Developing ESP curriculum for physics students of Iran on the basis of Needs Analysis

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Abstract

It is a long time EAP courses are being offered to all students of Iran in every academic field without any previous evaluation or needs analysis. The bulk of students in translation centers and applications for ESP courses outside the university indicate that the learners' needs are not fulfilled with the current trend of presenting ESP courses; therefore, the present study was conducted in order to improve the way of presenting the course. For this purpose, there was a Needs Analysis conducted in both quantitative and qualitative levels. A questionnaire survey was performed with 33 undergraduate students who had passed the course, 49 students who had not passed it, and 32 graduate students, all from Azarbaijan Shahid Madani and Tabriz Universities. The results revealed that it is not feasible to fulfill all the specific language needs of the students in a single ESAP course even with inclusion of the advance EGAP. Moreover, it was realized that the students' needs are not the same in different phases of their academic periods. It was concluded by presenting a 'language program' which addresses different needs of the students in different phases of their academic lives.

Key words: ESP, Needs Analysis, curriculum, language program

1. Introduction

Sometimes it happens with most of the students that they take a course without sufficient knowledge about what they are taking. ESAP courses in Iran have taken such a stance nowadays with no practical step taken, so far, for improvement. Learners are bundled with texts and many new words on every page and that is all what they know about ESP, language, and language learning, in general. A course which could have brought about a lot of knowledge, enthusiasm and fun with its novelty and attractiveness is left with ignorance at the doors of routines and formalities.

ESP for physics, just like any other subject courses, is being offered to the students of Iran every year without any special needs analysis and with the same old curriculum, methodology, and attitudes of the past. Moreover, as Aliakbari and Boghayeri (2014) assert, even after passing two EAP courses, namely: EGAP and ESAP, the students do not achieve an acceptable level of proficiency to accomplish their language-related tasks.

English, more than a course of study in the universities is a means of living in the world, a world with full of changes in all aspects of life which is affected by the political, socio-economic, and cultural changes that, above all, influence people's relations, aims of life and striving to improve their lives than any other thing (Luka, 2007). For sure, a course of study which has got something to do with the lifestyle of the students in relation with that of the rest of the world, is more demanding in terms of using specialty in its administration and implementation than could be treated as a course like any other major course the students have.

The investigations carried out, so far, for improving the presentation of ESP courses have been in a status of identifying the learners' needs but have not recommended any idea as for how they should be implemented in a curriculum (see Aliakbari and Boghayeri, 2014; Dehnad, Bagherzadeh, Bigdeli, Hatami, & Hoseini, 2014; Khoshal, Mahdavi, & Khalili, 2017; Mazdayasna & Tahririan, 2008; Moslemi, Moinzadeh, & Dabaghi, 2011; Nemat & Mojoudi, 2016; Poorhadi, 2017). Although, identifying needs is the first essential step in any ESP course design, rather it is the subsequent actions taken, as a result of identifying the needs, that is, introducing the change and methodology of actual implementation in the curriculum, which brings about the desired remedies sought for.

It seems that there is not enough consensus among the researchers as for what really happens in Iran's ESP courses but the number of orders in the line of applications for translating subject-related texts and the students' enrolment in outside ESP institutions reveal that EAP courses in the universities of Iran have not been successful in developing graduates who could take charge of their language-related tasks. The present study was, therefore, conducted with the aim of providing remedies to the current curriculum of the students through needs analysis, following a particular model in this respect.

2. Literature Review

Teaching approaches, traditionally, were based on linguistic facts without much attention to interactive activities, which led to inadequate speaking competence in the learners (Rao, 2014). However, with the advent of communicative language teaching during 1970s-1980s, the methodology of language teaching went under substantial reformation by shifting its focus from language form to language function in order to meet the learners' needs, since the new paradigm had a learner-centered orientation which is considered as being of especial importance in ESP practice (Savignon, 1997).

Atai (2002) identified the overall goal of ESAP curriculum in developing autonomy in the learners. This is what Soleimani (2003) also implied, to some extent, by: "the main purpose of EAP has been to enable the students to study their specific academic reference materials and text books in order to get familiar with scientific and technological advances in their field of study" (p.926). Setting such an aim, as Naseri (2009) stated, without having enough knowledge about the learners' capacities and characteristics before their entrance to ESAP programs has brought about an incoherent educational context.

In an outstanding movement, Ghaemi and Sarlak (2015) investigated the issue of Iran's ESP programs from retrospective and introspective viewpoints. Reflecting retrospectively, they concluded that one of the important problems the learners face is that they enter ESP levels without acquiring proficiency on previously held general English courses; and introspectively reflecting, they found out that five determining factors with ESP courses are still being ignored: needs analysis, teacher education, EGP or ESP? ESP materials, EFL teacher or content area specialist? They summed up the problems of Iran's ESP courses in five major issues:

- Absence of level adaptation for the learners
- Lack of training courses neither for ESP teachers nor content area specialists as well as lack of cooperation between the two which leads to a de-motivating context with a teaching method of no more than word by word translation that results in giving a mechanical role to the learners and not making them actively involved in the process of learning
- The instructors' lack of reflection and self- evaluation
- Poor method of teaching void of any strategic instruction and expecting the learners to demonstrate in a single particular way
- Not allocating time for doing researches and developing appropriate materials.

