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Exploring the Challenges of AI Adoption in English-Medium Instruction Classes: A Case Study of First-Year Computer Sciences Students- University of Ain-Temouchent

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Dedications

I dedicate this research work to:

My late father, whose love, support, guidance and memory still inspires me in my life.

May ALLAH have mercy on his soul and grant him a place in paradise.

To my Lovely Mother for her continuous encouragement, sacrifice, love, kind, endless

Duaa, and trust in in my capacities to reach this stage.

To My sweet sisters: Fatima, Chahinez, Narimen and my beloved brother Nasr Eddine for their constant love, protection, tremendous care and unwavering support.

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To all those who own a special place in my heart.

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Abstract

English Medium instruction is a phenomenon that has recently been applied in universities worldwide. Similarly, artificial intelligence is a prominent system that has been widely recognized in the area of education specifically in higher education. Therefore, the combination of both phenomena has witnessed considerable challenges in scientific and technical streams, particularly in the ‘mathematics and computer sciences’ field. To this end, this research work aims to investigate the different challenges encountered while integrating artificial intelligence in English-Medium Instruction contexts, as well as teachers’ and students’ attitudes towards this adoption. A triangulation of research instruments, including an online questionnaire, a structured interview, and classroom observation, was used with a sample of 44 first-year students and six teachers from the Department of Computer Science- University of Ain Temouchent. The data were analysed following a mixed- methods approach including both quantitative and qualitative approaches. The results revealed that teachers and students encountered various challenges such as grammar issues, lack of vocabulary and lack of training in English. Other important results lied in the students’ risk of dependency on AI, and the positive attitudes displayed towards artificial intelligence integration. Additionally, the present study provided a significant contribution in understanding the role and the significance of artificial intelligence within English-Medium Instruction classrooms.

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List of Abbreviations and Acronyms

AI	Artificial Intelligence
CBI	Content Based Instruction
CL	Cognitive Load
CLIL	Content Language Integrated Learning
EAP	English for Academic Purposes
EL	English Language
EMI	English Medium Instruction
ESP	English for Specific Purposes
GPT	Generative Pre-trained Transformer
HE	Higher Education
MCS	Mathematics and Computer sciences
ML	Machine Learning
NLP	Natural Language Processing

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General Introduction

General Introduction

The global dominance of the English language (EL) as a lingua franca has provided, many sectors, the opportunity to develop their universal interaction. Diverse fields such as economy, politics, science and technology use it as a tool of communication in their professional domains. In the educational sector, and more particularly in higher education, EL is actually a medium to teach and learn distinct subject matters; this phenomenon is known as English medium Instruction (EMI). Today, at university level, EMI has witnessed a remarkable evolution in different streams, and teachers are supposed to teach various subjects through the EL following the recent initiative by the Ministry of Higher Education.

On another front, artificial intelligence (AI) is the groundbreaking process in the field of education that leads to the advancement in the quality of education. It represents a machine that possesses human intelligence and can function in different tasks such as reasoning and problem solving. Consequently, the adoption of AI in EMI classes has noted a substantial controversy where both teachers and students depend on various AI tools as an assistant in their teaching/learning process as it helps them in preparing lectures, summarizing large volume of documents and solving tasks. This has raised a concern about the challenges of AI adoption in EMI classes, as well as teachers' and learners' attitudes towards AI integration in higher education (HE).

The adoption of AI in EMI Settings, particularly in 'Mathematics and Computer Sciences' stream, plays a vital role in enhancing the quality of the teaching/ learning process in higher education. To investigate AI challenges faced by both teachers and students within EMI settings, it is crucial to shed light on how teachers and students perceive the adoption of AI in EMI contexts. Thus, the current study aims to investigate the challenges of AI adoption in EMI classes, alongside teachers and students' attitudes towards its integration. To achieve this, the current research study seeks to answer the following research questions:

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1- What pedagogical challenges do teachers and students face when integrating AI tools into EMI classes?

2- How does AI adoption affect language use and comprehension among students in EMI settings?

3. What are teachers' and students' attitudes towards AI integration in EMI settings?

Based upon the above research questions, we hypothesize that:

1. EMI courses can be supported by AI. However, challenges such as teachers' lack of training and students' overreliance on AI might impede their language proficiency and comprehension in EMI contexts.

2. AI adoption in EMI classes might either support or hinder students' language use and comprehension depending on teachers' training level regarding its use.

3. Teachers and students display positive attitudes towards AI adoption in EMI classrooms.

To either confirm or reject these hypotheses, we attempt to investigate challenges of AI adoption in EMI classes. Therefore, three research instruments were used to collect data: First, an online questionnaire was administered to a random sampling including 44 first year students studying Mathematics and Computer Sciences-University of Ain-Temouchent (MCS). Second, a structured interview was conducted with six teachers of the same stream. Third, classroom observation was added to reinforce the results. Data were analysed through a mixed methods approach including quantitative and qualitative approaches.

The current study consists of three chapters. The first chapter deals with notions about EMI and AI by providing insights into their definitions. It also tackles the emergence of EMI

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particularly in scientific and technical streams. AI is also explored by allocating its challenges of integrating it in higher education. Finally, the chapter covers the process of AI adoption in EMI classrooms, and tackles the notion of ‘attitude’ towards AI integration in education.

The second chapter entails the methodological concerns of this research work. The chapter begins with restating the research objectives and the motivations behind conducting this study. It also addresses the research design, site of research, sample population including teachers and learners’ profile, research instruments, and the methods of data collection and analysis namely the mixed methods approach.

The third chapter focuses on data analysis and interpretation. The chapter introduces data analysis and interpretation obtained from the students’ questionnaire, the teachers’ interview and classroom observation. The chapter also provides suggestions and recommendations to overcome the different challenges of AI adoption in EMI classes. The chapter ends with shedding light on the limitations we encountered during the conduct of this study.

*Chapter One: English
Medium Instruction
and Artificial
Intelligence*

Chapter One: English Medium Instruction and Artificial Intelligence

1.1 Introduction
1.2 Definition of English Medium Instruction
1.3 The Emergence of English Medium Instruction
1.4 English Medium Instruction in Scientific Fields and Technical Stream.....
1.5 Definition of Artificial Intelligence.....
1.6 Challenges of AI Integration in Higher Education
1.7 AI Adoption in EMI Classrooms
1.8 Attitudes towards AI Integration in Education
1.9 Conclusion

1.1. Introduction

In recent years, language education has changed due to different factors such as the emergence of the English language throughout the world. This language has become global and dominant in different fields such as education, technology and science. This advent has influenced the educational system in higher education especially in non-English-speaking countries.

This chapter explains the concept of English Medium of Instruction (EMI) as an educational process in higher education; particularly at the level of universities. It also explores the emergence of EMI in Algeria; a special focus is put on the implementation of EMI, and the challenges faced by students in scientific and technical streams. Moreover, the chapter highlights the relation between EMI and the Artificial Intelligence (AI), then the challenges of integrating AI in higher education. Furthermore, it shows how AI is adopted in EMI classes, in addition to the attitudes displayed towards AI integration in education.

1.2. Definition of English Medium Instruction

Different universities worldwide have changed their way of teaching and started to teach the content of academic subjects in English. This way of teaching is known as English Medium Instruction. This new trend has largely spread in higher education. In fact, the concept of EMI has been defined by several scholars. Dafouz & Gray (2022, p.1) state that “EMI refers to the use of English to teach academic subjects, other than English itself...”. In other words, while the traditional language focuses on the language itself, EMI is about teaching and learning the content of academic subjects, such as computer sciences, engineering, mathematics and other subjects taught through English.

EMI takes place mainly in countries and universities where English is not the first language. According to Dearden (2014), EMI is:

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.2).

In other words, it is about the existence of EMI in non-Anglophone countries such as Algeria, China, France, Morocco and others. Though English is not the first language, these countries introduce EMI in their educational system. Different labels are given to EMI by different scholars and researchers (Macaro, 2018). Briggs, Dearden, and Macaro (2018) cite the following terms: English medium instruction, English medium of instruction, English as a medium of instruction, English-medium education, and English as the lingua franca medium of instruction. However, they all mean teaching the content of academic subjects in English.

This method of teaching helps students to enhance their English proficiency, develop their vocabulary through learning the content in English. It also prepares students for future studies and international opportunities in professional career. However, EMI cannot function without the support of distinct theories and learning approaches.

According to Sweller (1988) humans can process only a limited quantity of new information simultaneously, but if too much information is offered learning fails as cited in Clark and Kimmons, 2023. The teacher Within EMI classes should provide only what is necessary to the learners, for example the use of the English language as a tool in order to convey content can already increase the cognitive load of the learners, due to their lack of the EL proficiency, complicated terminology, intricate linguistic requirements. As a result, learners

may face learning obstacles such as lack of comprehension, low academic performance, difficulty in reasoning and problem solving.

Clark and Kimmons (2023) explain in their article (Cognitive Load Theory) that the cognitive load theory can be divided into three main types, which are the intrinsic, extraneous and germane cognitive load.

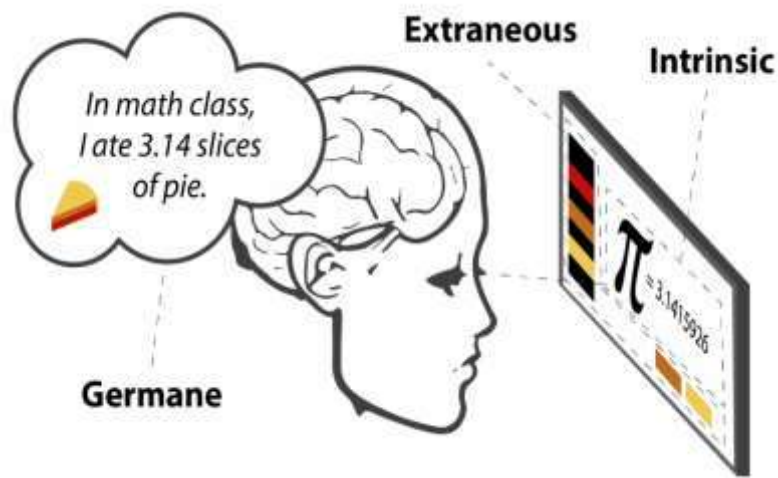


Figure1: Types of the cognitive load theory Adapted from Clark &Kimmons (2023).

Figure 1 above illustrates the three types of cognitive load. The intrinsic load that is defined as the difficulty of the material itself, which means the complexity comes from the content itself, not because it is not well-explained but the inner structure of the conceptual material is difficult. In scientific fields such as mathematics, this complexity is found in calculus, algebra, abstract reasoning and mathematical functions. So, learners with high complexity of the material may face higher intrinsic load.

In addition to the intrinsic CL, there is the extraneous cognitive load that it is determined by how the information is displayed not the content itself, i.e., the way information is offered to learners. In EMI contexts, the teacher's rapid explanation using the English language, complex terminology, excessive use of technical notions and difficult grammar patterns, may move their attention away from focusing on learning the content of the lesson and increase the extraneous overload.

The figure also discusses another type which is 'the germane cognitive load'. It focuses on the mental effort learners' face in order to process, comprehend and store information in a form of Schemas. So, the germane CL assists learners in constructing and assimilating knowledge efficiently. While the cognitive load theory establishes the distinct issues learners face i.e., the mental overload in EMI, it does not elucidate how the course delivery can incorporate both language and content in order to minimize this cognitive burden. From an educational point of view, Content-Based Instruction (CBI) provides the necessary structures needed; in order to present EMI courses by teachers in the classroom.

On the one hand, CBI is determined as a teaching approach that emphasizes on the teaching instruction which should integrate both language and content. Crandall & Tucker (1990) define it as an approach to language teaching that integrates both language learning and subject matter content in order to develop students' academic capacities that are needed in their courses. In this phase, CBI considers both content and language proficiency as main objectives in language learning.

On the other hand, another significant approach to language teaching/learning that is known as the content and language integrated learning is regarded as an expansion of the previous approach. CLIL is defined as "a generic term that refers to the teaching of subjects in a different language from the mainstream language of instruction" (Marsh, 2008, p.1986).

This definition suggests that CLIL is an approach to language teaching/learning that emphasizes on teaching the academic content in the target language, i.e., the use of distinct language apart from the mother tongue of the learner in order to teach the academic content. The overarching objective of CLIL is to enhance the progress of both content /subject acquisition and language mastery simultaneously for the learner.

In the same vein, Coyle et al. (2010) highlights that CLIL has a bifocal emphasis which are both studying the subject matter and improving language proficiency simultaneously “Content and Language Integrated Learning (CLIL) is a dual-focused educational approach in which an additional language is used for the learning and teaching of both content and language” (p.1). This dual focus supports the main aim of CLIL as stated previously. In brief, CLIL still does not explain how learners are supposed to be encouraged academically, and this gives attention to a further educational approach that is known as English for academic purposes.

English for academic purposes (EAP) took its roots from the umbrella field ESP; i.e., English for specific purposes which focuses on teaching the English language according to learners’ specific needs while EAP is defined as “the teaching of English with the specific aim of helping learners to study, conduct research or teach in that language – is an international activity of tremendous scope.” (Flowerdew& Peacock, 2001). This signifies that the core goal of EAP is to enable learners and support them to use the English efficiently within distinct academic contexts.

