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وزارة التعليم العالي والبحث العلمي

مؤسسة التعليم العالي والبحث العلمي:

نموذج التصريح الشرفي

الخاص بالالتزام بقواعد النزاهة العلمية لإنجاز بحث

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مديرية الدراسات العليا والبحث العلمي

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MOHAMMED EL BACHIR EL IBRAHIMI UNIVERSITY
BORDJ BOU ARRERIDJ
FACULTY OF LETTERS AND LANGUAGES
DEPARTMENT OF ENGLISH



A Dissertation Submitted in Partial Fulfilment of the Requirements for the Degree of Master of Arts in the Didactics of English

Investigating the Main Challenges and Solutions Proposed by Science, Technology, Engineering and Mathematics Teachers and Students When Using English as a Medium of Instruction in Algerian Higher Education

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DEDICATION 1

لَكَ الحَمدُ يا ذا الجودِ والمَجدِ وَالعُلا تَبارَكتَ تُعطي مَن تَشاءَ وَتَمنَعُ

إِلَهي وَخَلّاقي وَحِرزي وَمَوئِلي إِلَيكَ لَدى الإِعسارِ وَاليُسرِ أَفزَعُ

-علي بن ابي طالب -

Praise be to the Greatest - Allah - who illuminated my path when all I could see was darkness. Without His guidance, I would have been nothing, and all my efforts would have been in vain.

To the Islamic nation and the greater cause, from every kid's tear to blood rivers that the world refuses to see. FREE PALESTINE, it will be.

To myself, who refused to surrender despite the overwhelming thoughts and the voices that whispered "no more" When every instinct said to quit, I chose to reach the shore. The lights are on now, welcome to the final show. This is the end I hoped for.

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This achievement belongs to all of you, who believed in me when I could not believe in myself.

FERYAL

DEDICATION 2

وَآخِرُ دَعْوَاهُمْ أَنِ الْحَمْدُ لِلَّهِ رَبِّ الْعَالَمِينَ

In the name of Allah, Alhamdulillah. My deepest gratitude and humble thanks are

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.

ABSTRACT

In response to Algeria's 2022 policy to implement English as a Medium of Instruction (EMI) in higher education, particularly within science, technology, engineering and mathematics (STEM) disciplines, this study investigates the multifaceted challenges faced by STEM teachers and students during this transition. Historically dominated by French, the Algerian academic context presents unique linguistic, pedagogical, and institutional obstacles that merit closer examination. The primary objectives of this research are to explore STEM educators' and learners' difficulties related to EMI and to identify their suggestions for enhancing the implementation process. To achieve these aims, a convergent mixed-methods approach was employed, combining qualitative and quantitative data. A semi-structured online questionnaire was distributed to 64 STEM students and semi-structured interviews were conducted with six STEM teachers at Mohammed El-Bachir El-Ibrahimi University in Bordj Bou Arreridj. The findings of this study underscore the challenges and potential solutions for effective EMI implementation in STEM disciplines. Key challenges include limited academic English proficiency, pedagogical difficulties in content delivery, reduced student participation, and increased cognitive load on teachers. Students suggested pre-semester intensive English courses, bilingual teaching approaches, and subject-specific vocabulary training, while teachers advocated for professional development programs, immersive training experiences, and institutional support through language centers. This study contributes to the growing body of EMI research by providing context-specific insights from both educators and learners in Algeria's STEM fields. The findings also offer practical implications for policymakers and educational leaders to design responsive teacher training programs, develop supportive learning materials, and implement EMI policies that are both linguistically and pedagogically informed.

Key words: EMI, STEM education, challenges, suggestions, questionnaire, interviews

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LIST OF ACRONYMS

BBA: Bordj Bou Arreridj

CBI : Content Based Instruction

CEIL : Centre d'Enseignement Intensif des Langues

CLIL: Content Language Integrated Learning

CNEAD: Commission Nationale de d'Enseignement A Distance

EAP: English for Academic purposes

EFL: English as a Foreign Language

ELT: English Language Teaching

EMEMUS: English-Medium Education in Multilingual University Settings

EMI: English Medium Instruction

ESP: English for Specific Purposes

HE: Higher Education

ICLHE: Integrating Content and Language in Higher Education

MOOCs: Massive Open Online Courses

MHESR: Ministry of Higher Education and Scientific Research

PUC: Pontificia Universidad Católica de Chile

STEM: Science Technology Engineering Mathematics

TIE: Teaching in English

TU Delft: Delft University of Technology

UN: United Nations

WTO: World Trade Organization

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GENERAL INTRODUCTION

Background of the Study

Having become the lingua franca of communication and commerce internationally, English proficiency is one of the most crucial elements of success in different domains (Ouarniki, 2023). With the demands of a rapidly changing world, several countries are recognizing the importance of English language mastery to produce competitive students who will be prepared for the challenges of the global world (Kirkpatrick, 2012). As a response, many non-native-speaking countries have introduced English as a medium of instruction (EMI) in higher education (HE), and Algeria was no exception. Driven by political as well as academic and economic factors (Khenioui & Boulkroun,2023), the Algerian policymakers introduced EMI officially in HE in 2022 (Scribd, n.d.).

While this policy shift is intended to yield significant benefits for the Algerian university, EMI implementation might also present considerable challenges for university staff especially for STEM teachers and students. Given Algeria's long history where French served as the dominant language of instruction in HE, teachers and learners alike might encounter numerous obstacles with EMI. These issues might significantly impede the teaching learning process making the transition to EMI a complex undertaking. As such, this study seeks to unravel the difficulties that STEM teachers and students face with EMI as well as their recommendations for enhancement. This study, therefore, significantly contributes to understanding EMI implementation in STEM disciplines by examining both teachers' and students' perspectives on the challenges they face and the solutions they put forward. This research provides essential insights for policymakers to develop effective strategies at university and pre-university levels. Ultimately, this research aims to enhance STEM

education practices based on the actual experiences of those directly involved in the EMI process.

Statement of the Problem

Introducing EMI at the Algerian HE is an important initiative but a sensitive decision. Following a long reliance on French for university instruction particularly for STEM disciplines, implementing EMI presents significant challenges not only for students but also university instructors from multiple angles (Ghouali & Haddam, 2024; Ouarniki, 2023). Therefore, despite the growing global literature on EMI, there exist scant research that address these challenges from the combined perspectives of Algerian STEM teachers and students. This study, which is qualitative in nature, seeks to shed light on Algerian STEM teachers' and students' challenges, and their recommendations for a more effective EMI implementation.

Research Aim and Objectives

In its essence, this proposed research study aims to investigate the challenges that university STEM teachers and students face regarding EMI as well as to explore their suggestions to address these challenges. Particularly, this study achieves the following objectives:

- To investigate the challenges encountered by both STEM teachers and students in the context of EMI.
- To identify the suggestions proposed by teachers and students for addressing the challenges related to EMI.

Research Questions

The study is driven by the following research questions:

- What are the challenges faced by STEM teachers and students when using EMI?
- What are teachers' and students' suggestions to better use EMI?

Significance of the Study

By addressing the above-stated research objectives, this study holds significant contributions and implications. First, this study covers the different gaps in the literature as it seeks to explore both teachers' and students' perspectives towards EMI not only regarding the impediments but also their suggestions for enhancement. Moreover, uncovering the key challenges encountered by STEM staff and students contributes to the knowledge base that helps equip decision-makers to formulate effective and realistic policies at both the university and pre-university levels. This research provides valuable insights for developing better teacher training programs and improving teaching and learning strategies, and materials. Hence, the results of this research might enhance the teaching and learning practices of STEM education based on the identified obstacles and suggestions grounded in the lived experiences of STEM teachers and students.

Research Methodology

Being qualitative in nature, this study is guided by the principles and goals of interpretive and critical paradigms. Nevertheless, this research employs a convergent mixed-methods design to ensure validity and reliability. For data collection procedures, the researchers selected a semi-structured online questionnaire administered to 64 STEM students at BBA University and semi-structured interviews conducted with 6 STEM teachers. To

achieve the research objectives, students were selected following purposive sampling while convenience sampling technique was chosen to recruit teachers.

Structure of the Dissertation

For its organization, this dissertation is divided into three chapters. It starts with a general introduction that addresses the context of the research, states the research problem, research objectives, and questions, and highlights the significance of the study, the methodological plan, and the structure of the dissertation. In the first chapter, a thorough review of the literature is conducted covering mainly the concept of EMI related to globalisation and internalisation, the implementation of EMI at the international level and its modals, and the shift to EMI in the Algerian context. The chapter then concludes with a summary of the relevant previous studies that exist in the body of knowledge. Moving to the second chapter which highlights the methodology of the study, presents the research questions and objectives, the paradigm, and the design of the research followed by data collection instruments. The methodology chapter also provides a detailed explanation of the setting, sampling techniques, data collection procedures, and analysis. It further addresses the steps followed to ensure validity and reliability as well as the ethicality of the research. The last chapter is devoted to presenting and discussing the findings in relation to the literature review and research objectives. Lastly, the dissertation culminates with a general conclusion which embeds the main research findings, research limitations, and recommendations for further research.

CHAPTER ONE: LITERATURE REVIEW

Introduction

The present study aims to investigate the challenges experienced by STEM teachers at the university when using English to teach their subjects, as well as to explore the solutions and suggestions to address these challenges. This chapter surveys the literature related to the topic under scrutiny. It begins by defining and contextualising globalisation and internationalisation, highlighting their economic, cultural, technological, and political dimensions. Then, it examines the concept of EMI, its definitions, models, and the language-content continuum. Special attention is given to the implementation of EMI in STEM disciplines, reviewing international experiences and challenges. The chapter further explores the specific case of Algeria, focusing on its historical language policies and the recent shift towards English in HE. Finally, it reviews previous studies on the challenges encountered during EMI implementation to provide a broader understanding of the research problem.

Definition of Internationalisation

Internationalisation has been described by Knight (2004) as embedding an international, intercultural, or global dimension into the purpose, functions, and delivery of postsecondary education. He explains that internationalisation reflects how extensively universities engage on a global scale, including admitting international students, fostering international research collaborations, and providing curricula that address global challenges and perspectives. Furthermore, Leask (2009) added that internationalisation is not merely international cooperation or student mobility but also the integration of global-mindedness into research activities, teaching, and curriculum. This involves equipping students to operate in a global labour market by enhancing their intercultural competence and offering international experience provisions, both on and off campus (Fantini,2009). Another prominent view on internationalisation is that of Adapa (2013) who explained that it is a strategic reaction to globalisation forces, pinpointing the increased competition between

universities to attract international students, staff, and research collaborations. Internationalisation is then imperative not only for academic quality but also for institution global competitiveness.

It appears from the above definitions that while concentrating on a variety of disparate elements of internationalisation, Knight (2004), Leask (2009), and Adapa (2013) emphasise the importance of embedding global elements on the canvas of HE. Indeed, internationalisation is seen as a comprehensive process which impacts all functions of a university, from governance through to curriculum. It also seeks to develop the global competencies of students and maintain the competitiveness of universities globally. Such considerations collectively highlight that internationalisation is not a uni-dimensional process but a comprehensive strategy for globalising HE.

Definition of Globalisation

Globalisation is a broad term referring to different elements of change and integration across the globe, including economic, cultural, technological, and political dimentions. From a cultural point of view, globalisation is characterized by Tomlinson (1999) as the global exchange of cultural commodities and the spread of ideas, values, and beliefs across frontiers. Globalisation, in his view, is the source of cultural interdependence between societies but can also result in cultural homogenisation or the exportation of superior cultural standards over local tradition and custom. Another standard definition is by Giddens (2000), which refers to globalisation “the strengthening of world-wide social relations which connect localities across space, so that events in one locality are influenced by events many miles away and vice versa” (p.64). Such a definition highlights the interdependence of cultures and places, as well as the way globalisation is increasingly based on global processes. Friedman (2005) presents yet another definition emphasising on the economic aspect of globalisation. According to him,

globalisation is a process of rising interdependence among countries brought about by advances in technology in communication, transport, and trade liberalisation. Globalisation, in this case, is primarily an economic process wherein markets, money, and commodities cross borders to bring about an integrated world economy.

While concentrating on various details of globalisation, these definitions share one thread in common: the growing tendency of nations and cultures towards interdependence. The transfer of culture being practiced all over the globe, the world social relations connecting remote places, and the economic activities bringing about an integrated world market by Friedman (2005). Therefore, these roles imply that globalisation is greater than the creation of economic action but entails a general process of interconnectedness across various domains such as social relations, cultural exchange, and political participation.

Perspectives on Globalisation

As noted above, globalisation has been viewed from many different angles, each providing different explanations of how it affects different areas of society. From an economic viewpoint alone, globalisation has been viewed as the growth of international markets, trade, and capital flows. The view emphasizes the impact of free-market policy, deregulation, and technological change as they establish an international economic system in which countries become more dependent on one another. As Friedman (2005) notes, globalisation has resulted in the creation of a "flat world" wherein distances between locations do not count as much anymore in economic activities.

The cultural perspective is more concerned with the spread of culture, ideas, and media across national borders. Tomlinson (1999) is of the opinion that globalisation of culture results in the spread of Western norms of culture, including consumer culture and media consumption, everywhere in the world. Although this process can result in cultural exchange

and hybridisation, it can also result in the dilution of local culture, as stronger global cultures engulf weaker or native ones.

The technological view of globalisation focuses on how the development of communication and information technology has facilitated the quick flow of information, thus connecting the world. Castells (2000) points out the contribution of the internet and digital technologies to enabling global communication and enabling people to participate in social, economic, and political activities that transcend nation-state boundaries.

Lastly, the political view sees globalisation as a relocation of political power and control. In Scholte's (2004) thesis, globalisation has resulted in the establishment of supranational organisations such as the United Nations (UN) and the World Trade Organization (WTO) that facilitate the management of world affairs and the governance of inter-state relations. The relocation of political power signifies the increased role of global governance in controlling issues such as climate change, security, and international trade.

That is to say, although globalisation can be viewed in a number of ways—economic, cultural, technological, and political, it is safe to assume that it is a complex process with wide-ranging effects on society. Such views are complemented by each other as they express the idea that globalisation is not merely about economic development or the dissemination of Western culture, but about people's reliance on one another and the exchange of ideas globally made possible through advances in technology and global regulation.

Globalisation and Internationalisation of Higher Education

Internationalisation of HE has been irreversibly tied up with the processes of globalisation. Giddens (2000) claimed that globalisation gained momentum when universities too have tried to internationalise their teaching, research, and student populations to remain

competitive in the global education market. By doing so, he argued that globalisation has opened up the mobility of people, ideas, and scholarship across borders to give rise to increased movement of academics and students and increased academic partnership among universities throughout the world (Giddens, 2000). This movement represents the growing need for higher learning institutions to address issues of worldwide concern and advance cross-cultural communication (Kuroda et al., 2018).

With globalisation bringing the world closer to being one society, universities accept that they have to prepare students for a global society and a global workforce (Altbach & Knight, 2007). This has opened up international thinking as part of the curriculum and global learning experiences being developed for students and academics. Furthermore, Altbach and Knight (2007) state that increased competition among universities to attract international students has been a significant force of internationalisation. Universities now also consider international students to be a positive addition to diversity of thought, but a critical source of income as well. International students have become a worthy economic consideration for most universities, particularly the English-speaking ones. The researchers also contend that this economic factor has prompted universities to create more international programs, including EMI courses, to cater to the interests of students from non-English-speaking nations who desire HE in a globally accepted language (Altbach & Knight, 2007). These programs also allow universities to recruit the best minds and faculty from around the world, further boosting their global reputation.

Within the same context, Altbach and Knight (2007) state that internationalisation is a strategic imperative for those universities which seek to upgrade their international profile and academic credentials. In a more globalising and competitive HE market, universities need to emphasize internationalisation so that they can receive foreign students, collaborate in research on a global scale, and form alliances with other elite institutions (Giddens, 2000).

These universities, in the process, can create a more globalised academic community as well as provide their students with exposure to a diversity of perspectives, global networks, and opportunities to engage globally (Leask, 2009).

Synthesizing these perspectives recognizes that globalisation and internationalisation are complementary. Giddens (2000) recognises increased mobility of individuals and ideas across borders, and Altbach and Knight (2007) recognise the existence of competition and economic need as driving forces towards the internationalisation of universities. Knight (2006) also recognises strategic planning as key to broadening the global presence and reputation of universities. When universities respond to the pressures of globalisation, they incorporate more global content into their activities, ranging from curriculum development to research partnerships, to make them competitive within an education system that is globalised (Knight, 2004).

It can be said, therefore, that internationalization is not merely a response to globalisation but rather an ambitious step that higher learning institutions take in order to prepare their students to face the interdependent global environment and become marketable in the global economy. Indeed, internationalization is a manifestation of the interdependent alliance between internationalization and globalisation, whereby the two processes drive and energize each other in the evolving world of HE (De Wit, 2011). Consequently, forces of globalisation as well as the ambition to be competitive and sustainable in the global knowledge economy and education sector inform higher learning institutions' internationalization strategies (Muminov, 2019). With this understanding, these institutions are now strategically positioned to strategize so as to promote global capacity, enroll global learners, and position themselves as leaders in the global knowledge economy (Leask, 2009). Globalisation has positioned English as the global lingua franca, driving its integration into

HE. This shift has led to the adoption of new teaching methods, particularly EMI, to meet the needs of an international student body.

The following section will explore the impact of this transition and the resulting educational approaches.

Globalisation and the English Language

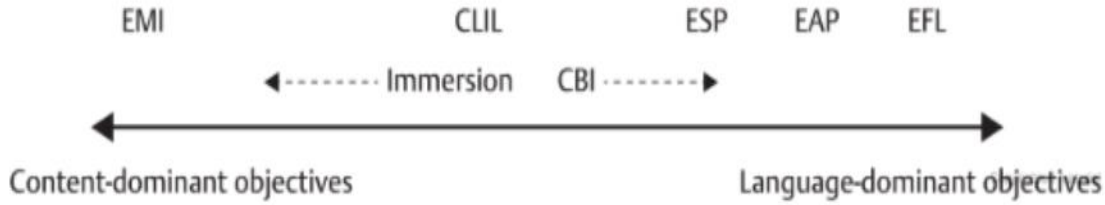
Galloway and Rose (2015) note that "the internationalization of HE continues to be a major goal for universities globally, and this process is closely tied to the growing role of English in university environments" (p. 230, as cited in Kadi, 2022). More and more educational institutions are offering courses or entire programs in English, particularly in HE (Dearden, 2015). There appears to be a fast-moving worldwide shift in non-anglophone countries from English being taught as a foreign language (EFL) to English being the medium of instruction for academic subjects such as science, mathematics, geography, and medicine (Dearden, 2014).

The language-Content Continuum

Macaro (2018) created a continuum that positioned the diverse approaches to teaching English and course content in English. The role and balance of learning objectives—more especially, whether they place more emphasis on language development, content acquisition, or a combination of the two—are the primary determinants of each term's place on this continuum.

Figure 1

Language-content continuum



At the more language-dominant end of the continuum, we can find English as a Foreign Language (EFL), where the subject matter is mostly a way of teaching language. The primary aim of EFL is linguistic knowledge rather than subject matter knowledge (Macaro, 2018). Moving a little more toward content yet placing emphasis on language development is English for Academic Purposes (EAP), which attempts to provide learners with the language skills needed to succeed in academic study and research (Flowerdew & Peacock, 2001). EAP, a branch of English for Specific Purposes (ESP) (Anthony, 2018; Dudley-Evans & St. John, 1998), places greater emphasis on discipline-specific discourse, as well as academic reading and writing, rather than on the actual subject content (Bailey, 2007; De Chazal, 2014). ESP represents a further shift toward content. It is a needs-based method of teaching English that is customized to meet the individual academic or professional objectives of the students. It emphasizes specific vocabulary, discourse norms, and communication skills related to certain fields or disciplines (Hutchinson & Waters, 1987; Swales, 2000)

Content-Based Instruction (CBI) integrates language learning and content acquisition, making it a more balanced approach on the continuum. CBI developed from the ideas of Communicative Language Teaching in the 1980s. Krahnke (1987) defined CBI as "the teaching of content or information in the language being learned with little or no direct or explicit effort to teach the language itself separately from the content being taught" (p. 66). In CBI, language instruction is integrated into the target content rather than taught separately (Macaro, 2018). It is a method in which students are taught academic subjects in a language

they are also learning as a second language (Lyster and Ballinger, 2011). Indeed, in CBI, language serves as the medium for teaching subject content, and content functions as a resource for language skill development (Stoller, 2000).

Furthermore, on Macaro's continuum, Content and Language Integrated Learning (CLIL) is classified within content-dominant objectives but near language-dominant objectives. It is a pedagogical approach that first appeared in Europe, which simultaneously emphasizes content and language learning. In practice, CLIL most frequently uses English, even though it could theoretically be applied to any language (Dalton-Puffer & Smit, 2013). According to Marsh (2012), CLIL is a dual-focused educational approach that uses a second language for both language and content instruction. This definition emphasizes CLIL's balanced approach, which seeks to address both language and content objectives specifically.

At the far end of content-dominant objectives lies EMI which represents a significant shift in HE around the world. According to Kamwendo et al. (2014), the term "medium of instruction" suggests a one-way process in which one individual gives knowledge while the other only receives it. Building on this, Taguchi (2014) proposed that language development could be an implicit goal of EMI programs, which are programs designed to improve students' academic English by teaching various subjects in English.

Defining EMI

The teaching of content courses in English at the university level has generated a diverse range of terminology. Initially, researchers developed various terms, including English as a Medium of Instruction (EMI), Teaching in English (TIE), English Medium Education in Multilingual University settings (EMEMUS), and Integrating Content and Language in Higher Education (ICLHE). Even though these terms may seem to represent different teaching methods, they are not separate concepts, and their meanings change

depending on the observer or the particular educational context (Airey, 2016). A well-known and frequently cited definition of EMI is provided by Dearden (2015) from the EMI Oxford team at the Centre for Research and Development. She defined it as “The use of the English language to teach academic subjects (other than English itself) in countries or jurisdictions where the first language of the majority of the population is not English” (p. 4).

Furthermore, Airey (2016) contends that with language choice depending on practical concerns rather than its influence on the subject matter, language in EMI is seen only as a teaching tool that could be replaced if required. In such situations, English is often just mentioned in course syllabi as the instructional tool without more explanation or emphasis. According to Aguilar (2017), because EMI does not specify language learning objectives, content is given priority, and students' proficiency in the language is typically not assessed. Briggs et al. (2018) recently emphasized this distinction, arguing that EMI focuses on the delivery of academic content in English rather than the teaching of English as a language and that English is primarily used as a medium for academic learning rather than as a subject of study in EMI contexts. Although EMI emphasizes content teaching, in reality, it is usually applied with the unstated aim of improving students' English language abilities (Hunter, 2024).

As Macaro (2018) describes, this terminological vagueness occurs because of "blurred boundaries" between EMI and other approaches like EFL, EAP, ESP, CBI, and CLIL. The resulting abundance of terms coupled with the absence of clear definitions continues to cause disputes within the literature about the exact limits of CLIL, EMI, and immersion education (Lasagabaster and Sierra, 2010; Somers and Surmont, 2012). According to Dearden (2014), EMI programs have rapidly spread throughout Europe and beyond, bridging linguistic divides and reflecting the globalisation of academic systems, as we shall discuss below.

EMI Program Implementation

The use of EMI has been a worldwide trend, especially among universities in non-English-speaking nations. As Martínez (2017) explained, universities are embracing EMI increasingly to increase their global profile and recruit foreign students. This can be observed with increasing numbers of universities implementing English not only for certain courses but for whole programs. All the same, effective implementation of EMI calls for significant institutional investment, such as language training and pedagogical adjustments among students and teachers. Wilkinson (2013) highlights that universities should invest in language support systems, especially for non-native English-speaking staff, to facilitate effective teaching in EMI environments. This entails requiring a general approach that addresses the language requirements of students and the quality of teaching by teachers to facilitate EMI programs to succeed.

