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Challenges In Learning Technical English : A Case Study Of First Year Students Of Science And Technology At The University Of Ghardaia

Thesis submitted to University of Ghardaia for obtaining the Master's Degree in Didactics

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Abstract

This study attempts to identify the major challenges that university students face in learning technical English in an ESP context. Fifty first year students of science and technology at the University of Ghardaia participated in the study. Data were collected using a questionnaire and classroom observation, and a mixed approach of quantitative and qualitative methods was applied for data analysis. The results of the study demonstrated that students considered the most difficult skill to be speaking, followed by listening, writing and finally reading. They struggled academically with technical vocabulary, grammar, pronunciation and fluency. They also experienced cognitive, motivational and anxiety issues such as concentration, anxiety and motivation.

Keywords: ESP, learning, technical English, challenges.

Dedication

To my beloved mother,

you are the reason I never lose hope. Your love and presence in my life shape who I am today, and I carry your strength with me every step of the way.

To my dear father,

I am forever grateful for your constant support and wise guidance. You have always been my mentor and my rock through every challenge.

To my wonderful siblings,

Hanane, Oussama and Mohammed, and for the beautiful addition to our family Nawel. Whose love and encouragement have made life richer and meaningful

To my beloved Hadjer,

You gave me the courage to keep going, thank you for everything.

Thank you for being my pillars of confidence and inspiration throughout this journey.

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List of Acronyms

- **CLT** - Communicative Language Teaching
- **ESP** - English for Specific Purposes
- **EAP** - English for Academic Purposes
- **EOP** - English for Occupational Purposes
- **EVP** - English for Vocational Purposes
- **EOP** - English for Occupational Purposes
- **EVP** - English for Vocational Purposes
- **EMP** - English for Medical Purposes
- **EBP** - English for Business Purposes
- **ELP** - English for Legal Purposes
- **ESCP** - English for Sociocultural Purposes
- **GE** - General English
- **STEM** - Science, Technology, Engineering, and Mathematics

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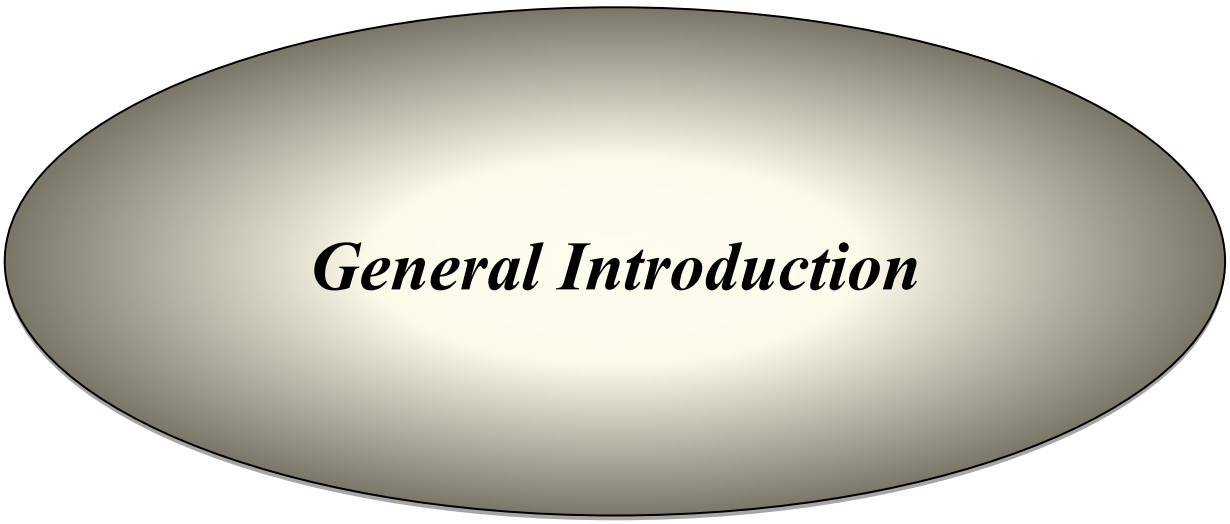

General Introduction

Background of the study

The advent of English for Specific Purposes (ESP) during the 1960s was a reaction to an emerging demand for language teaching that would be specific to particular academic and professional contexts. For Hutchinson and Waters (1987), the internationalization of science and technology fields has significantly enhanced the demand for more specialized types of English language teaching. ESP classes aim to equip students with the language ability to read discipline-based texts, write academically, and produce research-based content. In the case of technical fields, it generally means developing the ability to deal with challenging vocabulary, grammatical constructions, and conventions of science writing despite the theoretical strengths of ESP, many students face practical difficulties in adapting to its demands. Difficulties such as novel jargon, abstractness, and limited availability of appropriate learning resources can negatively affect the learning process (Dudley-Evans & St John, 1998). In addition, if ESP course content does not match students' actual academic needs, students may become disengaged or perplexed. This study discusses such issues more thoroughly hoping that current teaching approaches would be refined to assist students in learning technical English.

Statement of the Problem

Despite its importance, technical English remains a major obstacle to much science and technology students. Most students fail to achieve the linguistic and technical skills necessary for performing effectively in academic and professional areas. Technical English as a specialized field of the English language is characterized by complicated terminologies, syntactical structures and discourse conventions particular to scientific writing. The present study attempts to identify the main challenges that students encounter in the learning technical English which lie behind their poor achievements.

Purpose of the study

This study aims to investigate the challenges science and technology students face in technical English acquisition including the challenges of specialized terminologies, complex structures, and scientific discourse, which can impede academic progress. By analyzing these issues, this study offers practical strategies for enhancing ESP training and equips students with the language skills.

Motivations

English has become the dominant language of the global scientific community and serves as a primary vehicle for research publications, university conferences and internationalcollaboration. For science students, proficiency in English is essential for academic success and career advancement. However, students often enroll in universities with different levels of language proficiency, and traditional English courses may not fully meet the specialized language requirements of their field. Thus, two major reasons lie behind our interest in this topic. First, our observations regarding the difficulties that University students encounter in learning technical English .Second, the teaching methods that are used to teach technical English at the University of Ghardaia are traditional and do not meet student's needs.

Significance of the Study

This study attempts to understand the difficulties that students face while learning

technical English. The aim of this study is to provide an understanding that can help develop effective teaching methods and create educational material that supports training better. Teachers play an important role in addressing these challenges by helping students develop the language skills needed for academic and professional success. Furthermore, this study provides practical recommendations for improving English technical training in the University of Ghardaia.

Research question

This study explores the following research question:

What are the challenges that University students face in learning technical English?

Definition of key Terms

-ESP: an approach to teaching English that focuses on particular language and communication requirements for professional domains such as science and medicine (Hutchinson and Waters , 1987)

-**Challenges**: Challenges are obstacles that hinder learning, such as linguistic differences, lack of motivation, or limited resources. These barriers often affect language acquisition and performance (Brown, 2007).

-**Learning**: The process of learning is acquiring either knowledge and/or skills through experience, study, or teaching. Learning leads “to long-lasting alteration of behavior or understanding” (Schunk, 2012, p. 5) and “can involve cognitive, emotional, and social processes” (Illeris, 2007, p. 3).

-**Technical English**: Technical English is a subtype of English for Specific Purposes (ESP) with a focus on the technical and scientific vocabulary and the specialized discourse across different discourse communities (Basturkmen, 2006).

Limitations of the study

Despite the insightful findings brought about by this study, some limitations should be noted. First, the study focuses on first year students majoring in science and technology at the University of Ghardaia. The findings may not be fully applicable to other fields of study. Second, this study is conducted solely with students of science and technology at the University of Ghardaia . This limits the generalizability of the findings. Further studies with different samples in different contexts are needed to increase the generalizability of the findings.

Structure of the Thesis

This thesis consists of two main sections: theoretical and practical one. The theoretical section is divided into two chapters. The first chapter provides a general overview about English for Specific Purposes (ESP). It explores its definitions, historical development, branches, key differences between ESP and General English GE and roles of ESP teachers and learners. The second chapter focuses on the teaching and learning of Technical English, highlighting its unique characteristics, instructional challenges, and effective strategies. The practical part introduces the procedures of data collection and data analysis. It concludes with presenting and interpreting of the results of the study.

