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The Impact of an Integrated ESP Mobile Application on Students' Performance in Medical English: A Case Study of First-Year Medical Students

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Declaration of Originality

I hereby declare that this submission is my work and contains no material previously published or written by another person nor material accepted for the qualification of any other degree or diploma of a university or other institution.

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Dedication

I thank the Almighty Allah for providing me with strength and patience to accomplish this work.

This dissertation is lovingly dedicated to:

My beloved father,

whose absence has left an emptiness that words can never describe, 'Allah Yerhmek'.

I wish with all my heart that you were here to see this moment and share this achievement with me.

Although life took you away too soon, your presence still lives in my heart and continues to guide me every day.

This accomplishment is as much yours as it is mine.

May you rest in eternal peace, knowing that you will always be deeply loved and never forgotten.

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who carried the weight of both a mother's love and a father's strength with endless sacrifice and devotion.

Thank you for being my source of comfort, courage, and unconditional support.

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Abstract

With the increased integration of technology in educational activities, the use of mobile technologies to support learning is gaining prominence in helping students acquire specialized language competencies required for Medical English. This study seeks to examine the impact of an integrated ESP mobile application on the performance of first-year medical students in Medical English classes at Dr. Moulay Tahar University of Saida. In particular, this study aims to explore the views of students about the usefulness and accessibility of the application and its potential for enhancing the acquisition of language and medical terminology skills. This topic is highlighted due to the linguistic barriers experienced by medical students in English-medium medical education, especially regarding the mastery of medical terminology and academic communication. To fulfill the main aim of the present study, a mixed-method approach is implemented. The researcher has integrated the Needs analysis questionnaire, pre-test, post-test, and semi-structured interviews. The questionnaire and test were administered to twenty-five first-year medical students, and the interviews were conducted with five medical students selected from the same sample. The results of this research indicated that the integrated ESP mobile app had an impact on the students' performance in Medical English. The findings revealed a significant change in the scores attained by the students in the post-test in comparison with the pre-test scores, indicating improved language proficiency as well as acquisition of medical terminology. Additionally, Students demonstrated positive attitudes toward the application, highlighting its ease of use, accessibility, and effectiveness in facilitating their learning process. The results further indicated that the use of the app facilitated the enhancement of students' motivation, reading comprehension, academic writing, and understanding of medical vocabulary in context. In light of these findings, the research underscores the importance of incorporating ESP theories within the realm of mobile-assisted language learning in the field of medicine. The recommendations presented in this study promote the integration of technology-enhanced approaches in Medical English instruction and highlight the importance of developing more specialized and interactive educational applications that address learners' evolving academic needs.

Keywords: *English for Medical Purposes (EMP); English for Specific Purposes (ESP); Mobile-Assisted Language Learning (MALL); Medical English; First-Year Medical Students.*

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List of Acronyms

ADDIE: Analysis, Design, Development, Implementation, Evaluation

EFL: English as a Foreign Language

EMP: English for Medical Purposes

ESP: English for Specific Purposes

MALL: Mobile-Assisted Language Learning

MVVM: Model-View-ViewModel

PSA: Present Situation Analysis

SAS: Statistical Analysis System

SPSS: Statistical Package for the Social Sciences

TELL: Technology-Enhanced Language Learning

TSA: Target Situation Analysis

General Introduction

The increasing globalization of higher education and scientific discourse has established English as the primary language of medicine, research, and academic exchange worldwide. In the context of medical education, students are required to master not only scientific content but also the linguistic competencies needed to follow lectures, understand medical texts, communicate in professional settings, and employ specialized terminology accurately. Therefore, English for Specific Purposes (ESP), and more specifically English for Medical Purposes (EMP), has become a fundamental component of contemporary medical education.

Although the importance of Medical English continues to grow, many first-year medical students face considerable difficulties transitioning from General English to English-medium medical studies. Medical English is distinguished from General English by its complex terminology, scientific discourse, formal writing conventions, and specialized communication requirements. As a result, students often encounter challenges in comprehending medical terminology, interpreting clinical expressions contextually, pronouncing scientific vocabulary, and communicating medical concepts effectively in English.

These challenges are especially pronounced in Algerian universities, as a significant number of medical students enter higher education with only intermediate General English skills. While students may demonstrate general linguistic competence, they commonly face challenges adjusting to the specialized language demands of medical studies. Initial observations and discussions with first-year medical students at Dr. Moulay Tahar University of Saida revealed that many relied heavily on literal, word-for-word translation when reading medical texts or listening to lectures. Students further expressed challenges associated with terminology retention, academic writing skills, pronunciation, and understanding specialized medical discourse.

Alongside linguistic challenges, the current EMP (English for Medical Purposes) learning environment suffers from several pedagogical shortcomings. Traditional teaching methods frequently prioritize rote memorization of theory over interactive, student-centered learning practices. In addition, there is an insufficient availability of specialized digital tools intended to facilitate Medical English learning among Algerian medical students. Consequently, many students find it difficult to autonomously learn and retain medical vocabulary, ultimately undermining both their academic performance and their confidence.

A further significant issue stems from the fragmentation that separates language instruction from medical content instruction in the university curriculum. English instruction is delivered independently from medical courses, resulting in limited integration between linguistic development and medical specialization. Therefore, students frequently struggle to bridge the gap between the linguistic skills developed in English courses and the real-world medical contexts they face in their scientific coursework. This separation limits students' ability to translate language theory into academic and clinical practice, making Medical English learning both more challenging and less meaningful.

The motivation for this study stems from these pedagogical insights and the researcher's focus on integrating educational technology into specialized language acquisition. It was demonstrated that learners needed a more flexible and interactive learning environment capable of enhancing their Medical English skills beyond the classroom. To address this, the researcher developed a dedicated ESP mobile application designed to help first-year medical students master medical vocabulary and enhance their language skills through interactive, student-centered activities.

In recent years, advancements in educational technology have fundamentally reshaped the landscape of language learning. The growing importance of Mobile-Assisted Language Learning (MALL) in digital education stems from its capacity to support flexible, accessible, autonomous, and continuous learning. Mobile learning platforms provide learners with constant access to educational materials, fostering learner autonomy and repeated engagement with learning activities. These features are especially advantageous in EMP learning, where students need continuous exposure to specialized vocabulary and contextualized language practice.

The current research is grounded in the combined fields of ESP, EMP, and MALL. While ESP establishes the broader pedagogical framework by targeting students' precise academic and professional needs, EMP serves as the specialized subset focused directly on medical communication and terminology. MALL, however, serves as the technological framework that enables learner-centered and adaptable language learning settings. Accordingly, this study bridges linguistic and technological dimensions to explore how mobile learning can facilitate Medical English acquisition among first-year medical students.

While prior research has extensively investigated the role of mobile applications in language education, the majority of these studies have centered on General English rather than specialized medical domains. Correspondingly, numerous EMP studies have analyzed vocabulary acquisition and linguistic challenges without incorporating educational technology into the instructional process. Additionally, the effectiveness of ESP mobile applications in the Algerian medical education context remains underexplored. Consequently, this study aims to bridge that gap by evaluating how an integrated ESP mobile application affects student performance in Medical English, while simultaneously exploring learners' perspectives on its usability, accessibility, and effectiveness.

This study primarily aims to examine the impact of the integrated ESP mobile application on students' performance in Medical English. In particular, it aims to pinpoint the challenges first-year medical students encounter when learning Medical English, assess the application's effectiveness in enhancing medical vocabulary and language skills, and analyze student feedback regarding the app's usability and utility, and bridge the gap that separates language acquisition from medical science education.

Consequently, the following research questions guide the present study:

- What difficulties do first-year medical students encounter in learning Medical English?
- What is the impact of the integrated ESP mobile application on students' performance in Medical English?
- How do students perceive the usability and effectiveness of the application?
- How does mobile-assisted learning support motivation and autonomous learning in EMP education?

To address these questions, the study tests the following hypotheses:

- First-year medical students encounter significant challenges in acquiring specialized medical terminology and developing professional communication skills.
- The integrated ESP mobile application has a positive effect on students' performance in Medical English.
- Students express positive perceptions regarding the usability and effectiveness of the application.

- Mobile-assisted language learning positively influences learners' motivation levels and fosters independent learning in Medical English education.

This research is significant because it offers valuable insights across three core dimensions: pedagogical, practical, and theoretical. From a pedagogical perspective, the study supports the improvement of EMP instruction through the adoption of a learner-centered and technology-enhanced approach to Medical English education. Practically, the study introduces a highly accessible and flexible tool designed to assist medical students in mastering specialized terminology and improving their language proficiency. The study theoretically enriches the literature related to ESP, EMP, and MALL through the combination of specialized language instruction and educational technology innovation.

This study employs a mixed-methods approach, combining quantitative and qualitative instruments for comprehensive data collection. The study employed questionnaires and pre-test/post-test evaluations to collect quantitative data on students' performance and progress, while qualitative data were obtained through semi-structured interviews examining students' perceptions and experiences regarding the application. Employing a mixed-methods design facilitates a deeper, more comprehensive understanding of both the student experience and their linguistic development.

This research comprises four interconnected chapters that build upon one another. The first chapter provides the theoretical background associated with ESP, EMP, and Mobile-Assisted Language Learning. The second chapter focuses on the design and development of the ESP mobile application and outlines its pedagogical basis. The third chapter details the research methodology, providing a comprehensive overview of the study design, participant population, sampling methods, and data collection tools. The final chapter analyzes and interprets the collected data, leading to a comprehensive discussion of the results and offering recommendations based on the findings.

Ultimately, this research aims to contribute valuable insights to current debates surrounding the role of digital learning tools in domain-specific language education. Linking mobile-assisted educational technology with Medical English pedagogy, this investigation endeavors to illustrate how targeted, digital interventions can empower medical students to transcend linguistic hurdles and achieve greater academic success.

***Chapter One: The Quest for Effective Medical
English Learning: Insights from ESP and Mobile
Learning Research***

1.1 Introduction

English for Specific Purposes (ESP), especially English for Medical Purposes (EMP), provides first-year medical students with the specific communication skills they need to succeed academically and professionally. Students at the Faculty of Medicine, Dr. Moulay Tahar University, Saida, must follow demanding first-year medical modules covering the cardiovascular, respiratory, and digestive systems while also developing the language required to access medical content in English. This dual burden increases cognitive load, particularly when English instruction remains separated from medical content. The needs analysis conducted with 25 first-year medical students showed that 64% of the respondents considered their medical English proficiency to be at a beginner level, which justifies the development of a focused mobile-supported EMP tool such as MyLingua.

Unlike General English, ESP is a learner-centered approach guided by learners' needs, specialized lexis, disciplinary discourse, and authentic tasks (Hutchinson & Waters, 1987). Key features of ESP include needs analysis, skill integration, and learning-centered methodology (Dudley-Evans & St. John, 1998). EMP, as a branch of ESP, focuses on medical vocabulary, academic reading, lecture listening, clinical communication, and report writing as essential activities for undergraduate training (Basturkmen, 2010).

In Algerian EFL contexts, traditional fragmented English courses may influence students' academic performance because they often prioritize decontextualized grammar, provide limited exposure to medical vocabulary, and offer insufficient authentic practice. Mobile-Assisted Language Learning (MALL) can help reduce these gaps by providing accessible, interactive, and self-paced learning opportunities. MyLingua exemplifies this direction by integrating EMP modules with first-year medical content without replacing formal medical instruction.

This chapter reviews the ESP and EMP frameworks, language skills in medical education, challenges in teaching and learning medical English, and technology-based solutions. It also establishes the conceptual basis that justifies the development of MyLingua, its implementation procedures, and its empirical validation through pre/post-testing and student interviews.

1.2 English for Specific Purposes (ESP)

1.2.1 Definition and Scope of ESP

English for Specific Purposes (ESP) is a learner-centered approach to language instruction in which learners identify communicative needs in particular academic, professional, or occupational contexts and directly guide curriculum content and methodological choices (Hutchinson & Waters, 1987, p. 19).

Hutchinson and Waters (1987) present the foundational definition: “ESP is an approach to language teaching in which all decisions as to content and method are based on the learner's reason for learning” (p. 19). This focus is functionally oriented, with emphasis on communicative competence rather than isolated linguistic knowledge.

Refining this conceptualization, Dudley-Evans and St. John (1998) see ESP as a needs-driven method grounded in the analysis of target language use. It is learning-centered because it prioritizes learning techniques, skills, and strategies rather than linguistic systems alone. Inspired by real texts and real tasks in particular contexts, ESP therefore reflects a pragmatic reorientation of language education toward students' target academic and professional circumstances.

1.2.2 ESP vs. General English

ESP differs from General English in three main aspects: purpose, content, and methodology. General English promotes broad communicative competence, while ESP is functional, discipline-based, and oriented toward specific discourse communities.

- Purpose: ESP addresses the communicative needs of academic programs, professional fields, or occupational roles, while General English develops general proficiency for social, travel, and broad professional interactions (Hutchinson & Waters, 1987).
- Content: ESP courses examine specialized lexis, genre conventions, and rhetorical patterns typical of target situations. In medical English, for example, case-report formats and anatomical terminology are prioritized over conversational idioms.
- Methodology: ESP employs register analysis, discourse analysis, genre-based instruction, and authentic text work adapted to learners' target contexts, whereas General English commonly follows more general language structures and high-frequency vocabulary (Dudley-Evans & St. John, 1998).

1.2.3 Characteristics of ESP

Dudley-Evans and St. John (1998) identify several features that distinguish ESP from General English and other language programs:

- Needs-driven: systematic target situation analysis (TSA) and present situation analysis (PSA). Identify language gaps and necessary competencies.
- Learning-centered: ESP gives priority to learning processes, strategies, skills, and methodologies rather than presenting language as an abstract system.
- Skills- and strategies-based: ESP combines receptive skills, productive skills, and cognitive strategies required in learners' real academic or professional tasks.
- Discourse- and genre-based: ESP relies on text-based analysis of specialized genres, cohesive patterns, rhetorical structures, and disciplinary conventions.
- Learner-centered: the syllabus is developed according to learners' target requirements and learning needs rather than a fixed linguistic inventory.

1.2.4 Learner-Centered Approach

The learner-centered approach of ESP changes the traditional method of teaching by transforming teacher-centered practices into learner-centered practices (Hutchinson & Waters, 1987). This paradigm shift places learners in an active role in curriculum development, task selection, and evaluation.

Core principles of the learner-centered approach include:

- Needs-responsive syllabus: content is derived from learners' target situations rather than from standardized textbooks alone.
- Encouraging autonomy: learners receive self-directed learning techniques that support independent mastery of disciplinary discourse.
- Process-oriented learning: language acquisition is connected to learning how to learn, how to monitor progress, and how to use feedback.
- Integration of feedback: students' responses continuously improve the focus and pacing of instruction.

1.2.5 Needs Analysis in ESP

Needs analysis is the core of ESP because it systematically connects learners' present skills with target performance requirements (Basturkmen, 2010). By determining what students

must master and how they learn best, needs analysis guarantees instructional relevance and prevents the course from becoming detached from the target context.