Further, EMI's success rests on how well it can address the types of issues students have, particularly less-skilled English-speaking students. According to Macaro (2018), EMI programs with success will compel institutions to attend to the student's academic English in stages because students find complex academic writing and engaging themselves in academic discourse challenging. Dearden (2014) also emphasizes the function of institutions in facilitating ongoing support for students throughout the course of studies so that they are linguistically equipped but academically effective in EMI environments as well. The universities, hence, need to reform support systems in order to deal with language insufficiencies and render faculty staff as well as students adequately ready to counter challenges of English instruction and learning. As we discuss the implementation models, we will look at three particular models that universities follow in an attempt to ensure EMI is a success.

The Preparatory Year Model is a key model adopted by universities to equip students sufficiently in order to accomplish the language and academic requirements of EMI programs. A model of such type, as debated by Macaro (2018), typically is a one-year intensive English language course whose mission is to enhance students' proficiency in English, academic writing capacity, and studying subject-related terminology. The foundation year is a transition course between secondary school and university-level EMI programs that prepares students for English-medium study. Baker and Wright (2017) comment that such a model is especially beneficial to international students who might lack proficiency in English since it allows them to enter their degree programs while acquiring suitable academic skills.

The English Language Support Model emphasizes offering ongoing language support during the students' university years, meant to enrich their English proficiency as they develop academically. In the view of Macaro (2018), such a design involves language studies incorporated into students' academic curriculum, offering specific support in reading, writing, speaking, and listening skills. This ongoing support enables students to develop their language skills gradually, improving their capacity to function in EMI courses. Coleman (2006) also argues that this model facilitates lifelong language learning in a way that the students not only become proficient in general English but can also specialize in the language needed for their fields of study.

The Curriculum Integration Model incorporates language learning with EMI course material. Macaro (2018) highlights that students can develop academic and language capabilities at the same time by experiencing language skills integrated into the curriculum. The model guarantees that learners are exposed to English in their respective areas of study, hence making learning the language more situated and contextually relevant. Coleman (2006) also endorses this strategy in that it diminishes cognitive load in learning complex subject matter using a second language. By merging language instruction with subject-specific

content, this model supports deeper learning and more effective preparation for the academic intensity inherent in EMI programs.

As we delve into the practical applications of these concepts, in the next part we'll establish an understanding of STEM education, and explore the critical role and varying implementations of EMI within STEM programs across universities worldwide EMI in STEM Disciplines.

EMI in STEM Disciplines

The integration of EMI into STEM disciplines has become increasingly prevalent worldwide, reflecting broader trends in higher education internationalization (Wächter & Maiworm, 2014; Galloway & Ruegg, 2022; Rosendal & Ngabonziza, 2023). In many non-anglophone contexts, universities are adopting EMI within science, technology, engineering, and mathematics programs to enhance students' English proficiency and align their skills with global workforce demands (Zhang & Zhang, 2019; Tejada-Sánchez & Molina-Naar, 2020; Bello & Cárdenas, 2024). This section first defines the concept and educational purpose of STEM, highlighting its interdisciplinary and practical nature, before discussing how EMI has been implemented in STEM education across various international contexts, with a particular focus on examples from Europe, Asia, Latin America, and Africa.

Definition of STEM Education. According to Atkinson (2010), STEM education has emerged as a comprehensive, interdisciplinary approach to teaching and learning, bringing together four traditionally separate fields—Science, Technology, Engineering, and Mathematics—into an integrated framework. As per Beers (2011), STEM education is designed to enhance students' abilities to think critically, solve problems, and apply what they learn to real-life situations, emphasizing not just content acquisition but also the application of knowledge in practical contexts.

The integration of these fields also plays a significant role in skill development, which is emphasized by the National Research Council (2011) which highlights its practical and skills-oriented nature in preparing students for complex real-world challenges. Their perspective on STEM education suggests that the integration of these disciplines is not just a method of teaching but a response to the evolving needs of the global workforce. STEM education prepares students with essential skills like adaptability, innovation, and problem-solving, which are increasingly demanded by employers in technology-driven industries (National Research Council, 2011). Additionally, Maltese and Tai (2011) present a broader view of the relevance of STEM education in solving societal challenges. They argue that STEM education is not just about individual skill development but also about equipping students with the tools to tackle global issues such as sustainability, energy, and health.

In a further way, Stohlmann and Roehrig (2012) attempt that this approach emphasizes hands-on learning, creativity, and collaboration, which are critical for preparing students to thrive in the 21st century. Bybee's (2013) view aligns with the idea that STEM education is not merely about content knowledge but also about how students interact with and apply that knowledge in innovative ways. Bybee (2013) stresses the importance of integrating these fields not only at a conceptual level but also in the teaching methodology itself. According to him, STEM education should encourage students to engage in interdisciplinary learning, breaking down the silos that traditionally separate the subjects of science, technology, engineering, and mathematics.

Finally, Kong (2014) expands on the concept by focusing on the pedagogical shift that STEM education demands. Rather than viewing science, technology, engineering, and mathematics as discrete disciplines, STEM education encourages an interconnected approach to learning. Kong's definition highlights the value of a holistic teaching strategy that reflects the interdisciplinary nature of real-world problems. This pedagogical shift is crucial in

fostering students' ability to think critically across multiple domains and to apply their learning in dynamic, real-world contexts.

Implementing EMI into STEM Education. The general rise of EMI has notably transformed HE, particularly within STEM fields. Several universities across Europe have successfully implemented EMI in STEM disciplines as part of broader strategies to boost global competitiveness and attract a more diverse international student body. A notable example is Delft University of Technology (TU Delft) in the Netherlands. TU Delft views EMI as a strategic necessity to maintain its international profile. As reported by Wächter and Maiworm (2014), the Netherlands has become the "outstanding provider" of English-taught programs in Central West Europe, with 65% of institutions offering EMI and 30% of all programs delivered in English (p. 40). To facilitate this transition, TU Delft systematically restructured its postgraduate curriculum, ensuring that a majority of master's and doctoral programs were delivered entirely in English. In addition, significant investments were made in professional development workshops for faculty to enhance their pedagogical skills in English, alongside the establishment of language support centers for students requiring additional academic English training (Wächter & Maiworm, 2014).

Similarly, some universities in Asia have embraced EMI in order to prepare students for the requirements of the global STEM workforce. Tsinghua University in China and the University of Tokyo in Japan emerge as prominent examples within this movement. At Tsinghua University, the adoption of EMI in graduate STEM programs has been complemented by a variety of language development initiatives. As noted by Zhang and Zhang (2019), "To support and facilitate EAP teaching and English-medium instruction, Tsinghua University has established its EFL learning environment platform, comprising an open environment and a personalized environment." (p. 168). Additionally, Tsinghua University has incorporated English for Specific Purposes (ESP) modules directly into STEM

curricula and established partnerships with English-speaking universities to provide collaborative supervision opportunities for graduate research projects (Zhang 2019).

Common EMI focus, The University of Tokyo has encountered several challenges, primarily stemming from limited English proficiency among both instructors and students. As highlighted by Galloway and Ruegg (2022), "teachers', as well as students', English proficiency [is] a main obstacle to successful EMI implementation" (p. 5). Nevertheless, the institution has taken proactive measures to address these obstacles. "Some studies have examined the provision of support for EMI faculty, albeit scarce, focusing mainly on language support" (Galloway & Ruegg, 2022, p. 5). Moreover, the University has promoted the development of bilingual course materials, encouraged the establishment of peer learning networks, and advocated for participation in international exchange programs as supplementary strategies to reinforce English proficiency across its STEM community (Galloway & Ruegg, 2022).

In Latin America, EMI adoption in STEM fields is also gaining momentum, albeit more gradually. A leading example is a private Colombian university, where the internationalization of education has become a central institutional priority. Tejada-Sánchez and Molina-Naar (2020) emphasize that "EMI has been implemented as a curricular requirement to promote international academic interaction and English language proficiency" (p. 346). At this institution, EMI was initially introduced in selected STEM courses as part of a phased pilot project. Faculty members participated in specialized training programs focused on English for Academic Purposes (EAP) and received pedagogical support to ensure that course delivery remained both linguistically accessible and academically rigorous. The university also established language centers offering tutoring and writing assistance in English, while simultaneously forging partnerships with foreign institutions to facilitate

student and faculty mobility within the international academic community (Bello & Cárdenas (2024).

African universities have progressively adopted EMI recently, aiming to strengthen their integration into the global academic community and enhance the competitiveness of their graduates. Countries such as South Africa, Rwanda, and Kenya have been leading this transition, particularly within STEM fields where proficiency in English is considered crucial for engaging in international research and publications (Sawir et al., 2012). According to Rosendal and Ngabonziza (2023), the promotion of English is often framed "as a pragmatic measure and a tool enabling economic development," (p. 87) reflecting broader efforts to align HE systems with global scientific and economic standards. To facilitate this shift, numerous universities have implemented various initiatives, including the establishment of EAP centers, curriculum revisions in STEM subjects to align with international standards, and providing professional development opportunities for instructors to enhance their ability to deliver content effectively in English (Coleman, 2011). Despite these efforts, the process has encountered significant challenges such as limited funding, diverse linguistic backgrounds among students, and concerns regarding equitable access to education, making the widespread adoption of EMI a complex and uneven process (Brock-Utne, 2010).

In Algeria, there has been a growing emphasis on English as the language of the future rather than French, particularly in scientific and technological fields, as policymakers acknowledge its importance for global engagement and competitiveness. Given that this study is conducted in the Algerian context, the following section reviews the implementation of EMI in Algeria in general and in STEM education in particular.

EMI for STEM Disciplines in Algerian Higher Education

Examining the implementation of EMI in Algeria first requires an understanding of the rich linguistic environment that has formed the country's educational policies. The recent move toward English in HE is best understood in light of Algeria's unusual historical relationship with language, especially the conflicts between Arabic and French stemming from its colonial past. Examining how language policy in Algeria has changed through phases of Frenchification and Arabization—each reflecting different socio-political goals and producing a multilayered linguistic environment still affecting educational changes today—helps one to fully grasp the move to EMI.

Historical Background of Language Policy in Algeria

According to Boudersa (2022), the Algerian language policy has overwhelmingly been shaped by its colonial experience, particularly the long French occupation that left profound marks on Algeria's language and culture. Upon independence in 1962, the Algerian state was faced with a dilemma as to how to make amends with the pervasive dominance of French, now the state language, education language, and culture. According to him, the extensive use of French in all fields created a deep linguistic divide between Arabic-speaking masses and the French-speaking elite. The colonial system created not only linguistic divides but also socio-political hierarchies, which went on to shape post-independence Algeria (Benrabah, 2004, 2013; Boudersa, 2022).

For this, the Algerian government enforced language policies with the goal of reviving Arabic as a national language and asserting its cultural sovereignty. As noted by Bouabdellaoui (2022), Arabization was a strategic step towards reinforcing Algeria's connection to the Arab world and reclaiming its Arab-Islamic identity. But to no success, French remained deeply

entrenched in education and intellectual circles as it was linked with economic and professional advancement (Benrabah, 2004; Bouabdellaoui, 2022).

Frenchification under colonial rule was instrumental in making French the dominant language of administration, education, and culture in Algeria (Benrabah, 2004). French was not only a language, as Benrabah (2007) explains, but an instrument employed by the colonial state to dominate and assimilate Algerians, thus becoming the language of power and intellectual leadership. The French colonial education system created a French-speaking elite, especially in the cities, with better access to education and vocational professions and with Arabic and Berber speakers left behind (Benrabah, 2004; Boudersa, 2022). This bilingual divide continued even after the 1962 independence because, as Boumechaal (2021) argues, French has continued to hold prestige in Algerian elite sectors, especially in higher education and scientific research. French was identified with economic and intellectual success, cementing its hold on central parts of Algerian life, such that the new state fought to impose to its full extent policies leaving out the language and pushing forward Arabic as an alternative. That is to say, although the country achieved political independence, French remained an enduring testament to colonialism, a main determinant of the educational and cultural climate of post-colonial Algeria.

After Algerian independence, Arabization policies were used by the government to replace French with Arabic in all facets of public life, such as education, administration, and the media. Benrabah (2007) recounts that Arabization was seen to be a necessary policy to reclaim Algeria's Arab-Islamic heritage and respond to France's cultural and linguistic hegemony during the colonial period. The government initiatives to popularize Arabic involved making it the language of instruction in schools and universities, as well as in government offices. Nevertheless, as per Boumechaal (2021), the policy was received with great resistance, especially in scientific and technical disciplines where French had been

deeply rooted as a science and research language. The Arabization policy also gave rise to an educational gap, as Boudersa (2022) argues, as Arabic did not have the necessary vocabulary and cognitive structure to displace French from medicine, engineering, and science. Even though Arabization in most regions had been successful, it was not yet capable of entirely replacing French at the top of education and professional careers, Boumechaal (2021) states, resulting in a dualistic form of language that weakened the capacity of Algeria to compete in the global knowledge economy.

Implementing EMI in Algerian Higher Education

Although French remains widely used, English is becoming increasingly popular and well-regarded among Algerians (Abid-Houcine, 2007). As noted by Benrabah (2013), "impassioned debate on this issue was triggered in the 1980s and 1990s by plans to introduce English as the preferred foreign language because scientific education at university level found English of greater use than French." (p. 91). Recently, the Algerian government has taken significant steps to encourage the use of English across the country, especially in academic settings (Allal, 2020; Bouthelji, 2022; Missedi, 2019). The Algerian Ministry of Higher Education and Scientific Research (MHESR) has shown interest in adopting English as an official language for teaching and learning in universities. This initiative has received backing from both the Algerian president and the HE minister (Allal, 2020; Bouthelji, 2022; Missedi, 2019)

The transition toward EMI began in 2019 when former Minister of MHESR Bouzid Tayeb conducted an online poll on his official Facebook page in which Algerians were invited to share their opinions on the English language and the implementation of EMI (Bouzid, 2019). The results revealed that 94% of participants supported implementing English as the language of instruction in universities. The decision was officially taken in 2022 by Kamel

Beddari, the current minister of the MHESR in which he declared that by September 2023, English is going to become the language of instruction in disciplines like medicine, science, and technology (Scribd, n.d.).

The implementation of EMI in Algerian HE is driven by several interconnected factors. The primary motivation was to gain linguistic independence from French influence (Khenioui & Boulkroun, 2023). In their study involving twenty-three Algerian EFL experts from fifteen different Algerian HE institutions, Khenioui and Boulkroun (2023) found that political reasons were the main impetus for EMI, specifically to assert linguistic independence from former colonizers and to align with international standards and trends. Scientific and pragmatic considerations also played a significant role, as EMI was viewed as a means to cope with rapid advances in research, improve the visibility of Algerian research internationally, and enhance the global competitiveness and employability of graduates.

In line with this, Brinton (2021) noted that internationalization seems to be a main factor as well influencing many of Algeria's educational and policy decisions. According to Khenioui and Boulkroun (2023), economic motivations also contributed to the shift toward EMI, as training students in English—the current lingua franca—is essential for access to international markets and knowledge. Furthermore, EMI is viewed as a strategy to respond to globalization, promote the internationalization of Algerian universities, and expand the research opportunities available to scholars. The recognition of English as a dominant global language in international communication further reinforced this policy change. However, despite these ambitious objectives, there are mixed perceptions about the preparedness of content teachers to deliver instruction in English, indicating potential challenges in the implementation of EMI (Khenioui & Boulkroun, 2023).

EMI Policies. Though the implementation of EMI in Algeria was late compared to the global trend, its popularity among Algerian stakeholders has significantly increased (Hamane, 2023). To support this transition, various methods are being employed to prepare content teachers for delivering their subjects in English. Some universities have started implementing pilot EMI programs, especially at the postgraduate level in fields such as engineering and information technology, while also offering intensive English courses for students and faculty (Abdel Latif & Alhamad, 2023; Ben-Yelles, 2024). Institutions are updating their course materials by incorporating English-language textbooks and promoting exchange programs with universities in English-speaking countries (Benrabah, 2014). Recently, the MHESR launched a comprehensive faculty development strategy to prepare content teachers. In September 2023, they introduced a mandatory online training program on the national platform Dual_Edx, supervised by the Commission Nationale d'Enseignement A Distance (CNEAD). This training was developed in collaboration with the Massachusetts Institute of Technology and follows international standards for Massive Open Online Courses (MOOCs) and standardized testing, with an initial cohort of 3,000 instructors and part-time doctoral students (Ben-Yelles, 2024). The MHESR has directed university rectors to enhance English proficiency among faculty and students at the institutional level with the ambitious goal of reaching B2/C1 proficiency levels (Ben-Yelles, 2024). With the invaluable assistance of ESP teachers, the Centre d' Enseignement Intensif des Langues (CEIL) is offering intensive on-site training to achieve this goal (Benhamlaoui & Benzadri, 2024; Khenioui & Boulkroun, 2023).

Algeria's dedication to EMI is evident in these extensive efforts, which demonstrate a methodical approach to preparing faculty for this significant shift in education, despite its relatively late adoption. However, the transition has been met with challenges such as low English proficiency among instructors, inadequate support structures for students, and

resistance from sections of the academic community that remain strongly attached to French-medium education (Amara, 2025; Sahki, 2025).

Previous Studies on the Challenges after EMI Implementation

To place our research within the body of literature, the following section examines previous studies on the challenges of EMI implementation.

To start with and bring the focus to the global issues of EMI, Dearden and Macaro's (2016) study provides a comparative investigation with teachers in Italy, Austria, and China. Through surveys and semi-structured interviews, the researchers explored how STEM teachers perceived EMI in each setting. Findings indicated that teachers overall expressed concern about diminished teaching effectiveness, student comprehension issues, and content dilution due to linguistic constraints. In China in particular, lecturers reported the loss of nuance in teaching technical subjects, while in Italy and Austria, resistance was due to concerns over national language erosion. In each of the three contexts, however, teachers acknowledged the increasing necessity of EMI for academic competitiveness. The research concludes that effective implementation of EMI requires not just language support, but also pedagogical innovation and institutional support for teacher agency, the identical conclusion of the North African and Middle Eastern research.

Abdeljaoued (2023) in Tunisia, provides a student-centred approach as well. He adopted qualitative interviews to investigate the STEM students' perceptions of EMI. The participants expressed a mix of enthusiasm and frustration. While they appreciated the opportunity to engage with international academic discourse, they also reported significant challenges related to understanding course content, participating in class discussions, and expressing complex ideas in English. The study suggested that students' secondary education context did not closely match the linguistic requirements of EMI in HE. Additionally, it

criticized the lack of pedagogical training to teach through EMI on the part of teachers, leading to inconsistent teaching quality. These results imply that EMI in Tunisia holds promise, but should be accompanied by wider reforms in teacher training and curriculum design if equitable learning outcomes are to be achieved.

The study by R'boul (2024) provides a critical analysis of the social, linguistic, and pedagogical implications of EMI in Moroccan HE. The study aimed to investigate the extent to which EMI influences linguistic ecology and equitable education at Moroccan HE with specific reference to STEM subjects. Adopting a qualitative case study methodology, R'boul collected data from extensive personal interviews with university lecturers and students in several universities. Findings indicated that although EMI is perceived as a gateway to the world of learning and academic notice, at the same time EMI may reinforce English linguistic dependence marginalize Arabic and Amazigh languages, and restrict access to less-privileged student population. It also found that there was little institutional support and teacher training in EMI and that many teachers were ill-equipped for the demands placed on them. These findings highlight the requirement for a balanced, bi/multilingual approach, and one that is not only socially just, but also respects the linguistic landscape of Moroccan learners.

Expanding the regional lens to the wider Maghreb region, Bichoualne and Rong (2023) carried out a scoping review that drew findings from more than thirty empirical studies from Algeria, Morocco, and Tunisia. In their review, they emphasized that EMI adoption across the region is driven by globalization and internationalization of HE, particularly in the STEM fields. However, they identified a pattern of teacher unpreparedness, student difficulty grasping the material, and inadequate planning at the institutional level. In Algeria particularly, the shift in STEM subjects from Arabic or French to English has led to heated debates about identity, nationalism, and the quality of education. The review pointed out the colonial history of language policy and its lasting impact on the atmosphere of classrooms

and students' achievement. Critically, the approach proposed by the authors was to be contextualised in terms of the historical, cultural, and linguistic particularities, rather than a one-size-fits-all EMI model, advocated by the authors.

Moreover, and more specifically in the case of Algeria, Ouafa Ouarniki (2023) explores teachers' perspectives on the implementation of EMI in Algerian higher education institutions, focusing on the challenges and opportunities it presents. The study collected data through semi-structured interviews with ten Algerian teachers from different fields of specialism. The results reveal that while EMI offers students opportunities to enhance their English language skills and gain access to international academic resources, its implementation faces considerable obstacles. These include inadequate language proficiency among both teachers and students, limited resources and support, and insufficient training and professional development opportunities. The teachers emphasized the importance of adopting a gradual and flexible approach to EMI, starting with basic-level courses and ensuring language support and training for all stakeholders. The study provides insights relevant to policymakers and educators in Algeria and other non-English-speaking contexts where EMI is being introduced or considered.

From the above yet growing body of studies on EMI, it can be said that no study has been conducted to investigate the challenges faced by both teachers and students specifically within STEM fields in Algerian HE. Hence, the aim of this study is to investigate the challenges encountered by STEM teachers and students in the context of EMI as well as to explore their suggestions to address these challenges.

Conclusion

This chapter provides foundation for our research on how EMI is implemented globally, with specific models of institutional support ensuring their success even with

difficulties. The first one has explored the complex relationship between globalisation, internationalisation, and the rise of EMI in HE. Globalisation has accelerated the need for international academic collaboration, positioning EMI as a crucial tool in this transition. This section also lighted a special attention to EMI within STEM disciplines, highlighting the growing necessity for English proficiency in scientific and technological fields. Furthermore, the unique context of Algeria was discussed, considering its historical language policies of Frenchification and Arabization, and how they influence current EMI initiatives. The chapter concludes with a review of some studies on the challenges faced in implementing EMI in HE in STEM fields.

The next chapter discusses the methodological plan of this research, covering various aspects related to research design, data collection, and data analysis.

CHAPTER TWO: RESEARCH METHODOLOGY

Introduction

The current research aims to investigate the challenges experienced by STEM teachers at the university when using English to teach their subjects, as well as to explore the solutions and suggestions to address these challenges. After having constructed the theoretical context that provides the foundation for this study, this chapter outlines the methodological framework adopted for the study. It begins by outlining the research questions with objectives and describing the research paradigm and design. Then, it presents the research instruments, setting, and sampling techniques. This is succeeded by a discussion of the data collection and analysis procedures. The chapter concludes with a review of research quality measures and ethical considerations.

Research Questions and Objectives

Given that this study seeks to investigate the challenges experienced by STEM teachers at the university when using English to teach their subjects as well as to explore their suggestions to address these challenges, two research questions guide this investigation:

- What are the challenges faced by STEM teachers and students when using EMI?
- What are teachers' and students' suggestions to better use EMI?

Therefore, our research aims to achieve the following objectives:

- To investigate the challenges encountered by both STEM teachers and students in the context of EMI.
- To identify the suggestions proposed by teachers and students for addressing the challenges related to EMI.

In the upcoming section, the research paradigm and the rationale behind its selection are discussed.

Research Paradigm

Research is guided by underlying philosophical assumptions known as paradigms or worldviews, which shape how researchers understand reality, acquire knowledge, and interpret data. These paradigms provide a framework for inquiry and influence methodological choices (Creswell, 2013). Common paradigms include positivism, post-positivism, interpretivism, and critical theory — each with distinct ontological and epistemological assumptions.

This study adopts an interpretive critical paradigm, which blends elements of interpretivism and critical theory. From the interpretive perspective, reality is seen as socially constructed, and knowledge is generated through understanding the meanings individuals assign to their experiences (Cohen et al., 2007). As such, researchers aim to understand the world "through the eyes of the participants rather than the researcher" (Cohen et al., 2007, p. 21). However, drawing from critical theory, the interpretive critical paradigm also recognizes that social realities are shaped by power relations and structural inequalities. It not only seeks to understand participants' perspectives but also to uncover hidden assumptions, challenge dominant narratives, and support transformative action (Cohen et al., 2018). Creswell (2013) notes that in such frameworks, researchers rely heavily on participants' views while remaining critically aware of the broader social, cultural, and political contexts in which these views are formed. The context of this research involves examining how language policies, institutional expectations, and access to support affect STEM educators who are required to teach in English, often in contexts where English is not their first language.