There have been various investigations in relation to identifying the needs of the students. Most of the researchers got to the point that a great number of the students still lack general language proficiency and cannot enter ESP courses (Mazdayasna & Tahririan, 2008; Moslemi, Moinzadeh, & Dabaghi, 2011; Nemat Tabrizi & Mojoudi, 2016; Poorhadi, 2017). Mazdayasna and Tahririan (2008)

concluded that the current two-credit ESP course is not enough for fulfilling the students' needs and sought for more specialized English courses to be offered throughout their undergraduate studies. In addition, several studies suggested that 'reading comprehension' and 'writing' were the most required skills by the undergraduate level students in terms of their language needs (Aliakbari & Boghayeri, 2014; Mahdavi, Khalili, & Khoshhal, 2017; Poorhadi, 2017) but the most striking result in the literature was the idea that ESP program should be either renewed or modified (Mahdavi, et al., 2017; Nemat Tabrizi & Mojoudi, 2016). The investigations, so far, have been trying to identify what the learners need. However, there hasn't been any practical solution contrived, yet. Therefore, the present study intended to recommend an idea in this respect which will hopefully be found useful for curriculum designers, stakeholders, teachers, and students.

3. Methodology

The needs analysis process was performed in accordance with the latest model of needs analysis, as Rahman (2015) has described in full details, which is that of Dudley Evans and St John's (1998). The needs analysis process according to Dudley Evans and St John, is comprised of Target Situation Analysis (TSA), Present Situation Analysis (PSA), Learning Situation Analysis (LSA), and Means/Environment Analysis which was followed in the present study.

Hutchinson and Waters (1987) divide the learners' needs into three major groups: necessities, lacks and wants. *Necessities* are the type of needs that the learners require in order to function in their target situation, *lacks* are the needs which are comprised of the gap between what the learners already know and what they should have essentially known at present but do not, and *wants* are what the learners desire or crave for to achieve. The TSA was performed with the aim of getting the students' target needs or 'necessities', PSA determined the 'lacks' of the study and LSA produced the students' learning preferences and their special 'wants' from the course.

The study was a descriptive one with a mixed type of quantitative and qualitative data analysis procedures. The quantitative part of the study was performed by a survey study using two questionnaires, one adopted from Alikhan (2007) and the other from Bosher and Smalkoski (2002). The qualitative part, was the result of semi-structured interviews with ESP teachers and some of the physics students, using the checklist adopted from Al-Samadani (2017), and actual observation.

The survey study was performed by 33 undergraduate students of physics who had passed the course, 49 undergraduate students who had only passed the EGAP but not ESAP, and 32 graduate students of physics, all from Tabriz and Azarbaijan Shahid Madani Universities. The results of the quantitative and qualitative studies were spread over the model of Needs Analysis procedure, i.e. that of Dudley-Evans and St John model which was comprised of TSA, PSA, LSA, and Means Analysis as mentioned above.

4. Results

4.1. Needs Analysis

Needs analysis, is one of the important criteria in the field of ESP as the basis for designing ESP courses (Dudley-Evans & St. John, 1998). It is "concerned with identifying general and specific language needs that can be addressed in developing goals, objectives and content in a language program" (Pushpanathan, 2013, p. 3). Iwai et al. (1999), define the term needs analysis as "the activities that are involved in collecting information that will serve as the basis for developing a curriculum that will meet the needs of a particular group of students" (p. 6).

According to Hutchinson and Waters (1992, as cited in Rostami and Mahdavi, 2014), "awareness about why learners need English will have an influence on the selection and inclusion of the reasonable content of these courses as well as on the exploitation of the course potentials" (p. 924). In retrospect, Widdowson (1984) has made a distinction between various types of needs calling some *subjective* and some others as *objective*. Subjective needs, as he has defined, are what the learner must do to actually acquire the language while objective needs reflect what they need to do with language once that learning is complete. Pondering upon what he has put, objective needs reflect

something about the target situation needs of the learners whereas subjective needs consist of two consecutive actions ESP teachers must take: First, they need to make an evaluation, before starting the course about the learners (i.e. their language backgrounds, cognitive and affective levels, attitudes towards the language and the teacher, etc.), the facilities at hand, what they have learned during the previous general English course, what they really need from the course, etc. all of which tell something about the present situation needs of the learners; second, they should make specific recommendations as for what the individuals need to do in order to achieve their learning goals satisfactorily during the ESP course which indicates analysis of their learning situation needs.

As Rahman (2015) states, many ESP scholars suggest that TSA (Target Situation Analysis), LSA (Learning Situation Analysis), and PSA (Present Situation Analysis) are the major components for assessing language needs of the learners. Thereupon, it was the framework of the present needs analysis since, as discussed earlier, it is also in accordance with the latest model of needs analysis, i.e. that of Dudley-Evans and St. John's (1998), in which these three components constitute the major elements.

4.1.1. Target Situation Analysis (TSA)

From the early 1950s throughout 1960s it was realized that learners did not need more and more lessons in "advanced English" or "colloquial English", but training in the kinds of English they would need to use in the specific occupations or situations they were going to be involved which needed to determine what the linguistic features were of such situations (Richards, 2001).

According to Basturkmen (2010), ESP courses generally aim to offer realistic descriptions of the discourse features derived from the communication and language use in the community of the specialist field. Therefore, it is important to know about the various characteristics of the subject field and the inter-disciplinary fields it goes with as well as the occupations physics students might take up as a career in future. Succinctly, as Berwick (1989) has stated, "the emphasis of target situation analysis is on the nature and effect of target language communications in particular situations (in offices, on assembly lines, in meeting rooms, in content-area classrooms, for example)" (p. 57).

Before designing a course, in any of its parameters, according to Strevens (1977), a process called 'restriction' must take place which is defined as limiting the selection of items and features from the corpus of the language to those which are relevant to the designer's intention and the student's needs. Such restriction could not be accomplished unless with thorough procedures of register, genre and discourse analyses.