1.2.5.1 Types of Needs Analysis

Target needs describe the skills and knowledge learners must acquire for a specific external goal or situation. They define the " what " of the course.

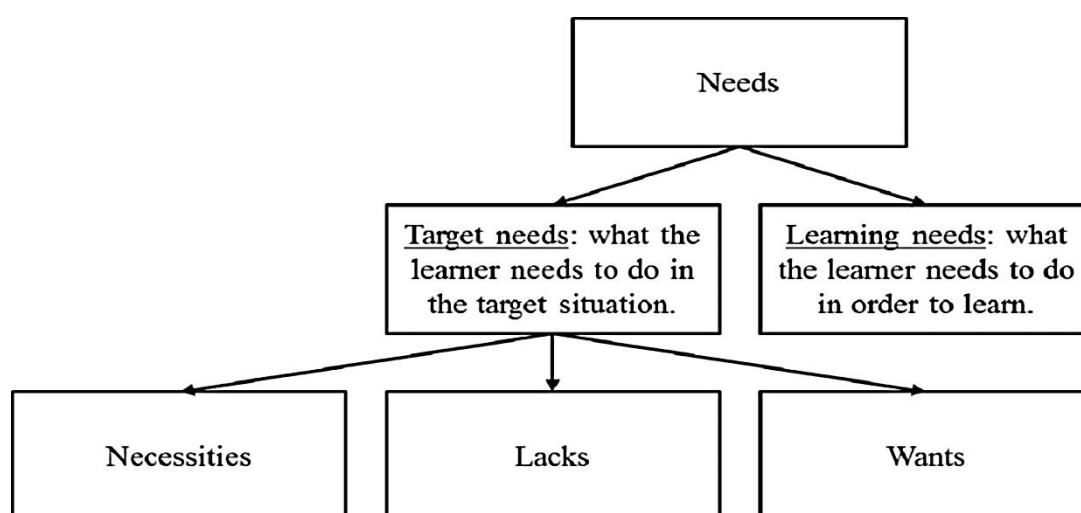


Figure 1 Types of Needs According to Hutchinson and Waters (1987)

Target needs are divided into three subcategories:

- **Necessities:** the essential skills and knowledge learners must have to function effectively in the target situation.
- **Lacks:** the gaps between learners' current competence and the competence needed for the target situation.
- **Wants:** learners' personal priorities and preferences, which may overlap with necessities but do not always fully correspond to them.

Learning needs describe the factors that affect the learning process, such as attitudes, motivation, awareness, personality, learning styles, strategies, and social background. They define the " how " of learning.

1.3 English for Medical Purposes (EMP)

1.3.1 EMP as a Branch of ESP

English for Medical Purposes (EMP) is a specialized branch of English for Specific Purposes focused on the communicative needs of medical education and medical professions (Basturkmen, 2010). EMP focuses on discipline-specific discourse that includes clinical terminology, procedural descriptions, academic genres, and professional interactions necessary for medical training.

EMP instruction encompasses four key discourse domains: clinical communication, academic discourse, procedural language, and interdisciplinary communication. Clinical communication includes taking patient histories, explaining diagnoses, and providing treatment instructions. Academic discourse includes writing case reports, analyzing journal articles, and understanding lectures. Procedural language includes diagnostic imaging interpretation and laboratory procedures. Interdisciplinary communication involves interaction with researchers, pharmacists, nurses, and other healthcare professionals.

In the needs-driven model of ESP, EMP gives priority to high-stakes authenticity because language use can affect academic advancement, clinical reasoning, and patient safety. This urgency distinguishes medical communication from many other ESP domains in which communicative errors may have less direct human consequences (Dudley-Evans & St. John, 1998).

1.3.2 Objectives in Medical Education

EMP is designed to fulfil three interconnected objectives crucial for undergraduate medical education:

1. Medical terminology mastery: students learn anatomical, physiological, pathological, and pharmacological terminology. EMP focuses on clinical terms such as “myocardial infarction” and “bronchospasm” and on root-based morphology that allows students to decode terms independently.

2. Academic discourse competence: students develop the ability to read textbooks, journal articles, case studies, and laboratory protocols, while also listening to lectures, educational videos, and clinical explanations.

3. Clinical communication skills: students build precise language for procedures, case presentations, patient explanations, and interdisciplinary exchanges. Writing includes patient histories, short reports, discharge summaries, and prescription-related language.

1.3.3 Role of Medical Terminology

Medical terminology represents the essential linguistic framework of EMP. Its systematic morphological structure allows vocabulary growth through root-based derivation rather than rote memorization alone. Medical terms commonly follow the pattern of prefix + root + suffix, often derived from Greek and Latin.

- **Prefixes:** cardio- (heart), hepato- (liver), broncho- (airway).
- **Roots:** myo- (muscle), Patho- (disease), pharmaco- (drug).
- **Suffixes:** -itis (inflammation), -ectomy (excision), -osis (condition).

Table 1 Medical Terminology: Word Roots, Prefixes, and Suffixes

Medical Term	Word Parts Breakdown	Meaning
Cardiomyopathy	cardio (heart) + myo (muscle) + pathy (disease)	Disease of heart muscle
Hepatitis	hepato (liver) + itis (inflammation)	Inflammation of the liver
Bronchiectasis	bronch (airway) + ectasis (dilation)	Dilation of the airways
Gastritis	gastr (stomach) + itis (inflammation)	Inflammation of the stomach
Nephrology	nephr (kidney) + logy (study of)	Study of the kidneys
Osteoporosis	osteo (bone) + porosis (porous condition)	Condition of porous bones
Dermatology	dermato (skin) + logy (study of)	Study of the skin
Neuropathy	neuro (nerve) + pathy (disease)	Disease of the nerves
Arthritis	arthr (joint) + itis (inflammation)	Inflammation of the joints
Hematology	hemato (blood) + logy (study of)	Study of blood

Myocarditis	myo (muscle) + card (heart) + itis (inflammation)	Inflammation of heart muscle
Rhinoplasty	rhino (nose) + plasty (surgical repair)	Surgical repair of the nose
Electrocardiogram	electro (electric) + cardio (heart) + gram (record)	Record of heart electrical activity
Hypoglycemia	hypo (low) + glyc (sugar) + emia (blood condition)	Low blood sugar
Hyperthyroidism	hyper (excess) + thyroid + ism (condition)	Overactive thyroid condition

1.3.4 Importance in Undergraduate Medical Studies

First-year medical students at the Faculty of Medicine, Dr. Moulay Tahar University, Saida, deal with immediate EMP requirements through foundational modules, including the cardiovascular, respiratory, and digestive systems. Linguistic deficiencies may affect lecture comprehension, textbook reading, laboratory instructions, and assessment performance.

Medical English is crucial because it fulfils academic requirements. Lecture comprehension depends on recognizing specialized terminology, textbook use requires vocabulary mastery, and laboratory protocols demand accurate terminology recognition. Assessment also depends on medical English because multiple-choice questions, labels, and case-based prompts often employ English terminology.

1.4 Language Skills in Medical Education

Medical studies require students to use language for understanding, reasoning, and communication. Since English is increasingly present in medical education, students need both general English skills and the specific language of medicine. Medical studies, therefore, require reading, listening, speaking, and writing skills that help students access and communicate medical knowledge effectively.

1.4.1 Reading Skills in Medical Contexts

Reading is essential for medical students because they are expected to process textbooks, research articles, clinical case reports, and laboratory instructions. Medical texts are often difficult because they contain dense technical vocabulary, long noun phrases, and

discipline-specific argumentation. Students, therefore, need strategies such as skimming, scanning, inferencing, and morphological decoding to understand complex information efficiently.

1.4.2 Listening Skills in Medical Education

Listening is essential for understanding lectures, following procedural instructions, and interacting with audio-visual medical content. Medical students need to understand expressions presented quickly and often supported by technical terminology. Effective listening allows students to identify important ideas, take notes, and participate actively in classroom discussions.

1.4.3 Speaking Skills in Medical Communication

Speaking skills are necessary academically and professionally. Students are expected to ask questions, present information, and participate in discussions. In clinical contexts, oral proficiency becomes central to communication with patients and colleagues. However, first-year medical students may struggle to express meaning clearly because of limited terminology, pronunciation difficulties, or low confidence.

1.4.4 Writing Skills in Medical Studies:

Writing supports academic and professional performance in medical education. Students must use accurate terms, coherent organization, and formal register when writing assignments, short reports, case descriptions, and explanations of medical concepts. Writing in a medical context requires clarity, precision, and consistency, which may be difficult for learners with limited command of English.

1.4.5 Integration of Language Skills

Language skills are integrated in real medical learning. For instance, students may listen to a lecture, take notes, read a related textbook section, discuss the topic with classmates, and write a short explanation. This sequence reflects authentic learning situations and confirms the need for an integrated approach to language teaching.



Figure 2 Integration of Language Skills in Medical Education

1.5 Challenges in Teaching and Learning Medical English

Teaching and learning Medical English involve several challenges, particularly for first-year medical students who are still developing English proficiency while also learning demanding medical content. These challenges are linguistic, pedagogical, and contextual, and they may affect academic outcomes and learner confidence.

1.5.1 Students' Linguistic Difficulties

One of the most serious difficulties is that many medical students lack sufficient English proficiency for specialized medical content. Students may possess basic or intermediate general English, yet still struggle with technical terms, complex structures, and field-specific expressions. This gap makes lectures, textbooks, and clinical materials more difficult to understand.

1.5.2 Lack of Alignment with Medical Content

Another significant issue is that language instruction and medical content are not always aligned. In many cases, English classes are planned without enough consideration of what students need for their medical studies. Consequently, students may learn general language

skills that are not directly connected to their medical modules, which may reduce motivation and practical relevance.

1.5.3 Fragmentation of Language Skills

Language instruction is frequently implemented through separate skills, with reading, writing, listening, and speaking taught in isolation. This fragmentation does not represent authentic medical language use, which usually requires several skills at the same time. As a result, students may struggle to transfer classroom learning to real academic or clinical situations.

1.5.4 Limited Communicative Practice

Students are rarely given enough opportunities to engage in meaningful English communication. Although English is being introduced in first-year medical instruction, teachers and students may still resort to French or Arabic when English becomes difficult. This practice reflects the transitional nature of the institutional context rather than a simple rejection of English, but it also reduces students' exposure to medical communication in English.

1.5.5 Institutional Transition and Code-Switching

The move toward English-medium medical instruction is gradual. First-year students experience stronger exposure to English, while students in later years may still receive a larger proportion of instruction in French. This creates a transitional bilingual environment in which code-switching is common. MyLingua responds to this reality by using bilingual support while directing learners progressively toward accurate English medical production.

1.6 Need for an Integrated ESP Approach

The difficulties of Medical English instruction reveal the need for a more coherent teaching approach that meets students' academic and professional needs. This can be achieved by integrating language skills within an ESP framework. Such an approach develops reading, writing, listening, and speaking simultaneously through authentic, contextually appropriate situations.

1.6.1 Concept of Integrated Skills

The integrated-skills approach is founded on the idea that language functions as a unified system in real communication rather than as separate parts. In medical education, students must read medical texts, attend lectures, participate in discussions, and write notes or summaries. Combining these skills in language teaching helps students use English in a more natural and effective way (Dudley-Evans & St. John, 1998).

1.6.2 Importance of Authentic Medical Tasks

The integration of real-world medical situations into learning tasks is another important part of an integrated ESP approach. Such tasks can involve case studies, medical reports, guided doctor-patient exchanges, and the interpretation of short clinical scenarios. Authentic materials and activities increase students' engagement and help them practice language in ways that are useful for their studies and future work (Basturkmen, 2010).

1.6.3 Benefits for First-Year Medical Students

An integrated ESP approach benefits first-year medical students by improving medical vocabulary through meaningful contexts, promoting communicative competence, and connecting language learning with content learning. It also helps students become more confident using English in academic medical situations (Hutchinson & Waters, 1987).

1.7 Technology in ESP and Mobile Learning

The integration of technology into language education has profoundly altered English teaching and learning, especially in ESP. Technological developments facilitate flexible, interactive, and student-centered methods that respond to learners' needs across specialized fields, including medical education.

1.7.1 Technology-Enhanced Language Learning (TELL)

Technology-Enhanced Language Learning (TELL) refers to the use of digital resources to support language teaching and learning. It reflects a shift away from exclusively teacher-centered instruction toward more dynamic and participatory learning. Through multimedia resources, online platforms, and digital content, students can access authentic materials and complete activities that improve language skills.

1.7.2 Mobile-Assisted Language Learning (MALL)

MALL is a key evolution of technology-enhanced language learning. It involves the use of smartphones and tablets in language learning. Through MALL, students can access resources at any time and place, which supports flexibility and continuity. Because smartphones are widely used in higher education, mobile learning has become a practical approach for supporting autonomous and contextualized learning.

1.7.3 Benefits of Mobile Learning in ESP

Within ESP settings, mobile learning enables learners to progress at their own pace and manage their own study time. Many mobile applications offer interactive components such as quizzes, audio-visual content, and immediate feedback, which increase learner interest. In ESP, mobile learning can be customized for specific fields, allowing students to focus on specialized vocabulary and discipline-related tasks.

Table 2: Features of Mobile Learning in ESP

Aspect	Description	Relevance to Medical Students
Accessibility	Learning anytime and anywhere	Supports busy academic schedules
Interactivity	Quizzes, audio, feedback	Enhances engagement and retention
Flexibility	Self-paced learning	Adapts to individual learner needs
Authenticity	Real-life tasks	Prepares students for academic and clinical contexts
Autonomy	Independent learning	Encourages responsibility and regular practice

1.7.4 Support for Autonomous Learning

Mobile learning encourages learner independence. Mobile apps allow learners to practice, monitor their progress, and review difficult content. Autonomous learning is especially valuable for medical students because it enables sustained engagement with English outside the classroom and supports continuous exposure to medical terminology.

1.7.5 ESP Mobile Applications in Medical Education

Mobile applications tailored to ESP can support language learning in specialized disciplines such as medicine. These apps are normally designed around learners' needs and integrate language skills through authentic, contextually relevant activities. In medical education, such apps can help students learn medical terms, practice real-life communication situations, and improve their language skills. ESP mobile applications, therefore, serve as useful tools for addressing first-year medical students' needs and promoting broader communicative competence.

1.8 Conclusion

This chapter has provided the theoretical foundation of the present study. It opened by highlighting the role of English in medical education and the challenges experienced by first-year medical students in acquiring medical English in an EFL context. It then examined English for Specific Purposes, emphasizing targeted academic and professional needs, learner-centered instruction, and needs analysis.

The chapter also presented English for Medical Purposes as a specialized branch of ESP, emphasizing medical terminology, disciplinary discourse, and context-driven language use in undergraduate medical education. The four language skills, reading, listening, speaking, and writing, were discussed as integrated components of medical learning rather than isolated classroom abilities.

Several challenges were identified, including linguistic difficulties, insufficient alignment with medical content, fragmented skill instruction, limited communicative practice, and institutional code-switching during the transition toward English-medium instruction. In response, the chapter demonstrated the need for an integrated ESP approach based on authentic tasks and skill combination.