Chapter One:

English for specific purposes

Introduction

English for a specific purpose (ESP) has become an important field of language education and meets the needs of learners who need English proficiency for academic or professional

contexts. Unlike general English (GE), which focuses on general language skills, ESP fits a specific field and ensures that learners acquire the linguistic and communication skills they need in their research or field of work. This chapter provides a detailed study of ESP, starting with its definition and historical development. It emphasizes the key differences between ESP and GE, emphasizing how the ESP instruction is designed to meet the exact needs of students in various fields. Additionally, this chapter describes the key areas of ESP, including English for Academic Purposes (EAP) and English for Professional Purposes (EOP) and discusses the value of ESP in professional and educational conditions. This chapter creates a solid base for ESP and aims to give clear ideas on its role in linguistic education and their effects on students.

1.1 Definitions of ESP

English for Specific Purpose (ESP) as one of the varieties in English language teaching aims at helping learners in terms of its function specific to use the English language. In the past, ESP came into being to cope with the pressing need for meaningful and appropriate communication in international trade and technical fields. Its scope, however, has grown significantly over the decades. Current ESP is all of the following areas: English for

Academic Purposes (EAP), English for Occupational Purposes (EOP), English for Vocational Purposes (EVP), English for Medical Purposes (EMP), English for Business Purposes (EBP) English, English for Legal Purposes (ELP) English for Sociocultural Purposes (ESCP) (Belcher 2009). The ESP Teacher: Issues, Tasks and Challenges Mohammad Kaosar Ahmed.

- Different scholars have defined English for Specific Purposes (ESP) in various ways. According to Hutchinson and Waters (1987), "ESP is an approach to language teaching in which all decisions as to content and method are based on the learner's reason for learning" (p. 19).
- Similarly, Strevens (1988) defines ESP as "English language teaching designed to meet specified needs of the learner; related in content to particular disciplines, occupations, and activities; and centered on language appropriate to those activities in syntax, lexis, discourse, semantics, and analysis of discourse."
- ESP uses two fundamental characteristics: absolute and variable. Absolute qualities highlight the need of addressing learners' unique objectives, utilizing proper approaches, and focusing on discipline-specific terminology. Variable qualities emphasize the flexibility of ESP to various professional and academic settings, separating it from General English (GE). Dudley-Evans and St John (1998)
- Widdowson (1983): "ESP is an enterprise involving education, training, and practice, drawing upon three major realms of knowledge: language, pedagogy, and the students' specialized areas of interest." (Widdowson, H. G., 1983)

1.2 The historical development of ESP

The development of the English language for specific purpose's (ESP) has been formed by decades of research, global changes and linguistic achievements. After the Second World War, the rapid growth of science, technology and international trade positioned English as a

dominant language in professional fields, creating a demand for learning from specialized languages . Traditional grammar-based training quickly transformed into a functional approach, recognizing that various professions only used language. This has led to research on discourse analysis, gender theory and dictionary (Swales, 1985). How ESP developed, the researchers accepted the student-oriented approach, by analyzing course design needs adapted to areas such as engineering, medicine and business, offering more efficient language (Dudley-Evans & St John, 1998). In the 1980s, ESP was established within the framework of applied linguistics, by extending to academic and professional specialized domains. Today, current research continues to improve methodology by preserving ESPs related to professional communications around the world.

1.3 Characteristics of ESP

Hutchinson and Waters (1987, p. 8-9) categorized ESPs into absolute and variable properties, highlighting the distinct traits of general English. Absolute characteristics include the decision of students / specific language requirements, the inclusion of content related to the subject, as well as focusing on linguistic features, such as vocabulary, discourse and communication skills necessary for specialized areas. Adaptability is key to using English for specific purposes across disciplines. Teaching strategies for English for specific purposes are not designed for specific types of students, but rather for the types of professional and academic requirements found in various fields, allowing these adaptations to suit a wide range of students, from high school to university, and even corporate training.. Furthermore, ESP suggests, in principle, that students have a basic understanding of the language. This allows you to focus on professional content rather than general language skills.

1.4 The role of ESP in modern education and professional fields

English for Specific Purposes (ESP) plays a vital role in contemporary educational and professional settings by designing language instruction to meet the unique needs of each discipline. There are general English courses, while specialized English courses focus on specific vocabulary and communication skills in the fields of medicine, business, engineering, and law. Also points to its teaching style as a teacher who believes the style is practical and can be directly used by professionals. Professional language skills are in demand, and English for Specific Purposes is an excellent way to advance one's career. However, ESP lessons typically include realistic scenarios that include details that are culturally relevant to a particular job, but teachers can also teach students complex dynamics. Bridging the gap between language and professionals is ESP, a tool for education and conversation in education, and networking is a means of cooperation and exchange with the community.

1.5 General English (GE) vs. English for Specific Purposes (ESP)

English language teaching is generally divided into two primary branches: General English (GE) and English for Specific Purposes (ESP). While GE aims to develop broad communicative competence applicable to daily interactions, ESP is tailored to meet the specialized linguistic needs of learners engaged in particular academic or professional fields, such as science, engineering, medicine, or law. This specialization ensures that learners acquire language skills relevant to their specific disciplines rather than general everyday communication (Dudley-Evans & St John, 1998, pp. 3–4).

ESP and GE offer dissimilar objectives united by different learning materials. Standardized GE course materials cover travel, entertainment, and everyday situations, while teaching vocabulary along with grammar concepts that apply to diverse situations, according to Harmer (2007). ESP focuses exclusively on specialized subject matter, which includes technical language alongside defined genres and appropriate communication methods related to each student's professional domain (Dudley-Evans & St. John, 1998). Engineering students

enrolled in an ESP course would learn report-writing along with data interpretation while studying technical terminology. The pedagogical methods of GE implement interactive communicative activities, according to Richards (2006), to teach all four skills including listening and speaking alongside reading and writing. ESP education utilizes learner-need-based instruction because teachers guide their curriculum based on the particular academic or professional aims of their students. ESP educators use authentic materials consisting of research articles, manuals, and case studies which replicate professional tasks.

GE creates fundamental language abilities that work in multiple settings, yet ESP delivers purpose-driven education which matches with professional or academic fields of students. Modern language education continues to embrace English for Specific Purposes because businesses worldwide need specialized communication in a globalized market.

1.5.1 Needs Analysis in ESP and GE

Needs analysis plays a crucial role in English for Specific Purposes (ESP), but it receives less attention in General English (GE). In ESP, needs analysis is essential for identifying learners' specific linguistic and communicative requirements in their fields of specialization or academia (Hutchinson & Waters, 1987). This analysis helps coordinate course content and ensures that learners acquire the specific skills required for their chosen field, whether medical, engineering, business, or legal (Dudley-Evans & St. John, 1998). Conversely, General English does not heavily rely on needs analysis, as it aims to develop general language knowledge for general communication. General English students have diverse goals, and the courses cover broad topics, vocabulary, and grammar, without focusing on specialized areas. Although some adjustments can be made to suit students' interests, General English instruction remains more standardized and less specialized.

Therefore, while needs analysis is a key feature of an ESP program and offers relevant practical courses, GE takes a more general approach without the same level of student training.

1.4.1 The role of learners and teachers in ESP

The concepts of ESP learners and ESP teachers are constantly changing and pervasive in nature, as the field of education tend to evolve continuously. In addition to more or less general characteristics of a language classroom, such as: there are a lot of things that ESP teachers are responsible for in a way that a traditional teacher isn't, and so much more that the learners have to take part and participate a lot to learn. The relationship and interaction between teachers and preferences is important in the area of teaching ESP.

1.4.1.1 The Role of Teachers in ESP

In ESP, the teacher's responsibilities go beyond teaching language. According to Dudley-Evans and St. John (1998), ESP practitioners serve as facilitators, researchers, material developers, course planners, and assessors. ESP instructors, in contrast to general English teachers, need to be knowledgeable about the specific discourse, vocabulary, and communication styles that are pertinent to the subjects in which their learners are studying . To create real and relevant instructional materials, this frequently calls for cooperation with subject-matter experts Additionally, in order to customise their courses to the unique language needs of their students, ESP teachers carry out comprehensive needs studies. In order to improve students' engagement and comprehension, they also use task-based and content-based techniques, including real resources like research papers, office records, and technical manuals. Furthermore, in order to keep their instruction in line with changing academic and professional expectations, ESP educators must constantly adjust to new developments in the sector.

1.4.1.2 The Role of Learners in ESP

Unlike general English students, English for Specific Purposes (ESP) students are typically adults or professionals with specific language needs related to their academic or professional fields (Dudley-Evans & St. John, 1998). They are expected to take responsibility for their own learning by identifying their language needs, setting learning goals, and actively engaging with course materials. Furthermore, ESP students frequently engage in self-directed learning and independent study, as they must build language skills relevant to their specialized fields, such as engineering, business, and medicine (Hutchinson & Waters, 1987).

