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**An Exploratory Study of Chatbots' Use and Its Impact on Communicative Skills of
Algerian University Students in an *Englishized* Higher Education Context**
The Case Study of Science and Technology Students at the University of Abdelhamid Ibn
Badis Mostaganem

A Dissertation Presented in Partial Fulfilment for the Requirements of a Master's Degree in
'Language and Communication'

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Abstract

As many higher education institutions worldwide shift towards using English as a medium of instruction, the use of technological tools such as chatbots has become widely used to facilitate this transition. This study aims to explore the use of chatbots among first year science and technology students at the university of Abdelhamid Ibn Badis Mostaganem in Algeria. It seeks to investigate the extent to which these students use chatbots and the reasons for their use, particularly focusing on how chatbots assist them in enhancing students' English communication skills. It assesses the impact of using these chatbots on students' communicative skills and identifies the challenges they face. We used a mixed methods research design to collect data from a sample of 50 first-year science and technology students and 6 teachers at the university of Abdelhamid Ibn Badis Mostaganem in the Science and Technology Department. The findings revealed that chatbots are frequently used among science and technology students, and this is done for various reasons, including the need to improve their English language proficiency, the inadequacies of English language teachers in teaching English for science and technology, and the limited English skills of teachers in delivering technical content. Furthermore, these chatbots help students develop their communicative skills. On the other hand, there are some challenges that students often face when using chatbots such as the repetitive answers of these apps and students' overreliance on their use. Thus, the present study's findings can be beneficial not only for students to develop their English language proficiency and communicative skills but also for science and technology educators and curriculum designers to rethink the importance of integrating technology tools, especially chatbots, in their teaching practices.

Keywords: chatbots, Englishized higher education, communicative skills, science and technology students

Dedication

I dedicate this work to the dearest people to my heart.

To my grandparents for their genuine love and prayers.

To my parents for their unconditional love, sacrifices and endless support.

To my aunts, Hbibba, Fatiha and Mira, for their constant encouragement and motivation.

To my sisters Nesrin, Imen and my brother Mostafa, I am thankful and grateful to have you.

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List of Abbreviations

AI: Artificial Intelligence

AIED: Artificial Intelligence in Education

EFL: English as a Foreign Language

ELT: English language Teaching

EMI: English as a Medium of Instruction

IELTS: International English Language Testing System

SNS: Social Networking Sites

TML: Technology Mediated Language Learning

TOEFL: Test of English as a Foreign Language

VARK: Visual, Auditory, Read/Write and Kinesthetic learners

VCP: Virtual Conversation Partners

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General Introduction

Algeria's higher education system is currently implementing a significant reform by integrating English language instruction into its programs. This initiative aims to improve the overall quality of education offered and equip graduates with the necessary skills to succeed in a globalised academic and professional landscape. However, integrating English as a medium of instruction (EMI) into the curriculum of Algerian universities is a complex process that requires careful planning. So far, it has presented some challenges for students whose primary language is not English. Therefore, students are now looking for other ways to improve their language proficiency and adapt to this new academic environment. One of these ways is through the use of chatbots, which is thought to help students practise their English language skills. These chatbots refer to computer programs that can simulate human conversation and can be used for various purposes, such as providing immediate feedback and answers, facilitating language learning, etc.

In fact, the phenomenon of using chatbots has become a growing area of interest for scholars in recent years; however, existing research on English for foreign languages (EFL) students has largely centred on its impact on their academic performance. As for in the Algerian context, not enough studies have been done on similar issues and on science and technology students particularly; consequently, the current study attempts to fill this gap.

Indeed, the aim of this study is to examine the use of chatbots among science and technology students. It also tries to explore the main reasons that may lead students to use these chatbots. Additionally, it seeks to investigate if these chatbots contribute to the development of students' communicative skills in technical and scientific contexts. Another objective is to identify the challenges that science and technology students face when using these chatbots for language learning.

To embark upon our investigation, we initially raised the following research questions:

1. To what extent do science and technology students employ chatbots in their academic activities?
2. Why do science and technology students employ chatbots in their academic activities?
3. Do chatbots contribute to the development of effective communication skills in technical and scientific contexts?
4. What are the challenges that science and technology students face when using chatbots for language learning?

The following hypotheses are suggested to answer the research questions:

1. Science and technology students frequently employ chatbots in their academic activities
2. Science and technology students may use chatbots to learn the English language because they find it difficult to understand the lessons delivered in English.
3. The use of chatbots may contribute to the development of effective communication skills among science and technology students in technical contexts.
4. Science and technology students often face some challenges when they use chatbots for language learning. Some students struggle to stay motivated when they use chatbots.

To validate or refute the hypotheses listed above, we conducted our study at the University of Abdelhamid Ibn Badis Mostaganem in the Science and Technology Department. An online questionnaire was shared on the Messenger group of first year science and technology students in addition to a classroom observation. Additionally, interviews were conducted with science and technology teachers.

The present dissertation is divided into three chapters. The first chapter consists of two parts. The first part deals with the theoretical concepts and studies related to language

learning, while the second part deals with the literature review and background of artificial intelligence. The second chapter describes in detail the data collection tools used in the fulfilment of our study. The last chapter presents the analysis and discussion of the findings obtained through the data collection tools.

Chapter One: Theoretical Background of Language Learning and Artificial Intelligence

Part One

1.1 Introduction

This chapter lays the groundwork for the current study by exploring relevant theoretical concepts. It aims to make the reader understand the principles of integrating chatbots in language learning within the context of the *Englishization* of Algerian higher education. It is divided into two sections. The initial section provides a comprehensive exploration of language learning theories and the different learning styles, which are known as the VARK learning model (visual, auditory, reading/writing and kinesthetic learners). Moreover, it examines the impact of learning styles within the online environment and delves into the role of technology in language learning. Additionally, it examines the significance of communication skills development in language learning and the use of English as a medium of instruction, specifically in the Algerian tertiary sector. The second section investigates the role of AI in higher education, specifically within the context of English as a foreign language teaching and learning. It also analyses the integration of AI, particularly chatbots, as a tool to facilitate English language acquisition. Finally, the chapter ends with presenting some practical applications of chatbots in education.

1.2 Overview of Language Learning Theories

Over the last few decades, there has been a significant shift in the field of education, particularly in language education. As stated by Romana Dolati (2012), there has been a shift

in focus from simply using teaching methods to applying appropriate learning theories to help facilitate the learning process. This approach involves gaining a deeper understanding of how learners absorb, process, and retain information. However, many people involved in education are unaware of the impact of learning theories on their attitudes and practices, which Bloom (1982) calls 'ignorance in education'. This lack of understanding makes it difficult for individuals to comprehend the basic principles of effective teaching and learning.

In this chapter, we will discuss the primary theories of learning: behaviourism, cognitivism and constructivism. These theories are crucial in enhancing students' abilities, especially in communicative skills. We will also focus on the VARK learning style model to understand learners' preferences, ways, and styles of processing information. The VARK learning style model, which stands for visual, auditory, reading, and kinesthetic, was introduced in 1987 by Fleming. This model helps identify learners' styles, as students tend to have different ways and styles of processing information. Therefore, language learning styles and strategies are critical factors that determine how students learn a second language. The concept behind including learning styles in the present work is that individuals have a specific approach or style of learning. The theory suggests that learning will be more efficient and effective if individuals are taught using a particular style or approach that corresponds to their learning style.

I.3 Language Learning Theories

Scholars and linguists have been developing theories to facilitate the language learning process. These theories are a set of principles that describe how learners acquire, process, and retain language. Some prominent theories include the following:

I.3.1 Behaviorism Theory

One of the earliest language learning theories is behaviourism. It is a psychological theory that was founded by J.B. Watson. This theory believes that language learning is a mechanical process that is concerned with observable aspects of human behaviour and has no ground for internal mental states (Dolati R., 2012, p. 752). It suggests that only observable behaviours should be studied since internal states such as cognitions, emotions, and thoughts cannot be explored objectively. According to behaviourist theory, Skinner (1985) says, “Children acquire L1 through stimulation, and the responses of children are conditioned through reinforcement. A positive response will be conditioned through positive reinforcement like reward or praise, and vice versa for a negative response, which is conditioned with punishment.”. That is to say, children are constantly exposed to linguistic stimuli in their environment, primarily from their parents. This exposure serves as the foundation for language acquisition. Through hearing language used in various contexts, children begin to grasp its structure, vocabulary, and usage patterns; consequently, the principles of reinforcement influence children's responses to this linguistic stimulation. Positive reinforcement encourages the repetition of successful linguistic behaviours, while negative reinforcement encourages adaptations or modifications to avoid mistakes. In a classroom setting, the teacher assumes an authoritative role (Baumgartner & Payr, 1994) and controls the classroom. The teacher decides what should be learned by setting objectives for the students who passively receive the information. On the other hand, Learners are expected to listen to lectures and read texts without necessarily participating in active learning tasks such as discussions, debates, etc.

I.3.2 Cognitivism Theory

Cognitivism is another language learning theory that came as a reaction to the behaviourist theory's limitations. It refers to the process that happens inside the learner's mind (Wijayanti, 2013, p. 6). In other words, it focuses on understanding how people think and learn. In contrast to behaviourism, cognitivism focuses more on internal mental processes such as perception, memory, attention, and problem-solving, which shape behaviour and learning (Clark, 2018, p. 176). This theory looks at how learners hear and remember words, pay attention to what they are learning, and understand grammar rules. This school of learning views learners as active participants who play an integral role in shaping their own learning experiences (Simon, 2001). When learners interact with their surroundings, they grasp written and spoken words and relate them to prior knowledge. Through this process, they actively construct meaning and draw connections between new information and existing concepts. This active engagement not only facilitates deeper comprehension but also makes their learning experience more personal.