Finally, the chapter addressed technology in ESP and Mobile-Assisted Language Learning as a means to enhance flexible, autonomous medical-English practice. This establishes the framework for the MyLingua application presented in Chapter Two.

***Chapter Two: Designing MyLingua: A Mobile
Learning Environment for Medical English
Development***

2.1 Introduction

This chapter presents the design and development process of MyLingua, an English for Specific Purposes (ESP) mobile application conceived to address the linguistic needs of first-year medical students. It translates the learner needs identified through the needs analysis into a functional instructional tool grounded in the theoretical framework discussed in Chapter One (Hutchinson & Waters, 1987). Through technology-enhanced and integrated-skills practice, the application aims to address long-standing gaps in medical English instruction within a Mobile-Assisted Language Learning (MALL) framework.

The application responds to empirically identified linguistic challenges in a medical education context where students must develop specialized communicative competence alongside medical content knowledge. This chapter documents the development process from theoretical rationale to prototype features and technical specifications to maintain academic coherence and methodological clarity.

The chapter has three main objectives. First, it justifies the development of the application in relation to the needs identified among first-year medical students. Second, it presents the pedagogical and instructional frameworks that guided the design, demonstrating alignment with ESP principles (Hyland, 2006) and MALL practices (Burston, 2015). Third, it explains the application's features, content, architecture, and limitations, thereby providing a basis for later evaluation.

The development process adopts a design-based orientation and uses the ADDIE model as the practical instructional design sequence. In this sense, the application functions not only as a learning resource but also as a research-informed prototype shaped by the findings of the needs analysis.

Beyond its immediate pedagogical value, MyLingua also provides a basis for examining the effectiveness of MALL in ESP contexts through user interaction, proficiency measures, and learner feedback. Its central role in the study reflects the broader objective of improving first-year medical students' medical English through authentic, accessible, and structured digital practice.

2.2 Rationale for Developing the Application

2.2.1 Identified Pedagogical Gaps

Pedagogical gaps in medical English instruction are widely acknowledged in ESP literature. Traditional courses often emphasize declarative knowledge and memorization of terminology rather than procedural language use in interactive situations. As a result, learners may recognize specialized discourse without being able to use it effectively in authentic medical tasks. These literature-based concerns were reflected in the needs analysis of the first 25-year medical students, in which 64% reported beginner-level medical English proficiency despite 76% reporting intermediate general English competence (Salmani-Nodoushan, 2006).

First-year medical students at the Faculty of Medicine, Dr. Moulay Tahar University, Saida, are particularly affected by these limitations because they follow a demanding curriculum with limited targeted ESP support. English-medium instruction assumes a level of medical language readiness that many students have not yet developed. The needs analysis showed that 52% of respondents identified clinical speaking as their main difficulty, 32% highlighted terminology, 72% reported a need for additional support, and all respondents expressed positive attitudes toward mobile learning (Atai & Mazlum, 2013).

The problem is compounded by the separation of speaking, writing, listening, and reading, even though medical communication requires these skills to operate together. Such fragmentation does not adequately prepare learners for academic presentation, clinical discussion, or interdisciplinary interaction. There is also a technological gap because specialized mobile tools for medical English remain limited in this local context.

2.2.2 Students' Academic and Linguistic Challenges

The needs analysis conducted before the design stage identified recurring challenges. Although 76% of respondents described their general English as intermediate, 64% stated that their medical English was at a beginner level. This contrast indicates difficulty in transferring general language ability to specialized academic and clinical contexts. The data also showed that clinical speaking and terminology learning were the most pressing areas of difficulty, which means that many students struggle to comprehend complex textbooks, write short medical explanations, and deliver oral presentations with confidence.

Moreover, 72% of students reported needing additional support in medical English, suggesting that these difficulties affect both confidence and course comprehension. This finding strengthens the case for specific, curriculum-aligned support that also respects students' limited schedules.

2.2.3 Why a Mobile Solution Is Appropriate

Mobile learning offers a practical response to the difficulties identified among first-year medical students, especially within the constraints of an intensive academic schedule. The needs analysis showed that all 25 respondents had smartphone access and positive attitudes toward mobile learning. In a context where specialized ESP support is limited and weekly schedules are dense, MyLingua provides additional practice without requiring extra classroom time. It transforms short periods such as commutes and study breaks into focused learning opportunities.

MyLingua addresses these needs through integrated features designed for a time-constrained academic context. Widespread smartphone access supports availability, autonomous progression responds to individual pace, and multimodal content accommodates different learning preferences. In this way, the application supports the medical curriculum without increasing classroom hours, while scenarios and quizzes encourage deeper comprehension and retention.

2.2.4 Design Objectives of MyLingua:

The application was designed around four practical objectives: to reinforce essential medical terminology; to integrate reading, listening, writing, and speaking within coherent medical scenarios; to provide immediate feedback and self-review opportunities; and to support autonomous learning outside the classroom. These objectives connect the needs analysis directly to the application structure.

2.3 Target Users and Learning Context

2.3.1 Profile of First-Year Medical Students

The target users are first-year medical students enrolled at the Faculty of Medicine, Dr. Moulay Tahar University, Saida, within the Algerian higher education context. The students generally report intermediate general English proficiency (B1-B2), but many demonstrate beginner-level medical English proficiency. This contrast creates a clear need for specialized support that builds from familiar language toward disciplinary communication.

2.3.2 Students' Academic and Language Needs

Five skill areas were prioritized for first-year medical students based on the needs analysis:

- Vocabulary: mastery of fundamental medical terms across body systems, especially because terminology was identified as a major difficulty by 32% of respondents.
- Speaking: clinical communication for describing patient cases, procedures, symptoms, and short doctor-patient exchanges, especially because 52% identified clinical speaking as the top challenge.
- Reading: comprehension of academic texts, case studies, textbook extracts, and clinical notes.
- Writing: production of organized medical summaries, brief reports, and explanations of medical concepts.
- Listening: comprehension of patient consultations, medical lectures, and short clinical audio materials.

MyLingua fosters these competencies through a six-part sequence that includes bilingual terminology practice, sentence construction, listening tasks, matching exercises, guided writing, and speaking simulations. This structure ensures that skill development occurs within authentic clinical contexts consistent with first-year curricular expectations rather than through fragmented exercises.

2.3.3 Institutional Learning Environment

The lecture-based environment at the Faculty of Medicine emphasizes theoretical coverage, with limited time for communicative ESP practice. Classes usually rely on lectures and dense content delivery, which can restrict active language use beyond receptive note-taking. Large class sizes also reduce opportunities for individualized speaking practice, which is central to medical communication.

MyLingua attempts to address some of these constraints by providing flexible practice beyond the classroom. Through bilingual terminology work, guided role-plays, and short writing tasks, the application creates opportunities for repeated practice that are difficult to sustain in large classes. Rather than replacing formal instruction, it functions as a complementary tool that supports more autonomous development of medical English.

2.4 Pedagogical and Instructional Framework

2.4.1 ESP Principles Guiding the Design

ESP design requires specificity, authentic materials drawn from target situations, integrated skills, and clear alignment between learning outcomes and academic or professional objectives. These principles guide the selection of content, activities, and progression in MyLingua.

- Specificity is reflected in the selection of cardiovascular, respiratory, and digestive terminology from first-year medical content.
- Authenticity is reflected in clinical scenarios, case-based sentences, and doctor-patient exchanges.
- Integrated skills are reflected in the movement from vocabulary recognition to reading, listening, writing, and speaking tasks.
- Outcome alignment is reflected in the connection between needs-analysis results and the application's learning sequence.

2.4.2 Learner-Centered and Needs-Based Approach

MyLingua enhances learner autonomy through dashboard functionalities, skill-specific progress monitoring, system-based module selection, and a bilingual interface. Students can

review challenging tasks, focus on specific skills, and adapt the pacing of exercises to their schedules and learning preferences.

The system follows a performance-based advancement model in which learners are encouraged to achieve a minimum of 80% accuracy before moving to the next activity. Lower results direct them to review essential vocabulary and prerequisite content. This structure creates a developmental sequence from lexical recognition to guided clinical communication.

This learner-centered design encourages students to move from passive reception to active engagement, particularly in relation to the clinical speaking difficulties identified in the needs analysis (Hutchinson & Waters, 1987).

2.4.3 Integrated Skills Approach

The application units follow a coherent sequence of terminology practice, sentence formation, listening comprehension, matching exercises, writing tasks, and guided speaking simulations within unified medical scenarios.

Table 3: Six-Step Integrated Learning Sequence

Step	Activity	Purpose	Cardiovascular Example
1	Terminology practice	Bilingual vocabulary mastery	Cardiac arrest → توقف القلب المفاجئ
2	Sentence formation	Contextual application	Patient admitted due to sudden ____ → cardiac arrest
3	Listening task	Auditory comprehension	Audio: Patient developed heart failure → MCQ
4	Matching exercise	Term-definition linkage	Cardiac arrest ↔ sudden heart stoppage
5	Writing task	Constructive recall	يعاني من تصلب الشرايين → suffers from atherosclerosis
6	Speaking simulation	Clinical communication	Rule out ____ → cardiac arrest / blood clot

This sequence responds directly to the needs analysis by moving learners from vocabulary development to contextualized clinical speaking within authentic medical scenarios.

2.4.4 Instructional Design Model Adopted

The development process follows the ADDIE model: Analysis, Design, Development, Implementation, and Evaluation (Branch, 2018). In the analysis phase, learner needs and institutional constraints were identified. The design phase defined module content and aligned tasks with ESP principles. The development phase focused on multimedia content and navigation structure. The implementation phase involved initial piloting of the prototype, and the evaluation phase collected feedback for later refinement.

2.4.5 Learning Outcomes and Competency Mapping

To strengthen the pedagogical alignment of the prototype, each module was connected to explicit learning outcomes. This mapping prevents the application from functioning as a simple vocabulary list and instead positions it as an integrated ESP learning environment.

Table 4: Competency Mapping in MyLingua

Competency	Learning Outcome	Application Feature
Terminology	Recognize and use high-frequency medical terms accurately.	Bilingual MCQs and matching tasks
Reading	Understand short medical sentences and case-based prompts.	Sentence formation and textbook-adapted items
Listening	Identify key information in short clinical audio materials.	Audio prompts followed by comprehension questions
Writing	Produce clear, short medical explanations.	Guided writing prompts and model answers
Speaking	Participate in controlled doctor-patient exchanges.	Role-play simulations and pronunciation checklists

2.5 Structure and Organisation of the Application

2.5.1 General Architecture and Interface

MyLingua provides a bilingual English-Arabic interface, module icons, and progress indicators across three main units: the cardiovascular, respiratory, and digestive systems. The use of a clean medical-themed design supports accessibility and helps learners move easily between activity types.

2.5.2 Organisation of Modules

Each module develops medical English from receptive to productive skills through the same scaffolded six-component structure.

Table 5: Organisation of Module Components

Component	Task	Purpose
Terminology practice	English ↔ Arabic MCQs (10 items)	Strengthen bilingual medical vocabulary
Sentence construction	Contextual phrase completion (4 items)	Apply vocabulary grammatically
Listening tasks	Short audio + MCQs (2 activities)	Enhance auditory medical comprehension
Matching tasks	Term-definition pairing (4-5 pairs)	Link vocabulary to clinical meanings
Writing activities	Open response prompts (3 tasks)	Develop recall and written expression
Speaking simulations	Guided clinical role-plays	Practise authentic medical dialogue

2.5.3 Navigation and Learning Pathways

Drawing on scaffolding and mastery learning, MyLingua uses systematic progression and activity locking to support gradual mastery. Activities are unlocked after the learner reaches the required threshold, set at 80%. Auto-save protects user progress, while review options allow completed sections to be revisited.

Table 6: Navigation and Progression Features

Feature	Mechanism	Pedagogical Justification
Sequential access	Activities locked until prior completion	Ensures foundational mastery before complex tasks
80% threshold	Progression encouraged after 80% accuracy	Balances mastery and continued motivation
Review unlock	Manual access to completed sections	Supports spaced repetition and consolidation
Auto-save	Continuous progress tracking	Reduces cognitive load and prevents frustration

2.6 Learning Content and Activities

2.6.1 Medical Terminology Component

Each module contains 10 medical terms selected from first-year medical course content. The terms were drawn from key references such as Robbins Basic Pathology, Guyton Physiology, and Gray's Anatomy to maintain alignment with the official first-year medical curriculum.

Table 7: Sources of Medical Terminology

Textbook Source	Curriculum Alignment	Examples (Cardiovascular Module)
Gray's Anatomy	Year 1 - Anatomy	Myocardium (عضلة القلب), Aorta (الأبهر)
Robbins Basic Pathology	Year 1 - Pathology	Hypertension (ارتفاع ضغط الدم)
Guyton Physiology	Year 1 - Physiology	Ventricle (بطين), Atrium (أذين)

2.6.2 Reading and Listening Tasks

To ensure curriculum authenticity, the sentence-formation tasks include four multiple-choice items per module based on reading sentences adapted from first-year medical textbooks used at the Faculty of Medicine. Each module also includes two short listening tasks, lasting approximately 15-30 seconds, followed by multiple-choice comprehension questions focused on medical terms in clinical settings.

2.6.3 Writing and Speaking Tasks

Writing tasks move learners from guided sentence formation and translation to more open medical descriptions. Speaking tasks use instructed role-play simulations that imitate authentic clinical conversations and provide model responses for self-correction.

Table 8: Productive Tasks in the Application

Task Type	Specific Activities	Pedagogical Purpose	Feedback Mechanism
Writing tasks	Sentence completion; statement translation; medical explanations	Scaffolded progression from controlled to open production	Instant model answers + self-check rubric
Speaking tasks	Guided role-play scripts	Authentic clinical dialogue practice with structured support	Audio model responses + pronunciation checklist

2.6.4 Integrated Communication Tasks

To reflect familiar clinical interactions, each module ends with an integrated task that brings together vocabulary, reading, listening, writing, and speaking in an extended scenario. The scenarios are based on common doctor-patient exchanges linked to digestive, respiratory, and cardiovascular topics.