Their motivation is stronger than that of regular language learners, as the language skills they acquire are immediately applicable to their jobs or studies. Furthermore, ESP students are encouraged to participate in needs assessments, which provide essential insights that help shape the curriculum and ensure that the content meets their professional and academic needs.

1.5 Branches of English for Specific Purposes (ESP)

The English for Specific Purposes (ESP) program is primarily divided into two categories: Academic Purposes (EAP) and Professional Purposes (EOP). Each category meets specific language and communication requirements, depending on the learners' academic or professional goals.

1.5.1 English for Academic Purposes (EAP)

The English for Academic Purposes (EAP) program aims to provide students with the language skills necessary for success in academic settings. The program includes subjects such as English for Science and Technology, Business English, and English for Medical

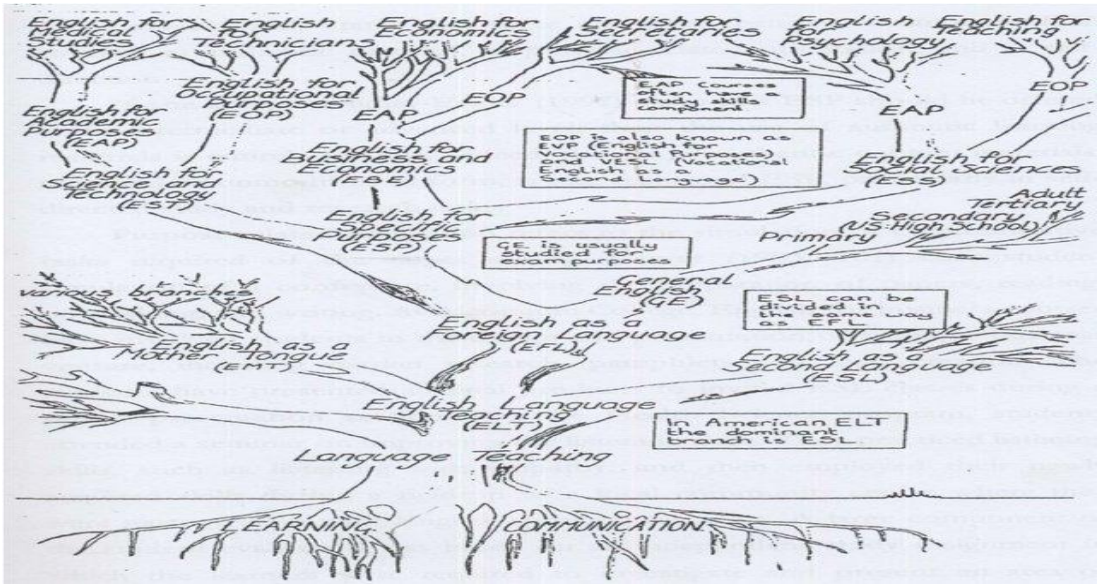
Studies. EAP students are often undergraduates, researchers, or scientists and are required to master academic writing, reading comprehension, and presentation skills. (Hyland, K. 2006).

1.5.2 English for Occupational Purposes (EOP)

On the other hand, the English for Professional Purposes (EOP) program targets professionals and workers who need English proficiency to communicate in the workplace. Unlike the EAP program, which prepares students for academic discussion, the EOP program is more practical and focused on the workplace. It includes business communication, medical consultations, legal English, and other professional encounters (Basturkmen, 2010). EOP students must understand job-specific terminology, business etiquette, and effective communication techniques applicable in their respective sectors.

Hutchinson and Waters (1987) suggested a renowned categorization in the form of a tree diagram to graphically depict the link between General English and the other ESP subcategories. The main differences between English for Academic Purposes (EAP) and English for Occupational Purposes (EOP), as well as their corresponding subcategories, were made clear by this approach.

Figure 1.1: ELT Tree (Hutchinson and Waters 1987, p. 17)



Conclusion

This chapter covers the history of the development and significance of English for Specific Purposes (ESP), as well as its differences from General English and its various branches. The discussion focuses on how ESP can be adapted to the individual linguistic and professional needs of students, making it an essential component of modern education and career development (Hutchinson & Waters, 1987; Dudley-Evans & St John, 1998). It also emphasizes the importance of analyzing specialized needs and techniques in ESP, demonstrating its practical applicability and learner-centered approach.

Understanding the principles of English for Specific Purposes (ESP) allows educators and researchers to create more effective teaching techniques that match student's academic and professional goals. These insights lay the way for Chapter two, which discusses fundamental features of teaching and learning technical English, as well as the problems and approaches involved in providing specialised language training.

Chapter Two:

Technical English

Introduction

Technical English is a key skill for science and technology working professionals to enhance their careers and comprehend difficult concepts (Hutchinson & Waters, 1987). Technical English is specialized to fulfill the specific language requirements of STEM fields with an emphasis on accuracy, consistency, and technical terminology. Technical English proficiency assists in supporting academic content, written communication, and reporting results. As professions become internationalized, technical practitioners will need to communicate with their international peers and stakeholders without any misunderstanding, as misunderstandings can lead to research errors, design flaws, or safety hazards.

2.1 Characteristics of Technical English

Clarity, accuracy, and a methodical approach to efficiently communicating complicated information are characteristics of technical English. (Pickett and Laster) explain that technical writing "requires accuracy, clarity, and conciseness" in Technical English: Writing, Reading, and Speaking.

2.1.1 Definitions of Technical English

Technical English is a specialized form of English used in science, engineering, and technology. It is characterized by precision and clarity, and relies on specialized terminology to help professionals communicate accurately and easily without ambiguity.

- According to Daniels (2011), "Technical English is the variant of English designed for conveying scientific and technological information clearly, using precise terminology and logical structure."

- Similarly, Alley (1996) defines it as "a specialized linguistic framework that integrates standardized terminology and syntactical structures, enabling the efficient dissemination of knowledge in technical disciplines."
- Technical English prioritizes clarity and precision in scientific and industrial communication by minimizing ambiguity (adapted from Glendenning, 2001).

2.1.2 Linguistic Features

2.1.2.1 Technical Vocabulary

There are aspects of Technical English that are very particular to Technical English and not present in General English. Technical vocabulary the specialist is one of the main features, a collection of domain-specific terms that have precise meanings. For instance, in engineering the terms “torque,” “viscosity,” and “thermal conductivity” have defined technical meanings. Moreover, technical vocabulary can also consist of abbreviations and acronyms like “CPU” (Central Processing Unit) in computer science (Cowie, 1998).

2.1.2.2 Technical Discourse

Technical discourse is also structured and shaped by the needs of the individual academic or professional communities. In the case of technical writing it tends to follow conventional patterns that accommodate the expectations of specialized readers. Each of these patterns helps to organize definitions, kinds of descriptions, steps in a procedure, the results of research, and so on, in a way that provides clarity and takes up less space eliminating unnecessary verbiage. Technical writing places an emphasis on clarity, precision, and formality. Likewise it uses standard expressions and terms or standardize whatever you're writing about so that everybody equally understands as a community or professional. (Swales 1990)

2.1.2.3 Specialized Terminology

Clearly, specialized terminologies are crucial to Technical English. In particular, these include the jargon specific to a given discipline that is adopted by a professional community. Hypertension, for example, has an exact definition in clinical medicine; quantum entanglement specifically denotes a phenomenon in physics (Cabré, 1999). These conventions help to guarantee that communication among peers is clear.

2.1.3 The Significance of Technical Discourse and communication in STEM Fields

STEM (Science, Technology, Engineering, and Mathematics) Technical English is essential to practice in STEM education, but it also is more than communication; it is a part of scientific practice. Montgomery (2003) states, "communicating is the doing of science" (p. 2), noting that conveying scientific information means that it cannot be separated from the procedures of science practice. For students pursuing a major in science and technology, developing technical English requires more than knowing the specific words; it requires them to describe procedures, interpret data, and connect their theoretical knowledge to its application in practice. Linguistic competency in technical English is significant in fields that require precision, clarity, and structured reporting for academic and practical usage.

2.2 Challenges in Learning Technical English

The following sections explore language-related, pedagogical, Motivational and cognitive issues that affect students' success in Technical English.

2.2.1 Language challenges

For individuals studying technical English, mastering the four fundamental language skills speaking, listening, reading, and writing is crucial. However, every ability has its own set of difficulties, particularly in technical and scientific settings (Jordan, R. R. 1997) English for Academic Purposes: A Guide and Resource Book for Teachers. Cambridge University Press.