4.1.1.1. Discourse of scientific language

According to Widdowson (1979), there is a universal rhetoric of scientific exposition which "with some tolerance for individual stylistic variation, imposes a conformity on members of the scientific community no matter what language they happen to use" (p. 61). As Kelly (2014) states,

> studies of student learning suggest that features of scientific discourse are not mastered as received knowledge through didactic instruction, but rather through participation as a member of a group in a discourse community. Students learn meanings of scientific terms through engagement in discourse and practices. (p. 333)

Kelly points out that "taking on a scientific discourse includes building an identity with the discipline and members of the local discourse community, which can be alienating for some students" (ibid). Thus, in order to get to know about the discourse of any field, one should make a membership with the particular discourse community of the field or gain knowledge about it.

Swales (1990, as cited in Chambers, 2007) enumerated characteristics of a discourse community as including "participatory mechanisms of intercommunication, mastery of a specific lexis, and the use of one or more genres" (p. 37). In this respect, Hanauer (2006) mentions some of the characteristics of the scientific discourse by referring to one of the distinctive features of the scientific discourse which is 'scientific inquiry'.

Scientific inquiry is at the heart of every scientific discourse, as Hanauer explains, and involves a range of activities including "making observations, posing questions, using a variety of scientifically informed print resources, designing experiments, reaching conclusions based on empirical data and communicating scientific findings" (p. 18) all of which require knowledge of the specific language and particular 'argumentation' each activity demands in order to convey a message within the bounds of the particular discourse features of the language.

4.1.1.2. Register of scientific language

A text is, in fact, a sort of interaction between the reader and the text or even between the reader and the author (Widdowson, 1979) out of which scientific texts are not exclusive. As Ahmad (2012) states, "the scientists represent the truth which has universal appeal because it is pertinent to experiment and logic" (p.50). The expressional language of science, therefore, needs to be simple and understandable to all the scholars and students of the specific field in the world. By simplicity, however, it is not meant that science is mere statement of facts in easy words. In fact, ease of language does not lie in choice of easy lexis but in an understandable one in terms of its relation with the particular register of the discipline it serves.

Register, according to Fromkin, Rodman, and Hymes (2003) is "a stylistic variant of a language appropriate to a particular social setting" (p. 593). The register of every field of study is unique and requires following the grammatical rules and terminology specific to that particular field of study. Some of the most salient characteristics of scientific register are: frequent use of passive voice over active voice, use of a formal language void of any ornaments or figurative elements, use of technical and sub-technical terminology, observing precision and accuracy in reporting the results, use of hedging in expression of facts, etc. It is being recommended that ESP teachers and students should have enough pre-study in the realm of the particular discipline they are going to deal with, in order to get the gist of the scientific register.

4.1.1.3. Genre of scientific language

Hutchinson and Waters (1987) believe that learners don't learn language in isolation from specialist contents but rather in the context of professional community that genre provides – an opportunity in which learning situation is provided in a meaningful context by integrating product, process, and communicative purpose. According to Hudson (2000) 'genres' are certain sets of linguistic features that are found to characterize certain functionally-defined types of spoken or written language. In fact, genres give structuring characteristics to the curricula on the basis of which materials and the syllabi could be classified and developed.

4.1.1.4. The results of the questionnaire survey

One of the questionnaires in the present study was adopted from Alikhan (2007) for which the correlation coefficient (ρ) and the reliability (R) scales were measured through Spearman-Brown Prophecy (table 1).

Table 1.

N	SD	ρ	R
114	4.93	0.89	0.94

The questionnaire survey was tapping into the target needs of the students with a question of Alikhan's (2007) questionnaire which was: 'the stimulus for learning English'. 50% of the graduate students, 60.6% of the undergraduate students who had passed the course, and 32.6% of the undergraduate students who hadn't passed the course expressed 'higher education' as their main reason for learning English. The second reason for studying English was 'success in their future professional life'. 46.4% of graduate students, 63.63% of undergraduates who had passed the course

and 20.4% of the undergraduate students who hadn't passed it selected this option (see Figure 1). The low amount of the undergraduate students' response to 'success in higher education' must be because their needs are different in this phase of their academic life.