In the classroom, the teacher acts more like a facilitator or tutor (Baumgartner & Payr, 1994). The teacher plays the role of a guide who helps learners through the learning process. Instead of just telling each student what to do and dictating the content, they adapt their teaching approach to meet the unique needs and abilities of each learner. They encourage active engagement and collaboration between students, which fosters their critical thinking and problem-solving skills.

I.3.3 Constructivism Theory

In constructivism, students take part in finding, transforming and making sense of complex information (Rusman, 2013, p. 56). In other words, students engage with the

materials they are learning with their teachers rather than just sitting and listening to the information. They engage through discussions, debates, reading and other learning activities. They incorporate the new concepts they have learned with their existing knowledge, and they form connections between new and prior knowledge. Questioning and problem-solving are two main functions of constructivism that support this process of knowledge construction (Chadli, M., 2020). Asking questions is a powerful tool that helps learners think more deeply about things to understand them clearly. The teacher encourages learners to ask questions, explore ideas and make connections between the new information and their existing knowledge. Problem-solving is another key aspect of constructivist learning. When learners work collaboratively with their classmates and engage in discussions, they explore different strategies for solving problems. They get to share their ideas and learn from each other's perspectives.

To know more about how learners acquire, retain and process language, let us have a look at the VARK learning style model.

I.4 VARK Learning Style Model

Each learner has a preferred way of learning and absorbing information. Some students find visual materials, such as diagrams, charts and images, to be an effective way to understand concepts. Also, there are some students who prefer to listen to lectures and recordings and engage in discussions. There are also those who excel in reading/writing texts and assignments. Additionally, certain learners learn best through hands-on activities, experiments, and physical activities. Neil Fleming (1987) developed a model called the VARK learning model. It stands for visual, auditory, reading/writing, and kinesthetic learners.

I.4.1 Visual learners

Visual learners find visual tools such as diagrams, charts, videos and animated images easier to remember. During class, they prefer written instructions to verbal ones, and they often give brief answers to questions (Stern, 2013, pp. 136-143). They also pay attention to gestures, body language and facial expressions. They often use colours and highlight points to help them understand and remember concepts.

I.4.2 Auditory learners

Auditory learners prefer receiving information through listening to discussions, lectures and tutorials (Ahmed, J., Shah, K., & Shenoy, N. 2013). During class, they enjoy talking and listening to their classmates and teachers. Additionally, this type of learners finds it easier to remember information when it is in spoken words or in the form of songs or poems, as Hussain (2017) stated. They usually tend to ask questions and seek clarification to enhance their learning capacity.

I.4.3 Reading/Writing learners

They prefer to receive information through reading textbooks, articles and handouts. Drago and Wagner (2004) described these learners as note takers. They like to take notes during class and find it easier to express themselves in written words. This helps them organise their ideas and remember concepts more effectively. They are seen as traditional learners (Hussain, 2017, p. 36) since they rely heavily on written materials such as textbooks, dictionaries and written assignments.

I.4.4 Kinesthetic learners

This type of learners learns best by touching, moving and doing (Hussain, 2017, p. 35). They prefer hands-on and practical activities that require using their body or parts of their body. They also like discovering new concepts through experimentation, role plays and physical activities. For this reason, Hussain (2017) states that they are known as active learners who always follow their curiosity.

Now that we have explained the VARK learning style model, we shall explain, in the following section, how these preferences can manifest within the context of the online environment.

I.5 Learning Styles and The Online Environment

As we are living in the digital era, the traditional “one style fits all” approach to education does not take into account the different learning styles and preferences of students (Mdhlalose and Mlambo, 2023, pp. 54-63). That is to say, every learner has different learning styles and preferences. Some learners excel with visual aids such as diagrams and charts, while others prefer listening to lectures and discussions. Some prefer reading and writing, while others learn best through hands-on activities and kinesthetic experiences. Unfortunately, traditional classrooms often rely on lectures, reading assignments and written assessments. Teachers do not take into account each student’s preferences and learning style and treat them all the same way. Therefore, students often turn to using technology as a means that better suits their learning styles and needs. Online learning is one of these technology based environments (Dağ & Gecer 2009).

The U.S. Department of Education (2013) reports that online learning encompasses a wide variety of programs that use the Internet inside and outside school walls. These programs provide access to instructional materials and facilitate interaction between teachers and students. Dağ and Geçer (2009) added that online learning can be face-to-face, synchronous or asynchronous. In face-to-face online learning, the teacher delivers the content in the classroom using PowerPoint slides, video clips, and multimedia. In the synchronous format, the instructor and learners do not meet physically; however, they always meet virtually while the teacher explains the content. It can also be asynchronous, in which the teacher and the learner do not meet at the time of content delivery. Learners can access materials and learn at their own pace and convenience without the need for real time interaction with their teachers.

Online learning environments require evaluating the learner's desired learning style before the course using online quizzes or during the course by tracking students' reactions (DeCapua & Marshall, 2015). By evaluating students' learning styles, teachers can tailor their teaching methods and materials to better suit each student's preferences and needs. This adaptation ensures that the content and the activities provided are more effective for students (El-Sabagh, 2021, p. 18). Many researchers have shown the effectiveness of adaptive e-learning in delivering digital content that matches each learner's unique needs and learning preferences (Ali et al., 2019; Behaz & Djoudi, 2012; Chun-Hui et al., 2017). In designing online classes, teachers can use different instructional strategies to suit their students' preferences. For visual learners, teachers can use visual aids such as digital whiteboards, graphical representations and PowerPoint presentations. Students who prefer listening to lectures and discussions can benefit from recorded lectures, group participation and collaborative activities. Additionally, students who prefer reading and writing will not experience a shift in their learning. They can still find handouts and reading materials delivered quickly through the internet. Online environments can provide opportunities for

kinesthetic learners through simulations, virtual labs and other interactive activities (University of Illinois Springfield, n.d.). These features can promote active engagement, personalised instruction and effective communication skills.

After getting an idea of how the different learning styles can be manifested or accommodated in online learning environments, the next section will reveal the role of technology in facilitating language e-learning for both educators and students.

I.6 Technology-Mediated Language Learning (TML)

Technology-mediated language learning, or TML, according to Zhou (2018) and Wan (2007), is a multifaceted process that involves the use of digital technologies to facilitate language acquisition. These digital technologies are reshaping education, making it more flexible and accessible for learners. Technology-mediated learning forms are either synchronous or asynchronous. Real-time learning activities that involve simultaneous interaction between teachers and students are referred to as synchronous learning. It could be done through online learning environments or video conferencing systems. Conversely, asynchronous learning eliminates the requirement for simultaneous involvement and allows students to interact with the course contents and activities at their own speed. It consists of educational apps, multimedia materials, lectures that have already been recorded, etc.

Zhou (2018) asserts that technology has transformed education, offering various advantages to both educators and learners. With the internet, students can easily research and explore up-to-date information and multimedia resources that exceed the limitations of textbooks. Additionally, technology has facilitated the interaction between students and their teachers through the use of online discussion forums and video conferencing. In their research paper, Shen et al. (2015) clarify that language learners can access a variety of

linguistic and cultural knowledge through websites and digital resources. Moreover, because of these digital tools' accessibility, students may take charge of their own education both inside and outside of the classroom. These tools provide students with real-life scenarios and contexts to help them grasp how language is used in various contexts and situations

Language learning via social networking sites (SNS) has attracted many users globally (Shadieva, R., & Yang, M. 2020). Social networking sites facilitate language learning through various means, such as joining language-specific groups, participating in discussions, and sharing resources, etc. By participating in online communities, language learners have the opportunity to engage in oral communication with native speakers and fellow learners (Godwin Jones, 2005). When learners engage with natives, they become more comfortable with conversational patterns, idiomatic expressions, and pronunciation. As they receive positive feedback from others, they gain confidence in their ability to practise the language. Mompean and Fouz-Gonzalez conducted research on the use of Twitter as a tool for language learning and teaching. The researcher focused on learners' pronunciation improvement. The results indicated significant advancements in students' pronunciation skills as well as high levels of students' participation in the learning process. From this perspective, the next section explains the development of communication skills since it is a crucial aspect of learning and professional success.

I.7 Communication Skills Development

Communication occurs when a person sends a message, and another person receives it and interprets it (Webb, L. 2011). This definition implies an interaction between two people: the sender of a message and the receiver. Effective communicators are usually clear thinkers who have confidence and high self-esteem. They tend to earn respect not only in society but also in academia and professional settings (Hasan et al., 2022, p. 194). People with good

communication skills feel more comfortable because they know how to convey their thoughts, needs, and desires to others. They know how to communicate their messages clearly and accurately. Hasan et al. (2022) presented the different types of communication as follows :

I.7.1 Verbal Communication

Verbal communication is the process of exchanging ideas and thoughts with others through spoken words. It involves listening and speaking. It includes face-to-face conversations, phone calls, meetings, etc.

I.7.2 Non-Verbal Communication

Non-verbal communication consists of body language, facial expressions, gestures, and other cues that convey a message without using words.

I.7.3 Written Communication

Written communication is the process of transmitting a message with the use of written symbols. It includes emails, documents, letters, etc.

