP teacher challenges for becoming an ESP instructor in Iran: a qualitative study. *English for Specific Purposes World, 46*(1), 1-18.

Ghaemi, F., & Sarlak, H. (2015). A critical appraisal of ESP status in Iran. *International Journal of Language Learning and Applied Linguistics World, 9*(1), 262-276.

Hayati, A. M. (2008). Teaching English for special purposes in Iran: problems and suggestions. *Arts and Humanities in Higher Education, 7*(2), 149-164.

Hutchinson, T., & Waters. A. (1987). *English for specific purposes: A learning-centered approach*. Cambridge: Cambridge University Press.

Jendrych, E. (2013). Developments in ESP teaching. *Studies in Logic, Grammar and Rhetoric, 34*(1), 43-58.

Kaewpet, C. (2009). Communication needs of Thai civil engineering students. *English for Specific Purposes, 28*(4), 266–278.

Kaosar, A. M. (2014). The ESP teacher: issues, tasks and challenges. *English for Specific Purposes World, 42*(15), 1-33.

Kavaliauskienė, G., & Kaminskienė, L. (2009). Proficiency in reading, writing, grammar and translation skills: ESP aspects. *Vertimo Studijo, 2*(1), 171-184.

Lavisa, S., & Cleverton, V. (2006). Learning by translating: A contrastive methodology for ESP learning and translation. *Scripta Manent, 2*(1), 3-12.

Long, M. H. (2005). *Second language needs analysis*. Cambridge: Cambridge University Press.

Mackay, R., & Mountford, A. (1978). *English for specific purposes: A case study approach*. Longman Group Ltd.

Mackay, R. (1981). Accountability in ESP programs. *The ESP Journal, 1*(2), 107-122.

Mehar Singh, M. K., & Suan Choo, J. C. (2012). Manufacturing industry employers' perception of graduates' English language skills proficiency. *International Journal of Applied Linguistics and English Literature, 1*(4), 114-118.

Mohammed, O. K. (2012). ESP teaching: Reversal of roles between ELT teachers and subject specialists. *International Journal of Social Science and Humanity, 2*(6), 505-508.

Nicoleta, M., & Rus, D. (2012). Challenges in teaching ESP: Teaching resources and students' needs. *Procedia Economics and Finance, 3*(1), 1165-1169.

Norback, J. S & Hardin, J.R. (2005). Integrating workforce communication into senior design. *IEEE Transactions on Professional Communication, 48*(4), 413-426.

Pandian, A., & Ghani, A. A. (2005). *University curriculum: An evaluation on preparing graduates for employment*. Monograph.

Patil, A.S. (2005). Global engineering criteria for the development of the global engineering profession. *World Transactions on Engineering and Technology Education, 4*(1), 49-52.

Robinson, P. C. (1991). *ESP today: A practitioner's guide*. Hemel Hempstead: Phoenix.

Sarjit, K., & Lee S. H. (2006). Analysing workplace oral communication needs in English among IT graduates. *ESP World, 5*, 1-12.

Schutz, N. W., & Derwing, B. L. (1981). The problems of needs assessment in English for specific purposes: Some theoretical and practical considerations. In R. Mackay & J.D. Palmer (Eds.), *Language for specific purposes program design and evaluation* (pp. 29-45). Rowley, MA: Newbury House Publishers, Inc.

Shukran, A. R., Hariyati Shariman, A. M., Saodah, W., & Noor Azlan, M. N. (2006). *Employee knowledge, skills, abilities, and others characteristics: expectation of industries*. Paper presented at the First International Conference of Muslim Psychologist, Khartoum, Sudan.

Sierocka, H. (2008). The role of the ESP teacher. *Business English*, *2*(56), 33-37.

Strevens, P. (1978). *New orientations in the teaching of English*. Oxford: Oxford University Press.

Teijeiro, M., Rungo, P., Freire, M. J. (2013). Graduate competencies and employability: The impact of matching firms' needs and personal attainments. *Economics of Education Review*, *34*, 286-295.

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*(2), 97-109.

Sunder, S. (2012). English for engineers. *Indian Streams Research Journal, 2*(9), 1-4.

Thomas, G. F. (2007). How can we make our research more relevant? Bridging the gap between workplace changes and business communication Research. *Journal of Business Communication, 44*(3), 1-15.