Table 1- 1: Learning approaches that encourage English medium of Instruction (EMI)

Approach	The core emphasis	Its relationship with “EMI”
CBI	Content –based language learning	Directs teaching the content through EL in EMI
CLIL	Content and language blending	Adjusts content proficiency and language progress simultaneously in EMI
EAP	Educational language proficiency	Enhances the academic EL students need in EMI

As shown in table 1, there is a mutual relationship between EMI learning/teaching contexts and the academic methodological learning /teaching approaches; i.e., CBI, CLIL and EAP and this core significant interconnection led to an effective learning/teaching atmosphere in EMI settings.

1.3. The Emergence of English Medium Instruction

EMI cannot be discussed without referring to its historical roots through globalization, colonization and its prominent dominance in many academic fields such as science, technology, engineering, mathematics, and other significant domains. The English language expanded its historical development first, across colonization. According to crystal (2003) the EL expansion originated in Britain, and it started to spread globally as a consequence of the British colonial and political power.

Within the same line, Crystal (2003) asserts that the EL became a global language not because of its specific linguistic elements, but due to other important factors such as politics, history, cultural strengths and economy, and it started to grow as a language of education, governance and administration, since, it has been transmitted and imposed through educational and formal institutions.

Moreover, this historical background laid a strong foundation for the EL to become a language that is used as a medium of instruction. Nowadays, the emergence of EMI does not imply that the EL should be taught as a subject matter in schools and universities only, but it should be used as a *tool* to teach different subject matters such as science, physics, mathematics, engineering and others. Galloway et al. (2017) state that “The global spread of English has seen an increase in importance placed not only on English language education throughout the world, but also on education through English.” (p.4). At the level of Higher Education, teaching using the EL as medium is necessary simply because EL exerts a powerful impact on academic writings, disseminations as well as scholarly research.

Furthermore, the widespread of EL as a global language is regarded as a pillar for EMI to become adopted as a medium in HE. “While the global status of English impels its adoption in HE, the adoption of English in HE further advances its global influence” (Coleman, 2006, p.4). The latter affirms the powerful impact of the EL to become adopted at the level of HE, and this reinforces its position globally. Crystal (2003) discusses the EL became a global language thanks to the historical power and other significant factors such as economy, politics and even culture. Moreover, in his book entitled “English as a Global language”, he tends to explain the worldwide spread of EL in distinct areas of the world, and these conditions laid a strong foundation for the emergence of the field EMI. The subsequent figure confirms the spread of EL in distinct territories in the world.

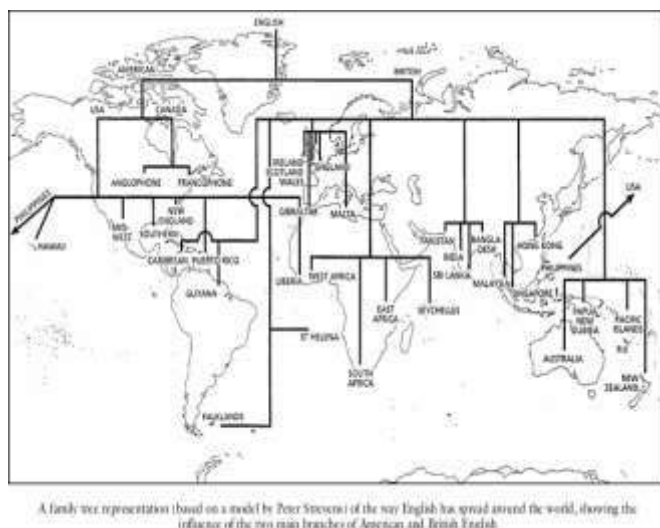


Figure1- 1: Worldwide Map showing the spread of EL as Global language Adapted from Crystal (2003, p. 70).

The figure above indicates the spread and the dominance of the EL in almost all over the world, distinct continents and regions adopted the EL in their government procedures, and on the top of them is the field of education. As it is shown in figure 2, the EL influences other significant factors such as economy, politics, and administration, in various areas, this impact worldwide, promoted EL as a language of communication, where people from different places can exchange academic knowledge.

Not only that, but also upon this influence and dominance, the EL now is known for its significant use as a tool in order to teach a range of subject matters, in this particular phase EMI emerged as soon as universities adopted it as medium in their academic programmes. As a result, EMI is rooted in the universal historical foundations of the EL and it's started to be applied in scientific and technical domains.

In the Algerian context, historically speaking, the French language is the hegemonic language of instruction that is used in teaching/learning fields and in other significant domains such as administration, medicine, media, policy, economy and technology because of the

colonial bequest. But now, the new educational and policy reclaims, EMI is highly grounded in the Algerian HE.

Additionally, EMI has begun to evolve in the framework of the Algerian HE as a shift from the French language towards the English language; this transition has the potential to develop the academic abilities of students, enhance their future skills, widen their learning opportunities globally, as well as enhancing the research knowledge and capacities. The overreaching objective of implementing EMI within the Algerian HE is to use the EL as a *tool* so that it can be used in both academic and professional domains, specifically in scientific and technological areas.

In recent research conducted by Hamzaoui (2025) on the Algerian doctoral students; she (2025) indicates that they displayed positive attitudes towards EMI integration, for learning through the EL is of paramount importance to align with high quality of research worldwide, publish scientific and technological literature and improve the educational integrity and validity. However, she (2025) believes that though these are core standards of implementing EMI within the Algerian HE, there are still some challenges faced by educators and learners such as not being ready for this integration and lack of proficiency in the EL. This, indeed, indicates that adopting EMI in the Algerian HE requires a well- structured and organized plan to assist educators and learners alike.

1.4. English Medium Instruction in Scientific Fields and Technical Streams

Since English has emerged to be the international language and the language of science, research and education, different universities especially whose first language is not English adopt the trend of EMI. The shift in the language of education happens in several specialties

including the scientific and the technical streams such as: Computer sciences, engineering, mathematics, physics, biology and many other fields.

The application of EMI in the classroom takes place through different teaching and learning aspects. It includes the language use inside the classroom which is English as the primary language of instruction. In addition to the delivery of the lecture, the teacher should simplify the content of the lecture and make the complicated words easier for the learners.

Moreover, the curriculum design and the use of scientific and technical terminologies, the teacher explanation i.e., he/she explains the content of the lecture through the English language. In addition to, the interaction between the students and the lecturer that includes asking questions or requiring for clarification. As well as the methods, and the techniques used by the teacher inside the classroom, such as using repetition, providing examples, translating difficult terminologies, the use of visual aids, or providing an environment where foreign language laboratories are equipped with the materials and instruments.

The implementation of EMI in the learning process has different benefits for learners. EMI can be an opportunity to improve their English proficiency and globalize the content they learn using the world's first language. It can help them develop academic performance; enhance critical thinking (Elkhayma, 2022). Mainly for non-native speakers, EMI gives them the opportunity to develop their English language and gain more knowledge.

Therefore, adopting EMI in the teaching/ learning process plays a vital role in enhancing the quality of learning and makes it more effective not only for learners, but also teachers. Thus, applying this method in their teaching strategies helps both teachers and learners to participate in international seminars and conferences, also to have more job

opportunities at the national and the international level. It also helps them to publish their works in international articles, journals and websites.

Despite its benefits, the application of EMI in higher education is challenging for both learners and instructors. Among the challenges they face the lack of English proficiency. For computer science classrooms, the teacher is supposed to speak in English during all the lecture while explaining or sharing knowledge. Therefore, there is a need for fluent and proficient teachers in order to better convey the content of the subject matter. This is challenging for teachers since English is not their first language, so if the teacher does not master the language, there will be a lack of understanding from the part of learners.

According to research done by Azarias (2021), in his article (English as a Medium of Instruction: The case of Technology-Related classrooms) through interviews done with 16 Teachers, they mention that they face difficulties while applying EMI in the classroom. Among these difficulties is speaking English fluently because the teacher's language proficiency plays a vital role in EMI contexts. In addition to the interaction between the learners and the teacher which should be in English, classroom interaction is one of the important aspects of the learning and teaching process through asking questions, participation, work in groups.

However, when the discussion is in English some of them find it difficult to be engaged in the lecture. Sometimes, they cannot understand the question of the teacher and others cannot find the exact vocabulary to answer. So, it is challenging for both the learners and the teacher to interact when the content is delivered in English. Moreover, for computer science classrooms the content of the lecture is explained in English. This is challenging for both the learners and the teachers, since the lessons include scientific and technical terminologies so it is difficult for learners to fully understand the teacher.

Therefore, teachers to facilitate things both teachers and learners code switch while explaining and this is according to Azarias (2021) one of the challenges of EMI. According to him in order to cope with the previous challenges the teacher needs to code switch, in the case of Algerian universities it can be through the use of Arabic for explanation and clarification or French for technical and scientific words. This method helps a lot, the teachers can explain and convey the information successfully and the learners can understand easily. So, the teacher can use the first language to give students instructions, asking them questions and explaining difficult terms.

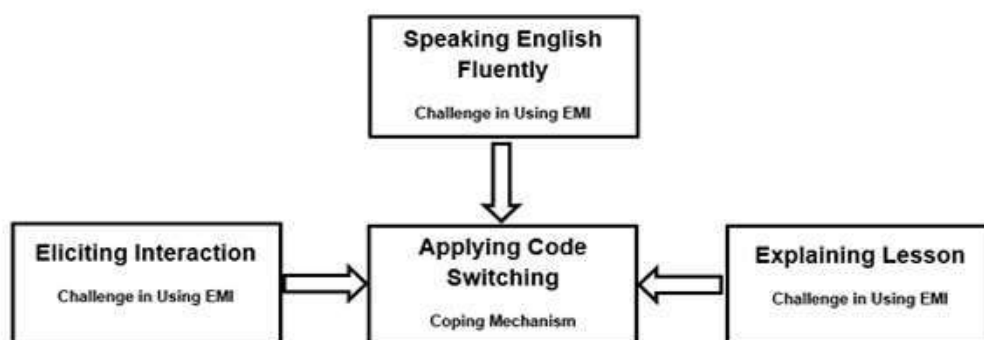


figure1- 2:Challenges of English Medium Instruction Adapted from Azarias (2021, p.305).

The figure above represents the challenges faced by learners and teachers in adopting EMI according to Azarias (2021) as mentioned by him SEE which are Speaking English fluently, Explaining lessons, Eliciting Interaction and applying code switching. Moreover, he mentions how the use of code switching can help both teachers and learners.

1.5. Definition of Artificial Intelligence

The term AI was coined for the first time by the notable scholar John McCarthy (1956) at the Dartmouth Conference; he defines it as “the science of engineering and manufacturing intelligent machines that simulate the basic mental processes of intelligent human behaviours, and building artificial systems that enable a computer to perform actions that can only be achieved by human intelligence”(cited in Marwoush et al. , 2025). Artificial intelligence (AI) is grounded in the broad domain computer science, it refers to machines that can be able to function in different tasks that entail human intelligence such as mental processing, problem solving, communicating, providing feedback and other miracle mechanisms.

The term AI has been developed thanks to other contributors such as Marvin Minsky who defines it as “the science of making machines do things that would require intelligence if done by men” (Stonier, 1992). This emphasizes the fact that AI can be actually able to master tasks that are unique only for humans. Besides, Russell and Norvig (2010) argue differently about AI which is based on the perspective of *Rationality*; *i.e.*, the capability of a machine to think in a logical manner, make important decisions and be able to assess knowledge in order to achieve a specific aim. In Order to strengthen their point of view, Russell and Norvig (2010) tackled their idea with an emphasis on these categories; thinking humanly, thinking rationally, acting humanly, acting rationally.

Table 1.2: The Distinct Categories of Artificial Intelligence Adapted from Artificial Intelligence; A Modern Approach (Russel and Norvig, 2010, p.2).

Thinking Humanly “The exciting new effort to make computers think . . . <i>machines with minds</i> , in the full and literal sense.” (Haugeland, 1985) “[The automation of] activities that we associate with human thinking, activities such as decision-making, problem solving, learning . . .” (Bellman, 1978)	Thinking Rationally “The study of mental faculties through the use of computational models.” (Charniak and McDermott, 1985) “The study of the computations that make it possible to perceive, reason, and act.” (Winston, 1992)
Acting Humanly “The art of creating machines that perform functions that require intelligence when performed by people.” (Kurzweil, 1990) “The study of how to make computers do things at which, at the moment, people are better.” (Rich and Knight, 1991)	Acting Rationally “Computational Intelligence is the study of the design of intelligent agents.” (Poole <i>et al.</i> , 1998) “AI . . . is concerned with intelligent behavior in artifacts.” (Nilsson, 1998)

The prominent dominance of Artificial Intelligence, in distinct areas, has witnessed various changes worldwide. AI has influenced diverse sectors such as medicine, business, education, economy and other significant fields. In language learning discipline, AI impacts results in enhancing teaching and learning, improving proficiency, supporting decision making and encouraging automatic feedback. Haenlein and Kaplan (2019) took the idea of AI much further. They viewed AI as “a system’s ability to interpret external data correctly, to learn from such data, and to use those learnings to achieve specific goals and tasks through flexible adaptation” (p.1). This indicates that AI can be also able to process, analyse and comprehend information. AI was and it will still be present in our daily lives as “AI will become as much part of everyday life as the Internet or social media did in the past” (Haenlein& Kaplan, 2019).

