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The Importance of Integrating Technology in ESP Teaching And Learning

A Case Study of 3rd Year Biology Students at Akli Mouhand Oulhadj University –BOUIRA-

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Dedication

There was a time when everything stopped when illness tried to take my strength, my hope, even my sense of who I was. I came face to face with fear, with limits I never imagined, and with a silence only pain can bring. But through it all, I was never truly alone.

To my parents your courage carried me. You held everything together while I was falling apart. Your love never once wavered. You gave me reasons to hold on when I had none of my own. The person I am now stronger, more grounded, more grateful is shaped by your strength.

To my sisters and brothers, each of you lifted me in your own quiet way. With you, I found calm. In your words, I found comfort. You were my home when everything else felt uncertain.

To my soulmate, you saw light in me even when I couldn't. Your faith never shook, and your love gave me the courage to rise again. You didn't just stand by me; you reminded me who I am.

To my dear friend Lisa even from miles away in France, your friendship has been a steady source of warmth. Your messages, your voice, and your care they reminded me I was still connected, still seen, and still loved.

This journey has changed me. I'm not who I was before the illness I'm someone who faced the dark and chose to keep going. And I carry each of you with me, always.

This isn't just my achievement. It is ours.

CHIKHI ROSA

Dedication

To little Roua:

I am so proud of you. It was not easy, but you made it in the end. I'm so happy and proud of us.

To my grandparents, Ahmed and Saiid – Allah yerhamhom:

Your little girl did it. I wish you were here to see me shine. Your love still guides me, and your prayers still reach me.

To my parents:

You did everything for me, and without your douaa, I wouldn't be here. Inchallah, I will always be your first source of happiness and do my best to make you proud.

To my siblings, Abdeldjalil and Loudjaine, and my cousins, Nessrine and Aymen:

Thank you for being a part of my life.

To my beloved friends – Maroua, Saada, Rahima, Romaissa, Hadjer, Rosa, and Liza.

Thank you for your love and support.

To my big family, and to everyone who supported me and never stopped praying for me:

I carry the love and hope of all those who lifted me.

This Journey has been more than academic, it's been personal, challenging and unforgettable.

It was not easy but I was strong and I survived , AL HAMDULLILAH.

KORICHI ROUA

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List of Abbreviations

AI: Artificial Intelligence

AR: Augmented Reality

CLT: Communicative Language Teaching

CMC: Computer-Mediated Communication

EAP: English for Academic Purposes

ELT: English Language Teaching

EOP: English for Occupational Purposes

ESP: English for Specific Purposes

GE: General English

IT: Information Technology

ISTE: International Society for Technology in Education

LMS: Learning Management System

MOOC: Massive Open Online Courses

NA: Needs Analysis

SME(s): Subject-Matter Expert(s)

TPCK: Technological Pedagogical Content Knowledge

VR: Virtual Reality

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ABSTRACT

In today's globalized world, where proficiency in the English language is becoming vital across workplaces such as in biology, for students to develop the language skills relevant to their particular career contexts. Language practitioners know technology enhances and fosters learner autonomy, motivation, and engagement in the learning of ESP. However, language teaching practices remain conventional and technology is not as developed or exploited for student learning and achievement in the curriculum of study within this department. The purpose of this research is to identify how technology is currently used in ESP teaching and learning, identify the ways in which students and teachers have adapted, and investigate how technology affects the language and professional communication abilities of the students. A mixed methods qualitative and quantitative approach was used to gather data in the form of questionnaires distributed to third year biology students, and structured interviews with ESP teachers. The findings show that despite the important role played by teachers and students, there were several barriers to effective teaching and learning including infrastructure, technical problems, inadequate teacher training in technology use, and the overuse of technology by students, which often led to distraction rather than engagement. The study concludes with recommendations for practical ways to integrate technology into ESP courses that potentially improve the quality and relevance of English language instruction for biology students in this context.

ملخص

بالنظر إلى الأهمية المتزايدة للغة الإنجليزية في المجالات الأكاديمية والمهنية، وخاصة في تخصصات علمية مثل علم البيولوجيا ، تبرز الحاجة إلى تطوير مهارات اللغة الإنجليزية لأغراض خاصة (ESP) بما يتماشى مع متطلبات التخصص. تشير الدراسات إلى أن التكنولوجيا يمكن أن تعزز استقلالية المتعلم ودافعيته وتفاعله، إلا أن ممارسات التدريس ما زالت تقليدية في بعض الأقسام، ولا يتم توظيف التكنولوجيا بشكل كافٍ في دعم تعلم الطلاب وتحقيق أهداف المناهج.تهدف هذه الدراسة إلى استكشاف استخدام التكنولوجيا في تعليم وتعلم ESP لدى طلاب السنة الثالثة في قسم البيولوجيا ، من خلال منهج يجمع بين الأسلوبين الكمي والنوعي، باستخدام استبيانات للطلاب ومقابلات مع معلمي.ESP أظهرت النتائج أن هناك وعياً بأهمية التكنولوجيا لدى المعلمين والطلاب، لكن لا تزال هناك عوائق تؤثر سلباً على فاعلية استخدامها، من بينها ضعف البنية التحتية، والمشكلات التقنية، ونقص التدريب المهني للمعلمين، إضافة إلى الإفراط في استخدام التكنولوجيا من قبل الطلاب مما يؤدي إلى التشتت بدلاً من تعزيز التفاعل.توصي الدراسة بضرورة تبني استراتيجيات عملية لإدماج التكنولوجيا بفاعلية في مقررات ESP، بما يسهم في تحسين جودة تعليم اللغة الإنجليزية وجعلها أكثر ارتباطًا بالتخصصات الأكاديمية واحتياجات سوق العمل.

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General Introduction

General Introduction

In the last several years, technology has been a revolutionary phenomenon in the education sector, changing the traditional teaching and learning methods. In today's globalized and technology-based world, English for Specific Purposes (ESP) has gained more demand, particularly in business, medicine, engineering, and law. As a reaction to this need, educators and researchers have increasingly focused on investigating how technology can assist in making ESP learning and teaching more meaningful, interesting, and effective.

The use of technology in ESP teaching not only assists the acquisition of language skills but also readies learners for the use of English in authentic, professional settings that are frequently based on digital media. According to Hutchinson and Waters (1987), ESP is a process rather than a product, i.e., it is tailored to address learners' specific requirements in specific disciplines. Warschauer and Healey (1998) believe that technology promotes learner autonomy, collaboration, and contact with real-world language use factors that are especially vital in ESP environments. In addition, recent research, including that of Alavi and Taghizadeh (2021), has shown that technology integration can greatly enhance learners' motivation, engagement, and general language performance in ESP classes.

I. Statement of the Problem

Despite the growing awareness of the benefits of technology in learning, the majority of ESP programs remain oriented towards traditional forms of instruction that may not fully address the specific needs of students in technical fields. In many Algerian universities, including Bouira University, ESP teaching remains traditional and lacks the integration of modern technological tools that could enhance learning outcomes. This is particularly marked for students of biology, who require English not only for academic purposes such as reading scientific texts and report writing but also for access to global research and communication in their field. Although there are existing technological resources, most Bouira University ESP courses are outdated with minimal integration of digital resources that can potentially offer more interactive, engaging, and field-based content. This gap leads to missing chances to assist Biology students in acquiring the particular English they require in their future studies and careers. Taking these issues into consideration, what we try to answer through this research is how technology is being utilized in ESP classes for Biology students at Bouira University, its benefits, the issues encountered by the teachers, and how its integration can be optimized?

II. Aims of the Study

The primary aim of this study is toinvestigate the importance and impact of integrating technology in ESP teaching/learning at Akli Mohand Oulhadj University of Bouira with an emphasis on the department of Biology, the research aims at investigating how technology tools and resources can increase students' language proficiency, motivation, and engagement, as well as identifying the challenges faced by both students and instructors in using technology in ESP teaching and learning. The study aims to provide practical recommendations to improve the use of technology in ESP courses tailored to the needs of Biology students.

III. Hypotheses

We hypotheses that the integration of technology in ESP teaching improves learners' language proficiency, professional communication skills, motivation, and overall engagement more effectively than traditional teaching methods.

We also hypotheses that the lack of teachers' training in using technology is a major barrier in front of an effective performance in ESP teaching.

In addition, we hypotheses that technical issues, and lack of infrastructure, hinder the effectiveness of integration technology in ESP teaching for biology students.

IV. Methodology Design

a) Choice of the Method

In order to explore the actual and immediate problems third year students in the biology department are facing, a mixed-methods design will be used. It is a design that incorporates both quantitative and qualitative methods to achieve a full understanding of the effects and challenges of using technology in teaching ESP to biology students.

b) Population

To obtain information regarding the situation of integrating technology in teaching and learning ESP at the biology department at Bouira University, we will deal with two samples chosen from the following population.

1. The teachers of English at the department of biology (about 4 teachers) Their insights are essential in uncovering the dominant instructional practices, problems, and potentials of technology utilization in ESP teaching.
2. Undergraduate (third year) biology students (a sample of approximately 50 biology students will be selected using stratified random sampling)

V. Data Collecting Tools

To collect both quantitative and qualitative data for this study, two main tools will be used:

- **The questionnaire**

The questionnaire is used as the main source of data and seems to be the most appropriate tool for many considerations, like the large number of populations under study.

- **The structured interview**

A structured interview is held with the ESP teachers at the department of Biology. The participants will provide more descriptive responses and a greater insight into their beliefs and attitudes towards the use of technology and also suggestions for change and best practices.

VI. Structure of the Dissertation

The thesis has been divided into three main chapters. The first and the second chapter are theoretical in issue, while the third chapter presents the practical part of the research, analysis, and findings.

Chapter one provides a theoretical overview of ESP, including its definition, historical development, differences from general English, the importance of needs analysis, and the various branches and applications of ESP.

Chapter two discusses the integration of technology in teaching and learning ESP, including its importance, advantages, tools commonly used, and the challenges that could face the learners and the teachers in the process.

The last chapter analyses the results of the field work, that is, the questionnaire and the interview findings.

Chapter One : English For SpecificPurposes

Introduction

Being able to communicate in English has become essential in today's interconnected and changing world. Learning English for broad communication purposes is no longer enough; professionals in a variety of professions need to develop specialized language abilities that are suited to their unique requirements. ESP is useful in this situation; It is a distinct area of language instruction that aims to provide students with the language skills they need to succeed in specific professional settings. It focuses on equipping learners with the necessary language competencies tailored to specific professional contexts.

I. 1 ESP Concept andScope

1 Esp Overview

The increasing globalization of industries has underscored the necessity for professionals to communicate effectively in English within their specific fields, leading to the development of ESP. This specialized branch of language education is distinct from GE due to its focused approach in addressing unique linguistic needs. Unlike traditional instruction, which emphasizes broad skills, ESP concentrates on the specific competencies required in professional contexts.

Hutchinson and Waters (1987) claim that the essence of ESP transcends teaching specialized vocabulary; it involves instructing students in the language relevant to their disciplines. Learners are not just memorizing terms but acquiring skills vital for their fields, enabling them to engage in professional discourse. According to Dudley-Evans and St. John (1998), ESP is characterized by a focus on the learner's needs, the specificity of language, and its applied context. They assert that ESP practitioners must analyze the language demands of the target situation and design courses to meet them. (p.04)

This ensures ESP content reflects actual professional language, such as in technical manuals, medical journals, and business reports. For instance, an engineer may need language for technical specifications and project management, while a medical practitioner might require training in healthcare communication. Robinson (1991) elaborates that ESP is about adopting a teaching approach centered on learners' needs and the specific contexts of use (p.05).

This methodology enhances instruction relevance and fosters engagement and motivation. Moreover, the rise of ESP responds to global job market demands, where English proficiency is essential across sectors like medicine, engineering, business, and law. Belcher

(2006:05) observes that in an interconnected world, effective English communication has become a necessity.

This shift has prompted educational programs to offer targeted instruction. Furthermore, ESP goes beyond language skills; as Flowerdew and Peacock (2001:10) emphasize, it includes understanding the culture and practices of specific fields. This cultural competence helps learners grasp norms and expectations, enhancing communication effectiveness.

ESP's tailored approach fosters professional confidence. Hyland (2006:12) notes that effective communication involves knowing terminology and understanding disciplinary communicative practices. This empowers professionals to engage more fully, contributing to their success and satisfaction. ESP is crucial in language education; ensuring learners are proficient and effective in their professional contexts. As global industries evolve, ESP's relevance and necessity will continue to grow.

2 ESPSubfields

ESP can be further categorized into various subfields, each tailored to address the unique demands of specific contexts. One prominent subfield is English for Academic Purposes (EAP), which concentrates on the language skills necessary for academic study. This includes essential areas such as reading comprehension, academic writing, and effective discussion techniques, all of which are crucial for success in higher education.

Another significant subfield is English for Occupational Purposes (EOP), which is specifically designed for various professions.EOP emphasizes the language and communication skills necessary for success in different fields, ensuring that professionals can engage effectively with colleagues, clients, and stakeholders.