However, Dr. Radhika Kapur (2018) stated that there are some unwanted barriers that occur within the process of communication. These barriers can be a challenge that hinders the effective exchange of ideas between people. They are presented as follows:

I.7.4 Environmental Barriers

Environmental barriers refer to the physical surroundings that make it hard to talk to each other. These barriers can include time, space, and place. Time barriers occur when people cannot be present at the same time for communication. For instance, the time difference

between countries may make it difficult for individuals to meet simultaneously. In addition, space barriers involve the physical distance between communicators, which makes it challenging for them to convey the message accurately. For example, if two individuals must discuss an important matter but they are located in different countries, like India and the United States,. Conducting a phone call might not be the most effective option. In such cases, using emails to exchange details could be more suitable for them. Place barriers refer to the physical location where communication takes place. These barriers can include noise, privacy, and comfort, which can impact the effectiveness of communication.

I.7.5 Semantic Barriers

Semantic barriers happen when people do not understand the message due to differences in vocabulary, meaning, or ambiguous language. Therefore, using a common language prevents communication clashes, misunderstandings, and misinterpretations.

I.7.6 Cultural Barriers

Communication can also take place between people from different nations, races, religions, etc. Differences in these cultural backgrounds can cause misunderstandings and conflicts between people. For instance, eye contact may be interpreted as a sign of respect in one culture but considered rude in another. Overcoming these cultural barriers requires cultural sensitivity, awareness, and respect.

I.7.7 Psychological Barriers

Bakar, A. et al. (2020) state that psychological or mental barriers are obstacles that arise in the minds of people and prevent them from communicating. For instance, if a person is feeling anxious during a conversation, they will find it difficult to express themselves clearly.

Radhika Kapur (2022) suggests some strategies to overcome communication barriers, for instance:

1. Possess proficient speaking and active listening skills.
2. Ensure listeners understand viewpoints and concepts.
3. Use simple language in both oral and written communication.
4. Maintain courtesy and politeness to prevent misinterpretation.
5. Have a good knowledge of the communicated concepts and ideas.
6. Avoid personal bias or discrimination based on religion, culture, race, etc.

As communication skills are so important in fostering effective interaction between the teacher and the students, we cannot deny the importance of English as a medium of instruction for both teachers and students.

I.8 English as a medium of instruction (EMI)

The English language is becoming increasingly important in the world today, especially in academia. It has become the primary language of communication, or lingua franca, in many countries around the world. It is now the dominant language in most educational materials, books, and publications (Hasan, 2022, p. 194). As a result, many researchers have seen the importance of using English as a medium of instruction due to its educational benefits. Julie Dearden (2014) defines this phenomenon as the use of the English language to teach academics in countries where the first language (L1) of the majority of the population is not English. This latter opens doors to many opportunities for both educators and students. Using English as a medium of instruction offers educators access to a variety of teaching resources that meet learners' needs and stay updated with the latest methodologies in teaching and learning to enhance their pedagogical skills. Besides, many international conferences and

workshops are conducted in English, which enables educators to participate and share their ideas with other colleagues from around the world. It also prepares students for both academic and professional opportunities. It equips them with the language skills necessary to excel in academic settings. It offers them the opportunity to study abroad, where many universities worldwide demand a certain level of English proficiency through standardised tests such as TOEFL or IELTS.

As Litovchenko (2020) noted, “EMI requires more than merely translating content and teaching it. It involves training subject matter in English, often in classes with students with diverse educational and linguistic backgrounds.” For instance, a science teacher cannot simply translate the science textbook into English and expects students to understand everything. Instead, the teacher must be capable of explaining scientific concepts clearly in English. Moreover, the teacher needs to take into account students’ language abilities and find ways to teach the subject in a way that all students can understand. Researchers and educators have identified several challenges faced by teachers and students in EMI classrooms. Teachers often struggle with some language difficulties, and they find it difficult to explain their ideas clearly and fluently in English (Chang, 2010; Sert, 2008; Tatzl, 2011, pp. 53-82). As a result, students may find it difficult to understand teachers’ explanations and instructions, and this can affect their motivation and academic performance in the classroom. Also, Huang (2012) observed that teachers often struggle to identify and address students’ linguistic limitations that hinder their learning and progress in EMI classrooms. So, students experience ongoing difficulties in understanding the course content, and they do not engage with their teachers in classroom activities.

I.8.1 EMI in the Algerian Tertiary Sector

Many North African developing countries such as Algeria, Tunisia and Morocco, have shown a great interest in EMI (Troudi, 2022, pp. 129-146). Joining this trend of EMI can enhance these countries' educational and scientific endeavours, as well as opening doors for globalisation, modernization and economic development. In recent years, Algerian higher education, led by its former minister of Higher Education and Scientific Research, Bouzid Tayeb, has introduced significant initiatives and upgrades in the higher education system. On July 4th, 2019, the former minister announced on his official Facebook page the ministry's intention to introduce English in Algerian universities as the language of instruction.



Figure 1: Tayeb Bouzid's Post on Facebook Page (2019)

The former minister posted an online poll on August 5th, 2019 and invited the Algerian people to vote either in favor or against this idea. A month later, the results showed that 94% of the voters supported the decision. Therefore, the Algerian universities were instructed to replace French with English as a medium of instruction (Zerrouky, 2019). In 2023, Algeria's Minister of Higher Education, Kamel Beddari, announced a significant policy shift. **Starting** in the 2023 academic year, English would become the primary language of instruction at Algerian universities.

The shift from French or Arabic to English as a medium of instruction in Algerian higher education has many benefits as well as challenges. Alhamami (2015) said, "EMI provides students with access to materials that are not available in their mother tongue." English has become the lingua franca of academia, science, technology, etc. This has led researchers and scientists to produce their works in the English language. Therefore, mastering the English language can provide students with the latest academic materials and scientific books and articles written in the English language. Moreover, EMI offers a platform for enhancing language proficiency among students, preparing them for global communication, and aligning educational practices with international standards (Hamane, nd). Additionally, it can enhance the employability of graduate students and empower them to compete on an international level (Benassou & Bournane, 2022, p. 62). On the other hand, some researchers argue that EMI poses various challenges for students. One of the main challenges of EMI is having difficulties understanding the lecture and course materials because of students and teachers' limited language proficiency (Phuong and Nguyen, 2019). Al-Bakri (2013) reports that reading English textbooks is one of the greatest challenges for students because of the lack of vocabulary and academic knowledge. Another important challenge is that many students have difficulties understanding test and exam questions, which results in low grades (Al Balushib and Rao, 2014).

In the second part of this chapter, we shift our focus to artificial intelligence and shall therefore explore its role in facilitating the teaching and learning of English as a foreign language (EFL).

Part Two

II.1 AI as a Revolution

In the 21st century, artificial intelligence (AI) has established itself as a significant area of research in many disciplines, including engineering, science, education, etc (Halal, 2003). The term artificial intelligence (AI) covers a wide range of computer systems that can do tasks that generally require human intelligence, as Sarker (2022) says. Li et al. (2018) acknowledge that, nowadays, artificial intelligence touches nearly every aspect of people's daily lives. It is integral to our decisions, information and communication. It has given countless opportunities and challenges to various fields. Many AI-powered technologies have been developed to improve these fields (Limna et al., 2021, pp. 1-9). The next section explains the role of artificial intelligence in one of these fields, which is education.

II.1.1 Artificial Intelligence in Education (AIED)

The development of intelligent tutors is one of the most interesting applications of artificial intelligence in education (AIED). These tutors perform a variety of functions, including teaching students, providing them with constructive criticism, and tracking their academic progress (Bayne, 2015). These applications increase the efficiency of instruction by offering individualised and customised support. They provide learners with invaluable guidance throughout their academic careers. These methods may identify gaps and deficiencies in a student's understanding and knowledge, according to Strauss (2022). To improve these areas

of weakness, they offer tailored comments. AI-powered educational solutions provide students with fast, individualised feedback so they may learn at their own pace and fix errors immediately. This enhances the effectiveness and enjoyment of the learning process.

In order to offer individualised support for individualised learning experiences, artificial intelligence (AI) has emerged as a critical tool in education. Accordingly, AI systems are able to modify their support in accordance with each student's particular learning styles and preferences (Hwang, 2014; Hwang et al., 2020, pp. 112-131). They give students immediate feedback and offer more explanations for difficult concepts. According to Kessler (2018), the individualised approach greatly enhances the educational process by tailoring the information to the interests and pace of the learners. This helps students become more independent and perform well in their studies.

Another interesting benefit of AI is its ability to automate assessments and simplify management and administration (F. Kamalov, 2023). When teachers use these AI tools that take care of grading tasks, they get the chance to spend more time with their students. This means that students can get more attention and help when they need it. As a result, students can better understand the lessons and engage with their teacher.

One of the ethical issues with using AI in education is the privacy of students and teachers. Akgun and Greenhow (2022) assure that privacy violations mainly occur as people expose an excessive amount of personal information on online platforms. This over-sharing can include students' personal details and locations, and it may be used or shared by other people without their consent.

II.1.2 Artificial Intelligence in Higher Education

So far, artificial intelligence (AI) has had an impact on higher education in developed countries, particularly in administration, instruction, and learning (Chassignol et al., 2018), which can enhance the efficiency, effectiveness, and overall learning experience for both students and teachers. It enables teachers to carry out their administrative tasks, such as grading and providing valuable feedback to their students, more quickly and effectively (Chen et al., 2020). Teachers can also benefit from AI in many ways, such as preparing lesson plans, completing students' attendance lists, and reporting students learning outcomes (Fitria, 2021, pp. 213-223).

