



A Learning-Centered Analysis of the ESP Needs of Engineering Students

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Received: June 15, 2020

Accepted: April 13, 2021

Abstract

The current study investigated Iranian engineering students' target situation and learning needs about a tertiary level course of English for specific purposes (ESP). To this end, a convenience sample including 27 ESP instructors and 222 students majoring in different fields of engineering from 10 randomly selected Iranian universities participated in an exploratory sequential mixed-method study. As the preliminary stage of the analysis, the instructor participants were interviewed about various domains representing the ESP needs of engineering students. The qualitative teacher-elicited data were used to develop a needs analysis questionnaire specific to the student participants of the study. The descriptive analysis of the responses provided by the engineering students to the needs analysis questionnaire shed light on the significant learner needs relevant to ESP learning and those related to the target situation of use. Providing a context-relevant scheme to design, evaluate, and modify ESP courses for Iranian students of engineering, the study's findings could positively influence the current ESP pedagogy in Iran.

Keywords: ESP; Learning-centered approach; Needs analysis; Technical English

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INTRODUCTION

The term *learner needs* recognized by Hyland (2006) as an umbrella title denoting a wide range of aspects, including “learners’ goals and

It comes as no surprise that such an inclusive concept is presumed to be the cornerstone of an ESP program as the exemplar of a goal-oriented needs-driven language teaching/learning practice. The contributory role of an in-depth realization of learner needs in developing effective ESP programs, as validated by the pioneers of ESP (Dudley-Evans & St. John, 1998; Flowerdew & Peacock, 2001; Hutchinson & Waters, 1987), may explain why needs analysis is indispensable in every systematic ESP curriculum design (Belcher, Johns, & Paltridge, 2011; Serafini, Lake, & Long, 2015). Additionally, delineating the extent to which an ESP instruction meets the demands of a particular educational setting, a proper specification of learner needs may lay the foundations for either a gradual improvement in or a significant reform of the relevant pedagogy (Hamp-Lyons, 2001).

Theoretical Background to the Study

Serving as a key methodological tool in designing ESP practices (J. C. Richards, 2001), needs analysis, as a booming profession, has facilitated the examination of the ESP learners’ target needs (Johns, 2013). Concurrent with the evolutionary changes in learner needs, needs analysis. The definitions thereof, have changed remarkably from the simple act of linguistic analysis of particular domain-relevant texts to

backgrounds, their language proficiencies, their reasons for taking the course, their teaching and learning preferences, and the situations they will need to communicate in” (p. 76).

the more sophisticated act of detecting a bewildering array of linguistic, communicative, and learning needs (Esfandiari, 2015). Influenced by the innovative approaches to ELT (i.e., CLT, TBLT, CALL, CLIL, etc.), the contemporary definitions of needs analysis proposed at the turn of the present century seem to present a more precise and sophisticated picture of the needs analysis profession.

Hyland (2006), for instance, generally defined needs analysis as data (information) gathering techniques targeted at course development. He further enlarged upon his definition, maintaining that needs analysis “is the means of establishing the how and what of a course. It is a continuous process since we modify our teaching as we come to learn more about our students. In this way, it shades into evaluation” (p. 74). In another definition, Basturkmen (2010) characterized needs analysis as “a course development process [in which] the language and skills ... are identified and considered concerning the present state of knowledge of the learners, their perceptions of their needs ... and constraints of the teaching context” (p. 19). Believing that every needs analysis attempt is a distinctive process grounded in a specific training situation, Frenco (2005) contended that such a process puts forward an ideal proposal for effective use of learning resources.

To effectively incorporate needs analysis into the practice of developing or modifying ESP courses, a variety of approaches, models, and classifications have been proposed to date. As enumerated by Paltridge and Starfield (2013), the major approaches to needs analysis included target situation analysis, present situation analysis, and strategy analysis. A target situation approach to needs analysis is deeply rooted in the early attempts made by Munby (1978), who grouped learner needs into nine context-based variables (i.e., participant, purposive domain, setting, interaction, instrumentality, dialect, target level, communicative event, and communicative key). Unlike the target situation analytical model, a current situation approach to needs analysis deals with the existing situation of students on the threshold of a language course. It predicts their strengths and weakness for an effective performance in the target situation (Robinson, 1991).

Deploying the underpinnings of the two previously-developed models (i.e., target situation and present situation models), Hutchinson and Waters (1987) suggested a learning-centered approach to needs analysis. According to this model, the process of needs analysis entails identifying both target situation and learning needs. As Hutchinson and Waters (1987) recommended, to systematically deal with the wide-ranging needs of learners in relation to either the target situation of use or the learning process, there is a need for using a multiplicity of data gathering and instrumentation methods. The great advantage

of the approach, as contended by Alsamadani (2017), is “that learners give much care to the learning process as a focus of the analysis rather than the knowledge they want to possess at the end of the classes” (p. 59).