Additionally, there is English for Professional Development, aimed at professionals who are seeking to enhance their language skills for career advancement, networking opportunities, and collaborative efforts. This subfield focuses on equipping individuals with the language tools they need to excel in their careers and to build meaningful professional relationships. Lastly, English for Specific Fields encompasses specialized areas such as medical, legal, and technical English, concentrating on the relevant terminology and context-specific language use. Each of these subfields plays a vital role in equipping learners with the necessary linguistic competencies to navigate their respective environments effectively, asDudley-Evans and St.John summarized

by addressing the specific language needs of various professional contexts, ESP provides a robust framework for language education that is both relevant and impactful.

This multifaceted approach not only prepares learners for the challenges they will face in their careers but also enriches their understanding of the global landscape in which they operate, thereby fostering a more informed and capable workforce. Ultimately, as industries evolve and new fields emerge, the adaptability and relevance of ESP will continue to be paramount, ensuring that learners are well prepared to meet the linguistic demands of their professional environments.

3 The Differences betweenGE andESP

The differences between ESP and GE can be understood through key aspects that define their distinct approaches to language learning. One core feature of ESP is its learner centered methodology, beginning with a thorough NA to assess each learner's linguistic requirements. This analysis often involves surveys, interviews, and discussions with industry professionals, emphasizing the importance of tailoring instructional materials to specific student needs. This ensures learners engage with content that impacts their academic or professional lives, making language acquisition more efficient, engaging, and motivating.

ESP emphasizes specialized terminology, requiring learners to master field-specific vocabulary, such as legal jargon or medical terminology. Proficiency in this vocabulary is crucial for effective communication, as learners must understand contextual usage to ensure clear communication in different settings. Understanding these nuances enhances a professional's ability to engage in meaningful dialogue, fostering a more effective environment.

ESP also prioritizes contextualized language learning through real-world scenarios, including case studies, role-plays, and simulations. For example, business students may engage in mock negotiations, while medical students might simulate patient interactions, these practical applications prepare learners to navigate industry complexities with confidence.

Task-based learning is another key component, involving activities aligned with learners' disciplines, such as drafting reports or conducting interviews. This boosts learners' confidence in using English professionally. As David Nunan (2004), a renowned scholar in language education, asserts, the focus of task-based learning is on the use of authentic language in

meaningful contexts. This highlights that instruction should reflect the specific contexts and demands of learners' environments.

The targeted approach of ESP focused on linguistic needs, specialized vocabulary, and practical application distinguishes it from GE, making it more effective for learners aiming to excel in their fields. By integrating linguistic demands of professions, ESP prepares students for immediate challenges and equips them for lifelong success. This holistic approach fosters a deeper understanding of the relationship between language, context, and professional identity, empowering learners to thrive in a dynamic world. While both ESP and GE aim to improve language proficiency, they differ significantly in focus and methodology. The following table summarizes the key differences:

Aspect	General English	English for Specific Purposes (ESP)
Focus	Broad language skills for everyday communication	Specific language skills for particular contexts
Content	General vocabulary and grammar	Specialized vocabulary and terminology
Learner Needs	Generalized needs of a wide audience	Tailored to specific professional or academic needs
Teaching Methodology	Traditional approaches with a focus on fluency	Task-based, contextualized learning
Assessment	Standardized tests assessing general language ability	Performance-based assessments reflecting real-world tasks

Table 1: The Distinction between ESP and GE (Dudley-Evans, 1998)p. p:1-2

2 Understandingthe Scope of ESP

2.1 Areas of Specialization within ESP

The term ESP refers to a wide variety of specialized sectors, each created to address the particular linguistic and communication requirements of particular professions. ESP is designed to address the particular vocabulary, discourse rules, and settings pertinent to various fields, in contrast to GE, which emphasizes general language skills. This focused approach guarantees that students gain the abilities needed to communicate successfully in their fields. According to Dudley Evans and St John (Ibid.p.19*)"ESP is an approach to language teaching in which the syllabus and materials are based on the specific needs of the learners,"*this emphasizes how crucial it is to adapt language training to different work settings.

2.1.1 English for Business

Business English gives professionals the language proficiency they need to communicate effectively in business settings. It emphasizes both formal and casual communication methods while covering subjects including presentations, negotiations, and report writing. In professional contexts, the capacity to express ideas in a clear and convincing manner is essential. The importance of language in accomplishing professional objectives is shown by Kelsey's (2022) observation that Effective communication in the business world can be the difference between success and failure. In addition to language, this area focuses on comprehending interpersonal dynamics and cultural quirks in the business world.

2.1.2 English for Medical sciences

Medical English is designed with healthcare workers in mind, focusing on the specific language and communication techniques required in medical settings. It places a strong emphasis on precision and clarity, as effective communication plays a crucial role in ensuring patient safety and care. According to Mychelangela et al (2022) *"Effective communication among health professionals is an indispensable factor to ensure patient safety in the health services"*(Ibid.P.579)

2.2 Technical English

Technical English plays a key role in fields like engineering, cybersecurity, and software development, where clear and accurate communication is essential. It relies on specific terms, structured language, and visuals to explain complex ideas in a way that others in the field can understand. Even small mistakes in wording or format can lead to serious misunderstandings and costly errors. As digital tools and platforms continue to grow, professionals must adapt how they share information while still keeping it clear, precise, and easy to follow. This makes Technical English not just a skill, but a necessity in today's fast moving technical world.

2.2 The Role of ESP to Different Professional Fields

ESP is useful in a variety of professional fields since it offers specialized language skills that improve efficacy and communication. For example, in order to thrive in international marketplaces, experts in the business sector must negotiate a variety of cultural contexts and industry specific vocabulary. According to Dudley Evans and St John *"Language is learnt not for its own sake or for the sake of gaining a general education, but to smooth the path to entry or*

greater linguistic efficiency in academic, professional or workplace environments"(P.18) this claim emphasizes how crucial ESP is to promoting possibilities for professional development.

Bruch (2020) states that the language used in healthcare settings must be accessible to both professionals and patients, ensuring that information is conveyed accurately and compassionately. This highlights the dual focus of Medical English on technical terminology and empathetic communication, which is crucial for patient trust and safety. In the medical field, the need for precise and clear communication cannot be overstated.

Technical English serves an equally vital role in sectors such as engineering and computer technology, where complex concepts must be communicated successfully to a range of audiences.*"The use of English language is widespread in the career of the engineering students in both the global and local contexts,"* According to (Ajit Gaikwad, 2022, P.14).

ESP equips professionals with the language skills needed to communicate complex ideas clearly and effectively within their specific fields. By focusing on industry-relevant vocabulary, formats, and communication strategies, ESP enables individuals to present technical information in a way that is accessible to both experts and non-specialists. This clarity fosters better collaboration across teams, reduces misunderstandings, and contributes to smoother project execution. As a result, ESP not only improves professional communication but also enhances teamwork and overall project outcomes, making it a vital tool in today's specialized and interconnected work environments.

3. ESP vs.GE: Methodological Differences

3.1 Comparative Analysis ofTeaching Methodologies inESP andGE

GE and ESP are two different ways to teaching languages, each with unique techniques designed to satisfy the needs of individual students.

3.1.1 ESP Approach

ESP is distinguished by its emphasis on the unique requirements of students in academic or professional settings. According to Dudley-Evans and St. John), this method highlights a number of important aspects:

Needs analysis is crucial, especially in time-limited courses. To design an effective program, the course designer must identify students' specific language needs. For example, a scientific English course may focus on key structural patterns and scientific terms rather than everyday

vocabulary. Gardner and Winslow (1983) emphasize that the goal of needs analysis is to gather information to align the course with students' needs. They also note that formal assessments provide measurable evidence to support course proposals and can be used in validation and approval processes.

The communicative method in ESP emphasizes genuine communication in relevant contexts. Students engage in real-world situations they may encounter professionally. Business English classes, for instance, may involve role-playing presentations or negotiations. As Long (1985) points out, this method makes language use more applicable by bridging the gap between instruction and real-world use.

Project-Based Learning works well in ESP by requiring students to apply language skills in practical tasks. Students may collaborate on topics, present market trends, or design marketing strategies. This method enhances linguistic skills, teamwork, and critical thinking. Thomas (2000) asserts that project-based learning promotes deeper learning by involving critical thinking and problem-solving.

3.1.2 GE Approach

GE approach seeks to foster more general language proficiency that is not domain specific. Basturkmen (2006) maintains that GE Language teaching tends to set out from a definite point to an indeterminate one .The emphasis in ESP on going from A to B in the most time and energy efficient manner can lead to the view that ESP is an essentially practical endeavour (Ibid, P.9).It encompasses a range of strategies intended to improve general language competency which are:

Translation Grammar Approach: This conventional method emphasizes translation exercises to acquire vocabulary and grammar norms. Despite criticism for not focusing on communicative competence, it remains common. It may benefit students who need to understand grammatical structure before proper usage.

Teaching Languages via Communication (CLT): This method emphasizes interaction as key to language acquisition. CLT includes role-plays, conversations, and pair work, offering a safe space to practice speaking and listening. For example, students may discuss current affairs, enhancing both language and critical thinking. Richards and Rodgers (2001) claim CLT boosts learners' confidence and fluency by encouraging authentic language use.

Learning Based on Tasks: In GE, this approach centers on meaningful tasks requiring language use, similar to project-based learning in ESP. Activities may include writing a message or planning a vacation. It makes study more relevant and engaging. According to Younes Behira (2023), task-based learning facilitates language acquisition by offering meaningful language use opportunities. (P51)

4 Learning Objectives

4.1 ESP Learning Goals

In ESP, learning objectives are frequently well-defined and focused on quantifiable results. An ESP course might, for example, focus on students' ability to present research in their field, create technical reports, and attend professional meetings. Hutchinson, T., & Waters, (p.18) assert that learning objectives in ESP must be directly related to the professional and academic needs of learners. Particular goals could be:

Technical Proficiency: Students should be able to comprehend and apply industry specific terminology. For instance, legal terminology, case analysis, and document writing may be the main topics of a law student course. For students to be able to communicate successfully in their professional settings, this emphasis on technical language is essential.

Communication Skills: The development of writing and spoken communication skills pertinent to the topic is a common goal of ESP courses. Writing reports, giving presentations, and participating in conversations that adhere to professional communication standards are all examples of this.

4.2 GE Learning Goals

The learning goals in GE are more expansive and seek to foster the development of general language proficiency that may be used in a variety of settings. The following are some p ossible expectations for learners:

Comprehension and Production: Students should be able to comprehend and generate a variety of documents, such as essays and emails. This entails improving one's capacity for cohesive and coherent writing as well as reading comprehension. These abilities are essential for successful communication in both personal and professional contexts.

Effective Communication: The goal of GE courses is to give students the tools they need to communicate effectively in social settings. This entails conversing on a range of subjects,

speaking clearly, and listening intently. Effective communication abilities are crucial for establishing connections and negotiating social situations, claims Thornbury (2005).

5 Needs Analysis

5.1 Importance ofConducting Needs Assessments

The foundation of creating successful, learner-centered courses is conducting needs assessments in ESP. In contrast to GE, ESP courses have to address the particular communication needs of a specified academic field or vocation. This difference is highlighted by Hutchinson and Waters (p.53) asserts that *"ESP differs from general English not because a need exists as such but because ESP is aware of the need".* Any ESP curriculum is built upon this insight, which also informs choices about methodology, assessment, and course material. By separating objective needs what students need to know to perform well in a target situation from subjective needs students' preferences, expectations, and learning strategies(Dudley-Evans, 1998)further clarify the multifaceted significance of NA.

Course designers must be aware of both because focusing too much on one could make a course ineffective. According to (Richards, Ibid p: 51), who presents the process in a more pragmatic manner. By eliminating the inclusion of superfluous resources and coordinating learning objectives with practical applications, this method enables practitioners to give priority to skills and content. *"Needs analysis is the process of determining the needs for which a learner or group of learners requires a language and arranging the needs according to priorities,"*

5.2 Methods for Gathering Data

Data for ESP requirements assessments is gathered using a variety of techniques. The population, situation, and resources at hand must all be taken into consideration while choosing these techniques. Brown (2016, p.102), who supports a mixed-methods strategy. The reliability and validity of the results are improved when several sources are combined.

- Questionnaires and surveys are effective tools for gathering large amounts of quantitative data. They can disclose how students view their own needs, goals, and preferred methods of learning.
- Focus groups and interviews enable more in depth, qualitative insights. These are helpful for uncovering unspoken or concealed needs, especially from stakeholders like subject-matter instructors or employers.

- Observations offer genuine insight into how language is used in everyday situations, particularly in the workplace. This makes it easier to match the course material with real-world communication assignments.
- Textual and discourse analysis academic or professional documents, such as emails, reports, and papers, provides a clear image of the genres and patterns that students need to acquire.

5.3 Case Studies Illustrating Successful NA inESP

Methodologically good requirements analysis can result in extremely successful and context-sensitive ESP course design, as demonstrated by real-world case studies. Basturkmen (2010), who looked at the creation of an ESP course specifically for Turkish engineering students, provides one noteworthy example. The researchers used a triangulated strategy to gather data, interviewing subject-specific instructors, evaluating real engineering literature, and administering surveys to determine student perspectives. Key skill deficiencies were identified by this thorough requirements' analysis, especially in the areas of oral presentations and technical report writing, which were previously undervalued in the current curriculum. Students' performance and confidence significantly improved as a result of the revised course's strong emphasis on genre-specific writing assignments and presentation practice.

