



## A needs analysis of ESP for mathematics students

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### Abstract

English proficiency plays a vital role in academic success, particularly in scientific disciplines where English serves as the primary language of research and communication. This study conducts a comprehensive needs analysis of English for Specific Purposes (ESP) for mathematics students at Chadli Bendjedid University, addressing a critical gap in understanding their specific language requirements. Using a questionnaire, the research explores students' experiences, challenges, and expectations regarding their English language skills and coursework. The findings indicate that while students recognize the importance of English for their academic and professional development, their primary needs lie in vocabulary acquisition and writing proficiency, particularly for tasks such as curriculum vitae preparation, academic projects, and examinations. Despite its significance in language acquisition, listening comprehension is often overlooked in current instruction, highlighting the need for more targeted activities to develop this skill. The study underscores the necessity of a balanced, skill-based approach to English language instruction that integrates reading, writing, speaking, and listening to effectively support mathematics students in their academic and professional pursuits.

**Keywords:** ESP; mathematics students; needs analysis; language skills; vocabulary.

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## 1. INTRODUCTION

English is the most widespread language in the world and it is the most widely spoken. As a means of communication, it is in constant growth. This fact is reflected in various fields and areas where English is regarded as an instrument of scientific research. To reach specific objectives, countries all over the world, including Algeria, incorporate English courses at all levels of the educational system in general and in higher education in particular through English for Specific Purposes (ESP). This has led to an increased demand for ESP programs for university students.

ESP provides advanced, specialized, and academic material that aligns with students' study programs, particularly in higher education settings where job performance is a focus. These programs are tailored to different fields such as Science and Technology, Business and Economics, and Social Sciences. They are designed based on a systematic needs analysis to determine the specific English skills required by learners. The main focus of ESP teaching is to identify and address the English language needs of students in their fields of study.

### 1.1. Literature review

#### 1.1.1. An overview of ESP

ESP was an important development in human activity. It was not a planned movement but rather a phenomenon that grew out of several converging trends as English has become an international language. ESP aims at acquainting learners with the kind of language needed in a particular domain, vocation, or occupation.

The field of English for Specific Purposes (ESP), which addresses the communicative needs and practices of particular professional or occupational groups, has developed rapidly in the past fifty years. It has become a major force in English language teaching and research.

ESP draws its strength from an eclectic theoretical foundation and a commitment to research-based language education which seeks to reveal the constraints of social contexts on language use and the ways learners can gain control over these.

#### 1.1.2. Defining ESP

ESP "English for Specific Purposes" refers to teaching or studying English for a particular domain such as agriculture, business, technology, law, tourism...and so on. In this case, there is a specific goal for which English is taught and learned, that is to say, learners have a specific aim to achieve (Topkaya & Çelik 2024). Learners learn English for a specific purpose to get and develop appropriate professional knowledge and skills through English. In other words, they aim to learn English not for the pleasure or prestige of knowing the language but because English is the key that helps them to perform a special task in their occupation (Anqi et al., 2024).

ESP concentrates more on language in context than on teaching grammar and vocabulary in the first place. It covers subjects varying from accounting or computer science to tourism and business management. In some cases, people with inadequate proficiency in English need to be taught to handle specific jobs (Kiczkowiak, 2024).

ESP began in the 1960s with the emergence of business and technology. Hutchinson (1987) sees ESP as an *approach* rather than a *product*, which means that ESP does not involve a particular kind of language, teaching material, or methodology. They suggest that 'the foundation of ESP is the simple question: Why does this learner need to learn a foreign language? The answer to this question relates to the learners, the language required and the learning context, and thus establishes the primacy of need in ESP.

Need is defined by the reasons for which the learner is learning. This varies from study purposes such as following a postgraduate course in an English-speaking country to work purposes such as participating in business meetings or taking hotel bookings. These purposes are the starting points that determine the language to be taught.

### **1.1.3. ESP teaching and learning processes**

The methodologies of ESP teaching comply with the same model of the language teaching process, that is, the basic teaching activities are the same as those of any language teaching: “*elaborating the input; motivating the learners to learn; operating the learning strategies and fostering practice and use*” (Stevens, 1988).

In ESP teaching, some basic items have to be taken into account. The most important ones are the learners’ needs, goals, and motivation (Nazari et al., 2024). Furthermore, learners’ attitudes toward learning the language and the emphasis on learning strategies are fundamental in ESP programming and teaching (Zhang et al., 2023).