Table 9: Examples of Integrated Communication Tasks

Module	Scenario Example	Integrated Skills	Clinical Basis
Cardiovascular	Hypertension consultation	Vocabulary + sentence use + role-play	Introductory patient history-taking
Respiratory	Asthma exacerbation	Listening + explanation + dialogue	Common emergency presentation
Digestive	Abdominal pain assessment	Writing prompt + speaking response	Basic clinical examination protocol

2.7 Technological Environment

2.7.1 Platform and Development Tools

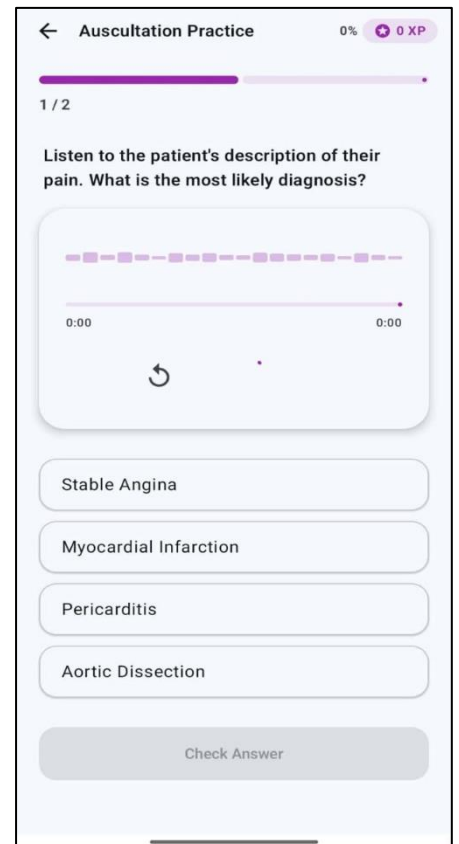
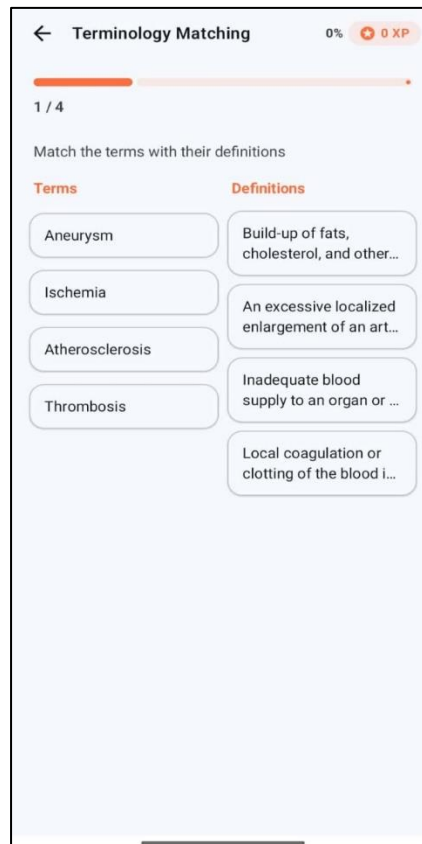
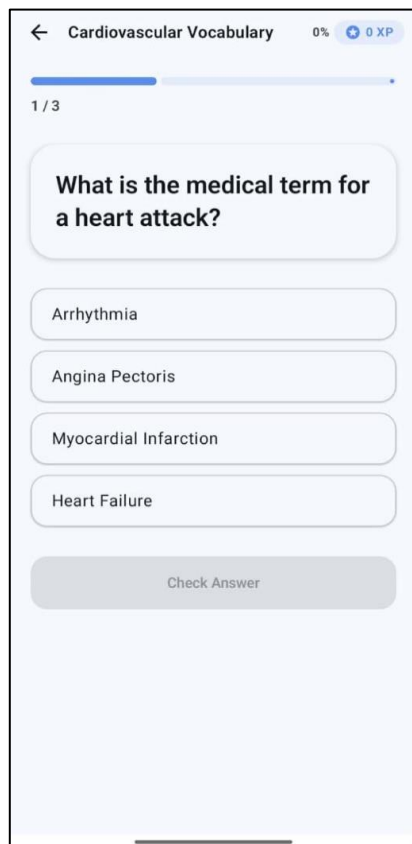
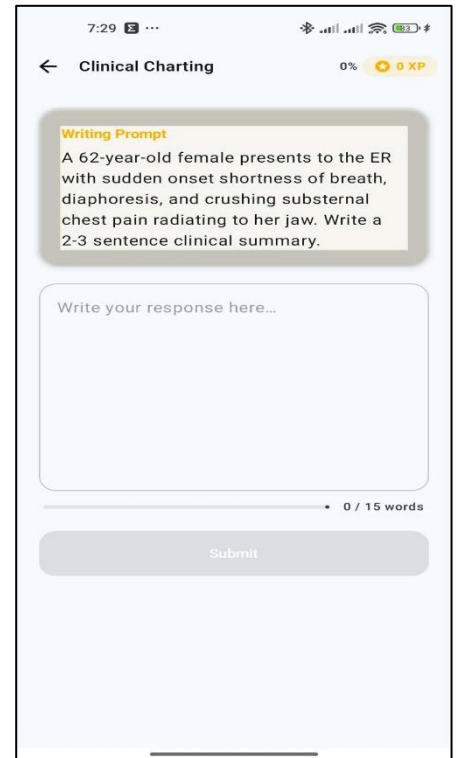
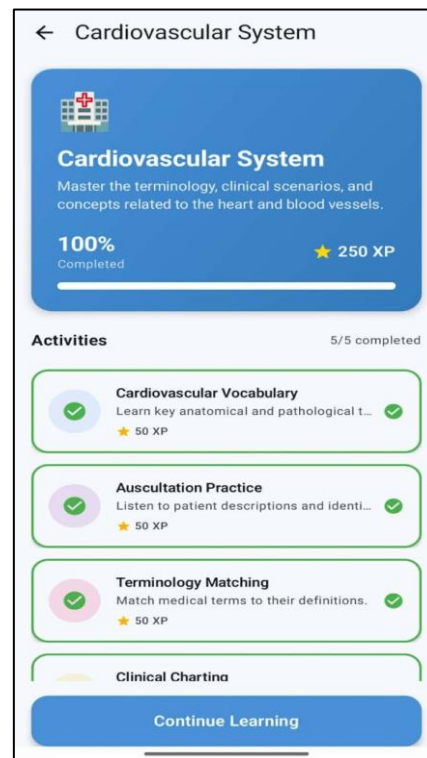
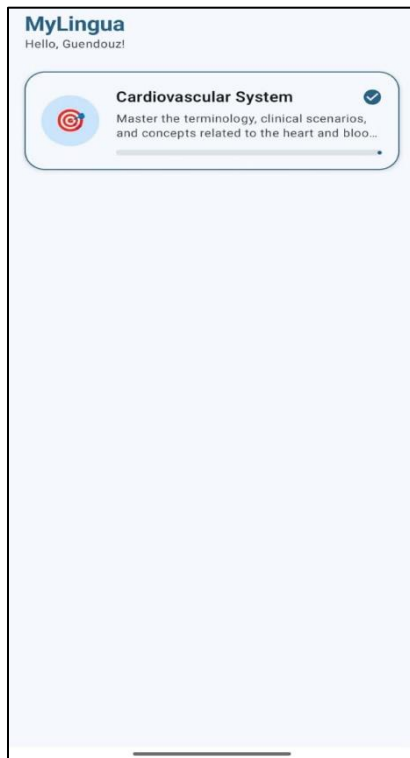
To ensure mobile compatibility and acceptable performance on Android smartphones, which are widely used by Algerian university students, MyLingua was developed as a prototype using the Flutter framework and the Dart programming language. Its MVVM architecture separates interface elements, business logic, and data storage, thereby supporting MCQ interaction, audio playback, text input, and local progress storage through SQLite.

Table 10: Technological Environment of the Prototype

Component	Tools / Technology	Purpose
Framework	Flutter (Dart)	Cross-platform mobile development
Architecture	MVVM pattern	Separation of UI, logic, and data layers
Database	SQLite	Local storage of user progress and scores
UI features	Material Design	Bilingual text, MCQs, progress bars, and audio integration
Target platform	Android 10+	Accessibility for Algerian students

2.7.2 Type of Application (Prototype)

At the alpha stage, MyLingua functions as a working prototype composed of three full modules: cardiovascular, respiratory, and digestive. The current version contains 30 vocabulary items, six listening tasks, nine writing prompts, and three speaking simulations. It is intended for initial user testing at the Faculty of Medicine in Saida. A later beta version could expand the program to additional modules for fuller alignment with the first-year curriculum.



2.7.3 Technical Limitations

As an alpha prototype, MyLingua has technical limitations, including the absence of built-in audio recording and incomplete offline accessibility. These constraints were accepted at this stage to prioritize the core pedagogical features of the application: terminology practice, integrated skill development, progress tracking, and clinical simulations.

2.7.4 Data Privacy and Accessibility Considerations

Because the prototype stores learning progress locally through SQLite, the design reduces dependence on external accounts during the initial trial. Future development should include clearer consent screens, secure backup options, and accessibility improvements such as adjustable font size, audio transcripts, and full offline availability.

2.8 Learning Scenarios and Sample Activities

2.8.1 Example of a Learning Session

A learning session in the respiratory module follows the six-part scaffolded sequence of the application, with a specific expected outcome attached to each activity.

Table 5: Example of a Respiratory-System Learning Session

Activity	Description	Expected Outcome
Terminology	Bilingual respiratory MCQs (10 items)	Achieve at least 80% accuracy in English ↔ Arabic medical term recognition
Sentence formation	Complete clinical sentences using appropriate vocabulary	Produce grammatically correct sentences incorporating target terms
Listening	Short audio + MCQs based on clinical dialogue	Demonstrate comprehension of spoken medical information
Matching	Term-definition pairing (4-5 pairs)	Accurately link specialized vocabulary to clinical meanings
Writing	Translation + short medical description	Produce coherent written explanations of respiratory concepts
Speaking	Guided doctor-patient role-play	Deliver a controlled clinical dialogue with appropriate pronunciation

2.8.2 Sample Integrated Task

Example: Integrated Cardiovascular Speaking Simulation (Clinical Role-Play). This activity asks students to complete blanks using vocabulary learned in the module while reinforcing appropriate doctor-patient dialogue through previously practiced skills.

Doctor-Patient Emergency Room Encounter:

Doctor: Good morning. What brings you to the emergency room today?

Patient: I am experiencing chest pain (ألم في الصدر).

Doctor: When did the chest pain start?

Patient: It started two hours ago (منذ ساعتين).

Doctor: Do you suffer from hypertension (ارتفاع ضغط الدم)?

Patient: Yes. I have high blood pressure (ضغط دم مرتفع).

Doctor: We need to check your pulse and rule out myocardial infarction (احتشاء عضلة القلب).

2.9 Innovative Features and Added Value

2.9.1 Pedagogical Innovation

MyLingua introduces pedagogical value through integrated-skills learning and authentic clinical simulations within each module. It differs from conventional ESP practices in which skills are often separated, and exercises are frequently decontextualized. This contextualized structure is intended to support deeper medical understanding than isolated word lists or paper-based drills.

Table 12: Traditional ESP Instruction and MyLingua

Aspect	Traditional ESP Classroom	MyLingua Innovation
Skill delivery	Isolated instruction	Integrated skills within each module
Context	Decontextualized textbook exercises	Authentic clinical scenarios and role-plays
Practice type	Paper-based worksheets and memorization	Interactive digital simulations and tasks
Feedback	Delayed teacher correction	Immediate model answers and self-assessment
Progression	Teacher-paced group progression	Individualized progression based on mastery

2.9.2 Institutional and Practical Benefits

MyLingua offers supplementary support for the existing medical curriculum and encourages student autonomy through self-practice outside class time without requiring major changes to classroom organization. It also gives instructors a structured way to recommend extra practice for students who need support in terminology, speaking, listening, reading, or writing.

Although MyLingua addresses several linguistic challenges faced by medical students at the Faculty of Medicine in Saida, the current prototype remains limited by its three-module scope and by technical constraints such as incomplete offline access. For this reason, it is best understood as a complementary tool to be integrated into the existing curriculum rather than a replacement for classroom instruction.

2.9.3 Future Development Potential

Future versions could expand the number of medical systems, add automatic pronunciation recording, include teacher dashboards, strengthen offline functionality, and provide adaptive revision based on repeated errors. These developments would make the application more scalable and more responsive to individual learner progress.

2.10 Conclusion

This chapter has presented the design and development process of MyLingua through its curriculum basis, mastery-learning logic, integrated-skills sequence, and technological structure. It has been shown that the Flutter/MVVM prototype is pedagogically and technically feasible for initial use at the Faculty of Medicine in Saida, while remaining open to refinement, expansion, and more rigorous evaluation in later stages.

***Chapter Three: Examining the Impact of
MyLingua: Methodological Foundations of the
Study***

3.1 Introduction

This chapter serves as a methodological lens through which the reader can examine the research design employed in the present study. It presents the methods used to fulfil the established research aims and describes the research design, setting, participants, instruments, procedures, and data analysis methods. The chapter also addresses the validity and reliability of the research instruments and concludes by discussing methodological limitations encountered during the study.

3.2 Research Design

Research design is the general structure of a study that guides the process of data collection and analysis (Leedy, 1997). It has also been described as the plan that assists researchers in selecting participants, locations, tools, and procedures in order to answer the research questions (MacMillan & Schumacher, 2001). In other words, the design provides the framework for collecting, assessing, and interpreting the data, and a successful design contributes to the production of valid results.

To evaluate the effectiveness of MyLingua in enhancing first-year medical students' medical English skills, this study adopts a mixed-methods research design. The quantitative component involves a needs analysis questionnaire and pre/post-test scores, while the qualitative component involves semi-structured interviews exploring students' experiences with the application. The combination of both approaches strengthens the credibility of the findings because numerical improvement can be interpreted alongside learners' perceptions.

Qualitative research may be described as “a methodology for systematic, empirical, and objective study of the meanings that people assign to significant events in their lives” (Shank, 2002, p. 5). Quantitative research, on the other hand, is “an approach for testing objective theories by studying the relationships among variables, which may be quantified, usually on instruments, to allow for statistical analysis” (Creswell & Creswell, 2018, p. 51).

3.2.1 Mixed-Methods Rationale

The mixed-methods design is appropriate because the study not only asks whether students improved after using MyLingua, but also how they experienced the intervention. The pre/post- test provides measurable evidence of development, while interviews explain the perceived usefulness, strengths, difficulties, and suggestions for improvement.

3.2.2 Operationalization of Research Variables

The independent variable in the study is the MyLingua intervention, whereas the dependent variable is students' medical English proficiency as measured through the pre/post-test. Learner perceptions, collected through interviews, function as qualitative explanatory data that help interpret the quantitative outcomes.

Table 13: Operationalization of Main Variables

Variable	Operational Definition	Instrument
Independent variable	Use of MyLingua during the three-week intervention	Intervention schedule and app use
Dependent variable	Medical English proficiency in vocabulary, reading, listening, writing, and speaking-related tasks	Pre-test and post-test
Explanatory qualitative data	Students' experiences, attitudes, strengths, and difficulties	Semi-structured interviews

3.3 Research Setting

The study was conducted at the Faculty of Medicine, University of Dr. Moulay Tahar, Saida. The institution is located in Algeria and has recently strengthened the integration of English in first-year medical instruction. First-year medical students receive medical content with increased exposure to English, while French continues to play a considerable role in later years and in wider Algerian medical education.

The faculty includes more than 500 medical students, including approximately 160 first-year students. The first-year curriculum is mainly lecture-based, with 90-minute classes. This setting is pedagogically relevant because the intensive schedule and heavy content load make

additional classroom-based English instruction difficult, thereby supporting the rationale for a mobile ESP intervention.