Literature Review

Although great emphasis has been placed on the investigation of ESP needs in the Iranian context of tertiary education in recent years (Alavi, Kaivanpanah, & Taase, 2018; Aliakbari & Boghayeri, 2014; Atai & Nazari, 2011; Boroujeni & Moradian Fard, 2013; Esfandiari, 2015; Eslami, 2010; Mahdavi Zafarghandi, Khalili Sabet, & Shahroudi, 2014; Zand-Moghadam, Meihami, & Ghiasvand, 2018), research on the ESP needs of Iranian tertiary level students majoring in engineering seems to be still scant. Furthermore, the scarce case studies carried out on the field (Atai & Shoja, 2011; Nemat Tabrizi & Mojoudi Renani, 2016) mainly focused on a specific engineering major. Given that communication with members of an international engineering community is fast becoming necessary, the absence of an inclusive and systematic needs analysis is likely to hinder the millennial engineering students’ progress in academic and working settings. This study, therefore, attempted to delve into the real needs of engineering students from their own and ESP instructors’ perspectives, addressing the following research questions:

1. *What are the ESP-related needs of Iranian engineering students from ESP instructors’ perspective?*

2. *What are the ESP-related needs of Iranian engineering students from students' perspectives?*

METHODS

Participants

Having grouped the whole population of the universities (with an engineering faculty) authorized by the Ministry of Science, Research, and Technology of Iran into ten distinctive geographical locations, the researchers embarked on stratified random sampling to choose the clusters (universities) of the universities study. Accordingly, a total of ten randomly-selected Iranian universities nationwide constituted the cluster sample of the study. To fulfill the study's objectives, the sample chosen from each of the randomly-selected cluster included both ESP instructors and students of engineering.

ESP Instructors. 27 (16 male and 11 female) instructors, with an age range between 37 and 63 ($M = 47.6$) and an acceptable (at least five years) experience of teaching ESP to tertiary level engineering students, participated in the current study. The participating instructors were either English teaching (40.7%) or discipline-specific (59.3%) specialists chosen taking account of their availability and tendency to participate in the study.

Engineering Students. In addition to the instructor participants, 222 undergraduate

students from different majors of engineering participated in the analysis. The selection of the student participants within every randomly-selected cluster (university) was done on a voluntary basis. The participating students, ranging in age from 19 to 25 ($M = 20.6$), were mostly junior (38.7%) or senior (33.1%) engineering students who presumed their English proficiency level to be at either intermediate (47.7%) or upper-intermediate (29.3%) level.

Design

The learning-centered needs analysis model proposed by Hutchinson and Waters (1987) was employed to conduct the current study. Additionally, to develop the needs analysis instruments, an exploratory sequential mixed-method approach was adopted and the data were gathered administering a qualitative and a quantitative survey instrument successively. The qualitative measure (i.e., a structured interview) probed into the ESP instructors' views, whereas the quantitative one (i.e., a structured questionnaire) was intended for the student participants.

Instruments

Needs Analysis Interview. To explore the instructors' perspectives on the ESP needs of engineering students, the researcher embarked on devising a structured needs analysis interview. The interview included 14 pre-determined open-ended questions on either

target situation (seven questions) or learning needs (seven questions) of engineering students concerning a tertiary level ESP course. The target needs questions dealt with the objectives pursued (one question) and the competences required (six questions) to effectively perform in the target situation. In contrast, the learning needs questions delved into five specific domains of ESP learning including a) syllabus (one questions), b) materials (one questions), c) teaching/learning features (two questions), d) administration (two questions), and e) assessment system (one question).

To establish the validity of the interview, an expert in teaching English as a foreign language (TEFL) and an experienced ESP instructor were consulted and the questions were structured under their direct supervision. To ensure the reliability of the instrument, an interview schedule was developed to conduct the interviews in a consistent way. The interviews were conducted in Persian so as to avoid any anxiety and ambiguity.

Needs Analysis Questionnaire. Relying upon the diverse needs proposed by the instructor participants, a structured questionnaire was developed to analyze the students' perceptions of their ESP needs. The questionnaire included 22 items referring to the seven major domains (learning objectives, language learning skills/sub-skills, syllabus, materials, teaching/learning features, administration, and assessment system). Owing to the multi-faceted nature of the learning needs proposed by the instructor participants, a broader range of

questions were developed in the questionnaire compared to the interview. Every item in the questionnaire entailed deciding on one or more option(s) from several pre-determined responses built on the interview results (see Appendix).

The questionnaire, initially developed in English, was rendered into Persian to avoid any misunderstanding. The validity of the questionnaire was established through expert appraisal, whereas its reliability (internal consistency) was ensured based on the Cronbach's Alpha level ($\alpha = 0.73$) estimated using the pilot data elicited from 30 Iranian engineering undergraduates.

Procedure

The procedure followed in the current study entailed going through two distinctive phases. As the preliminary step toward the systematic analysis of the ESP needs, one of the researchers interviewed the instructor participants. Accordingly, each of the 27 instructors was required to answer the 14 pre-planned interview questions for 30 minutes, while his/her responses were recorded to be transcribed accordingly. To maximize the validity of the interview data, the four successive steps proposed by K. Richards (2009) including a proper preparation, a good start, an effective face-to-face interaction, and a carefully-organized ending were taken into account. The interview data provided a scheme to structure the needs analysis questionnaire. Having been finalized and validated, the needs

analysis questionnaire was administered to the undergraduate participants under the researchers' careful supervision. Of all the questionnaires distributed among the engineering students of the randomly-selected universities (clusters), a total of 222 questionnaires were filled in thoroughly and accurately.

RESULTS

ESP Needs from Instructors' Perspective

To analyze the qualitative data elicited from the instructors, their responses to every single question were transcribed and condensed into one-sentence explanations. To detect the widely-accepted needs, the percentage of every particular need was estimated dividing the number of instructors who articulated the need into the total number of the instructors (27). Since the interviewees were allowed to propose more than one need in relation to every specific domain, the sum of the percentages could be more than 100.