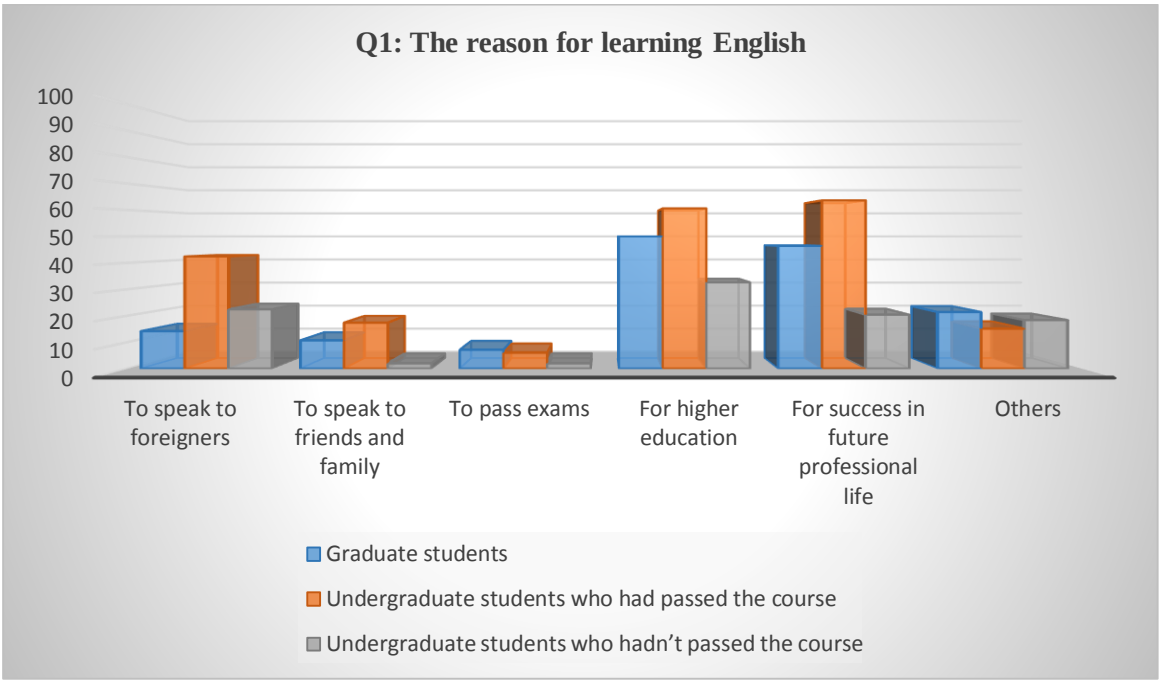

Figure 1.

4.1.1.5. Target academic careers physics students may take

After passing undergraduate level, some of the students may go for a job and some others may wish to continue their education to higher degrees and stay in the academic situation. The language program for undergraduate level was stipulated according to what the learners' needs demanded at the time. In higher education the situation is no less varied and the students still crave for at least 2 credit courses of specialized English in order to handle their academic needs.

The students' academic requirements in graduate level, however, is not similar to what they had in undergraduate level since new tasks are added to their curricula such as writing thesis and articles, attending conferences, giving lectures for which they need listening and speaking skills mostly as well as acquiring academic writing skills.

Although they enter masters level through university entrance examination that includes English as one of the examination criteria, they still need listening and speaking skills which was never presented to them to take up as a course. In addition, academic writing, is a very sensitive and meticulous activity demanding observation of many subtle points in terms of language rules that students should acquire for presenting an academically appropriate writing piece of material, but they are never presented such a course and the students resort to translation centers for this purpose.

4.1.1.6. Application of physics in future occupational careers of the students

Physics is a science for which there are various jobs the students can take but unfortunately, nowadays, most of the graduates of basic sciences cannot find jobs relevant to their own fields of study. However, in ideal situations, physics graduates could apply their knowledge in many professions in the realm of science and technology in the world.

Students of physics could enter into careers in space and astronomy, energy, healthcare, technology and industry, environmental sciences, manufacturing, teaching, mathematical-related

fields, and even law (in areas like forensics, patent law, networking, and cyber security). They may be employed in the foretold fields as researchers or research assistants, chief executives, production/ sales/ or procurement managers, technicians, managing directors, official clerks, and teachers. No doubt, the type of jobs that demand special communicative abilities will not be assigned to those who do not have communicative language proficiencies. Moreover, most companies usually require particular language degrees for employment.

Obviously, language knowledge at a minimum level of proficiency in reading and writing is required for doing minimum tasks for all those who wish to enter a lower-level job in this respect, at least. However, the tasks which demand active communication such as jobs like procurement or sales managers demand knowledge of the language in more than textual skills i.e., in communicative abilities with listening and speaking skills at the top, specific subject-related English, that is ESP-related knowledge of the language, and special EBP (English for Business Purposes) knowledge. Therefore, a single ESAP course with a focus on reading comprehension is not enough in developing the aforementioned skills in the students. It is not feasible to include all these skills in a single semester, either. Hence, ESP should be presented in a more specific way to the students if the universities and institutes wish to prepare them for functioning in their future occupational careers.

4.1.2. Present Situation Analysis (PSA)

PSA is one of the most important phases of needs analysis. According to Dudley-Evans and St John (2012), "a PSA estimates the strengths and weaknesses in language, skills and learning experiences" (p. 124). No doubt, target situation analysis without PSA will not be effective enough in yielding a successful ESP course. As Haselie (2008) states, "if the destination point to which the students need to get is to be established, first the starting point has to be defined, and this is provided by means of PSA" (p. 10).

PSA is a framework upon which all scheduling should be based. Anything from TSA needs to be applied to PSA in order to take effect since designing a curriculum without taking consideration of the most tangible weaknesses and needs of the learners will not lead to any noticeable accomplishment. PSA is mostly performed by means of using questionnaires. Two questionnaires were applied for this purpose which are dealt with below:

One of the most important questions of the questionnaires was question 20 of Alikhan's which probed into the *importance* of having ESP course in the students' curriculum (Figure 2). The most significant about this question was the number of students who had selected 'agree' or 'strongly agree' as their response, especially among undergraduate students who hadn't passed the course (30.61%) which was quite meaningful and indicated the amount of disinterest among the learners or the amount of dissatisfaction with current language program. The amount of 'no idea' option which was rather high among undergraduates who had passed the course (36.66%) was also significant which meant they either don't have any idea, or don't hope any amendments to happen in their language program since they haven't seen any reformations, so far, in their previous language courses. However, a great number of the students (62.96% of the graduate students, 46.66% of the undergraduate students who had passed the course, and 51.02% of those who hadn't) had disagreed with this idea which means they really feel the need for the course even in its present status.