This paradigm is particularly suitable for the study, which aims to gather authentic insights from educators and learners regarding the challenges and solutions of Algerian STEM educators and students in their experiences with EMI in academic settings.

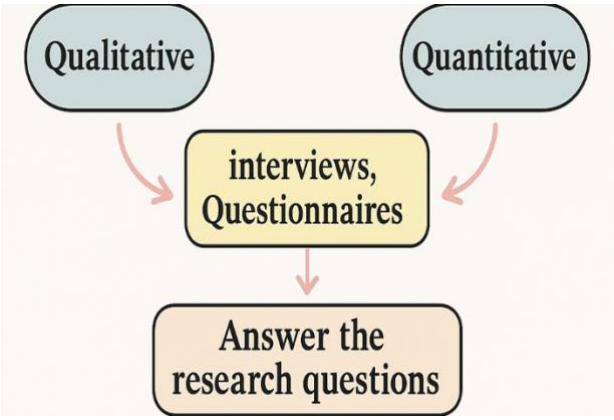
Research Approach and Design

This research employed a mixed-methods approach, according to Creswell and Creswell (2017) "a useful strategy to have a more complete understanding of research problems and questions… such as comparing different perspectives drawn from quantitative and qualitative data" (p. 298). Similarly, Leavy (2022) affirms that "mixed methods research "provides a way of capturing the complexity of lived experience in educational settings" (p. 9), making it particularly fitting for this inquiry. Supporting this view, Dawadi et al. (2021) argue that mixed-methods research is ideal for "understanding multifaceted phenomena where both statistical and thematic data are needed" (p. 27).

Moreover, mixed-method research combines quantitative and qualitative trends, either for data collection or analysis at any number of stages of the investigation process (Creswell & Creswell, 2017). Dawadi et al. (2021) support this dual approach by stating that "mixed-methods studies often rely on interviews and surveys to capture both detailed views and broader trends" (p. 28). Hence, data collection for this study will consist of a semi-structured questionnaire and semi-structured interviews. Furthermore, in the data analysis phase, Leavy (2022) argues that "bringing together different types of data allows for a more layered and nuanced discussion" (p. 107). This integration, as Dawadi et al. (2021) argue, is essential in mixed-methods research to "cross-validate findings and develop more robust conclusions" (p. 30). Indeed, merging both data types may allow the researcher to gain a holistic understanding of both teachers' and learners' perspectives on their experiences of implementing EMI. Such an approach is considered suitable too.

Figure 2

Research Design



The research study will be reviewed below.

Research Instruments

In order to collect relevant data for this study, two research instruments were employed; an online semi-structured questionnaire distributed to students and semi-structured interviews conducted with teachers. With the use of both tools, we intended to gather diverse perspectives and ensure a comprehensive understanding of the research topic.

Students' Semi-Structured Online Questionnaire

Dörnyei and Taguchi (2010) conceptualize questionnaires as self-completed written documents that respondents fill in independently. In this research, the online semi-structured questionnaire functioned as a key data collection instrument in this research given that, as Dewaele (2018) argues, it enables the researcher to obtain rich and abundant data while sitting behind one's desk. Hence, this tool was strategically implemented to gather insights from STEM students regarding challenges they encounter when learning through EMI in Algerian HE.

The online format was selected after careful consideration of its numerous advantages. Ball (2019) suggests that online surveys allow respondents to answer at their convenience and pace, potentially improving response rates. This approach offers several compelling benefits: cost-effectiveness in setup and administration; enhanced anonymity that encourages honest

responses due to the absence of face-to-face interaction with researchers; autonomous operation without requiring additional researcher intervention; and automated tracking of participation levels until sufficient data has been collected (Dörnyei, 2007; Phakiti et al., 2018). These advantages collectively outweighed potential limitations and made online questionnaires particularly suitable for this research context.

The semi-structured questionnaire employed in this study (see Appendix A) was constructed as a bilingual instrument in both English and Arabic to ensure comprehensibility and accessibility for all participants. It comprises three distinct sections: (1) General Information, which captures demographic data and language background; (2) Learning Challenges, which explores specific difficulties encountered with EMI; (3) Learning Materials and Resources, which evaluates available resources and identifies unmet needs; and (4) Solutions and Additional Support, which gathers students' suggestions for improving EMI in STEM education through courses, resources, and institutional policies.

This online questionnaire aligns with Dörnyei and Taguchi's (2010) observation that questionnaires typically present highly structured formats, with items either requesting specific information or offering various response options. In order to produce both quantitative and qualitative insights, the questionnaire included a variety of question formats. Likert scales and multiple-choice questions allowed for effective statistical analysis, while strategically placed open-ended questions encouraged participants to elaborate on their experiences in greater detail, adding insightful viewpoints to the dataset that might not have been obtained through closed-ended questioning alone.

Teachers' Semi-structured Interview

Although questionnaires offer useful quantitative information, Dörnyei and Taguchi (2010) contend that the best way to enhance questionnaire data is to combine questionnaires with complementary data collection methods rather than just adding open-ended questions. To

this end, to make our data more reliable, we conducted semi-structured interviews to explore the subjective viewpoints of STEM teachers.

"Qualitative interviewing" is defined by Mason (2002) as "in-depth, semi-structured or loosely structured forms of interviewing" (p.62). This strategy calls for creating open-ended questions that are in line with the goals of the study while providing room for follow-up questions that explain interviewees' answers and investigate new concepts (Hancock et al., 2007). Because semi-structured interviews are more like natural conversations than written questionnaires, they enable participants to express themselves more freely and authentically (Duranti, 2011). The semi-structured format was purposefully chosen to allow for fresh viewpoints based on participants' individual experiences, opinions, and knowledge while keeping the main research topics front and center (Matthews & Ross, 2010). In contrast to more structured formats, open-ended questions allow interviewers to gather detailed information that is enhanced with individual feelings, emotions, and ideas while causing participants to restrict their responses less (Brinkman & Kvale;2005).

Face-to-face teacher interviews were held in the scientific departments of the participants, which Walliman (2006) suggests is a good way to get detailed information. Four separate sections made up the interview protocol used in this study (see Appendix B), which was intended to investigate teachers' experiences with EMI in STEM education. Academic qualifications, teaching experience, length of EMI teaching, English language instruction, and self-assessed proficiency levels were among the background data collected in the first section. Teachers' opinions about the shift to EMI in STEM fields were investigated in the second section, which also looked at students' readiness for this teaching method and perceived benefits. The third section, consisting of nine questions, focused on particular difficulties that arise when teaching STEM subjects in English. Questions covered vocabulary restrictions, the sufficiency of instructional materials, challenges in preparing materials, methods for resolving

comprehension issues with students, and the effects of these issues on teaching effectiveness. This section also examined institutional support mechanisms available to teachers. The last section addressed solutions and suggestions, asking educators to discuss their own coping mechanisms, pinpoint the support systems they need, share their preferences for bilingual teaching methods, and provide detailed suggestions for administrators and policymakers on how to implement EMI in Algerian HE.

Piloting the Research Instruments

The small-scale pilot study was conducted as a necessary preliminary step before commencing the main data collection process. As Dźwigoł (2018) suggests, pilot studies are essential when researchers need to gather initial knowledge about the studied phenomenon. Such studies enable researchers to collect preliminary information that, while inherently incomplete, helps verify the chosen research direction, formulate assumptions, and check the correctness of developed instruments (Kaur et al., 2017).

In this respect, we transformed the revised questionnaire into an online version using Google Forms and shared it with five mathematics students (two first-year and three second-year students). Although there were concerns about the questionnaire's length, students' feedback confirmed it was appropriate, clear, and easy to answer.

For the interview, adjustments were made under our supervisor's guidance. Several questions were removed to avoid redundancy and achieve appropriate length. We sent the interview to one teacher who works at the Department of Science and Technology and preferred to do the interview face-to-face. His feedback was positive confirming the clarity and well-structured form of the questions.

Setting and Sampling Technique

The research setting is the place where the research study takes place. According to Creswell (2014), "the research setting is the physical, social, and cultural site or location where the researcher conducts the study" (p. 179). Therefore, the setting chosen to attempt the fieldwork was the STEM Departments at Mohammed El- Bachir El -Ibrahimi Bordj Bou Arreridj (BBA) University during the academic year 2024-2025. This university was chosen for several factors. Since we are students in the Department of English Language, we have easy access to teachers and students to conduct the study in STEM courses that are delivered in English. Moreover, it was a practical choice for our research as it helps in reducing time constraints and travel expenses given that the university is close to use.

For this study, we opted for Purposive sampling with students and convenience sampling with teachers. Purposive sampling is defined as "the deliberate selection of certain individuals or groups for inclusion in a study because they possess characteristics of importance to the research question" (Fraenkel et al 2022, p. 238). As such, our sample consisted of the first year and second year, they were chosen because EMI has been introduced in HE for only two years or three years, so they can include their recent experiences in STEM courses in English. This approach allowed for the collection of more focused and detailed insights into the real challenges faced during instruction.

For the semi-structured interviews, we opted for convenience sampling to recruit teachers. In convenience sampling, the reason to choose it was guided by practical considerations such as time, accessibility, and participants' willingness to take part, along with the fact that "respondents are chosen based on their convenience and availability" (Creswell & Creswell, 2018, p. 212). Furthermore, the advantage of convenience sampling lies in its casiness, low cost, and quickness (Denscombe, 2010). This sampling method was suitable

given the limited number of teachers engaged in EMI and their tight schedules. The section below details the questionnaire and interview samples.

Questionnaire Sample

The questionnaire was administered to 64 students from the 1st, and 2nd year licence levels. Table 1 below details students' profiles.

Table 1

Students' Profiles (Age, Gender, and Educational Level)

		Frequency	Percentage
Age	18-23	62	96.9%
	24-29	1	1.6%
	30-above	1	0%
Gender	Male	28	56.3%
	Female	36	43.8%
Educational level	1st year licence	46	73 %
	2nd year licence	17	17%

Regarding gender distribution, 36 of the students are females, and 28 of them are males. The majority of students fall within the age range of 18 to 23, comprising 96.9% of the total. Only 1.6% of them are aged between 24 and 29. In terms of student's educational level, the largest majority of students (73%) are in their first year of the license program. Following this, 17% are in their second year.

Interview Sample

The interview sample consisted of six teachers. The selected teachers have different academic backgrounds, and teaching experiences, and are in charge of different levels. Table 2 presents the profile of the teachers who participated in the semi-structured interviews.

Table 2

Teachers' Profile

Participants	Years of experience	Academic Background
Teacher 1	20	Ethical Engineering
Teacher 2	4	Networks and Multimedia
Teacher 3	16	Pure mathematics
Teacher 4	4	Computer Science
Teacher 5	20	Mathematics
Teacher 6	16	Mechanical Engineering

Data Collection

Once the research design and instruments were finalized, and the necessary pilot testing and participant access were secured, the data collection process commenced. This stage unfolded between April 5th and April 30th within the Departments of Science and Technology and Computer Science and Technology at BBA University. The initial step involved distributing an online questionnaire specifically targeting first- and second-year undergraduate students. To enrich the findings and provide a deeper understanding, the researchers later carried out semi-structured interviews with teachers from the same departments, allowing for a qualitative insight to complement the survey data.

Distributing the questionnaire and reaching participants proved to be somewhat challenging. It was shared through Facebook and Telegram groups specifically created for

first- and second-year license students. Additionally, with the help of Master 2 colleagues, the survey link was circulated directly to students they personally knew. During the data collection period, no inquiries or requests for clarification were received from participants. In total, 64 responses were successfully collected.

For the interviews, each researcher was responsible for conducting sessions with two teachers within their respective departments which represents 6 teachers in general. One of the interviewees, a former classmate, was contacted through email and opted for a face-to-face interview. The remaining participants were approached in their classrooms after they had finished their teaching sessions. All teachers agreed to be audio-recorded and signed a consent form (see Appendix C) that outlined the purpose and details of the study. During the interviews, we utilized a semi-structured interview guide which comprised 16 open-ended questions. The first interview extended to approximately 20 minutes, while the rest was conducted in roughly 10 minutes. Upon gathering all necessary data from both faculty and student participants, we transitioned to the analytical phase, which is comprehensively detailed in the forthcoming section.

Data Analysis

As Creswell and Plano Clark (2017) explain, “data analysis in mixed methods research consists of analysing separately the quantitative data using quantitative methods and the qualitative data using qualitative methods” (p. 218). Since we employed a convergent mixed methods design, and to present the analysis of both qualitative and quantitative data unambiguously, we started with the semi-structured questionnaire analysis followed by the interviews’ thematic analysis. The data then, was discussed and merged in a separate section. Accordingly, statistical and qualitative content analysis was utilised in order to analyse the data obtained from the semi-structured questionnaire. Teachers' interview data were examined through thematic analysis allowing for the identification of recurring themes.

Students' Questionnaire Analysis

In line with quantitative data analysis procedures, we started by converting students' answers directly from Google Forms to Excel Microsoft Office 2019. We employed descriptive statistical analysis to examine the data collected from the closed-ended items using tables and bar graphs to represent the results. For open-ended questions, we employed qualitative content analysis.

As Hsieh and Shannon (2005) explain, qualitative content analysis involves interpreting textual data by systematically organizing codes and identifying patterns or themes. Based on this approach, qualitative content analysis was employed to examine the open-ended responses in the questionnaire. This process consisted of three main steps which are stated and illustrated below.

- First in order to familiarize ourselves with the data, we translated the answers written in Arabic into English and organize the answers to facilitate understanding.

Table 3

Translating Example of the Questionnaire Answers

Original statement	Translation
"لضبط اللغة جيدا"	To master the language well (Response 4)

- Second, we divided the text into meaning units before we started the coding process through which key themes were identified. This step is exemplified in the table below.

Table 4

Example of the Process of Thematic Analysis

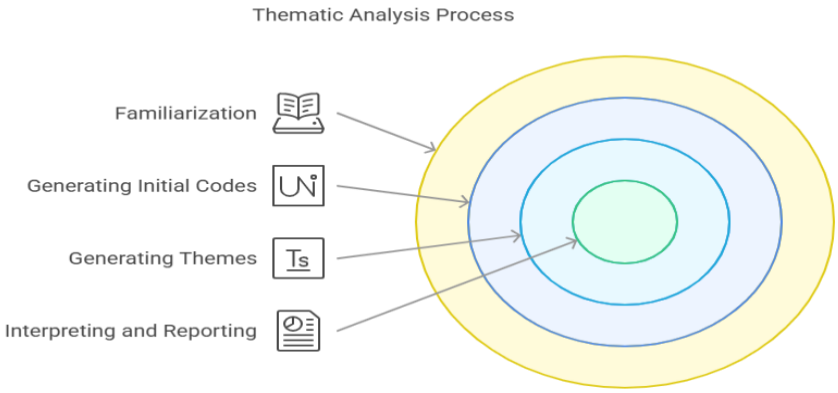
Meaning units	Generated Theme
"For greater improvement and proficiency," "To master the language well."	Enhancing English language proficiency

Teachers' Semi-structured Interviews Analysis

Thematic analysis is a widely recognized qualitative research method for identifying, analyzing, and reporting patterns (themes) within data (Braun & Clarke, 2017). In the context of this study, thematic analysis was employed to systematically explore and extract meaning from the qualitative data derived from the semi-structured interviews with STEM teachers. This approach allowed for an in-depth investigation into their experiences, opinions, and perceptions regarding teaching STEM subjects in English, specifically delving into the challenges, advantages, support mechanisms, and recommendations they provided. To achieve this, the data analysis followed the systematic steps outlined in the thematic analysis literature (Braun & Clarke, 2012, 2017; Creswell, 2008; Maguire & Delahunt, 2017), as presented in Figure 3 below.

Figure 3

The process of Thematic Analysis



- *Transcription and familiarization*: After collecting data from face-to-face and written interviews, we transcribed the audio content, converting spoken language into a written format without any changes or modifications for a full transcript of a teacher's interview (see Appendix D). We kept each interview transcript in a Word format file and then consolidated all the files into a single document. To guarantee the anonymity of participants' identities, we assigned a pseudonym for each interviewee (e.g., interview 1, interview 2, interview 4, etc.). This allows for straightforward reference to the participants during the analysis and reporting processes. Finally, we familiarized ourselves with the data by reading the transcripts many times.
- *Generating initial codes*: Since our research is exploratory in nature, we started generating the initial codes using an inductive coding approach and assigning different coding types such as "descriptive coding" (summarizing the data in words that describe the topics); "values coding" (capturing participants' feelings through codes); and "In Vivo coding" (using participants' words as they are). Table 5 illustrates this step.

Table 5

Example of Initial Coding from Teachers' Interview

Data Extract	Initial Code
"*For me as a professor, I find it difficult to speak fluently in English..."* (Interview 1)	Difficulty with English fluency

- *Generating and reviewing the themes*: After identifying the codes, we organized them into categories by colour coding them. Then, we started to identify and develop themes by combining different codes and categories. Furthermore, we reviewed and checked the generated themes to verify their relevance and coherence (Braun & Clarke, 2012) as exemplified below in Table 6.

Table 6

Example of Themes' Generating from Teachers' Interview

Data Extract	Code	Category	Initial Theme
"*For me as a professor, I find it difficult to speak fluently in English...Yes, my limited English vocabulary affects lesson delivery..."* (Interview 1, 2)	Difficulty with English fluency, Limited English vocabulary	Teacher Language Proficiency	Challenges related to teacher English proficiency
"*As for the students, I find myself forced to explain in English and then repeat in the local dialect..."* (Interview 1) "*When students do not understand explanations in English, I resort to explaining in Arabic or French..."* (Interview 2, 4)	Explaining in local dialect, Explaining in Arabic or French	Teaching Strategies	Use of multiple languages in teaching

- *Interpretation and reporting:* The last step according to Braun and Clarke (2017) was reporting, in which we provided a comprehensive interpretation of the results based on our research questions and objectives. We presented the findings in a clear and organized way, with each theme explained in detail and illustrated with examples from the participants' responses.

Trustworthiness

Although different from quantitative research, qualitative research quality could be increased following particular steps (Kumar, 2011). According to Creswell and Creswell (2018), qualitative validity means using certain procedures to check the accuracy of research findings, whereas qualitative reliability indicates the consistency of the research approach across distinct researchers and among varied projects. This means that if other researchers followed the same procedures, they might arrive at similar findings. In qualitative studies, reliability and validity are determined by four indicators: credibility, transferability, dependability, and confirmability (Kumar, 2011). To increase research quality and ensure its trustworthiness, we employed different steps, as outlined below.

Credibility

Ensuring credibility is arguably the most important element of being trustworthy in research. Credibility is all about "how congruent are the findings with reality" (Merriam, 2009, p. 213), which suggests that the outcomes of the study should be able to depict the experience and view of the participants. For establishing credibility for the current study, triangulation was utilized, i.e., utilizing multiple instruments, data sources, and even researchers (Denscombe, 2010). Triangulation makes the data and findings robust with cross-validation of the data gathered by diverse means. Through questionnaires and semi-structured

interviews, the current study was able to combine data from various sources, students and teachers, that is more qualitative in nature about the issues they encounter with EMI. Besides, the verbatim quotes of the participants were used in the analysis and were transparent to allow the reader to follow the interpretation back to the data, thereby improving the research credibility (Creswell & Creswell, 2018).

Transferability

Transferability in research is the transfer of evidence from one situation to another, as opposed to generalization, since it responds to the comparability of situations. Transferability can be achieved when the researcher provides a thorough explanation of the research steps (Kumar, 2011). Accordingly, we provided a detailed description of the research design, setting, and participants, as well as data collection procedures and data analysis, with a justification for each procedure we took. In this case, the findings of this research could be transferred to similar contexts.

Dependability

Kumar (2011) stated that dependability in qualitative research is similar to the concept of quantitative research reliability. To achieve the dependability of research, the steps of the study should be explained in detail, thereby enabling other researchers to repeat the work to gain the same results (Shenton, 2004). For this purpose, we reported detailed descriptions of research design, and the procedures for data collection and analysis while discussing the steps with our supervisor. Moreover, the use of mixed method design "calls for a clear appreciation of 'triangulation' and makes good use of its potential" (Denscombe, 2010, p. 150). This triangulation, this mixing of qualitative and quantitative data, double confirms findings and raises the total validity of the research. The process provides an overall view, allowing researchers to gain richer and more precise findings by merging one source of information.

Confirmability

Confirmability (i.e., objectivity) refers to the extent to which the researcher has not influenced the findings of the research (Denscombe, 2010). Therefore, we encouraged participants to provide their honest opinions and we minimized the effect of our interests by objectively reporting the findings so that we keep an "open mind and are willing to consider alternative and competing explanations of the data" (Denscombe, 2010, p.302). As stated by Bouacha (2021), "to address confirmability, the researcher's interpretation ought to be consistent with the participants' declared views, beliefs, and experiences" (pp.114-115). Hence, we included quotations from participants' responses (teachers and students) as well as the interpretation of results without modifications so that the reader would have a sense of their opinions.

Using these strategies, this study seeks to achieve both qualitative validity and reliability, which strengthens the trustworthiness of the findings. The following section details the ethical measures addressed in this study.

Ethical Considerations

Ethics in research are crucial (Merriam & Grenier, 2019), thus we ensured to follow ethical considerations in our study, following British Educational Research Association Ethical Standards (2018). We utilized the following methods:

- We informed both teachers and students that their participation was completely voluntary.
- We asked all teachers to sign the consent form, which was provided with a detailed explanation of our topic and aim, to mitigate ethical concerns.
- Concerning confidentiality and anonymity, we ensured that participants' names and identities were kept private by using pseudonyms or numerical codes (e.g.,

Teacher 1, Teacher 2, interview 1, interview 2) instead of real names, which are known only to the research team.

- "The validity and reliability of a study depend upon the ethics of the researcher" (Merriam & Grenier, 2019, p. 46); therefore, we tried to be as objective as possible in the data collection and analysis phases as well as in presenting the data, preventing participants' perceptions and autonomy from personal biases.

Conclusion

In this chapter, we outlined the methodology adopted in order to conduct this research. We discussed the research paradigm, design, instruments, setting and sampling technique, data collection as well as analysis followed by ethical guidelines. We employed a convergent mixed methods design, combining interviews and questionnaires to gain comprehensive insights from teachers and students. Our methodological approach ensures the validity and reliability of the research while adhering to established ethical standards. Following this chapter, we delve into presenting our findings from the interviews and questionnaires.

CHAPTER THREE: RESULTS AND FINDINGS

Introduction

In this chapter, the results and the findings of our study are presented and then discussed in relation to the research questions and in light of the literature. As has been explained in the data analysis section in the previous chapter, the questionnaire data were analysed quantitatively using descriptive statistics while the interview data was analysed using thematic analysis. Henceforth, this section is divided into three parts. First, the questionnaire results are presented. Second, the findings from the analysis of the teachers' interviews are exhibited under two themes. Lastly, the two parts are synthesised in the discussion part to answer the research questions.

Questionnaire Results

In the following, we present the questionnaire results in the form of tables and bar graphs for a comprehensive visual representation. We analysed close-ended questions using quantitative measurements. Whereas some open-ended questions which are included as follow-up ones are analysed using qualitative content analysis. The answers to open-ended questions are supported by the respondents' quotes which were translated from Arabic to English. We used (Response + Number) to refer to the quotes.

STEM Students' Rating of their English Proficiency

Table 7

1.Q.5. How Would You Rate Your English Proficiency in The Following Areas?