Target Needs. The majority of the instructor participants (85.2%) believed that the primary purpose of learning technical English is to use it as a means of effective communication in domain-specific academic contexts such as meetings and conferences. The other widely accepted purposes included making progress in future careers (70.4%), making success in dealing with modern technology throughout working/academic life (66.7%), and making

progress in post-graduate education abroad (59.3%). The learning purposes proposed by smaller proportions of the instructors included passing the obligatory ESP exams (51.8%), finding field-relevant jobs (51.8%), making progress in post-graduate education in Iran (40.7%), experiencing an independent content-based study by virtue of online-learning resources (40.7%), and improving in terms of social status (18.5%).

Comprehending instructional content (63%) and operating instructions (59.2%) written in English were the following reading needs proposed by the instructors. As suggested by the data relevant to the reading needs, the vast majority of the instructor participants (more than 70%) acknowledged the need to comprehend discipline-specific academic (e.g., scientific papers, journals, online textbooks, etc.) and occupational documents (e.g., official deeds, reports, memos, correspondence, advertisement, booklets, circulars, etc.). 33.3% of the interviewees stressed the need for comprehending texts written about other engineering fields.

Regarding the writing needs, the instructors recognized the need to compose scientific papers, manuscripts, and speeches (51.8%) and deal with discipline-specific correspondence—electronic and printed— (48.1%) as the significant writing needs of engineering students. Furthermore, writing discipline-specific reports (33.3%) and detailed resumes (29.6%) became of considerable importance. Other writing needs proposed by the instructors included filling in discipline-specific

application forms/bills/receipts (14.8%), writing summaries while reading discipline-specific documents (22.2%), taking note in discipline-specific contexts (18.5%), composing an order to the subordinates in future careers (7.4%), writing working complaints about the quality of tools and services (11.1%).

According to the listening-relevant interview data, the engineering students' need for comprehending the utterance of English language orators and lecturers in discipline-specific contexts as well as the utterance of foreign engineers in working meetings was presumed by a conspicuous number of the instructors (59.3% and 33.3% respectively) to be essential for making success in the target situation. Comprehending audio/video recordings made to instruct how to use materials/tools/equipment (25.9%), oral discipline-specific reports (18.5%), and the utterance of colleagues about the details of engineering works (7.4%) were the other listening needs to be articulated by the instructors.

Concerning the speaking needs, more than half of the interviewees (51.8%) expressed that engineering students need to use oral means of communication to build up an effective rapport with members of international discipline-specific academic settings. The other speaking needs included participating in class activities throughout post-graduate education abroad (40.7%), explaining discipline-specific processes, materials, instruments, and measurements during inspections and external

audits (29.6%), managing working meetings with foreigners to conclude effective agreements (29.6%), pronouncing the names of discipline-specific tools, materials, and equipment accurately (22.2%), asking for clarification on difficult discipline-specific concepts in academic contexts (18.5%), and giving foreign customers a brief account of the available engineering services (14.8%).

A detailed analysis of the interview data relevant to vocabulary learning indicated that a vast majority of the instructors (70.4) stressed the need for gaining familiarity with English equivalents of more frequent discipline-specific Persian words or vice versa. However, there were others (55.6%) who stressed the need to expand the repertoire of engineering terminology. A small proportion of the instructors proposed that engineering students need to know the words that collocate with technical words (22.2%) or have an active knowledge of technical vocabulary. The grammar needs proposed by the instructor participants included knowing the basic grammar of English (66.7%), gaining familiarity with widely-used structures (40.7%) and gaining an active knowledge of English forms/structures (18.5%).

Learning Needs. The analysis of the interview data indicated that a remarkable proportion of the interviewees (51.9%) believed that a multi-skill communicative syllabus developed based on real-world discipline-specific tasks (both academic and occupational) could contribute to effective technical English learning. An

eclectic needs-oriented syllabus aimed at fostering technical English knowledge on the basis of specific desires of the target students in terms of language learning strategies and skills also appealed to approximately a quarter of the interviewees (25.9%). The other instructor-proposed syllabuses included a) a content-based communicative syllabus including both academic and occupational discipline-specific topics with a focus on receptive language learning skills (11.1%), a genre-based multi-skill syllabus which put a focal focus on the use of language in different genres (7.4%), and a translation-based syllabus which puts a focal focus on reading, vocabulary, and grammar (3.7%).

Based on the interview data, opinion was divided over the materials ideally suited to the learning needs of engineering students. Nonetheless, 44.5% of the instructors believed that the combined use of the prescribed textbooks (published by SAMT) and some instances of up-to-date use of technical language in different academic contexts and workplace (known as instructor-devised booklets) is beneficial to ESP learners. There were two small proportions of the instructors, however, who believed that the use of either SAMT textbooks (11.1%) or instructor-devised functional-notional booklets (14.8%) per se may serve the purposes of the target courses. The other combinations of materials proposed by the instructors included SAMT textbooks, online resources, and discipline-specific glossaries (11.1%), instructor-devised booklets, online resources, and discipline-specific

glossaries (7.4%), SAMT textbooks and discipline-specific glossaries (7.4%), SAMT textbooks and online resources (3.7%).

Concerning the teaching/learning features, the instructor participants were interviewed about two distinctive features: the scaffolding methods and the teaching/learning activities. Regarding the scaffolding methods, with the exclusion of a small proportion of the instructors (18.5%) who believed that the learning process should begin with the instructor's explicit instruction and proceed utilizing peer scaffolding, the others believed that the whole process of learning/teaching, as well as performance monitoring, should be dealt with actively and under the instructor's direct guidance. Although the instructor sample was split over the appropriateness of implicit correction techniques (e.g., recast, clarification request, metalinguistic feedback, elicitation, etc.) versus explicit ones, a greater proportion of the use of implicit techniques was approved participants (63%).