The emergence of AI has affected different sectors mainly education. In higher education, students are using different AI tools to support their works. These tools are defined by different scholars (Archana et al., 2025; Ray, 2023; Gururaj and Dsouza, 2024; Van Wyk, 2025). For instance, Archana et al (2025) mention that,

AI tools are defined as artificial intelligence (AI) based applications or platforms that assist learners, educators and researchers in simplifying various academic tasks (p.3).

This shows that AI tools are used in education as a support to facilitate and simplify tasks for learners; for example, they use them to check the grammar, spelling or to write academic essays. Similarly, educators use them to prepare and design lectures. Moreover, learners are using different AI tools in their studies mainly while writing their works; for instance, they use them in order to paraphrase, summarize, correct grammatical mistakes, translate to different languages, and so on. Different AI academic writing tools were identified in previous studies such as Grammarly, Paperpal, QuillBot, ProWritingAid and others mention ChatGPT (Gururaj& Dsouza, 2024).

- Grammarly: It is one of the artificial intelligence tools that work as an assistant to help learners while writing. It uses Machine Learning (ML) and Natural Language Processing (NLP) to check learners' writing. Its mission is to look for grammar mistakes and try to correct and improve them. It also offers suggestions to learners to make their writing more academic and clearer. In addition to grammar checking, it also checks plagiarism, spelling and many other functions. It is used by teachers, learners, writers, and professionals. In order to use this writing tool, learners need first to enter their text in Grammarly, it will check Grammar, spelling, Plagiarism. In addition, it will provide the learners with suggestions and alternatives to replace their mistakes. After having them the learner will examine each one and either accept or reject them.

- Paperpal: It is also one of the AI assistant tools that help learners improve their academic writing. Similar to Grammarly, it also corrects grammar errors, spelling and punctuation. In addition to that, it paraphrases learners' work with keeping the original meaning; i.e., it does not generate new ideas.

- QuillBot: It is an online AI tool that is used by learners in their academic production. It has several functions including paraphrasing, summarising long sentences, avoiding plagiarism and many other functions. It makes learners writing more formal by providing alternatives and synonyms. This tool uses NLP while working to understand the meaning of the text given. Different reports show that EFL learners use Quillbot in their writing projects as a learning support.

- ProWriting Aid: It is an AI tool that works as a grammar and spelling checker. It also edits the style of writing offering learners with suggestions to improve their writing quality. This tool is designed for learners, writers and other professional writers. So, rather than generating new ideas, it provides you with suggestion for the editing and revision stage.

- Chat GPT (Generative pre-trained Transformer): It is a writing assistant and AI programme. It was released in December,2022 by Open AI which is an American Company. Learners are using it a lot in their academic journey since it generates texts that are similar to human production. This programme is considered as a Chabot that uses NLP to generate information and ideas similar to that of the human. Whenever learners enter their prompt, it provides them with information from different sources including articles, essays, dissertations, and it can also generate images or videos.

These tools help students to save time, avoid mistakes, have more examples and ideas for different topics, and organize their work. In the context of EMI, AI tools help students to better understand the lectures by translating difficult terminologies, develop their vocabulary by learning more scientific and technical terms, correct and improve their grammar, and spelling, and while writing, they help them to have clear, organized and coherent pieces of writing.

1.6. Challenges of AI Integration in Higher Education

Due to the emergence of the Artificial Intelligence, different sectors start to support their works using its different tools. As for the learning/ teaching process, AI is adopted by learners inside the classrooms. They are using it to improve their studies, to have a personalised learning through learning according to their individual needs and abilities; it also helps them to have better outcomes.

Recently, learning has been transformed through the integration of AI as a significant assistant for both learners and teachers. According to Fachrurrozie et al. (2025), “the application of modern AI technologies is essential for the success of higher education institutions, replacing outdated technologies and manual processes” (p.60). This means that HE has seen a shift from manual methods to modern AI tutors and that plays a significant role in the success of the educational system.

However, the integration of AI in HE does not present benefits only; it also provides challenges that must be considered by practitioners and policymakers. Among these challenges as Harry (2023) mentions, is that some AI tools and systems are expensive and cannot be afforded by all learners. Some of them are premium and they require fees to get access; this may be challenging for universities as well in order to implement AI systems mainly those with

low budget. In fact, some universities have even limited access to technology; this may be a barrier because learners will not have the ability to use AI effectively. Harry (2023) also mentions that the privacy and the security of learners and teachers' data is not secured, and it can be in risk if they fall into the wrong hands. Therefore, universities must ensure that their data is protected in order to avoid data breaches.

Moreover, learners have problems with motivation, creativity and critical thinking. Through the overuse of AI, learners depend too much on it to perform their tasks and activities. Therefore, instead of using their cognitive abilities, problem solving skills and critical thinking they will rely solely on AI answers, and as such, their motivation will decrease, and there will be no interaction inside the classroom. Moreover, the information provided by AI systems, tools and applications are not always correct and trusted. In fact, the information may be false and misleading; this will harm learners and hinder their learning development, i.e., they will learn wrong information that may cause misunderstanding and information gaps.

The AI integration can be challenging even for teachers. AI systems are taking different roles in the educational settings, such as providing lectures, explaining them, providing feedback and assessing learners. These can present a career risk for teachers in the future since AI is performing teachers' role in the classroom i.e., teachers can be replaced by the AI systems, tutors and assistances.

1.7. AI Adoption in EMI Classrooms

The use of Artificial Intelligence is highly recommended nowadays in the area of education, primarily in the field of HE. Research has been done by Akinwalere and Ivanov (2022) who argues that AI is growing rapidly in HE, and it influences the way universities offer their services. During this phase, the importance of using AI at the level of HE is to alter

education through the use of diverse methods and tools that can aid both the tutor and learners, as well as facilitating the teaching/learning process.

The implementation of the AI within the area of pedagogy can be attributed to the user's eagerness towards the usefulness or the limited effectiveness of technological functions, as described by Davis (1989) who claims that "people tend to use or not use an application to the extent they believe it will help them perform their job better" (p.320). He (1989) refers to the extent of utility i.e., the amounts of benefits the system offers to carry out the work as perceived usefulness. However, the easiness of the platform that focuses on how much the attempt is accessible is called perceived ease of use.

In AI settings, perceived usefulness and perceived ease of use are considered as pillars upon which users accept or may reject to use the AI; for instance, the case where the AI instruments assist educators and learners to execute, understand and accomplish their tasks or when these tools necessitate an amount of system potential and easiness. As a result, the approval or the disapproval on the AI use depends on the user's advantage and profit to achieve the teaching and learning goals.

AI endorsements in teaching can be widely noticed; Holmes et al. (2019) note that AI is expected to affect the teaching process. They (2019) report that AI admission in the classroom should encourage the tutor mission not replace his duties and tasks. This highlights that though the involvement of AI in teaching and learning, the teacher's role remains essential. AI application in this case is concerned with whether it supports educators in facilitating lectures, designing lessons, and assessing students, instead of substituting his/her responsibility.

Moreover, AI adoption in EMI classrooms can be based on offering a number of benefits and support in the knowledge construction process of both tutor and learners. Lin (2024), in his second International Conference on Social Psychology and Humanity Studies, states that “Artificial intelligence technology has fundamentally transformed the landscape of higher education, offering new possibilities for learning.” (p.139).

This affirms that the adoption of the AI in EMI settings depends on its diverse contributions in enhancing the learning process. Boudaoud and Dehmoune (2025) highlight that AI offers a great experience for learners so that they learn for their own pace and according to their needs. This means that AI can assist learners in comprehending lectures, enable them to have direct feedback, solve their tasks, translate difficult terminologies for them, and provide activities according to their level.

There is also a shift in the adoption of the AI in EMI settings, Boudaoud and Dehmoune (2025) conduct a study on the application of EMI within accounting sciences as a field of study, and they found that the shift towards EMI within accounting programmes cannot be accomplished without cautious and structured employment of AI smart systems. In other words, accounting students are learning difficult terminologies through the EL, and it cannot be accomplished without the assistance of the AI and the supervision of the tutor in the classroom.

1.8. Attitudes towards AI Integration in Education

As stated several times in this research work, the use of AI, nowadays, is a well-known body of research in the area of education. Its integration in EMI classrooms has earned distinct positions and attitudes regarding the use of online-based technologies inside the classrooms by teachers and learners. According to Alzahrani (2023),

AI is being increasingly used in education, mainly because of the advances that have occurred in technology, implying that technology can be used to enhance learning and research (p.65).

This indicates that the integration of modern technologies is used to enhance the learning process in HE. However, the AI integration inside the classroom has different perceptions from the part of learners and teachers. They show different attitudes towards using different AI tools and platforms in their learning and teaching process. According to Alzahrani (2023), attitude is “an individual’s feelings, positive or negative, toward the target activity”. (p.69). This means that attitude can be either positive or negative.

He (2023) also mentions that attitude is determined by emotions of the participants towards a particular behaviour, their motivation and pleasure to use it is when they possess a positive attitude with regard to it. This indicates that people’ motivation and pleasure is related to their feeling and attitudes; i.e., if their attitudes towards something are positive, they will use it overtime.

AI perception cannot be understood and developed without addressing and comprehending its unique benefits in teaching and learning, Farahani and Ghasmi (2024) claims that AI provides a range of advantages that enable the progress of the academic programmes as well as institutional functions. This demonstrates that AI integration in education leads to various changes in knowledge acquisition, and it tends to improve the quality of education.

Furthermore, AI usage in the classroom has witnessed distinct dynamics in assisting the students. For example, AI can offer an opportunity for them to have a personalized learning experience; this means that AI can alter the tasks according to their needs, capacities and

choices. A student can request for another easy task, extended criticism or comment as well as a better simple clarification for the subject matter content. According to Farahani and Ghasmi (2024), AI can be considered as a data driven insight, such as having the ability to gather data about learners' needs, abilities and wants to help teachers detect students' weaknesses, struggles and obstacles.

Farahani and Ghasmi (2024), on their part, mentioned that AI can provide a lifelong learning and professional development for teachers and students, so that they stay up-to-date with the current knowledge and trends. This reveals that the teachers' mission becomes accessible and easier; they can check students' progress anytime and everywhere. The following figure summarises the main selected benefits mentioned previously.

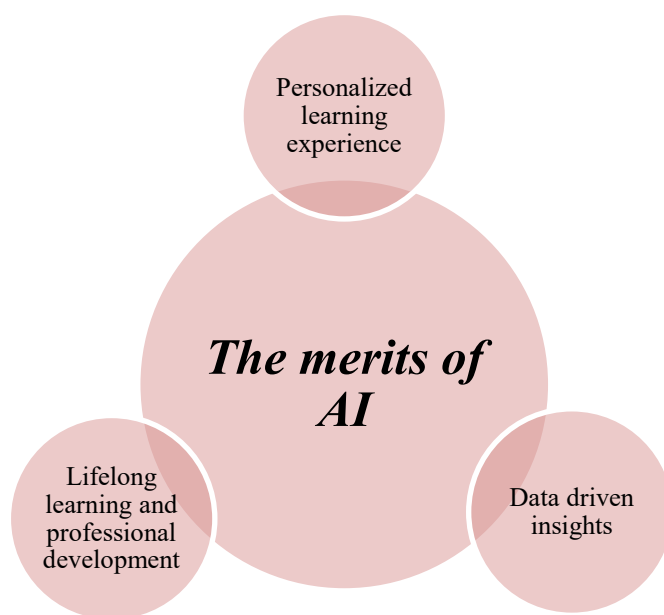


figure1- 3: The selected Merits of AI in education Adapted from Farahani &Ghasmi (2024).

The figure above illustrates the main merits of AI in education that enable teachers and students to have a better educational experience in learning, and these advantages tend to

enhance the future development of the teacher's profession and the quality of education for students.

In recent years, the different AI tools and platforms are regarded as a positive assistant for both the learners and the instructors. According to Kim et al. (2013) teachers consider the various tools as a collaborative partner in the educational process; they assume that the collaboration between technology and human capacities will achieve better outcomes in learning as cited in Mujahidah et al., 2025.

In EMI classes, instructors demonstrate a positive attitude concerning the shift from the traditional way of teaching to the AI tools' integration. They are using AI tools to support their teaching process. According to Mujahidah et al. (2025),

Teachers expressed a strong interest in integrating artificial intelligence (AI) into their teaching practices, viewing it as a tool that can complement and enhance traditional methods rather than replace them (p.108).

In other words, they consider AI as an assistant that facilitates their teaching and makes it more updated. In addition, as mentioned by Mujahidah et al. (2025), the use of AI in learning can foster learners' creativity, innovation and problem-solving skills, i.e., learners will be more engaged in the classroom (p.109). In another research by Sayici and Aydin (2025), they mention that "some studies showed that teachers viewed AI positively, agreeing that it could aid in conducting lessons, planning and designing curriculum, and assessing learners' writing" (p.3). In other words, this signifies that some teachers accept the use of AI in their classes and they consider it as a support that helps them in planning lectures, design curriculum and in the way of assessing learners.

Additionally, learners show a positive perception towards the use of AI in their learning, they are using it in different activities. In scientific fields and mainly in EMI contexts, learners use AI to facilitate and have a deep understanding of various subjects where they translate different terminologies and technical concepts and have large amount of information about the topic understudy. Moreover, according to Liang and Reiss (2025), there is a relation between students' attitudes towards AI and their learning engagement, enjoyment and autonomy. In other words, when students accept and view AI tools as an asset, they are more motivated and engaged to learn.