3.4 Research Participants

Thirty first-year medical students were initially approached from two intact classes at the Faculty of Medicine, University of Dr. Moulay Tahar, Saida. Of these students, 25 completed the full quantitative phase, including the needs analysis questionnaire, pre-test, three-week MyLingua intervention, and post-test. Five students participated in the semi-structured interviews after the intervention. This clarification resolves the distinction between the initial target sample and the final number of participants whose data were analyzed.

Participants were selected through convenience sampling because they were available in intact first-year classes and could participate during the intervention period. Students were required to be first-year medical students and smartphone owners. Repeat-year students were excluded to keep the sample focused on students experiencing the first-year curriculum for the first time.

The needs analysis showed that many participants reported intermediate general English proficiency (B1-B2), while their medical English competence remained largely beginner-level. This profile supports the need for a focused medical ESP intervention using MyLingua's scaffolded modules.

3.4.1 Inclusion and Exclusion Criteria

Table 6: Participant Criteria

Criteria Type	Criteria
Inclusion	First-year medical student at the Faculty of Medicine, smartphone owner, voluntary participation
Exclusion	Repeat-year student, incomplete participation, withdrawal from the study

3.4.2 Sampling Rationale

Convenience sampling was selected because the research required participants who could attend the intervention sessions, use the application, and complete both tests within the

available academic schedule. Although this sampling method limits generalization, it is suitable for a small-scale graduation research project and for the initial evaluation of an educational prototype.

3.5 Research Instruments

This study used a triangulation of research tools: a needs analysis questionnaire to identify students' needs, a pre-test/post-test to evaluate the effect of MyLingua, and semi-structured interviews to explore students' perceptions and experiences. This combination enhances the depth and credibility of the findings by providing both quantitative and qualitative insights into the effectiveness of the MyLingua ESP mobile application.

3.5.1 Quantitative Data Collection

To evaluate the effectiveness of MyLingua in enhancing first-year medical students' English proficiency, the study used two quantitative instruments: a needs analysis questionnaire and a pre/post-test. In scientific research, constructing sound questionnaires remains a highly developed art form (Rea & Parker, 2014, p. 36).

3.5.1.1 Needs Analysis Questionnaire

The needs analysis questionnaire was used as a diagnostic tool to identify first-year medical students' requirements before designing the application. It examined students' necessities, lacks, and wants. The questionnaire consisted of eight questions covering general linguistic ability, difficulties in medical English, preferred learning modes, and attitudes toward mobile learning.

3.5.1.2 Pre/Post-Test

The pre/post-tests were chosen as the main quantitative instruments to determine the development of medical English proficiency after the MyLingua intervention. It consisted of 15 questions designed to evaluate key competency areas in accordance with the first-year curriculum at the Faculty of Medicine, especially the cardiovascular, respiratory, and digestive systems.

The pre-test was administered to the 25 completing participants immediately before the intervention, and the post-test was administered after the three-week MyLingua intervention. The pre/post-test directly operationalizes the main research question about MyLingua's

effectiveness and provides baseline and post-intervention comparison data for determining pedagogical impact.

3.5.1.3 Scoring and Competency Areas of the Pre/Post-Test

The test items were organized around the medical English skills targeted in the application: terminology recognition, contextual sentence completion, reading comprehension, listening comprehension, and short productive language tasks. Scores were compared before and after the intervention to identify improvement across the same competency areas.

3.5.2 Qualitative Data Collection

To explore students' perspectives and experiences with MyLingua, the study used qualitative data collection through semi-structured interviews. Semi-structured interviews were selected for their flexibility because they provide guidance while allowing deeper exploration of participants' responses.

3.5.2.1 Semi-Structured Interview

During the data collection process, five first-year medical students at the Faculty of Medicine, University of Dr. Moulay Tahar, Saida, were interviewed. The interview began with background information, such as age, gender, education, and learning experience. The core of the interview explored students' perceptions, experiences, and attitudes toward the effectiveness of MyLingua in developing their medical English. Finally, participants were asked to discuss the strengths of the application, the difficulties they faced, and suggestions for improving the learning process.

3.5.3 Triangulation Matrix

The instruments were triangulated to connect needs, performance, and learner experience. This alignment improves methodological coherence because each tool answers a different part of the research problem.

Table 7. Instrument Triangulation Matrix

Instrument	Purpose	Data Type	Contribution to the Study
Needs analysis questionnaire	Identify necessities, lacks, and wants	Quantitative descriptive data	Guides app design and confirms learner needs
Pre/post-test	Measure medical English development	Quantitative comparative scores	Evaluates intervention effectiveness
Semi-structured interviews	Explore learner experience and perceptions	Qualitative thematic data	Explains usefulness, difficulties, and suggestions

.3.6 Reliability and Validity of the Research Instruments

The validity and reliability of the research instruments must be considered to ensure the quality of the study. Reliability refers to the production of stable and consistent results (Phelan & Wren, 2006). Validity refers to the extent to which an instrument measures what it is intended to measure (Bond, 2003).

3.6.1 Reliability

Reliability was strengthened by maintaining consistent procedures for all 25 participants involved in the quantitative phase. The needs analysis questionnaire and pre/post-tests were administered under comparable conditions, and the same intervention schedule was followed during the three-week MyLingua trial. Interview reliability was supported by using the same semi-structured guide with the five interview participants.

The reliability of the findings was further supported by comparing patterns across questionnaire responses, pre/post-test outcomes, and interview transcripts. This cross-checking reduced the likelihood that the interpretation would depend on a single source of evidence.

3.6.2 Validity

Validity was addressed by aligning the instruments with the study's objectives and research questions. The questionnaire examined students' medical English needs; the pre/post-test measured the competencies targeted by the application, and the interviews

explored learner perceptions after actual use of MyLingua. This alignment supports content validity because each instrument corresponds to a specific part of the research purpose.

The study also sought to improve credibility through triangulation. By combining questionnaires, tests, and interviews, the research collected diverse evidence about the relationship between MyLingua and the development of medical English proficiency among first-year medical students.

3.7 Research Procedures

This section describes the procedures used to implement the research tools and collect the data. It explains how participants were selected and prepared, how the needs analysis questionnaire, pre/post-tests, three-week MyLingua intervention, and semi-structured interviews were administered, and how data were documented. Presenting the procedures chronologically improves transparency and enables other researchers to replicate the study under comparable circumstances.

Before data collection, preparatory actions were carried out to ensure a systematic process. The researcher arranged sessions with the Faculty of Medicine administration, prepared the interview guide, tested the application, and installed MyLingua on the 25 participating students' devices. Participants received brief verbal and written instructions about the app navigation, the study process, and ethical guidelines.

The objective, methods, and voluntary nature of the study were explained to all 25 participants before data collection. The briefing covered MyLingua's role in enhancing medical English, the three-week commitment, pre- and post-testing, and interviews. Students were informed that they had the right to withdraw at any time without academic consequences. To ensure technical familiarity, participants received a short demonstration of MyLingua covering login, modules, progress tracking, and quiz features.

The intervention lasted three weeks and included three 30-minute sessions, one session per week. Sessions followed a consistent structure: review, new content, app-based exercises, and reflection. Activities included vocabulary practice, reading tasks, listening activities, writing prompts, and speaking simulations linked to the first-year medical curriculum.

3.7.1 Ethical Procedures and Data Management

Ethical considerations were respected throughout the study. Participation was voluntary, informed consent was obtained, anonymity and confidentiality were ensured, and participants were allowed to withdraw without penalty. Data were stored securely and used only for academic research purposes.

3.7.2 Intervention Schedule

Table 16: Three-Week MyLingua Intervention Schedule

Stage	Duration	Main Activity	Purpose
Pre-intervention	30 minutes	Needs analysis questionnaire and pre-test	Identify needs and baseline proficiency
Week 1	30 minutes	Cardiovascular module	Terminology and integrated skills practice
Week 2	30 minutes	Respiratory module	Listening, reading, writing, and speaking practice
Week 3	30 minutes	Digestive module + post-test	Final practice and outcome measurement
Post-intervention	About 20 minutes per interview	Semi-structured interviews	Collect learner perceptions and suggestions

3.8 Data Analysis Methods

According to Merriam (2009), data analysis is the process of making sense of the data by consolidating, reducing, and interpreting what people have said and what the researcher has observed and read (pp. 175-176). Hinton (2004) also emphasizes the importance of statistical analysis for describing large amounts of data and helping researchers find answers. In the present study, data analysis includes thematic analysis of qualitative data and descriptive statistical analysis of quantitative data.

3.8.1 Qualitative Data Analysis

The study used thematic analysis to examine interview data. Thematic analysis allows researchers to arrange and interpret complex textual data in a systematic way (King, 2004). It is theoretically flexible and useful for identifying, describing, and interpreting patterns in

qualitative data (Braun & Clarke, 2006; Nowell, Norris, White & Moules, 2017). The interview responses were read, coded, grouped into themes, and interpreted in relation to the research questions.

3.8.2 Quantitative Data Analysis

The quantitative data included closed-ended questionnaire responses and pre/post-test scores. Quantitative analysis is appropriate when data are numerical (Dudovskiy, 2016). In this study, the numerical data were organized in Microsoft Excel to calculate frequencies, percentages, and comparative score changes. Tables and graphs were used to present the results clearly and support interpretation.

3.9 Limitations of the Study

Every research project may encounter methodological limitations. Acknowledging these limitations strengthens transparency and helps readers interpret the findings carefully (Glesne & Peshkin, 1992). In this study, the first limitation concerns the sample size. Thirty students were initially approached, but only 25 completed the full quantitative phase. The reduced final sample limits generalization and should be considered when interpreting the findings.

A second limitation is the short duration of the intervention. The study lasted three weeks, which was sufficient for initial prototype testing but not enough to measure long-term retention or broader language development. A longer intervention would provide stronger evidence about sustained learning.

A third limitation concerns the technical stage of the application. The alpha prototype did not include built-in audio recording or full offline functionality. These limitations affected the extent to which speaking performance and independent access could be evaluated. Finally, because the study used convenience sampling, the findings should be interpreted as exploratory and context-specific rather than fully generalizable.

3.10 Conclusion

In summary, this chapter has provided a detailed overview of the methodological approaches, instruments, procedures, and data analysis methods used in the present research. The study employed a mixed-methods design combining a needs analysis questionnaire, pre/post-tests, and semi-structured interviews. Quantitative data were used to examine

development in medical English proficiency, while qualitative data provided insights into students' experiences with MyLingua.

The chapter also clarified the research setting, participant selection, reliability and validity procedures, ethical considerations, and limitations. By correcting the distinction between the initial target sample and the final analyzed sample, the methodology now presents a coherent account of the research process. This coherence prepares the ground for interpreting the results of MyLingua implementation and its contribution to first-year medical students' medical English development.

***Chapter Two: Evaluating Learning Outcomes:
Findings and Discussion of MyLingua's Impact
on Medical English Performance***

Chapter Four: Findings and Discussion

4.1. Introduction

This chapter shows how the data was analyzed and interpreted to evaluate how effectively the integrated ESP mobile app functions. It seeks to investigate learners' perceptions of the application, its usability and accessibility, and its influence on the enhancement of language skills and medical terminology.

The chapter begins with a brief description of the collected data and proceeds to present the results, which will be analyzed further in relation to the literature on ESP and EMP. The study's findings will be considered in light of previous research and its practical implications. Finally, the recommendations for future research development are presented in this chapter.

4.2 Description of the Collected Data

The data collected for the study was obtained through various research instruments that were developed to test the efficacy of the integrated ESP mobile application. The research instruments used include a questionnaire to determine the requirements of students and pre-test and post-test questions as well as interviews to explore the learners' perceptions and experiences. This data was intended to investigate the impact of the application on the students.

4.3 Data analysis procedures

Both quantitative and qualitative techniques were employed in analyzing the data collected. In describing the numerical data obtained from the questionnaires/tests, percentages and frequencies were applied to determine trends among students and gauge the efficiency of the application. On the other hand, thematic analysis was employed to analyze the qualitative data obtained to determine the experiences and perceptions of the students. This way of analyzing the data enabled a proper assessment of the ESP mobile application.

4.4 Findings

4.4.1 Findings of the Quantitative Tools

This section presents the data analysis results of the students' questionnaire and the pre- and post-tests. The results obtained represent the answers of 25 first-year medical students at Dr Moulay Tahar, Saida's University.

4.4.1.1 The Needs Analysis Questionnaire

To reach an adequate understanding of the necessity of the ESP application and its impact on developing medical English skills, the research has used a questionnaire consisting of closed and open-ended questions. The questionnaire was distributed to 30 participants at the Department of Medicine, The Faculty of Medicine at Saida's University. It is equally important to note that at the very beginning, the researchers had distributed 30 questionnaires and received only 25 back. Each question will be analyzed separately in the following

i. Self-Assessment of Language Proficiency

Question 01: General English Proficiency

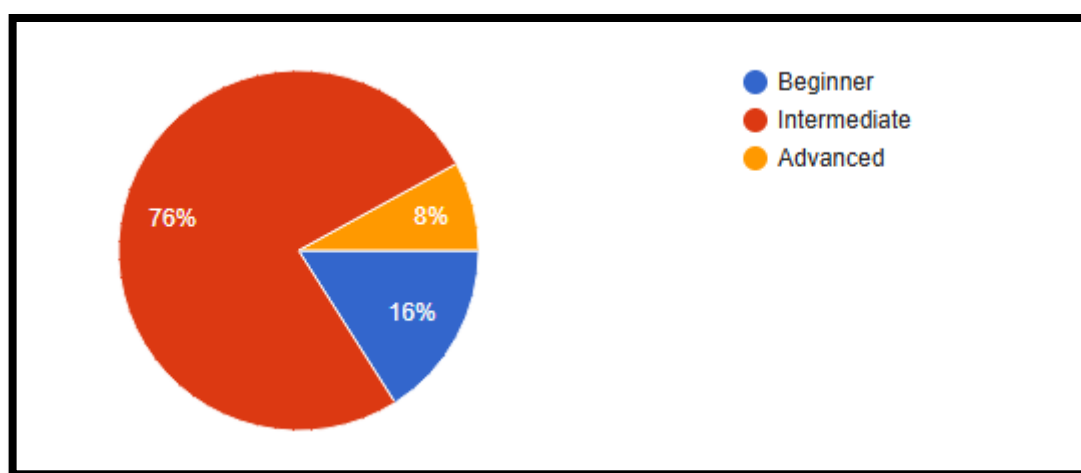


Figure 3: Students' General English Proficiency

The majority of participants fall into the intermediate category, where they constitute the largest percentage at 76%. Following this, 16% of participants claim that they are beginners in general English. While 8% are advanced in English. This aims to evaluate students' perceived level of English.