The instructor-proposed teaching and learning activities included content-relevant learning-reinforcement tasks (mainly those in the textbook) which entail dealing with discipline-specific problem-based collaborative projects (48.2%), discipline-specific passages relevant to both occupational and academic contexts accompanied by a variety of pre-reading and post-reading activities (22.2%), and a combination of content-relevant learning-reinforcement tasks and discipline-specific passages (29.6%).

Concerning the administration needs, the majority of the interviewees (76.7%) believed that a two/three-hour weekly instruction using educational facilities typical of Iranian academic settings (e.g., whiteboards and video projectors) would suffice for the purposes pursued an ESP pedagogy. Nonetheless, a minority of the instructors believed in the necessity of using modern educational tools such as smart boards and ICT tools in an ESP class. Regarding teacher expertise, the need for using instructors enjoying an acceptable degree of both content and English teaching knowledge was proposed by a considerable number of the instructors (63%). The need for each of the two expertise per se was stressed by small proportions of the instructors.

Last of all, an overwhelming majority of the instructors (74.1%) contended that the combination of formative assessment of the

ongoing performance (through the use of low-stakes exams) and summative assessment of the ultimate learning (through the use of high-stakes exams) could signify the learners' average competence throughout the training. The use of either summative (11.1%) or formative assessments (14.8%) per se was deemed to be helpful by a minority of the instructors.

Students' Perspective

Table 1 displays the frequency and percentage of the students' responses to the questionnaire items representing the target situation needs. Since the learners were allowed to choose more than one single item, the sum of the frequencies could be more than the total number of respondents (222).

Table 1

ESP-related Target Situation Needs from the Engineering Students' Perspective

Domain	Sub-Domain	Item	<i>F</i>	<i>P</i>
Learning Purposes	-----	To establish effective communication in domain-specific contexts	103	46.4%
		To find a discipline-specific job	46	20.7%
		To make progress in career	38	17.1%
		To make use of it while post-graduation study abroad	48	21.6%
		To pass the course-specific exams	30	13.5%
		To make progress in post-graduate education	54	24.3%
		To effectively deal with modern technology	33	14.9%
		To make use of online domain-specific resources	165	74.3%

Language Learning Skills	Reading	To improve in terms of social statuses	12	5.4%	
		To comprehend discipline-specific academic documents	186	83.8%	
		To comprehend discipline-specific occupational documents	143	64.4%	
		To comprehend operating instructions Written in English	96	43.2%	
		To comprehend the instructional content developed in English	83	37.4%	
		To read about different sorts of engineering specialization	74	33.3%	
		To write discipline-specific reports	49	22.1%	
		To deal with discipline-specific working correspondence	55	24.8%	
		To fill in discipline-specific application forms	66	29.7%	
		To write detailed resumes (CVs)	144	64.9%	
		To fill in discipline-specific bills and receipts	32	14.4%	
		To take note while reading discipline-specific documents	66	29.7%	
	Writing	To take notes while listening in class/discipline-specific contexts	98	44.1%	
		To compose an order to the subordinates in my future workplace	9	4%	
		To write complaints about the quality of tools and services	53	23.9%	
		To write scientific papers and manuscripts	84	37.8%	
		To compose discipline-relevant speeches	36	16.2%	
		Speaking	To accurately pronounce the names of tools/materials/equipment	42	18.9%
			To explain discipline-specific processes/services/measurements	97	43.7%
	To ask for clarification on difficult concepts in academic contexts.		22	9.9%	

Language Learning Sub-Skills		To give a brief account of the available engineering services	28	12.6%
		To communicate in discipline-specific academic contexts	73	32.9%
		To manage working meetings with foreign customers	57	25.7%
		To participate in class activities while post-graduate study abroad.	34	15.3%
	Listening	To comprehend the utterance of foreigners in working meetings.	44	19.8%
		To comprehend the utterance of English language orators	123	55.4%
		To comprehend the orally-presented details of engineering works	78	35.1%
		To comprehend audio/video recorded operating instructions	66	29.7%
		To comprehend oral discipline-specific reports	28	12.6%
	Vocabulary	To know English equivalents of more frequent Persian words	169	76.1%
		To know Persian equivalents of more frequent English words	126	55.7%
		To expand my technical terminology repertoire	102	45.9
		To learn vocabulary which collocate with Technical words	38	17.1%
		To gain an active knowledge of technical vocabulary use	74	33.3%
Grammar	To know the basic grammar of English	144	64.9%	
	To be familiar with widely-used structures of English language	97	43.7%	
	To have a good mastery of English forms and structures	27	12.2%	

Table 2 below displays the descriptive statistics (i.e., frequency and percentage) of the

students' responses to the learning needs items in the needs analysis questionnaire.