- **Listening**: Because of the speed of lectures and the volume of specialized jargon, listening to technical subject matter can be particularly challenging. When new phrases used without enough context or clear explanation, students sometimes find it difficult to follow the instructor's explanations or the audio content. Comprehension is hampered by disparate accents, pronunciations, and a lack of visual aids (Goh, C. C. M. (2000). A cognitive perspective on language learners' listening comprehension problems. System, 28(1), 55–75.
- **Speaking:** Students commonly face challenges when trying to speak effectively. The field requires both technical discussion fluency together with specialized vocabulary that is specific to the field. Students experience both decreased participation and hesitation because they fear pronouncing words incorrectly and making grammatical mistakes. Students face increased difficulty when they need to work in groups or explain scientific concepts through English communication. (Hyland, K. (2006). English for Academic Purposes: An Advanced Resource Book. Routledge
- **Reading:** Students encounter multiple obstacles when reading technical texts. The formal nature of this writing style combines with its complexity and information density that stands in contrast to general written texts. Students face difficulties when trying to understand abstract ideas while also extracting essential information and

reading graphs and tables (Grabe, W., & Stoller, F. L. (2011). Teaching and Researching Reading (2nd ed.). Pearson Education.

- **Writing:** The writing of technical English demands accuracy together with clearness. Students need to produce lab reports together with summaries and research papers which must follow specific standards (Swales, 1990). The main difficulty of this task consists of both vocabulary accuracy and logical idea organization and proper academic style application (Basturkmen, 2006). Students tend to translate their native language content literally, which leads to grammatical mistakes and issues with syntax (Hyland, 2006). The four skills demonstrate increased complexity when applied to technical fields, which requires specialized instruction to meet these particular needs (Jordan, 1997).

2.2.2 Pedagogical , Motivational , and cognitive challenges

Studying technical English is not just about learning vocabulary; it requires students to adopt a positive and engaging attitude. Many students in science and technology view English as a hurdle due to past experiences focused on memorising grammar without real-world use, which limits their ability to engage with technical materials. Key cognitive factors like memory, attention, and understanding of abstract concepts influence learning outcomes. When students see the importance of English in reading research papers or participating in global discussions, they become more motivated and engaged. Motivation helps students get through the challenges of technical English, but it is shaped by external factors like classroom environment, teacher influence, and the relevance of the subject. Connecting English skills to future success boosts motivation, prompting teachers to create relevant and captivating lessons to keep students engaged.

2.2.3 The Impact of Students' Background Knowledge on Learning Outcomes

The role of students' background knowledge when learning technical English is significant. Students who already have knowledge of scientific or technical concepts in their own language seem to find it easier to acquire the same concepts when they are in English (Carrell & Eisterhold, 1983). However, many first-year students experience the dilemma of learning new technical content and a foreign language in tandem. The continued cognitive overload and difficulty with the new language can slow their academic progress (Sweller, 1988). It is also important to be aware of teachers' assumptions of prior knowledge among students. This is a potentially dangerous assumption because it can leave some students stuck while others progress, and it underestimates the potential impact of individual differences.

2.3 Theoretical Framework

The difficulties of learning technical English need to be studied not only in practice in the classroom or by learners, but also by a good understanding of language learning theory. Theoretical models are able to explain how students learn language in a specific context and why some methods may work better than others. In this section, you will find three theoretical approaches to instruction and learning Technical English: the theory of English for Specific Purposes (ESP), the theory of Communicative Language Teaching (CLT), and the Constructivist Learning Approach. All these provide practical insight into what can be done to fit the needs of learners in scientific and technological fields.

2.3.1 English for Specific Purposes (ESP) Theory

The goal of English for Specific Purposes (ESP) is to teach language that is pertinent to the

learners' particular academic or career needs, particularly in science and technology. In contrast to General English, which encompasses a wide spectrum of communication, ESP focuses on giving students the specific vocabulary and abilities they need. According to Hutchinson and Waters (1987), ESP is designed to meet the demands of students' curriculum and instructional approaches. Instructors in technical English provide students with the essential vocabulary and interpersonal skills they need for their chosen profession. In dealing with academic and real-world settings, ESP is student-focused. In general, science and technology students utilize English primarily for academic reading, lectures, report writing, and technical discussions rather than for social connection.

2.2.3 Communicative Language Teaching (CLT)

Communicative Language Teaching (CLT) has a lot to offer to the process of making Technical English teaching better by focusing on meaning rather than knowledge about grammar. CLT, according to Richards and Rogers (2001, p. 158), seeks to provide learners with communicative competence. This means that students are able to produce grammatically correct sentences as well as know when to use language that is appropriate in a given context. An example for Technical English instruction would be helping students complete authentic tasks such as describing a procedure, interpreting data, or presenting scientific findings. CLT includes interactive activities like pair work and problem solving, which mirror tasks and situations that exist in the real world, which theoretically increases learner engagement. More importantly, CLT is a good combination with ESP in ensuring that Technical English instruction is relatable to students as they prepare for the type of academic and career situations they will encounter outside of our instruction.

2.2.4 Constructivist Learning Approach

The constructivist model of learning emphasizes the idea that learners actively construct knowledge rather than passively receive it. This perspective is especially relevant to the teaching of Technical English, as students often have a wide range of prior knowledge and learning experiences. As elaborated by Piaget (1950) and exemplified by Vygotsky (1978), learning is most effective if students' prior knowledge is drawn upon in social negotiations and problem-solving activities that reflect real-life scenarios. In ESP classrooms, constructivist ideals underpin the incorporation of learners' prior subject knowledge in language tasks so that the students can map new English lexis and grammar onto science concepts with which they are familiar. This not only enhances comprehension but also inspires, for the students are able to view the direct relevance of language study to their own field of study.

Conclusion

Technical English learners encounter a number of difficulties concerning language, cognition, and motivation. Approaches such as Constructivist Learning, Communicative Language Teaching, and English for Specific Purposes contribute to a better understanding of these challenges. By customizing language instruction to particular disciplines, emphasizing communication, and incorporating students' existing knowledge, educators can foster effective learning environments for those studying technical subjects. Yet, numerous issues stem from teaching techniques, curriculum development, and assessment, rather than from the theoretical frameworks themselves. The following chapter will outline the research methods used in this study, providing an overview of the strategy employed to explore these difficulties within an actual educational setting.

Chapter Three:

Research Methodology and Data Analysis

Introduction

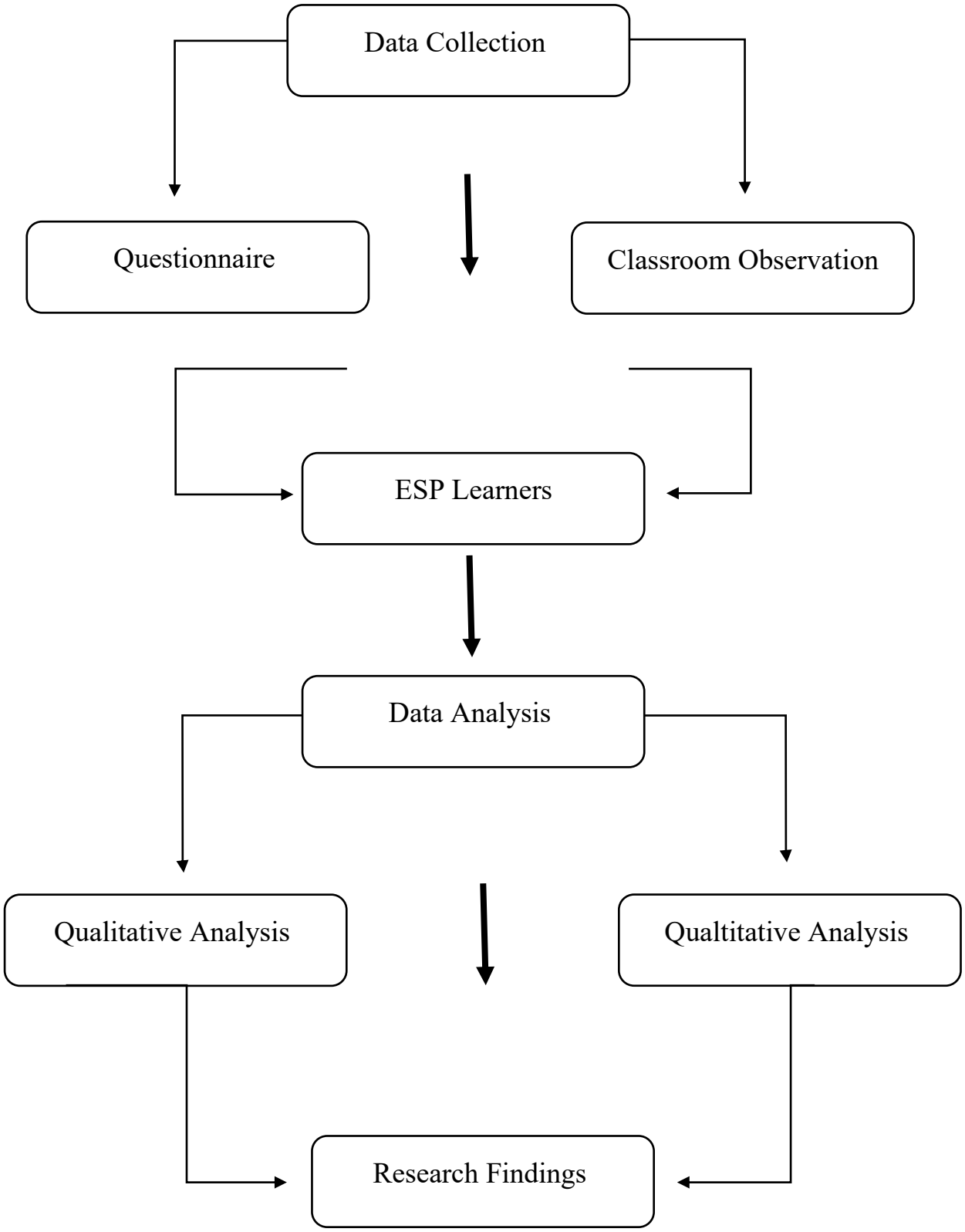
This chapter introduces the research methodology. It provides the reader with a through description of the subjects of the study, data collection tools and methods of data analysis. Finally, it concludes with results presentation.