Anthony (2011), who created an ESP course for Japanese airline ground crew, has another strong argument. In this case, job shadowing, staff interviews, and linguistic observation in hectic airport settings were all part of the NA process. These techniques demonstrated the importance of exact, formulaic English speaking and rapid response listening, especially in safety critical scenarios. This research led to the inclusion of scenario based learning in the course, which included emergency simulations, situational dialogues, and role-plays that mirrored real-world encounters. Significant gains in service quality and communication effectiveness resulted from the deployment.

The claim that effective ESP training is impossible without a thorough comprehension of learners' genuine requirements in context is supported by these case studies. But it is also critical to understand that requirements' analysis is a continuous process.

6 Common Challenges inESP

6.1Challenges Faced byTeachers

ESP presents unique challenges that often test teachers in ways that GE training does not. One of the most persistent issues is the knowledge gap between language and content. Many ESP teachers find themselves needing to teach specialized vocabulary, genres, and discourse elements that they may not be entirely familiar with, as they are often trained primarily in language pedagogy rather than in specific technical subjects.

As Hutchinson and Waters noted ESP teachers often feel uncertain when addressing content areas that fall outside their expertise, especially in technical or scientific settings (p.13). This feeling of unpreparedness can be particularly daunting when educators are faced with the complexities of specialized fields like medicine, engineering, or law. Such challenges can undermine their confidence and affect how students perceive the validity of the course.

Additionally, the implementation of ESP courses is often hampered by institutional barriers such as administrative oversight, financial constraints, and limited time. Anthony (2011) points out that ESP is frequently considered an addition to general English courses rather than a distinct area of study, leading to inadequate planning and underfunding (p. 24). This lack of institutional support can prevent teachers from adapting their courses to meet the evolving demands of the workplace or from adopting more learner-centered approaches.

6.2 Challenges Faced by Learners

Learners in ESP programs face their own set of challenges, particularly when it comes to expectations and motivation. Many of these students are adults or professionals with clear goals and tight deadlines. When the training doesn't align with their immediate practical needs, frustration can quickly set in. (Basturkmen, 2006) Highlights that learners who anticipate quick application of their skills but receive materials that feel too generic or irrelevant often find themselves at odds with their expectations. This disconnect can lead to difficulties in language retention and participation in class.

Moreover, learners often struggle to adapt to the specific linguistic features and conventions of their fields. This can create feelings of overwhelm and anxiety, especially when the specialized language differs significantly from what they learned in general English classes. The pressure to perform in a professional context can make some learners hesitant to engage in discussions or activities, fearing they may not measure up.

Another challenge is the lack of personalized feedback. In many ESP courses, the focus on content can overshadow the need for individualized language support. Without the guidance necessary to improve their skills effectively, students may feel lost and unsure of their progress, which can sap their confidence and motivation. Learners may grapple with understanding the cultural nuances and practices unique to their fields. These aspects are often overlooked in generic English courses but are crucial for effective communication in a professional setting. Navigating these cultural contexts can be daunting, making it even more challenging for learners to feel comfortable and confident in their interactions.

6.3 Methodological Strategies toAddress The Challenges faced by teachers and learners

6.3.1 Solutions forTeachers

In ESP, the teacher plays a critical role in adapting and simplifying specialized content to make it accessible and effective for learners. While the ESP teacher does not need to be a subject expert, they must be skilled in designing courses that meet learners' needs and objectives. Effective ESP teaching involves utilizing authentic materials and task-based learning approaches, where students engage with real world tasks that are closely related to their professional or academic disciplines. This approach, according to Hutchinson and Waters (1987), aims to align course content with the specific needs of learners, ensuring they can apply language skills directly in real-world contexts, such as professional communication, report writing, or presentations.

Classroom training becomes more relevant to the learner's reality when, for example, a commercial negotiation task is simulated or an actual workplace report is analyzed. Additionally, a flexible and needs-based syllabus aids in addressing changing learner priorities. Language teaching should be viewed as a dynamic process, according to Richards who states that "*syllabi must accommodate the shifting needs of learners and institutional demands"* (Richards, 2001, p. 128). Ongoing needs assessment is a crucial methodological tool in this context since it enables teachers to modify focus areas, modify content mid course, and offer individualized help. This adaptability is particularly crucial when students' learning objectives or professional roles change throughout the course.

6.3.2 Solutions forLearners

Utilizing authentic resources and task-based learning enables students to interact with texts and communication activities from the real world. (Nunan, 2004) backs this up by saying

that assignments with real-world applications help students learn the language and use it in appropriate social or professional settings. Classroom training becomes more relevant to the learner's reality when, for example, a commercial negotiation task is simulated or an actual workplace report is analyzed.

Additionally, a flexible and needs-based syllabus aids in addressing changing learner priorities. Ongoing needs assessment is a crucial methodological tool in this context since it enables teachers to modify focus areas, modify content mid-course, and offer individualized help. This adaptability is particularly crucial when students' learning objectives or professional roles change throughout the course.

Conclusion

ESP is a vibrant and constantly evolving field that continues to gain importance in today's increasingly interconnected and globalized world. As industries expand across borders and communication becomes more specialized, the need for tailored English instruction that meets the demands of specific professional, academic, and occupational contexts has never been greater. ESP responds directly to these needs by focusing on practical language skills, relevant content, and learner-centered approaches, ensuring that learners are better prepared to meet the challenges of their chosen fields. With its dynamic nature and its ability to adapt to emerging trends and global demands.

ChapterTwo: The Importance of IntegratingTechnology in Teaching and Learning ESP

Chapter Two:
The Importance of Integrating Technology in Teaching and Learning ESP

Introduction

In today's fast-evolving educational landscape, technology has become an essential component in the teaching and learning process. Ever since the emergence of digital tools, online websites, and mobile applications, teaching practitioners nowhave a wide range of resources that can enhance the effectiveness and engagement of their teaching practices. In ESP, the incorporation of technology is most relevant, enabling the exploitation of authentic, discipline-specific materials and supporting learner-centered methodologies consistent with particular academic or occupational requirements.

This chapter discusses, the use of technology in ESP teaching by focusing on its significance, the advantages it offers, the tools commonly used in ESP classrooms, and the challenges that teachers and learners may face when integrating it into the learning environment.

II The Integration of Technology in the ESP Classroom

1 Definition of Technology and Technology Integration

According to Isman (2012 p 207-213), technology involves using knowledge in practical application, especially in practical field, requiring methods, processes, or technical knowledge to achieve tasks. Technology is much more than the physical tools of learning, such as computers and instruments. Technology also involves the organized interactions of people, machines, and the environment.

The term technology in educational contexts typically refers to the application of computer-based digital tools, systems, devices, and software that support teaching and learning processes.According to Roblyer and Doering (2013 p52), technology is defined as "the application of scientific knowledge for practical purposes, especially in industry and education,involving the use of tools such as computers, software, and networks to facilitate learning and performance.Insimpler terms, technology in education includes everything from simple audiovisual aids to advanced digital learning environments and interactive applications.

The Oxford Dictionary describes technology as *"the application of scientific and practical knowledge to develop products and processes that are useful to humanity,"* highlighting its practical and beneficial outcomes, which means technology is more than machines or digital tools. Technology is the application of knowledge in a way that creates useful solutions for real-world problems. It reflects the functional aspect of technologyto serve human needs in various fields, like education, communication, and medicine. In the world of education, this means using

a technology tool not because it's novel, but to improve the learning/teaching experience, solve a teaching problem, or improve the whole educational process to create more effective, efficient, and accessible processes.

Technology integration, however, implies the use of technology within the classroom to assist learning objectives in an efficient and meaningful way. Hew and Brush (2007: p223) define technology integration as "the use of technology to support instructional strategies and improve student outcomes.". More than using technology as an add-on or supplement, integration means utilizing digital tools within the curriculum in a manner that enhances the students' engagement, understanding, and achievement.

According to Hennessy et. all (2005: p155) and Pour Hosein Gilakjani (2017: p95 - 106),describe technology integration in terms of educators' use of technology as a tool for enhancing familiar activities, and for extensively changing them. Dockstader (2008) describes it simply as using technology to improve the educational environment by enabling learners to complete assignments digitally instead of traditional pencil-and-paper methods.

Likewise, Ertmer and Ottenbreit-Leftwich (2010: p255) describe technology integration as "teachers' use of technology to facilitate, enhance, and transform teaching and learning processes.". Successful integrationinvolves embedding digital tools into the curriculum in a way that enhances student engagement, comprehension, and achievement.

In ESP, incorporating technology involves embedding digital tools particular to students' academic or professional disciplines, i.e., domain-specific vocabulary software, discipline-related internet resources, simulations, or communication platforms that mirror real-world tasks.Therefore, the integration of technology in ESP is not simply a matter of using digital technology but of using it in a way that communicates subject-specific content, promotes learner independence, and builds practical language skills for specific purposes.

2 The Importance of Integrating Technology

The use of technology can greatly impact the learning experience. Students should be motivated to use technology as an educational tool, and teachers can model effective uses for students to achieve the intended goals of the curriculum (Costley, 2014; Murphy, DePasquale, & McNamara, 2003). If appropriately used, technology can enhance the collaboration needed for students to collaborate, create, and learn from reviewing each other’s work (Keser, Huseyin, &Ozdamli, 2011).

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Bennett et. all (2000) argue that computer technology positively influences teaching and learning experiences. It also assists instructors in meeting the educational needs of their students. As Bransford, Brown, and Cocking (2000) note, computer technology links teachers and learners to communities around the globe and in their local area, increasing the potential for learning. The effectiveness of technology relies heavily on the application use of it by teachers in language teaching contexts. Susikaran (2013) states that chalk-and-talk methods are no longer adequate in effectively teaching English. Raihan and Lock (2012) state that effective learning environments for students also promote the development of effective learning strategies when classrooms are clearly structured. It is better to learn in a technology-enhanced environment as opposed to merely listen to a lecture.Even teachers who are not technology experts should seek ways to integrate technology as an effective learning tool.

Technology has changed the landscape of English teaching and learning significantly, and has provided many opportunities to make teaching and learning more engaging and efficient (Patel 2013). The typical classroom, where a teacher simply lectures using a blackboard or whiteboard, needs to move forward with the increased use of technology resources. According to Arifah (2014), the use of a range of multimedia (print texts, films, and online content) allows students not only learn language structures, but also develop skills, and think critically about interpreting various texts and contexts.

Technology integrationprepares students for rapidly changing workforce where students will increasingly be expected to acquire technological skills. The International Society for Technology in Education (ISTE) highlights that many of today's high-demand jobs did not exist a decade ago and, by integrating technology prepares students to be competent in these emerging careers. Integrating technology generates learning. It also helps make the learning process towards knowledge development more active, engaging, and effective. Research supports that technology added to the curriculum in a purposeful way leads to effective student learning processes and outcomes. Technology facilitates active engagement, collaborative group participation, immediate feedback, and connections to real-world experiences that create rich, deeper learning experiences.

In summary, using technology in ESP not only modernizes the learning experience but also aligns language instruction with students' academic and professional needs in a modern digital context. It facilitates active participation, collaboration and connection to the real- world which

makes the learning relevant to students. Moreover, and most importantly, it provides learners with critical digital skills needed in today's technology saturated workforce.

3 Technological Tools Used in ESP Instructions

In the context of ESP, the use of technology has expanded the variety of tools available to language teachers and learners,providing more engaging, customized, and field-specific learning. When choosing and integrating technological tools, particular tools can improve language proficiency by offering learners exposure to real-world, discipline-specific language use and encourage active engagement with the content of learning. There are several technological tools used in ESP:

3.1 Learning Management System (LMS)

A learning management system (LMS) is a platform that enables teachers to deliver learning content in an interactive and organized way, making it easier for them to manage assessments. LMS platforms like Moodle, Google Classroom, Blackboard, and Canvas have become foundational to a multitude of learning environments in education to organize content, monitor progress, and facilitate communication between teachers and students. According to Al-Awidi and Aldhafeeri (2017), 78% of ESP teachers surveyed within higher education institutions in Kuwait said that LMS technology enhanced their ability to organize materials and promote learner autonomy through a modular approach to self-paced learning.

3.2 Multimedia Tools

Multimedia tools refer to the use of multiple types of content, such as text, images, audio, video, animation, and interactive content, to engage learners and support them to enhance their understanding. For instance, González-Vera (2016) finds that ESP learners who regularly engaged with YouTube videos related to their field (e.g., business negotiations or biological achievements) showed higher vocabulary retention and better listening comprehension than peers who relied only on the traditional text. Additionally, multimedia can create opportunities to encounter cultural elements, by giving learners access to real-world situations, body language, and intercultural communication practices. However, effective use of multimedia requires careful planning. Teachers need to select not only engaging, materials but also materials that are pedagogically aligned with learning objectives and appropriate for learners' language proficiency.