Question 02 : Medical English Proficiency

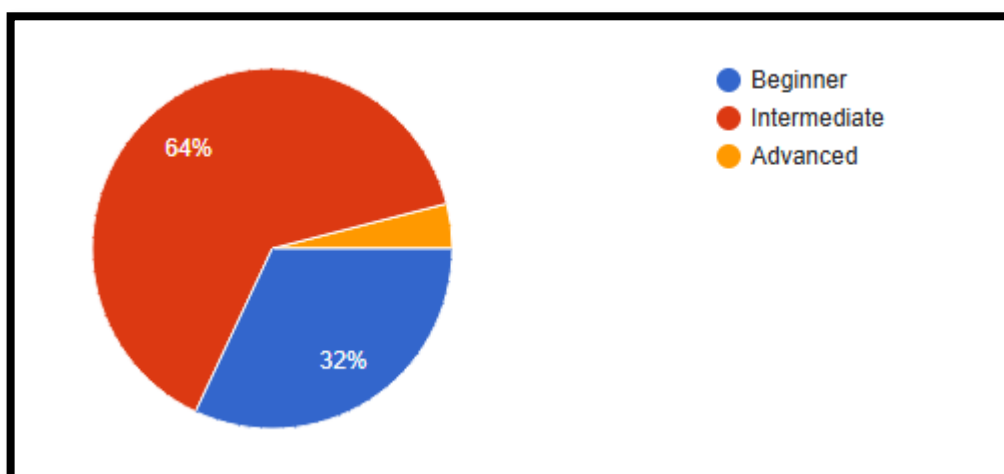


Figure 4 Students' Medical English Proficiency

The results indicated that 70% of students have attained an intermediate level of medical English proficiency. 32% of them perceive their medical English proficiency to be at the beginner stage. While the remaining 4% report having advanced level skills of medical English. This shows that there is a significant pedagogical gap between the students' general proficiency and the specific linguistic demands of the medical field.

ii. Perceived Learning Difficulties

Question 01: Studying medicine in English is a significant challenge for me.

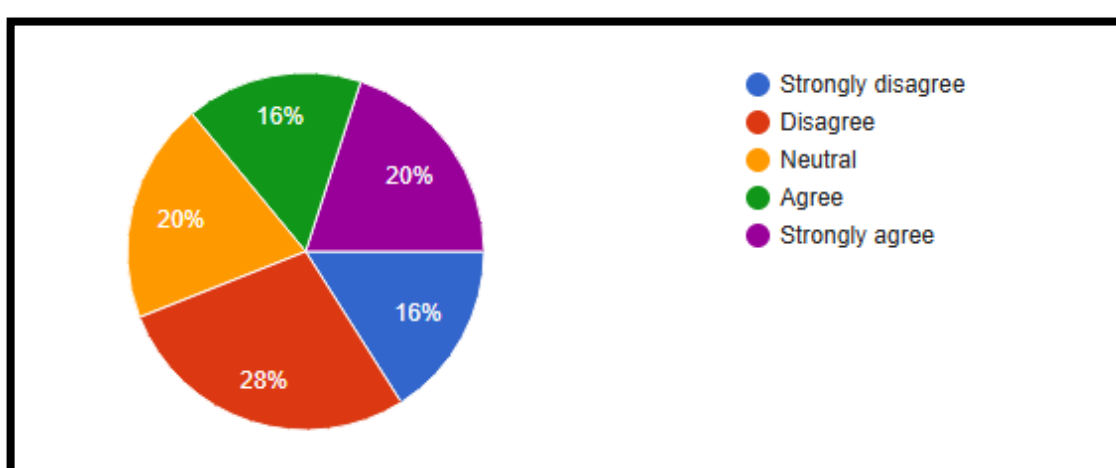


Figure 5: Students' Perceptions of Studying Medicine in English as a Challenge

Students vary in their level of agreement with the statement "Studying medicine in English is a significant challenge for me." The graph above reveals a varied distribution

across all levels of agreement, with a significant portion of 28% of students who disagree. However, 20% of students perceived that studying medicine in English is a challenge for them, and 20% of them expressed a neutral stance regarding studying medicine in English. While 16% of participants agree with the statement, another 16% strongly disagree. This indicates that while the English medium of instruction presents difficulties for certain students, it is not universally regarded as a major challenge.

Question 02: I find medical terminology harder to master than general vocabulary.

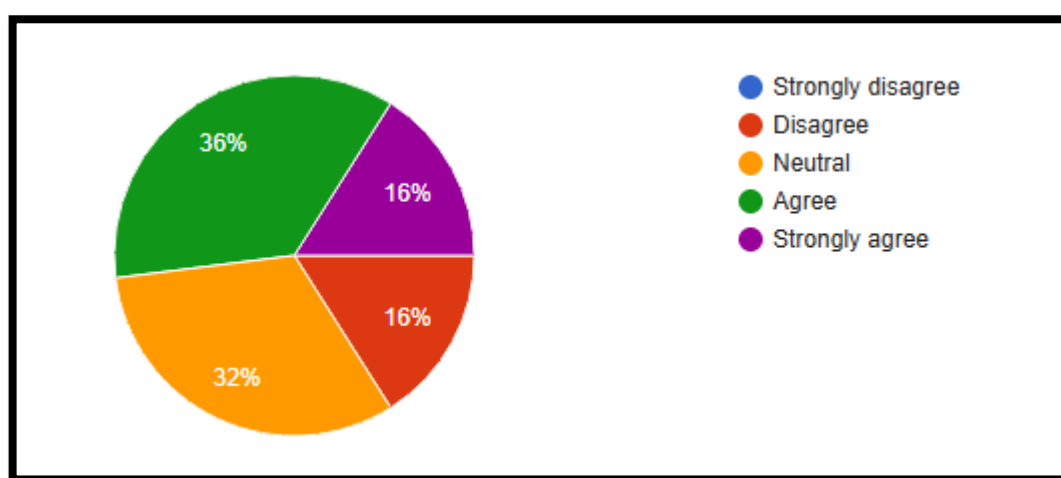


Figure 6: Distribution of Students' Responses on the Difficulty of Medical Terminology

This graph shows that 36% of students claim that they face difficulties in learning medical terminology. Furthermore, 16% strongly agree, which means that 52% of students claim that medical terminology is challenging. In contrast, 16% of respondents disagreed, and none selected "strongly disagree." A significant percentage (32%) remains neutral.

Overall, these results show that more than half of the students think that medical terms are harder to understand than general vocabulary. This indicates that specialized medical vocabulary in English is extremely difficult.

iii. Skill-Based Needs Analysis

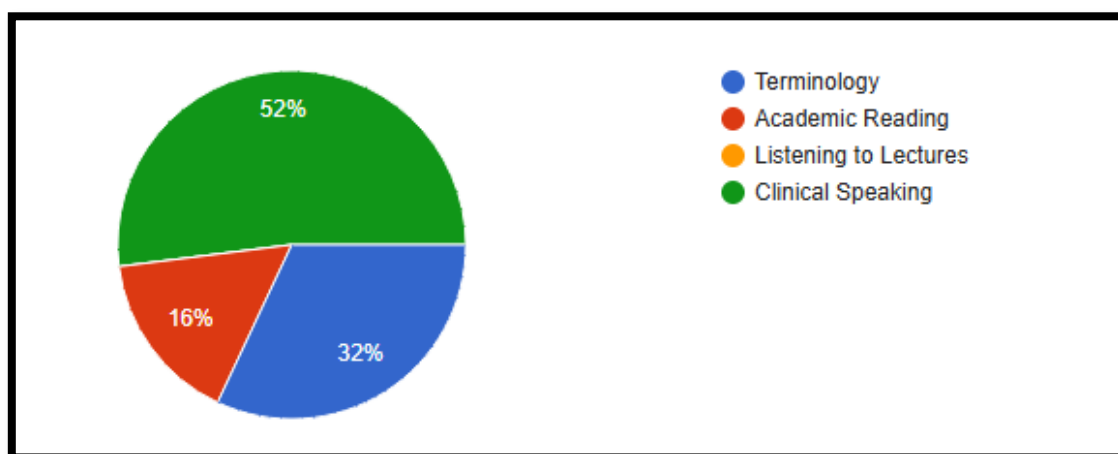


Figure 7 Distribution of Students' Skill-Based Learning Needs

Based on this data, most of the students 52% struggle with clinical speaking and perceived it as the most challenging skill in studying medicine in English. Following this, 32% of students claim that they face challenges with medical terminology. 16% of them find academic reading challenging. However, none of them perceived listening to lectures as a challenge.

In summary, the findings clearly indicate that the aspects which are crucial for students to master include clinical speaking and terminology, whereas academic reading and lecture listening are not crucial.

iv. Perceived Need for Support

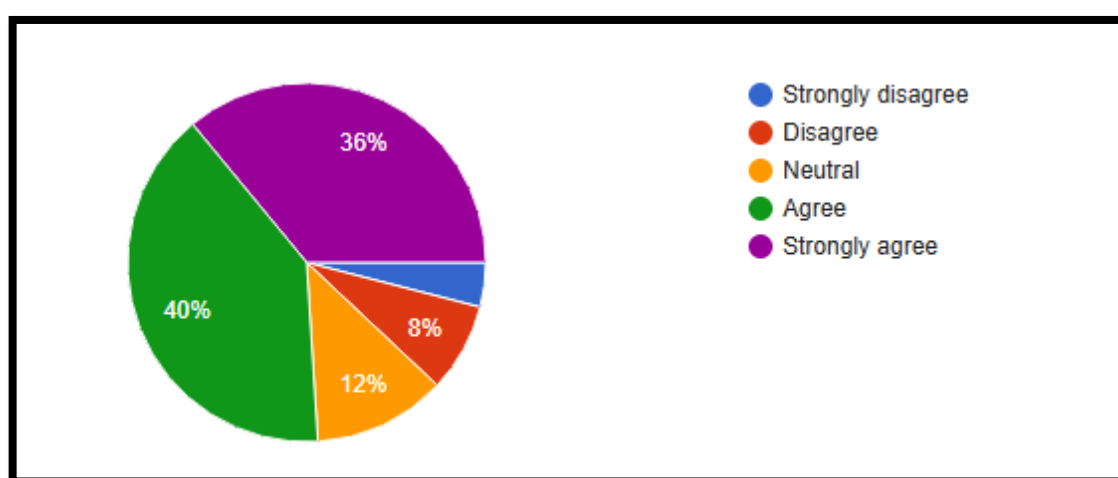


Figure 8 Perceived Need for Support in Medical English Learning

According to the data shown in the graph, the statement « I need additional support in Medical English to better understand my medical courses » was very well received, with 40% of participants agreeing and 36% strongly agreeing. In total, more than three-quarters of the sample population (76%) said they had a positive opinion. Conversely, only 8% expressed disagreement, and an additional 12% maintained neutrality. While only 4% strongly disagreed with the statement. This indicates a significant level of consensus among respondents concerning the topic.

v. Attitudes Toward Mobile-Assisted Learning

Question 01: Using a mobile application would be an effective way to improve my Medical English learning.

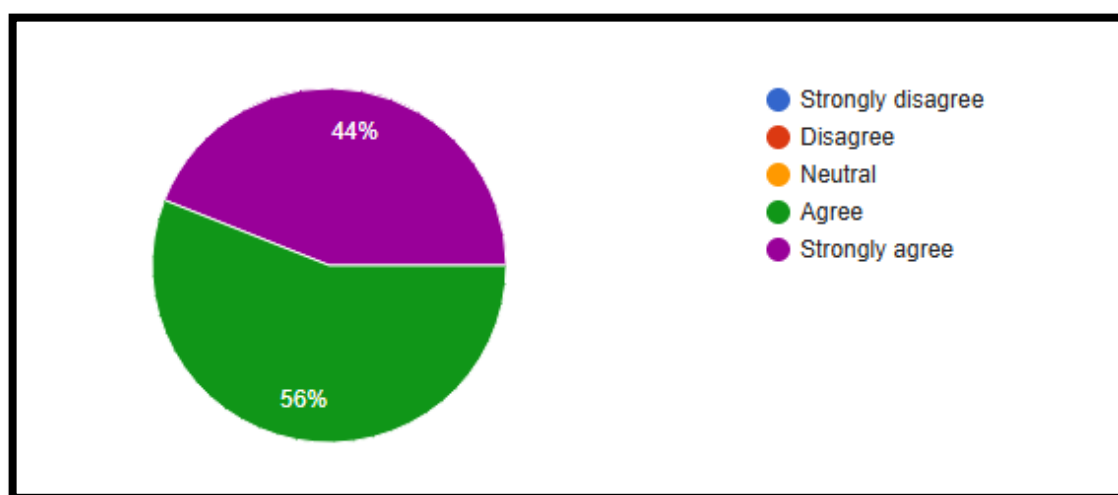


Figure 9: Distribution of Students' Responses on the Effectiveness of Mobile Learning for Medical English

The data shows that all respondents agree with the statement « Using a mobile application would be an effective way to improve my Medical English learning ». To be more specific, out of the total number of respondents, 56% agreed with the statements, while 44% strongly agreed with the statements. There were no cases of neutral or negative feedback, which means that 100% of the people who responded agreed with the statement. The absence of differing responses points to a shared acceptance among participants.

Question 02: A specialized app would increase my motivation to study English regularly.

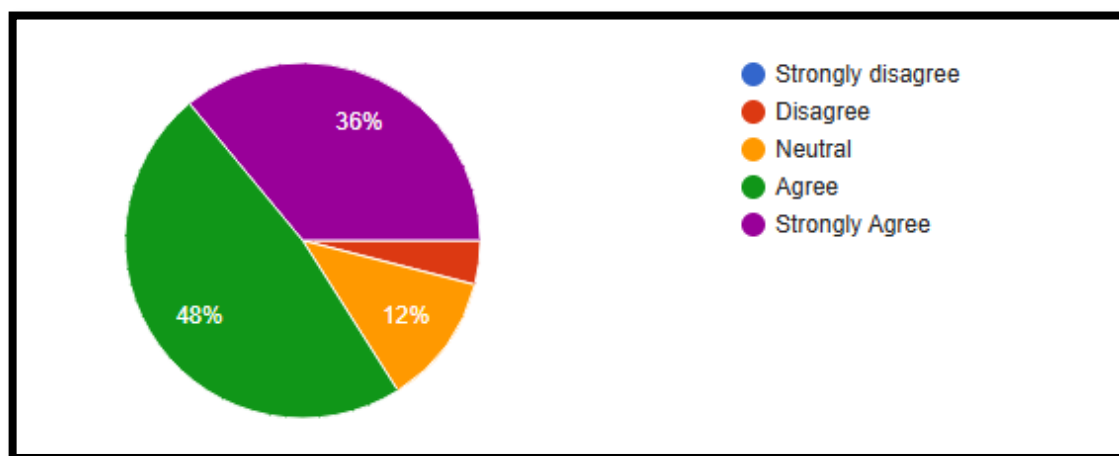


Figure 10: Distribution of Students' Responses on Motivation to Study English Using a Specialized App

The findings above reflect that there is quite an obvious degree of agreement among the participants, as 84% of them have given positive responses to the statement « A specialized app would increase my motivation to study English regularly» where 48% agreed, and 36% strongly agreed. The neutral answers were 12%, and the negative ones were 4%. The latter can be described as marginal, since they represent only the Disagree option.