Pokrivcakova (2019) claims that the use of artificial intelligence (AI) alongside current technology-based adaptive systems can enhance the efficacy and quality of instruction. These systems change how materials are presented, giving each learner a personalised learning experience. Developers have created tutoring and instructional systems to address the numerous issues encountered in individualised teacher-student tutoring, aiming to improve the quality of education (Cox, 2021; Dogmus et al., 2015; Renz & Hilbig, 2020). For example, Grammarly, an AI-powered program, offers teachers a selection of tools, including comments on areas for growth, grading, and plagiarism detection (Singh, S. V., & Hiran, K. K., 2022). Yasar Akyuz (2022) supports the idea of using smart tutoring systems in classrooms. He said these systems make students do better and cost less. Using them means students can learn at their own speed and work harder on things they find difficult. However, in regular classes, teachers typically impose a predetermined curriculum on students.

Aggarwal (2023) believes that technology has made learning more flexible and convenient. With online courses, digital textbooks, and educational apps, students can explore different subjects and perspectives beyond traditional textbooks. Additionally, AI-powered tools can

analyze students' strengths, weaknesses, and learning styles to adjust lesson content and difficulty levels. This often allows teachers to customise their instructions based on students' needs.

To understand more about artificial intelligence in higher education and in English learning in particular, the next sections will explore how artificial intelligence (AI) can help with English language learning in tertiary education. We will look at the role of chatbots and their potential to benefit both teachers and students.

II.2 Integrating AI in English as a Foreign Language Teaching and Learning

In Nazia Hasan's words, English is regarded as a second language in practically every nation where it is not the native tongue (2022). The English language is used and learned in many countries all over the world, and this reflects its importance in global communication, commerce, and education. With the advancements of technology, particularly in the field of artificial intelligence (AI), there is a growing interest in the integration of AI into English as a foreign language for teaching and learning. Artificial intelligence (AI) is a field in computer science that deals with creating intelligent systems. These systems can do things that usually only humans can do, such as solving problems and making decisions (Sarkerr, I. H., 2022, p. 158). In other words, one can argue that AI gives computers the ability to think and act like people. A study by Kim, Cha, and Kim in 2021 found that using AI in English classrooms is all about putting students first. Their aim is to make learning more personalised, interactive, and effective for them. With this technology, teachers can tailor their lessons to suit each student's unique needs and learning style. It helps students learn in a way that works best for them and allows teachers to improve their teaching methods. Overall, it creates a more

engaging and enriching learning environment that adapts to students' individual needs and helps them understand the material better.

Fitria (2021) suggests that technology and digital platforms have made teaching and learning English easier, providing several opportunities to enhance language skills (listening, reading, speaking, and writing). For instance, a study by Lee et al. (2015) introduced a correction system called Genie Tutor, which helps improve English writing by identifying grammar mistakes and suggesting better expressions. This tool can be beneficial for developing language skills.

Johnson and his colleagues (2017) created a program called iSTART, which includes instructional videos and exercises. The program focuses on teaching comprehension strategies, especially summarization techniques, to improve reading skills in adult learners. It helps them better understand and navigate written texts. In another study, Khasawneh (2023) considers virtual conversation partners (VCPs) a valuable tool that helps learners practise and improve their speaking and listening skills. These AI-powered conversation partners can offer immediate feedback on pronunciation, grammar, and vocabulary usage.

Molin et al. (2020) assert that students in traditional classrooms often lack formative feedback from their teachers because of limited time and large class sizes. It is crucial to recognize the importance of formative feedback in supporting student development. One way to give students immediate and valuable feedback is by using new technologies like AI-powered educational tools. In this context, Grammarly stands out as a noteworthy example of personalised feedback. It helps students improve their writing by finding and suggesting corrections for grammar, spelling, and punctuation mistakes (Taguma et al., 2018).

Many AI tools for learning English include elements of gamification, such as point systems, rewards, and challenges (Moybeka et al., 2023, p. 2451). Students are motivated to participate and improve their language skills by earning points, unlocking rewards, and

overcoming challenges. This gamified approach not only boosts motivation but also gives students a sense of accomplishment and progress. It makes learning English interactive and fun. Moybeka et al. (2023) also supported using AI in English as a Foreign Language (EFL) classrooms. They stated that AI tools create a relaxed environment for learners to practise without worrying about making mistakes or being judged. As AI technologies continue to shape the landscape of English language education, the use of chatbots emerges as a tool that facilitates English language learning.

II.2.1 Facilitating English Learning through Chatbots

Over the last few years, in the field of English language teaching (ELT), there has been a growing interest in using artificial intelligence (AI) technologies (Rusmiyanto R, 2023, p. 750). Chatbots, as a manifestation of artificial intelligence (AI), have gained prominence in the realm of facilitating English language learning. A chatbot is a computer program that uses natural language processing to talk like a human in a text conversation (Zumstein & Hundertmark, 2017, p. 98). They can be used either within web pages or messaging applications. One of their benefits is that they provide students with easy online access to learn, practice and enhance their proficiency in the English language (Grudin & Jacques, 2019). Students can use these platforms at any time and anywhere they want. Therefore, this flexibility helps them customise their learning to fit their own pace and preferences.

Many researchers have agreed on the effectiveness of using chatbots to help people learn languages. Shawar (2017) did a study on using different chatbots to teach languages and highlighted some of their benefits. For instance, they help students get more involved and feel less nervous about speaking. When students talk to chatbots, they do not have to worry about the teacher judging them or making mistakes. This makes it easier for students to get involved and take part in language activities.

Similarly, Yin and Satar (2020) stated that students with limited English proficiency can freely use chatbots without fearing mockery from their classmates and instructors, as they have time to prepare their responses. In another study, Nalyvaiko and Maliutina (2021) analysed students' awareness of chatbots and their functionality and pointed out that these programs attract students' attention through various interactive activities such as testing, quizzes, and surveys. Offering students different ways to learn makes the learning process more engaging and enjoyable for students. They added in the same research that chatbots play a crucial role in covering various subjects using multimedia content such as videos, images, and other interactive materials.

Additionally, Ilieva et al. (2023) stated that AI chatbots offer personalised communication and provide conversations that closely mimic human interaction. This indicates that these intelligent chatbots can adjust their communication style and interaction approach depending on the user they are interacting with. The researcher gave the example of CHATGPT, which is an intelligent chatbot based on the GPT-3.5 LLM model from 2022. It excels at various tasks, including translation, conducting searches, and providing accurate responses to users' inquiries. Another chatbot is Google Bard, which was released on March 21, 2023. It also engages in conversational discussions with humans.

However, language teachers raise some concerns regarding the use of AI chatbots. Brinegar (2023) states that teachers worry that students will not be able to generate their ideas and questions independently and creatively. The overreliance on these chatbots may hinder students' ability to come up with new ideas on their own.

II.2.2 Practical Applications of Chatbots in Education

With the recent rapid and unprecedented advancement of AI technology, many chatbots have emerged as a valuable tool in education. These chatbots offer both teachers and students

a plethora of benefits in their teaching and learning processes. In this section, we will explore some of the practical applications of chatbots that many teachers and students tend to use and how these chatbots can facilitate and shape their educational journey.

II.2.2.1 ChatGPT

One of the latest and most advanced technologies in artificial intelligence is ChatGPT. Sabzalieva, E., & Valentini, A. (2023) define chatGPT as a natural language processing (NLP) model developed by OpenAI. It was released on November 30, 2022. ChatGPT is based on a deep learning model called GPT-3,5, which stands for Generative Pre-trained Transformer (Deng, J., & Lin, Y., 2022, pp. 81–83). The researchers added that this system is able to understand and generate answers in many languages and styles. ChatGPT is designed to analyse human-like conversations and respond in a naturalistic way to language input (Atlas, 2023). The researcher explained that this ability makes it useful for a variety of tasks, especially in the field of higher education. This powerful tool facilitates students and educators' academic activities and assignments. It can be used for writing, professional communication and individualised learning (Atlas, 2023). Students can use it to write essays in different styles, and they get suggestions and corrections to improve their writing. On the other hand, educators can use it to write professional emails, reports, etc. It can also be used to generate exercises and courses that tailor to learners' needs and preferences.

II.2.2.2 Google Gemini

Google seeks to advance AI technology by creating an innovative chatbot model capable of delivering precise and relevant responses (Saeidnia, 2023). On March 21, 2023, Google created its first AI chatbot called Google Bard, which uses machine learning and natural language processing to simulate human-like dialogue (Carlà et al., 2024). Recently, on

February 8, 2024, the name Bard was changed to Google Gemini (Team G, 2024); Google presented this new update with enhanced capabilities that can understand image, audio, video, and text data and aims to revolutionise the information industry. This advanced chatbot model has been tested and used for various tasks such as reasoning, answering questions, translating languages and generating code (Google, 2023). So, both students and teachers can gain significant benefits from this advanced chatbot model in their academic work, such as research, homework, exam preparation, etc. A study done by Farrokhnia et al. (2023) shows that teachers can use Gemini and even ChatGPT for lesson planning. These chatbots can generate lesson plans with detailed group work activities for students. Indeed, both chatbots gave teachers the role of a facilitator in the lesson plans, which indicates that they embrace a constructivist approach to learning (Ebo, 2018; Özdaş, 2018). This means that chatbots recognize the importance of student-centred learning, where learners actively participate in the construction of their own knowledge and the teacher acts as a facilitator or a guide in the class.

II.3 Conclusion

The present chapter presented the conceptual framework of our investigation and the key aspects of integrating chatbots into language learning with regard to the recent Englishization of Algerian higher education. It particularly discussed various concepts related to language learning. It also investigated the role of artificial intelligence in education, specifically in teaching and learning English as a foreign language. Moreover, it attempted to explain how the integration of chatbots can be considered as a facilitative tool for English language learning. As for the next chapter, it will outline the research methodology employed in this investigation.