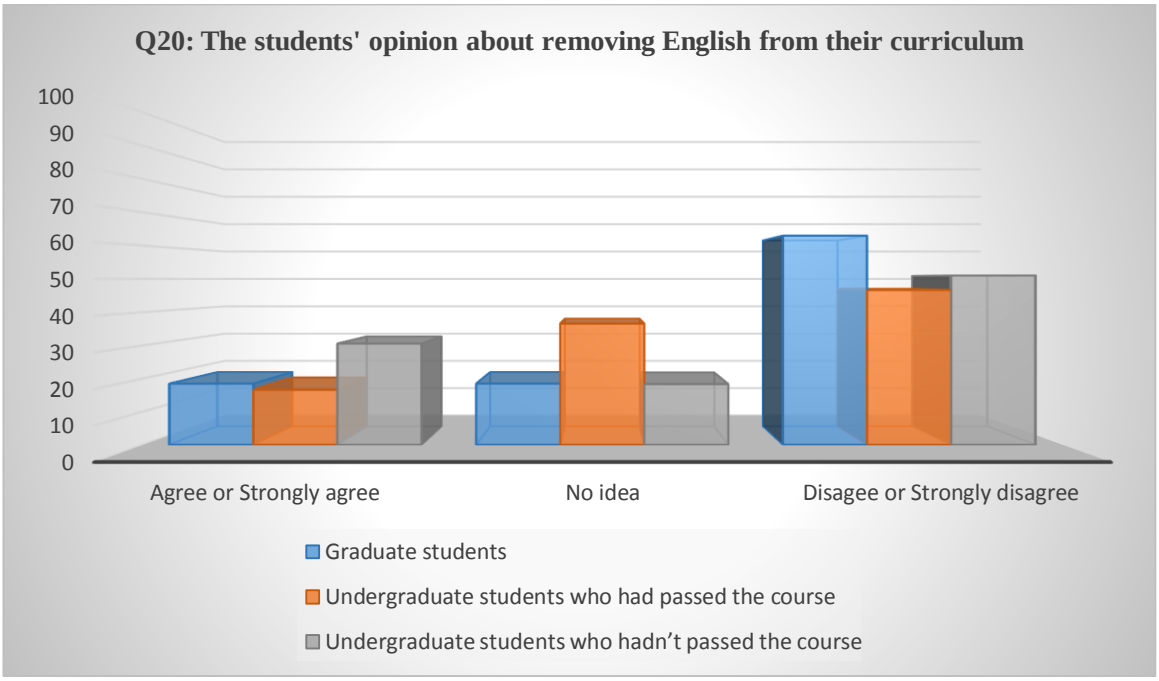

Figure 2.

The second questionnaire, adopted from Bosher and Smalkoski (2002), was administered to investigate what the learners felt about their language abilities at present. The questionnaire was a Likert-scale one and produced the following results as for the correlation coefficient (ρ), and reliability (R) scales (table 2).

Table 2.

N	SD	ρ	R
114	1.65	0.97	0.98

Some of the results of this needs analysis questionnaire revealed that the learners are not pleased with their current language abilities which were the focus of their current curriculum, that is reading comprehension and writing. On average, 44.37% of the graduate students, 66.72% of the undergraduate students who had passed the course, and 82.25% of those who hadn't passed it, indicated that they were poor in reading comprehension (Figure 3) and 65.16% of the graduate students, 69.85% of the undergraduate students who had passed the course, and 83.47% of those who hadn't passed it, indicated that they felt poor about their writing ability (Figure 4).

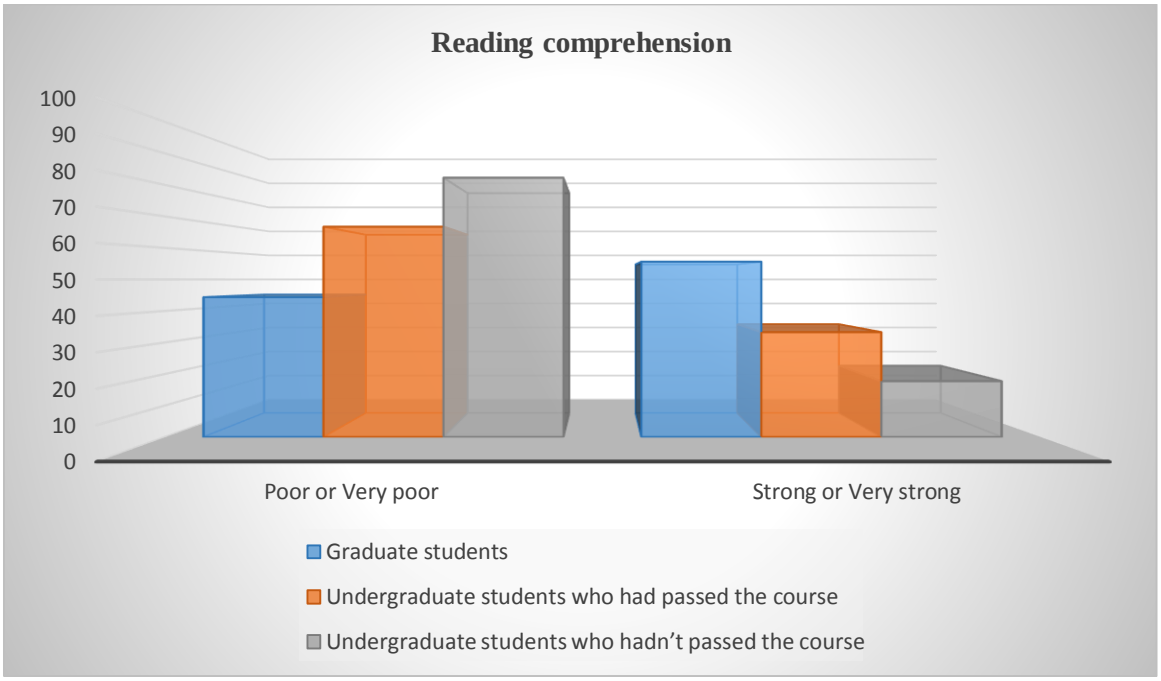

Figure 3.