### **1.1.4. Stages in the ESP teaching process**

Dudley-Evans and St Johns (1998) sustain that the key stages in ESP are: needs analysis, course (and syllabus) design, materials selection (and production), teaching and learning, and evaluation. ESP course design is the product of a dynamic interaction between these elements which “... are not separated, linearly-related activities, rather, they represent phases which overlap and are interdependent”.

Mumby (1978) insists that the fulfillment of ESP courses relies on the syllabus and the materials that are determined by the prior analysis of the communication needs of the learner. Nevertheless, an effective ESP course is governed by further parameters that have to be taken into account. Miliani (1994) points out that four essential items have to be studied and analyzed as a pre-design process, which consists of:

- 1- Situation analysis:** it covers the general requirements of learners and institutions, their profiles and attitudes as well as the existing materials.
- 2- Setting Aims and Objectives:** the identification of learners’ needs analysis leads to establishing a general plan and what would be accomplished by the end of the course.
- 3- Generating Syllabus Content:** elaborating the syllabus content “through the sequencing of materials whose layout and presentation should form a continuum” (Benyelles, 2009).
- 4- Assessment:** collecting data concerning the syllabus before or during the course execution leads to retrofitting the content of the syllabus.

These steps of an ESP teaching process indicate that learners need to be identified and analyzed in the first place. Thus, the progress of an ESP course should be on par with the learners’ requests and wants. Therefore, needs outcomes will guide the syllabus designer to work out an adequate syllabus, providing course materials as well as teaching and assessment methods.

### **1.1.5. Needs identification and analysis (NIA)**

The concept of “needs” is defined in general as the differences between the actual state concerning a group or a situation related to a specific question and the required state. “As in all ESP teaching situations, we must start by considering the needs of the learners and what they have to do in the target situation” (Benyelles, 2009).

The definition of 'needs' has been studied by many scholars concerned with Needs Analysis and ESP. They have suggested a multitude of terms to define the concept of “needs”. The latter includes objective and subjective needs. Brindley (1989) suggests that if the needs are generated from external and known

facts that can be verified, then they are objective and perceived needs. For instance, if learners learn English to satisfy their requirements for graduation, then their needs to study English are objective and perceived. On the other hand, if the needs emerge from internal stimuli and fit the cognitive and affective factors such as 'to feel trustful' or 'to be more performant' in one's school or workplace then the needs are subjective or felt.

Dudley-Evans and St John (1998) suggest that objective, perceived, and product-oriented needs meet the target situation analysis (henceforth TSA) in one part and the subjective perception as well as the process-oriented needs correspond to a learning situation analysis (henceforth LSA) on the other part. They propose one more analysis which is a present situation analysis (PSA). A present situation analysis is aimed at explaining what learners already know. Therefore, the analysis can be used to identify their lacunae. A TSA deals with the objective, perceived, and product-oriented needs of learners, an LSA discusses subjective, felt, and process-oriented needs and a PSA evaluates the strengths and weaknesses of learners in language skills and learning experiences.

Hutchinson (1987) suggests similar but different definitions and classifications regarding 'needs.' They use three terms to explain 'needs' such as: 'necessities', 'wants', and 'lacks. They define 'necessities' as the type of need determined by the demands of the target situation, that is *what* the learner *should know* to *work* effectively and efficiently in the target situation.

All in all, the ESP student is disposed to focus on meaning in the field of this subject matter. In ESP class, English should be presented not as a subject to be learned in isolation from real situations, nor as a mechanical skill or activity to be developed. On the contrary, it should be presented in authentic contexts to make the learners familiar with the particular ways in which the language is used in real situations.

Learners in the ESP classes are generally conscious about the purposes for which they need to use English; since they have already oriented their education toward a specific field. In this way, their knowledge of the subject area enables them to identify a real context for the vocabulary and structures of the ESP classroom. In such cases, the learners can take advantage of what they already know about the subject matter to learn English.

## **1.2. Purpose of study**

This study aims to attain a comprehensive needs analysis to identify the specific English language needs of Mathematics students at Chadli Bendjedid University by investigating students' needs and language skills preferences. Hence, to achieve the aims of this research, the following questions are raised:

Q1: What are the ESP needs of mathematics students at Chadli Bendjedid University in terms of language skills and academic requirements?

Q2: What are the preferred language skills among mathematics students in ESP courses at Chadli Bendjedid University?