3.3 AI-Powered Tools

The reality that AI-based tools have been increasingly integrated into ESP instruction is nothing unusual nowadays. These tools are powered by artificial intelligence (AI) technologies, including machine learning, natural language processing, and speech recognition, which help in analyzing learners' performance, giving instant feedback, and personalizing learning paths according to individual needs and goals.

Deep Learning In the context of (ESP), where students generally concentrate on subject specific lexis and professional communication skills, AI tools enable the provision of task-based, field-dependent training that adjusts dynamically. For instance, a biology student writing a technical lab report can use AI-enabled writing assistants such as Grammarly or QuillBot to get feedback on technical jargon, grammatical correctness, and clarity of sentences, which would be vital for formal scientific writing. These tools not only show errors but also recommend improvements in style and scientific tone. According to Luckin et al. (2016), AI in education increases learner engagement by enabling more adaptive and responsive learning environments. Instead of offering the same content to every student, AI tools, recommendations of lessons, vocabulary, or practice activities might be suggested for each learner, considering the learner's performance and goals. This is particularly beneficial in the ESP context, as the learners' needs in English will differ based on their academic or professional needs. A HolonIQ (2023) report discussed that AI language learning tools have increased in the past three years by over 400% in usage, largely in higher education or professional training contexts. AI language learning tools are noted to improve accessibility, efficiency, and to provide real-world task relevance.

Sun and Rueda (2012) conducted a study and found that online learning environments are able to greatly increase student motivation and overall engagement, especially when courses are professionally relevant and personalized. In terms of statistics, a report from Statista (2022) indicated that there were more than 220 million learners around the world who registered on online learning platforms. The majority of users on these platforms are in higher education and professional development sectors, where ESP is most commonly practiced.

Technology Tool	Key Benefits
Corpora and web- Based Materials	Enhances vocabulary acquisition and exposure to authentic language use.
Computer- Mediated communication (CMC)	Fosters collaborative communication and real-time interaction.
Wikis and e-Modules	Provides interactive and authentic learning experiences.
Smart technology and AI	Increases and engagement and provides personalized feedback.
Digital Writing Tools	Aids in grammar, sentence's structure, and professional formatting.

Table 2: Benefits and Tools of Technology Integration in ESP Education.

4 Benefits of integrating technology in ESP

Technology is now a central component of ESP teaching and learning. It strengthens even more effective language instruction via lessons that are increasingly engaging, flexible, and suited to learners' specific needs. Technology plays a key role in improving both teaching practices and learning outcomes in ESP contexts.

4.1 Enhanced Engagement and Motivation

One of the most meaningful advantages to integrating technology into ESP education is its ability to improve student engagement with motivation. Traditional teaching methods often fail to fully capture the interest of modern learners, as well as dynamic interactive educational settings. Technology, such as interactive platforms like Slido, offers up features such as quizzes, polls, and real-time feedback. This can increase student participation and motivation considerably (Ningsih, 2023). The use of smart technology, which includes artificial intelligence and virtual reality, promotes more interaction and participation, and makes learning more effective and engaging.

Furthermore, technology allows for certain customized learning experiences, which can cater to the various needs of ESP learners. Digital tools, as an instance, can provide learners with tailored resources and activities that align with their specific professional or academic goals, thus increasing their motivation to learn. The planned integration of technology into legal English lessons has been shown as well to improve intrinsic motivation, self-efficacy, and personal relevance, leading to improved academic performance.

4.2 Personalized and Flexible Learning

The role of technology in ESP education provides opportunities for personalized and flexible learning. With technology, digital tools, like adaptive learning software, allow learners to work at their own pace on areas that need improvement. This is particularly useful for ESP learners because they are focused on specific language needs that relate to their specific field of study or occupation. An example would be biology students using digital tools in order to improve their scientific vocabulary or communication abilities, preparing them for real-world professional challenges.

The use of technology allows course instructors to develop individual learning plans that can be modified to the capabilities, abilities, and needs of each learner. Not only does this improve student language learning, but it also improves teacher-learner interaction, positively impacting their learning experience. Also, there are digital platforms and multimedia tools - like podcasts and video tutorials - that also give learners access to learning materials anytime, anywhere.

4.3 Access to Global Resources and Experts

Some of the greatest benefits of using technology in ESP education are the ability to connect learners with a wide range of global resources and experts. Learners can now access innovative and current materials to support their learning, such as peer-reviewed journal articles, professional articles, webinars, and online courses that correspond with their specific fields (Miller & Wonderling, 2023). This exposure improves their professional vocabulary while keeping them abreast of developments and best practices in their field.

Moreover, it includes attending virtual workshops, conferences, and lectures with professionals from around the world with tools like Zoom, Microsoft Teams, and LinkedIn Learning. Such direct engagement would be nearly impossible without technology. Ali (2024) confirms that students who were enrolled in technology-enhanced ESP programs experienced a 35% increase in their ability to comprehend professional texts from international sources. Similarly, Li (2018) reported that access to global resources greatly increased students' motivation to learn and apply English to real-world situations.

Furthermore, Surani et al. (2023) suggest that participating in online forums and virtual exchanges with international practitioners supports the development of language proficiency and intercultural competence-both of which are highly valued in a global marketplace. These digital

interactions develop not only communication skills and cultural experience but also give learners an authentic understanding, paving the way for meaningful collaboration in international professional spaces.

- **Advantages of technology for ESP teachers**

The incorporation of technology into ESP teaching has changed the role of teachers, providing further opportunities for instruction and management of a students' learning. As the demands of teaching change, technology offers a fine tool for ESP teachers to support the particular language and professional needs of their learners.

- **Improved Lesson Preparation:** technology opens many reliable sources of materials (videos, articles, corpora, simulations) that ultimately allow teachers to create more meaningful and engaging lessons.
- **Efficient Assessment and Feedback:** applications like Google Forms orlearning management systems (LMS), or AI platforms, allow for quick testing and grading and personalized feedback.
- **Flexible Teaching Methods:** the range of synchronous (live) or asynchronous (recorded) tools can be used by teachers to suit individual teacher preferences and to meet diverse student needs.
- **Professional Development:** online courses, webinars, and teacher networks allow ESP teachers to stay updated on new trends and develop their teaching practice.
- **Data-Driven Learning:** technology allows teachers to monitor students' progress or performance through analytics and allows teachers to modify their instruction.
- **Time Saving:** online assessment, templates, or scheduled link tools can minimize the administrative load and allow teachers more time for teaching and learning.

5 Challenges of technology integration in ESP

While technology provides many benefits for teaching/learning (ESP), there are some challenges also. These challenges can be a barrier to both students and teachers and limit the effectiveness of technology when it is used in an ESP classroom. Understanding these challenges is important to identify better ways of using technology to support students learning ESP.

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5.1 The learners' Challenges

5.1.1 Limited Digital Literacy

Many ESP learners experience unequal technology access with computers, tablets, or constant internet use. This is known as a digital divide with significant inequity, especially in rural or low-income communities of learners' access to these technologies. Without consistent access to resources, learners are not able to fully engage in online lessons, they may not be able to access digital resources, and they may not be able to provide a completed assignment. According to the UNESCO report, over 40% of people around the world do not have access to the internet at home. If learners' access to technology is limited, they will not realize the potential advantages of technology enhanced learning. Lack of digital literacy can hinder learners' academic achievement.

5.1.2 Distraction and Technology Overuse

While technology can offer interactive and engaging learning tools, it can also become a source of distraction. Students often find themselves distracted by social media, games, and multitasking, which can negatively impact their overall learning experience and ability to retain information. Additionally, learners might start to rely too heavily on tools like automatic translators, spell checkers, and grammar correctors. When they rely on technology too much, they might lose their ability to solve problems independently or think critically without digital help. Alshumaimeri (2011) highlights this issue, stating: "Overdependence on technology may lead learners to neglect fundamental language skills, such as reading comprehension and writing fluency, especially when technological tools become substitutes rather than supplements."

(Alshumaimeri, Y.,ibid, Turkish Online Journal of Educational Technology)

5.1.3 High costs of advanced educational technologies

A significant challenge associated with the integration of modern educational technologies into teaching and learning is the high cost. Schools and institutions may have to spend considerable amounts of money on hardware - computers, tablets, interactive whiteboards, virtual reality tools, etc. which can be very expensive. In addition to the purchase, these devices need regular updates and technical support to ensure they function properly.On top of that, there are significant costs related to software licenses, subscriptions for learning platforms, and the development or acquisition of quality digital content tailored to specific subjects like ESP.

Furthermore, many institutions have to enhance their internet infrastructure to accommodate these technologies, which also represents costs. Ongoing costs also include training teachers to effectively utilize these new tools and providing technical support for both staff and students.These cumulative costs can be burdensome, largely for schools that have limited budgets, making it difficult to implement and maintain advanced technology integration in education.

5.2 The Teachers' Challenges

5.2.1 Lack of training

Numerous ESP instructors they have not had enough training to effectively use digital tools in their classrooms. Without professional development that emphasizes practical applications, these teachers might find it challenging to incorporate technology in a way that truly addresses their students' needs. For instance, many teachers at Bouira University, particularly in the Biology Department, have not received any training and often find themselves on their own when it comes to adapting platforms like Moodle, Google Meet, Kahoot, or specialized ESP apps to fit their students' professional needs. Without proper training, many educators tend to use technology just to "replace" traditional face-to-face tasks, such as sharing PDFs, rather than creating engaging, learner-centered experiences.

5.2.2 Resistance to Change

Even when teachers have access to the right resources and training, some are unwilling to change their methods of teaching because of the idea that they are losing control over classrooms, the possible failure of technology in front of their students, or the doubtful mindset of whether technology truly enhances learning. Overcoming this resistance is not just to provide effective training on technology; it is to provide ongoing support and motivation and show clear evidence that it can truly create a positive impact on student engagement and success. As Ertmer (2005) suggests, such beliefs are termed as second-order barriers, indicating that they are internal barriers that are typically harder to overcome than external barriers.

Ertmer (ibid) categorizes such resistance as first-order and second-order barriers where first-order barriers often include external factors (e.g., access to technology and professional development and training), while second-order barriers are individual teachers' beliefs, attitudes, and values. He (ibid) states that: *"Teachers' personal beliefs about teaching and learning are often the most significant barriers to meaningful technology integration."* (p 47-61)

5.2.3 Technical Difficulties and Infrastructure Problems

One major problem for both teachers and learners, using technology in ESP classes is dealing with technical issues and poor infrastructure. Problems include bad internet connections, outdated devices, software glitches, and not enough maintenance or tech support in schools. These issues can interrupt lessons, waste time, lower lesson quality, and frustrate teachers and students. As Warschauer (2004) notes, technology use will only work well when everyone has equal access. Even if teachers are motivated and prepared to use technology, their attempts can fail if the needed infrastructure is weak or unreliable.

Without stable internet, working computers, and quick technology help, teachers might worry that technological issues will make them lose control of lessons. This fear often drives them back to traditional teaching methods, which seem safer and more dependable.Certainly, for technology to work for teachers' purposes, simply installing digital tools is not enough. Schools must adapt and develop a positive and strong technology environment so teachers can use tech confidently and effectively.

6 The Role of Teacher in Technology integration

The integration of technology in ESP classrooms has transformed the educational landscape, but it has not taken away the importance of teachers. In fact, teachers are still vital as facilitators, mediators, and decision-makers in the learning journey. As stated by Zhao et al. *"Technology integration is not about using tools to replace teachers, but rather to empower them to create more effective and engaging learning environments."* (2002: p 482–515).

Teachers have a crucial role to play in choosing, modifying, and presenting technology-enhanced materials that align with learners' specific language needs. According to (Ertmer: ibid) integration is more dependent on the beliefs and willingness of the teachers to adapt than the technology itself. Mishra & Koehler (2006) highlight the importance of teachers' Technological Pedagogical Content Knowledge (TPCK), which allows them to combine the subject matter knowledge, teaching practices, and digital tools for effective learning.

In fact, teachers have a responsibility to address the challenges associated with technology integration. For instance, they must make sure that digital tools enhance their teaching methods instead of leaving the learners in a distressed state or overwhelming them (Ali: ibid). Teachers have to be ready to manage technical issues, decide how learners can optimize their use of the digital tools and facilitators,and offer guidance on how to effectively use these digital

tools,ensuring that students can truly benefit from the advantages of technology-enhanced learning environments.

While digital tools offer an important support and enhancement to ESP instruction, they can never replace the same human capacity of teachers. The success of technology in education ultimately relies heavily on the ways teachers use it to meet learner needs and support successful learning.

7 Future directions and recommendations

Although integrating technology into ESP instruction and learning constitutes a great advantage, there are also some drawbacks that should be considered carefully.To make sure that digital tools truly benefit learners and enhance their outcomes, future initiatives should concentrate on delivering effective solutions and strategies. This means boosting digital literacy, providing teacher training, encouraging motivation, and building a supportive infrastructure. As Almekhlafi and Almeqdadi (2010: p165) point out: "Success in integrating technology lies not only in its availability but also in how it is implemented and supported through planning and training." The recommendations that follow are designed to improve the integration process and foster a more inclusive, engaging, and effective learning environment for ESP learners.