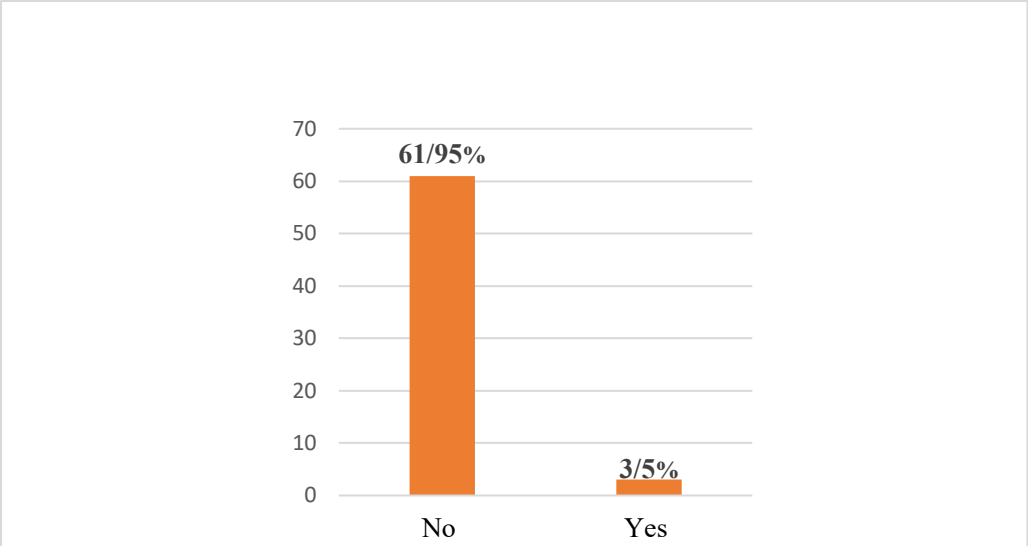
Skills	Beginner		Intermediate		Advanced	
	Number	Percentage	Number	Percentage	Number	Percentage
Reading	13	20.3%	40	62.5%	11	17.2%
Writing	22	34.4%	34	53.1%	8	12.5%
Listening	20	31.3%	33	51.6%	11	17.2%
Speaking	36	56.3%	24	37.5%	4	6.3%

When asked about their perceived English proficiency in the four language skills, the students' questionnaire results revealed disparities in their self-assessment of their level, with notable challenges in Speaking and Writing. 56.3% of students identified themselves as beginners in Speaking, while only 6.3% rated themselves as advanced. Similarly, writing proficiency was low with 34.4% of students at a beginner level and just 12.6% at an advanced one. Reading and listening proficiency are comparatively stronger. Approximately more than half of the students rated their reading and listening as intermediate. Advanced proficiency remained limited (17.2% for both reading and listening skills). It can be noted from the above results that the participant students are aware of the difficulties they face in productive skills.

STEM Students' Pre-University Private English Tutoring

Figure 4

1.Q.6. Have You Taken Any Formal English Courses Before Entering University?



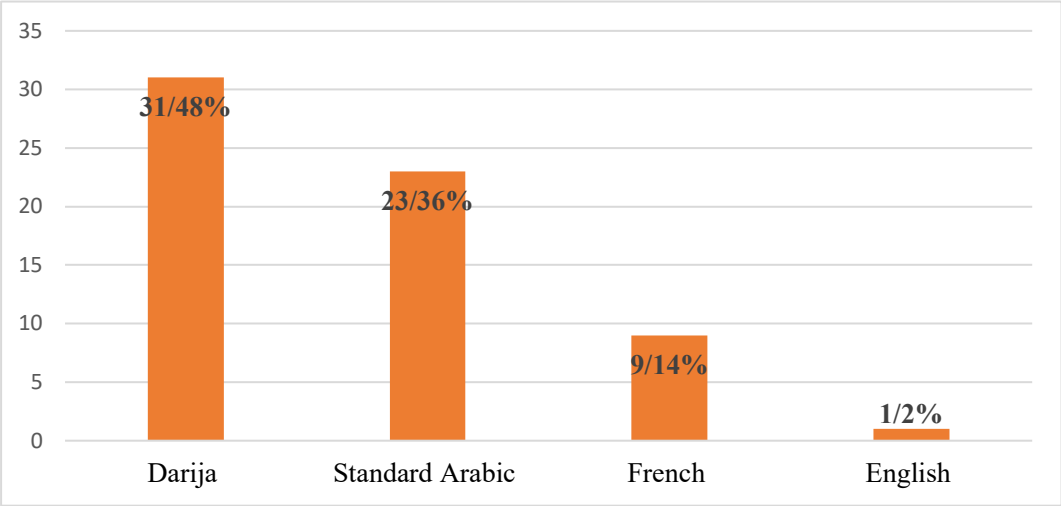
According to the results demonstrated in Figure 4 above, the vast majority of the respondents (95%) mentioned that they did not take any formal English courses (separate from the school) before entering university while only 5 % of them stated the opposite. The analysis of the open-ended item reveals that such courses were taken in private schools which focus more on communication skills, as exemplified by Response 47:

" Private schools. "

STEM Students' Rating of the Language in Instruction used in Pre-University Education

Figure 5

1.Q.7. What Languages Were Most Commonly Used for Teaching in Your Previous Education before University?



In an attempt to know which languages are mostly used for instruction in the pre-university levels, the results of this question as depicted in the bar graph above suggest that Darija (Algerian Arabic) is the most used one among teachers in their instruction. Standard Arabic comes in second place with 36 % while French and English are the least used with 14 % and 2% respectively. These results show that most teachers' instruction at pre-university levels is delivered through students' native language (Arabic) whether using Darija or standard Arabic particularly.

STEM Students' Perspectives on The University Provided English Language Support

Figure 6

1.Q.8. Does Your University/Department Provide Any Language Support for Students Learning in English?

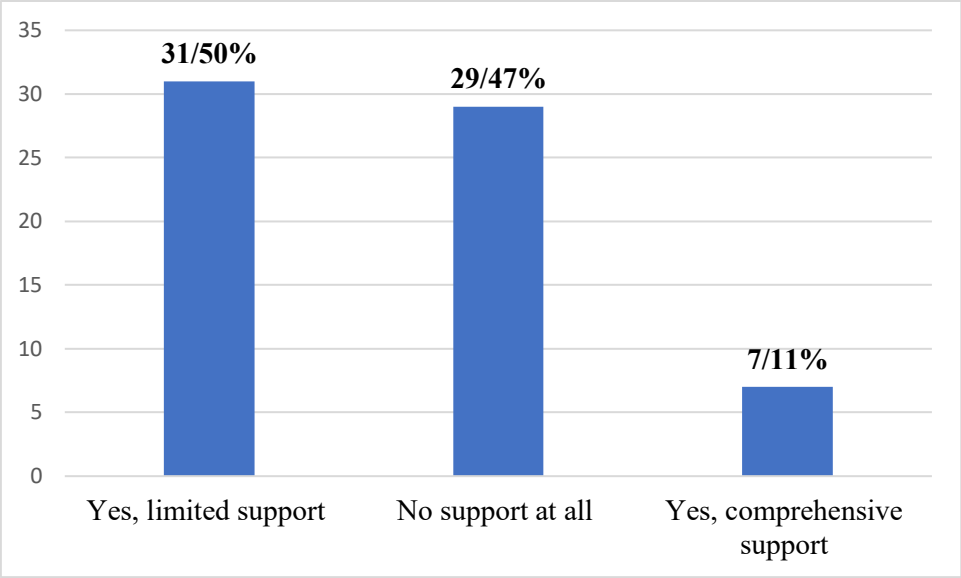


Figure 6 displays the amount of language support provided by the university. Half of the respondents (50%) declared that the university offers limited support while about 47% of them stated that there is no support provided. Yet, over 11% of the students acknowledged that the university provides comprehensive assistance.

Types of Language Support Provided by the University

Table 8

*1.Q.9. If Your University Provides Language Support, What Kind of Support Is Available***?**

Response	Number	Percentage
English language courses	21	65.6%
Online resources	17	53.1%
Other	5	7.8%

The majority of students reported that the university provided limited linguistic support. Most of this support, as Table 8 shows, consists of English language courses. While 53.1% of students selected online resources, others (Response 53) added that their teachers:

"Give lessons in the English language."

Another student said that He/She took lessons at the university language centre as exemplified in Response 3:

" مركز تكثيف اللغات" translates as: *"Intensive language teaching centre"*

STEM Students' Views Regarding Teachers' Use of English in STEM Courses

Table 9

2.Q.1. Do All Instructors Consistently Use English in Your STEM Courses?

Response	Number	Percentage
Most instructors use English, but some use Arabic/French	29	45.3%
Most instructors use Arabic/French with some English terms	18	28.1%
It varies widely between instructors and modules	9	14.1%
Yes, all instructors use English in all modules	5	7.8%
No, most instruction is in Arabic/French despite the English curriculum	3	4.7%
Total	64	100%

The results of Question 1 in Part 2 revealed limited adherence to full English instruction in Algerian STEM courses. While 45.3% of students reported that most instructors use English with some Arabic/French, 28.1% observed that teachers use Arabic/French for instruction with only technical terms in English. Only 7.8% confirmed consistent English use across all classes, while 4.7% noted instruction remained largely in Arabic/French despite the English curriculum. An additional 14.1% reported that the language used in the classes varies according to teachers and modules. In accordance with these results, most STEM teachers use either English, the native language, or French to deliver their lessons as will be discussed in the interview results.

STEM Students' Perceived Challenges

Table 10

2.Q.2. What Are The Biggest Challenges You Face as A STEM Student Learning in English?

Response	Number	Percentage
Difficulty expressing ideas in English	20	31.3%
Difficulty understanding lectures in English	18	28.1%
Struggling with technical vocabulary	10	15.6%
Limited English proficiency of professors	9	14.1%
Lack of English learning support	7	10.9%

As shown in the table above, STEM students faced multiple difficulties with English-medium instruction. Nearly one-third (31.3%) reported struggling to express ideas in English, while 28.1% found lecture comprehension difficult. Technical vocabulary posed problems for 15.6% of respondents. Notably, 14.1% chose professors with limited English proficiency as a barrier, and 10.9% highlighted insufficient institutional support for English learning. One respondent added that He/She struggled with exam questions as exemplified in Response 6:

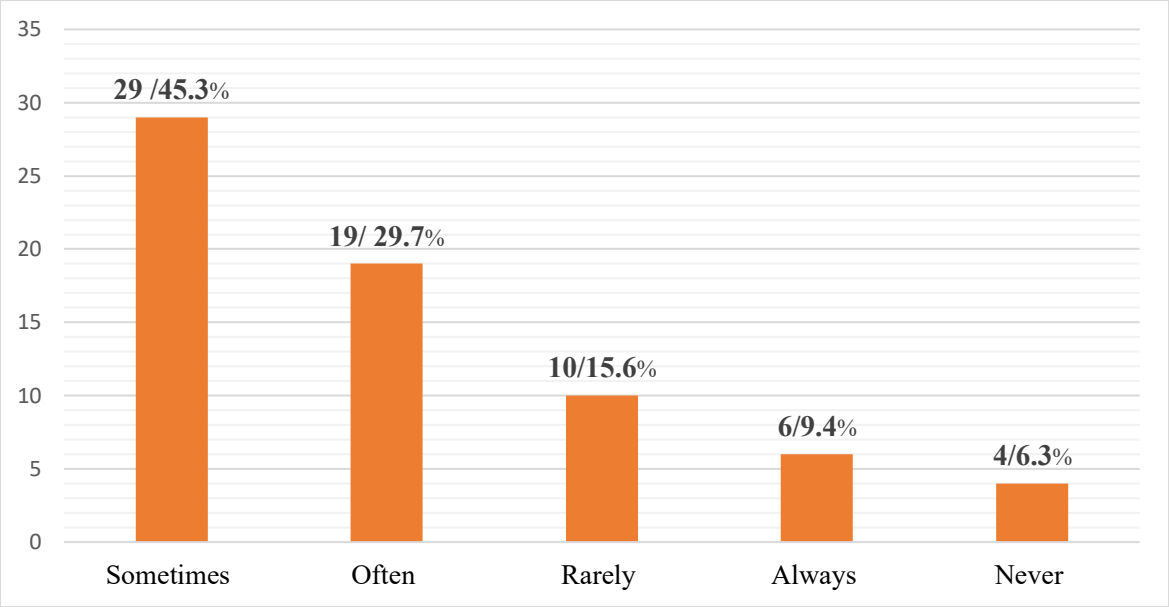
"The difficulty of reading exam questions and understanding them."

These results suggest that both students and faculty teachers lack English proficiency specifically in communication, speaking skills, and technical vocabulary. Indeed, the findings from teachers' interviews highlighted several challenges related to expressing ideas in English and lecture comprehension difficulties.

STEM Students' Views Regarding the Frequency of Understanding English- Medium Lectures

Figure 7

2.Q.3. How Often Do You Find It Difficult to Understand Lectures Due to The Use of English?



According to the information shown in Figure 7 above, nearly half (45.3%) of respondents sometimes struggle to understand lectures, while a significant 29.7% face difficulties often. Alarmingly, 9.4% always find lectures hard to follow, suggesting some students face persistent language barriers. Only 15.6% rarely encounter problems, and a mere 6.3% report never struggling. These results, combined with the previous ones (see Table 3.4) on low English proficiency indicate that EMI implementation may be outpacing both students' and instructors' language readiness, potentially compromising learning outcomes in STEM disciplines.

STEM Student's Perspective on the Most Difficult Aspect of English in STEM Subjects

Table 11

2.Q.4. Which Aspect of English Do You Find Most Difficult in STEM Subjects?

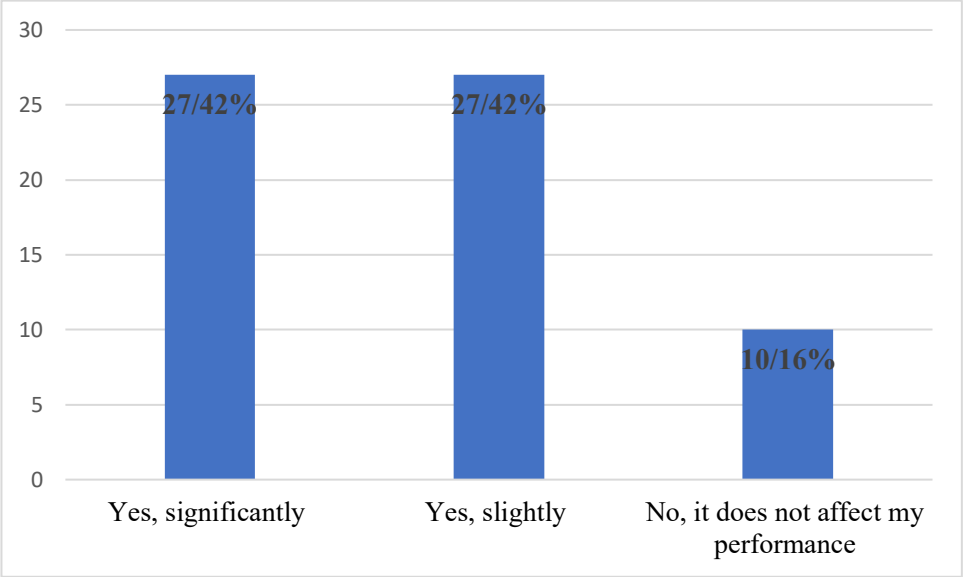
	Not difficult at all	Slightly difficult	Moderately difficult	Very difficult	Extremely difficult
Understanding spoken lectures	8	28	19	8	3
	12.5%	43.8%	29.7%	12.5%	4.7%
Reading scientific materials	12	21	24	7	2
	18.8%	32.8%	37.5%	10.9%	3.1%
Writing reports and assignments	15	20	18	8	4
	23.4%	31.3%	28.1%	12.5%	6.3%
Participating in discussions	11	13	16	21	4
	17.2%	20.3%	25%	32.8%	6.3%
Grammar and sentence structure	13	7	23	11	10
	20.3%	10.9%	35.9%	17.2%	15.6%

This question aims to discover in which particular aspects STEM students find difficulties. Depending on the results shown in Table 11, students report varying levels of difficulty with different aspects of STEM courses. Concerning listening comprehension, 12.5% find lectures “not difficult” but 29.7% report “moderate” difficulty. 17.2% combined rate it "very" or "extremely" difficult. For reading scientific materials, only 14% of students reported major difficulties, and 37.5% experienced moderate challenges. 18.8% of students thought writing assignments were very/extremely difficult and 28.1% faced moderate struggles. Most critically, 39.1% (25) found discussions very/extremely difficult - the highest among all skills. Grammar shows polarization, with 20.3% (13) comfortable but 32.8% (21) struggling significantly. These results highlight speaking and grammar as primary barriers in EMI STEM higher education.

STEM Students’ Perceived Impact of Language Barrier on Academic Performance

Figure 8

2.Q.5 Do You Think The Language Barrier Affects Your Academic Performance?



When asked about the perceived impact of the language barrier on their academic achievement, the majority of the participating students (84.4%) claimed that the language barrier affects their academic performance, with 42% experiencing significant impacts and another 42% noticing slight effects. Yet, only 16% (10 students) claimed no influence on their performance.

STEM students' Views on the Ways in Which Language Barrier Impact Their Academic Success

Table 12

2.Q.6. In What Ways Does Language Influence Your Academic Success?

Response	Number	Percentage
It affects my ability to take effective notes during lectures	7	10.9%
It affects my exam performance and grades	27	42.2%

It creates a gap between my subject knowledge and my ability to demonstrate it	9	14.1%
It hinders my critical thinking skills when working in English	3	4.7%
It impacts my ability to explain scientific processes accurately	3	4.7%
It limits my access to and comprehension of scientific literature	3	4.7%
It reduces my confidence to participate in class discussions	10	15.6%
It reduces the quality of my research papers and assignments	2	3.1%
Total	64	100%

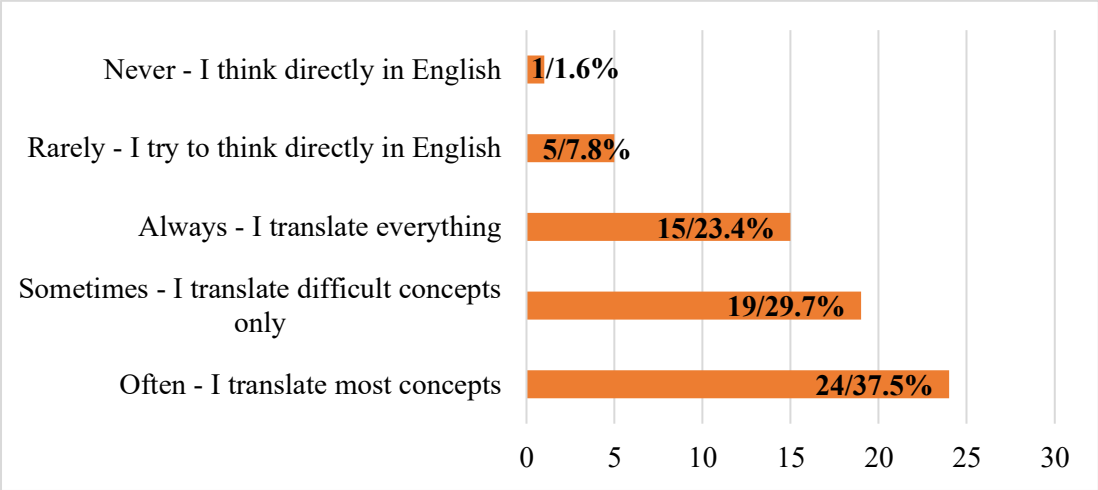
Respondents' answers to Question 6, Part 2, reveal the ways in which language (in this context English) impacts STEM students' academic performance. As demonstrated in the table above, a significant proportion of respondents identified academic performance concerns. The most prominent challenge, reported by 42.2% of respondents, was the negative impact on exam performance and grades. This suggests that the language barrier is directly affecting student assessment outcomes. Class participation emerged as the second most significant concern, with 15.6% of respondents indicating that their confidence to participate in the classroom decreased after implementing EMI. This highlights how language barriers may limit their active engagement in the learning process. Similarly, 14.1% reported that EMI creates a gap between their subject knowledge and their ability to demonstrate it, pointing to a disconnect between comprehension and expression. Note-taking difficulties were identified by 10.9% of respondents, suggesting that some students struggle to grasp the lecture content effectively. The remaining challenges were less frequently reported but still noteworthy: 4.7% of respondents each indicated that EMI hinders critical thinking skills, impacts the ability to explain scientific processes accurately, and limits access to and comprehension of scientific literature. Only a small percentage (3.1%) felt that EMI reduces the quality of their research papers and assignments.

These findings collectively illustrate how language proficiency intersects with various aspects of academic performance and engagement in STEM education.

STEM Students' Frequency of Mental Translation While Learning STEM Concepts

Figure 9

2.Q.7. How Often Do You Mentally Translate Between Languages While Learning STEM Concepts?



The bar graph above exhibits how often STEM students use translation while learning. 24 (37.5%) students chose often. 19 (29.7%) students said they use translation when dealing with difficult concepts only. 15 (23.4%) students claimed they always translate everything while 5 (7.8%) selected rarely. Only one student selected Never. It can be deduced that most STEM students rely on translation to understand their specialty concepts.

STEM Students' Strategies for Managing Language Difficulties in STEM Courses

Table 13

2.Q.8. How Do You Usually Deal with Language Difficulties in STEM Courses?

Responses	Number	Percentage
Using translation tools	46	71.9%
Asking teachers for clarification	7	10.9%
Discussing with classmates in another language	5	7.8%
Relying on resources in Arabic language	3	4.7%
Relying on resources in French language	3	4.7%

Table 13 above portrays the methods that STEM students employ to confront the challenges of EMI. 72% of respondents reported using translation tools to overcome language barriers, indicating a heavy dependence on technological assistance. Only 11% seek teacher clarification. 8% opted for discussing with classmates in other languages, and equal percentages (4.7%) settled on relying on Arabic or French resources.

STEM Students' Views on Professors' Strategies for Managing their Language Challenges

Table 14

2.Q.9. How Do Your Professors Handle Students' Language Difficulties?

Response	Number	Percentage
Allowing students to use their native language when needed	34	53.1%
Translating key terms	17	26.6%
Using simpler English	11	17.2%
No special support provided	1	1.6%
Providing additional English resources	1	1.6%
Total	64	100%

We formulated this question aiming to know how professors deliver their lessons after implementing EMI from students' perspectives. More than 50% of the respondents indicated that teachers allow them to use their native language. 26.6% said teachers translate the key terms and 17.2% said they try to use simpler English to clarify the lessons. Only 1.6% of respondents reported receiving additional English resources, and an equal percentage (1.6%)

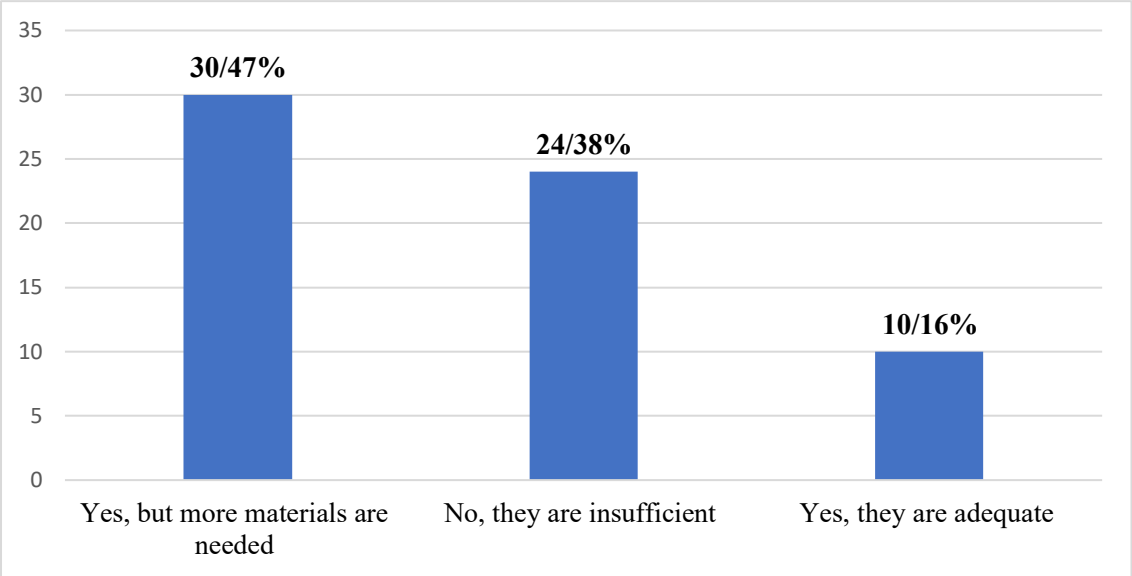
received no special support. Other students added that their teachers discuss lessons in Arabic as illustrated in Response12:

"التحدث والتدريس باللغة العربية", translated as "talking and teaching in Arabic".