## **2. METHOD AND MATERIALS**

### **2.1. Participants**

The participants of this study encompass 56 university students from the mathematics department at Chadli Bendjedid University.

### **2.2. Data collection instrument**

To gather information and obtain a more realistic picture of the target situation. The researcher opted to use a questionnaire addressed to the participants of this study. The questionnaire was designed to

gather pertinent data from students of mathematics that concern their needs in the English language related to their subject matter.

### 2.3. Research design

This study is descriptive research in which the focus is to understand more about ESP needs for mathematics students. Thus, a questionnaire was employed to gather the required data for the topic under study; and ultimately, a mixed method in analyzing the gathered data was used.

## 3. RESULTS

This part outlines the results from the data collection process in which we describe participants' English language needs through the selection of materials needed and wanted by Mathematics students at Chadli Bendjedid University.

### 3.1. Question 1: Are you interested in taking an English for Specific Purposes course?

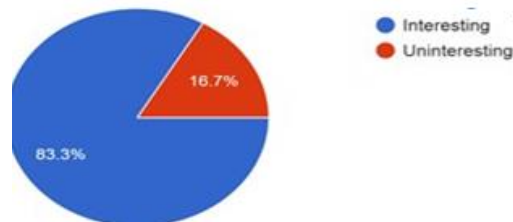
The question aims to evaluate student interest in ESP courses; the finding indicates that all students (100%) are interested. This demonstrates that the students are aware of the importance of ESP courses and are willing to attend these kinds of courses.

### 3.2. Question 2: How do you find the content of your English language course?

This question aims to know what students think about their ESP course content. The results, show that a great proportion with a percentage of (83.3 %) declared that the course content is interesting for Mathematics, while only (16.7 %) stated that the content is uninteresting because courses are online. Figure 1 displays that the ESP course serves the majority of students' expectations and interests, that is, the course is designed based on students' needs.

**Figure 1**

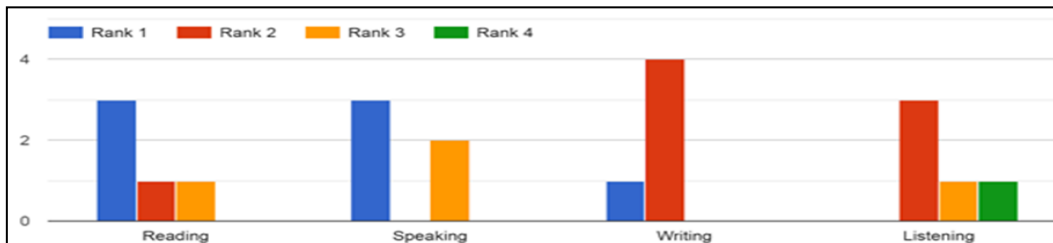
*Students' viewpoint about mathematics course contents*



### 3.3. Question 3: How would you classify the following English language skills in terms of their importance for your academic studies? Please use numbers to rank them from 1 (most important) to 4 (least important).

**Figure 2**

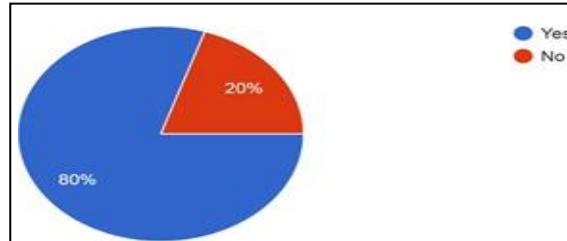
*Mathematics student's perceptions of the four skills in terms of importance*



The results in figure 2 show that writing skills are the most important one (80%) for mathematics students for their academic studies, followed by reading, speaking, and listening skills (75%). So, students need all four skills with a great emphasis on the writing skill.

### 3.4. Question 4: Do you read materials written in English?

**Figure 3**  
*Students' reading practices of English (Mathematics students)*

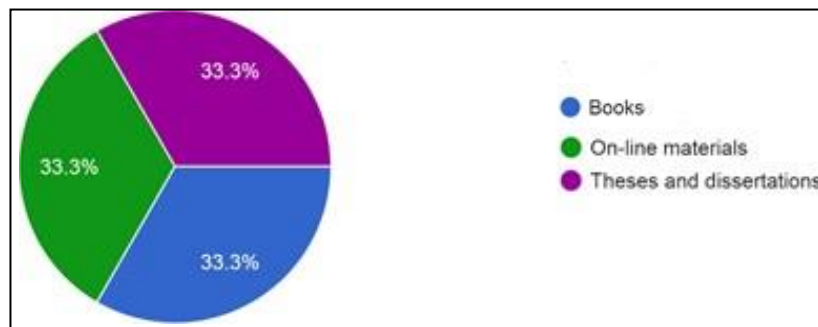


The question aimed to evaluate students' aptitude in reading materials written in English and how familiar they are with the language. The results demonstrate that (80%) of mathematics students read content written in English, while (20%) of them do not read.