Additionally, there is a need to dive deeper into how effective technology integration really is in ESP education over the long haul. Future studies should take a closer look at how different digital tools and teaching strategies affect student outcomes, along with the hurdles that come with putting them into practice. This kind of research could help shape solid, evidence-based guidelines for integrating technology, making sure that educators and institutions can confidently choose the right digital tools for their ESP courses.

7.1 Develop personalized learning paths

Future integration should emphasize adaptive technologies that adjust to individual learners' unique needs, preferences, and pace. Personalizing learning meets learners' desires for independence, which increases motivation and allows learners to engage with ESP skills more successfully. Johnson et al. (2016) assert, *"Adaptive learning technologies can provide learners with the personalized support that traditional classroom-based approaches cannot."*

7.2 Invest in Virtual Reality (VR) and Augmented Reality (AR):

Virtual Reality (VR) and Augmented Reality (AR) are paving the way for the future of (ESP) instruction. These innovative technologies can recreate real-life professional environments like hospitals, airports, or business meetings, allowing learners to practice the specific language and communication skills they will need in real-world situations. By immersing students in these interactive and realistic scenarios, VR and AR make language learning not just more engaging but also more memorable and practical.

As Godwin-Jones (2016) points out, "VR and AR technologies offer immersive environments that can significantly enhance language learning experiences," emphasizing how these tools go beyond the traditional classroom to provide dynamic and meaningful practice opportunities. These experiences can enhance learners' technical language skills while also boosting their confidence in using English in their future careers.

7.3 Design Technology Policies

When it comes to effectively integrating technology into (ESP) teaching, it is crucial for institutions to establish clear and structured policies. These guidelines should outline how and when technology should be used in lessons, as well as the reasons behind its importance in reaching learning objectives. Without this kind of planning, technology use can end up being inconsistent, random, or even ineffective across various courses or classrooms.

As Hew and Brush (ibid: 237) highlight, *"lack of vision and policy support is one of the major barriers to successful technology integration."* This highlights the need for a strong commitment from institutions, strategic planning, and ongoing support to make technology integration a success.

7.4 Provide teacher training

One of the key areas we need to focus on to enhance technology integration in ESP is investing in continuous professional development for teachers. It is not that many teachers are resistant to using educational technology; rather, they often struggle simply because they have not received the necessary training and support. As Tondeur et al. (2012 p134) point out, "professional development is key to preparing teachers for meaningful use of technology."

This highlights that without consistent and effective training, even motivated teachers might find it challenging to implement technology in ways that truly improve learning outcomes. This challenge is particularly evident at the University of Bouira, especially within the Biology Department, where many teachers have not had any training on how to effectively incorporate

technology into their teaching methods. A lot of them still struggle with even basic tools like Google Meet for online classes.

7.5 Integrate Gamification Techniques

Gamification is the use of game elements, such as points, badges, leaderboards, and rewards, in non-game context (like education). Gamification can quickly change traditional engagements into more interactive and rewarding ones. For example, awarding badges when students learn certain vocabulary fields (i.e., medical vocabulary or business vocabulary) or organizing friendly competitions among students can really boost motivation, engagement, and persistence. According to Deterding et al. (2011: p 09), "gamification can significantly increase user engagement and motivation in educational environments." Gamification enables the learning engine to tap into the intrinsic reasons for learning, such as achievement, winning, recognition, or competition. A meta-analysis by Hamari et al. (2014) found that 70% of students felt more engaged when gamification was part of their learning experience, highlighting how game mechanics can enhance participation and enjoyment.

However, it is crucial that gamification strategies align with learning objectives to avoid focusing too much on competition rather than skill development (Domínguez et al., 2013).

Therefore, careful planning is key to ensuring that learners stay focused on their professional language needs while enjoying a more vibrant learning atmosphere.

Conclusion

To sum up, technology can play a crucial role in teaching and learning ESP. It provides new ways to assist students and make lessons more effective. However, technology success might be based on how it is used and by whom. Teachers need assistance and professional learning so they can use technology effectively, and there are still barriers to overcome. Overall, it is clear that technology has a place in the future of ESP, and more efforts are needed to make it effective and inclusive.

ChapterThree:Analysisand dResults of Students' Questionnaire andTeachers' Interview

Chapter Three:
Analysis and Results of Students' Questionnaire and Teachers' Interview

Introduction

This study aims to explore the current conditions of ESP teaching and learning in the Biology Department at Bouira University, and to examine whether third-year Biology students face difficulties in learning ESP. To achieve this objective, two research tools were employed: a questionnaire and an interview. The questionnaire was administered to third-year Biology students, while the interview was conducted with ESP instructors.

III. 1 The Descriptive Statistical Method

This research adopts a mixed-methods framework that integrates both quantitative and qualitative approaches, aiming to uncover statistical patterns as well as contextual insights within the target population. The analytical process utilizes descriptive statistics, following the model proposed by Allen and Davis (1978), to analyze numerical data, while inductive thematic analysis is employed to interpret qualitative, narrative responses. This combination of methods ensures a comprehensive understanding of the data collected through standardized questionnaires and semi-structured interviews.

III 2 The Students' Questionnaire

2.1 Description of the Questionnaire

In the biology department, ESP is taught during the first year, second and third yearjust for one semester. The learners' questionnaire is handed to third-year students.

The whole population under investigation numbered two hundred and fifty (250) learners. We took one third 1/3 of this population to form our sample, i.e., eighty-three point three (83.3) learners. The questionnaire was distributed randomly among the students. Fifty (50) questionnaires were given out, and forty-four (44) questionnaires, representing 88%, were answered and returned. The remaining six questionnaires (12%) were not, as shown in the following table.

	N	%
Questionnaire handed	50	100%
Questionnaire returned	44	88,3%
No answer	6	12%

Table3: The Representativity ofQuestionnaire

The questionnaire is made up of five sections structured as follows:

Section One: General Information

This section aims to gather basic information about learners; academic background, English proficiency and prior experience to better understand their interaction with the English. (Q1) is about gender and investigates the number of the years they have been studying English at the University (Q2) and whether they show an interest to learn it (Q3) if yes, what is their level in this language (Q4) and if it helps them in their career (Q5) do they consider it important in their field (Q6)

Section Two: The Use of Technology Tools

This section aims to explore student's access to technology and the tools used in their ESP courses. It also examined the quality and usefulness of these digital resources in supporting biology learning. As (Q7) if students have access to Internet if yes, and (Q8) how would they rate the quality of these tools and what types of resources do they find the most useful (Q9).

Section Three: Impact and Engagement

This section aims to measure the impact of English students learning outcomes and engagement, as (Q10) do they think that the use of Technology improves their understanding and (Q11) what teaching methods do they find most effective in a teaching environment.

Section Four: Learning Experiences

This section explores the impact of technology on English language learning, focusing on the challenges students face, (Q12) difficulties encounter when using technology.

Section Five: Overall Evaluation

This section assesses how technology affected English language learning (Q13) whether students would recommend the use of technology in ESP teaching to their peers, aiming to measure their overall satisfaction and perceived benefits.

2.2. Analysis of the Questionnaire

Section One: General Information

1. Gender

	N	%
Male	19	38%
Female	31	62%
Total	50	100%

Table4: Learners 'Distribution According to Sex

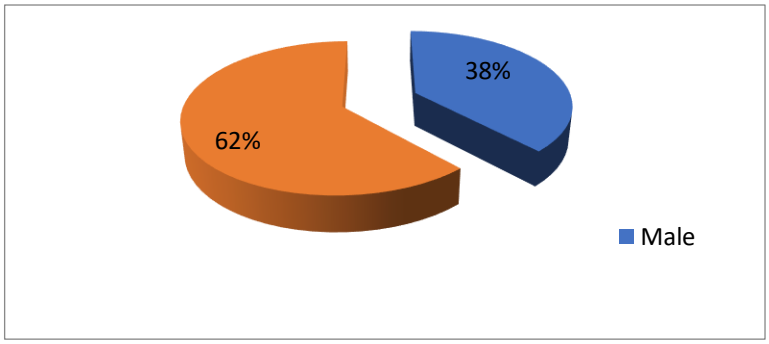

Figure 1: Learners' Distribution According to Gender

As shown in the figure, female learners represent the majority. A total of (62%) are female learners, compared to (38%) who are male.

2. How long have you been studying English at the university?

	N	%
1 year	3	6%
2 years	40	80%
3 years	7	14%
more	00	00%
total	50	100%

Table5: Learners' English Learning Year atthe University

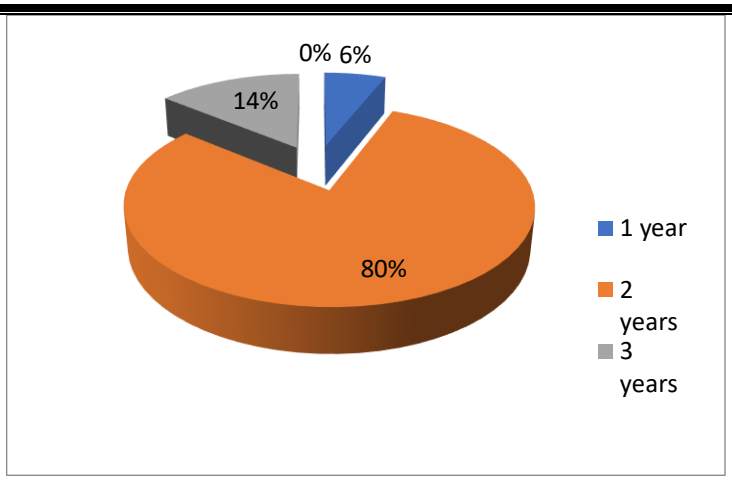

Figure 2 :Learners' English learning Year at the University

As shown in the figure, most learners have studied English for 2 years (80%). A smaller group has studied for 3 years (14%), and only a few have studied for 1 year (6%). This suggests that the majority are in the second year of their English studies at the university.

3. Are you interested in learning English?

	N	%
Yes	30	60%
No	20	40%
Total	50	100%

Table 6: Interest in Learning English

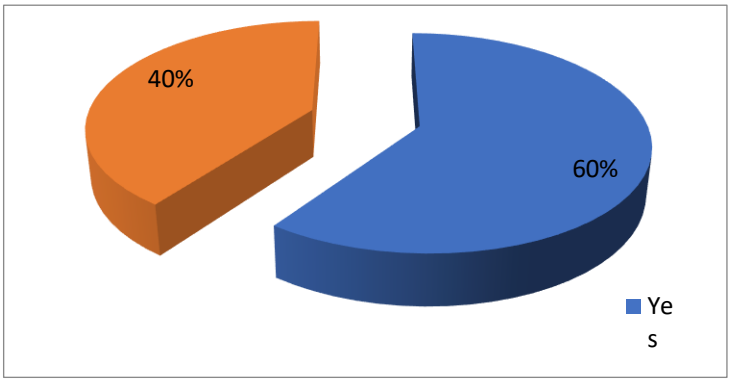

Figure3: Interest in Learning English

This question suggests that most learners (60%) said they are interested in learning English, showing strong motivation and an understanding of how important the language is. Meanwhile, 40% were less interested either seeing English as less useful or simply not putting much effort into learning it.

4. Is your level in English?

	N	%
Good	25	50%
Bad	10	20%
Excellent	15	30%
Total	50	100%

Table7: Learners' Level in English

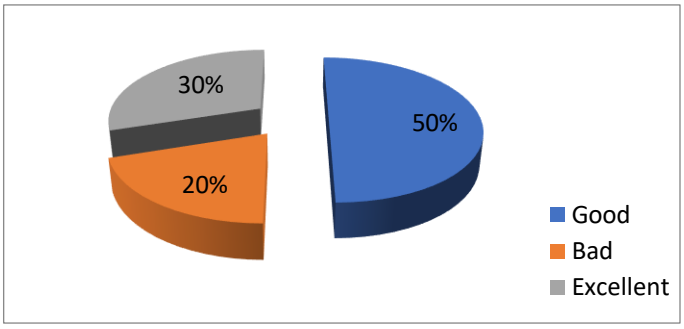

Figure 4 Learners' Level in English

As it is shown in the figure, 50% of the learners described their English level as good, while 30% rated it as excellent. Meanwhile, 20% of the them considered their level to be bad. These figures show a range of self-assessed language abilities among the learners.

5. Does the English language help you advance your career as a Biology student?

	N	%
Yes	35	70%
No	15	30%
Total	50	100%

Table8: Attitudes towards English for Career Advancement

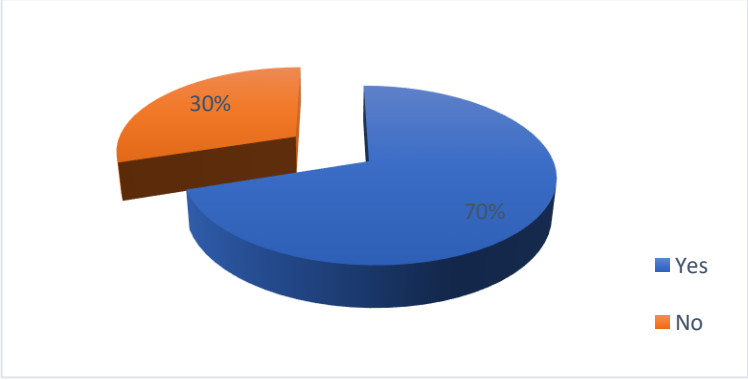

Figure 5: Attitudes towards English for Career Advancement

The majority of Biology learners (70%) considers English important for enhancing their careers, while (30%) do not see it as a significant factor in their professional development. These results suggest that most learners recognize the role of English in their career progression.