STEM Students' Perceived Sufficiency of English Textbooks and Materials

Figure 10

3.Q.1. Are The Available STEM Textbooks and Learning Materials Sufficient to Support Your Learning in English?



The figure above shows that 30 (47%) students reported that the current EMI learning more materials in Algerian STEM programs are needed. These students argued that they needed personal support and direct assistance. For instance, a student in Response 1 noted:

"Because I need someone to support me."

Furthermore, 24 (38%) students declared that the available materials are insufficient. The analysis of the justification for this answer revealed that the frequently mentioned themes

revolve around the critical lack of accessible English-language resources and materials in their field. To illustrate, a student in Response 31 argued:

"All the books in the college library are only available in French and Arabic. Therefore, to rely on or use information, we face difficulties translating such a large volume for use in research."

However, 10 (16%) respondents considered the available resources adequate. The justification for this answer centres on the dominance of the English language within STEM fields and the institutional support for English use, as exemplified in Response 40:

"Because the field of Science and Technology mostly uses the English language."

STEM Student's Use of External Resources for Understanding Subjects in English

Table 15

3.Q.2. Do You Use External Resources to Help You Understand STEM Subjects in English?

Response	Number	Percentage
Yes, occasionally	24	37.5%
Yes, frequently	23	35.9%
No, I rely only on university materials	17	26.6%
Total	64	100%

According to the percentages shown in Table 15, most students use external learning resources beyond what their universities provide for EMI in STEM education. 37.5% selected doing so occasionally and 35.9% designated frequently. Only 26.6% rely entirely on university-provided materials. These findings indicate that nearly three-quarters of the participating students find it necessary to search for additional learning materials, highlighting the insufficiency of current institutional ones.

STEM Students' Preferred Additional Resources for Learning Subjects in English

Table 16

3.Q.3. What Kind of Additional Resources Would Help You Learn Stem Subjects Better in English?

Response	Number	Percentage
Video lectures with subtitles	32	50%
Online English-STEM courses	24	37.5%
More visual aids and diagrams	19	29.7%
Bilingual textbooks	9	14.1%

As for the different types of materials that STEM students perceive as being helpful in facilitating their learning in English, the questionnaire results elucidated that 50% preferred video lectures with subtitles, 37.5% selected online English-STEM courses as the second most preferred materials. A percentage of 29.7% opted for visual aids. Yet, only 14.1% were inclined towards bilingual textbooks.

STEM Students' Recommendations for Enhancing the Implementation of EMI in STEM Education

Table 17

4.Q.1. What Do You Think Could Improve EMI In STEM Education?

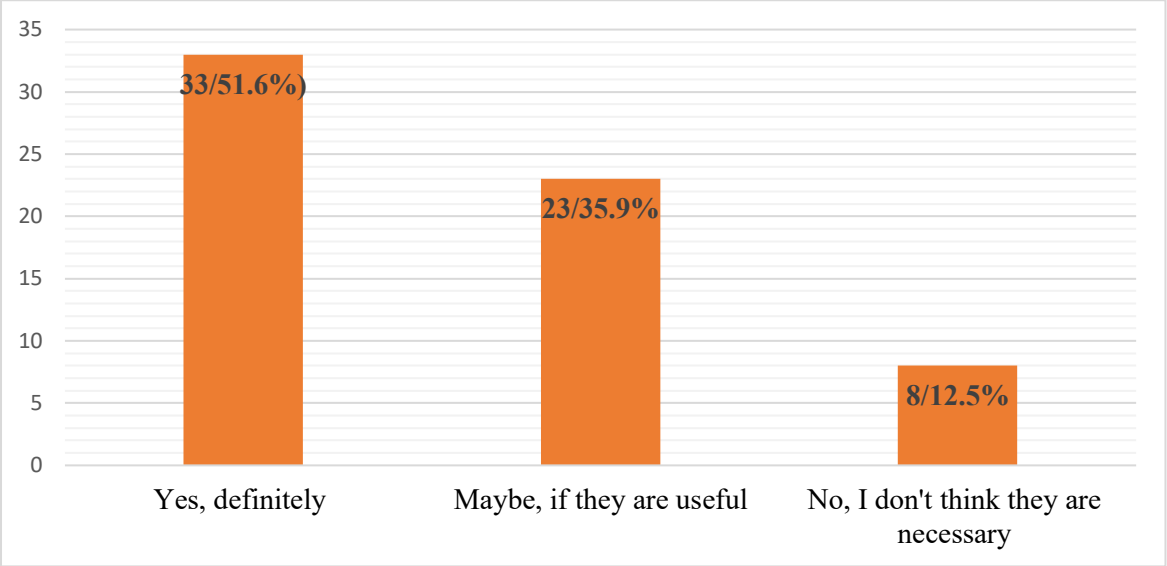
Response	Number	Percentage
Pre-semester intensive English courses	32	50%
Encouraging bilingual instruction (mixing English with Arabic/French)	14	21.9%
Discipline-specific English vocabulary courses	11	17.2%
Providing more learning materials in English	4	6.3%
Online self-study resources with STEM focus	3	4.7%
Total	64	100%

When asked about what could improve EMI in STEM education, Pre-semester intensive English courses were ranked first by half of the respondents. Bilingual instruction ranked second at 21.9%, followed by discipline-specific English vocabulary courses at 17.2%. Far fewer students prioritize additional English learning materials (6.3%) or online self-study resources with a STEM focus (4.7%). These preferences strongly suggest that students value receiving language preparation before content delivery and prefer mixing English instruction with their native language. In addition, STEM students recognize how important learning their discipline terminology is.

STEM Students Preference for Supplementary English courses or workshops in STEM

Figure 11

4.Q.2. Would You Like Additional English Language Courses or Workshops for STEM Students?



It can be noted from the figure above that slightly over half of STEM students (51.6%) expressed definite approval for adding English courses or workshops. The arguments provided by these students centred on the desire to master English and enhance proficiency as explained in Responses 8:

"For greater improvement and proficiency,"

Furthermore, over a third of them (35.9%) indicated conditional support based on the quality and adequacy of instruction. As exemplified by a student in Response 48:

"If the teacher's expertise and sufficient support are available/provided."

Yet, only 12.5% considered this suggestion unnecessary. It can be said that there is a need for effective assistance after EMI implementation.

STEM Student's Suggested Institutional Policies for Improving EMI Experience

Table 18

4.Q.3. What Institutional Policies Would Most Improve Your Experience with EMI?

Response	Number	Percentage
Establishing language support centres in each faculty	37	59.7%
Gradual transition to EMI across the curriculum	29	46.8%
Mandatory English proficiency development for faculty	19	30.6%
Including language proficiency in program admissions criteria	2	3.2%

When asked about the potential policies that could be implemented to improve EMI, the majority of respondents selected establishing language support centres in each faculty as the most favoured institutional improvement strategy at 59.7%. Gradual EMI implementation across the curriculum followed at 46.8%. Nearly 30.6% believed mandatory English proficiency development for faculty would improve EMI delivery, while only 3.2% preferred including language proficiency in program admissions criteria. These priorities indicate that students need both faculty development and a gradual approach to EMI integration to improve their learning experience.

Interviews Findings

In this section, we present the findings from the semi-structured interviews conducted with STEM teachers, using thematic analysis. We organized the data under four constructs, with a focus on two themes related to the challenges faced by STEM teachers using EMI, and suggestions for supporting EMI implementation.

Challenges Faced by STEM Teachers Using EMI

This category represents the main challenges highlighted by the participant teachers concerning the use of EMI. Based on the teachers' viewpoints, implementing EMI in STEM contexts presents several challenges, primarily related to teachers' English language proficiency, lack of teacher training in EMI leading to burnout, and concerns about student preparedness. These are presented below:

English Language Insufficient Proficiency. One of the prominent challenges highlighted by teachers is their own insufficient proficiency in English, particularly in fluency and vocabulary. For instance, Teacher 1 acknowledged:

> *"For me as a professor, I find it difficult to speak fluently in English, meaning I find it a weakness of mine…During my phase of teaching in English, I couldn't finish presenting the lesson compared to using French or the local dialect."*

In the same line of thought, Teacher 2 also expressed this, saying:

> *"The challenges facing professors when teaching in English include difficulty in communication and dialogue with students…My limited English vocabulary affects lesson delivery because professors should be familiar with all terminology to facilitate dialogue with students and provide examples to simplify the lesson."*

It appears from the above quotes that such a lack of fluency in the language might influence teachers' ability to deliver technical content effectively. This is further contended by Teacher 4. He stated:

> *"The challenges of teaching in English affect the effectiveness of teaching by requiring more time to explain lessons to students … I find it difficult to explain technical concepts in English due to my level of proficiency in the language."*

It seems that this lack of fluency and vocabulary can not only slow the pace of lessons but also hinder students' comprehension and engagement. These responses show how limited proficiency in English and the challenge of simplifying complex content directly affect the amount of material that can be delivered in a session. As teachers spend more time repeating or translating concepts, lesson delivery becomes less efficient, making time management a significant issue in EMI settings.

Lack of Teacher Training in EMI. The implementation of EMI in STEM disciplines highlighted a critical shortcoming. Many teachers indicated that there is a lack of both language-specific and pedagogical training needed to deliver effective lessons in English. In this regard, Teacher 3 stated:

> *"We are not qualified in terms of teaching skills. As teachers in technical fields, we did not receive training in educational psychology, so we find ourselves treating the student like a machine."*

This quote underlines an issue beyond linguistic competence, which is the absence of pedagogical preparation. Without training in how to interact with and motivate students, especially in a language they are still acquiring, instructors often revert to one-way instruction, which reduces classroom engagement and learning effectiveness.

Similarly, Teacher 4 explained:

> *"I have not received any formal training in teaching in English… my academic training was in French."*

This reflects a common situation among STEM faculty who were trained in another language and have not been sufficiently prepared to teach in English. The lack of training programs tailored to their specific academic and linguistic backgrounds leaves them under-equipped to manage EMI classrooms effectively.

In summary, the lack of targeted pedagogical training particularly in educational psychology and student engagement compounds the challenges of using English as a medium of instruction. Teachers emphasized that a successful EMI transition requires more than language proficiency; it demands preparing educators to teach, interact, and support learning in an English-based environment.

Teacher's Burnout. The transition to EMI leads to significant exhaustion and burnout among teachers. Beyond the act of constantly adapting and re-explaining content in a less familiar language can be mentally taxing. As a teacher highlighted:

"When we are asked to switch to English without support, we are not only translating content—we are also translating ourselves. It's exhausting."

This sentiment captures the profound effort involved, not just in literal translation, but in adapting one's entire pedagogical approach and internal thought processes to a new linguistic framework.

A similar declaration that reflects this burden from another Teacher, who stated:

> *"During my phase of teaching in English, I couldn't finish presenting the lesson compared to using French or the local dialect for teaching."*

While not explicitly mentioning exhaustion or burnout, the inability to complete lessons due to the language barrier strongly implies an increased workload and a struggle against time and linguistic limitations, which are common precursors to feelings of being overwhelmed and burnt out.

In summary, this subtheme of teacher burnout suggests that the challenges of EMI extend beyond mere skill gaps to impact the psychological well-being and professional efficacy of educators. The constant "translation" of both content and self, coupled with the increased time demands and the pressure to ensure student comprehension, creates a highly demanding environment. Without adequate support, this sustained effort can lead to exhaustion and reduced teaching effectiveness contributing to teacher burnout.

Students' Language Deficiencies and Resistance. While the primary focus is on teachers' challenges in using EMI, several instructors noted that students often lack the necessary English proficiency and motivation, which hinders their engagement and comprehension in EMI classrooms as Teacher 3 noted:

> *"When teaching second-year bachelor's students who did not study in English before, I found problems in using both languages, whether English or French, in addition to indifference on their part, as they are not motivated."*

Teacher 4 indicates students' preference for Arabic due to the perceived challenge of English, suggesting a lack of readiness or comfort with EMI:

> *"For students, their primary preference is studying in Arabic because they find English challenging, especially in scientific subjects. "*

It appears that learners' unfamiliarity with technical English further complicates the learning process, placing additional pressure on instructors to constantly adapt their teaching approach.

In conclusion, it can be said that from personal language limitations to broader communication barriers, teachers' responses reveal a range of challenges that shape the implementation of EMI. These insights highlight the importance of acknowledging and addressing such obstacles to ensure more effective teaching and learning experiences in English-medium contexts.

Suggestions for Addressing Challenges Related to EMI

Participants shared several distinct suggestions aimed at addressing the challenges encountered by both teachers and students when using EMI in STEM higher education. Their suggestions are represented under the subsequent three themes.

The Need for Teachers' and Students Training and Support. A recurring theme among participants was the critical need for structured training for STEM teachers and students to use English effectively. Many teachers emphasized the necessity of pedagogical and linguistic preparation to deliver and receive complex STEM content in English. As teacher 2 suggested:

> *"We need specific training in EMI. Not just general English, but how to teach our subjects in English—how to simplify terms without changing the scientific meaning."*

Another teacher 3 proposed:

> *"There should be a unified training on professors and students, I believe it's crucial to establish ongoing language and pedagogical support units within the university for both. These centres would provide continuous professional development opportunities for faculty and language support services.*

This highlights a recognition that EMI success is a shared responsibility, not solely dependent on teachers' efforts. By providing training for both groups, it aims to bridge the language gap from both sides – equipping teachers to deliver content effectively and students to receive and process it.

A teacher 5 added:

> *"University administrators and policymakers should consider dividing teaching responsibilities: STEM subject teachers would focus on delivering content in English, while trained language instructors would support students and staff in improving English communication, especially for STEM-related tasks. This division would create a more balanced and effective EMI environment."*

This proposed division of responsibilities where STEM educators focus on subject content and language instructors provide English communication support is aimed at creating a more sustainable and less stressful EMI environment. By leveraging the complementary strengths of both groups, the university could offer more comprehensive and effective support to both.

Enhancing EMI through Institutional Support and Faculty Exchanges.

To integrate EMI into STEM fields, many teachers also stressed the significance of creating an inclusive learning environment that allows building confidence and adopting best practices, as Teacher 3 declared:

> *"Even short-term exchanges or joint online classes would help us see how EMI is handled elsewhere. It's not only about language, but classroom management and student engagement too."*

He further noted the importance of support from HE authorities:

> *"The support from the Ministry of Higher Education is substantial and effective … My suggestion is to have faculty missions to English-speaking countries"*

By suggesting faculty missions to English-speaking countries, the teacher emphasizes the value of immersive experiences in improving English proficiency and pedagogical effectiveness. He also highlights the significance of institutional and governmental backing in enhancing EMI practices.

Integrating Bilingual Strategies within Pedagogical Practices. Most of the participants supported a bilingual approach as a more realistic and inclusive approach to EMI in STEM education. Teacher 3, for instance, recommended integrating the native language, particularly for complex topics, to ensure deeper student comprehension:

> *"I prefer starting with a bilingual approach and then gradually transitioning to using only English "*

In the same vein, Teacher 4 contended:

> *"I prefer a bilingual approach, utilizing both English and Arabic, to facilitate students' understanding, especially when they encounter difficulties."*

It appeared from the above quotes that teachers proposed policies that allow for strategic use of the native language alongside English to support both teaching and learning outcomes.

In these sections, we presented the findings from questionnaires and interviews. These findings reflect a significant interest in implementing EMI into STEM classes. Participants provided several suggestions and referred to some challenging elements for this implementation.

In the following section, we provide a comprehensive discussion of the findings, drawing connections to our research questions and existing literature.

Discussion of the Results and Findings

This study explores the main challenges that STEM teachers and students face when using EMI in HE. It also investigates the suggestions provided by both teachers and students for addressing these challenges. We shall now discuss the findings in line with our research questions and objectives and in light of the existing literature. For clarity, we present the discussion of the research findings under two sections: the challenges faced by STEM teachers and students when using EMI, and the suggestions proposed by both groups for overcoming these challenges in HE settings.

Teachers' and Students' Challenges of Using EMI in STEM Education

The first research question aims to explore teachers' and students' challenges of using EMI in STEM courses at the university level. As discussed in the literature review, using EMI in HE, particularly in STEM disciplines, can present both linguistic and pedagogical challenges that affect teaching effectiveness and student comprehension (Macaro et al., 2018).

The findings from the students support this perspective, as many respondents reported difficulties in understanding complex STEM content due to limited English proficiency. Similarly, teachers highlighted challenges in delivering subject matter clearly and ensuring students' engagement. These findings reflect the broader concern that while EMI is essential for global academic participation, it must be implemented with adequate support for both educators and learners in STEM contexts. These findings closely align with those of Abdeljaoued (2023), who found that Tunisian STEM students struggled with classroom discussions and academic expression due to gaps in linguistic preparedness. Similarly, Dearden and Macaro (2016) reported that teachers across China, Italy, and Austria expressed concerns about student comprehension and content dilution, mirroring the concerns raised by our participants. These commonalities suggest that the challenges in EMI-STEM education are not confined to a single context but are rather widespread across non-Anglophone countries.

Supporting these findings, results from the Likert scale statements reveal that both teachers and students encounter significant challenges when using EMI in STEM courses. Students frequently reported difficulties in understanding technical concepts and following lectures due to limited academic English proficiency. This often leads to reduced participation and lower academic performance. On the other hand, teachers expressed concerns about their ability to explain complex STEM content clearly in English, especially when students struggle with comprehension. Additionally, some teachers highlighted the increased cognitive load and

time required to prepare EMI lessons. These findings are consistent with those of Bichoualne and Rong (2023), who emphasized widespread teacher unpreparedness and student difficulty grasping content due to linguistic barriers in EMI-STEM contexts across Algeria, Morocco, and Tunisia. They also echo Abdeljaoued's (2023) observations regarding students' struggles with technical content and the inadequacy of pedagogical preparation among instructors. Dearden and Macaro (2016) similarly found that STEM teachers across various international contexts encountered issues with simplifying and delivering complex material effectively due to the language medium. These challenges suggest that language barriers, coupled with the demands of STEM subjects, create a learning environment that can hinder both teaching effectiveness and student engagement. These observations are consistent with Macaro et al. (2018), who emphasized the strain EMI places on learners' cognitive processing in content-heavy disciplines. Our findings support their conclusion that without adequate linguistic and pedagogical support, EMI environments can reduce instructional efficiency. Moreover, this finding is echoed in the study by Bichoualne and Rong (2023), who observed widespread patterns of teacher unpreparedness and institutional inadequacy across the Maghreb, which have similarly contributed to limited learning outcomes.

Furthermore, our interpretation of students' and teachers' views revealed the significance of the linguistic and pedagogical challenges that emerge in EMI-based STEM education. These challenges create barriers to effective teaching and learning, particularly when students struggle to comprehend subject-specific content due to limited academic English proficiency. This aligns with findings from R'boul (2024), who warned that EMI may marginalize native languages and reinforce educational inequality when implemented without adequate resources and teacher training. The lack of consistent training and institutional guidance, as noted by our participants, reinforces R'boul's call for a more inclusive and

context-sensitive EMI strategy in Moroccan HE, which parallels the Algerian context explored in our research.

Students' and Teachers' Suggestions to Address EMI Challenges

The results from students' questionnaires and the findings from the teachers' interviews offered different perspectives regarding what assistance needs to be offered to enhance EMI in Algerian STEM universities. The students prioritized preparation of the language foundation, with half of the respondents highly rating pre-semester intensive English courses. This preference reflects the basic requirement for language preparedness early enough, prior to engaging with advanced STEM content in English. This concurs with Dearden (2014), who observed that the strengths of such pre-enrolment programs lie in shaping students' educational confidence and preparedness for language use in EMI environments, and with Lasagabaster (2023), who emphasized the importance of students' motivational drives in selecting EMI courses, which also aligns with the need for effective preparatory measures.

In addition, students appreciated bilingual teaching, demonstrating a pragmatic strategy for making teaching accessible while slowly acquiring English proficiency. Indeed, the bilingual policy acts as a scaffold, facilitating the process of proceeding to complete English-medium teaching. Additionally, the students also preferred English vocabulary subject-specific courses, indicative of the need to achieve proficiency in subject-specific vocabulary to learn effectively in the fields of STEM. This is contrasted to fewer students mentioning other English study materials or online self-directed STEM-related study materials, indicative of immediate, systematic language preparation and bilingual support to qualify as more useful and necessary interventions than those independent or supplementary. These findings resonate with Macaro (2018), who emphasize the importance of ongoing language support and curriculum integration models to enable academic effectiveness in EMI contexts. Collectively,

these student responses imply an integrated vision of prioritizing early, focused, and contextually sensitive language provision to support effective EMI learning, this aligns with Dearden (2014), who underscores the importance of early, context-sensitive language support in ensuring students' success in EMI programs. He argues that institutions must offer ongoing language training throughout students' academic journey to help them overcome language barriers and fully engage with the content in EMI settings.

It is also of significance to point out one of the recommendations that the teacher revealed regarding the pedagogical interaction, highlighting the necessity of training professors in effective communication and instructional strategies in English. Notably, this teacher cautioned against mixing English with a second language during teaching, advocating instead for a gradual transition to full English immersion to ensure students develop robust language skills. This is in line with Briggs et al. (2018), who stress the importance of consistent EMI exposure to maximize language acquisition and academic success.

The teachers also highly called for comprehensive professional training very mindful of EMI challenges. Their suggestions articulate a multifaceted approach to professional development and institutional support. A stratified training system based on age groups was recommended by one of the teachers, suggesting that professors aged 30 to 40 be sent for immersive experiences in English-speaking countries for one to two months, after which they would mentor older colleagues aged 40 and above. This aligns with Wilkinson (2013), who stresses the importance of tailored professional development, including immersive training experiences, to help faculty effectively navigate the challenges of teaching in EMI environments. Additionally, Koenraad et al. (2003) highlight that teacher training and education regarding best practices in EMI greatly promote teaching effectiveness and enhance teacher confidence and capacity.

Reflecting the strategic internationalization goals outlined by Knight (2004) and Leask (2009), which emphasize capacity building through global engagement, teachers proposed mandating English language training from the start of PhD studies and organizing internships abroad for doctoral candidates as measures to address language barriers at early career stages. One of the teachers involves the need for discipline-specific language support by proposing specialized English instructors at the faculty level. This targeted approach acknowledges the diverse linguistic demands across different STEM disciplines. Complementing this, another teacher recommended developing customized English language courses aligned with the technical or literary nature of each field, ensuring relevance and applicability. To enhance instructional quality further, he suggested an intensive one-month training program abroad for faculty members providing immersive exposure to EMI best practices. Such discipline-specific and customized language training is advocated by Altbach and Knight (2007) as essential for meeting the demands of international STEM education. These recommendations culminate in broader policy suggestions, such as implementing scientific missions by age cohorts and requiring English proficiency as an entry criterion for PhD students.

Furthermore, and as evidenced by the findings, most of the teachers called for faculty missions to English-speaking countries, reinforcing the importance of international exposure and linguistic immersion as a key component of capacity building. This aligns with broader teachers' recommendations for policy initiatives supporting faculty development through overseas assignments. Such initiatives are consistent with Giddens' (2000) assertion that global academic collaboration and mobility are vital components of effective internationalization strategies.

Taken together, teachers and students alike stressed the value of phased EMI implementation. These findings suggest the need for an adaptive and integrated model in Algerian STEM EMI programs that includes early language preparation (such as pre-semester

intensive courses), targeted bilingual pedagogies to scaffold comprehension, specialized and discipline-specific English training for both students and staff, and institutional support through ongoing language aid centres and faculty missions abroad. The teachers' focus on stratified training, discipline-specific language instruction, and international exposure complements student demands for foundational language support and bilingual instruction, forming a comprehensive framework that addresses linguistic and pedagogical challenges holistically.

Conclusion

In this chapter, the quantitative results and the qualitative findings have been put together in an attempt to yield a fruitful understanding of challenges and support for successful EMI implementation in Algerian STEM higher education. The students' questionnaire answers pointed to the necessity of pre-emptive language preparation and bilingual pedagogic practices, while the teacher interviews placed the focus on the need for the customization of professional training, discipline-specific language assistance, and institutional activities like mission trips overseas for staff development. The interconnection of the findings evokes the necessity of a phased, adaptive model of EMI that brings together language preparedness, pedagogical capacity development and infrastructure provision, and provides pragmatic recommendations for improving the quality of EMI and academic outcomes in multilingual university contexts.