The following diagram shows the effect of students' attitudes regarding AI and its effect on students' autonomy and engagement. According to Liang & Reiss (2025) "When students hold favourable attitudes towards AI, they are more likely to use it purposefully and flexibly, which enhances their perceived autonomy" (p.3). This reveals that their positive attitudes will increase their engagement and perceived autonomy, and their learning will be more enjoyed.

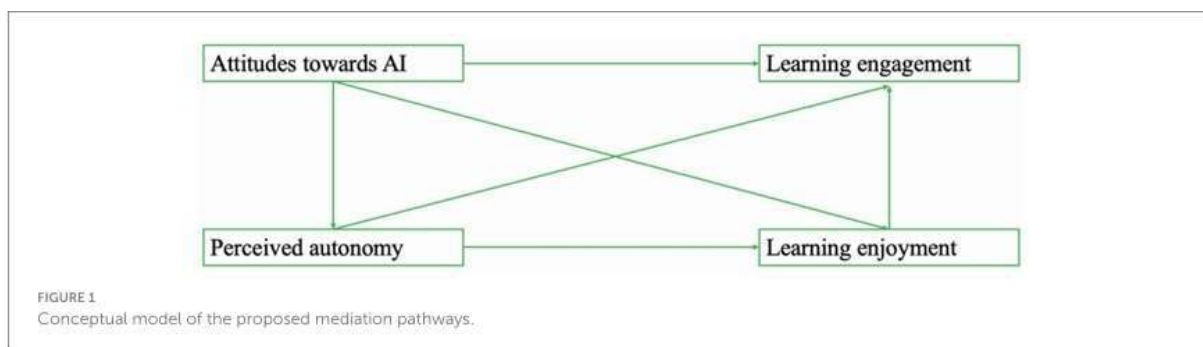


figure1- 4: Attitudes of learners towards AI; Adapted from Liang& Reiss (2025, p.3).

The figure above represents the relationship between Attitudes of learners towards AI and learning engagement, enjoyment and perceived autonomy. According to Liang & Reiss2025, when students show a positive attitude towards AI tools, perceive them as a tool

that enhances their autonomy and makes them choose what they want to learn, they will be more engaged in the learning process.

Individuals in the teaching/learning process also possess negative attitudes towards the integration of AI within HE institutions. Ayala-Pazmiño (2023) argues that students misuse AI tools in order to cheat in their tasks and exams. This shows that AI usage inside the classrooms may hide students' capacities. Teachers may also hold negative perceptions towards AI. For example, Prilop et al. (2025) claim that educators have unwanted concerns towards the integration of AI in the academic settings, such as ethical issues. Moreover, teachers have insufficient expertise concerning AI usage in the classroom, so they may face real academic challenges, mainly if the institutions do not offer academic support like material and training.

Sayici and Aydin (2025), on their part, found that AI has an impact in the teaching/learning setting. Through their study findings, they assumed that educators face difficulties when adopting AI into their teaching strategies such as causing distraction for learners. Following the same findings, teachers also reported that AI use in the classroom could lead to misconceptions because of the AI inaccurate and non-valid content. Furthermore, they raised constraints concerning the incapacity of AI driven applications to adjust content according to students' level of competencies and capabilities, and that AI systems may restrict the critical thinking and problem-solving skills along with innovation among teachers and learners.

1.9. Conclusion

This chapter has addressed a conceptual framework relevant to the investigation of the common “Artificial Intelligence” *Challenges* that can be identified within English medium instruction classes. Moreover, the chapter has examined some definitions of key concepts such

as ‘English Medium Instruction’ and ‘Artificial Intelligence’. The chapter has also discussed an overview about the emergence of EMI in Algeria through examining the influential historical background of the EL, and how it started to spread to reach the status of a language of instruction, recently, imposed by the government. Finally, the chapter has highlighted challenges of AI implementation in HE settings, its adoption in EMI classes and how it is perceived. The next chapter will discuss some methodological concerns related to this study.

Chapter Two:
Methodological
Concerns

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2.1. Introduction

This chapter aims to provide a detailed description of methodological concerns implemented in investigating the AI challenges in EMI settings, particularly, within the stream of Mathematics and Computer Sciences at the University of Ain Temouchent-Belhadj Bouchaib. Initially, the chapter discusses the objectives and the motivations behind conducting this study, and then it describes the research design, site of research, sample population, and the research instruments, including the online questionnaire, teachers' interview and classroom observation. Finally, the chapter tackles the mixed methods approach to data analysis.

2.2. Restating the Research Objectives

The principal objective of this research work is to investigate the effective adoption of AI tools in EMI classrooms. Additionally, this research work aims to examine how EMI courses can be assisted by AI. Moreover, it aims to evaluate how language use and comprehension outcomes of EMI instruction in higher education are affected by the adoption of AI.

2.3. Motivations of Choice

The motivation of choice in this study is based on the idea that EMI has been recently been implemented in the Algerian HE and the significant role of AI integration in the academic contexts. Research on AI challenges in EMI classes, especially in technical streams, is still limited and remains under-explored. Thus, we deemed it important to investigate the main obstacles educators and students actually face. Another motivation is that, AI adoption in EMI settings raises a number of concerns in the teaching/learning process, which makes it a debatable and an emerging topic of research.

2.4. Research Design

The research design plays a significant role in a research work. It is the procedures and the overall plan followed by the researcher while conducting the research in order to yield a successful study. Kerlinger (1986) defines research design as “The plan, the structure, and strategy of investigation conceived so to obtain answers and research questions and to control variance” (p.300). In other words, research design serves as the outline followed in order to have answers to the research questions. Another definition is given by Creswell & Creswell (2018) who define research design as “a set of formal procedures for collecting, analyzing, and interpreting data such as those found in a quantitative experiment or qualitative case study” (p. 309). This means that research design is a formal process that covers collecting, analyzing then interpreting data that match with the methodological approach followed in this research work.

This study adopts a descriptive case study design to effectively investigate the adoption of AI tools in EMI classrooms. The case study is implemented to explore the integration of EMI at the Department of Mathematics and Computer Sciences at the level of the University of Ain Temouchent-Belhadj Bouchaib in Algeria. The case study is defined by Nunan (1997) as “an empirical inquiry that investigates a contemporary phenomenon within its real-life context” (p.76). It is used by the researcher in order to have in-depth perception of a particular problem or phenomenon.

This research work also relies on a mixed methods approach in collecting data, including both quantitative and qualitative approaches. Creswell (2014) states; that the mixed method is the combination or association of both qualitative and quantitative forms. Moreover, the mixed method will help the researcher to have a perspective of the research problem from different aspects. In addition, the use of a mixed method is to have the strengths and minimize the weaknesses of both quantitative and qualitative methods in a single research study (Morse, 2003).

2.5. Site of Research

The current study was conducted at the University of Ain Temouchent, Belhadj Bouchaib during the second semester (January, February, March and April) of the academic year 2025/2026 to investigate AI challenges within EMI settings; the investigation took place at the Department of Mathematics and Computer Sciences.

2.6. Sample Population

Sampling is an important aspect in any research work. It is to select a small group of individuals and collect data from them instead of studying the whole population. This small group will represent the entire population. Verma et al. (2017) define sampling as “the act, process, or technique of selecting a suitable sample, or a representative part of a population for the purpose of determining parameters or characteristics of the whole population” (p. 298). In this sense, Richards (2001) claims that; sampling is concerned with a partial population rather than the whole population, and to ensure that the selected group is representative. Therefore, choosing the appropriate sample is crucial to ensure the validity and generalizability of the findings.

In the current study, the sample population comprises of 44 First year students in addition to six (06) teachers at the Department of Mathematics and Computer Sciences, University of Ain Temouchent during the 2025-2026 academic year. The students are divided into two different specialties: Mathematics and Computer Sciences. Yet, they are studying together. There are eight (08) groups in the first year, about 24 students specialized in Mathematics, and about 198 students specialized in Computer Sciences. The criteria behind choosing this sample are: First, MCS students and teachers are supposed to study different subject matters through EL from the first year and some of these modules are related to AI like

“Introduction to AI”. Therefore, they are required to expose positive attitudes towards EMI. Second, The Ministry of HE encourages teachers to teach through English by programming training sessions for them in order to improve their language abilities.

In this study, a random sampling is followed while gathering data from the participants. Therefore, the questionnaire has been distributed to students via e-mail and different social media platforms such as (Instagram) just like the teachers who were chosen randomly to participate in the interviews. In simple random sampling each member has an equal chance to be selected (Acharya, (2013), as cited in Noor et al., (2022). In addition, this technique of sampling is considered as an objective and unbiased type of sampling, according to Sharma (2017) random sampling is “an unbiased and impartial selection method” (cited in Noor et al., 2022, p. 80). In other words, participants are chosen randomly to ensure the validity of the results and to increase objectivity.

2.6.1. Teachers’ Profile

This research study; deals with First year students and their teachers at the Department of Mathematics and Computer Sciences, University of Ain Temouchent. The sample comprises of six (06) teachers chosen to participate in semi structured the interviews. They were four (03) males and four (03) females. The teacher participants have a doctorate degree and they are teaching modules related to both MCS. Among the modules they are teaching are “Machine Structure”, “Introduction to AI” and “Algorithms and Data Structures”. The main goal of these interviews is to know the attitudes and the experiences of the teachers towards AI integration in EMI classes. In addition, the interviews aim to know the challenges associated with this integration.

2.6.2. Learners’ Profile

In the current research study forty-four (44) participants were selected randomly from first-year students specialized in the field of MCS in order to respond to the online questionnaire. To ensure fairness and generalizability of the results, the participants have been chosen randomly. The students were selected randomly from nine groups (09): one group (01) specialized in Mathematics and eight groups (08) specialized in Computer Sciences.

2.7. Research Instruments

In any study, the researcher tends to rely on the process of instrumentation in order to collect the necessary data about the area under investigation, from a given sample. The process of instrumentation or what is known as data collection instruments refer to the various tools, methods and measures researchers use in order to gather information from the sample's responses that are used in a specific research study. The use of correct instrumentation ensures the validity and credibility of the research results.

In this humble study, to investigate the AI *challenges* in EMI settings and in order to examine the concerns both educators and learners possess, we tend to rely on these three important research tools which are: online questionnaire, structured interview, and classroom observation. The aforementioned instruments provide valuable insights to the findings, as they are crucial to address the research goals.

The first primary tool is online questionnaire which is a set of questions distributed to students in order to gather quantitative statistics from the students. The second instrument involves a teachers' interview to have a deep inquiry as well as to gather detailed insights about the teachers' professional perceptions, experiences and points of views concerning the integration of AI within EMI contexts related to the issue under investigation.

The third instrument used in this study is classroom observation, that allows us to gather authentic data via observing what actually happens inside EMI settings, including the classroom interaction, real-life language use, actual behaviour of students inside the classroom as well as the difficulties both teachers and students encounter in their natural settings.

2.7.1. Online Questionnaire

The Questionnaire is a significant data collection instrument used by researchers. It is among the quantitative data collection instruments that comprises of a set of questions. These questions are generally used with the aim of collecting large amount of data from the participants. Thus, Krosnick (2018) and Malhotra (2006) claim that the questionnaire enables the researcher to collect data rapidly and accurately. It also makes the data analysis easier (cited in Taherdoost, 2022).

In the current investigation, the online questionnaire includes two major types of questions divided into closed-ended and open-ended questions. In close-ended questions the respondents are restricted to specific options or answers while in open-ended questions, the respondents are free to answer and the answers are not fixed or limited i.e.; the answers are not provided for them.

In this research work, the online questionnaire was distributed to 44 students from the department of MCS. It was designed via Google forms and shared to students via E-mail and different social media platforms such as (Instagram). Ten (10) questions were close-ended questions and three (03) were open-ended questions. The questionnaire starts with a brief definition of the main concepts EMI and AI. It was divided into three sections. The first section is about the background information of MCS students and it is composed of three (03) close-ended questions. The first question is about the gender of the respondents. The second question

is about their specialty which is either Mathematics or Computer Sciences. The third question was about their level in EL.

The second section is devoted to the use of English inside the classroom, in addition to the challenges faced by students while studying through EL. It includes both close-ended and open-ended questions where the participants were asked to mention some of the challenges they face. Moreover, the third section is concerned with the use of AI tools in the classroom. It includes five (05) close-ended questions and two (02) open-ended questions. The questions of this section aim to have students' opinion towards the use of AI tools in their studies, in addition to their experience and challenges with the distinct AI platforms in which they had an open-ended question to cite the difficulties they face while using AI. Additionally, the last question of this section aims to know the attitudes of the students towards AI integration in HE.

2.7.2. Teachers' Interview

The interview is a data collection instrument that permits the researchers to get qualitative data about a phenomenon under investigation. It usually occurs between two persons, the interviewer and the interviewee. The interviewer tends to ask open-ended questions to the interviewee in order to know in detail their personal opinions, thoughts, and experiences about the research topic. The interview provides the opportunity for the researchers to interact and ask open-ended questions directly, not only that but also allow them to wonder questions from the participant's answers and this is how interaction process occurs. The later offers rich and in-depth data to assist researchers in exploring their study.

The quantitative method was not enough to get deeper insight about the research topic. Thus, the teachers' interviews are considered as another research tool. This research instrument aims to gather valuable results and detailed answers about the phenomenon under study. In

this research work, this tool helps to fully understand teachers' perspectives towards EMI and AI integration in HE. Moreover, the interviews with teachers aim to investigate and collect their experiences and the challenges they face while combining EMI with AI tools in MCS classrooms.