3.1 Research Design

The study was undertaken with a sample of fifty students of Science and Technology at the University of Ghardaia. The objective, as stated earlier in the introduction to this research, was to find out the major challenges that University students encounter in leaning technical English. Data were collected by means of a questionnaire and classroom observation. The researcher applied a mixed approach of quantitative and qualitative methods for data analysis.

The following diagram summarizes the different steps that the researchers went through to collect and analyze the data.

Figure 2: The Design of the Study



3.2 Subjects of the Study

The study was conducted during the second semester of the academic year 2024-2025 with fifty first year students enrolled at the department of Science and Technology at the University of Ghardaia.

3.3 Data Collection Tools

Classroom observation and a questionnaire were used to collect the data.

3.3.1 The Questionnaire

The questionnaire is a written list of questions which are answered by a number of people in order to provide information for a report or survey. In this study, the questionnaire was the primary source for data collection. It allowed the researcher to get information from the students themselves about the challenges that they experience in learning technical English.

The questionnaire was translated into Arabic language to avoid any confusion or miscomprehension. It consisted of six structured questions which students were allowed to select more than one response per item to better reflect the complexity of their experiences. In order to accommodate any perspectives not covered by the listed choices, an “Other” option was included at the end of each question. However, no participants selected this option or provided additional comments. This suggests that the preset response options were sufficient to capture the students’ perceived challenges. .

3.3.2 Classroom Observation

Classroom observation is viewed as a significant data collection strategy because it captures the process of teaching and learning as it happens naturally. In this study, the content was collected in an observational manner without intervention of any kind with the exception of

taking notes minimally to avoid interfering in the interaction. Before observations took place, the teachers were given an explanation of the project and asked for consent to be an observer. Four observation sessions were carried out noting the teacher education strategies that focused on the use of technical language, the level of student engagement and activity, and the types of teaching methods that were observed.

3.4 Methods of Data Analysis

The data analysis was conducted using a mixed-methods approach employing both quantitative and qualitative data. The data obtained from the questionnaires was organized into categories, and the number and percentage of responses for each item were determined. Percentages were calculated using the following formula:

(Number of Responses ×100) / Total number of Sample = Percentage

This method was applied to all questions. The results were organized into tables, and visually presented using pie and bar charts for easier interpretation.

At the same time, the notes on classroom observations were handwritten on separate sheets of paper and carefully reviewed for analysis .

3.4.1 Results

3.4.1.1 Questionnaire results

Question 1: Which of the following skills do you find most challenging in learning technical

English?

A) Reading
B) Writing
C) Listening
D) Speaking

Table 3.1 Participants most challenging Language skill

Option	Frequency	Percentage
A	10	20%
B	11	22%
C	14	28%
D	15	30%

The most challenging language skill for students is speaking (30%) followed by listening (28 %), writing (22%) and reading (20%).

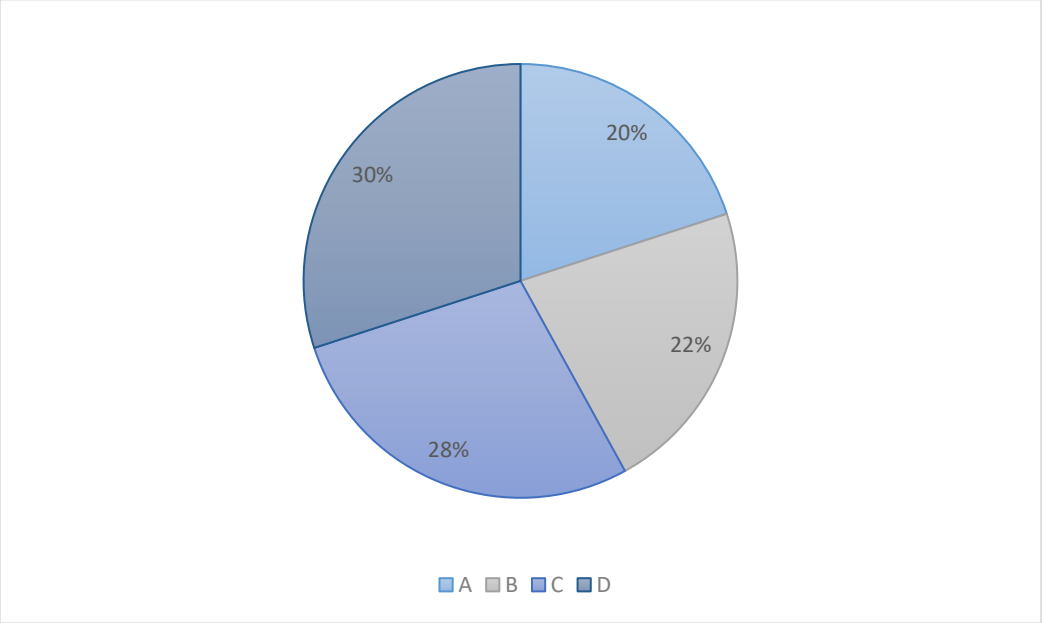


Figure 3.1 Participants' most challenging Language skill

Question 2: What challenges do you face in reading technical English texts?

A) Difficulty in understanding specialized vocabulary
B) Difficulty in comprehending complex sentence structures
C) Slow reading pace
D) Trouble in identifying main ideas of the text
E) Other

Table 3.2 challenges students face in reading

Option	Frequency	Percentage
A	21	42%
B	18	36%
C	19	38%
D	10	20%

The most cited challenge was comprehending specialized vocabulary stated by 21 students (42%). Subsequently, 19 students (38%) were found to read slowly possibly because they had to keep stopping to decipher unknown words or grammatical structures. 18 students (36%) indicated that they struggle with complicated sentence structures. 10 students (20%) indicated struggling to identify main ideas in a text. This finding implies that some students may lack effective skimming, scanning, or main idea identification strategies skills that are crucial for proficient technical reading.