GENERAL CONCLUSION

This study aimed to explore the challenges that university STEM teachers and students face regarding EMI in Algerian HE and to identify their suggestions for enhancing the implementation process. By addressing the research questions and examining these dimensions, this study offers a significant contribution to the research area by providing meaningful perspectives on the practice of EMI among both STEM teachers and students. Additionally, the research sought to develop practical recommendations for teachers, policymakers, and stakeholders dealing with EMI.

The literature review chapter delivered an extensive examination of the existing body of knowledge on EMI particularly in STEM disciplines. This section served as a foundation for understanding the theoretical underpinnings of this educational approach while highlighting the research gap that the current investigation addressed. The methodology chapter detailed the research design and data collection methods. Qualitative and quantitative data obtained through teacher interviews and student questionnaires were analysed to gain a deeper understanding of the experiences of participants. The final chapter began with the presentation of survey results, subsequently providing an in-depth analysis of interview data organized around three central themes. This section included a thorough discussion that offered a detailed interpretation of the findings. Initially, it identifies the main challenges encountered by STEM teachers and students when using EMI, including linguistic barriers that impede comprehension of complex STEM content, pedagogical difficulties in delivering subject matter clearly, reduced student participation due to limited academic English proficiency, and increased cognitive load on teachers. These challenges create substantial barriers to effective teaching and learning in STEM contexts.

The discussion part also addressed the major suggestions for better EMI use. Key recommendations included pre-semester intensive English courses and bilingual teaching approaches from students, while teachers advocated for professional development programs, immersive training experiences, and discipline-specific language support. These suggestions point toward an integrated model combining early language preparation, specialized training, and institutional support. The study concluded with an acknowledgment of research limitations and suggestions for scholars pursuing future investigations in this field.

To conclude, this research aimed to investigate STEM teachers' and students' challenges with EMI in Algerian HE. The questionnaire and interview findings highlighted the significant challenges that EMI implementation presents in STEM disciplines. Teachers and students proposed different suggestions for better EMI practice; however, noteworthy barriers were identified that require immediate attention. As such, this research contributes to the evolving body of knowledge in the Algerian EMI field by addressing a relatively under-investigated area.

Research limitations

Any research might include certain limitations that could affect the generalizability and scope of the findings, and our study is no exception. First, it is important to acknowledge that the limited scope and sample size of our study may not fully represent the diversity of experiences of all STEM teachers and students within the EMI context at BBA University. In addition, participant selection was restricted to first- and second-year undergraduate students, excluding senior students who might have offered different perspectives. Because we were limited by time, we were not able to include the remaining STEM students from other specialties such as Biology. Furthermore, since our study was conducted at Bordj Bou Arreridj

University, and regarding the study sample size, the findings may not be generalised to other similar academic contexts in Algeria. Conducting an online questionnaire rather than a face-to-face one might have excluded students with limited internet access or those who are not active on social media platforms. Also, the inability to clarify questions in real-time, as evidenced by no inquiries received during data collection, may have led to the misinterpretation of certain questions. Finally, the reliance on self-reported data through questionnaires and interviews may have introduced response bias, as participants might have provided socially desirable answers rather than fully authentic responses. As such, acknowledging our research limitations gives a holistic comprehensive view of the boundaries encountered, allowing future researchers to be cautious regarding potential hurdles.

Recommendations for Future Research

For future research that will target the implementation of EMI, researchers should take into consideration the limitations that were identified in this study. To start with, it is recommended to explore larger groups of participants covering more STEM specialties from different Algerian universities. In addition, including senior undergraduate and postgraduate STEM students is highly recommended to understand how EMI affects academic performance after long exposure. It is also important for future interpretive qualitative research to integrate classroom observations alongside interviews and questionnaires to objectively assess EMI practices and instructional strategies. Furthermore, researchers should consider employing different research designs such as experimental designs (true experiments or quasi-experiments) to provide empirical evidence on the effectiveness of EMI for STEM students. Acting upon these suggestions by future researchers contributes to the existing body of knowledge on EMI implementation challenges and helps improve EMI practices.

References

Abdel Latif, M. M. M., & Alhamad, M. (2023). Arabicization or Englishization of higher education in the Arab world? Controversies, policies and realities. *Frontiers in Psychology, 14*, Article 1093488. https://doi.org/10.3389/fpsyg.2023.1093488

Abdeljaoued, M. (2023). English-medium instruction in Tunisia: Perspectives of students. *Frontiers in Psychology*, *14*, 1112255.

Abid-Houcine, S. (2007). *English language teaching in Algerian universities: The case of biology students at the University of Tlemcen* [Master's thesis, University of Tlemcen]. http://dspace.univ-tlemcen.dz/handle/112/3704

Adapa, P. K. (2013). Strategies and factors affecting internationalization of university research and education. In *Internationalization: The strategic challenge in higher education* (pp. 45-60). https://researchers.usask.ca/phani-adapa/documents/Internationalization.pdf

Aguilar, M. (2017). Engineering lecturers' views on CLIL and EMI. *International Journal of Bilingual Education and Bilingualism*, *20*(6), 722–735. https://doi.org/10.1080/13670050.2015.1073664

Airey, J. (2016). EAP, EMI or CLIL? In K. Hyland & P. Shaw (Eds.), *The Routledge handbook of English for academic purposes* (pp. 71–83). Routledge. https://www.researchgate.net/publication/294055125_CLIL_and_EAP_Content_and_Language_Integrated_Learning_and_English_for_Academic_Purposes

Allal, A. (2020). English as a medium of instruction in Algerian universities: Motivation and challenges. *Journal of Language and Education*, *6*(2), 23–31. https://doi.org/10.17323/jle.2020.9757

Altbach, P. G., & Knight, J. (2007). The internationalisation of higher education: Motivations and realities. *Journal of Studies in International Education*, *11*(3-4), 290-305. https://doi.org/10.1177/1028315307303542

Amara, N. (2025). *Implementing English as a medium of instruction in Algerian higher education: Facts and challenges*. Atras, *6*(1), 34–45. https://doi.org/10.70091/atras/vol06no01.2

Anthony, L. (2018). *Introducing English for specific purposes*. Routledge. https://www.taylorfrancis.com/books/mono/10.4324/9781351031189/introducing-english-specific-purposes-laurence-anthony

Atkinson, R. D., & Mayo, M. J. (2010). Refueling the US innovation economy: Fresh approaches to science, technology, engineering and mathematics (STEM) education. *The Information Technology & Innovation Foundation*, Forthcoming.

Bailey, A. L. (Ed.). (2007). *The language demands of school: Putting academic English to the test*. Yale University Press. https://scispace.com/pdf/the-language-demands-of-school-putting-academic-english-to-43yajaiddg.pdf

Baker, W., & Wright, L. (2017). *Foundations of bilingual education and bilingualism* (6th ed.). Multilingual Matters. https://www.academia.edu/31613009/Baker_C_and_Wright_W_E_2017_Foundations_of_Bilingual_Education_and_Bilingualism_6th_ed_Bristol_UK_Multilingual_Matters

Ball, H. L. (2019). Conducting online surveys. *Journal of Human Lactation*, *35*(3), 413-417. https://journals.sagepub.com/doi/abs/10.1177/0890334419848734

Beers, B. (2011). 21st century skills: Preparing students for their future. *Technology and Engineering Teacher*, *70*(1), 28-33.

Bello, P. V., & Cárdenas, M. L. (2024). Colombian university students' experiences as users of the English language during international mobility. Profile: Issues in Teachers' Professional Development, 26(1), 149–165. https://doi.org/10.15446/profile.v26n1.112148

BELMIHOUB, Kamal (2018) [2018]. "English in a multilingual Algeria". World Englishes. 37 (2): 207–227. doi:10.1111/weng.12294. ISSN 0883-2919.

Benhamlaoui, S., & Benzadri, A. (2024). Faculty development for EMI in Algerian higher education: Challenges and strategies. *Algerian Journal of Applied Linguistics*, *7*(1), 53–72. https://www.asjp.cerist.dz/en/article/249857

Benhamlaoui, M., & Benzadri, Z. (n.d.). *Attitudes of Algerian university teachers and students towards English as a medium of instruction: A comparative analysis with Arabic and French* [Manuscript]. Department of English Language and Literature, University Frères Mentouri – Constantine 1, & University of Constantine 2 – Abdelhamid Mehri, LIRE Laboratory. https://www.researchgate.net/publication/Benhamlaoui,%20M.,%20&%20Benzadri,%20Z.%20(n.d.).%20Attitudes%20of%20Algerian%20university%20teachers%20and%20students%20towards%20English%20as%20a%20medium%20of%20instruction:%20A%20comparative%20analysis%20with%20Arabic%20and%20French%20[Manuscript].%20Department%20of%20English%20Language%20and%20Literature,%20University%20Fr%C3%A8res%20Mentouri%20%E2%80%93%20Constantine%201,%20&%20University%20of%20Constantine%202%20%E2%80%93%20Abdelhamid%20Mehri,%20LIRE%20Laboratory

Benrabah, M. (2004). Language and politics in Algeria. *Nationalism and Ethnic Politics*, *10*(1), 59-78. https://www.academia.edu/769520/Language_and_Politics_In_Algeria

Benrabah, M. (2007). Language-in-education planning in Algeria: Historical development and current issues. *Language Policy*, *6*(2), 225–252.

https://scholar.google.com/scholar?q=Language-in-Education+Planning+in+Algeria:+Historical+Development+and+Current+Issues+Benrabah+2007

Benrabah, M. (2013). *Language conflict in Algeria: From colonialism to post-independence*. Multilingual Matters. https://www.researchgate.net/publication/292430156_Language_Conflict_in_Algeria_From_Colonialism_to_Post-Independence

Benrabah, M. (2014). Competition between four 'world' languages in Algeria. *Journal of World Languages*, *1*(1), 38–59. https://www.researchgate.net/publication/271926486_Competition_between_four_world_languages_in_Algeria

Ben-Yelles, L. C. (2024). Motivational factors influencing the preferences of trainees learning English at the Intensive Language Teaching Centre at Djillali Liabes University. *التعليمية*, *14*(1), 862-876. https://www.asjp.cerist.dz/en/article/248614

Bichoualne, A., & Rong, Y. (2023). Language of instruction in the educational systems: A scoping review of empirical studies in the Maghreb region. *Studies in the Maghreb Region. North American Academic Research*, *7*(4), 34-51.

Ghouali, K., & Haddam Bouabdallah, F. (2024). *Englishisation of Algerian higher education through EMI: Expectations versus reality*. Aleph, *11*(4-2), 67–81. https://aleph.edinum.org/13133

Bouabdellaoui, A. (2022). *Arabic language: A colonial discourse in North Africa (Morocco and Algeria as case studies)* [Doctoral dissertation, Ghent University]. https://libstore.ugent.be/fulltxt/RUG01/003/096/693/RUG01-003096693_2022_0001_AC.pdf

Bouacha, N. E. H. (2021). *Starting from the grassroot: Exploring teachers' and learners' views, wants, and uses of their English textbook in Western Algeria secondary schools* [Doctoral dissertation, University of Northampton]. https://www.researchgate.net/publication/375132300_Starting_from_the_Grassroot_Exploring_Teachers%27_and_Learners%27_Views_Wants_and_Uses_of_their_English_Textbook_in_Western_Algeria_Secondary_schools?channel=doi&linkId=654248620426ef6369f523c5&showFulltext=true

Boudersa, H. (2022). Finding identity, civilisational dimensions and cultural perspectives in an Algerian EFL post-colonial situation. *Revue des Sciences Humaines & Sociales*, *8*(3), 830-839. https://asjp.cerist.dz/en/article/206344

Boumechaal, S. (2021). *English language teaching and conflicting visions of change within Algerian higher education* [Doctoral dissertation, University of York]. https://etheses.whiterose.ac.uk/id/eprint/29936/1/Boumechaal_S_LCS_PhD_2021.pdf

Bouthelji, F. (2022). Challenges of adopting English medium instruction in Algerian universities. *International Journal of Language and Literary Studies*, *4*(3), 134–148. https://doi.org/10.36892/ijlls.v4i3.1008

Bouzid, T. [@ministre.mesrs.dz]. (2019, November 7). Survey insights: Enhance English in Algerian universities [Facebook post]. Facebook. https://www.facebook.com/ministre.mesrs.dz/posts/%D8%A7%D8%B3%D8%AA%D8%A8%D9%8A%D8%A7%D9%86-%D8%AA%D8%B9%D8%B2%D9%8A%D8%B2-%D8%A7%D9%84%D9%84%D8%BA%D8%A9-%D8%A7%D9%84%D8%A5%D9%86%D8%AC%D9%84%D9%8A%D8%B2%D9%8A%D8%A9-%D9%81%D9%8A-

%D8%A7%D9%84%D8%AC%D8%A7%D9%85%D8%B9%D8%A7%D8%AA-%D8%A7%D9%84%D8%AC%D8%B2%D8%A7%D8%A6%D8%B1%D9%8A%D8%A9-surveyenhance-english-in-al/401599560766459/

Braun, V., & Clarke, V. (2012). Thematic analysis. In H. Cooper, P. M. Camic, D. L. Long, A. T. Panter, D. Rindskopf, & K. J. Sher (Eds.), *APA handbook of research methods in psychology, Vol. 2: Research designs: Quantitative, qualitative, neuropsychological, and biological* (pp. 57–71). American Psychological Association. https://doi.org/10.1037/13620-004

Braun, V., & Clarke, V. (2017). Thematic analysis. *The Journal of Positive Psychology*, *12*(3), 297–298. https://doi.org/10.1080/17439760.2016.1262613

Briggs, J. G., Dearden, J., & Macaro, E. (2018). English medium instruction: Comparing teacher beliefs in secondary and tertiary education. *Studies in Second Language Learning and Teaching*, *8*(3), 673–696. https://doi.org/10.14746/ssllt.2018.8.3.6

Brinton, D. M. (2021, October 11). *The role of content faculty in language development* [Narrated PowerPoint slides].

Brinkmann, S., & Kvale, S. (2005). Confronting the ethics of qualitative research. *Journal of Constructivist Psychology*, *18*, 157-181. https://www.tandfonline.com/doi/abs/10.1080/10720530590914789

Brock-Utne, B. (2010). Language and inequality: Global challenges to education. In R. Phillipson (Ed.), *Language rights and language policies* (pp. 49–68). Multilingual Matters.

Bybee, R. (2013). The case for STEM education: Challenges and opportunities. *Technology and Engineering Teacher*, *73*(4), 5-13.

Castells, M. (2000). *The rise of the network society*. Wiley-Blackwell. https://www.wiley.com/enus/The+Rise+of+the+Network+Society%2C+2nd+Edition%2C+with+a+New+Preface-p-9781405196864

Chihab, M., Benmhamed, M., Belmekki, M., Belmekki, L., & Koumachi, B. (2024). Attitudes towards language(s) of instruction in higher education institutions of science and technology in Morocco. *International Journal of Linguistics, Literature and Translation*, *7*(8), 137-152.

Cohen, L., Manion, L., & Morrison, K. (2007). *Research methods in education* (6th ed.). Routledge.

Cohen, L., Manion, L., & Morrison, K. (2018). *Research methods in education* (8th ed.). Routledge.

Coleman, H. (2006). English-medium instruction in European higher education. *Language Policy*, *5*(4), 1-25. https://doi.org/10.1017/S026144480600320X

Coleman, H. (2011). *Teaching and learning in English in multilingual classrooms: Towards a policy for English language in education*. British Council.

Creswell, J. W. (2013). *Qualitative inquiry and research design: Choosing among five approaches* (3rd ed.). SAGE Publications.

Creswell, J. W., & Clark, V. L. P. (2017). *Designing and conducting mixed methods research*. SAGE Publications. https://bayanbox.ir/view/2360519664443692 58/9781483344379-Designing-and-Conducting-Mixed-Methods-Research-3e.pdf

Creswell, J. W., & Creswell, J. D. (2017). *Research design: Qualitative, quantitative, and mixed methods approaches*. SAGE Publications.

Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). SAGE Publications. https://spada.uns.ac.id/pluginfile.php/510378/mod_resource/content/1/creswell.pdf

Dalton-Puffer, C., & Smit, U. (2013). Content and language integrated learning: A research agenda. *Language Teaching*, *46*(4), 545–559. https://doi.org/10.1017/S026144481300001X

Dawadi, S., Shrestha, S., & Giri, R. A. (2021). Mixed-methods research: A discussion on its types, challenges, and criticisms. *Journal of Practical Studies in Education*, *2*(2), 25-36.

Dearden, J. (2014). *English as a medium of instruction – A growing global phenomenon*. British Council. https://www.britishcouncil.es/sites/default/files/british_council_english_as_a_medium_of_instruction.pdf

Dearden, J., & Macaro, E. (2016). Higher education teachers' attitudes towards English medium instruction: A three-country comparison. *Studies in Second Language Learning and Teaching*, *6*(3), 455-486.

De Chazal, E. (2014). *English for academic purposes-Oxford handbooks for language teachers*. Oxford University Press. https://elt.oup.com/catalogue/items/global/teacher_development/oxford_handbooks_for_language_teachers/9780194358316?srsltid=AfmBOopEEOWLchg1TW2Po1FVB5AIPy8N2NWpbg_ajNPIHmp64ohfWqiP&cc=global&selLanguage=en

Denscombe, M. (2010). *The good research guide: For small-scale social research projects* (4th ed.). Open University Press.

https://www.researchgate.net/file.PostFileLoader.html?id=582a0dbf217e20276533f5a5&assetKey=AS:428404664213506@1479151039119

Dewaele, J. M. (2018). Online questionnaires. In *The Palgrave handbook of applied linguistics research methodology* (pp. 269-286). https://link.springer.com/chapter/10.1057/978-1-137-59900-1_13

De Wit, H. (2011). Internationalization of higher education in the era of globalization. In J. C. Smart & M. B. Paulsen (Eds.), *Higher education: Handbook of theory and research* (Vol. 26, pp. 23-63). Springer. https://doi.org/10.6017/ijahe.v7i2.12891

Dörnyei, Z. (2007). *Research methods in applied linguistics*. Oxford University Press. https://www.scirp.org/reference/referencespapers?referenceid=2083915

Dörnyei, Z., & Taguchi, T. (2009). *Questionnaires in second language research: Construction, administration, and processing*. Routledge. https://www.english-efl.com/wp-content/uploads/2020/12/questionnaires-in-second-language-research.pdf

Dudley-Evans, T., & St John, M. J. (1998). *Developments in English for specific purposes: A multi-disciplinary approach*. Cambridge University Press. https://assets.cambridge.org/97805215/96756/excerpt/9780521596756_excerpt.pdf

Duranti, A. (2011). Linguistic anthropology: The study of language as a non-neutral medium. In R. Mesthrie (Ed.), *The Cambridge handbook of sociolinguistics* (pp. 28-46). Cambridge University Press. https://www.cambridge.org/core/books/abs/cambridge-handbook-of-sociolinguistics/linguistic-anthropology-the-study-of-language-as-a-nonneutral-medium/E6749D2D05C5C345C99354F745CBDF93

Dźwigoł, H. (2018). *Współczesne procesy badawcze w naukach o zarządzaniu. Uwarunkowania metodyczne i metodologiczne*. PWN. https://www.researchgate.net/publication/346755531_Research_processes_and_methodological_triangulation

Fantini, A. E. (2009). Assessing intercultural competence: Issues and tools. In D. K. Deardorff (Ed.), *The SAGE handbook of intercultural competence* (pp. 456–476). SAGE Publications. https://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1029&context=cehsedadfacpub

Flowerdew, J., & Peacock, M. (Eds.). (2001). *Research perspectives on English for academic purposes*. Cambridge University Press. http://dx.doi.org/10.1017/CBO9781139524766

Fraenkel, J. R., Wallen, N. E., & Hyun, H. H. (2022). *How to design and evaluate research in education* (11th ed.). McGraw-Hill Education.

Friedman, T. L. (2005). *The world is flat: A brief history of the twenty-first century*. Farrar, Straus, and Giroux. https://corescholar.libraries.wright.edu/dlpp_all/107/

Galloway, N., & Ruegg, R. (2022). English medium instruction (EMI) lecturer support needs in Japan and China. *System*, *105*, 102728.

Giddens, A. (2000). *Runaway world: How globalisation is reshaping our lives*. Routledge. https://www.routledge.com/Runaway-World-How-Globalization-is-Reshaping-Our-Lives/Giddens/p/book/9780415944878

Hamane, S. (2024). The changing landscape of language use in Algerian higher education: A comprehensive examination of advantages & changes to English medium instruction (EMI). https://www.ziglobitha.org/wp-content/uploads/2024/03/040-Art.-Soraya-HAMANE-PP.531-540.pdf

Hancock, B., Windridge, K., & Ockleford, E. (2007). *An introduction to qualitative research*. SAGE. https://dl.icdst.org/pdfs/files3/315d0c3a18c9426593c9f5019506a335.pdf

Krahnke, K. (1987). *Approaches to syllabus design for foreign language teaching*. Prentice-Hall. https://files.eric.ed.gov/fulltext/ED283385.pdf

Hunter, M. (2024). *Affect regulation in the English medium instruction (EMI) university classroom in Germany: How do home and international students' and lecturers' experiences differ?* [Doctoral dissertation, University of York]. https://etheses.whiterose.ac.uk/id/eprint/35089/1/Affect%20in%20EMI%20PhD%20Thesis-eThesis%20WREO.pdf

Hutchinson, T., & Waters, A. (1987). *English for specific purposes: A learner-centered approach*. Cambridge University Press. http://dx.doi.org/10.1017/CBO9780511733031

Kadi, A. (2022). *The role of English in Algerian higher education: Trends and challenges* [Master's thesis, University of Tlemcen]. https://dspace.univtlemcen.dz/bitstream/112/19524/1/amine-kadi.pdf

Kamwendo, G., Hlongwa, N., & Mkhize, N. (2014). On medium of instruction and language attitudes in South Africa: A brief commentary. *Alternation Special Edition*, *12*, 170–184. https://journals.co.za/doi/abs/10.10520/EJC165488

Kaur, N., Figueiredo, S., Bouchard, V., Moriello, C., & Mayo, N. (2017). Where have all the pilot studies gone? A follow-up on 30 years of pilot studies in clinical rehabilitation. *Clinical Rehabilitation*, *31*(9), 1238-1248. https://doi.org/10.1177/0269215517692129

Khenioui, N., & Boulkroun, M. (2023). Exploring the implementation of English as a medium of instruction in Algerian higher education: Motivations, challenges, and strategies for success. *Afak for Sciences Journal*, *8*(5), 50–73. https://asjp.cerist.dz/en/article/234911

Kirkpatrick, A. (2012). English as an international language in Asia: Implications for language education. In A. Kirkpatrick & R. Sussex (Eds.), *English as an international language in Asia: Implications for language education* (pp. 29–44). Springer. https://doi.org/10.1007/978-94-007-4578-0_3

Knight, J. (2004). Internationalisation: Elements and checkpoints. *Journal of Studies in International Education*, *11*(3), 290-305. https://doi.org/10.1177/1028315307303534

Koenraad, T., Hajer, M., Hootsen, G., & van der Werf, R. (2003). Towards a linguistically scaffolded curriculum: How can technology help? In R. Wilkinson & V. Zegers (Eds.), *Realizing content and language integration in higher education* (pp. 64–76). Maastricht University Language Centre. https://www.researchgate.net/publication/237717072_Towards_a_linguistically_scaffolded_curriculum_How_can_technology_help

Kong, L. (2014). Integrating STEM education in the classroom: A pedagogical approach for educators. *International Journal of STEM Education*, *1*(1), 1-8.