### 3.5. Question 5: If yes, what kind of materials do you find useful?

- Books -Theses and dissertations- Online materials.

**Figure 4**  
*Preferences for useful English-language materials*



According to figure 4 above, the results showed a fair percentage of (33.3%) for all the suggested materials.

### 3.6. Question 6: Why do you think reading skills are important for your academic studies?

The results showed that 100% of students believe that reading skills are essential to expand their vocabulary, especially in technical words that are related to Science and Technology.

### 3.7. Question 7: What type of vocabulary do you want to learn?

The results determined that 100% of Mathematics students realized the importance of both kinds of vocabulary: general vocabulary needed for daily life and technical terms especially related to their field of study. This showed the important role that vocabulary plays in the student's learning process.

### 3.8. Question 8: do you think speaking skills are important for your academic studies?

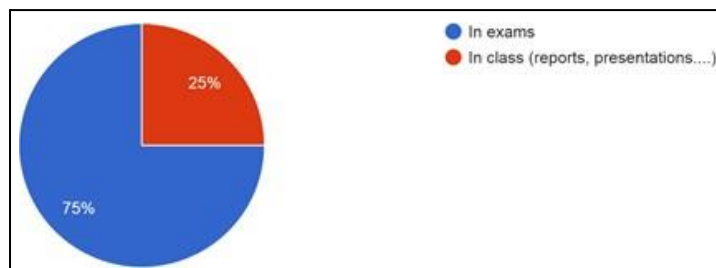
Results showed that (100%) of the students need speaking skills to improve their fluency in oral discussions, conversations, debates, and group work as they need interactions to improve their English language learning skills.

### 3.9. Question 9: Do you write in English?

This question aims to know the participants' ability to write in the English language. Thus, the results showed that (50%) of the students write in English, while the rest of them do not. This is because students are limited in their writing to classroom practices.

### 3.10. Question 10: If yes, in which setting do you write in English?

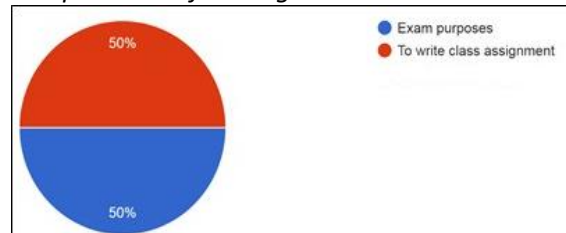
**Figure 5**  
*Students Setting for Writing in English*



The results in figure 5 showed that (75%) of the students write in English during the examination and (25%) of them write in English during classroom activities (reports, presentations).

### 3.11. Question 11: Why do you think writing skill are important for your academic studies?

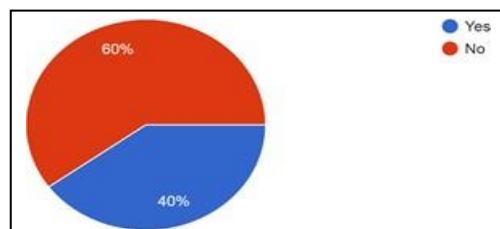
**Figure 6**  
*Students' perceptions of the importance of writing*



Results in figure 6 showed that (50%) of the students consider writing skills important for their academic studies, mostly for exam purposes. And (50%) of them emphasize writing class assignments importance.

### 3.12. Question 12: Do you listen to materials in English related to your studies?

**Figure 7**  
*Students listening practices*

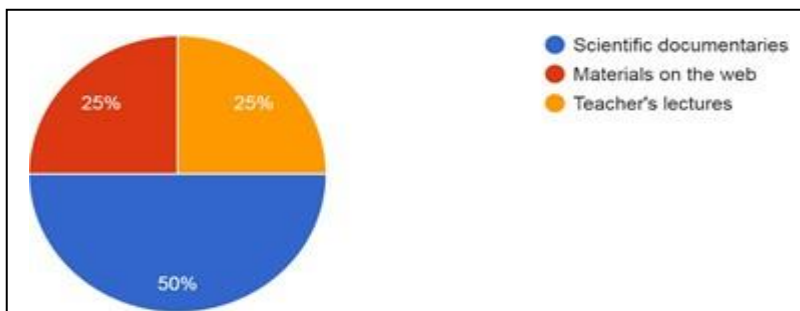


The results (figure 7) revealed that 60% of the students do not listen to English materials related to their academic studies. While 40% of them claimed they listen to materials in English relevant to their studies. This indicates that students do not consider listening as a very important skill.