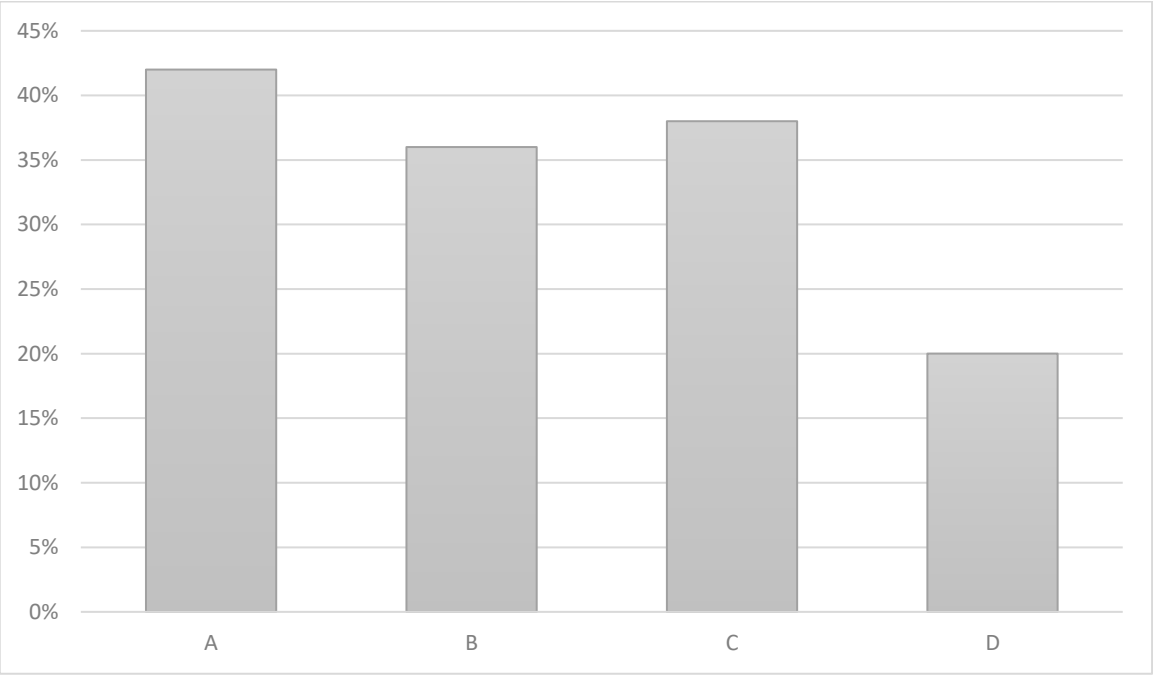


Figure 3.2 challenges students face in reading

Question 3: What challenges do you face when you write in technical English?

A) Lack of vocabulary and technical terms

B) Finding it hard to write correct grammatical sentences

C) Having trouble with punctuation

D) Difficulty in arranging ideas in a logical order

E) Other

Table 3.3 challenges students face in writing

Option	Frequency	Percentage
A	21	42%
B	14	28%
C	21	42%
D	10	20%

(42%) of students face difficulty in using appropriate technical terms and punctuation, structuring correct grammatical sentences and using comes next (28%), while organizing ideas logically is the least frequent challenge (20%).

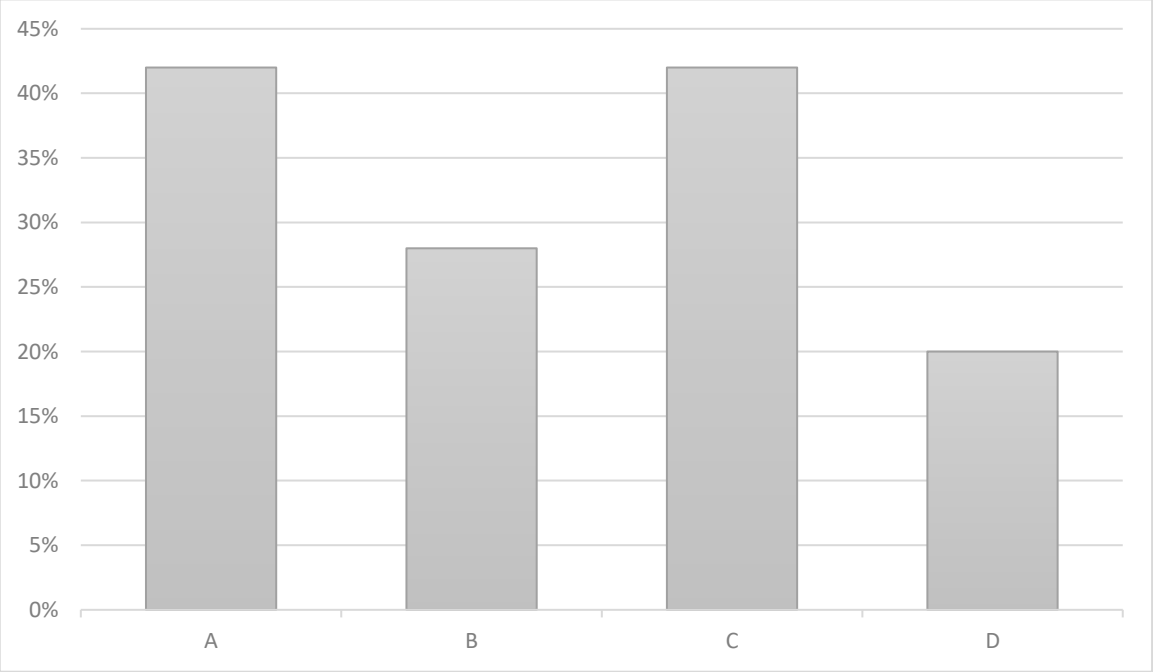


Figure 3.3 challenges students face in writing

Question 4: What challenges do you face while listening to technical English?

A) Difficulty in understanding accents and pronunciation

B) Difficulty in keeping up with fast-paced speech

C) Difficulty in recognizing technical terms in speech

D) Difficulty in following complex explanations

E) Other

Table 3.4 challenges students face in listening

Option	Frequency	Percentage
A	16	32%
B	16	32%
C	16	32%
D	16	32%

Students most commonly faced difficulties with understanding accents and pronunciation, keeping up with fast-paced speech, recognizing technical terms, and following complex explanations, each cited by 32% of respondents. All these challenges were reported by around16 of students, indicating common struggles with comprehension in technical English listening.

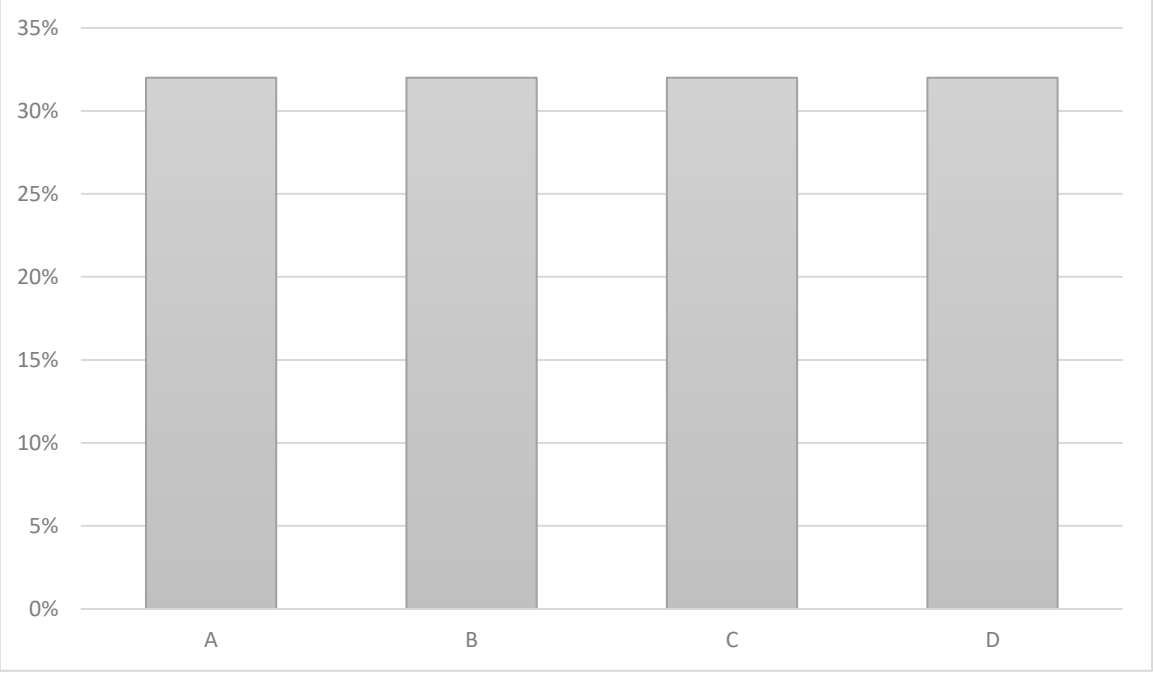


Figure 3.4 challenges students face in listening

Question 5: What challenges do you face in speaking in technical English ?