In this research study, we opted for a structured interview conducted with six (06) teachers from the department of MCS at the University of Ain Temouchent Belhadj Bouchaib. The interview is based on a set of predetermined questions; i.e., formulated in advance, the same questions were asked with the same order to all the participants. Hence, structured interviews provide us with a concise focused data that can be aligned with the research objectives and can be analyzed later on. The interview predetermined questions were conducted in English, but to ensure clarity and that all the participants can share their own views and experiences freely without any confusion, we offered a chance to the participants to answer in French to avoid any further misunderstandings.

After the participants' consent, we prepared audio recordings for the answers to ensure reliability and accuracy of the data; afterwards, the answers were transcribed and if there was any answer in French, it was translated into English so that it can be further analyzed. The Interviews were engaging; they lasted approximately from 20 minutes to 30 minutes, where we got valuable and targeted responses from the participants.

The interview is composed of seven (07) open-ended questions, in which the teachers are free to express themselves and expand their answers. Initially, the interview starts with the clarification of the main concepts EMI and AI. The first question aims to know to what extent the teachers use English while teaching. Then, the second question is about the challenges they face while using EMI, they were also asked to mention some of them.

Additionally, the third question is about their perspective about the use of EMI in technical streams mainly MCS streams. The fourth question is about their attitudes towards AI integration in EMI classrooms. After that, the fifth question is about their opinion about teachers' training concerning EL and AI tools. Consequently, the sixth question is concerned with the challenges that may arise while combining EMI with AI in the classroom. Finally, the last question is related to the previous question, aiming to know how AI tools help students with the obstacles they face in EMI classes.

2.7.3. Classroom Observation

Classroom observation is among the qualitative tools that enable researchers to gather data in authentic settings through observing the target population of the study in their natural context. The objective of employing this tool is to gain a deeper understanding of the phenomenon under investigation, through observing the behaviour of the participants, their interaction in the classroom and in how they use language in the academic context. Marshall and Rossman (1989) affirm that observation is based on the idea of noting the details in a social environment including the behaviours, incidents and materials. Thus, the researcher can immediately note the participant's interactions and actions firsthand to guarantee the accuracy, authenticity and reliability of the data, which in turns reinforce the validity of the research findings.

In this study, classroom observation took place during the second semester of the academic year 2025/2026 with first year MCS classes, in order to investigate the AI challenges that can be identified in EMI settings. We attended a total of eight (8) structured observation sessions in distinct classes to comprehend and gather the crucial notes about the phenomena

under study. The observed sessions are four (4) lecture sessions, three (3) tutorial sessions i.e., (TD) and one (1) practical session i.e., (TP), each of the mentioned sessions lasted one hour and a half.

MCS specialty comprises seven (7) modules; the observation sessions were conducted during the following modules: Introduction to Artificial Intelligence (course) and (TD), Machine structure (Course), Analyse (course) and (TD) and ASD called ‘Algorithmique et Structures de Données’ (TD) and (TP). The researchers note that Artificial Intelligence is new module in their programme. The data were gathered by taking notes and writing down in the observation grid. Moreover, to ensure objectivity, we did not participate directly in the classroom observations. Thus, the current study opts for covert observation so that student can behave naturally.

The observation grid is composed of six (06) main features to observe AI challenges in EMI settings. The first three items in the grid aim to discover language use; i.e., in which language the teacher delivers the course, as well as how the process of interaction occurs between teacher –students / students-students, also whether the teacher uses specific material to help students understand the course. Additionally, the grid attempts to investigate the use of AI by teacher/students, within EMI classes, to see if the participants are using AI tools to assist themselves and enhance the teaching/learning process. The next feature focuses on detecting any difficulties students face while studying EMI courses. Finally, the grid shed light on the common obstacles teacher/students face while using AI platforms.

2.8. Methods of Data Collection and Analysis

The current research work followed different methods and procedures of data collection. Thus, as already stated, data was collected through different instruments and sources

including the online questionnaire, the teachers' interview and classroom observation. The first step, was administering the online questionnaire with the purpose of gathering data from the students. This research tool aims to collect large data about the students' perspectives towards EMI and AI integration in their studies. The questionnaire took a period of two months (February and March) to gather valuable data.

The second step was teachers' interviews; six (06) interviews were carried out with teachers at the department of MCS during the second semester. They aim to collect deeper insight about teachers' experiences and challenges in relation to EMI and AI.

The last instrument was classroom observation during the second semester of the 2025-2026 academic year, precisely the months of January, February and March. In this sense, data was classified in an observation grid with the aim of exploring the integration of EMI and AI in MCS classrooms at the level of the University of Ain Temouchent. After the completion of data collection stage, data analysis stage takes place. This phase includes evaluating, selecting and analyzing the data collected from the different instruments. Thus, data analysis can be through different methods applying either the quantitative or the qualitative approaches, or combining both approaches depending on the data collected in the study. Each research approach presents different techniques of collecting data.

In this research work, both quantitative and qualitative approaches were applied to analyse the data collected from the questionnaire, teachers' interviews and classroom observation. The combination of both methods i.e., the use of the mixed method gives in-depth insights to the phenomenon under study which is the AI challenges in EMI classes at the department of MCS in Ain Temouchent University. Macky and Gass (2005) declare that "the

use of multiple research techniques and multiple data sources contributes to the credibility of the investigation.” (p. 164).

2.8.1. Quantitative Method

The quantitative method is a systematic approach of data collection and analysis. It is objective and formal method of gathering numerical and statistical data to answer certain research questions. This approach helps the researcher to collect large number of data which can be in form of percentages, statistics, graphs and pie charts in order to achieve the reliability and generalizability of the findings. Data can be collected through various instruments such as questionnaire, surveys and experiments.

In the current research, the quantitative method was through the use of the online questionnaire with MCS students to investigate the AI adoption in EMI classes and the challenges associated with them. The questionnaire consists of close-ended and open-ended questions. Close-ended questions were analysed quantitatively while the open-ended were analysed qualitatively. Moreover, the numerical data collected were presented in a form of statistics and percentages. Then, data were represented in form of graphs and pie charts in order to present and interpret the results in clear form.

2.8.2. Qualitative Method

The Qualitative method is a non-statistical approach that offers a deeper understanding of the phenomenon in its natural setting; it is based on the collection of non-numerical data that enable the research to explore the research study in depth. Oranga and Matere (2023) state that the qualitative method allows the researcher to explore the research topic through investigating not only in what the respondents says but also the reason behind their answers and this can be

noticed in their reactions and gestures that reveals their experiences, perceptions and attitudes towards the research problem.

Thus, the current study opted for this method to gather authentic data that can increase the validity and the credibility of the research via the use of structured interviews with teachers to know their concerns, perspectives and insights concerning the research topic in details and classroom observation to detect student's behaviours, acts and reactions in their natural context.

2.8.3. The Mixed-Methods Approach

The mixed methods approach is the combination of both the quantitative and the qualitative approaches in one single study, in order to have a deep understanding of the research topic as well as to ensure the validity and the reliability of the research findings. Dawadi et al. (2021) affirms that the use of the mixed method approach widens the scope of the researcher's study by allowing them to investigate in the research topic in detail.

Creswell (2003) mentions that the generalizability of the findings in research depends on the combination of both numerical data and in-depth insights to comprehend the research problem. (Cited in Dawadi et al. 2021). Furthermore, the mixed method often employs the use of triangulation that is the use of multiple methods such as questionnaire, interviews, and classroom observation to develop the understanding of the research topic and provide authentic and credible data.

The objective behind using the mixed s approach is to ensure the validity and the reliability of the results through a mixture of both quantitative and qualitative data, in this study the use of the online questionnaire administered to the first year MCS students as well as the interview conducted with the teachers and the classroom observation, provided a range of data to answer our research questions.

2.9. Conclusion

This chapter has provided a detailed explanation of the methodological framework followed in this research work to investigate the AI challenges in EMI classes. It has started with the objectives and the motivations behind choosing and conducting this study. Moreover, the chapter has described the research design, site of research, sample population. In addition, it has clearly stated the various research instruments used including the online questionnaire, the interview and the classroom observation. Furthermore, it has tackled the mixed methods approach involving both quantitative and qualitative approaches to data analysis. The next chapter will be devoted to data analysis, discussion and interpretation of the main results collected for this study.

*Chapter Three: Data
Analysis and
Interpretation*

Chapter three: Data Analysis and Interpretation

3.1 Introduction	
3.2 Data Analysis	
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3.2.2 Analysis of the Interview with Teachers.....	
3.2.3 Analysis of Classroom observation	
3.3 General Interpretation of the Main results	
3.4 Suggestions and Recommendations	
3.5 Limitations of the study	
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3.1. Introduction

The current chapter starts with the analysis of the collected data from the various research tools employed in this study: An online questionnaire, a semi structured teachers' interview and classroom observation. It also presents a general interpretation of the main results. Moreover, the chapter provides some suggestions and recommendations for teachers and learners. Finally, the chapter ends with discussing the limitations of the current research work.

3.2. Data Analysis

The following chapter is devoted to data analysis and interpretation. The following section will analyse the students' online questionnaire.

3.2.1. Analysis of the Students' Questionnaire

The analysis of the students' questionnaire is based on the answers of 44 participants of first year MCS department. The first section focused on the background information of the participants. The second section is devoted to the investigation on the use of English in EMI classrooms. In the end, the third section is devoted to the use of AI in EMI classrooms.

Section one: Background information

Question one: What is your gender?

Table 0.1: Gender of the participants

Options	Responses	Percentages
Male	25	57%
Female	19	43%

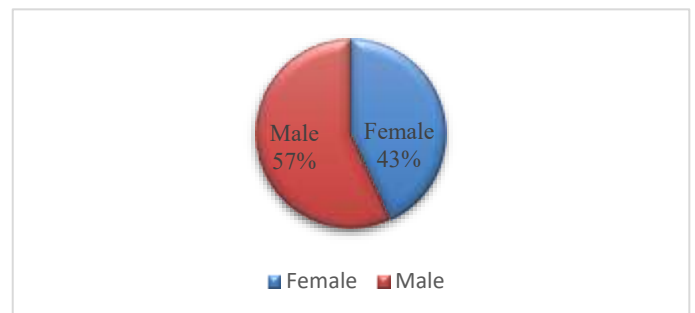


Figure 0.1 Gender of the participants

Figure 3.1 indicated that 57 % of the participants are males, and 43 % of the participants are females. The majority of the participants are males.

Question two: what is your field of study?

Table 0.2: The field of study of the participants

Options	Responses	Percentages
Computer sciences	40	91%
Mathematics	4	9%

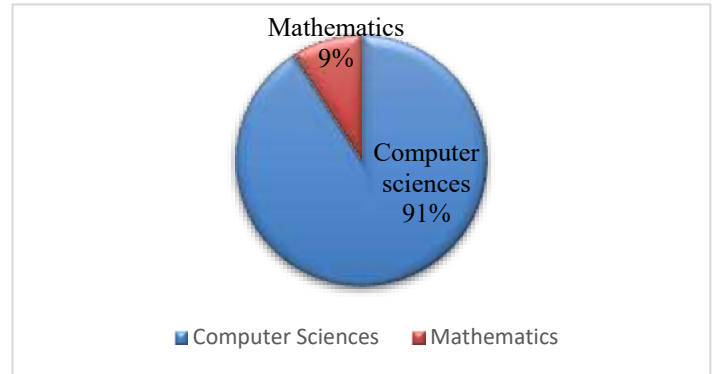


Figure 0.2: The field of study of the participants

Figure 3.2 indicated that 91% of the participants are from the speciality of Computer sciences and only 9% are from Mathematics specialty. This highlighted that most participants are from the speciality of Computer sciences.

Section two: The use of English in EMI classrooms

Question three: How can you evaluate your English proficiency?

Table 0.3: Evaluation of English proficiency

Options	Responses	Percentages
Intermediate	16	36%
Advanced	15	30%
Beginner	13	34%

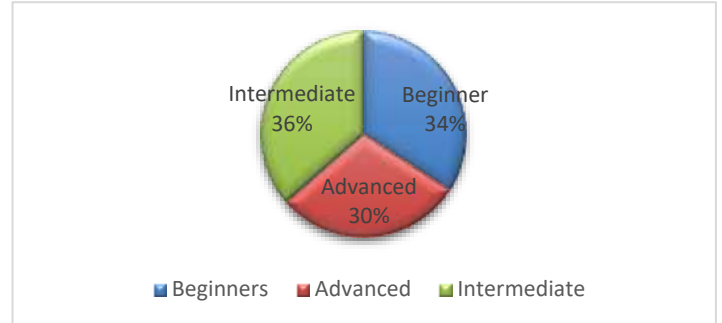


Figure 0.3 :Evaluation of English proficiency

Figure 3.3 demonstrated that 34% of the participants are beginners while 30% are advanced and the rest of the participants, 36% are intermediate. This suggested that most of the participants have an intermediate level in English.

Question Four: How much do you use English in the classroom?