6. Do you think English is important in your field? How

	N	%
Yes	40	80%
No	10	20%
Total	50	100%

Table9: English Language Importance

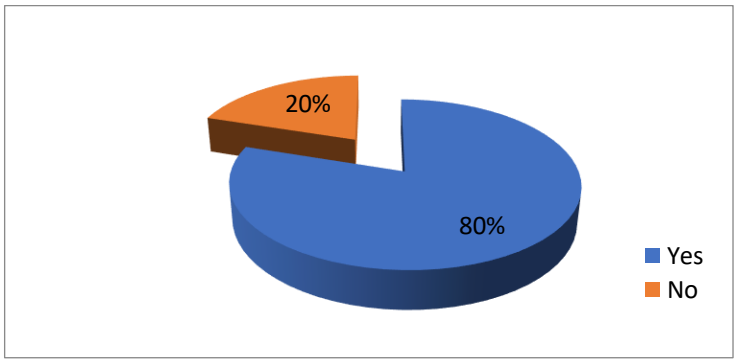

Figure6: English Language Importance

The data indicate that a significant majority of students (80%) acknowledge the importance of English within their academic discipline, suggesting a strong awareness of its relevance to both their studies and future careers. In contrast, a minority (20%) do not perceive English as essential, which may reflect either limited exposure to the language's professional applications or differing academic priorities. Overall, the findings highlight a general consensus among learners regarding the value of English as a foundational tool for academic and professional advancement.

Section Two: The Use of Technological Tools

7. Do you have access to the internet?

	N	%
Yes	50	100%
No	00	00%
Total	50	100%

Table 10: Learners' Access to the Internet

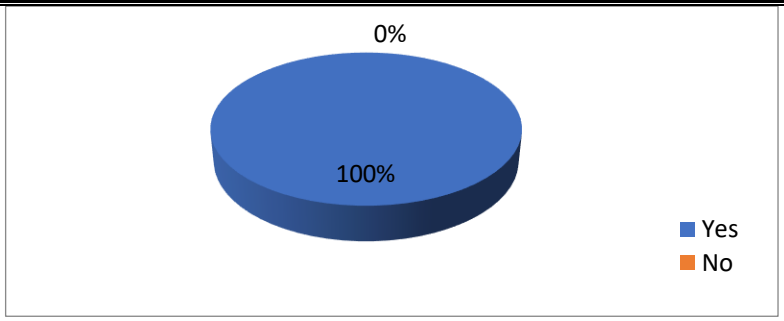

Figure7: Learners' Access tothe Internet

As shown in the figure, all learners (100%) reported having access to the internet. This suggests that internet access is fully available among the learners.

8. How Would You Rate the Quality of The Technological Resources Used in Your Courses?

	N	%
Never	4	8%
Occasionally	7	14%
Sometimes	16	32%
Often	13	26%
Always	10	20%
Total	50	100%

Table 11: Learners' Rating of Technological Resources Quality

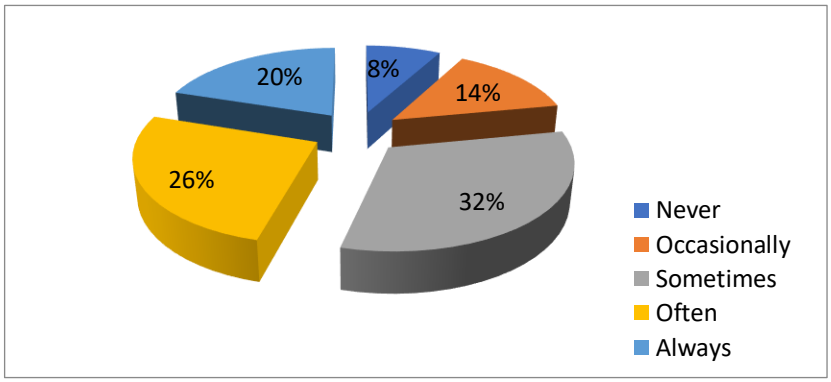

Figure**8**: Learners' Rating of Technological Resources Quality

As shown in the figure, many learners rate the quality of technological resources positively: 32 % say they sometimes find them reliable, 26 % often, and 20 % always. A smaller share is less positive, with 14 % choosing "occasionally" and 8 % "never." Overall, learners appear reasonably satisfied, although there is still room for improvement.

9. What Types Of Digital Resources Do You Find Most Useful?

	N	%
Educational videos	40	80%
Scientific articles	5	10%
Interactive simulations	3	6%
Discussion forums	2	4%
Other	0	0%
Total	50	100%

Table 12: Learners' Views on the Most Useful Digital Resources

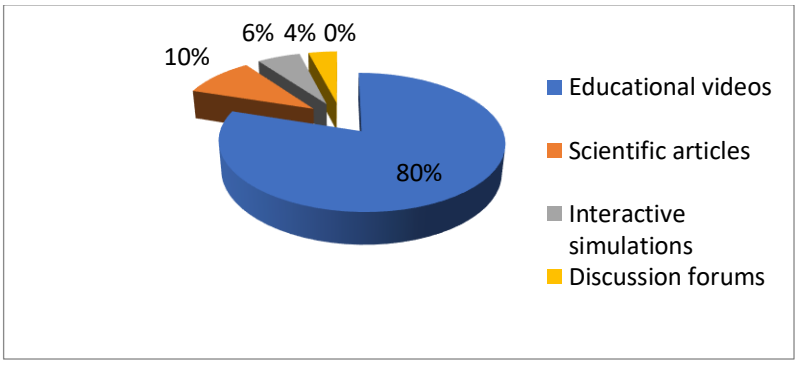

Figure 9: Learners'' View paints On the Most Useful Digital Resources

As the figure shows, educational videos (80 %) are the resource learners find most useful. By contrast, scientific articles (10 %), interactive simulations (6 %), and discussion forums (4 %) are far less popular, indicating a general preference for more accessible and engaging formats.

Section three: Impact and engagement

10. Do You Think That Using Technology Improves Your Understanding of ESP Subjects?

	N	%
Not at all	3	6%
A little	12	24%
A lot	35	70%
Total	50	100%

Table13: The Impact of Technology on Understanding ESP Subjects

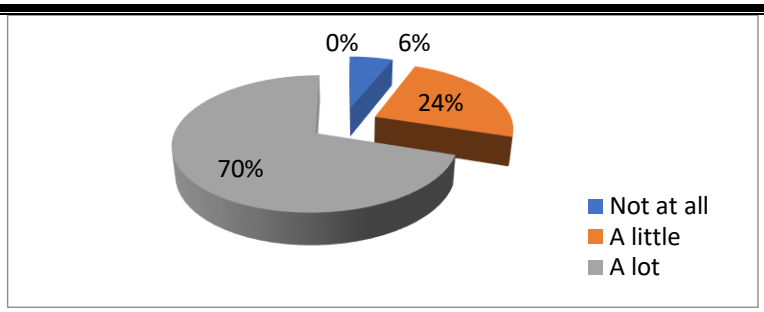

Figure 10: The Impact of Technology on Understanding ESP Subjects

As shown in the figure, most learners (70 %) report that technology greatly enhances their understanding of ESP subjects. A smaller share (24 %) say it helps only a little, while just 6 % feel it does not help at all. Overall, these findings indicate that technology has a positive impact on ESP learning for the majority of learners.

11. What Teaching Methods Do You Find Most Effective in A Technological Environment?

	N	%
Project-based learning	24	48%
Online lectures	15	30%
Online discussion groups	11	22%
Other	0	0%
Total	50	100%

Table14: Teaching Methods in Technological Environment

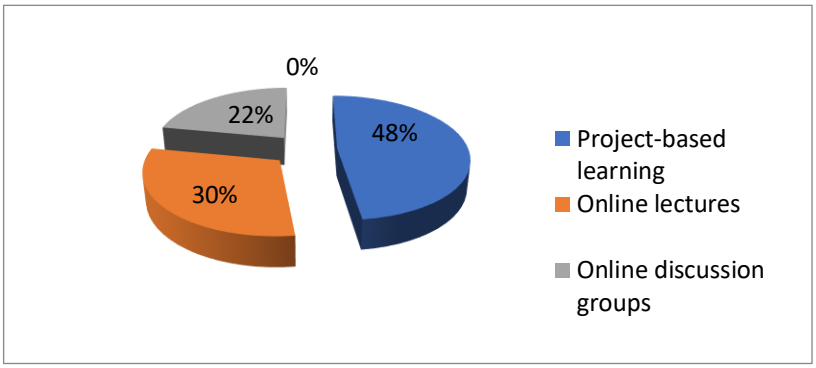

Figure 11: Teaching Methods in a Technological Environment

As shown in the figure, most learners find project-based learning (48%) the most effective in a technological environment. Online lectures (30%) and online discussion groups (22%) are also valuable. showing a strong preference for active and organized learning formats.

Section Four: Learning Experience

12. What Difficulties Do You Encounter When Using Technology for Your Studies?

	N	%
Technical issues	21	42%
Lack of time	18	36%
Difficulty navigating platforms	8	16%
Other	3	6%
Total	50	100%

Table15: Difficulties Encountered When Using Technology

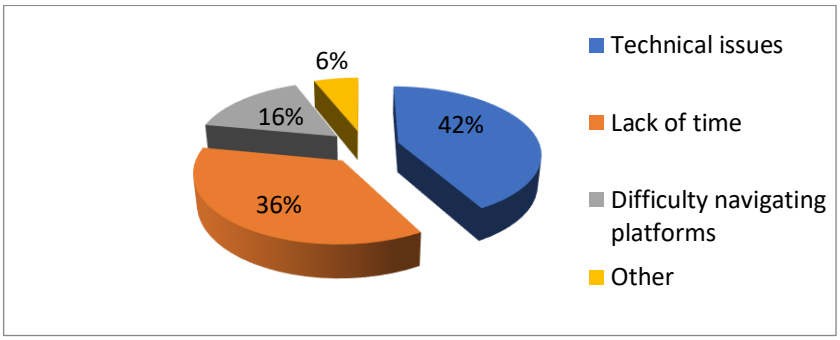

Figure 12: Difficulties Encountered When Using Technology for Studies

According to the results, it seems that technical issues (42%) and lack of time (36%) are the most common difficulties learners face when using technology. Difficulty navigating platforms was reported by 16% of learners, while only 6% mentioned other types of problems.

Section Five: Overall Evaluation

13. Would you recommend using technology in ESP learning to other students?

	N	%
Yes	41	82%
No	5	10%
Maybe	4	8%
Total	50	100%

Table 16: Recommendation for the Use of Technology in ESP Teaching

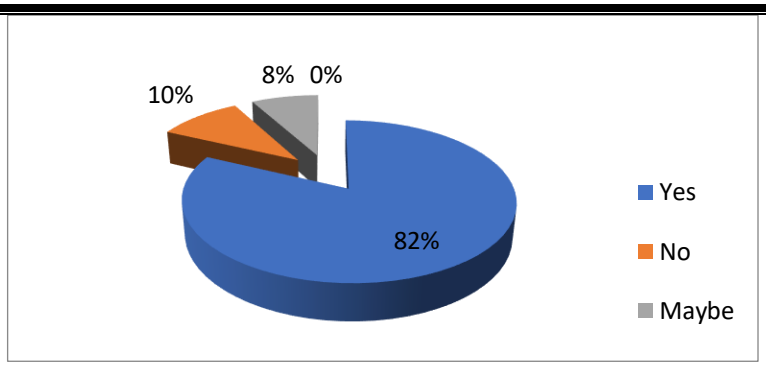

Figure13: Recommendation for the Use of Technology in ESP learning

As shown in the figure, the majority of learners (82%) would recommend the use of technology in ESP interaction. Maybe was selected by (8%) of learners, while (10%) of learners disagreed.

3. The teachers' interview

The biology department includes four English teachers. The number is small, we opted to carry the interview with two of them (only 02 teachers were available). The interview was conducted on an individual, face to face basis and took place in the amphitheater.

In fact, this is a structed interview, we asked all the teachers the same questions in the same order. It contains ten questions through which teachers are required to answer and justify some points.