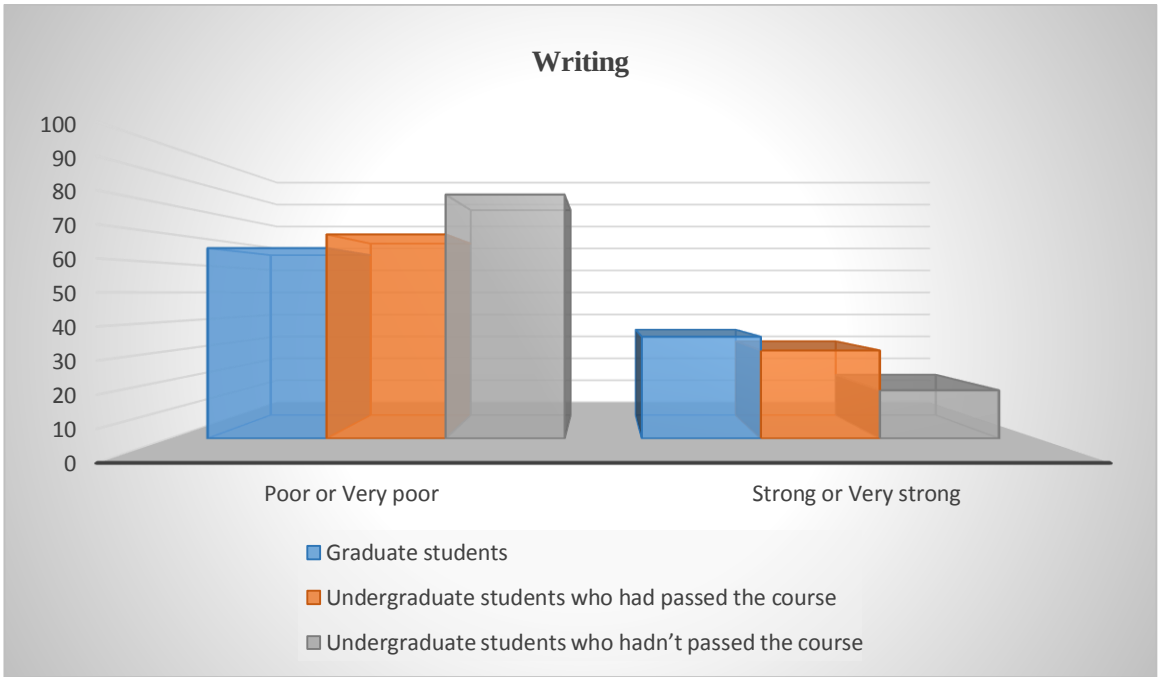

Figure 4.

In an interview with some of the ESP teachers it was realized that most of the teachers have consensus of ideas about 'reading ability' and 'increasing knowledge of specific vocabulary' as the most required skills by the students in ESP courses. However, some of the teachers were of the opinion that the focus of language teaching should be on all language skills and elements. Most of them also expressed their dissatisfaction with the current syllabus and the students' language learning level.

All in all, the teachers and the students wished to have interesting ESP classes in which everyone could be benefitted but the obstacles and problems are great such as shortage of time and budget, lack of facilities, inappropriate management system, lack of needs analysis, defects in curriculum, lack of consultation with language teachers, inappropriate materials all of which decrease the effect these classes are purported to have on the students' progress.

4.1.3. Learning Situation Analysis (LSA)

Hutchinson and Waters (1987) divided the needs of the students into *target needs* (what the learners need to do in their target situation) and *learning needs* (what they need to do in order to learn). So far, TSA and PSA were held and a part of the students' needs were identified but TSA and PSA are not enough in developing a suitable course of study. They are rather like specifying the 'destination points', to use Haseli's term, whereas what is needed is 'how to learn' in order to get to the predetermined goals. Thus, after having a complete target and present situation needs analysis, learning situation analysis is required in order to know about the learning needs and the learning preferences of the students.

In the investigation about the skills that the students wished to develop, 71.4% of the graduate students, 54.54% of the undergraduates who had passed the course, and 61.22% of those who hadn't passed it, had chosen 'speaking' as the skill that they mostly wished to develop (Figure 5).