Table 0.4: The use of English in the classroom

Options	Responses	Percentages
To a small degree	23	52%
Moderately	12	27%
Not at all	5	12%
Too much	4	9%

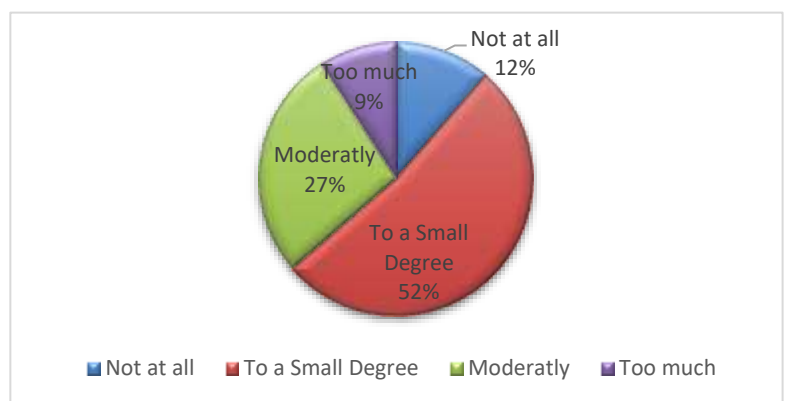


Figure 0.4: The use of English in the classroom

Figure 3.4 showed that 52% of the participants used English to a small degree, 27 % used it moderately, 12 % did not use English at all, 9 % used it too much. This demonstrated that most of the participants use English to a small degree in the classroom.

Question Five: Do you encounter issues in comprehending spoken English in lectures?

Table 0.5: Issues in spoken language comprehension

Options	Responses	Percentages
Yes	28	36%
No	16	64%

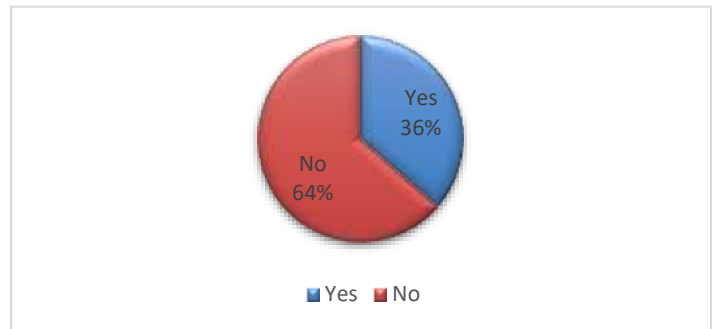


Figure 0.5: Issues in spoken language comprehension

Figure 3.5 indicated that 36 % of the participants encounter issues in comprehending spoken English in lectures, while 64% did not encounter issues. Therefore, the majority of the participants did not have issues in the comprehension of spoken English in lectures.

The common issues encountered by students in comprehending spoken English were stated as follows:

- ✓ The majority of students faced difficulties in understanding spoken English due to the lack of vocabulary and grammar, hard or difficult terminologies used by teachers.
- ✓ A number of students faced difficulties in terms of hearing issues; they assumed that there are some teachers who spoke in low voice.
- ✓ Few students faced difficulty in terms of concentration and this led them to lose their attention; as a result, they did not understand spoken English.

✓ The greater part of the students are still beginners in English proficiency; therefore, they lacked comprehension.

✓ Several students reported that their difficulties to understand spoken English lectures can be attributed to teacher's deficiency in pronunciation and for this reason they miss the comprehension of the courses.

✓ A subset of students affirmed that the majority of teachers use a mixture of English and French while explaining the lectures, therefore the students felt confused and they cannot understand the courses explained by the teacher.

Section Three: The use of AI in EMI classrooms

Question seven: To what extent do you use AI tools in your studies?

Table 0.6: The use of AI tools in EMI classrooms

Options	Responses	Percentages
Often	23	52%
Always	21	48%
Never	0	0%

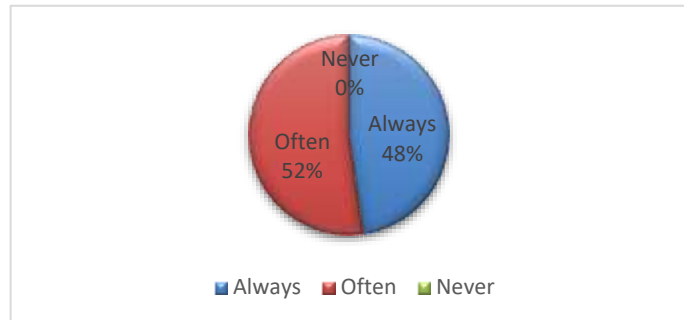


Figure 0.6: The use of AI tools in EMI classrooms

Figure 3.7 showed that 52% of students used AI tools frequently in their studies, while 48% of the students used AI tools consistently while studying. Additionally, none of the students, 0% reclaimed about none usage of AI which indicated that AI tools employment in EMI classrooms is of paramount importance.

Question eight: How do you find the use of AI in the classroom?

Table 0.7: The use of AI in the classroom

Options	Responses	Percentages
Beneficial	34	77%
Neutral	10	23%
Not Beneficial	0	0%

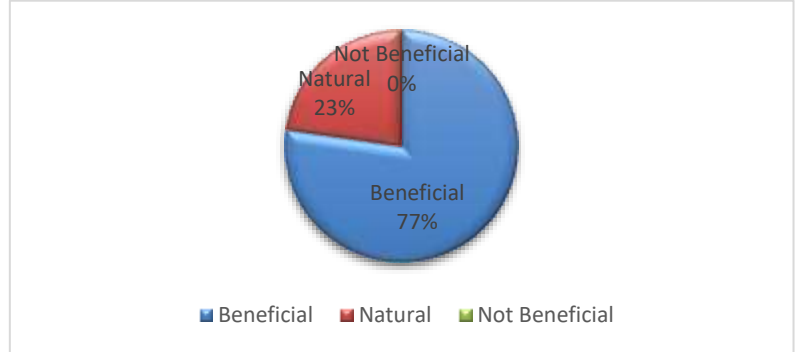


Figure 0.7: The use of AI in the classroom

Figure 3.8 showed that 77 % of the participants found the use of AI in the classroom beneficial, 23 % are neutral, while the rest 0% of the students determined AI as a non-useful platform. Thus, the majority of the participants supported the use of AI in the classroom and find it helpful.

Question nine: Do you feel hesitated to give your data to AI because of privacy concerns?

Table 0.8: Learners' hesitation towards AI in relation to privacy concerns

Options	Responses	Percentages
No	30	68%
Yes	14	32%

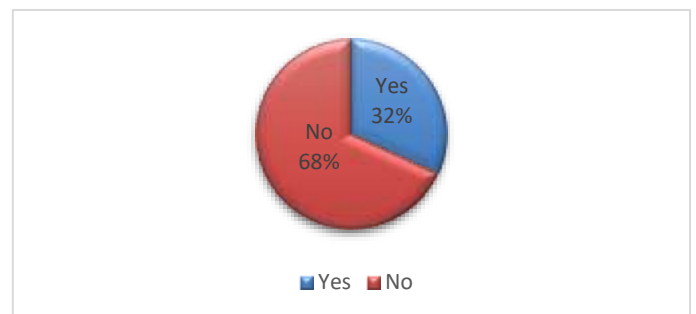


Figure 0.8: Learners' hesitation towards AI in relation to privacy concerns

Figure 3.9 illustrated the reluctance of students towards the adoption of AI. The results showed that 68% of the students were not yet ready to give their data to AI due to privacy doubts, only 32% of the whole participants trusted AI platforms and they did not have any kind of uncertainty regarding AI. This means that the majority of the students reflected on the negative side of AI in terms of privacy issues.

The common reasons that make learners feel hesitated to give their data to AI were the following:

- ✓ The majority of the students felt hesitated to provide AI with their data because they do not trust it.
- ✓ Quite few of them mentioned that AI programs are made by humans, so they cannot trust them and they mentioned that AI can use their information against them.
- ✓ Some of them felt afraid that AI programs can publish or steal their sensitive and confidential information.
- ✓ Several students stated that they use AI for their studies only, without providing it with any personal information.
- ✓ Only a few students revealed that they do not have problems to share their data and that AI is made to help them.

Question Eleven: While using AI, do you face any difficulties?

Table 0.9: Difficulties with using AI

Options	Responses	Percentages
No	36	82%
Yes	8	18%

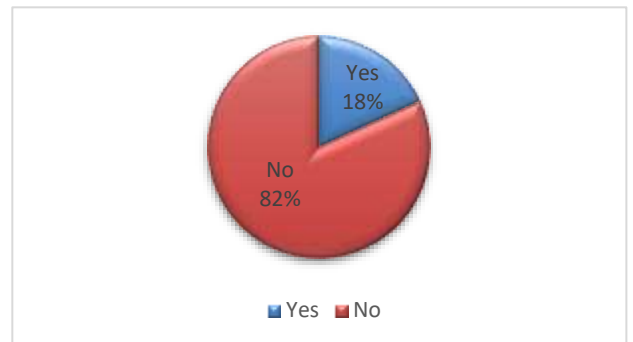


Figure 0.9: Difficulties with using AI

Figure 3.11 indicated that 82% of the participants did not face difficulties while using AI, while 18% mentioned that they face difficulties. This highlighted that the majority of the participants did not face problems with the use of AI.

The typical difficulties students faced while using AI were:

- ✓ The majority of the students had no difficulties when using AI, but a number of students affirmed that AI takes a long time in order to provide an accurate answer or bring good results.
- ✓ A subset of students assumed that AI is most of the time wrong especially in terms of answering questions.
- ✓ The students also reclaimed that AI sometimes does not understand the request and may do completely different things, such as offering wrong answers or replying to something outside the topic of the request or the discussion.
- ✓ Several students complained about AI being wrong frequently, and not providing the students with what they are looking for.

Question thirteen: What is your attitude towards AI usage in higher education?

Table 0.10: Learners' attitudes towards AI use in HE

Options	Responses	Percentages
Positive	33	75%
Neutral	9	20%
Negative	2	5%

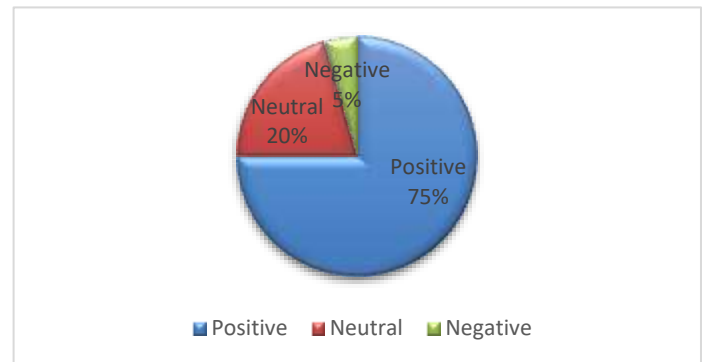


Figure 0.10: Learners' attitudes towards AI use in HE

Figure 3.13 showed that 75 % of the participants had a positive attitude towards the use of AI in higher education, 20.5% of them were neutral, while 4.5% of them have a negative attitude towards it. This indicated that the majority of the participants possessed a positive attitude towards AI use in HE.

3.2.2. Analysis of the Interview with Teachers

The analysis of the teachers' interview provided valuable and authentic insights that have been taken from (8) teachers of first year MCS. The interview consists of (7) significant questions in order to know the teachers' perspectives, concerns and attitudes towards the use of AI within EMI settings. The Analysis of the questions are analysed and introduced as follows:

Question one: To what extent do you use English as a medium of instruction in your courses?

Teacher one: *"I would estimate that I use English for about 60-70% of the instruction. I deliver core concepts and terminology in English (PowerPoint slides in English) to build their technical vocabulary, but I often switch to Arabic/French to explain complex theories, check for understanding, or facilitate classroom discussions".*

Teacher two: *"I use English particularly in speciality modules such as deep learning where the important terms are in English".*

Teacher three: *"I use English in preparing lectures, and choosing examples which are related to other fields".*

Teacher four: *“When it comes to L1 students, while explaining the lessons, I use French, and when writing on the board, I use English by contrast to L3 students where I use French only”.*

Teacher five: *“I use English in a limited way, specifically while preparing TD activities”.*

Teacher six: *“I sometimes use English in my courses”.*

Question two: Do you encounter any challenges while using English as a medium of instruction?

List them if any.

Teacher one: *“1) I have problems in preparing lessons with simple language and double-checking the grammar on my written materials.*

2) I also have issues with looking for the most commonly used technical terms, because my training was in French. For example: the phrase "Déroulement d'un algorithme," which means trying to manually simulate the execution of an algorithm on paper. Its translation in English is "Simulate the execution of an algorithm." So, it is not a word-for-word translation; you have to find out how people are used to calling it in English.

3) I often have to rephrase explanations to increase the chances of a good explanation.

4) I need to make sure that all students are following along, and to check that they understand the substance of the course.”

Teacher two: *“Some mathematical or physics concepts are sometimes difficult to explain”.*

Teacher three: *“Speaking is the biggest challenge in teaching mathematics in English.”*

Teacher four: *“I do not have rich vocabulary in English; this causes difficulty for me mainly in oral explanation.”*

Teacher five: *“Yes, sometimes specifically for the comprehension of certain technical terms for students.”*

Teacher six: *“Yes, I do encounter challenges. Since my own studies were conducted in French, and I have begun my career teaching in French; this is my first year using English as a medium of instruction. Transitioning between these two technical languages remains a significant challenge.”*

Question three: To what extent do you agree that EMI is essential in technical fields, and more particularly in Mathematics and Computational Sciences stream?