A) Difficulty in pronouncing technical terms correctly

B) Lack of confidence in using technical language

C) Trouble in structuring sentences

D) Difficulty in explaining technical concepts clearly

E) Other

Table 3.5 challenges students face in speaking

Option	Frequency	Percentage
A	18	36%
B	18	36%
C	24	48%
D	18	36%

The difficulties that students had with speaking most frequently included difficulty with the fluency (36%) and errors in pronouncing technical terms, lacking confidence in using technical language and their ability to clearly explain the concept (36%) and structuring sentences (48%)

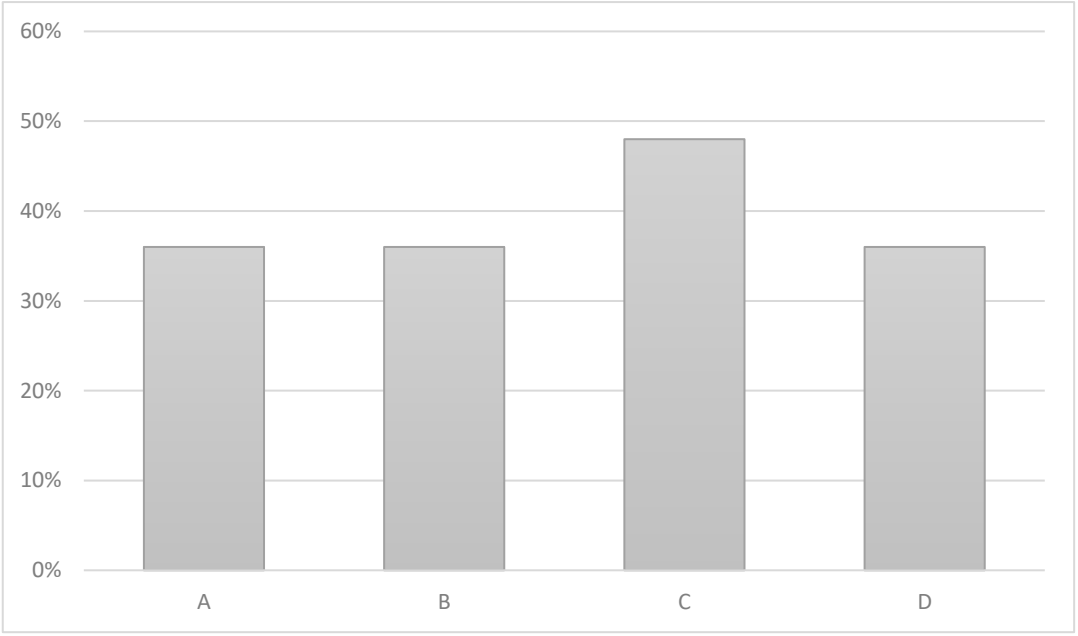


Figure 3.5 Speaking challenges faced by participants

Question 6: What other cognitive challenges do you face in learning technical English ?

A) Problems in understanding and concentrating while learning

B) Lack of motivation and interest in learning

C) Difficulty staying focused for long periods

D) Feeling anxious or stressed when learning

E) Other

Table 3.6 Cognitive challenges students face in learning technical English

Option	Frequency	Percentage
A	17	34%
B	19	38%
C	22	44%
D	13	26%

44% of students struggle to stay focused, 38% lack motivation, 34% have trouble understanding and concentrating, and 26% feel anxious. Focus and motivation are the top issues.

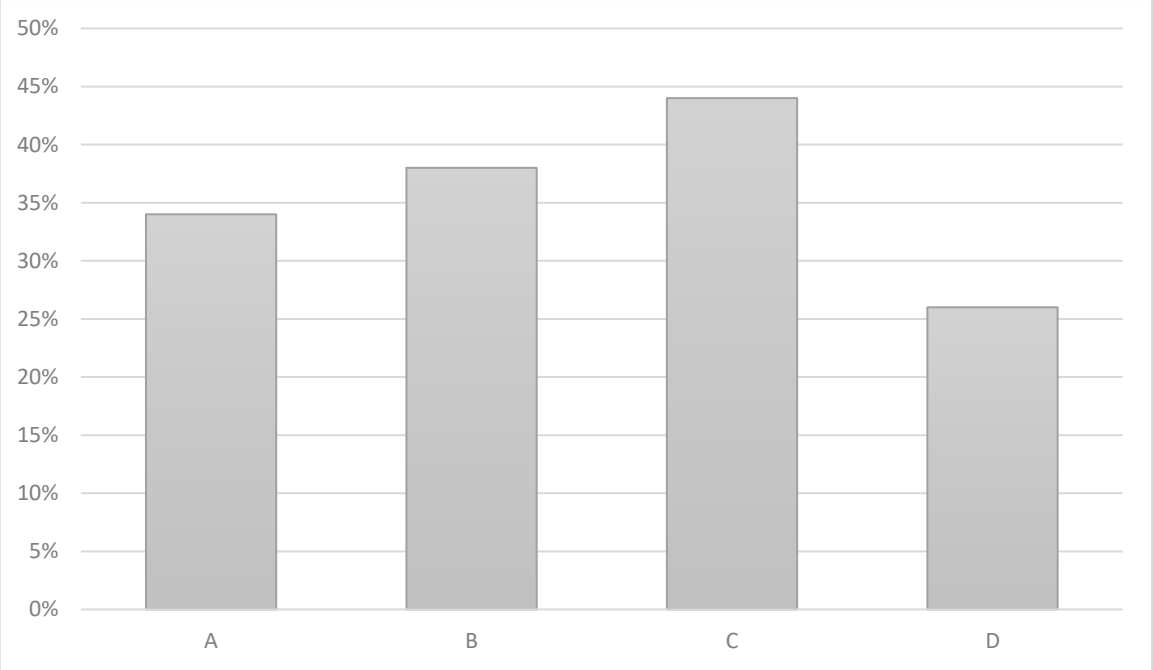


Figure 3.6 cognitive challenges students face in learning technical English

3.4.1.2 Classroom Observation Results

The classroom observations uncovered a number of difficulties related to learning technical English .

Linguistic: The main issue students faced was linguistic, they struggled to control technical vocabulary. The lexical gaps led many to use French or Arabic equivalents and this limited their spontaneous ability to communicate .

Fluency was an issue students struggled to remain fluent based on the videos and there were missed breaks and struggles with production of spoken language .

Phonological issues were evident in their explanations as students often mispronounced technical items. French phonetics was also present and contributed to their errors in the spoken form .

Use of grammar was inconsistent for example students produced sentences that were structurally inaccurate. Students demonstrated confusion with verb tenses, auxiliaries, and

word order, which disrupted the clarity and precision of their speech.

3.5 Discussion of the Findings

Findings from classroom observations and questionnaires together demonstrate that first-year students faced various language challenges in Technical English learning. Students persistently struggled with technical vocabulary, which made them incapable of spontaneous speech. The lexical issue was evident in both written and oral production, where they relied on French or Arabic translation. Fluency was also an observable issue, as the students could not maintain smooth and confident speech, and instead hesitated or stuttered.

This is consistent with Lesiak-Bielawska (2015), who observed that ESP learners in scientific fields often rely on their native language due to a limited technical lexicon, which impairs their fluency and spontaneous expression.

Phonological problems were present in oral explanations, as students mispronounced

technical terms and exhibited French-influenced phonetics. In addition, grammatical errors dominated, especially in the field of verb conjugation, auxiliaries, and sentence formation, which derailed clarity and precision in their communication.

These findings are echoed in Ouarniki (2011), who documented persistent grammar and pronunciation issues among Algerian university students in ESP classes, often linked to their prior educational background and dominant use of French.

These issues observed through observation precisely reflect what students indicated in the questionnaires, testifying that language issues such as vocabulary, fluency, and phonological and grammar problems are truly core to their issues. The combined data show that the issues are not distinct but rather interconnected and engage multiple aspects of the application of language within technical situations.

Similarly, West (1994) emphasized that ESP learners often struggle because language skills are not taught in an integrated, contextualized manner, which limits their ability to transfer knowledge across speaking, reading, and writing tasks.

The idea that these issues still exist in spite of the instructors' teaching efforts can signify that the teaching processes as currently employed might need to be adjusted to more effectively meet students' specific linguistic needs. The building of vocabulary, spoken fluency, and phonetic and grammatical accuracy should be the top areas of focus within Technical English teaching.

The indications are clear that the main issues confronting first-year students in learning Technical English at the University of Ghardaia are of a linguistic nature. They require an integrated strategy involving systematic vocabulary acquisition, practice in pronunciation, and practice in grammar, along with provision for the use of the language in authentic contexts.

Conclusion

This chapter discussed the research methodology. It provides a detailed description about the participants of the study, data collection tools and methods of data analysis. The chapter ends with presentation of the results of the study.

General Conclusion

This study aimed to identify the major challenges that university students students encounter in learning Technical English. Fifty first year students of science and technology participated in data collection for the study. Data were collected by means of a questionnaire and classroom observation. A mixed approach of quantitative and qualitative methods was applied for data analysis .