Table 2
ESP-related Learning Needs from the Engineering Students' Perspective

Domain	Sub-Domain	Item	F	P
Teaching/Learning Features	Task Accomplishment Type	Individual task accomplishment	36	16.2%
		Collaborative task accomplishment in small groups	16	7.2%
		Collaborative task accomplishment in pairs	24	10.8%
		Individual and pair task accomplishment	42	18.9%
		Individual task accomplishment and group work	34	15.3%
		Individual and pair task accomplishment	70	31.5%
	Classroom Monitoring	Active (direct) monitoring	163	73.4%
		Discreet (indirect) monitoring	59	26.6%
	Corrective Feedback	Explicit correction	51	23%
		Recast	87	39.2%
		Clarification request	10	4.5%
		Metalinguistic feedback	58	26.1%
		Elicitation	7	3.1%
		Repetition	9	4.1%
	Scaffolding Type	Teacher Direct guidance	40	18%
		Indirect scaffolding methods such as Think-aloud	31	14%
		Peer scaffolding	30	13.5%
		Teacher Direct guidance and peer scaffolding	87	39.2%
		Teacher Indirect guidance and peer scaffolding	34	15.3%
	Syllabus Approaches to ESP teaching	Communicative Task-based ESP teaching	34	15.3%
Communicative genre-based ESP teaching		99	31.1%	
Communicative project-based ESP teaching		22	9.9%	
Translation-based ESP teaching method		16	7.2%	

Assessment System	-----	An Eclectic reading-based ESP teaching method	51	23%
		Formative assessment (Low-stakes exams)	66	29.7%
		Summative assessment (High-stakes exam)	59	26.6%
		A combination of formative and summative assessment	97	43.7%
Materials/Tasks	Tasks and Activities	Activities which resemble authentic use of technical English	84	37.8%
		Problem-based activities	39	17.6%
		Discipline-oriented projects	44	19.8%
		Textbook-derived tasks aimed at reinforcing the newly-learnt language	93	41.9%
		Reading-based Tasks and activities	79	35.6%
		Out-of-class activities	21	9.5%
	Instructional Materials	SAMT textbooks (per se)	7	3.1%
		Instructor-developed booklets (per se)	38	17.1%
		SAMT textbooks and instructor-developed booklets	58	26.1%
		Online resources and discipline-specific glossaries	17	7.7%
		SAMT textbooks, online resources, and discipline-specific glossaries	23	10.4%
		SAMT text books and online resources	32	14.4%
		Instructor-developed booklets, online resources, and discipline-specific glossaries	47	21.2%
Administration	Instructor Expertise	Discipline-specific expertise (per se)	61	27.5%
		English Teaching expertise (per se)	42	18.9%
		A combination of English teaching and field specific expertise	119	53.6%
	Course Type	A Compulsory course	78	35.1%
		An Optional Course	144	64.9%
	Teaching Facilities	The mainstream educational facilities	79	35.6%
		Modern educational facilities such as smart boards	143	64.4%
	Training Hours	Two hours per week	94	42.3%
		Three hours per week	128	57.7%

DISCUSSIONS

Target Situation Needs

To lay the foundations for a systematic evaluation of tertiary level ESP courses for Iranian engineering students, the two questions of the study delved into the real needs of engineering students from their own and ESP instructors' perspectives, respectively. Having successively surveyed two samples of Iranian ESP instructors and engineering students, the researcher ascertained the prominence of the need for using technical English as a means of effective communication in domain-specific academic contexts. The clear consensus of both instructors and students on a communication-oriented learning goal seems to be in harmony with the communicative trend in language pedagogy of Iran whereby communication has become the primary focus of ESP teaching (Khodi, 2015). The finding is also in accord with the findings of Zand-Moghadam et al. (2018), reflecting the need for improving EAP learners' communicative competence to facilitate effective discipline-specific communication.

Notwithstanding the instructors' and students' consensus on the significance of a good mastery of technical English in fostering scholarly communication, there was considerable disagreement between them on the other objectives. For instance, while the majority of the instructor participants perceived the need for making progress in future careers as a main reason behind ESP learning, the

student participants downgraded such need preferring other objectives including making use of online resources, making progress in post-graduate education, finding a discipline-relevant job. These differing views held by the instructor and student participants could be explained because the students mainly regard post-graduate education and find a job as two significant hurdles they have to deal with in advance of making progress in their future career. The significance of the post-graduate study and working needs for the student participants corroborated Boroujeni and Moradian Fard (2013) findings showing the importance of higher education and success in future jobs from students' perspectives.

The study of the target situation needs was also aimed to explore the need for using different language learning skills and sub-skills. Regarding the two receptive skills (i.e., reading and listening comprehension), the result revealed an agreement between the instructors and students on the necessity of comprehending the documents or utterances written/speculated in either academic or occupational discipline-specific contexts. Support for this result may come from the study conducted by Tabatabaei and Mokhtari (2014) which testified to the significance of reading English language documents for Iranian ESP learners. Additionally, the results revealed the significance of other readings needs, such as comprehending instructional content and operating instructions initially developed in English, for both student and instructor participants. The variety of readings needs

central to the particular academic context of Iran has been previously validated through empirical evidence (Alavi et al., 2018; Atai & Nazari, 2011).

Notwithstanding the clear consensus on receptive skills, the instructors and students were deeply split over the needs related to productive skills (i.e., writing and speaking). Contrary to the viewpoints on the writing needs which indicated the students' preference for academic (immediate) needs and the instructors' tendency toward working (future) needs, the speaking needs of concern to the instructor and student participants were found to be academic and occupational, respectively. The underlying reason behind such uncommon foresight on the students' part could be attributed to the little emphasis placed on speaking skills in the Iranian academic setting where technical English is perceived mainly as a means of either comprehension or written communication (Alavi et al., 2018; Aliakbari & Boghayeri, 2014; Atai & Nazari, 2011; Atai & Shoja, 2011). The prospect that a good mastery of speaking skills could hardly contribute to significant levels of academic success may account for the students' favourable attitudes toward working oral needs.