Teacher one: *“In computer science, the tools themselves (programming languages) are based on English, and the best documentation is in English. So, EMI is essential to prepare students for research and the international opportunities of jobs. However, I believe it should be implemented flexibly: the core concepts and terminology must be taught in English to build vocabulary, but complex mathematical reasoning can be clarified in other languages to ensure deep understanding”.*

Teacher two: *“EMI use is very productive in technology and more particularly in the “Introduction to Artificial Intelligence” subject, where scientific papers are written in English”.*

Teacher three: *“It is useful to teach and produce written research papers in English. In addition, there are many beneficial sources in English.”*

Teacher four: *“I agree that teaching in English is important especially with this advanced transition, so it is important for traditional teachers to adapt with the integration of English in higher education.”.*

Teacher five: *“I am with the utilization of English in teaching simply because it is the most used language in technical and scientific domains.”*

Teacher six: *“The vast majority of technical documentation is written in English, making English as a Medium of Instruction (EMI) essential for my students and my own teaching practices.”*

Question four: How do you perceive the integration of AI tools in EMI classrooms?

Teacher one: *“I perceive the integration of AI tools in EMI classrooms as inevitable and revolutionary. On the other hand, I note a significant decrease in the personal effort students put into preparing exercises. They tend to systematically resort to AI-generated solutions. I sometimes provide a temporary solution before revealing the final answer, but I am regularly faced with a certain disappointment: I receive perfectly written responses that I am certain do not come from the students’ own work.”*

Teacher two: *“AI tools can provide the summary of large volumes of documents to ensure comprehensive knowledge of the area tackled.”*

Teacher four: *“AI tools may help students to better understand scientific concepts in English but their effective use should be based on academic integrity.”*

Teacher five: *“AI is very useful in my class since it can be used to analyse data, explain difficult terms in English, and help students solve their tasks.”*

Teacher six: *“AI is now an essential tool for higher education, especially in computer science. Nonetheless, we must educate students on how to avoid the misuse of these technologies.”*

Question five: According to you, to what extent is English alongside AI training at university so important?

Teacher one: *“Learning English constitutes a necessary alignment with global trends. However, the major problem with the use of AI is that we are not certain we will be able to control it in the future. The current manifestations of this phenomenon—such as cheating and the erosion of personal effort—are merely the early signs of more complex problems to come. It is imperative to anticipate a worsening of these deviations.”*

Teacher two: *“Without training and background in English, we will not be able to go further and develop our knowledge about AI.”*

Teacher three: *“It may open more opportunities for teachers so that they develop updated.” teaching methods as well as for students to enhance their learning styles and acquire knowledge.”*

Teacher four: *“English proficiency is essential for AI usage because most research tools and resources are in English, allowing access to recent knowledge and international collaboration.”*

Teacher five: *“Yes, training in English is very important because most resources and software are in English.”*

Teacher six: *“I believe this is an excellent strategy. By integrating English and AI tools early on, future teachers will be better prepared and won't face the same challenges I encountered at the start of my career.”*

Question six: What challenges arise when combining EMI with AI tools in your classrooms?

Teacher one: *“AI tools can help students overcome language barriers to understand complex concepts. However, they risk creating a dependency that hinders the development of their autonomy in English. These challenges also push us to rethink our assessment methods.”*

Teacher two: *“As a teacher among the challenges I faced, is the increased risk of dependence on AI tools by students especially during exams and evaluations.”*

Teacher three: *“According to me, mathematics is a practical field in which it is rarely combined with AI.”*

Teacher four: *“I personally do not use English in my teaching strategies. I use French rather.”*

Teacher five: *“Most students rely on the use of AI to solve their tasks and to get feedback about their assessments.”*

Teacher six: *“I have not encountered any problems using AI. On the contrary, it has been of a great help in translating my course materials into English, mostly technical terms.”*

Question seven: In what ways can AI tools help students overcome language obstacles in EMI courses?

Teacher one: *“EMI courses pose a dual burden on students: they must learn both a new language and a new subject. AI tools reduce this cognitive load by handling some of the language processing.”*

Teacher two: *“AI tools are used for simulations and presentation of situations and programs that are difficult to understand or implement.”*

Teacher three: *“I think students rely on AI tools to solve problems more often without confirming that the results are correct.”*

Teacher four: *“AI tools are used by students to understand the content, translate difficult terminologies and vocabulary, therefore it facilitates learning English in EMI contexts.”*

Teacher five: *“In tutorial sessions, AI helps students a lot but one obstacle remains in which the students rely on AI excessively with no effort.”*

Teacher six: *“AI can significantly help students overcome language barriers by translating course materials. It can also provide simple explanations, practical examples, and suggest relevant documentation. However, the effectiveness of these tools depends entirely on the students’ ability to formulate precise and well-structured queries.”*

3.2.3. Analysis of Classroom Observation

The data gathered from the classroom observation focus on the analysis of the key aspects mentioned in the grid of observation.

- **The use of language instruction**

This aspect emphasises on the language used by the teacher to deliver the content of the subject matter. We observed that teachers were not using too much English in their

explanation. In a course session, the teacher explains the content of the lecture through French, she/he rarely explains some terminologies through English. In the tutorial sessions, the teachers give the instruction of the exercise in English; while answering and explaining she/he sometimes switches to Algerian Arabic in order to make students understand the content of the lecture and the activity.

- **Classroom interaction**

This aspect focuses on the interaction that occurs between teacher-students/ students-students. We noticed that there was limited interaction between the participants. In course sessions, the teacher usually explains the course and the students remain silent and passive. In tutorial sessions when the teacher asks questions the students remain also silent, and they do not tend to interact. Thus, rarely students collaborate with the teacher and the latter reflects the teachers' authority in the classroom with a restricted learner's involvement.

- **The materials used**

The focus of this aspect is on whether the teacher uses tools like the visual aids and the handouts in the classroom in order to enable students understand the course. We noticed that the teachers use visual aids mainly the data- show in the course sessions. In this sense, the lectures were presented to students through PPT and they were written in English. In addition to the use of handouts for the activities provided for them in the tutorial session. We also noticed that the teacher writes on the board some notes while explaining. In practical sessions, we have noticed that students were frequently using their laptops and mobile phones to solve the tasks given by the teacher and practice what they have learned in the course sessions.

- **The use of Artificial Intelligence**

This aspect deals with whether teachers/students utilize AI instruments within the classroom environment. We observed that teachers usually do not use any kind of AI tools in order to explain the course or to provide examples for their students; they only tend to use the paper sheet or their body language such as gestures and facial expressions in order to explain the content of the course. Meanwhile, the students often use AI tools such as ChatGPT in order to answer the questions, or they use it frequently to translate hard terminologies expressed by their instructors. Furthermore, we have noticed that the students, in practical sessions, use their computers to apply what they have practised in the tutorial sessions and to have a deep understanding of the subject matter “Introduction to Artificial Intelligence”.

- **Student comprehension**

The student comprehension aspect is concerned with whether students are facing difficulties to understand the course delivered in the language of instruction. We have noticed that the students usually do not understand when the course is explained in English; as a result, they remain silent; they do not provide feedback on the lesson explained previously by the teacher; They also rarely ask questions and participate in tasks.

- **Obstacles encountered while using AI**

This aspect aims to observe whether the teacher or the students encounter difficulties in using AI tools inside the classroom. Since we noticed that the teachers use no AI tools; automatically, no issues were observed. As for the students, we noticed that they had Internet issues; this affected their access to AI tools. They were asking each other whether they have access to them or not.

3.3. General Interpretation of the Main results

The results obtained from the online questionnaire, the Interview with teachers and classroom observation yielded interesting results. The analysis of data collected from the online questionnaire unveiled that students hold positive attitudes towards the integration of AI within EMI Classrooms. The majority students consider AI as a beneficial system for learning as it offers them the opportunity to translate difficult terminologies, solve hard tasks and understand the content of the lecture.

Moreover, from the interview with teachers; it was obvious that teachers exhibit positive attitudes towards AI integration in EMI courses; they perceived it as “inevitable” and “revolutionary” since it helps them to analyse data and summarize large volumes of documents and they consider AI as an essential system in HE. Furthermore, a subset of teachers affirmed that AI tools reduce the cognitive load of students. However, the combination of both AI and EMI in Mathematics and Computer sciences revealed typical challenges in EMI such as grammar issues; lack of vocabulary and teachers’ training in EL. While for AI the most common challenge is the risk of dependency on AI by students.

Classroom observation also offered relevant insights concerning AI integration within EMI settings. We found that there was a lack of EL usage since teachers were explaining lectures in French, and only assignments were given in EL; also, in order to facilitate the task for students, teachers tended to code-switch from French to Algerian Arabic. Additionally, students were passive learners. they remained silent during all the tutorial observed sessions; they rarely collaborated with their teacher. Concerning AI use, we noticed that teachers did not use any AI tools in their teaching strategies while students did.

Before conducting this study, three hypotheses were proposed. As a first hypothesis, we proposed that EMI courses can be supported by AI. However, challenges such as teachers’ limited training in AI and students’ excessive reliance on AI hinder their academic language

use and comprehension in EMI contexts. On the basis of the data gathered from the different tools used, the current study validates this hypothesis because, in light of the teachers' and students' answers, EMI courses can be supported by AI. However, from the classroom observation we attended, teachers' limited training and students' excessive reliance on AI partially hinder their academic language use and comprehension in EMI contexts.

For the second hypothesis on whether AI adoption in EMI classes might either support or hinder students' language use and comprehension depending on teachers' AI ability, this study confirmed that AI adoption in EMI classes supports students' language use and comprehension depending on the teachers' level as regards its use. Yet, a part of the hypothesis was invalidated, which is the adoption of AI within EMI classes hinders students' language use and comprehension depending on teachers' level as regards its use.

For the last hypothesis, we proposed that teachers and students display positive attitudes towards AI adoption in EMI classrooms. In light of the results collected, this hypothesis has been proven. Both teachers and students had positive attitudes towards AI adoption in EMI classrooms. Most students used AI as a support in their learning, and the teachers' answers confirmed that the use of AI helps students to better understand scientific and technical terms.

3.4. Suggestions and Recommendations

In light of the results obtained, we suggest several recommendations that would be helpful for both teachers and students of First Year Mathematics and Computer Sciences to overcome challenges related to both AI and EMI. On the one hand, students should attend training sessions to improve and develop their vocabulary related to their field of study. In this sense, students are recommended to engage and participate in classroom interaction to enhance

their communication skills. Moreover, students are advised to adopt positive attitudes towards EMI.

Therefore, they consider EL as an opportunity to widen their knowledge in relation to their future career. Additionally, students are advised to use AI in a wise manner where its different tools are considered as assistants that can aid them in their studies. To avoid any miscomprehension- in terms of answers provided by AI-, it is beneficial for students to check the source of the information given by AI tools. Furthermore, students are recommended to learn how to provide AI with a well-structured prompt that can lead to accurate answers.

On the other hand, not only students and teachers are recommended to attend AI training sessions, but also teachers are advised to do trainings to reach better EL skills. Also, teachers should use simple terminology mainly for the complex terms. Additionally, teachers are recommended to encourage students to interact with each other through meaningful tasks specifically in Tutorial and Practical sessions. Moreover, teachers are advised to guide their students to use AI in a wise and responsible manner that can enable them to collect accurate and correct responses. Furthermore, teachers should support students to think critically instead of relying only on AI answers. In terms of enhancing the quality of teaching/ learning, teachers need to demonstrate positive attitudes towards the integration of AI within EMI settings.

3.5. Limitations of the study

Like any study, researchers usually face some difficulties that may hinder the process of collecting data to obtain valid and reliable results. We encountered distinct drawbacks that delayed our work. One of the limitations we faced is the lack of sources since our research topic is partially updated; particularly, when we combined it with Artificial Intelligence.

Another limitation is time constraints; students took too much time in order to answer the online questionnaire, and this delayed the process of data collection. Moreover, teachers and students did not attend all the sessions in Ramadan; this causes a delay in the schedule of the classroom observation.

Since the questionnaire was sent to first year Mathematics and Computer Science students, we encountered several issues because they were not quite aware that their answers are important for our research work. Thus, we tend each time to remind them to answer the online questionnaire. Furthermore, while checking the answers of the respondents, we found some irrelevant answers especially in the open-ended questions section; students were not serious in their answers, and they usually provided meaningless and childish responses that were out of the context of our topic.

Additionally, some teachers did not enable us to enter the tutorial and the practical sessions. Concerning the TD sessions, some teachers declared that the session will be about tasks only, and that the session will not be beneficial for us. For the practical sessions, the problem was that some teachers did not allow us to check the material students use. The last teacher prevented us to check whether both teachers and students use AI or not.

3.6. Conclusion

The chapter at hand dealt with data analysis and the interpretation of the main results obtained from both quantitative and qualitative methods. The chapter began with the analysis and interpretation of the online questionnaire, teachers' interview and classroom observation. Afterwards, it interprets the main results. Then, the chapter provided some significant and useful suggestions and recommendations for both teachers and students. In the end, the chapter discussed the prevalent limitations that we faced during the conduct of our study.

General Conclusion

General Conclusion

Along with the advancement of the educational system, the status of English Medium Instruction and Artificial Intelligence in higher education play a significant role in enhancing the quality of teaching/learning process. The present research work is an insightful investigation on the combination of both AI and EMI in higher education with a special focus on the challenges of AI adoption in EMI settings and the attitudes towards this adoption.