Chapter Two : Research Methodology

2.1 Introduction

This chapter is devoted to the practical framework of the present study. It discusses the methodologies used, the procedures, and the context in which the investigation took place. It describes the participants with whom we worked to accomplish this research and the data collection tools that were used to fulfil the study. The latter involved an interview, a questionnaire and an observation.

2.2 Research Method

As stated in the general introduction, this study aims at exploring the use of chatbots by Algerian university students after the shift towards English as the language of instruction in science and technology programs. It also tries to investigate how the use of these chatbots influences students' communication skills. The issues referred to in this study are as follows:

- To what extent do science and technology students employ chatbots in their academic activities?
- Why do science and technology students employ chatbots in their academic activities?
- Do chatbots contribute to the development of effective communication skills in technical and scientific contexts ?
- What challenges do science and technology students face when using chatbots for language learning ?

To answer these questions, a triangulation method was used. Yeasmin (2012) defines the latter as a research method that combines qualitative and quantitative approaches to enhance

the validity of findings. Noble (2019) claims that the use of this method can lead to more confident research findings, especially when different methods have the same results. Therefore, we have used three types of data collection tools. An online questionnaire was sent to first year science and technology students. This questionnaire includes closed-ended questions in which students are provided with a list of answers they can choose from and a couple of open-ended questions. The other tool used in the present work is observation. The observation was crucial in investigating the subject of the work. It was directed to first year students at the science and technology faculty of Abdelhamid Ibn Badis Mostaganem. The aim of the observation was to investigate the reasons that often lead students to use chatbots in their academic activities and to assess the impact of these chatbots on students' communicative skills in the target language when they interact with their teachers. To get more data, an interview was conducted for teachers to investigate the challenges and opportunities they face after the shift towards English as the language of instruction in science and technology programs.

2.3 Procedure

This study took place at the level of the science and technology faculty at Abdelhamid Ibn Badis University, Mostaganem. To find answers to our research questions and to validate or refute the hypotheses that were put forward at the beginning of the study, we conducted an observation, designed an online questionnaire, and formulated an interview. These were the three tools for our data gathering. First of all, we carried out an observation with the science and technology students at the end of the first semester and during the second one of the academic year 2023-2024. Then, we addressed an online questionnaire on Google Forms for the same students. The questionnaire was sent to the students' Messenger group, and they

were asked to respond to it. Finally, we had an interview with six science and technology teachers.

2.4 Participants

The first population that we worked with in the current study were L1 science and technology students at the University of Abdelhamid Ibn Badis Mostaganem. The total number of participants who accepted to take part in the research was 50. They were selected randomly. The gender and age of the participants were not taken into account, as these variables are not part of the research questions.

The second population of this study were science and technology teachers at the University of Abdelhamid Ibn Badis Mostaganem. We worked with a sample of 6 teachers who were selected randomly. The reasons behind choosing first year science and technology students to contribute to this research work are mainly to investigate their use of chatbots in their academic activities and to assess their impact on students' communicative skills in the English language, since the Algerian authorities have replaced French with English as a medium of instruction in Algerian higher education. The teachers were selected in order to know the challenges and opportunities they face when they deliver their courses in English.

2.5 Data Collection Tools

We have used three types of data collection instruments in our investigation in order to collect more information and find answers to our research questions. The first tool is observation. It was directed to first year science and technology students and their teachers at the university of Abdelhamid Ibn Badis, Mostaganem. The second tool is an online questionnaire, which was administered to the same students. Also, we used an interview with the teachers to get a broader understanding of the research problems.

2.5.1 Observation

Many researchers opt for observation as a data collection tool, as it enables them to get more valid and credible data. It is a qualitative technique that helps researchers analyse the participants' ongoing behaviour in a natural setting. The observation was important in our case study to assess and observe the learning and teaching process to explore what goes on inside the classroom between the teachers and students. The observation was carried out at the end of the first semester and during the second one of the academic year 2023-2024 with first year science and technology students at the university of Abdelhamid Ibn Badis, Mostaganem. It was conducted during five sessions in different modules and in a classroom amphitheatre. The latter consists of eight groups of first year students. It should be noted that the teachers were not aware that they had been observed, nor were the students, until the end of their sessions. The objective of the observation is to observe students' interaction with their teachers, the reasons for students' use of chatbots and the impact of chatbots on students' communicative skills.

2.5.2 The online questionnaire

The questionnaire is the most common method that many researchers tend to use in their investigations. To reach a larger number of participants, we have designed an online questionnaire using "Google Forms". This questionnaire is addressed to 50 students of science and technology faculty, and it was sent to their Messenger groups. This questionnaire is composed of three sections; each section contains a number of questions.

- Section one is about students' English language proficiency and their opinion about the Englishization of Algerian higher education. This section includes six questions. The six questions are a mix of closed-ended questions and open-ended questions.

Question 01: Please rate your current level of English proficiency

(Choose one option for each)

- Speaking: Beginner Intermediate Advanced
- Listening: Beginner Intermediate Advanced
- Reading: Beginner Intermediate Advanced
- Writing: Beginner Intermediate Advanced

The aim of this question is to evaluate students' current level of English proficiency across speaking, listening, reading and writing skills.

Question 02: How often do you use English in your academic activities?

- 1) Always 2) Often 3) Sometimes 4) Rarely 5) Not at all

This question seeks to assess the use of the English language in students' academic activities.

Question 03: In what ways do you think the *Englishization* of Algerian higher education would impact your learning experience?

(you may choose more than one)

- Increases your opportunities to study abroad
- Improves communication with international peers and professors
- Provides access to more resources and knowledge
- Others

This question seeks to know students' perspectives on the shift towards English in Algerian higher education.

Question 04: How much do you like the English language? very much/ somewhat/ a little/ not at all

The purpose of this question is to know their attitudes towards the English language.

Question 05: Do you feel confident when you communicate in English in technical or scientific contexts?

1) Yes 2) No

- please explain why?

The aim behind this question is to assess students' confidence level when they communicate in English within technical and scientific contexts. They are also asked to provide a reason behind their answer.

Question 06: Do you think your English language teachers are competent enough to teach you English for science and technology? Justify your answer, please!

This question was asked to check students' attitudes towards their teachers of English and to assess their perceptions of the competence of their English language teachers in teaching English for science and technology.

- Section two is about the use of chatbots. This section includes four questions. The four questions are closed-ended type of questions

Question 01: Does your limited language proficiency lead you to use chatbots?

Yes/ No

The reason behind this question is to understand if students with limited language proficiency tend to use chatbots for communication or assistance. It could also provide us with useful data on the effectiveness of chatbots in providing support for students with language barriers.

Question 02: How often do you use chatbots to learn English?

1) Never 2) Rarely 3) Sometimes 4) Often 5) Always

This question attempts to determine the frequency with which students use chatbots as a tool to learn English.

Question 03: For what reasons do you primarily use chatbots ?

(you may select more than one)

- To practise English language skills
- To seek clarification on concepts or topics
- To receive immediate assistance with coursework or assignments
- To understand technical or scientific knowledge
- Others

This question is asked to understand the primary motivations behind the use of these chatbots.

Question 04: Do you think these chatbots improve your communication skills ?

1) Yes 2) No

- If yes, please explain how ?

The final question of the second section is to know students' perceptions of whether these chatbots contribute to the improvement of their communication skills in English.

- Section three is about the challenges that students face when using chatbots in language learning. This section includes two closed-ended questions.

Question 01: What are the challenges you face when you use chatbots to learn English? (you may select more than one)

- I find it difficult to understand chatbots' responses.
- I struggle to stay motivated
- I over-rely on these chatbots
- Others

The reason behind this question is to identify the challenges encountered by the students when they use chatbots as a tool for learning English.

Question 02: How do you find the use of chatbots in addressing your language learning needs?

- 1) Effective
- 2) To some extent
- 3) Ineffective
- 4) Not sure

This final question attempts to assess students' perceptions of the effectiveness of chatbots in meeting their language learning needs.

2.5.3 Teachers' Interview

In any qualitative research, interviews are the most powerful tools that transmit interviewees' narrative data compared to other research methods or tools, as Kvale (2003) says. In this study, six interviews were conducted with science and technology teachers at the university of Abdelhamid Ibn Badis, Mostaganem. The interviews consist of six open-ended questions in which the teachers are asked to respond freely according to their experiences. According to Berg (2007), the interview enables interviewees to "speak in their own voice and express their own thoughts and feelings". The interviews were done separately, and each

interview took 10 minutes to answer. They were recorded and transcribed for a better analysis.

1. What's your current level of English ?

Question (1) attempts to assess teachers' proficiency in English language skills; do they have the ability to communicate effectively in English?

2. According to your experience and knowledge, what are the main challenges and opportunities you face as a teacher after the shift towards English as the language of instruction in science and technology programs?

In the second question, the teachers are asked to state the difficulties involved in teaching technical subjects in English for the first time and to state the opportunities that arise from this shift.

3. Do you feel prepared as a teacher to effectively deliver your courses in English?

The third question seeks to know if the teachers feel ready to deliver their courses effectively in English.

4. With regard to your students' performance inside the classroom, have you recently noticed if they started using some chatbots in their learning process?

The fourth question is designed to understand the extent to which educational technology, especially chatbots, is being adopted within the classroom.

5. Do you support the idea of using chatbots in the classroom?

This question aims to know the teachers' perspective on the use of chatbots within the classroom and the different benefits or drawbacks of incorporating this technology into their teaching practices.

6. From your perspective, do you believe that these chatbots contribute to the development of students' communication skills in the target language?

The last question is proposed to know if the teachers believe that these chatbots facilitate students' language learning and communication skills in the English language.