The results also stressed the need for a) knowing either Persian or English equivalents to unknown technical vocabulary and b) enriching the repertoire of engineering terminology. Such realistic needs were favored by both groups of the participants over several idealistic ones such as gaining an active knowledge of technical vocabulary and

knowing the advanced structures of English. These findings make sense given the major learning purpose widely approved by the participants (i.e., using English as a means of effective communication) and the practical constraints of a two/three-credit course of technical English. The preference for translation-based vocabulary needs corroborated the findings of Alavi et al. (2018) that revealed a heavy use of translation-based vocabulary teaching methods in Iranian ESP classrooms. The significance of a need for translation-based vocabulary learning techniques is also reflected in the study conducted by Hatam and Shafiei (2012).

Learning Needs

Based on the results relevant to the learning needs, the instructors and students stressed the necessity of using instructor-devised booklets along with the prescribed textbooks published by SAMT. In spite of the popularity of the textbooks as a main component of ESP instructional load, their use as the only learning resource was perceived as satisfactory only by a small proportion of the instructors and students. The finding provides additional support for the claim established by Zand-Moghadam et al. (2018) that there is a need for incorporating more communicative materials, as instances of real-word disciplinary communication, into the mainstream instructional load of Iranian ESP courses. Furthermore, the need for a flexible use of locally-published ESP textbooks has been

validated by research (Azodi & Karimi, 2017; Donna, 2000; Eslami, 2010).

As another learning need, a multi-skill task-based communicative approach to technical English teaching was favored by both groups of the participants. Such learning need is thoroughly in harmony with the communication-based learning objective widely favored by the participants. Additionally, the demand for a task-based communicative syllabus turned out to be in line with the tendency towards CLT in Iran, as supported by the vast majority of the recently-conducted needs analyses (Esfandiari, 2015; Eslami, 2010; Khany & Tarlani-Aliabadi, 2016; Malmir & Bagheri, 2019; Tabatabaei & Mokhtari, 2014). In addition, there is adequate empirical evidence for the desire for a multi-skill ESP syllabus (Atai & Khazaei, 2014; Atai & Shoja, 2011; Eslami, 2010; Mahdavi Zafarghandi et al., 2014; Shahini & Riazi, 2001; Zand-Moghadam et al., 2018).

Both groups of participants stressed the need to include textbook-derived content-relevant tasks and activities that resemble technical English in authentic academic and occupational contexts. The significance of such purposeful tasks is attributed by Ellis (2003) to their capability to offer a shift in the role of undergraduate learners from a mere receiver (learner) of a target language to its user in real-life situations. The widely-approved need for the inclusion of discipline-specific authentic task may also signify the participants' preference for being provided with a functional language practice applicable to the

requirements they have to fulfill in a target situation.

The results also testified to the student participants' preference for receiving the instructor's direct guidance and active monitoring throughout the whole teaching/learning process. Similarly, a noteworthy proportion of the instructor participants corroborated the need to commence the course with an explicit instruction and continue it under the instructors' direct guidance. They also stressed the need for an active type of performance monitoring whereby students are allowed to ask as many questions as they have while proceeding toward an acceptable level of learning. The need for receiving explicit instruction and direct teacher guidance may be attributed to the potential low- or medium-level proficiency of the target ESP learners (engineering students) in English. The findings related to scaffolding and monitoring methods are partially consistent with what has been concluded by Mostafaei Alaei and Ershadi (2017) that there is a need for adopting a teacher-fronted approach to ESP teaching. Additionally, the student and instructor participants prioritized the provision of recast as an indirect type of corrective feedback. The preference for an indirect way of correction in general and recast in particular could hardly be recognized as a revealing finding owing to the plentitude of relevant empirical evidence in the specific context of Iran (Ghandi & Maghsoudi, 2014; Khatib & Vaezi, 2017)

A consensus of opinion was also reached regarding the assessment system. The vast majority of the instructor and student participants acknowledged the need for a combined use of both summative and formative assessment to gauge the ultimate learning outcomes and evaluate the ongoing learning throughout the training span. Knowing that summative assessment is integral to the mainstream tertiary level ESP courses, the participants may have speculated that the incorporation of a formative account of assessment into the traditional assessment system could provide appropriate room for learning improvements, allowing instructors to expedite the re-training process. The need for incorporating formative assessment into the evaluation system of ESP programs lends additional support to the study performed by Tabatabaei and Mokhtari (2014). The use of formative assessment was recognized as a highly validated learning need for Iranian ESP learners.

Another learning need approved by both the instructor and student participants was the need for being taught by professional ESP instructors enjoying an adequate knowledge of the target discipline and English teaching. Such a widely-approved necessity has already been emphasized by a couple of the previously performed local studies (Mashhadi Heidar & Abassy Delvand, 2015; Sherkatolabbasi & Mahdavi-Zafarghandi, 2012). The necessity of both English teaching knowledge and technical expertise for ESP instructors has also been validated by Tsao, Wei, and Fang (2008).

Although both groups of the participants underlined the need to include ESP instruction in the Iranian undergraduate curriculum as a three-credit optional course, the facilities required to administer such training were found to be a source of disagreement between them. While most of the student participants believed in the necessity of using modern educational facilities to gain access to online resources, most of the instructor participants contended that conventional educational facilities, such as whiteboards and video projectors, will suffice for fulfilling the objectives of a tertiary level ESP course. The finding lent additional support to the findings of Mahdavi Zafarghandi et al. (2014) and Tabatabaei and Mokhtari (2014), reflecting the need for using multimedia materials and audiovisual aids in Iranian ESP classrooms.