3.1. Analysis of the interview

1- Gender

	N	%
Male	01	50%
Female	01	50%
Total	02	100%

Table 17: Teachers' Distribution according to Sex

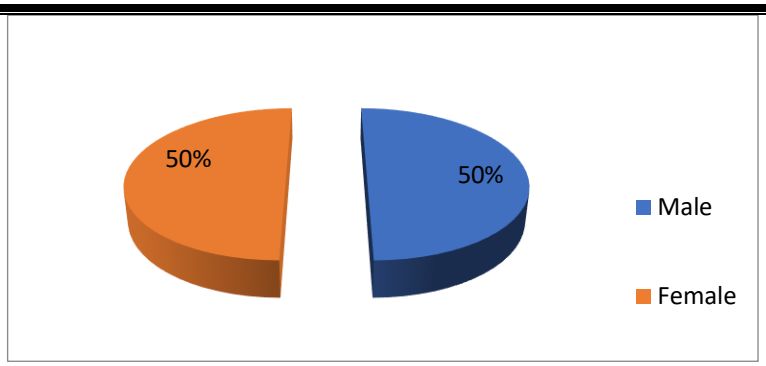

Figure 14: Teachers' Distribution According to Sex

We notice that the gender demographics of the teacher sample is balanced with an equal representation of male and female teachers.

2- What qualification do you hold

	N	%
License in English	02	100%
Master of English	00	0%
Total	02	100%

Table 18: Academic Qualification

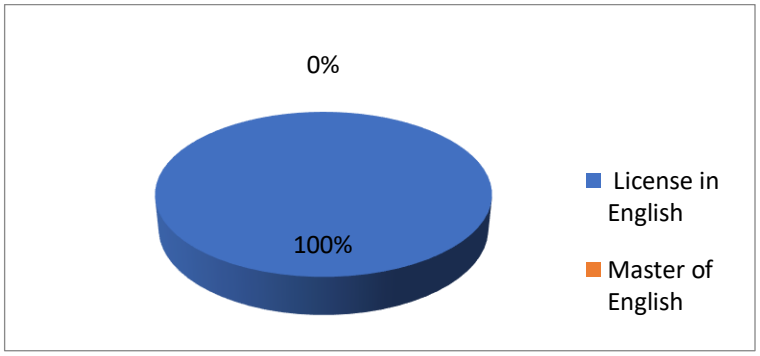

Figure 15: Academic Qualification

According to Table 23, both teachers hold a license degree in English instead of a Master's degree or higher. They also indicated that they have not received any training in ESP. This fact about their education may impact how well or deep the teachers can offer ESP instruction. They lack training to look for specific materials, match the correct pedagogy or application of new technology to the relevant of ESP. These factors illustrate the need for teachers to receive training and specific support in ESP.

3- How long have you been teaching English

	N	%
1 Year	00	00%
2 Years	01	50%
3 Years	01	50%
Total	02	100%

Table 19: Experience of Teaching English at the University

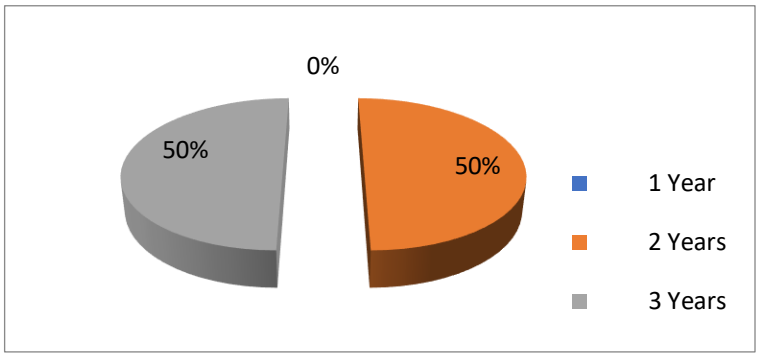

Figure 16: Experience of Teaching English at the University

Both teachers have only 2 to 3 years of teaching experience in the Department of Biology, and this is their first experience teaching ESP. They also stated that they have not taught in other departments.

4- Can you describe your experience in teaching ESP in the field of biology

	N	%
Excellent	00	00%
Good	01	50%
Not bad	01	50%
Total	02	100%

Table 20: The Teacher's Perception of Teaching ESP in the Biology Department

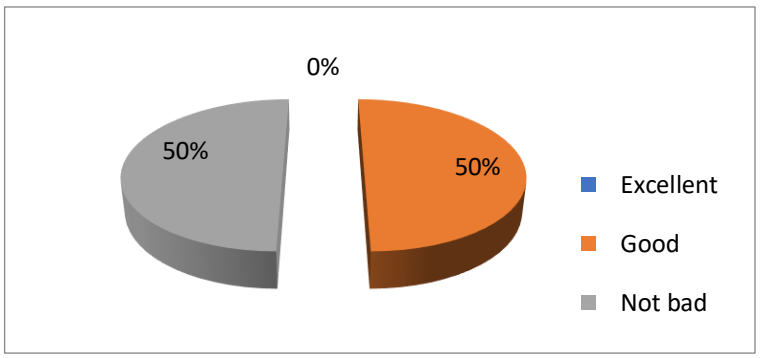

Figure 17: the teacher's perception of teaching ESP in the biology department

Both teachers rated their experience teaching ESP in the biology department as either "good" or "not bad," with neither considering it "excellent." This moderate evaluation suggests that their experience is generally pleasant, but the teachers may face some challenges that affect their teaching. The lack of a more rated response indicates factors such as limited experience teaching ESP, no training in ESP, or unfamiliarity with scientific content that may have had an impact on how confident and effective they felt in the classroom.

5- How often do you use technology in your ESP classes

	N	%
Always	00	00%
Sometimes	02	100%
Never	00	00%
Total	02	100%

Table 21: Teachers' Use of Technology in ESP Classes

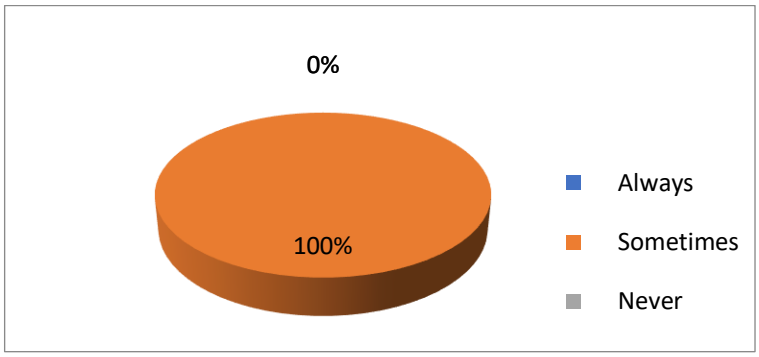

Figure 18: Teachers' Use of Technology in ESP Classes

As shown in Table 26, all the teachers 100% said they use technology sometimes in their ESP classes. This shows that technology is used, but not regularly or all the time.

6- In your opinion, does using technology in ESP classes help improve students' language proficiency. How?

	N	%
Yes	02	100%
No	00	00%
Total	02	100%

Table 22: Teachers' View on Technology and Language Proficiency in ESP

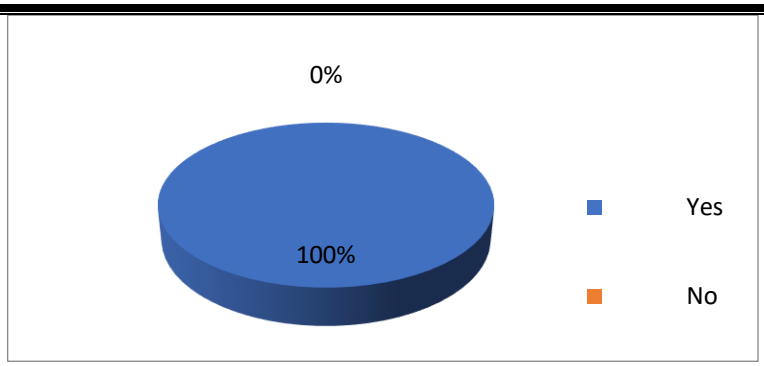

Figure 19: Teachers' View on Technology and Language Proficiency in ESP

According to the results shown in table 27, both teachers believe that using technology in ESP classes can help improve students' language proficiency. Technology makes lessons more engaging, and helps students practice skills in a more practical way. This demonstrates that teachers see technology as an effective resource in supporting language learning.

7- How? / Justify your answer

Teachers' justifications are summarized as follow:

- Technology makes real life videos, recordings, and materials related to the students' field available, which improves their listening and vocabulary.
- It enables students to rehearse emails, reports, and presentations with online tools, which make the assignments more practical.
- Technology encourages students to speak more by using voice recording applications or video presentation tools.

8- Compared to traditional methods. Do you believe technology enhances students' professional skills?

	N	%
Yes, it does	02	100%
No, it does not	00	00%
Total	02	100%

Table 23: Teachers' Beliefs on Whether Technology Enhances Students' Professional Skills Compared to Traditional Methods.

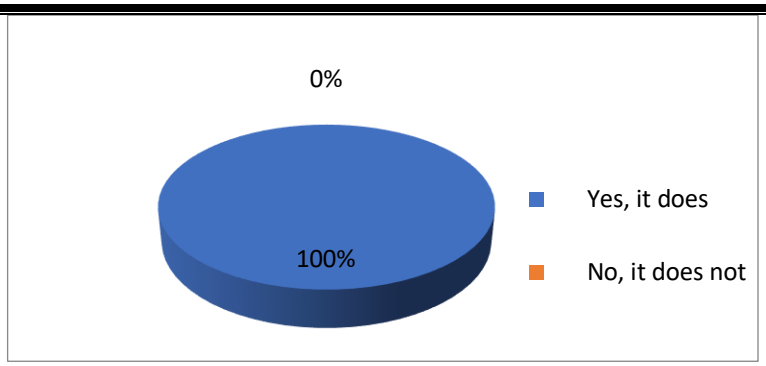

Figure 20: Teachers' Beliefs on Whether Technology Enhances Students' Professional Skills Compared to Traditional Methods.

In Table 28, both teachers expressed agreement that technology helps develop students' professional skills compared to traditional methods and stated that students show higher levels of motivation and engagement through technological tools (like the projector) in class. Overall, it is useful to remember that technology is useful in supporting learning and developing professional skills, but the impact of how we use technology is importantly distinctive.

9- Have you received any training in using technology? If yes, explain.

	N	%
Yes	00	00%
No	02	100 %
Total	02	100%

Table 24: Teachers' Training in using Technology

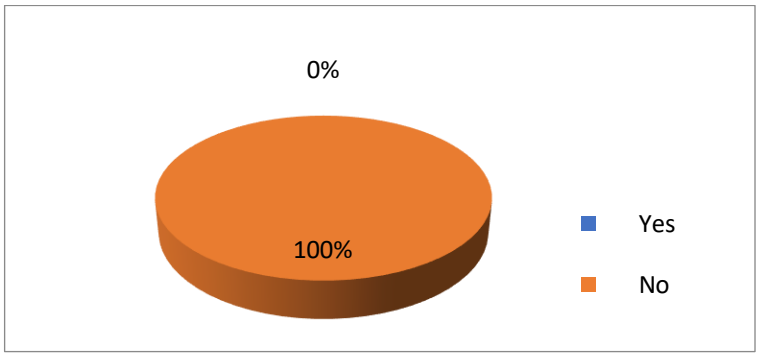

Figure 21: Teachers' Training in using Technology

The results of table 29 indicate that none of the teachers had a training on using technology in teaching ESP to biology students. This lack of training may limit the way they teach, particularly those teachers who are not familiar with even the basic use of technology, and they may simply not know how to use digital tools effectively due to not having sufficient training to

do so. This could limit how well technology can assist in the classroom and the overall effectiveness of its positive effects on the students learning.

10- How do your students respond to the use of technology tools (videos, online platforms…)

Responding to this question the teachers' answers was as follow (both of them have given almost the same answers)

- They are very engaged and motivated through the use of technology.
- They find it helpful but sometimes face technical issues.
- Some students respond in the same way regardless of whether technology is involved (technology does not influence their thinking or engagement)
- They are more active and participate more when using an online platform.
- They struggle to stay focused on online or Zoom lessons.

Responses from instructors show that, in general, students are positive about using technology in ESP classes. For many students, technology enhances engagement and motivation, particularly when instructors use more interactive tools and online opportunities to enhance learning. Some become more active and participate better during technology. Nevertheless, not all students show the same reaction, a few students do not respond differently from traditional methods, and a few students struggled with connectivity, technical issues, stay focused and engaged during zoom or online lessons. This suggest that while technology can be a helpful tool, its impact varies depending on several factors, including the students' preferences in learning style.