2.6 Conclusion

This chapter presented the research methodology followed in conducting this study, the procedure and the participants who took part in the fulfilment of the research work. We also described each data collection tool used in this research, notably the observation, the questionnaire and the interview. The next chapter will present the findings and the analysis of the data that we collected.

Chapter Three: Data Analysis and Results

3.1 Introduction

The last chapter of this research attempts to describe and analyse the findings that we have obtained in the previous chapter. It discusses the main points gathered from the data collection tools; observation, questionnaire and interview. Finally, it presents some recommendations related to the use of chatbots in English language learning and provides some solutions in order to enhance students' communication skills in the context of the Englishization of Algerian higher education.

3.2 Data Analysis

This section describes the steps followed to analyse the data collected in the previous chapter. First, we started our analysis by observing teachers and students' interactions in the classroom and their communication skills. Then, we analysed the questionnaire, in which we sought students' points of view regarding the use of English in their academic activities and the use of chatbots as a tool to learn English language communication. Finally, we interpreted the interview, in which we investigated the teachers' perceptions and attitudes on the shift towards English as the language of instruction in science and technology programs, as well as their perspectives on the use of chatbots within the classroom.

3.2.1 Results from the Analysis of the Observation

The observation was carried out during five sessions of different modules with first year science and technology students at the university of Abdelhamid Ibn Badis, Mostaganem. It was conducted in an amphitheatre classroom with eight groups. To get accurate data on

teacher-student interactions, we sat at the back of the classroom and opted for the note taking technique.

During the two first sessions of different modules, we observed a variety of language use among teachers. The teachers were noticed to be using French and Arabic when they delivered the content of their lectures to their students. However, their PowerPoint presentations were in the English language. The teachers did not explain their lessons in English; however, they showed the students the graphics presented on the whiteboard and explained them in French and Arabic. The students, on the other hand, felt confused and were asking each other about the lesson presented in English. They were also noticed to be taking pictures of the PowerPoint presentation. The students were following their teacher's instructions and explanations, and some of them were interacting and asking questions.

During other sessions, other teachers also presented their PowerPoint presentations in English. When they had to explain the lesson, they were code-switching from English to French or Arabic. They were reading the content presented in English and translating at the same time. They also faced some difficulties finding the right words and constructing grammatical sentences. Some students were asked to read the presentation; they showed a good level of reading proficiency. They made some mistakes, but they managed to read it correctly. Additionally, when students were asked to answer teachers' demands orally, they struggled to convey their ideas clearly in English. They were hesitant and not confident enough to talk, which led their teachers to permit the use of Arabic or French. However, they were required to respond in English in written exercises, tests and exams.

In the same previous sessions, we observed some students using chatbots in the classroom without teachers' permission. These students were more active and confident when interacting with the teachers compared to the other students who do not use chatbots. They

made fewer mistakes when communicating with their teacher or when they answered written exercises. In some cases, the teachers allowed their students to use these chatbots to look for explanations or translations of complex words. Other teachers invited their students to use these chatbots as supplementary tools outside of the classroom and told them not to over-rely on them. After the session, we had to ask students for the reasons behind using these chatbots. Some students said that they do not understand some technical words in English, so they use chatbots to seek clarification. Other students answered by saying that they wanted to prepare their answers to avoid making mistakes. Others justified their use of chatbots, saying they do not know how to express their ideas and answers clearly in English. So they rely on chatbots to complete the work for them. The students told us that they do not find difficulties when they use these chatbots.

From these observation notes, we conclude that most teachers have a limited level of English language proficiency. They use the English language for their slides and PowerPoint presentations, but they speak mostly French or Arabic during class. These inconsistencies in language use during instruction make it difficult for students to understand the content. This shows that teachers did not have enough training in the English language, and they need more assistance in effectively delivering the content in English. Addressing this need can enhance the quality of instruction and improve students' comprehension and language development. Moreover, we can conclude that not all students have proficiency in English communication skills; they find some difficulties in expressing their ideas clearly in English. We can also add that most students use chatbots in the classroom as a tool that helps them overcome language barriers and enhance their understanding of the course. These chatbots served as a valuable tool that helped students improve their English communication skills. By providing instant clarification on complex words and offering error corrections, the students could answer the teachers' questions correctly and explain their ideas accurately. They were confident enough

to speak and answer. Furthermore, not all the teachers allowed the use of these chatbots in the classroom; they asked their students to use them outside the classroom as a supplementary tool.

3.2.2 Results from the Analysis of the Online Questionnaire

The data collected from the questionnaire are interpreted as follows :

Section One: English Language Proficiency and The Englishization Context

Question 1: Please rate your current level of English proficiency

(Choose one option for each)

Please rate your current level of English proficiency (Choose one option for each)

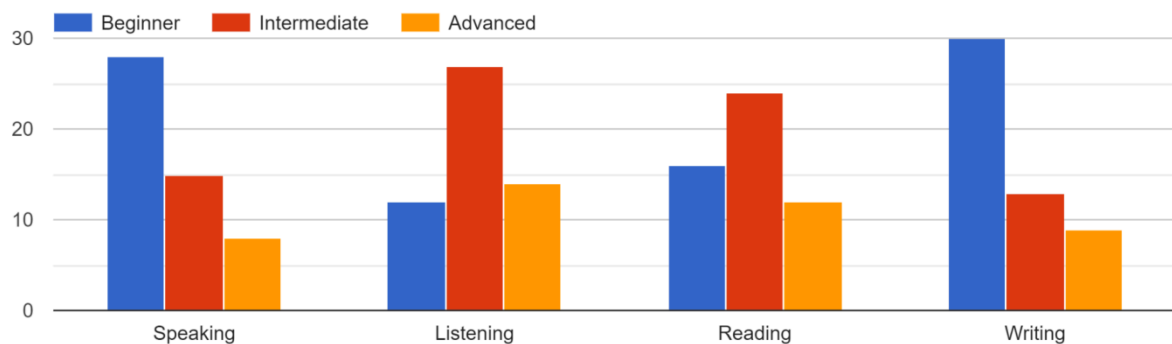
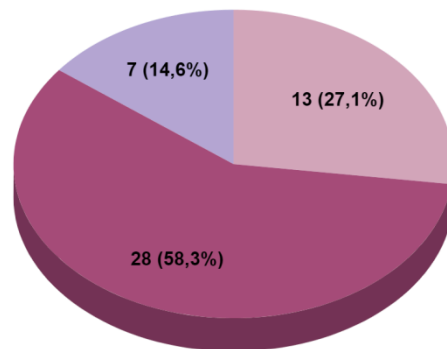


Chart 1: Students' English Language Proficiency

This question is addressed to students in order to assess each one's level of English language proficiency in four areas: speaking, listening, reading and writing. To better understand the results of the above chart, we will analyse each skill separately in the next graphs.

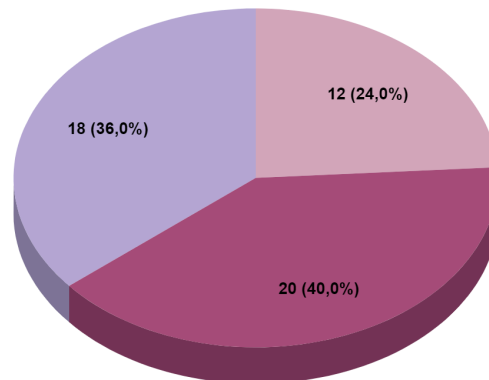
● Intermediate ● Beginner ● Advanced



Graph 1: Students' Speaking Skill Proficiency

We can see from the results shown above that (58.3%) of students cannot speak well in English, while (27.1%) are intermediate and (14.6%) are advanced in speaking English.

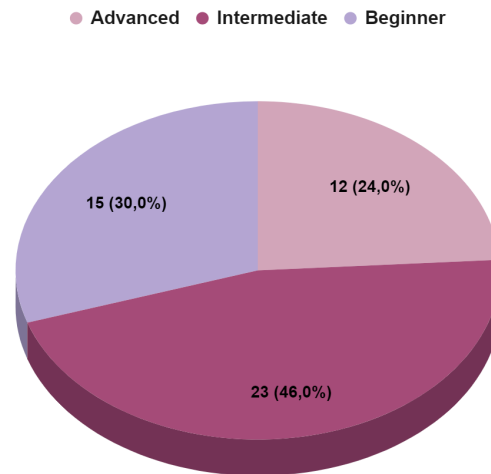
● Advanced ● Intermediate ● Beginner



Graph 2: Students' Listening Skill Proficiency

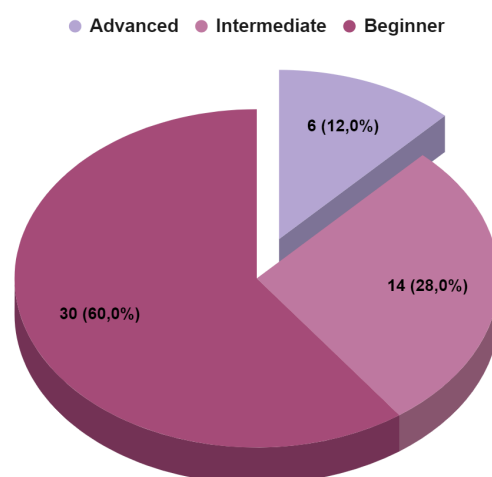
The graph above shows that (36%) of students see themselves as beginners in listening to lectures in English since they are used to French or Arabic as a language of instruction,

whereas (40%) of students are intermediate listeners, and the rest (24%) of students have no problems with listening to English



Graph 3: Students' Reading Skill Proficiency

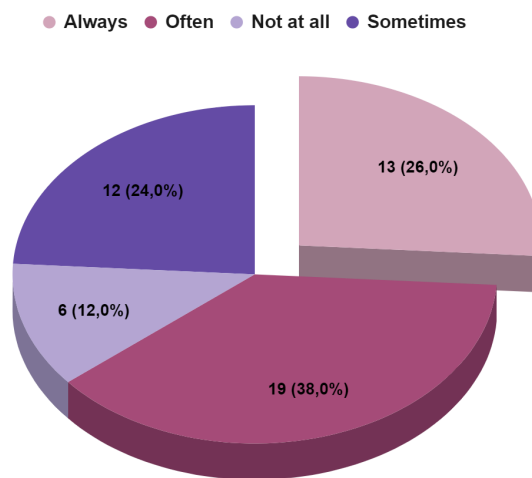
The findings of this graph show that (46%) of students are intermediate in reading in English, (32%) find some difficulties in reading in English and consider themselves as beginners and (22%) of the rest of students are more confident in reading in English.