4.4.1.2. The Pre-test and Post-test

The pre-test and post-test were conducted to determine the level of performance of the learners prior to and following the application of the integrated ESP mobile application MyLingua. The purpose of conducting the pre-test was to gauge the initial level of the learners' performance, whereas that of the post-test was to establish their improvement level following the intervention. The findings of the pre-test and post-test are presented in Table

Table 17: Students' Pre-Test and Post-Test Results

Student ID	Pre-Test Score	Post-Test Score
S1	2/11	10/11
S2	4/11	10/11
S3	2/11	11/11
S4	2/11	11/11
S5	5/11	11/11
S6	4/11	8/11
S7	10/11	11/11
S8	9/11	10/11
S9	7/11	10/11
S10	7/11	11/11
S11	4/11	11/11
S12	6/11	8/11
S13	9/11	11/11
S14	6/11	9/11
S15	2/11	8/11
S16	5/11	11/11
S17	6/11	8/11
S18	4/11	9/11
S19	5/11	11/11
S20	7/11	7/11
S21	7/11	11/11
S22	4/11	11/11
S23	4/11	10/11
S24	4/11	10/11
S25	3/11	11/11

Table 8 Comparison of Pre-Test and Post-Test Scores

Measure	Pre-Test	Post-Test	Improvement
Mean Score	5.12	9.96	+4.84
Number of Students	25	25	—

According to the table shown above, it can be observed that students had improved their performance in the post-test compared to the pre-test. Students achieved a mean score of 9.96 in the post-test, which was an increase of 4.84 marks from the pre-test score of 5.12 marks.

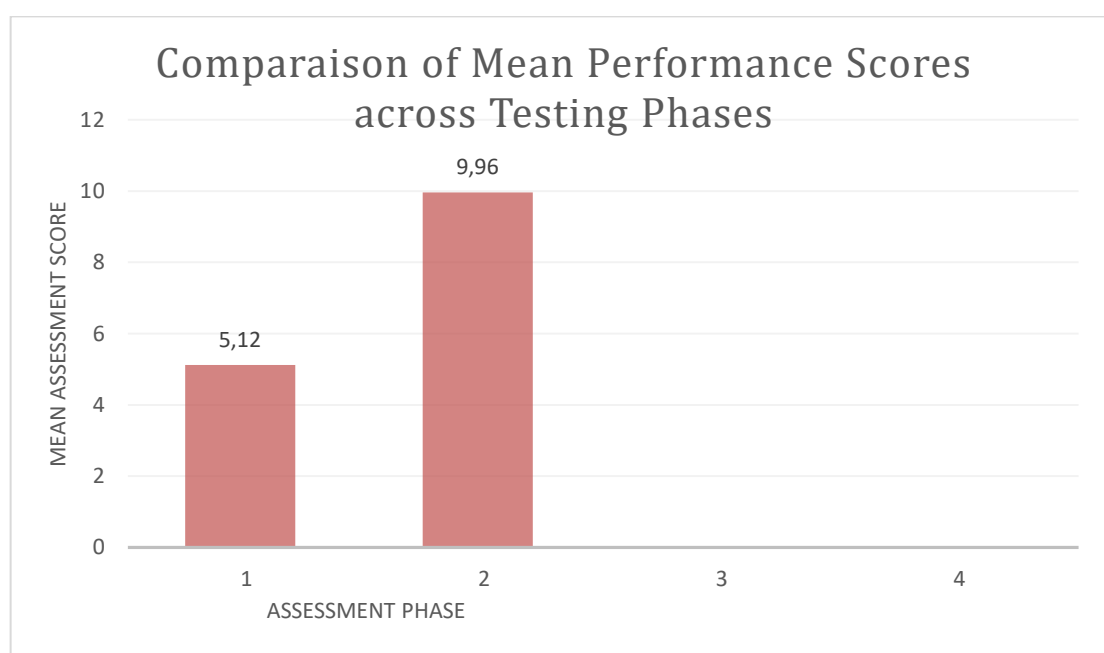


Figure 11 Comparison of Pre-Test and Post-Test Mean Scores

According to Figure 4.9, the mean value for the post-test is significantly higher than that for the pre-test. The gap between the two values indicates an improvement of 4.84 points ($9.96 - 5.12$). Such a large increase proves that the students made considerable progress after using the integrated ESP mobile application.

4.4.2 Findings of the Qualitative Tools

This section presents the findings from the analysis of data collected through interviews with students. The findings represent the views expressed by the first-year medical students involved in this study in the academic year 2025/2026. Interviews were conducted to explore issues related to the experiences and problems encountered when using English to study medicine, as well as to evaluate the ESP app.

4.4.2.1 Students' Interviews

To gain deeper insights into how first-year medical students at Dr. Moulay Tahar University perceive the use of English in medical studies and their attitudes toward using the integrated ESP mobile application, five first-year medical students were interviewed. The interview questions comprised an open set designed to examine students' problems, needs, and viewpoints regarding the mastery of medical English. The interviewer paid close attention to recording participants' answers to conduct a thorough analysis of the data. After grouping and coding interviewee responses by theme, these codes were then translated back into written explanations, providing the detailed descriptions presented below.

I - Students' Difficulties in Learning Medical English

Students' responses regarding their learning experiences indicate that they encounter numerous difficulties while studying medicine in English. Almost all of the participants claimed that the difficulty and quantity of the medical vocabulary were the major problems that they faced during their studies. The students stated that they felt overloaded with an excessive volume of new words. It is difficult to learn these words independently. One student noted, "It's impossible to memorize each word separately."

Beyond vocabulary-related difficulties, many students said they had trouble making grammatically correct sentences in academic medical settings. In particular, students noted that despite their understanding of medical principles, they struggled to articulate these concepts in writing. For instance, one participant noted, "I am unable to link ideas together grammatically when explaining a physiological process."

Inaccurate pronunciation and lack of clarity in speech were also recognized as major barriers to learning English. A student said, "I am afraid that the poor pronunciation will ruin

my knowledge of medicine," indicating that he was unsure of the proper pronunciation of some medical terms, which made him uncomfortable speaking in class.

Additionally, issues with comprehending listening material were raised, particularly in lecture classes, where the rapid pace makes it difficult to follow. According to the students, they frequently have to make translations that hinder them from following the lessons.

Furthermore, participants identified issues related to comprehending medical vocabulary within context. Participants indicated difficulties in comprehending the definitions of certain words used in medicine, both in their general sense and in specific contexts, proving the necessity of learning in context. As one participant mentioned, "I need a device that illustrates the usage of these terms in actual medical situations."

Overall, these results prove that language learners encounter multiple challenges besides acquiring new vocabulary. Difficulties in grammar, pronunciation, listening comprehension, and understanding the context of language use are among them.

II - Evaluation of the Mobile Application

According to the analysis of the answers provided by students, it is noted that the designed ESP mobile application was well-received and considered a valuable educational tool. The majority of the participants stated that they found the activity to be beneficial for their educational purposes, especially since it helped them to adapt to English-language studies at a medical institution. The main benefit of using this app was that it met a special demand for language teaching in medical institutions, concentrating only on medical English rather than general language acquisition. As one participant noted, "Having something targeted at medical language made the first semester easier," and another, "It fills a gap for non-beginners in general English, but beginners in medicine."

All of the participants agreed that they received many medical benefits through their participation. Specifically, the use of the app was determined to assist learners in gaining better comprehension and retention skills via Greek and Latin roots, prefixes, and suffixes. Notably, this approach facilitated the comprehension of not only vocabulary but also its formation and structure. Thus, a participant claimed, "It made the words seem less scary because I was able to find some patterns. Moreover, the contextualization strategy was greatly appreciated by all of the participants for helping them understand clinical terms accurately.

As far as language proficiency is concerned, most of the students found that there were significant improvements in several areas, especially in academic writing, reading comprehension, and listening comprehension. The students found that with the use of this application, they were able to develop an academic tone of writing, which was very important. A participant noted " I learned how to structure sentences using formal medical language." The other area where the students reported a lot of improvement was reading comprehension. They found that the vocabulary building had helped them read faster because they did not have to translate everything word by word.

Overall, the results show that the integrated ESP mobile app is effective in improving the development of language skills and terminology learning. The positive feedback of the students proves its role in facilitating learning and improving students' ability to deal with medical content in English.

III - Usability of the Application

The responses provided by the students reveal that the proposed ESP mobile application is highly user-friendly and accessible. According to the respondents, the development process was uncomplicated and intuitive, and all participants had no difficulties when using the tool. In addition, students liked the logical approach and were satisfied with the simplicity and efficiency of navigating the tool owing to the absence of excessive functions. One of the respondents said, "There are no complicated settings...you simply turn it on and start working."

Moreover, the majority of students reported that the tool was intuitive and fun to use as well. The activities were interactive, and the immediate feedback made the learning experience feel more like a game than an academic task. "It felt like I was playing a game rather than studying," said one student. Another said it created a "just one more round" effect that prompted further use.

Additionally, the aesthetics of the application were well-received by the students. They valued the logical organization of the design, which allowed them to easily find information without increasing their cognitive workload while learning. One user remarked, "The layout is very clean... everything you need is right where you expect it to be."

In conclusion, the results show that the application's usability is one of its strengths, combining simplicity, interactivity, and accessibility, all of which encourage regular use and support effective learning.

IV - Suggestions for improvements

The answers given by the respondents reveal that several recommendations can significantly enhance the utility of the ESP mobile application. One of them that was recommended by all the respondents as very valuable was the inclusion of an audio recording function. The ability to record one's voice and evaluate it based on correct pronunciation models is extremely valuable for gaining better speaking skills and boosting confidence. As one respondent stated, "adding an audio recording function would boost confidence." Another respondent called it "an interactive learning experience."

Another recommendation made was to incorporate more specialties into the application, such as cardiology, neurology, pediatrics, and surgical specialties. Students highlighted the need for the application to evolve as they acquire new knowledge, thereby providing them with more specialty-related vocabulary. This is reflected in one student's remark that stated, "It would be better if the content grew with us as we learn."

The importance of adding a dictionary or an option of searching for specific medical terms was also pointed out by some participants. The purpose of this option would be to enable the students to find the precise meaning of the word from a clinical perspective without the need for additional sources. Several respondents argued that there were multiple words in English whose meaning differed when used in medicine, and hence it was necessary to have precise definitions in this regard.

These recommendations, generally speaking, indicate that the application is already quite beneficial and user-friendly. Yet further features in terms of pronunciation training, special materials, and relevant terminology would enhance its benefits and keep up with students' developing demands.

4.5 Discussion of the Main Findings

This section provides a thorough analysis of the main results that were found during the analysis of quantitative and qualitative data collected during this research. The main purpose of this section is to provide the answer to the research question: What is the influence of an

integrated ESP mobile application on the performance of students in Medical English? The other purpose of this section is to verify the hypothesis about the positive influence of using an ESP mobile application on the performance of students in Medical English. These purposes are based on findings from the needs analysis questionnaire, pre-test, post-test, and student interviews, analyzed within the framework of the relevant literature review in ESP, EMP, and MALL.

The results of the current research indicate that learners have achieved better results in the use of the integrated ESP mobile application. As it follows from the results obtained from the use of quantitative data analysis, the difference between pre-test and post-test scores indicates that the level of student performance improved significantly, rising by 4.84 points (from 5.12 to 9.96). Hence, the significant results obtained prove that the application used can be successfully employed in teaching Medical English to students. It is necessary to mention that the obtained results correlate with the principles of ESP, proposed by Hutchinson and Waters, suggesting that language learning must be targeted and customized to the specific conditions of a learner. In this context, the integrated application provided students with focused material that directly addressed the linguistic needs of medical studies, thereby enabling more effective learning.

The results of the needs-analysis questionnaire also reflect the difficulties faced by first-year medical students learning medicine in English. A significant number of students indicated challenges in comprehending medical terminology, which is frequently noted for its complexity and dependence on Greek and Latin origins. These findings support the work of Dudley-Evans and St John, who stress that ESP learners face language specific to their field that necessitates specialized teaching. Basturkmen also stresses the need for needs analysis in identifying language deficiencies among students and ensuring the availability of suitable instructional materials. The participants' strong agreement on their need for more Medical English support highlights the need for focused ESP interventions.

The results indicated that apart from vocabulary-related challenges, students encounter difficulties in developing productive language competencies, particularly oral and written communication within academic-medical environments. This aligns with prior research in English for Medical Purposes, which demonstrates that learners frequently encounter difficulties in employing specialized terminology accurately and appropriately in

communication (Hyland, 2006). According to the results received during this investigation, the developed integrated ESP mobile application successfully managed to resolve this issue by providing structured training of vocabulary and language skills. The learners claimed that their skills of reading, writing, and listening had improved. This supports Nation's (2001) who claims that effective language acquisition requires combining vocabulary learning with meaningful language use.

In addition, the responses from the students on the questionnaire indicate that they have a positive perception towards the concept of mobile-assisted learning. It is evident that all participants agreed that mobile applications can assist them in improving their proficiency in Medical English, and most of the respondents indicated that they feel more motivated to use such applications. The findings are similar to other studies conducted on Mobile-Assisted Language Learning (MALL). These studies emphasize the importance of mobile devices as a means of promoting autonomous, adaptive, and engaged learning among language learners. According to Kukulska-Hulme, mobile learning allows students to access learning resources at any time and place, thus providing personalized and continuous learning experiences. Stockwell adds that mobile applications can help language acquisition by creating interactive and user-friendly platforms.

The additional evidence of qualitative results obtained from the students' interviews supports the above findings. Interviewees mentioned that the use of the application was helpful for their problem with medical vocabulary since it allowed them to get the knowledge on how to create words, such as prefixes, suffixes, and roots. Thus, the described approach allowed students to study new vocabulary in an innovative manner that required more effort than simple rote learning. The findings presented above correspond with the theoretical model suggested by Lewis in his lexically oriented approach (1993), emphasizing the necessity to identify patterns and chunks. At the same time, students stressed the importance of providing examples in order to understand the usage of terminology.

The other noteworthy finding concerns the usability of the app. Students agreed that it was user-friendly, logical, and enjoyable to work with. Its interface was straightforward, and interactive elements helped the learning process. The tasks became more enjoyable and engaging since they were entertaining and provided instant feedback. These findings confirm the findings by Dörnyei, according to whom motivation plays an essential role in learning a

language, and creating an entertaining learning environment is crucial. The concept of bite-sized learning, as discussed in MALL literature, was further demonstrated by the students' proficient use of the app for brief intervals, such as between classes, which fostered greater consistency and motivation.

Despite the generally positive feedback from the majority of learners, several recommendations on how the program could be improved have also been formulated by the students. The improvements proposed include the development of pronouncing abilities by the introduction of options such as audio recording and feedback; an expansion of the content so that more branches of medicine would be covered; and the inclusion of a specialized medical dictionary. All the above recommendations reveal the dynamic nature of the learners' demands and emphasize the necessity for continuous progress in education through technology.

The findings of this study broadly support the research hypothesis that the integration of the ESP mobile application positively influences the performance of students in Medical English. The significant improvement in the test scores, along with the favorable attitudes and identified needs of the students, indicate that the use of this mobile application is indeed an effective pedagogical tool. These findings support the idea that integrating ESP theory with mobile learning technology can be an effective solution to the issues encountered by medical students in their English language learning.