Kumar, R. (2011). *Research methodology: A step-by-step guide for beginners* (3rd ed.). SAGE Publications. https://rauterberg.employee.id.tue.nl/lecturenotes/DBB150/references/Kumar-2011%20Research%20Methodology-ed3.pdf

Kuroda, K., Sugimura, M., & Asada, S. (2018). *Internationalization of higher education and student mobility in Japan and Asia*.

https://www.researchgate.net/publication/335890081_Internationalization_of_Higher_Education_and_Student_Mobility_in_Japan_and_Asia

Lasagabaster, D., & Sierra, J. M. (2010). Immersion and CLIL in English: More differences than similarities. *ELT Journal*, *64*, 367-375. https://www.researchgate.net/publication/228815979_Immersion_and_CLIL_in_English_More_differences_than_similarities

Lasagabaster, D. (2023). *Why do students choose EMI courses? An analysis of their motivational drives*. Universidad de Granada. https://digibug.ugr.es/bitstream/handle/10481/83564/13.%2bIRATXE%2bSERNA.pdf?sequence=1&isAllowed=y

Leask, B. (2009). Using formal and informal curricula to improve internationalisation. *Journal of Studies in International Education*, *13*(2), 145-157. https://journals.sagepub.com/doi/abs/10.1177/1028315308329786

Leavy, P. (2022). *Research design: Quantitative, qualitative, mixed methods, arts-based, and community-based participatory research approaches*. Guilford Publications.

Lyster, R., & Ballinger, S. (2011). Content-based language teaching: Convergent concerns across divergent contexts. *Language Teaching Research*, *15*(3), 279–288. https://doi.org/10.1177/1362168811401150

Macaro, E. (2018). *English as a medium of instruction: A guide for teachers and administrators*. Oxford University Press. https://global.oup.com/academic/product/english-as-a-medium-of-instruction-9780194214764

Macaro, E. (2018). English medium instruction: A research agenda for a worldwide phenomenon. *La Didattica delle Lingue nel Nuovo Millennio*, 15-20. https://scholar.google.com/scholar?hl=fr&as_sdt=0%2C5&q=English+Medium+Instruction+A+Research+Agenda+for+a+Worldwide+Phenomenon&btnG=

Maltese, A. V., & Tai, R. H. (2011). Eyeballs in the fridge: Sources of early interest in science. *International Journal of Science Education*, *33*(1), 55-78.

Marsh, D. (2012). *Content and Language Integrated Learning (CLIL): A development trajectory*. University of Córdoba Press. https://docplayer.net/25206193-Content-and-language-integrated-learning-clil-a-development-trajectory.html

Martínez, R. (2017). *English as a Medium of Instruction (EMI) in Brazilian higher education: Challenges and opportunities*. https://www.researchgate.net/publication/318487508_English_as_Medium_of_Instruction_EMI_in_Brazilian_Higher_Education_Challenges_and_Opportunities

Mason, J. (2002). *Qualitative researching* (2nd ed.). SAGE. http://www.sxf.uevora.pt/wp-content/uploads/2013/03/Mason_2002.pdf

Matthews, B., & Ross, L. (2010). *Research methods: A practical guide for the social sciences* (1st ed.). Pearson Longman. https://api.pageplace.de/preview/DT0400.9781408226186_A25058788/preview-9781408226186_A25058788.pdf

Merriam, S. B. (2009). *Qualitative research: A guide to design and implementation* (2nd ed.). John Wiley & Sons. http://ndl.ethernet.edu.et/bitstream/123456789/49003/1/82.pdf

Merriam, S. B., & Grenier, R. S. (2019). *Qualitative research in practice: Examples for discussion and analysis* (2nd ed.). Jossey-Bass. https://books.google.dz/books?id=PL59DwAAQBAJ&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false

Missedi, N. (2019). The future of English in Algeria: Perspectives from policymakers and academics. *Algerian Journal of English Studies*, *3*(1), 45–60. https://www.asjp.cerist.dz/en/article/84768

Muminov, N. G. (2019). Internationalization of higher education as a factor in improving the competitiveness of the national economy. *International Journal of Educational Research*, *3*(2), 23-35. https://inlibrary.uz/index.php/archive/article/download/21803/22659/25513

Ouarniki, O. (2023). Exploring teachers' perspectives on the implementation of English as a medium of instruction (EMI) in Algerian higher education institutions: Challenges and opportunities. *Afak for Sciences*, *8*(3), 176–192. https://asjp.cerist.dz/en/article/223062

Phakiti, A., De Costa, P., Plonsky, L., & Starfield, S. (Eds.). (2018). *The Palgrave handbook of applied linguistics research methodology* (pp. 423-457). Palgrave Macmillan. https://www.researchgate.net/publication/329057080_The_Palgrave_Handbook_of_Applied_Linguistics_Research_Methodology

R'boul, H. (2024). English medium instruction in Moroccan universities: Implications for multilingualism, linguistic dependency and epistemic justice. *Journal of Multilingual and Multicultural Development*, *45*(7), 2770-2784.

Rosendal, T., & Amini Ngabonziza, J. D. D. (2023). Amid signs of change: Language policy, ideology and power in the linguistic landscape of urban Rwanda. *Language Policy*, *22*(1), 73-94.

Sahki, T. (2025). The adoption of English Medium Instruction (EMI) in Algerian higher education: Linguistic and identity considerations. *Ziglôbitha: Revue des Arts, Linguistique, Littérature & Civilisations*, *4*(13), [pages if known]. Université Peleforo Gon Coulibaly – Korhogo. https://www.ziglobitha.org/wp-content/uploads/2025/03/14-Art.-Toufaha-SAHKI-Amel-AFIA-pp.193-206.pdf

Sawir, E., Marginson, S., Forbes-Mewett, H., Nyland, C., & Ramia, G. (2012). International student security and English language proficiency. Journal of Studies in International Education, 16(5), 434–454. https://journals.sagepub.com/doi/10.1177/1028315311435418

Scholte, J. A. (2004). *Globalization and governance: From statism to polycentrism* (Warwick Papers in Globalisation and Governance, No. 2004/13). https://wrap.warwick.ac.uk/1984/1/WRAP_Scholte_wp13004.pdf

Scribd. (n.d.). *نتائج الاستبيان تعزيز اللغة الإنجليزية في الجامعات الجزائرية* [Survey results on promoting English in Algerian universities]. https://fr.scribd.com/document/441154901/

Shenton, A. K. (2004). Strategies for ensuring trustworthiness in qualitative research projects. *Education for Information*, *22*(2), 63-75. https://www.researchgate.net/publication/228708239_Strategies_for_Ensuring_Trustworthiness_in_Qualitative_Research_Projects

Somers, T., & Surmont, J. (2012). CLIL and immersion: How clear-cut are they? *ELT Journal*, *66*(1), 113-116. https://www.researchgate.net/publication/275262486_CLIL_and_immersion_how_clear-cut_are_they

Stohlmann, M., Moore, T., & Roehrig, G. (2012). Considerations for teaching integrated STEM education. *Journal of Pre-College Engineering Education Research (J-PEER)*.

Stoller, F. L. (2002). *Content-based instruction: A shell for language teaching or a framework for strategic language and content learning*. https://citeseerx.ist.psu.edu

Swales, J. M. (2000). Languages for specific purposes. *Annual Review of Applied Linguistics*, *20*, 59-76. https://www.researchgate.net/profile/John-Swales-3/publication/273984465_Languages_for_Specific_Purposes/links/55119aaa0cf270fd7e304aee/Languages-for-Specific-Purposes.pdf

Taguchi, N. (2014). English-medium education in the global society: An introduction. *International Review of Applied Linguistics*, *52*(2), 157–181. https://www.researchgate.net/profile/Naoko-Taguchi/publication/263966637_English-medium_education_in_the_global_society_Introduction_to_special_issue/links/59c8f8420f7e9bd2c01a42b0/English-medium-education-in-the-global-society-Introduction-to-special-issue.pdf

Tejada-Sanchez, I., & Molina-Naar, M. (2020). English medium instruction and the internationalization of higher education in Latin America: A case study from a Colombian university. *Latin American Journal of Content & Language Integrated Learning*, *13*(2), 339-367.

Tomlinson, J. (1999). *Globalization and culture*. University of Chicago Press. https://www.bibliovault.org/BV.book.epl?ISBN=9780226807683

Wächter, B., & Maiworm, F. (2014). *English-taught programmes in European higher education: The state of play in 2014*. Lemmens Medien GmbH.

Walliman, N. S. R. (2006). *Social research methods*. SAGE Publications Ltd. http://ndl.ethernet.edu.et/bitstream/123456789/79439/6/Walliman%20%282006%29

Appendices

Appendix A: Students' Semi-Structured Online Questionnaire

Dear Students,

This questionnaire aims to explore the challenges STEM students face in Algerian higher education when learning through English as a Medium of Instruction (EMI). Your responses will help us understand the difficulties you encounter, their impact on your learning, and possible solutions. Your participation is voluntary, and all responses will remain confidential.

أعزائي الطلاب،

يهدف هذا الاستبيان إلى دراسة التحديات التي يواجهها طلاب العلوم والتكنولوجيا والهندسة والرياضيات في التعليم العالي الجزائري عند استخدام الإنجليزية كلغة للتدريس. ستساعدنا إجاباتكم على فهم الصعوبات التي تواجهونها، وتأثيرها على تعلمكم، والحلول الممكنة لهذه التحديات. مشاركتكم طوعية، وستبقى هويتكم سرية.

Part 1: General Information / الجزء الأول: معلومات عامة

1.What is your gender? / ما هو جنسك؟

- Female / أنثى
- Male / ذكر

2.What is your age range? / ما هي الفئة العمرية التي تنتمي إليها؟

- 18-23
- 24-29
- 30-39
- 40+

3.What is your current year/level of study? / ما هو مستواك الدراسي الحالي؟

- First year (Undergraduate) / السنة الأولى (ليسانس)
- Second year (Undergraduate) / السنة الثانية (ليسانس)

4.What is your specific field of study? / ما هو مجال دراستك؟

- Mathematics / رياضيات
- Computer science and technology / علوم الحاسوب و التكنولوجيا
- Science and technology / العلوم و التكنولوجيا

5.How would you rate your English proficiency in the following areas? / كيف تقيم مستوى إتقانك للغة الإنجليزية في المجالات التالية؟

	Beginner / مبتدئ	Intermediate / متوسط	Advanced / متقدم
Reading / القراءة	☐	☐	☐
Writing / الكتابة	☐	☐	☐

Listening / الاستماع	☐	☐	☐
Speaking / التحدث	☐	☐	☐

6.Have you taken any formal English courses before entering university? / هل التحقت بأي دورات رسمية في اللغة الإنجليزية قبل دخول الجامعة؟

- Yes / نعم
- No / لا

If yes, where? / إذا كانت الإجابة نعم، اين؟

……

7.What languages were most commonly used for teaching in your previous education before university? / ما هي اللغات التي كانت الأكثر استخداماً للتدريس في تعليمك السابق قبل الجامعة؟

- Standard Arabic / اللغة العربية الفصحى
- Darija / الدارجة
- French / الفرنسية
- English / الإنجليزية

8.Does your university/department provide any language support for students learning in English? / هل توفر جامعتك/قسمك أي دعم لغوي للطلاب الذين يدرسون باللغة الإنجليزية؟

- Yes, comprehensive support / نعم، دعم شامل
- Yes, limited support / نعم، دعم محدود
- No support at all / لا يوجد أي دعم

9.If your university provides language support, what kind of support is available? (Select all that apply) / إذا كانت جامعتك توفر دعماً لغوياً، ما نوع الدعم المتاح؟ (اختر كل ما ينطبق)

- English language courses / دورات في اللغة الإنجليزية
- Online resources / موارد عبر الإنترنت
- Other (please specify) / أخرى (يرجى التحديد):……...

Part 2: Learning Challenges / الصعوبات التعليمية

1.Do all instructors consistently use English in your STEM courses? / هل يستخدم جميع المدرسين اللغة الإنجليزية بشكل مستمر في مقررات العلوم والتكنولوجيا والهندسة والرياضيات؟

- Yes, all instructors use English in all modules / نعم، جميع المدرسين يستخدمون اللغة الإنجليزية في جميع الوحدات الدراسية
- Most instructors use English, but some use Arabic/French / معظم المدرسين يستخدمون الإنجليزية، لكن البعض يستخدم العربية/الفرنسية

- It varies widely between instructors and modules / يختلف الأمر بشكل كبير بين المدرسين والوحدات الدراسية
- Most instructors use Arabic/French with some English terms / معظم المدرسين يستخدمون العربية/الفرنسية مع بعض المصطلحات الإنجليزية
- No, most instruction is in Arabic/French despite the English curriculum / لا، معظم التدريس يتم باللغة العربية/الفرنسية رغم أن المنهج باللغة الإنجليزية

2.What are the biggest challenges you face as a STEM student learning in English? / ما هي أكبر التحديات التي تواجهها كطالب في مجال العلوم والتكنولوجيا والهندسة والرياضيات عند التعلم باللغة الإنجليزية؟

- Difficulty understanding lectures in English / صعوبة فهم المحاضرات باللغة الإنجليزية
- Struggling with technical vocabulary / مواجهة صعوبات مع المصطلحات التقنية
- Limited English proficiency of professors / محدودية إتقان الأساتذة للغة الإنجليزية
- Difficulty expressing ideas in English / صعوبة التعبير عن الأفكار باللغة الإنجليزية
- Lack of English learning support / نقص الدعم في تعلم اللغة الإنجليزية
- Other (please specify) / أخرى (يرجى التحديد).....

3.How often do you find it difficult to understand lectures due to the use of English? / الى أي مدى تجد صعوبة في فهم المحاضرات بسبب استخدام اللغة الإنجليزية؟

- Never / أبداً
- Rarely / نادراً
- Sometimes / أحياناً
- Often / غالباً
- Always / دائماً

4.Which aspect of English do you find most difficult in STEM subjects? (Rate each aspect) / ما هو الجانب الأكثر صعوبة في اللغة الإنجليزية في مواد العلوم والتكنولوجيا والهندسة والرياضيات (قيّم كل جانب)

	Not difficult at all / ليس صعباً على الإطلاق	Slightly difficult / صعب قليلاً	Moderately difficult / صعب بشكل متوسط	Very difficult / صعب جداً	Extremely difficult / صعب للغاية
Understanding spoken lectures / فهم المحاضرات المنطوقة	☐	☐	☐	☐	☐

Reading scientific materials / قراءة المواد العلمية	☐	☐	☐	☐	☐
Writing reports and assignments / كتابة التقارير والواجبات	☐	☐	☐	☐	☐
Participating in discussions / المشاركة في المناقشات	☐	☐	☐	☐	☐
Grammar and sentence structure / القواعد النحوية وبناء الجمل	☐	☐	☐	☐	☐
Other (please specify) / أخرى (يرجى التحديد): ……					

5.Do you think the language barrier affects your academic performance? / هل تعتقد أن حاجز اللغة يؤثر على أدائك الأكاديمي؟

- Yes, significantly / نعم، بشكل كبير
- Yes, slightly / نعم، بشكل طفيف
- No, it does not affect my performance / لا، لا يؤثر على أدائي

6.In what ways does language influence your academic success? (Select all that apply) / بأي طرق تؤثر اللغة على نجاحك الأكاديمي؟ (اختر كل ما ينطبق)

- It affects my exam performance and grades / تؤثر على أدائي في الامتحانات وعلاماتي
- It affects my ability to take effective notes during lectures / تؤثر على قدرتي على تدوين ملاحظات فعالة خلال المحاضرات
- It reduces my confidence to participate in class discussions / تقلل من ثقتي للمشاركة في المناقشات الصفية
- It reduces the quality of my research papers and assignments / تقلل من جودة أوراقي البحثية وواجباتي
- It hinders my critical thinking skills when working in English / تعيق مهارات التفكير النقدي لدي عند العمل باللغة الإنجليزية
- It limits my access to and comprehension of scientific literature / تحد من وصولي وفهمي للمراجع العلمية

- It impacts my ability to explain scientific processes accurately / تؤثر على قدرتي على شرح العمليات العلمية بدقة
- It creates a gap between my subject knowledge and my ability to demonstrate it / تخلق فجوة بين معرفتي بالموضوع وقدرتي على إظهارها
- Other (please specify) / أخرى (يرجى التحديد):.....

7.How often do you mentally translate between languages while learning STEM concepts? / كم مرة تقوم بالترجمة ذهنياً بين اللغات أثناء تعلم مفاهيم العلوم والتكنولوجيا؟

- Always - I translate everything / دائماً - أترجم كل شيء
- Often - I translate most concepts / غالباً - أترجم معظم المفاهيم
- Sometimes - I translate difficult concepts only / أحياناً - أترجم المفاهيم الصعبة فقط
- Rarely - I try to think directly in English / نادراً - أحاول التفكير مباشرة بالإنجليزية
- Never - I think directly in English / أبداً - أفكر مباشرة بالإنجليزية

8.How do you usually deal with language difficulties in STEM courses? (Select all that apply) / كيف تتعامل عادةً مع الصعوبات اللغوية في مقررات العلوم والتكنولوجيا والهندسة والرياضيات؟ (اختر كل ما ينطبق)

- Using translation tools / استخدام أدوات الترجمة
- Asking teachers for clarification / طلب التوضيح من المعلمين
- Discussing with classmates in another language / المناقشة مع الزملاء بلغة أخرى
- Relying on resources in Arabic language / الاعتماد على المراجع باللغة العربية
- Relying on resources in French language / الاعتماد على المراجع باللغة الفرنسية
- Other (please specify) / أخرى (يرجى التحديد):?.....

9.How do your professors handle students' language difficulties? (Select all that apply) / كيف يتعامل أساتذتك مع الصعوبات اللغوية للطلاب؟ (اختر كل ما ينطبق)

- Using simpler English / استخدام لغة إنجليزية أبسط
- Translating key terms / ترجمة المصطلحات الرئيسية
- Allowing students to use their native language when needed / السماح للطلاب باستخدام لغتهم الأم عند الحاجة
- Providing additional English resources / توفير موارد إضافية باللغة الإنجليزية
- No special support provided / لا يقدم دعم خاص
- Other (please specify) / أخرى (يرجى التحديد).....

Part 3: Learning Materials and Resources / الجزء الثالث: الوسائل والموارد التعليمية

1.Are the available STEM textbooks and learning materials sufficient to support your learning in English? / هل الكتب والوسائل التعليمية المتاحة في مجال العلوم والتكنولوجيا والهندسة والرياضيات كافية لدعم تعلمك باللغة الإنجليزية؟

- Yes, they are adequate / نعم، هي كافية
- Somewhat, but more materials are needed / إلى حد ما، ولكن هناك حاجة لمزيد من المواد
- No, they are insufficient / لا، هي غير كافية
- Justify your answer / برر إجابتك:

……..

2.Do you use external resources to help you understand STEM subjects in English? / هل تستخدم موارد خارجية لمساعدتك في فهم مواد العلوم والتكنولوجيا والهندسة والرياضيات باللغة الإنجليزية؟

- Yes, frequently / نعم، بشكل متكرر
- Yes, occasionally / نعم، أحياناً
- No, I rely only on university materials / لا، أعتمد فقط على مواد الجامعة

3.What kind of additional resources would help you learn STEM subjects better in English? (Select all that apply) / ما نوع الموارد الإضافية التي من شأنها مساعدتك على تعلم مواد العلوم والتكنولوجيا والهندسة والرياضيات بشكل أفضل باللغة الإنجليزية؟ (اختر كل ما ينطبق)

- Bilingual textbooks / كتب مدرسية ثنائية اللغة
- More visual aids and diagrams / المزيد من الوسائل البصرية والرسوم التوضيحية
- Online English-STEM courses / دورات عبر الإنترنت باللغة الإنجليزية في مجال العلوم والتكنولوجيا والهندسة والرياضيات
- Video lectures with subtitles / محاضرات فيديو مع ترجمة نصية
- Other (please specify) / أخرى (يرجى التحديد)……

Part 4: Solutions and Additional Support / الجزء الرابع: الحلول والدعم الإضافي

This section asks for your input on potential solutions and institutional changes that could better support students learning STEM subjects in English.

يطلب هذا القسم مدخلاتك حول الحلول المحتملة والتغييرات المؤسسية التي يمكن أن تدعم الطلاب بشكل أفضل في تعلم مواد العلوم والتكنولوجيا والهندسة والرياضيات باللغة الإنجليزية.

1.What do you think could improve EMI in STEM education? (Select all that apply)

ما الذي تعتقد أنه يمكن أن يحسن التعليم باللغة الإنجليزية في تعليم العلوم والتكنولوجيا والهندسة والرياضيات؟ (اختر كل ما ينطبق)

- Pre-semester intensive English courses / دورات مكثفة في اللغة الإنجليزية قبل بداية الفصل الدراسي
- Encouraging bilingual instruction (mixing English with Arabic/French) / تشجيع التدريس ثنائي اللغة (مزج الإنجليزية مع العربية/الفرنسية)

- Providing more learning materials in English / توفير المزيد من المواد التعليمية باللغة الإنجليزية
- Discipline-specific English vocabulary courses / دورات مصطلحات إنجليزية متخصصة حسب التخصص
- Online self-study resources with STEM focus / موارد للدراسة الذاتية عبر الإنترنت مع التركيز على العلوم والتكنولوجيا
- Other (please specify) / أخرى (يرجى التحديد).....

2.Would you like additional English language courses or workshops for STEM students?
هل تؤيد دورات أو ورش عمل إضافية في اللغة الإنجليزية لطلاب العلوم والتكنولوجيا والهندسة والرياضيات؟

- Yes, definitely / نعم، بالتأكيد
- Maybe, if they are useful / ربما، إذا كانت مفيدة
- No, I don't think they are necessary / لا، لا أعتقد أنها ضرورية

- Justify your answer برر إجابتك

.....

3.What institutional policies would most improve your experience with EMI? (Select all that apply.)
ما هي السياسات المؤسسية التي من شأنها تحسين تجربتك مع التعليم باللغة الإنجليزية؟ (اختر كل ما ينطبق)

- Mandatory English proficiency development for faculty / تطوير إلزامي لكفاءة اللغة الإنجليزية للأساتذة
- Gradual transition to EMI across the curriculum / انتقال تدريجي إلى التعليم باللغة الإنجليزية عبر المناهج
- Establishing language support centers in each faculty / إنشاء مراكز دعم لغوي في كل كلية
- Including language proficiency in program admissions criteria / تضمين الكفاءة اللغوية في معايير القبول للبرامج
- Other (please specify) / أخرى (يرجى التحديد).....

Appendix B: Teachers' Semi-structured Interview

Section 1:

1. Can you briefly introduce yourself (academic background, years of teaching experience, and the subjects you teach)?

   هل يمكنك تقديم نفسك بإيجاز (الخلفية الأكاديمية، سنوات الخبرة في التدريس، والمواد التي تُدرّسها)؟

2. How long have you been teaching in English in your institution?

   منذ متى وأنت تدرّس باللغة الإنجليزية في مؤسستك؟

3. Have you received any formal training in EMI or English language proficiency for teaching?

   هل تلقيت أي تدريب رسمي في التدريس باللغة الإنجليزية أو الكفاءة اللغوية الإنجليزية للتدريس؟

4. How would you describe your level of English proficiency?

   كيف تصف مستوى إتقانك للغة الإنجليزية؟

Section 2:

5. How do you perceive the shift to EMI in STEM fields at your university?

   كيف ترى التحول إلى اللغة الإنجليزية كوسيلة للتدريس في مجالات العلوم والتكنولوجيا والهندسة والرياضيات في جامعتك ؟

6. In your experience, what are the main advantages of EMI for both teachers and students?

   من خلال تجربتك، ما هي المزايا الرئيسية للتدريس باللغة الإنجليزية لكل من المعلمين والطلاب؟

7. Do you think students are adequately prepared to learn STEM subjects in English? Why or why not?

   هل تعتقد أن الطلاب مستعدون بشكل كافٍ لتعلم مواد العلوم والتكنولوجيا والهندسة والرياضيات باللغة الإنجليزية؟ لماذا أو لماذا لا؟

Section 3:

8. What are the biggest challenges you face when teaching STEM subjects in English?

   ما هي أكبر التحديات التي تواجهها عند تدريس مواد العلوم والتكنولوجيا والهندسة والرياضيات باللغة الإنجليزية؟

9. Do you find it difficult to explain technical STEM concepts in English? Why or why not?

   هل تجد صعوبة في شرح المفاهيم التقنية العلمية باللغة الإنجليزية؟ لماذا أو لماذا لا؟

10. Do you ever feel that your limited vocabulary affects your ability to deliver lessons effectively?

    هل تشعر أحيانًا أن محدودية المفردات لديك تؤثر على قدرتك على تقديم الدروس بفعالية؟

11. Do you think STEM teaching resources in English are adequate for your needs?

    هل تعتقد أن موارد تدريس العلوم والتكنولوجيا والهندسة والرياضيات باللغة الإنجليزية كافية لاحتياجاتك؟

12. Are there specific challenges you face when preparing lesson plans or materials in English?

    هل هناك تحديات محددة تواجهها عند إعداد خطط الدروس أو المواد باللغة الإنجليزية؟

13. How do you handle situations where students do not understand technical terms or explanations in English?

    كيف تتعامل مع الحالات التي لا يفهم فيها الطلاب المصطلحات التقنية أو الشروحات باللغة الإنجليزية؟

14. Do you use any strategies, like translating to the local language or simplifying terms, to help them understand better?