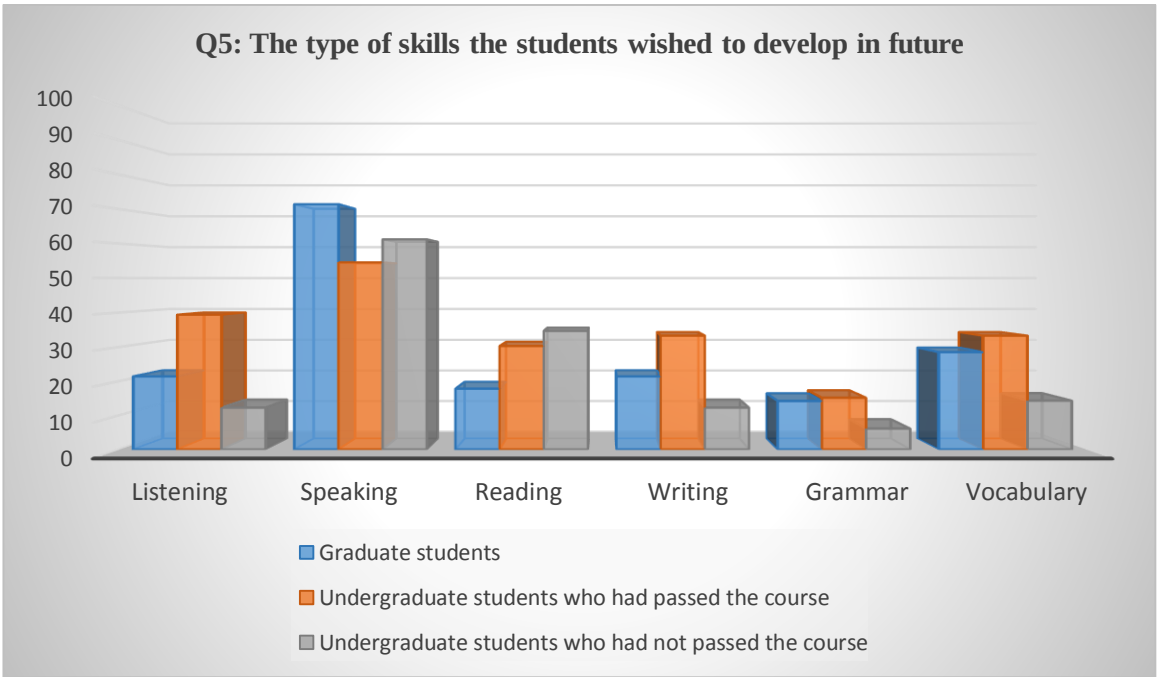

Figure 5.

Question 18 of Alikhan's (2007) questionnaire asks about the students' styles and strategies of learning preferences. 55.17% of the graduate students, 54.5% of the undergraduate students who had passed the course, and 40.8% of those who hadn't, stated that they prefer to reach the answer by themselves rather than by copying from the board or memorizing. 37.9% of the graduate students, 39.3% of the undergraduate students who had passed the course, and 36.7% of the undergraduate students who hadn't, also alleged that they preferred learning by problem-solving (Figure 6). These all indicate that CLT is able to make use of the learners' learning potentials if it is going to be established in their classrooms and the learners are willing to adapt themselves with any changes that may occur, in any way possible, in their language learning-teaching methodology.

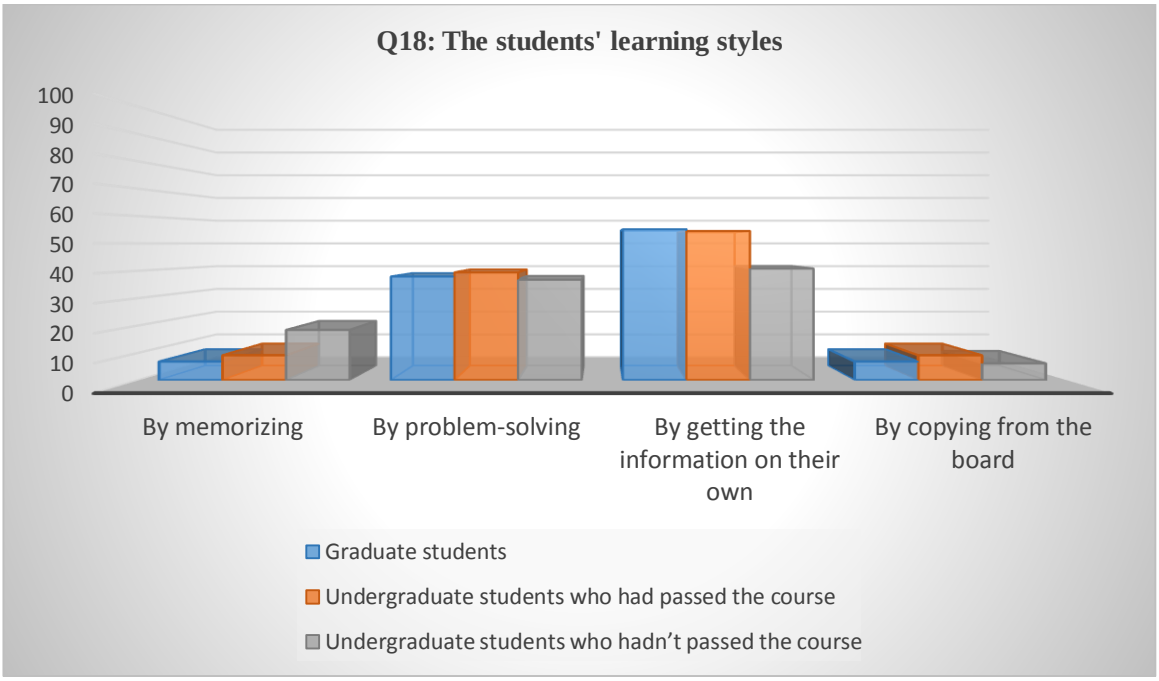

Figure 6.

4.2. Environment Analysis

Environment Analysis is one of the key steps in the procedures related to developing curricula. As Nation and Macalister (2010) state, whatever needs analysis suggests, should be balanced against constraints found in environment analysis. Definitely, in any needs analysis, it is very important to know for what context, in what circumstances, and with what constraints the ESP course is being programmed. According to Swales (1989),

> a recognition of the importance of the decision-making process, plus a realization that attempts to preserve the ideal may be counter-productive, have given rise to a new approach to programme design that has been variously labelled 'ecological' or 'means analysis' (Holliday and Cooke, 1982; Holliday, 1984), 'learning environment analysis' (Crocker, 1984) or 'Appropriate Technology' (Markee, 1986b)" (p. 88).

ESP course, in Iran, is being offered to all undergraduate students in every field of study. It is presented as a single course in an only semester, held regularly once a week with the same timing schedule as the students' most other credit courses, i.e. for 2 hours, and has always been taught by subject field teachers rather than language teachers.