Graph 4: Students' Writing Skill Proficiency

As we see in the graph, the majority of students (60%) find it difficult to write and express their ideas clearly in English, while (24%) perceive an intermediate level, and the other (16%) are advanced in writing in English.

Question 2: How often do you use English in your academic activities? Always/ Often/ Sometimes/ Rarely/ Not at all



Graph 5: Students' Use of English in their Academic Activities

The results in the graph above indicate that (38%) of students often use English in their academic activities, while (26%) of students said that they use it regularly in their academic activities. Besides, (24%) of the students mentioned that they sometimes use it, and only 6 students (12%) said they do not use it. So, we can say that most of the students use English in their academic activities.

Question 3: In what ways do you think the *Englishization* of Algerian higher education would impact your learning experience?

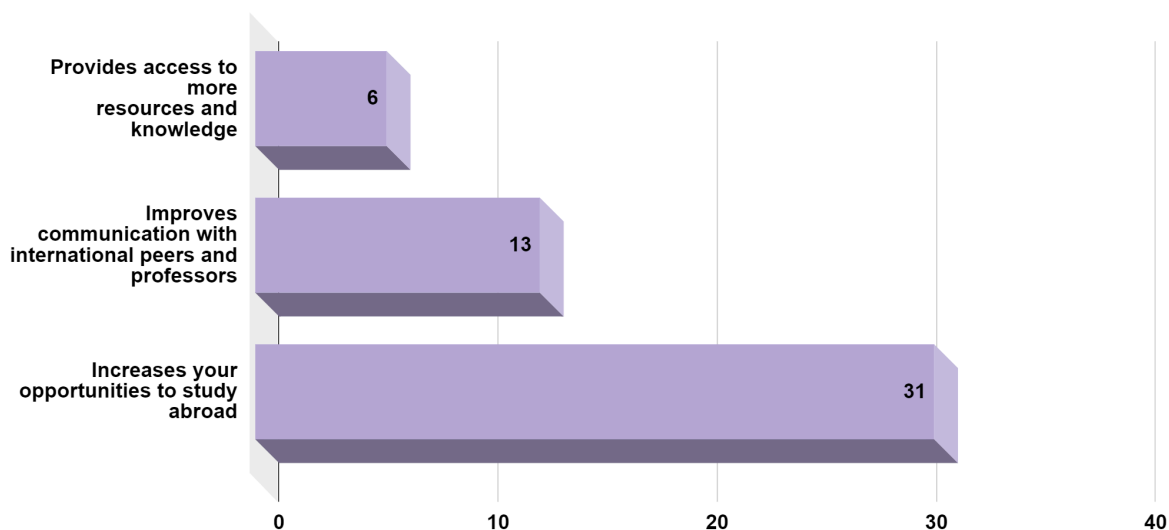


Chart 2: Students' Perspectives on the Shift towards English in Algerian Higher Education.

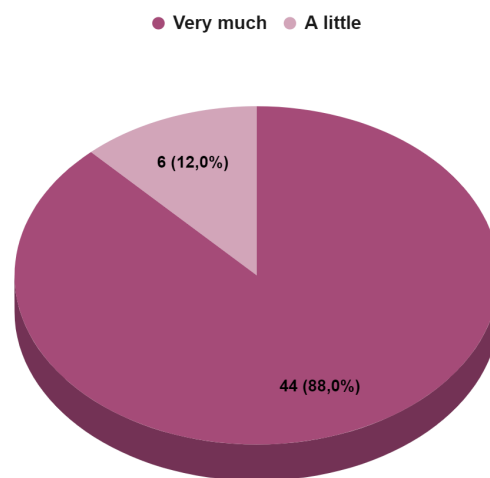
Choices	Increases your opportunities to study abroad	Improves communication with international peers and professors	Provides access to more resources and knowledge
Numbers	31	13	6
Percentage	62%	26%	12%

The results show that 31 students (62%) recognize the importance of the Englishization in the Algerian tertiary in increasing their opportunity to study abroad and carry on their post-graduate studies, whereas 13 students (26%) mentioned that they believe it can improve their communication with international peers and professors specialising in their fields. Only

6 students (12%) stated that it provides them with access to more resources and allows them to acquire much more knowledge. Other students also mentioned that it helps them read scientific books and articles in their field of study.

Question 4: How much do you like the English language?

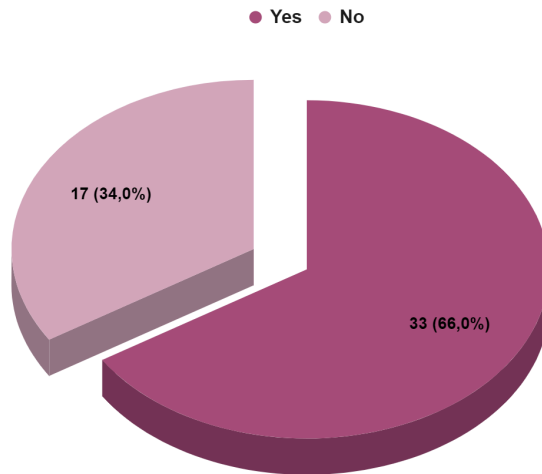
Very much/ Somewhat/ A little/ Not at all



Graph 6: Students' Attitudes towards the English Language

The findings indicate that the majority of students (88%) like the English language, and only (12%) said a little. Surprisingly, no one voted for “somewhat” or “not at all”, which means that students have a positive attitude and appreciation towards the English language.

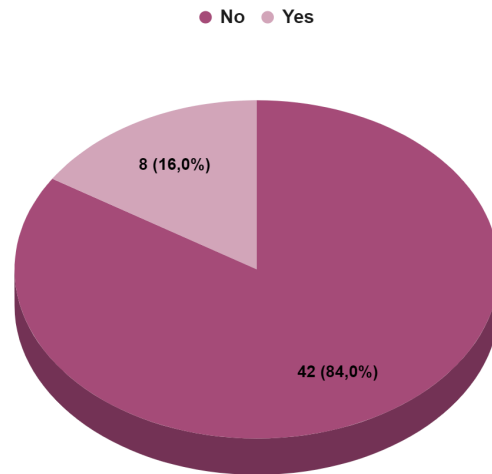
Question 5: Do you feel confident when you communicate in English in technical or scientific contexts? 1) Yes; 2) No and please explain why?



Graph 7: Students' Confidence in English Communication

The findings reveal that the majority of the students (66%) declare that they feel confident when they communicate in English in technical and scientific concepts, as they find it easier than French and believe that it can provide them with more opportunities in the future. Those (34%) who said no, they do not feel confident, justified their answers, saying that they have a fear of making mistakes and they got afraid of teachers' negative feedback, while others said they haven't studied English for a long time and they are used to French as a medium of instruction.

Question 6: Do you think your English language teachers are competent enough to teach you English for science and technology? Justify your answer, please!



Graph 8: Students' Attitudes towards their English Language Teachers

As we can see in the graph, only (16%) of students claimed that their teachers were able to teach them English for science and technology. They said they are experienced and knowledgeable. On the other hand, the majority of students (84%) said that their teachers are incompetent. Their answers were as follows:

“ They are not present all the time, and they send us the lessons on Moodle.”

“ They teach us English grammar, and I think we don't really need it.”

“They focus on teaching grammar instead of teaching the English used in science and technology.”

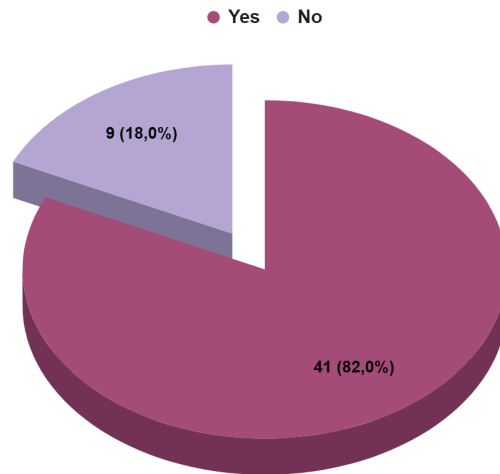
“They are not specialised in English for science and technology.”

“They do not know technical English, and their classes are boring and not interesting.”

We can conclude from these findings that students are not satisfied with their English teachers' ability to teach English for science and technology. As a result, this can impact their motivation to learn English and their willingness to attend English classes.

Section 2: Chatbot use

Question 1: Does your limited proficiency in English lead you to use chatbots?



Graph 9: Students’ Perception of the Impact of their Language Proficiency on their Use of Chatbots

As it is shown in the graph, (82%) of the students agreed that their limited language proficiency leads them to use chatbots, as these latter can help them with clarification or assistance. On the other hand, only (18%) said no; it is not the main reason for using chatbots.