In conclusion, the integrated ESP mobile application significantly and positively impacts medical English performance by improving language abilities, enabling medical vocabulary acquisition, and enabling more effective interaction with medical material.

4.6 Practical and Pedagogical Recommendations

Based on the results of this study, a number of practical and educational recommendations might be suggested to enhance the teaching and learning of Medical English using integrated ESP approaches and mobile-assisted learning tools. Based on quantitative and qualitative results, these recommendations are aimed at solving the identified issues and taking advantage of the existing strengths of the integrated ESP mobile app.

First, it is suggested that medical departments should integrate ESP into the curriculum of students, particularly in the first year. The results indicated that students experienced

difficulties in learning medical terminology and acquiring effective communication skills. Targeted language instruction aligned with medical content can support students to transition to English-medium education and improve their academic performance.

Similarly, ESP instructors are advised to incorporate an integrated skills strategy to integrate vocabulary acquisition into the acquisition of reading, writing, listening, and speaking skills. The findings of this study suggest that language acquisition is more effective through contextual and meaningful application than through isolated memorization. As such, the pedagogical approaches utilized should involve authentic activities that reflect real-life academic and clinical discourse.

Additionally, the adoption of mobile-based language learning software is recommended as a supplemental component in ESP instruction. The favorable reception of students concerning the applicability and efficiency of the integrated ESP mobile app signifies the importance of technological advancements in facilitating flexible, autonomous, and engaging learning experiences.

Additionally, it is recommended that the development of educational applications intended for ESP students' needs be constantly improved, depending on the needs of their users. In particular, according to the participants' suggestions, improvements may include such elements as an audio feature, which will help to practice pronunciation; information about a wide range of medical specialties; and special dictionaries that will provide correct definitions of words within their contexts.

Moreover, instructors are recommended to teach students about the most effective methods of language acquisition, particularly concerning medical terminology. For example, making learners examine the process of creating a new word or noticing certain patterns when using medical terminology can be very helpful. Such techniques will allow students to become more autonomous during the study process.

In addition, the adaptation and further development of the ESP mobile application for learning within other academic disciplines than medicine should also be considered. As the app was developed in line with the principles of ESP, it may also find its successful application in areas such as engineering, economics, or law, as these disciplines will also have the need for learners' acquisition of specific language abilities.

Finally, it is highly recommended that ESP practitioners, content experts, and software developers collaborate to ensure the development of learning tools that are pedagogically sound and contextually relevant. This type of interdisciplinary collaboration can help to create improved educational technologies that cater to linguistic as well as disciplinary requirements.

In conclusion, these suggestions are aimed at developing an ESP approach that would combine both learner-centeredness and technology to ensure success for the students linguistically and academically.

4.7 Conclusion

This chapter has delved into the key findings of the current chapter. The data collected was through pre and post-test, questionnaires, and interviews. This chapter was devoted to evaluating the efficacy of the integrated ESP application for enhancing the performance of the students in medical English. The discussion explored the perceptions of the learners concerning the use of the application, its usability and accessibility, and the increase in language skills and medical terminology.

To conclude, the findings of this chapter were based on the analysis of the results obtained during the needs analysis questionnaire, pre-test, and post-test, as well as on students' interviews. The results indicated a significant improvement in students' academic performance and underscored the positive impact of the application on their learning experience. The findings emphasized the effectiveness of the application in developing both specialized medical vocabulary and general language proficiency.

General Conclusion

General Conclusion

Due to the increasing prominence of English within medical education, proficiency in Medical English has become a vital academic and professional prerequisite for medical students. Nevertheless, the shift from General English to English for Medical Purposes continues to pose a significant challenge for many first-year medical students, especially in contexts where specialized linguistic support and technological resources are limited. Within Algerian higher education, medical students often face challenges regarding specialized vocabulary acquisition, academic communication, accurate pronunciation, reading comprehension, and the contextual analysis of medical discourse. The presence of these challenges demonstrates the importance of adopting innovative and learner-centered educational strategies to support specialized language acquisition.

This study sought to investigate the impact of an integrated ESP mobile application on student performance in Medical English. In particular, the study aimed to investigate the linguistic difficulties faced by first-year medical students, determine the effectiveness of the application in developing language skills and medical vocabulary acquisition, and investigate learners' perceptions of its accessibility and usability. Additionally, this research sought to examine the capacity of Mobile-Assisted Language Learning (MALL) to foster student motivation, engagement, and independent learning within the context of EMP education.

To address these aims, the research combined quantitative and qualitative instruments within a mixed-methods approach. Quantitative data collection involved needs analysis questionnaires and pre-test/post-test measures, while qualitative data were derived from semi-structured interviews conducted with students. This mixed approach provided measurable evidence of student improvement alongside qualitative insights into their perceptions of the application.

The results of this research indicated that first-year medical students encounter difficulties during Medical English acquisition, specifically regarding specialized vocabulary mastery and the precise application of medical language within academic settings. The study also highlighted the educational limitations caused by separating English language classes from medical content courses. The separation between English instruction and medical studies often makes it difficult for students to relate linguistic knowledge to genuine medical contexts. The integrated ESP mobile application aimed to fulfill this gap by combining

General Conclusion

language and medical content into contextualized, meaningful, and learner-centered lessons. The findings also revealed that the integrated ESP mobile application improved students' performance in Medical English. Pre-test and post-test comparisons showed clear student progress after using the application, proving its effectiveness as a teaching support tool.

Qualitative findings also showed that students viewed the application as useful, easy to access, interactive, and motivating. Participants responded positively to the terminology-centered activities, contextualized tasks, and the application's accessible design. The findings also showed that mobile learning helps students study independently and practice regularly outside the classroom. The study therefore confirmed that the use of mobile-assisted learning in EMP education can enhance the flexibility and learner-centered nature of learning experiences.

This research also contributes to the literature by connecting the fields of ESP, EMP, and Mobile-Assisted Language Learning. It highlights the capacity of educational technology to enhance specialized language acquisition by means of interactive and accessible learning environments. Furthermore, this research offers practical utility by designing a pedagogical model that empowers medical learners to overcome linguistic hurdles and improve their overall academic performance.

In light of the study's conclusions, several pedagogical and institutional recommendations can be offered. The study encourages EMP instructors and curriculum developers to integrate educational technology and mobile-assisted learning practices into specialized language education. Furthermore, higher education institutions ought to encourage the creation of digital, student-centered learning materials tailored to the specific academic requirements of their student body. Additionally, future investigations should explore the efficacy of instructional technologies across other ESP domains, including engineering, business, law, and academic science.

In conclusion, this study proves that using educational technology in Medical English classes significantly improves students' language skills, motivation, and grades. The integration of ESP pedagogy and mobile-assisted learning in this research highlights the need for innovative and accessible educational solutions that respond to the evolving requirements of modern higher education. Overall, the study adds to current discussions on digital

General Conclusion

pedagogy, specialized language instruction, and educational innovation in Algerian universities.

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APPENDIX I

MEDICAL ENGLISH NEEDS ANALYSIS QUESTIONNAIRE

Research Title: The Effectiveness of the MyLingua ESP Mobile Application in Enhancing Medical English Vocabulary Acquisition among First-Year Medical Students

Instructions:

Please answer the following questions honestly. The information collected will be used solely for research purposes and will remain confidential.

Section A: Background Information

1. How would you rate your general English proficiency?

☐ Beginner

☐ Intermediate

☐ Advanced

2. How would you describe your level in Medical English?

☐ Beginner

☐ Intermediate

☐ Advanced

Section B: Medical English Learning Needs

For each statement, indicate your level of agreement by selecting one option.

Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
3. Studying medicine in English is a significant challenge for me.	☐	☐	☐	☐	☐
4. I find	☐	☐	☐	☐	☐

Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
medical terminology harder to master than general vocabulary.					
5. I need additional support in Medical English to better understand my medical courses.	☐	☐	☐	☐	☐
6. Using a mobile application would be an effective way to improve my Medical English learning.	☐	☐	☐	☐	☐
7. A specialized app would increase my motivation to study English regularly.	☐	☐	☐	☐	☐

Section C: Learning Difficulties

8. Which Medical English skill(s) do you find most difficult? (You may select more than one.)

- ☐ Medical Terminology
- ☐ Academic Reading
- ☐ Listening to Medical Lectures
- ☐ Clinical Speaking
- ☐ Other: _____

APPENDIX II

DIAGNOSTIC MEDICAL ENGLISH PRE-TEST

Research Title: The Effectiveness of the MyLingua ESP Mobile Application in Enhancing Medical English Vocabulary Acquisition among First-Year Medical Students

Instructions:

Read each question carefully and choose the most appropriate answer. Complete all tasks.

Part I: Medical Terminology (Multiple Choice Questions)

Choose the correct answer.

2. A chronic condition is best defined as one that:
 - a) Appears suddenly
 - b) Persists for a long duration
 - c) Is immediately fatal
3. Metastasis refers to a cancer that:
 - a) Is easily cured
 - b) Stays in one place
 - c) Spreads to other parts of the body
3. Which diagnostic tool uses high-frequency sound waves to view internal organs?
 - a) X-Ray
 - b) Ultrasound
 - c) Biopsy

Part II: Sentence Completion

Complete each sentence using the correct term:

Diagnosis – Prognosis – Contraindication

4. After evaluating the biopsy results, the lead surgeon confirmed the final

5. The patient's _____ is positive, with a 95% expected recovery rate.
6. A history of heart disease is a _____ for this specific surgical procedure.

Part III: Matching Medical Terms and Definitions

Match each term with the correct description.

Medical Terms:

1. Renal System
2. Hepatic Function
3. Cerebral Cortex
4. Gastrointestinal System

Definitions:

- a) Concerns the mechanical and chemical breakdown of food.
- b) Pertains to the kidneys and the regulation of fluid balance.
- c) Relates to the liver's role in detoxification and metabolism.
- d) The outer layer of the brain responsible for high-level processing.

Medical Term	Correct Letter
Renal System	_____
Hepatic Function	_____
Cerebral Cortex	_____
Gastrointestinal System	_____

APPENDIX III

POST-TEST

Research Title: The Effectiveness of the MyLingua ESP Mobile Application in Enhancing Medical English Vocabulary Acquisition among First-Year Medical Students

Instructions:

Read each question carefully and answer based on your knowledge of Medical English. Choose the most appropriate answer where required.

Part I: Medical Terminology (Multiple Choice Questions)

Choose the correct answer.

5. The medical term “hypertension” means:

e) Low blood pressure

f) High blood pressure

g) Heart failure

h) Respiratory infection

4. “Pulmonary embolism” refers to:

i) Lung infection

j) Blockage in a lung artery

k) Heart muscle damage

l) Stomach ulcer

4. The Arabic medical term “الكبد تليف” means:

m) Liver cirrhosis

n) Liver infection

o) Kidney failure

p) Gastritis

7. “Shortness of breath” is related to which body system?

- q) Cardiovascular system
- r) Respiratory system
- s) Digestive system
- t) Nervous system

Part II: Sentence Completion

Complete each sentence by choosing the correct medical term.

5. A severe _____ in the coronary artery may block blood flow.
- u) Infection
 - v) Blood clot
 - w) Fever
6. Chronic alcohol consumption may lead to _____.
- x) Peptic ulcer
 - y) Liver cirrhosis
 - z) Pneumonia

Part III: Medical Conditions Matching

Match each medical condition with its correct definition.

Medical Condition	Definition
-------------------	------------

Pneumonia	_____
Angina	_____
Cirrhosis	_____
Cardiac Arrest	_____

Definitions:

A. Lung infection

B. Chest pain due to reduced blood flow to the heart

C. Chronic liver damage

D. Sudden loss of heart function

Part IV: Translation Task

7. Translate the following sentence into English:

النتفس في ضيق من المريض يعاني

.....

.....

9. Translate the following sentence into Arabic:

The patient has high blood pressure.

.....

.....

Summary

The present study explores the integration of Mobile-Assisted Language Learning (MALL) into English for Medical Purposes through the design and development of MyLingua, a mobile learning application intended for first-year medical students. The study was motivated by the linguistic challenges students encounter when learning Medical English and the need for more flexible, accessible, and specialized learning tools. Following the ADDIE instructional design model, the application was developed to provide curriculum-aligned activities focusing on medical terminology, sentence construction, listening comprehension, matching exercises, and medical writing tasks. Data were collected through questionnaires, interviews, and prototype evaluation. The findings revealed a positive perception of the application among participants, who highlighted its usability, relevance, and potential to support Medical English learning. The study concludes that mobile learning applications such as MyLingua can serve as valuable supplementary tools for enhancing English language learning in medical education.

Résumé

Cette étude examine l'intégration de l'apprentissage mobile des langues (Mobile-Assisted Language Learning – MALL) dans l'enseignement de l'anglais médical à travers la conception et le développement de MyLingua, une application mobile destinée aux étudiants de première année en médecine. Cette recherche est motivée par les difficultés linguistiques rencontrées par les étudiants dans l'apprentissage de l'anglais médical ainsi que par le besoin d'outils d'apprentissage plus flexibles, accessibles et spécialisés. En s'appuyant sur le modèle de conception pédagogique ADDIE, l'application a été développée afin de proposer des activités alignées sur le programme de formation, notamment la terminologie médicale, la construction de phrases, la compréhension orale, les exercices d'association et les tâches de rédaction médicale. Les données ont été recueillies à travers des questionnaires, des entretiens et l'évaluation du prototype. Les résultats montrent une perception positive de l'application par les participants, qui ont souligné son utilité, sa pertinence et son potentiel pour soutenir l'apprentissage de l'anglais médical. L'étude conclut que les applications mobiles d'apprentissage telles que MyLingua peuvent constituer des outils complémentaires efficaces pour améliorer l'apprentissage de l'anglais dans le domaine médical.

الملخص

في تعليم الإنجليزية للأغراض الطبية من خلال (MALL) تهدف هذه الدراسة إلى استكشاف توظيف التعلّم المتنقل للغات الموجّه لطلبة السنة الأولى طب. جاءت هذه الدراسة استجابةً للصعوبات اللغوية التي MyLingua تصميم وتطوير تطبيق يواجهها الطلبة في تعلّم الإنجليزية الطبية والحاجة إلى أدوات تعليمية أكثر مرونة وسهولة وتخصّصًا. واعتمادًا على نموذج ، تم تطوير التطبيق ليقدم أنشطة متوافقة مع المنهاج تشمل المصطلحات الطبية، وبناء الجمل، ADDIE التصميم التعليمي والاستماع، وتمارين المطابقة، ومهام الكتابة الطبية. جُمعت البيانات من خلال الاستبيانات والمقابلات وتقييم النموذج الأولي للتطبيق. وأظهرت النتائج وجود نظرة إيجابية تجاه التطبيق من قبل المشاركين الذين أكدوا سهولة استخدامه وأهميته يمكن أن تمثل MyLingua وإمكاناته في دعم تعلّم الإنجليزية الطبية. وتخلص الدراسة إلى أن تطبيقات التعلّم المتنقل مثل أدوات تعليمية داعمة وفعّالة لتعزيز تعلم اللغة الإنجليزية في المجال الطبي.