CONCLUSION

The wide-ranging set of needs proposed by the current study participants testified to a real desire to use technical English as a channel of communication throughout the learning /working life. Such genuine interest led the beneficiaries to voice their concern for acquiring all language learning skills and sub-skills in a way that accelerates oral/written comprehension and communication in academic and occupational discipline-specific contexts. The learner need for communication was also reflected in the stakeholders' choices for the communication-based learning needs such as the need for a task-based multi-skill

communicative syllabus and being involved in an interactional type of task accomplishment which entails collaboration.

The specification of Iranian engineering students' learning needs may help ESP instructors adapt their teaching practice to the real needs of their target students. On the other hand, being aware of the target situation needs proposed by ESP instructors, Iranian undergraduate students majoring in different fields of engineering may have a better realization of the ESP-based tasks and duties they are to tackle shortly. Additionally, syllabus designers could take advantage of the findings to reflect the genuine concern for effective communication, including more communicative materials/tasks in ESP syllabuses. Finally, the authorities in charge of the undergraduate curriculum in Iran may exploit the findings to modify their decisions listening to the instructors' and students' voice. These decisions may range from extending the training hours to implementing a significant reform of the current ESP pedagogy.

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Appendix

Needs Analysis Questionnaire

Direction: Please read different parts of the questionnaire below, one by one, and choose one of the choices accordingly. In cases which none of the choices appeals to you, you are free to add your favorite item(s).

1. Why do you need to learn technical English?

- a. To use it as a means of effective communication in domain-specific contexts such as meetings and conferences
- b. To find a field-specific job
- c. To make progress in career
- d. To study abroad
- e. To pass the course-specific exams
- f. To make progress in post-graduate education
- g. To effectively deal with modern technology
- h. To make use of online domain-specific resources
- i. To improve in terms of social statuses

j. Other reasons:

2. What are the basic reading needs of you in relation to a tertiary-level ESP course?

- a. To comprehend field-specific academic documents such as scientific papers, journals, online textbooks, etc.
- b. To comprehend the field specific occupational documents, such as official deeds, reports, memos,

correspondence, advertisement, booklets, and circulars etc.

- c. To comprehend written instructions on how to use field-specific tools, materials, and equipment
- d. To comprehend the instructional content of textbooks and pamphlets originally developed in English
- e. To read about other engineering specialization

f. Other reasons:

3. What are the basic writing needs of you in relation to a tertiary-level ESP course?

- a. To write field-specific reports such as a report on the installation of an engineering equipment.
- b. To effectively deal with field-specific correspondence (electronic and printed) in my future career
- c. To fill in field-specific application forms
- d. To write detailed curriculum vitae (CVs)
- e. To fill in field-specific bills and receipts
- f. To take note while reading field-specific documents
- g. To take notes while listening in class or field-specific contexts (meetings and conferences)
- h. To compose an order to subordinates in future career

- i. To write complaints about the quality of tools and services in future career
 - j. To write scientific papers and manuscripts
 - k. To compose field-relevant speeches
 - l. Other needs:**
4. What are the basic speaking needs of you in relation to a tertiary-level ESP course?
- a. To pronounce the names of different field-specific tools, materials, and equipment accurately
 - b. To give foreign customers a brief account of the available engineering services
 - c. To explain field-specific processes, developments, materials, instruments, and measurements during inspections and external audits
 - d. To ask for clarification on difficult field-specific concepts in international academic context
 - e. To effectively communicate with others in international academic settings (e.g., addressing field-specific speeches in meetings and conferences)
 - f. To effectively manage working meetings with foreign customers
 - g. To effectively participate in class activities throughout post-graduate education abroad
 - h. Other needs:**
5. What are the basic listening needs of you in relation to a tertiary-level ESP course?
- a. To comprehend the utterance of foreign engineers in working meetings
 - b. To comprehend the utterance of English language orators and lecturer in field-specific contexts (meetings and conferences)
 - c. To comprehend the utterance of colleagues about the details of engineering works (even those articulated in Persian but included English technical vocabulary items)
 - d. To comprehend audio/video recorded instructions on how to use field-specific tools, materials, and equipment.
 - e. To comprehend oral field-specific reports (even those articulated in Persian but included English technical vocabulary items)
 - f. Other needs:**
6. What are the basic vocabulary needs of you in relation to a tertiary-level ESP course?
- a. To know English equivalents of more frequent field-specific Persian words
 - b. To know Persian equivalents of more frequent field-specific English words
 - c. To expand my engineering terminology repertoire

- d. To learn general English vocabulary which collocate with Technical words
- e. To gain an active knowledge of technical vocabulary use (a knowledge which not only facilitate vocabulary learning and retention but also allows students properly use context-relevant words in their writings and utterances
- f. **Other needs:**
7. What are the basic grammar needs of you in relation to a tertiary-level ESP course?
- a. To activate the basic grammar of English so as to comprehend field-specific texts and utterances.
- b. To be familiar with widely-used structures to not only comprehend written/oral field-specific productions but also to maintain their fluency while interacting with members of English-language field-specific contexts.
- c. To have a good mastery of English forms and structure to fully comprehend field-specific productions and, at the same time, interact with others fluently and accurately
- g. **Other needs:**
8. What are the learning strategies ideally suited to your learning needs?
- a. Learning strategies which help students memorize the instructional content (Mnemonic Strategies)
- b. Learning strategies which promote active learning by encouraging students to mentally pick out important information and put it together into one structure through techniques like making conceptual maps, flow charts, or outlines (Structural Strategies).
- c. A combination of both
- d. **Any other suggestion:**
9. What types of teacher role appeal to you ideally?
- a. A lecturer who only conveys the instructional content
- b. A learning facilitator who leads his/her learners into full understanding of the intended instructional load
- c. A resource creator or material developer
- d. A combined role which entails facilitating learning in addition to lecturing
- e. A combined role which entails lecturing the prescribed content along with developing supplementary materials
- f. A combined role which entails lecturing and monitoring learners' performance
- g. A combined role which entails lecturing the content, monitoring learners' performance, and facilitating learning