The findings of the study revealed that students face many challenges in learning technical. Some of the key challenges are poor knowledge of technical vocabulary, phonological problems resulting from mispronunciations, grammatical errors, and overuse of code-switching to French or Arabic.

To with these challenges, students are encouraged to actively build a repertoire of technical vocabulary by compiling terms that are commonly used within their specific discipline and doing exercises using their definitions and contextual uses. This is particularly crucial, considering that unfamiliar lexis was a major obstacle mentioned under each of the four language skills. Creating personalized glossaries or vocabulary notebooks would be a way to guarantee long-term memorization and facilitate students' abilities to identify patterns in specialized texts.

Second, due to the classification of speaking as the most challenging skill , students need to find frequent opportunities to practice oral communication, especially in technical or academic environments. This may involve describing scientific concepts to others, joining study groups, or practicing oral presentations of lab reports and research papers. Furthermore, self-recording or voice-dairying can be useful means for developing both fluency and confidence.

Thirdly, it is advisable that students engage with authentic technical materials—e.g., videos, articles, or textbooks written in English. Exposure to content relevant to their field

increases understanding, especially in the areas of reading and listening, as well as offers examples of how English is used to express complex ideas in their area of study. Through frequent reading and listening exercises, learners are exposed more and more to sentence patterns, common collocations, and technical discourse.

Fourth, the results also revealed that the majority of students experience cognitive and affective barriers, such as low motivation, difficulty in concentrating, and language anxiety. To resolve these, students may use self-directed learning strategies, such as setting achievable goals, using spaced repetition for learning vocabulary, and choosing topics of interest within their field to maintain their interest. Work in pairs or in a group can likewise reduce tension and produce a sense of shared progress.

In conclusion, it is essential that the acquisition of Technical English is viewed as a changing and challenging process. This encompasses not just the learning of the language, but also the adaptation of new modes of thought and communication within a scientific context. Those students who adopt habitual, reflective, and active approaches to studying are more likely to succeed. By cultivating a growth mindset and the realization that errors are part of the learning experience, one is capable of transforming their weaknesses into valuable achievements in the long term.

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Appendices

Appendix A: English Version of the Questionnaire

Dear Students,

This questionnaire aims to collect information from University students about the challenges that they encounter in learning technical. Please, read the questions and answer them all. Your responses will remain confidential and used solely for research purposes.

We sincerely thank you in advance for your time and cooperation.

Please, tick the appropriate box

1-Which of the following skills do you find most challenging in learning technical English?

a-Reading ☐

b-Writing ☐

c-Listening ☐

d-Speaking ☐

2- What challenges do you face in reading technical English texts? (you can tick more than one)

a-Difficulty in understanding specialized vocabulary ☐

b-Difficulty in comprehending complex sentence structures ☐

c-Slow reading pace ☐

d-Trouble in identifying main ideas of the text ☐

e-Other (mention them)

……

……

3- What challenges do you face when you write in technical English? (you can tick more than one)

a- Lack of vocabulary and technical terms ☐

b- Finding it hard to write correct grammatical sentences ☐

c-Having trouble with punctuation ☐

d-Difficulty in arranging ideas in a logical order ☐

e- Other (mention them)

……
……

4- What challenges do you face while listening to technical English? (you can tick more than one)

a-Difficulty in understanding accents and pronunciation ☐

b-Difficulty in keeping up with fast-paced speech ☐

c- Difficulty in recognizing technical terms in speech ☐

d- Difficulty in following complex explanations ☐

e- Other (mention them)

……
……

5- What challenges do you face in speaking in technical English ? (you can tick more than one)

a- Difficulty in pronouncing technical terms correctly ☐

b-Lack of confidence in using technical language ☐

c-Trouble in structuring sentences ☐

d-Difficulty in explaining technical concepts clearly ☐

e-Other (mention them)

……

……

6- What other cognitive challenges do you face in learning technical English ? (you can tick more than one)

a-Problems in understanding and concentrating while learning ☐

b- Lack of motivation and interest in learning ☐

c-Difficulty staying focused for long periods ☐

d- Feeling anxious or stressed when learning ☐

e-Other (mention them)

……

……

THANK YOU

Appendix B: Arabic Version of the Questionnaire

أعزائي الطلبة،

يهدف هذا الاستبيان إلى جمع معلومات من طلبة الجامعة حول التحديات التي يواجهونها في تعلم اللغة الإنجليزية التقنية .
الرجاء قراءة الأسئلة والإجابة عنها جميعًا .ستظل إجاباتكم سرية وستُستخدم فقط لأغراض البحث الأكاديمي.
نشكر لكم تعاونكم ووقتكم مقدمًا.

الرجاء التأشير على الخانة المناسبة.

1. أي من المهارات التالية تجدها الأصعب في تعلم اللغة الإنجليزية التقنية؟

أ- القراءة ☐

ب- الكتابة ☐

ت- الاستماع ☐

ث- التحدث ☐

ج-

2. ما التحديات التي تواجهك في قراءة النصوص الإنجليزية التقنية؟) يمكنك اختيار أكثر من خيار(

أ- صعوبة في فهم المصطلحات المتخصصة ☐

ب-صعوبة في استيعاب التراكيب اللغوية المعقدة ☐

ت-بطء في وتيرة القراءة ☐

ث-صعوبة في تحديد الأفكار الرئيسية للنص ☐

ج-أخرى (اذكرها)

.....
.....

3. ما التحديات التي تواجهك عند الكتابة باللغة الإنجليزية التقنية؟) يمكنك اختيار أكثر من خيار(

أ-نقص في المفردات والمصطلحات التقنية ☐

ب-صعوبة في كتابة جمل صحيحة نحويًا ☐

ت-وجود مشكلات في استخدام علامات الترقيم ☐

ث-صعوبة في ترتيب الأفكار بشكل منطقي ☐

ج-أخرى (اذكرها)

.....
.....

4. ما التحديات التي تواجهك أثناء الاستماع إلى اللغة الإنجليزية التقنية؟) يمكنك اختيار أكثر من خيار(

أ-صعوبة في فهم اللهجات والنطق ☐

ب-صعوبة في مواكبة سرعة الحديث ☐

ت-صعوبة في التعرف على المصطلحات التقنية في الكلام ☐

ث-صعوبة في متابعة الشروحات المعقدة ☐

ج-أخرى (اذكرها)

.....
.....

5. ما التحديات التي تواجهك عند التحدث باللغة الإنجليزية التقنية؟) يمكنك اختيار أكثر من خيار(

أ-صعوبة في نطق المصطلحات التقنية بشكل صحيح ☐

ب-انعدام الثقة عند استخدام اللغة التقنية ☐

ت-صعوبة في بناء الجمل ☐

ث-صعوبة في شرح المفاهيم التقنية بوضوح ☐

ج-أخرى (اذكرها)

.....
....

6. ما التحديات المعرفية الأخرى التي تواجهك في تعلم اللغة الإنجليزية التقنية؟) يمكنك اختيار أكثر من خيار(

أ-صعوبات في الفهم والتركيز أثناء التعلم ☐

ب-انعدام الدافعية والاهتمام بالتعلم ☐

ت-صعوبة في الحفاظ على التركيز لفترات طويلة ☐

ث-الشعور بالقلق أو التوتر أثناء التعلم ☐

ج– أخرى (اذكرها)

.....
.....
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ملخص

تهدف هذه الدراسة إلى تحديد التحديات الرئيسية التي يواجهها طلبة الجامعة في تعلم اللغة الإنجليزية التقنية في سياق اللغة الإنجليزية لأغراض خاصة .(ESP) شارك في الدراسة خمسون طالبًا من السنة الأولى في تخصصات العلوم والتكنولوجيا بجامعة غرداية. تم جمع البيانات باستخدام استبيان وملاحظة صفية، وتم اعتماد منهج مختلط يجمع بين الطريقتين الكمية والنوعية لتحليل البيانات. أظهرت نتائج الدراسة أن الطلبة اعتبروا أن أصعب مهارة هي التحدث، تليها مهارة الاستماع، ثم الكتابة، وأخيرًا القراءة. وقد واجهوا صعوبات أكاديمية تتعلق بالمفردات التقنية، والقواعد النحوية، والنطق، والطلاقة. كما عانوا من مشكلات معرفية وتحفيزية ونفسية مثل ضعف التركيز، والقلق، وانخفاض الدافعية

الكلمات المفتاحية: اللغة الإنجليزية للأغراض الخاصة، الإنجليزية التقنية، التعلم، التحديات