Wilden, S. (2011, January 1). Can translation (and translation tools) facilitate language learning and how can it be used to best effect [weblog post]. Shaun Wilden. Retrieved from http://shaunwilden.com

Appendices

Appendix A: Needs Analysis Questionnaire for Electrical Engineering Students, Graduates, and Employers.

1. Personal information

University/company……

Gender……

Educational level……

2. How important, in your opinion, are each of the following language skills or components for your academic/occupational success? Please circle one of the numbers from 1 to 5 according to the importance of each item.

1 = Not important, 2 = Slightly important, 3 = Moderately important, 4 = Important, 5 = Highly important

Writing skill
Writing journal or conference articles
Writing formal emails to foreign universities/ companies
Writing resume and proposal
Writing project reports/ answers to exercises

Reading skill
Reading discipline-related specialized texts
Reading instructions (i.e. how to work with a system).
Reading field-related information on internet
Reading datasheets and technical software.

Speaking skill
Informal conversation via internet chat, telephone or in person
Formal conversation via telephone or in person
Asking questions in international conferences
Having technical conversation with foreign friends or colleagues

Listening skill
Listening to discipline-related news, audios and movies
Listening to discipline-related lectures
Listening to specialized conversations with foreign friends or colleagues
Listening to English radio and watching English movies

Study skills
Translation of discipline-related texts and articles
Note-taking while reading discipline-related texts
Using mono-lingual or bilingual dictionaries
Using discipline-related specific-purpose dictionaries

3. What are the purpose(s) of electrical engineering students for studying English language? You can choose more than one option. (This question is only for students and ESP instructors).

1. Reading field-related information on the internet.
2. Reading discipline-related specialized texts.
3. Giving lectures in national and international conferences.
4. Writing papers in prestigious journals such as IEEE and IET.
5. Being successful in both education and career.
6. Speaking fluently.
7. Speaking accurately.
8. Finding a good job.
9. Going abroad for work.
10. Going abroad for studies.

4. To what extend are the following English skills and components important for the prospective employees who are supposed to be recruited in an electrical engineering company? (This question is only for the employers and ESP instructors).

English Language Skills
Writing
Speaking
Reading
Listening
Translation
Grammar
Technical vocabulary
General vocabulary
Note-taking
Pronunciation

Appendix B: Semi-structured Interview

1- How important are each of the language skills or components for Electrical engineering students' future carrer?

2- What are the major language problems and difficulties that electrical engineering students face?

3- Do you have any suggestions in order to make general and technical English courses more effective for EE students?

Appendix C: Classroom Observation Protocol

Date:
Time:
Course:
Department:
Observer:
Class Type:

I. Instructional Activity

A) Note the approximate percentage of time given over to the activity.

B) Note the language (English/Persian) used.

___ Lecturer (monologue)
___ Discussion (student to student)
___ Instructions
___ Instructor questioning students
___ Student questioning students
___ Small group discussion
___ Small group work
___ Presentation
___ Other

II. Instructional Aids

Note which of the following were used.

___ Over-heads
___ Handouts
___ Video/film
___ Blackboard text
___ Blackboard diagram/numerical information
___ Tools or other realia
___ Other

III. Student Activity

Note some samples of the language used, if relevant.

___ Taking notes
___ Asking questions
___ Asking for clarification/repetition

___ Explaining (e.g., instructions)
___ Giving comments

IV. Student Difficulties

Note any observations you had of the nature, extent, any source of any language-related difficulties experienced by students.

V. Other

Do you have any other useful information about your observation or this protocol?

Appendix D: Workplace Observation Protocol

Date:
Time:
Name of the Company:

A) Note which of the following Skills in English were used in the company:

☐ Reading ☐ Writing
☐ Speaking ☐ Listening ☐ Translation

B) Note the aspect (s) of each skill mostly used by the Engineers:

Reading:
1)…….
2)…….
3)…….
4)…….

Writing:
1)…….
2)…….
3)…….
4)…….

Speaking:
1)…….
2)…….
3)…….
4)…….

Listening:
1)…….
2)…….
3)…….
4)…….

Translation:
1)…….
2)…….
3)…….
4)…….

C) Note any language-related difficulties experienced by Engineers in the company.