- h. A combined role which entails lecturing the content, monitoring learners' performance, facilitating learning, and developing supplementary materials.
- i. Any other combination of the above items:**
10. What types of classroom monitoring is favorably to you?
- a. Active (direct) monitoring which allows allow students to frequently ask for help and advice.
- b. Discreet (indirect) monitoring which allows learners to call for ask only when they hit a significant problem
- c. Any other suggestion:**
11. What types of corrective feedback do you prefer to be provided with while learning ESP?
- a. Explicit correction (Instructors should explicitly correct students' errors mentioning them and providing correct forms.)
- b. Recast (Instructor should correct students' errors providing correct forms.)
- c. Clarification request (Instructor should ask for a clarification to correct an erroneous phrase/sentence.)
- d. Metalinguistic feedback (Instructor should provide clues and information related to the formation of the student's erroneous word/phrase/sentence.)
- e. Elicitation (Instructor should restate an erroneous phrase/sentence and pause for students to complete it correctly.)
- f. Repetition (Instructor should repeat the error using an interrogative intonation.)
- g. Any other suggestion:**
12. What types of assessment can thoroughly gauge your knowledge of technical English?
- a. *Low-stakes assessments which entail monitoring students' ongoing learning* so as to allow them to identify their strengths and weaknesses and target areas that need work.
- b. High-stakes assessments which entails the evaluation of student learning at the conclusion of the course through a comparison of their performance with pre-determined standards.
- c. A combination of the two types enumerated above**
13. Which sorts of language learning activities (tasks) do you prefer to engage in while learning ESP?
- a. Activities which resemble authentic use of technical English (e.g., reading a manuscript and preparing a summary of it, addressing a field-specific conference, etc.)
- b. Problem-based activities
- c. Field-oriented projects

- d. Textbook-derived tasks and activities aimed at reinforcing the newly-learnt language
- e. Reading-based Tasks and activities
- f. Out-of-class activities
- g. A combination of all the items
- h. **Any other combinations of the aforementioned items:**
14. What types of qualification do you think an ESP instructor need to have?
- a. English Teaching Expertise
- b. Field-Specific Expertise
- c. General English Expertise
- d. A combination of all the items
- e. **Any other combinations of the aforementioned items:**
15. What types of materials do you think better suit your learning needs?
- a. The prescribed technical English textbooks devised by SAMT
- b. Online resources
- c. Field-specific glossaries
- d. Instructor-developed booklets
- e. Instances of up-to-date use of technical language in different academic contexts and workplace gathered by instructors
- f. Online resources and field-specific glossaries
- g. Prescribed textbooks along with online-resources
- h. Prescribed textbooks along with online-resources and field-specific glossaries
- i. Prescribed textbooks along with instructor-developed booklets
- j. Prescribed textbooks along with instances of up-to-date use of technical language in different academic contexts and workplace gathered by the instructors
- k. **Any other combination of the single items:**
16. What types of task accomplishment is more beneficial to technical English learning?
- a. Individual task accomplishment
- b. Collaborative task accomplishment in groups
- c. Collaborative task accomplishment as a whole class
- d. Collaborative task accomplishment in pairs
- e. A combination of all the items
- f. **Any other combinations of the above items:**
17. What types of scaffolding is more beneficial to technical English learning?
- a. Direct guidance by teacher
- b. Indirect scaffolding methods such as Think-aloud
- c. Peer scaffolding
- d. **Any combination of the above items:**
18. How do you perceive the ideal place of an ESP course in a tertiary level curriculum?
- a. A Compulsory course
- b. An Optional Course
19. Which of the following approach to ESP teaching really appeals to you?
- a. Communicative ESP teaching while the sole means of communication is English

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- b. Communicative ESP teaching while both English and Persian would act as the means of communication
 - c. Translation-based ESP teaching method
 - d. Task-based ESP teaching
 - e. Project-based ESP teaching
 - f. An Eclectic Method that focuses on improving reading comprehension ability of the university students through the use of some necessary strategies and skills.
 - g. Any other suggestion:**
20. What type of facilities do you need for effective ESP learning?
- a. The mainstream educational facilities such as whiteboards and video projectors
 - b. Modern educational facilities such as smart boards which facilities learners' access to online resources
 - c. Any other suggestion:**
21. How many hours a week do you prefer to receive ESP instruction throughout a tertiary-level ESP course?
- a. One hour per week
 - b. Two hours per week
 - c. Three hours per week
 - d. Any other suggestion:**
22. How students should be organized in a tertiary-level ESP classroom?
- a. A class containing learners of the same English proficiency level
 - b. A class containing learners of the same content knowledge level
 - c. A thoroughly homogeneous class in terms of both language proficiency and content knowledge
 - d. Any other suggestion:**

Biodata

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