### 3.13. Question 13: If yes, what kind of materials do you listen to?

**Figure 8**

*Students' types of listening materials*



The results showed that (25%) of the students indicated that they listen to English through web materials due to easy access to materials online, (25%) of them said they listen to English through their teachers' lectures and they consider that it is one of the most reliable sources of information, whereas (50%) of them asserted that they listen to the English language through the scientific documentaries.

## 4. DISCUSSION

The analysis of the questionnaire provides valuable insights into Mathematics students' needs and experiences regarding their English language skills and courses. Most students acknowledge the significance of English for their academic performance, particularly its crucial role as a lingua franca in scientific research.

This positive attitude points to their genuine motivation to excel in English, which is essential for their chosen disciplines. Indeed, the importance of vocabulary development for comprehension and effective communication is highly recommended. Therefore, vocabulary-focused instruction is essential to meet students' needs. Additionally, most students recognize the importance of writing skills for academic purposes, such as CV writing, projects, and exams, making it crucial to incorporate these skills into English language teaching programs. However, listening comprehension is often neglected despite its importance in language acquisition.

It is essential to incorporate a broader range of activities and exercises specifically designed to enhance listening skills, as these skills play a crucial role in the academic success of Mathematics students. Developing strong listening abilities can improve their capacity to comprehend instructions, follow complex explanations, and engage effectively in discussions, which are all critical for understanding mathematical concepts. This investigation emphasizes the necessity of adopting a well-rounded approach to English language instruction, one that goes beyond focusing on individual skills in isolation. By integrating reading, writing, speaking, and listening into a cohesive learning framework, ESP teachers can create a more supportive environment that addresses the diverse linguistic and academic needs of Mathematics students. Such an approach not only facilitates better language acquisition but also equips students with the tools they need to thrive in their mathematical studies and broader academic pursuits.

## 5. CONCLUSION

In conclusion, the needs analysis of mathematics students at El-Tarf University highlights the critical role that English language proficiency plays in their academic success and professional development. The



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findings indicated that students are highly motivated to improve their English skills, recognizing its importance for comprehending scientific literature, participating in research, and effectively communicating within their field. However, the current English language programs need to be more aligned with the specific needs of these students. Emphasizing vocabulary development, academic writing, and oral communication skills is essential to bridge this gap and enhance students' overall language proficiency.

Moreover, the study revealed a significant oversight in the area of listening comprehension, which is crucial for holistic language acquisition. Addressing this gap by incorporating targeted listening activities will provide students with a more balanced skill set. By adopting a comprehensive approach to English language instruction that equally addresses reading, writing, speaking, and listening skills, ESP teachers can better support their mathematics students. This, in turn, will empower them to excel in their academic pursuits and future careers, contributing to their success in the global scientific community.

## 6. RECOMMENDATIONS

Based on the analysis, it is recommended that English language courses for mathematics students at El-Tarf University place a stronger emphasis on vocabulary development. Since vocabulary is crucial for comprehension and effective communication in scientific contexts, specialized vocabulary instruction tailored to the needs of mathematics students should be integrated into the curriculum. This could include targeted exercises, the use of mathematical texts, and practical applications that reinforce the use of technical terminology. Additionally, writing skills should be a focal point, with specific modules devoted to academic writing, including research papers, CV writing, and project reports. This will equip students with the necessary tools to succeed in their academic endeavors.

Moreover, to address the often neglected area of listening comprehension, it is essential to incorporate more listening activities into the curriculum. These activities could involve listening to academic lectures, participating in discussions, and engaging with multimedia resources. By enhancing listening skills, students will be better prepared to understand and engage with spoken English in academic settings. Furthermore, a balanced approach that integrates all four language skills—reading, writing, speaking, and listening—should be adopted. This strategy will ensure that mathematics students develop a comprehensive proficiency in English, ultimately supporting their academic performance and future career prospects in scientific research and other professional fields.

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