An observation of ESAP classes for the students of physics revealed that this course is suffering from substantial administration procedures. The students are sitting in rather large learner size classes which is a great obstacle itself in managing to meet with individual practice and monitoring. However, Iranian universities are more or less equipped with facilities such as language laboratory, internet facilities and projectors in the classrooms which could be well used of, whereas they are not. The only constraining factors are time and the management of time, location, and programing, in a way that overlap with other programs is avoided, which is, unfortunately, unfavorable.

The resources for this course are usually textbooks compiled by the official Iranian center for materials development in humanities (SAMT) the writers of which are subject-specialist teachers rather than EFL teachers. The materials, according to Mazdayasna and Tahririan (2008), neither address the students' learning needs, wants or lacks, nor do they include the four language skills, but are solely focused on reading skill which is not flourished to its best, either, and has even brought about complaints. Mazdayasna and Tahririan also point out that the text-centered nature of the

materials, give examination-oriented characteristics to the course and the students don't get the proficiency they are expected to achieve after taking the exam.

The methodology of teaching, as the personal observations and interviews revealed and as the subject-teachers of the research of Moslemi et al. (2011) indicated, is based on Grammar Translation Method which, according to the teachers in their study, is because "they have no other alternative but to translate specialized English texts in order to put the message across to the students" (p. 124). This is at odds with what the goal of ESP instruction is purported to be, that is to develop autonomy in the learners (Atai, 2002).

All in all, as Aliakbari and Boghayeri (2014) assert, Iranian students, despite passing two English courses in the universities namely: EGAP and ESAP, still lack adequate level of proficiency to deal with the target language.

5. Discussion and Conclusion

The results of the target situation analysis revealed that the learners' primary needs in undergraduate level are 'written skills' mostly than oral ones since the first act in the process of ESP learning is to study the various written documents in the realm of the particular subject course they have taken, in order to be familiar with the special discourse features, register, technical vocabulary, and the specific language of the course, in general. Thus the learners' fundamental needs or necessities are 'reading academic texts' and 'writing for different purposes' ranging from taking notes to writing reports of their experiments and articles. This is in agreement with the results of the researches of various other scholars in this respect, such as Mazdayasna and Tahririan, Moslemi, et al., Aliakbari and Boghayeri, and Poorhadi.

The high proportion of the students' and their teachers' dissatisfaction with their general English proficiency indicates that more than half of the learners cannot benefit from ESP courses since struggling with language components may bring about feelings of bewilderment, depression, and even hatred of the language that may lead to their complete failure and abandonment. So, their curriculum should be changed or a treatment should be planned.

The findings of the TSA, especially in various occupational careers of the learners, revealed that various sub-disciplines physics students may enter in future demand specific language knowledge. This implies that a single ESP course is not sufficient for fulfilling the students' probable future careers which is what Ganta (2015) also attests. Therefore, it is recommended that ESP be extended over the academic periods of the learners.

An interesting point in Aliakbari and Boghayeri's (2014) investigation was that there were different points of views between the two groups in their study. The students had focused on the needs which would reduce their academic failures and weaknesses whereas the graduates had mostly focused on the needs which would eliminate their problems with applying English for work. This was also attested by the present study with the difference of the graduate students' responses to the questions from those of the undergraduate ones and totally confirms that ESP learners' needs are not the same in different phases of their academic studies just as their tasks, assignments, and future goals are not the same in their different academic periods.

Krashen and Terrell (as cited in Nunan, 1988) had produced another typology in classification of learner needs which is more compatible with what the results of the present study suggests. They had claimed that "most learning goals can be divided into one of two categories: basic personal communication skills and academic learning skills, and that those can be further subdivided into oral and written modes" (p. 51). As was mentioned earlier, textual abilities or written skills are more important than other skills at the beginning phases of physics students' academic lives. That is, in fact, one of the necessities for which there should be obligatory courses. Yet, the students' other needs in terms of their wants and lacks can be compensated for by other optional courses with the most valuable advantage that the learners will take them out of their own interest. Basic personal communication skills, for instance, could be accomplished by an adjunct communicative ESP class especially designed for ESP students with a focus on listening, speaking and communicative needs of

the students; an 'EBP course' would fulfill the students' language requirements in case they wish to enter into business as a career; and an 'ESP translation course' would equip the learners with special knowledge and ability for fulfilling their translation needs in their own field of study.

Considering all what was discussed, the recommended ESP classes for the students of physics are summarized below:

- *Adjunct EGAP class*, which is designated for under-achievers mostly, who are identified after the placement test for entering ESAP and is regarded as obligatory for them.
- *ESAP level 1*, the primary level of ESP, is provided mainly for undergraduate students focusing on the two most required skills physics students need which are reading and writing.
- *Adjunct ESP Communication class (optional)*, which is specifically stipulated for undergraduate physics students' communicative skills with an emphasis on subject-related issues that their normal ESAP level-1 course does not provide.
- *Adjunct ESP Translation class (optional)*, for undergraduate students which provides physics students with essential translation techniques.
- *Adjunct EBP class (optional)*, is an optional course for those who intend to enter into the realm of business in their own field of study.
- *ESAP level 2*, the advanced level of ESP designated for graduate and even postgraduate students with a focus on the students' speaking and listening skills in their own course of study.
- *ESP Academic Writing class*, which fulfills the graduate students' special writing needs such as writing reports, proposals, theses, journal articles, etc.

As mentioned above, the findings of the needs analysis procedures, sparked the foundation of a new curriculum with a new language program. Taking the environmental constraints into account, the execution of such a change might seem far beyond practical estimations for an innovation. However, that cannot justify not to take a step forward in revising and making amendments. In fact, the chaos could be alleviated if the trend of curriculum development and language programming get closer to its ideal status, that is, even if it couldn't be completely executed with the present constraints, the presentation of the course could be directed towards a right path by partly subordinating it.

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