    هل تستخدم أي استراتيجيات، مثل الترجمة إلى اللغة المحلية أو تبسيط المصطلحات، لمساعدتهم على الفهم بشكل أفضل؟

15. How do these challenges affect your teaching effectiveness and students' understanding of the subject matter?

    كيف تؤثر هذه التحديات على فعالية تدريسك وفهم الطلاب للموضوع؟

16. Are there institutional or pedagogical support mechanisms in place to help teachers overcome these challenges? If so, how effective are they?

    هل هناك آليات دعم مؤسسية أو تربوية موجودة لمساعدة المعلمين على التغلب على هذه التحديات؟ إذا كان الأمر كذلك، ما مدى فعاليتها؟

Section 4:

17. What strategies have you personally adopted to cope with the challenges of EMI?

    ما هي الاستراتيجيات التي اتبعتها شخصيًا للتعامل مع تحديات التدريس باللغة الإنجليزية؟

18. What types of support (e.g., training, materials, policy changes) do you believe would help improve EMI implementation in Algerian higher education?

    ما أنواع الدعم (مثل التدريب، المواد، تغييرات السياسات) التي تعتقد أنها ستساعد في تحسين تنفيذ التدريس باللغة الإنجليزية في التعليم العالي الجزائري؟

19. Would you prefer a bilingual approach (English + another language) in STEM instruction? Why or why not?

    هل تفضل نهجًا ثنائي اللغة (الإنجليزية + لغة أخرى) في تدريس مواد العلوم والتكنولوجيا والهندسة والرياضيات؟ لماذا أو لماذا لا؟

20. From your perspective, what recommendations would you make to policymakers and university administrators regarding EMI in STEM education?

من وجهة نظرك، ما هي التوصيات التي ستقدمها لصانعي السياسات وإداري الجامعات بخصوص التدريس باللغة الإنجليزية في تعليم العلوم والتكنولوجيا والهندسة والرياضيات

Appendix C: Consent Form (English and Arabic versions)

Title of Study: Investigating the main challenges that STEM teachers and student face when using English as a medium of instruction in higher education.

Investigators: Feriel Louali, Asma Remmache, Meriem Hanane Azzi

Procedures: You are invited to participate in a research study that aims to investigate the main challenges that STEM teachers and students face when using English as a medium of instruction in HE. The study involves an interview where you will be asked a series of questions regarding your experience of using EMI in HE. The interview will be face-to-face and last approximately 30 minutes and will involve questions about your experiences of teaching STEM subjects in English and the difficulties encountered. With your permission, the interview will be audio-recorded for accuracy.

Voluntary Participation: Your participation in this study is completely voluntary. You may withdraw at any time without penalty.

Risks and Benefits: There are no foreseeable risks involved in participating in this interview. You may skip any questions you do not wish to answer. However, the benefits of your participation will help gain valuable insights into the challenges faced by STEM educators and inform strategies to better support them.

Confidentiality: Your identity and responses will remain confidential. Pseudonyms will be used in any publications or presentations. Only the researcher will have access to the audio recordings which will be destroyed after transcription.

Contact Information: If you have any questions or concerns regarding the study or the interview process, please contact the investigators at (asma.remmache_2@univ-bba.dz), (feryal.louali@univ-bba.dz) or (azzimeriem01@gmail.com)

Consent: Your signature below indicates that you have read the information provided above and have decided to participate in the study. You may withdraw at any time after signing this form if you choose to discontinue participation in this study.

Participant's Signature:…….. **Date : …/…/…**

استمارة الموافقةّ:

عنوان الدراسة: استقصاء التحديات الرئيسية التي يواجهها مدرسو ومتعلمو العلوم والتكنولوجيا والهندسة والرياضيات عند استخدام اللغة الإنجليزية كوسيط للتدريس في التعليم العالي.

الباحثون: فريال الوالي، أسماء رماش، مريم حنان عزي.

عزيزي المدرس،

أنت مدعو للمشاركة في دراسة بحثية تهدف إلى استقصاء التحديات الرئيسية التي يواجهها مدرسو وطلاب العلوم والتكنولوجيا والهندسة والرياضيات عند استخدام اللغة الإنجليزية كلغة للتدريس في التعليم العالي. تتضمن الدراسة اجراء مقابلة حيث سيتم طرح سلسلة من الأسئلة عليك بخصوص تجربتك حول استخدام اللغة الإنجليزية كلغة للتدريس في التعليم العالي.

الإجراءات: ستتم مقابلتك وجهًا لوجه. ستستمر المقابلة لمدة 30 دقيقة تقريبًا وستتضمن أسئلة حول تجاربك في تدريس مواد العلوم والتكنولوجيا والهندسة والرياضيات باللغة الإنجليزية والصعوبات التي واجهتها. بإذنك، سيتم تسجيل المقابلة صوتيًا للدقة.

المشاركة الطوعية: مشاركتك في هذه الدراسة طوعية تمامًا. يمكنك الانسحاب في أي وقت.

المخاطر والفوائد: لا توجد مخاطر متوقعة في المشاركة في هذه المقابلة. يمكنك تخطي أي أسئلة لا ترغب في الإجابة عليها. ومع ذلك، ستساعد فوائد مشاركتك في الحصول على رؤى قيمة حول التحديات التي يواجهها مدرسو العلوم والتكنولوجيا والهندسة والرياضيات وستساهم في إبلاغ استراتيجيات لدعمهم بشكل أفضل.

السرية: ستبقى هويتك وإجاباتك سرية. سيتم استخدام أسماء مستعارة في أي منشورات أو عروض تقديمية. سيتمكن الباحث فقط من الوصول إلى التسجيلات الصوتية التي سيتم إتلافها بعد النسخ.

معلومات الاتصال: إذا كانت لديك أي أسئلة أو مخاوف بشأن الدراسة أو عملية المقابلة، يرجى الاتصال بالباحثين على (asma.remmache_2@univ-bba.dz) أو (azzimeriem01@gmail.com)او

(feryal.louali@univ-bba.dz)

الموافقة: توقيعك أدناه يشير إلى أنك قرأت المعلومات المقدمة أعلاه وقررت المشاركة في الدراسة. يمكنك الانسحاب في أي وقت بعد التوقيع على هذا النموذج إذا اخترت وقف المشاركة في هذه الدراسة.

توقيع المشارك: ..... **توقيع الباحث**: .....

التاريخ :.../.../...

Appendix D: An Example of a Teacher's Interview Answers

The answer in Arabic

مقابلة مع أستاذ آخر حول التدريس باللغة الإنجليزية :

س1: لدي خبرة عشرين سنة في التدريس، درست في جامعتي بجاية و تيزي وزو قبل القدوم الى برج بوعريريج، درست العديد من المواد. اذكر منها المواد التي درستها باللغة الانجليزية؛vibration and wave ، مستوى سنة ثانية تخصص TCTبالاضافة الى مادة commende électromécaniques مستوى السنة الثانية الكتروميكانيك ودرست كذلك commende avancéمستوى سنة ثانية ماستر اوتوماتيك، كل هذه المواد بدأت تدريسها باللغة الانجليزية ولا يمكن القول لغة انجليزية بحتة ولكن بدأت بادخال الانجليزية كلغة للتدريس

س2: منذ متى وأنت تدرّس باللغة الإنجليزية في مؤسستك؟

ج2: عامين بالضبط

س3: هل تلقيت أي تدريب رسمي في التدريس باللغة الإنجليزية أو الكفاءة اللغوية الإنجليزية للتدريس؟

ج3: انا بالذات لم اقم باي تدريب لانني احمل شهادة ليسانس في اللغة الانجليزية وفي طريق الحصول على شهادة الماستر، لكن هناك تدريب متوفر بخصوص هذا الامر على مستوى جامعة التكوين المتوسط

س4: التدريب اختياري ام الزامي للاساتذة الذين لا يحملون شهادة لغة انجليزية مثلك؟

ج4: التدريب اختياري وبالمناسبة التدريس اجباري باللغة الانجليزية فقط للسنة الاولى والثانية ليسانس اما باقي السنوات فاختياري، مثلا بالنسبة لي فضلت اختيار التدريس باللغة الانجليزية لباقي السنوات ايضا

س5: كيف ترى التحول إلى اللغة الإنجليزية كوسيلة للتدريس في مجالات العلوم والتكنولوجيا والهندسة والرياضيات في جامعتك؟

ج5: ارى ان التحول الى التدريس باللغة الانجليزية حتمي لا يمكن تخطيه لان هذه اللغة هي لغة العلم ومعظم المصادر التعليمية بهذه اللغة، اعتبر الحالة حاليا صعبة وهناك مشاكل كبيرة اولا لان الاساتذة غالبا غير مؤهلين، وثانيا الطلاب يشكلون عائقا فمثلا عند تدريسي للسنة الثانية ليسانس والذين لم يدرسوا قبلها باللغة الانجليزية وجدت مشاكل في استعمال كلا اللغتين سواء الانجليزية او الفرنسية. بالاضافة الى اللامبالاة من طرفهم حيث انهم غير متحفزين

س6: من خلال تجربتك، ما هي المزايا الرئيسية للتدريس باللغة الإنجليزية لكل من المعلمين والطلاب؟

ج6: اخبرتك اهم ميزة هي توفر المصادر بكثرة باللغة الانجليزية بالاضافة الى العولمة حيث ان كل من يرغب في الخروج والدراسة في بلد أجنبي يجد الامر أسهل فلا يواجه مشاكل مع اللغة

س7: هل تعتقد أن الطلاب مستعدون بشكل كافٍ لتعلم مواد العلوم والتكنولوجيا والهندسة والرياضيات باللغة الإنجليزية؟ لماذا أو لماذا لا؟

ج7: لا غير مستعدون

س8: ما هي أكبر التحديات التي تواجهها عند تدريس مواد العلوم والتكنولوجيا والهندسة والرياضيات باللغة الإنجليزية؟

ج8: المشكلة مع الطلاب، رغم ان اللغة في مجالنا ليست عائق كبير لان المصطلحات العلمية تعاد بكثرة وسهل حفظها، كل ما يلزم هو التحفز من طرف الطلاب فقط، بالنسبة للأساتذة المشكلة اننا لا نعرف كيفية كسب الطلاب والتعامل معهم

س9: كيف تصف مستوى اتقانك للغة الانجليزية؟

ج9: مستواي متوسط، ولعدم وجود تواجب مع الانجليزية من طرف الطلاب أجد انني دائما في نفس المستوى، كما انهم دائما ما يطلبون مني التدريس باللغة الفرنسية، فلطالما أجد نفسي اشرح باللغة الإنجليزية واعيد بالفرنسية وأحيانا اضيف حتى العربية. اضيف ايضا أحد التحديات التي اجدها مهمة جدا هو اننا لسنا مؤهلين من جانب مهارة التدريس. حيث اننا كمدرسين في المجالات التقنية لم نتلقى تأهيلا في educational psychology حيث اننا نجد أنفسنا نعامل الطالب كآلة.

س10: هل تجد صعوبة في شرح المفاهيم التقنية العلمية باللغة الإنجليزية؟ لماذا أو لماذا لا؟

ج10: لا أجد اي صعوبة

س11: هل تشعر أحيانًا أن محدودية المفردات لديك تؤثر على قدرتك على تقديم الدروس بفعالية؟

ج11: المصطلحات والمفردات لدي جيدة لذلك لا تؤثر

س12: هل تعتقد أن موارد تدريس العلوم والتكنولوجيا والهندسة والرياضيات باللغة الإنجليزية كافية لاحتياجاتك؟

ج12: في مجالي، جد كافية

س13: هل هناك تحديات محددة تواجهها عند إعداد خطط الدروس أو المواد باللغة الإنجليزية؟

ج13: لا أجد مشكلة مع اللغة في حد ذاتها، في مجالنا ما يهم هو ان تتقن تخصصك أكثر ومحتوى درسك

س14: كيف تتعامل مع الحالات التي لا يفهم فيها الطلاب المصطلحات التقنية أو الشروحات باللغة الإنجليزية؟

ج14: غالبا الجا الى الترجمة باللغة الفرنسية للطلبة الذين درسوا من قبل بالفرنسية، اما مع الطلبة الذين درسوا فقط بالإنجليزية فألجا الى كلا اللغتين الفرنسية ثم العربية

س15: هل تستخدم أي استراتيجيات أخرى لتبسيط؟

ج15: الترجمة غالبا واحاول تقديم نصائح دائما لكي يطورو من لغتهم

س16: كيف تؤثر هذه التحديات على فعالية تدريسك وفهم الطلاب للموضوع؟

ج16: تؤثر سلبا

س17: هل هناك آليات دعم مؤسسية أو تربوية موجودة لمساعدة المعلمين على التغلب على هذه التحديات؟ إذا كان الأمر كذلك، ما مدى فعاليتها؟

ج17: لا يوجد، تم توفير تدريس ufc للأساتذة لا اعلم إذا كان هذا يعتبر دعما

س18: ما أنواع الدعم التي تعتقد أنها ستساعد في تحسين تنفيذ التدريس باللغة الإنجليزية في التعليم العالي الجزائري؟

ج18: اول اقتراح يجب وجود تكوين للأساتذة لكيفية التعامل مع الطلاب والتدريس بهذه اللغة، ثانيا لا أشجع استعمال لغة ثانية مع الانجليزية اطلاقا حتى يكتسب الطلاب اللغة من الاحسن ان يكون الانتقال تدريجيا

س19: هل تفضل نهجًا ثنائي اللغة (الإنجليزية + لغة أخرى) في تدريس مواد العلوم والتكنولوجيا والهندسة والرياضيات؟ لماذا أو لماذا لا؟

ج19: لا ابدا، رغم انني امارسها حاليا لكنها لم تثمر بنتائج جيدة

س20: من وجهة نظرك، ما هي التوصيات التي ستقدمها لصانعي السياسات وإداري الجامعات بخصوص التدريس باللغة الإنجليزية في تعليم العلوم والتكنولوجيا والهندسة والرياضيات؟

ج20: تمت الإجابة

Translated Version :

Interview 2: Engineering Professor

Q1: I have twenty years of experience in teaching. I taught at the universities of Bejaia and Tizi Ouzou before coming to Bordj Bou Arreridj. I taught many subjects. Among them, I mention the subjects I taught in English: Vibration and Wave, second-year level specializing in TCT, in addition to Electromechanical Control for second-year Electromechanical level, and I also taught Advanced Control for second-year Master's level in Automation. All these subjects I started teaching in English, and it cannot be said to be pure English, but I started introducing English as a language of instruction.

Q2: How long have you been teaching in English at your institution?

A2: Exactly two years.

Q3: Have you received any formal training in teaching in English or English language proficiency for teaching?

A3: I personally did not undergo any training because I hold a bachelor's degree in English and am on the way to obtaining a master's degree. However, there is training available regarding this matter at the level of the Intermediate Training University.

Q4: Is the training optional or mandatory for professors who do not hold an English language certificate like you?

A4: The training is optional, and by the way, teaching in English is mandatory only for the first and second years of the bachelor's degree, while for the rest of the years, it's optional. For example, for me, I preferred to choose teaching in English for the rest of the years as well.

Q5: How do you view the shift to English as a medium of instruction in STEM fields at your university?

A5: I see that the shift to teaching in English is inevitable and cannot be bypassed because this language is the language of science, and most educational resources are in this language. I consider the current situation difficult with major problems: first, because professors are often not qualified, and second, students constitute an obstacle. For example, when teaching second-year bachelor's students who did not study in English before, I found problems in using both languages, whether English or French, in addition to indifference on their part, as they are not motivated.

Q6: From your experience, what are the main advantages of teaching in English for both teachers and students?

A6: I told you the most important advantage is the abundance of resources in English, in addition to globalization, where anyone who wants to go out and study in a foreign country finds it easier, so they don't face problems with the language.

Q7: Do you think students are sufficiently prepared to learn STEM subjects in English? Why or why not?

A7: No, they are not prepared.

Q8: What are the biggest challenges you face when teaching STEM subjects in English?

A8: The problem is with the students, although language in our field is not a major obstacle because scientific terms are repeated frequently and easy to memorize. All that is needed is motivation from the students only. For professors, the problem is that we don't know how to engage students and deal with them.

Q9: How would you describe your level of English proficiency?

A9: My level is intermediate, and due to the lack of engagement with English on the part of students, I find myself always at the same level. They also always ask me to teach in French, so I often find myself explaining in English and repeating in French, and sometimes I even add Arabic. I also add that one of the challenges I find very important is that we are not

qualified in terms of teaching skills. As teachers in technical fields, we did not receive training in educational psychology, so we find ourselves treating the student like a machine.

Q10: Do you find it difficult to explain scientific technical concepts in English? Why or why not?

A10: I don't find any difficulty.

Q11: Do you sometimes feel that your limited vocabulary affects your ability to deliver lessons effectively?

A11: My terminology and vocabulary are good, so they don't affect me.

Q12: Do you think that resources for teaching STEM in English are sufficient for your needs?

A12: In my field, they are very sufficient.

Q13: Are there specific challenges you face when preparing lesson plans or materials in English?

A13: I don't have a problem with the language itself. In our field, what matters is that you master your specialization and the content of your lesson.

Q14: How do you deal with cases where students don't understand technical terms or explanations in English?

A14: I often resort to translation into French for students who have previously studied in French. As for students who studied only in English, I resort to both languages, French and then Arabic.

Q15: Do you use any other strategies for simplification?

A15: Translation mostly, and I always try to provide advice for them to improve their language.

Q16: How do these challenges affect the effectiveness of your teaching and students' understanding of the subject?

A16: They affect it negatively.

Q17: Are there institutional or pedagogical support mechanisms in place to help teachers overcome these challenges? If so, how effective are they?

A17: There are none. UFC training was provided for professors; I don't know if this is considered support.

Q18: What types of support do you think would help improve the implementation of teaching in English in Algerian higher education?

A18: First suggestion, there must be training for professors on how to interact with students and teach in this language. Second, I do not encourage the use of a second language with English at all so that students acquire the language; it's better for the transition to be gradual.

Q19: Do you prefer a bilingual approach (English + another language) in teaching STEM subjects? Why or why not?

A19: No, never, although I practice it currently, but it has not yielded good results.

Q20: From your perspective, what recommendations would you give to policy makers and university administrators regarding teaching in English in STEM education?

A20: The answer has been given.

RÉSUMÉ

En réponse à la politique algérienne de 2022 visant à mettre en œuvre l'anglais comme langue d'enseignement (EMI) dans l'enseignement supérieur, particulièrement dans les disciplines STEM, cette étude examine les défis multiformes auxquels font face les enseignants et étudiants STEM durant cette transition. Historiquement dominé par le français, le contexte académique algérien présente des obstacles linguistiques, pédagogiques et institutionnels uniques qui méritent un examen plus approfondi. Les objectifs principaux de cette recherche sont d'explorer les difficultés des éducateurs et apprenants STEM liées à l'EMI et d'identifier leurs suggestions pour améliorer le processus de mise en œuvre. Pour atteindre ces objectifs, une approche de méthodes mixtes convergentes a été employée, combinant des données qualitatives et quantitatives. Des entretiens semi-structurés ont été menés avec six enseignants STEM, tandis qu'un questionnaire en ligne semi-structuré a été distribué à 64 étudiants STEM à l'Université Mohammed El-Bachir El-Ibrahimi de Bordj Bou Arreridj. Les résultats de cette étude soulignent les défis et les solutions potentielles pour une mise en œuvre efficace de l'EMI dans les disciplines STEM. Les défis clés incluent une maîtrise limitée de l'anglais académique, des difficultés pédagogiques dans la transmission du contenu, une participation réduite des étudiants, et une charge cognitive accrue pour les enseignants. Les étudiants ont suggéré des cours intensifs d'anglais pré-semestriels, des approches d'enseignement bilingue, et une formation vocabulaire spécifique aux disciplines, tandis que les enseignants ont plaidé pour des programmes de développement professionnel, des expériences de formation immersive, et un soutien institutionnel à travers des centres de langues. Cette étude contribue au corpus croissant de recherche sur l'EMI en fournissant des perspectives spécifiques au contexte des éducateurs et apprenants dans les domaines STEM algériens. Les résultats offrent des implications pratiques pour les décideurs politiques et les dirigeants éducatifs afin de concevoir des programmes de formation d'enseignants réactifs,

développer des matériels d'apprentissage de soutien, et mettre en œuvre des politiques EMI qui sont à la fois linguistiquement et pédagogiquement informées.

الملخص

استجابة لسياسة الجزائر لعام 2022 لتطبيق اللغة الإنجليزية كوسيلة للتدريس في التعليم العالي، خاصة في تخصصات العلوم والتكنولوجيا والهندسة والرياضيات، تبحث هذه الدراسة في التحديات متعددة الأوجه التي يواجهها معلمو وطلاب العلوم والتكنولوجيا والهندسة والرياضيات خلال هذا التحول. في السياق الأكاديمي الجزائري المهيمن عليه تاريخياً باللغة الفرنسية، تظهر عقبات لغوية وتربوية ومؤسسية فريدة تستحق فحصاً أكثر تعمقاً. الأهداف الأساسية لهذا البحث هي استكشاف تصورات المعلمين والمتعلمين في مجال العلوم والتكنولوجيا والهندسة والرياضيات حول الصعوبات المرتبطة باستخدام اللغة الإنجليزية كوسيلة للتدريس وتحديد اقتراحاتهم لتحسين عملية التنفيذ. لتحقيق هذه الأهداف، تم استخدام نهج الطرق المختلطة المتقاربة، الجامع بين البيانات النوعية والكمية. أُجريت مقابلات شبه منظمة مع ستة معلمين من تخصصات العلوم والتكنولوجيا والهندسة والرياضيات، بينما تم توزيع استبيان إلكتروني شبه منظم على 64 طالباً من نفس التخصصات في جامعة محمد البشير الإبراهيمي ببرج بوعريريج. تؤكد نتائج هذه الدراسة على التحديات والحلول المحتملة للتنفيذ الفعال لاستخدام اللغة الإنجليزية كوسيلة للتدريس في تخصصات العلوم والتكنولوجيا والهندسة والرياضيات. تشمل التحديات الأساسية إتقاناً محدوداً للغة الإنجليزية الأكاديمية، وصعوبات تربوية في توصيل المحتوى، ومشاركة مخفضة للطلاب، وحملاً معرفياً متزايداً على المعلمين. اقترح الطلاب دورات مكثفة في اللغة الإنجليزية قبل الفصل الدراسي، ونهج التدريس ثنائي اللغة، والتدريب على المفردات الخاصة بالتخصص، بينما دعا المعلمون إلى برامج التطوير المهني، وتجارب التدريب، والدعم المؤسسي من خلال مراكز اللغات. تساهم هذه الدراسة في مجموعة البحوث المتنامية حول استخدام اللغة الإنجليزية كوسيلة للتدريس من خلال توفير رؤى خاصة بالسياق من كل من المعلمين والمتعلمين في مجالات العلوم والتكنولوجيا والهندسة والرياضيات الجزائرية. تقدم النتائج آثاراً عملية لصانعي السياسات والقادة التعليميين لتصميم برامج تدريب المعلمين المتجاوبة، وتطوير مواد تعليمية داعمة، وتنفيذ سياسات استخدام اللغة الإنجليزية كوسيلة للتدريس المطلعة لغوياً وتربوياً.

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