11- What are the Benefits you have Noticed from Integrating Technology into ESP Teaching:

	N	%
Enhances lesson engagement	01	50%
Encourages independent learning	02	100%
Helps in practice listening and speaking	02	100%
Helps explain scientific terms easily	01	50%

Total	06	100%

Table 25: The Benefits of Technology Integration

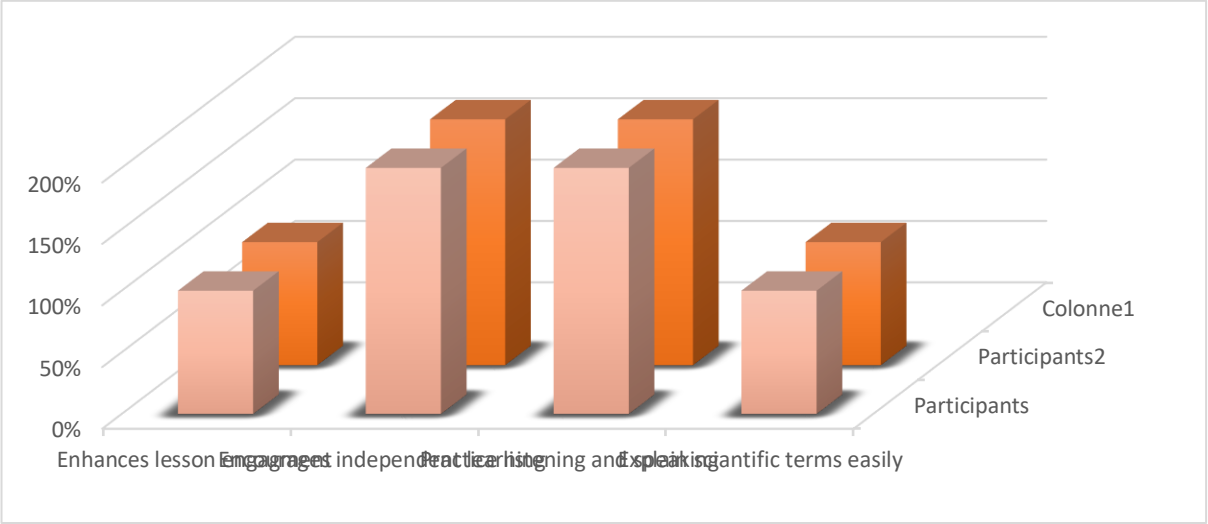

Figure 22: The benefits of technology integration

As shown in Table 30, both teachers (100%) agreed that technology use in ESP classrooms is useful for allowing students to practice their listening and speaking, and encourages independent learning. This is crucial not only for ESP learners, but particularly true for learners of subjects related to scientific disciplines like biology. One teacher (50%) even mentioned that technology provides a useful tool to help with engagement in the lesson and to help explain scientific terms with more ease. This suggests that although both teachers see distinct benefits to language practice and learner autonomy, the benefits of increased engagement in the lesson and explaining technical content, for example, may reflect the fact that it relies on how the technology is used in the classroom.

12- What Challenges or Limitations have you Faced when Using Technology in ESP Classroom?

	N	%
Not enough training in the use of tools	02	100%
Technical issues during lessons	02	100%
Students are easily distracted	02	100%
Low student motivation online	01	50%
Total	07	100%

Table 26: Challenges of Integrating Technology

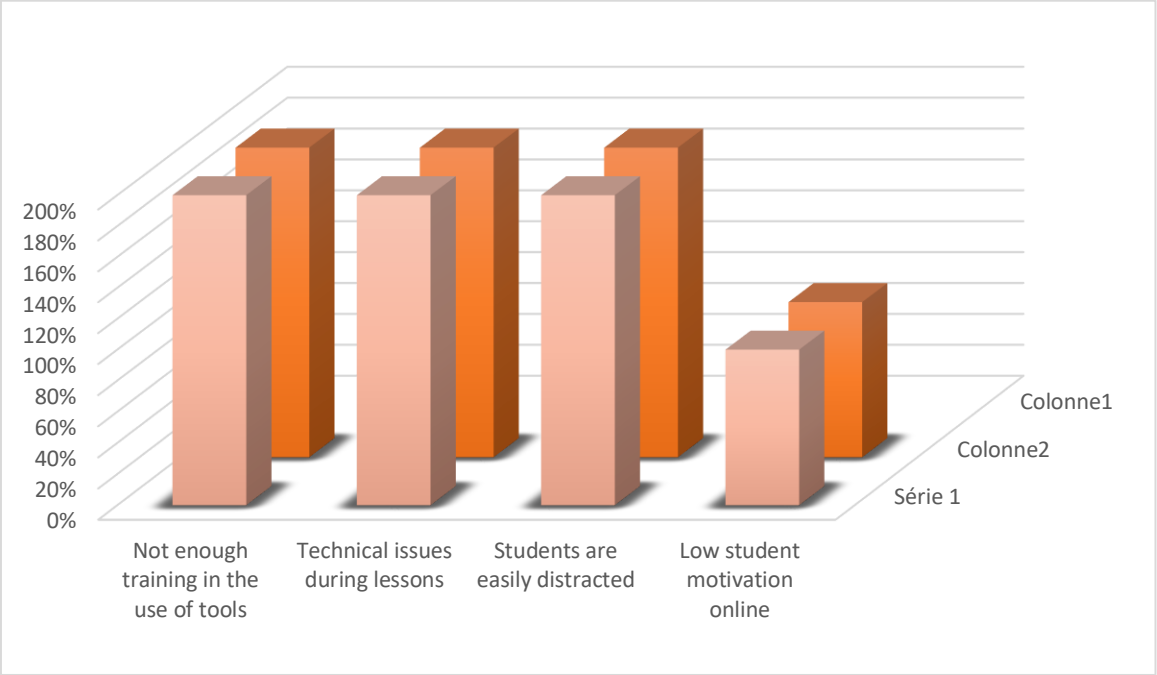

Figure 23: The challenges of integrating technology

Table 23 shows that both teachers (100%) reported a number of core challenges in applying technology in ESP class. These are lack of training for using digital tools, regular technical challenges in lessons, and learner distractions. These barriers can reduce the effectiveness of technology in supporting learning. Additionally, one teacher (50%) mentioned that online learning has had low student engagement, which can be seen as an observation that remote, or distance learning does not always engage learners as well as traditional, face-to-face methods. Overall, these responses highlight the need for training and ongoing technical support, along with approaches to maintain student engagement when incorporating technology within lessons.

III. 4 Findings of Students' Questionnaire and Teachers' Interview

After we analyzed both students' questionnaire and teachers' interview, key challenges emerged that hinder the effectiveness of the ESP course in the Biology department. Despite recognizing English's importance, both groups face instructional and organizational limitations affecting learning outcomes.

Lack of Training and Content Relevance

Teachers are not trained in ESP and lack familiarity with scientific content, which affects how well they can prepare relevant lessons. Students notice that lessons often don't match their field, which affects their motivation.

Limited Experience and Structure

The teachers have limited experience with ESP and work without a clear curriculum. As a result, some students receive more useful instruction than others, leading to uneven language progress.

Technology Use and Challenges

Both teachers and students see the value of technology in learning, but teachers lack training, and technical problems are common. Students use online tools, but access and time issues limit their effectiveness.

Engagement and Motivation Issues

Teachers rated their experience as only moderate. Students showed mixed motivation—often influenced by how clearly lessons connect with their studies.

Suggestions and Recommendations

1. **Provide Specialized ESP Training for Teachers**

Offer targeted professional development focusing on ESP methodologies, scientific vocabulary, and technology use. This will equip teachers to create more relevant and effective lessons tailored to biology students.

2. **Develop a Clear and Structured ESP Curriculum**

Design and implement a standardized curriculum that aligns with students' academic and professional needs. This will ensure consistency in teaching and help students progress uniformly.

3. **Enhance Technology Integration and Support**

Invest in training teachers to use digital tools confidently and reliably. Improve technical infrastructure and provide ongoing technical support to minimize disruptions. Encourage use of educational videos and interactive platforms favored by students.

4. **Foster Student Motivation Through Relevant Content**

Create learning activities linked directly to biology and students' career goals. Incorporate real-world scenarios and discipline-specific materials to increase engagement and perceived value.

Conclusion

This chapter examined the practical findings drawn from students' questionnaires and teachers' interviews, highlighting several obstacles affecting the success of the ESP course in the Biology department. Issues such as insufficient teacher preparation, lack of course structure, and challenges with technology use were found to hinder effective instruction and student engagement. The recommendations offered aim to address these problems and, if applied thoughtfully, can contribute to enhancing the overall quality of ESP teaching and learning in this context.

General Conclusion

General Conclusion

In a world where knowledge is rapidly expanding and transcending borders, the ability to communicate effectively in English has become more than a linguistic privilege it is a strategic academic and professional necessity. Now here is this more evident than in the realm of science and technology, where English functions as the global lingua franca. For students in scientific disciplines such as biology, access to current research, participation in international academic dialogue, and the ability to produce scholarly work are all contingent upon a solid command of English, particularly English tailored to their specific field of study.

Despite this acknowledged importance, achieving proficiency in ESP remains a complex challenge in non-English-speaking contexts. Many teaching practices continue to fall short of meeting learners' academic and professional needs, particularly when instruction is disconnected from disciplinary content or fails to incorporate relevant technological tools.When thoughtfully integrated, technology provides dynamic and personalized path ways for learning. It connects language instruction to authentic academic contexts, supports learner autonomy, and fosters deeper engagement. However, its implementation in ESP settings often remains, limited due to institutional constraints, lack of training, and minimal strategic planning.

The present study investigated these issues within the biology department at the University of Bouira, examining how technology is being used or not used in ESP instruction and the implications for students' academic engagement. Specifically, it sought to explorehow technology is being utilized in ESP classes for Biology students at Bouira University, its benefits, the issues encountered by the teachers, and how its integration can be optimized**.**

It was structured into three chapters: a theoretical overview of ESP, a discussion of technology in language education, and a field investigation involving student questionnaires and teacher interviews.The mixed-methods approach revealed a strong awareness among students of the importance of English for academic and professional success, accompanied by dissatisfaction with the limited and disconnected instruction they currently receive.

Teachers echoed these concerns, highlighting challenges such as vague curricular guidance, insufficient collaboration with subject specialists, and a lack of institutional support for digital integration.Among the core issues identified were an underdeveloped ESP curriculum, limited access to discipline-specific materials, marginalization of English in the academic

program, and a clear disconnect between language instruction and scientific content. The absence of needs analysis and feedback mechanisms further undermines the development of responsive, effective instruction.

Despite these challenges, both students and instructors demonstrated a clear willingness to embrace innovation, particularly through educational technology. The growing shift toward blended and mobile-assisted learning offers promising avenues for renewing ESP instruction, provided such tools are implemented within tentionality and support.

Addressing the current gaps requires systemic and collaborative reform. Effective ESP programs must be grounded in interdisciplinary cooperation, guided by clearly defined curricular objectives, and supported by teacher development and technological infrastructure. Viewing technology not as an optional enhancement but as an integral part of the learning process is key to creating more engaging, relevant, and outcome-driven instruction.

Enhancing ESP in biology and related scientific fields depends on sustained efforts to modernize instructional practices. Data-informed design, cross disciplinary collaboration, and strategic use of technology can lead to scalable improvements that better prepare learners to engage with academic content and communicate effectively in an increasingly English-dominated global scientific community.

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Appendices

Appendices

Appendix I: Students' Questionnaire

Section one: General Information

1. Gender

Male☐

Female☐

Prefer not to say☐

2. How longe have you been studying English at the University?

One year☐

Two years ☐

Three years ☐

3. Are youinterested in learning English?

Yes ☐No☐

4Your level in English is?

Good☐

Bad☐

Excellent ☐

5. Does the English language help youadvanceyourcareer as a biologystudent?

Yes☐ No ☐

6. Do youthink English is important in yourfield?

Yes☐ No☐

7. Have youtakenany ESP courses?

Yes☐ No☐

Section Two: The use of Technological Tools

8. Do you have access to the internet?

Yes☐ No☐

10. How wouldyou rate the quality of the technologicalresources used in your courses?

Occasionally ☐ Often ☐

Always ☐ Sometimes ☐

Never ☐

11. What types of digital resources do youfindmostuseful?

Educationalvideos☐ Interactive simulations☐

Discussion forums☐ scientific articles☐

Section three: Impact and Engagement

12. Do youthink that using technologyimproveyourunderstanding of ESP subjects?

Not at all

A little

A lot

15. What teachingmethods do you, findmost effective in a technologicalenvironment?

Appendices

Project-basedlearning☐ Online lectures☐

Online discussion groups☐

Appendix II: Teachers' Interview

12-Gender

Male ☐

Female☐

13-What qualification do youhold?

License in English☐

Master of English☐

14 How long have you been teaching English?

1 year☐

2 years ☐

3 years☐

15 Can youdescribeyourexperiences in teaching ESP in the field of biology?

Excellent ☐

Good ☐

Not bad☐

16 How often do you use technology in your ESP classes?

Always☐

Sometimes☐

Never☐

17 In your opinion does using teaching in ESP classes help improvesstudents language proficiency how

Yes☐

No☐

Justifyyouranswer.

……..

18 Compared to traditional methods Do youbelievetechnologyenhancestudents'professionalskills?

Yes, it does☐

No, it does not☐

19 Have your receivedany training in using technology?Ifyesexplain

Yes ☐

……

No☐

20 How do yourstudents respond to the use of Technological tools?

Video☐

Online platforms☐

21 What are the benefitsyou have noticed from integratingtechnology into ESP teaching?

Enhance lesson engagement ☐ Encourages Independent Learning☐

Helps in practice listening and speaking☐ Helps explain scientific terms easily☐

22 What challenges or limitations have youfacedwhen using technology in ESP classroom?

Appendices

Not enough training in the use of tools ☐

Technical issues during lessons☐

Students are easily distracted☐

Low student motivation online☐

Appendices