This study was comprised of three chapters; the first chapter was devoted to explore the emergence of EMI in Algeria; a special focus is put on the implementation of EMI, and the challenges faced by students in scientific and technical streams. The second chapter tackled the methodological concerns of the research study, describing the motivations of choice, site of research, sample population, research instruments and methods of data collection and analysis. The third chapter dealt with data analysis and interpretation of the main results obtained from the three research instruments to confirm or reject the proposed research hypotheses and offered suggestions to overcome AI challenges in EMI settings.

Based on the analysis of the online students' questionnaire results, the teachers' interview and classroom observation, the first research hypothesis has been confirmed since EMI courses can be supported by AI. Yet, from the classroom observation sessions, we found that the teachers' limited training in AI and English and the students' excessive reliance on AI, can partially hinder their language use and comprehension in EMI contexts.

The second hypothesis which states that AI adoption in EMI classes supports students' language use has been partially validated, since AI can also hinder students' language use and comprehension depending on teachers' level of training as regards its use. As for the third hypothesis, it has been proven because teachers and students had positive attitudes towards AI adoption in EMI classrooms. From the results obtained, most students' answers showed that AI supports their learning, while teachers' answers revealed that there are typical challenges

General Conclusion

when combining both AI and EMI involving grammar issues, lack of vocabulary, lack of training in EL, as well as students' reliance on AI system.

The current study provided insightful results. For instance, first year computer sciences students face difficulties in understanding spoken EL mainly technical terms in their field of study. In this sense, it has been realised that AI can serve a crucial support for both teachers and students. The employed instruments in our research shed light on an interesting finding about teachers' and students' positive attitudes towards AI integration in EMI classes. Yet, AI adoption in EMI classes can be challenging in terms of students' excessive reliance on AI, and limited teacher training in both EL and AI.

The main conclusion inferred, from the present study, is that in order to enhance the quality of teaching/ learning in scientific fields-mainly 'mathematics and computer sciences' stream- and in order to improve teachers' and students' skills in EL, it is necessary to integrate AI within EMI classes. To make this feasible, it is important to incorporate training sessions for both partner-parties to enhance the quality of teaching and learning. Future studies may tackle the role of AI in enhancing students' speaking and writing skills in EMI settings.

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Appendices

Appendix 1

Students' Online Questionnaire

Questionnaire for First Year Computer Science and Mathematics Students

This questionnaire is administered to First Year students of Mathematics and computer sciences. It aims to investigate AI challenges within EMI settings. We kindly ask you to answer these questions for the purpose of academic research.

EMI: is to teach subject matter content through the English Language.

AI: Machine intelligence, which has the ability to perform tasks that require human intelligence.

- Thank you in advance for your collaboration.

NB: The answers of the following questionnaire will be anonymous.

1/ -What is your gender?

- a- Male b- Female

2/- What is your field of study?

- a- Computer sciences b- Mathematics

3/- How can you evaluate your English proficiency?

a- Beginner b- Intermediate C- Advanced

4/- How much do you use English in the classroom?

a- Not at all B- To a small degree c- Moderately d- Too much

5/- Do you encounter issues in comprehending spoken English in lectures?

a- Yes b- No

If yes what are these issues?

6/- To what extent do you use AI tools in your studies?

a- Always b- often c- d- never

7/- How do you find the use of AI in the classroom?

a- Beneficial b- Neutral c- Not beneficial

8/- Do you feel hesitated to give your data to AI because of privacy concerns?

a- yes b- no

Why?.....

9/- While using AI, do you face any difficulties?

a- yes b- no

If yes, cite them.....

10/- What is your attitude towards AI usage in higher education?

a- Positive b- Neutral c- Negativ

Appendix 2

Teachers' Structured Interview

Dear Teachers,

We would be grateful for your valuable time to answer the following questions that will help us in our research study. Be sure that your answers will remain anonymous and our conversation will be confidential.

EMI: is to teach subject matter content through the English Language.

AI: Machine intelligence, which has the ability to perform tasks that require human intelligence.

Questions:

1/- To what extent do you use English as a medium of instruction in your courses?

2/- Do you encounter any challenges while using English as a medium of instruction?

List them if any.

3/- To what extent do you agree that EMI is essential in technical fields, and more particularly in Mathematics and Computational Sciences stream?

4/- How do you perceive the integration of AI tools in EMI classrooms?

5/- According to you, to what extent is English and AI training at university so important?

6/- What challenges arise when combining EMI with AI tools in your classrooms?

7/- In what ways can AI tools help students overcome language obstacles in EMI courses?

NB: You can answer in English or in French.

Thank you for your collaboration!

Appendix 3

The Grid of Observation

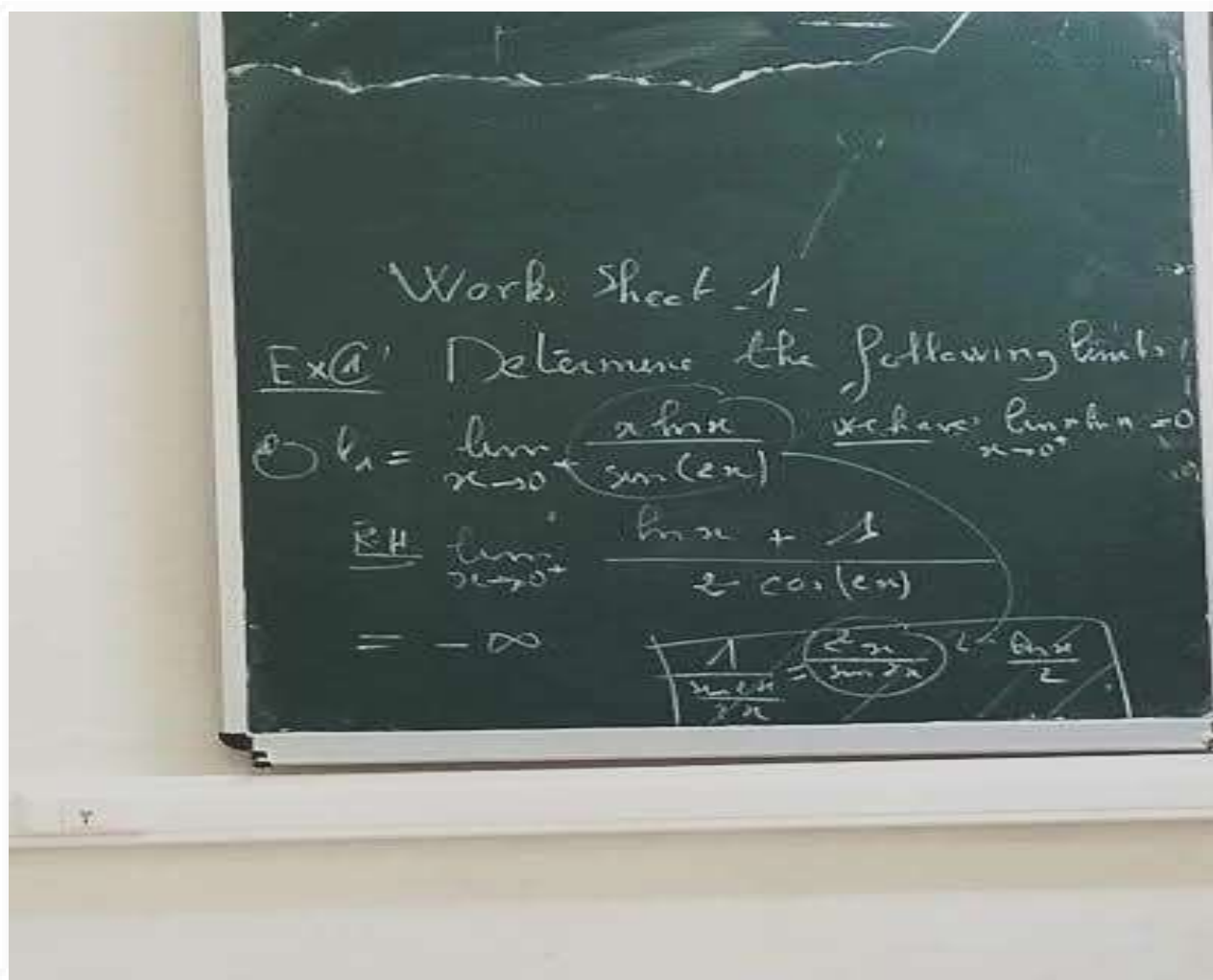
<i>Items to be observed</i>	<i>Session One</i>	<i>Session Two</i>	<i>Session Three</i>	<i>Session Four</i>	<i>Session Five</i>	<i>Session Six</i>	<i>Session Seven</i>	<i>Session Eight</i>
The use of language instruction: The language in which the teacher delivers the content of the subject matter.								
Classroom interaction: If there is an interaction between Teacher-students / Student-student.								

The materials used: whether the teacher uses different tools like the visual aids inside the classroom in order to support the content comprehension.								
The use of Artificial Intelligence: If the teacher/students are using AI tools inside the classroom.								
Student comprehension whether students face difficulties in understanding								

the lecture in the language of instruction or not.								
Obstacles encountered while using the AI: If the teacher/students face (s) difficulties in using AI platforms.								

Appendix 4

A photo of blackboard that illustrates the use of English during the tutorial session.



Appendix 5

A screenshot of a practical paper sheet in introduction to artificial intelligence subject in English



L1 Computer Science - Course: Intro to AI - Dr BENOMAR.M.I

Practical session n°2 : Introduction To PYTHON (number of sessions=1)

Objective:

- ✓ Rules for Variable Names in Python
- ✓ Understand how Python stores data, use basic data types (int, float, str, bool)
- ✓ Interact with the user using the keyboard
- ✓ Perform simple calculations
- ✓ Write properly indented Python code (Python indentation rules)

1. Rules for Variable Names in Python These are syntax rules. If you break them → Python error

Rules	Examples
A variable name must start with: • a letter (a-z, A-Z) • or an underscore _	<u>Valid:</u> age _name student1 <u>Invalid:</u> 1age # cannot start with a number -name # cannot start with a symbol
A variable name can contain: • letters • numbers • underscore _	<u>Valid:</u> student_age score2 total_sum <u>Invalid:</u> student-age # hyphen not allowed total sum # space not allowed
Variable names are case-sensitive	These are two different variables age = 20 Age = 25
Reserved keywords are not allowed	<u>Invalid:</u> if = 10 for = 5 class = 3 To see all keywords: import keyword print(keyword.kwlist)

Jupyter Untitled9 Last Checkpoint: 1 hour ago

File Edit View Run Kernel Settings Help Trusted

JupyterLab Python 3 (pykernel)

```
[25]: import keyword
      print(keyword.kwlist)

['False', 'None', 'True', 'and', 'as', 'assert', 'async', 'await', 'break', 'class', 'continue', 'def', 'del',
 'elif', 'else', 'except', 'finally', 'for', 'from', 'global', 'if', 'import', 'in', 'is', 'lambda', 'nonlocal',
 'not', 'or', 'pass', 'raise', 'return', 'try', 'while', 'with', 'yield']
```

الملخص

يُعدّ التدريس باللغة الإنجليزية ظاهرةً معروفةً طُبِّقَتْ مؤخرًا في العديد من الجامعات. وبالمثل، يُعتبر الذكاء الاصطناعي نظامًا بارزًا حظي باعتراف واسع في مجال التعليم، وتحديدًا التعليم العالي. ولذلك، واجه دمج هذه الظاهرة مع واجهوا الذكاء الاصطناعي تحديات كبيرة في فصول علوم الحاسوب. في هذا السياق، كشفت النتائج أن المعلمين والطلاب أي تحديات في تطبيق الذكاء الاصطناعي ضمن فصول التدريس باللغة الإنجليزية. علاوة على ذلك، أظهرت النتائج المهمة الأخرى أن المعلمين والطلاب لديهم مواقف إيجابية تجاه دمج الذكاء الاصطناعي في بيئات التدريس باللغة الإنجليزية.

الكلمات المفتاحية: التدريس باللغة الانجليزية، الذكاء الاصطناعي، التعليم العالي، التحديات، المواقف

Summary:

English Medium instruction is a well-known phenomenon that has been applied recently in many universities. Similarly, Artificial Intelligence is a prominent system that has been widely recognized in the area of education specifically Higher Education. Therefore, the combination of this phenomenon with AI has witnessed considerable challenges in computer sciences classes. In this sense, the results revealed that teachers and students encountered challenges while adopting AI within EMI classes. Moreover, another significant result is that teachers and students had positive attitudes towards the integration of AI in EMI settings.

Key words: English Medium Instruction, Artificial Intelligence, Higher Education, Challenges, Attitudes

Résumé :

L'enseignement en anglais est un phénomène bien connu, récemment mis en œuvre dans de nombreuses universités. De même, l'intelligence artificielle (IA) est un système important et largement reconnu dans le domaine de l'éducation, et plus particulièrement dans l'enseignement supérieur. Par conséquent, l'intégration de l'IA dans les cours d'informatique a soulevé des défis considérables. Les résultats ont révélé que les enseignants et les étudiants ont rencontré des difficultés majeures lors de l'adoption de l'IA dans les cours dispensés en anglais. De plus, un autre résultat significatif est que les enseignants et les élèves manifestent un intérêt positif pour l'intégration de l'IA dans les contextes d'enseignement en anglais.

Mot clés : L'enseignement en Anglais, L'Intelligence Artificiel, Les Défis, Les Attitudes