Question 2: How often do you use chatbots to learn English?

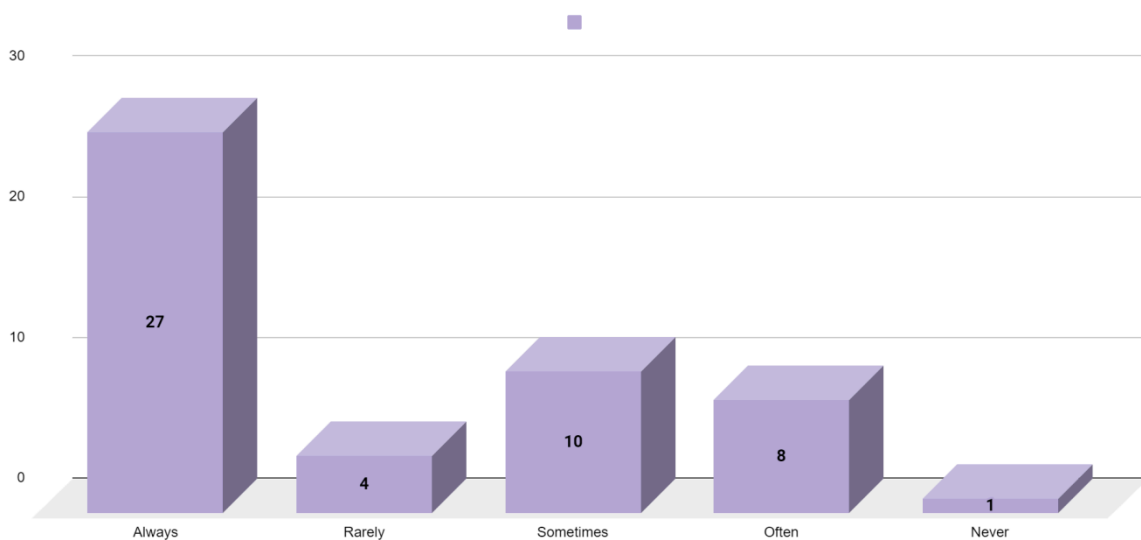


Chart 3: Students’ Use of Chatbots in Learning English

Choices	Always	Rarely	Sometimes	Often	Never
Number	27	4	10	8	1
Percentage	54%	8%	20%	16%	2%

The data indicated in the graph and the table reveals different levels of students' engagement with chatbots. The majority of students (54%) reported that they always use chatbots as a tool for language learning. Another significant percentage (20%) said they sometimes use it, while (16%) said they use it often. A small minority of students (8%) stated that they rarely use chatbots for English learning, while only (2%) reported never using them. So, the majority use it consistently, while others use it occasionally.

Question 2: For what reasons do you primarily use chatbots ?

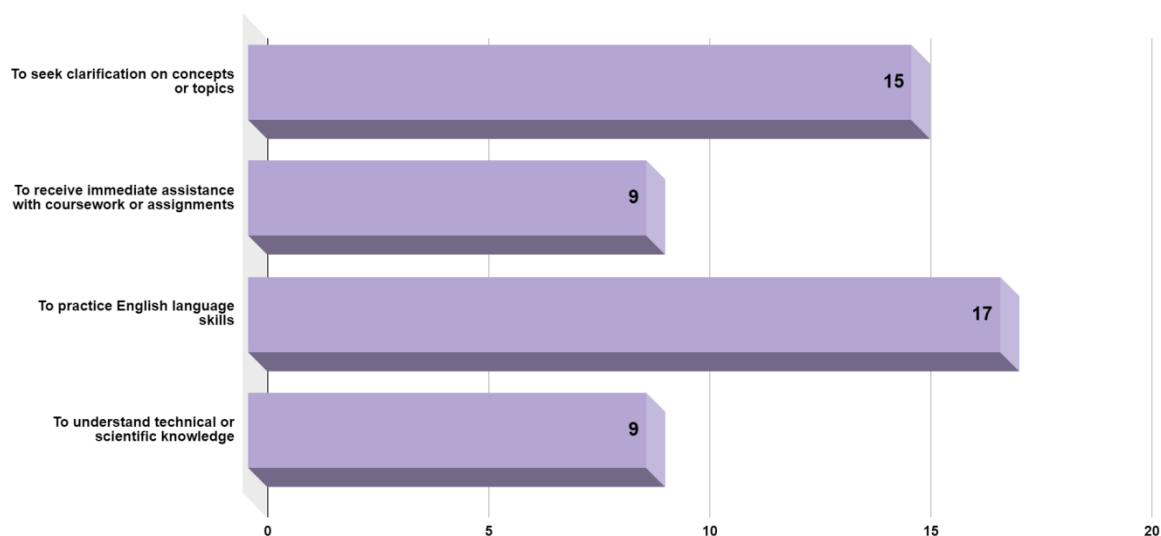


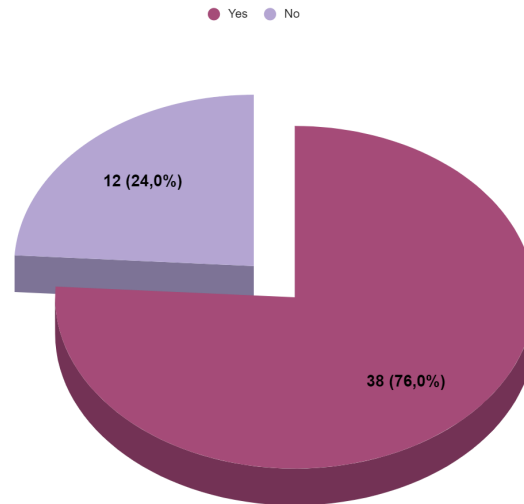
Chart 4: Students' Reasons of Using Chatbots

Choices	To seek	To receive	To practise	To understand

	clarification on concepts or topics	immediate assistance with coursework or assignments	English language skills	technical or scientific knowledge
Numbers	15	9	17	9
Percentage	30%	18%	34%	18%

According to the data mentioned in the table, (34%) of students mentioned that they use chatbots as a tool that helps them develop their English language skills, whereas (30%) claimed that they use chatbots to seek clarification on concepts or topics. Additionally, (18%) said they rely on chatbots to receive immediate assistance with coursework or assignments. Another (18%) said they use chatbots to understand technical or scientific knowledge. Other students added that these chatbots are great tools for translation.

Question 3: Do you think these chatbots improve your communication skills ? Yes / no; if yes, please explain how?



Graph 10: Students' Perception of Chatbots' Influence on Communication Skills Development

It is apparent that the significant percentage in the graph (76%) indicates the number of students who believe that chatbots help them improve their communication skills. They supported their claim as follows:

“ Daily interaction with chatbots can help me learn new vocabulary and phrases.”

“ If we talk each time with these chatbots, we will learn how to write correctly because these chatbots provide us with the necessary corrections.”

“ When I listen to chatbots' answers each time, I get used to them, and I think this can improve my listening and speaking skills.”

“ They can provide a fun and interactive environment for communication and improving language skills.”

The other (24%) said they don't think these chatbots can develop their communication skills for the following reasons:

“ I've become too reliant on the chatbots to help me communicate, and now I'm struggling to do it on my own without their assistance.”

“ Sometimes it gives me incorrect answers or some answers that are not related to my inquiry.”

“ I do not feel that I am making progress.”

Section three: Challenges Faced

Question 1: What are the challenges you face when you use chatbots to learn English?

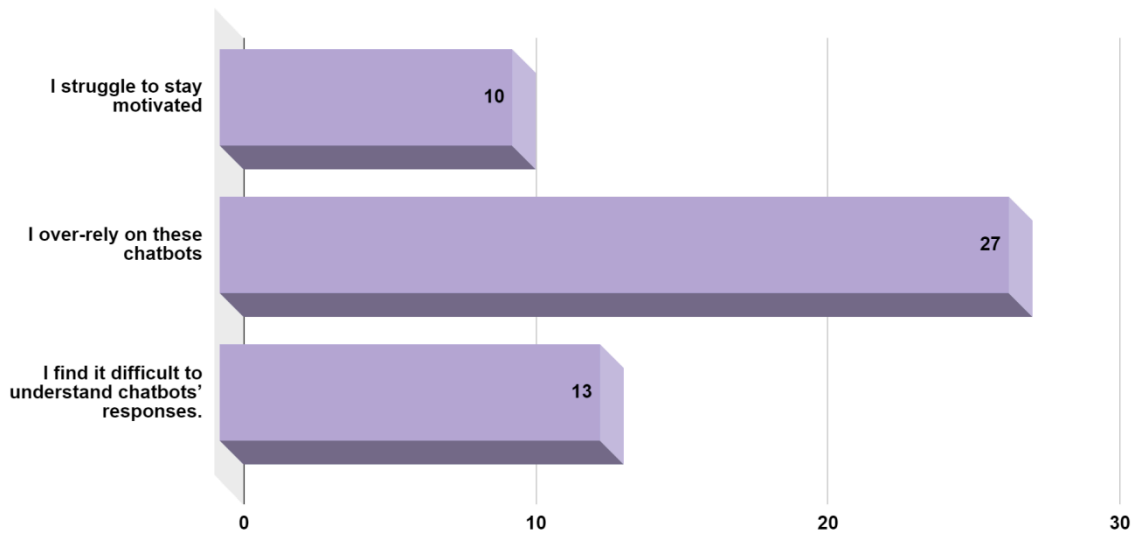


Chart 5: Challenges Faced by Students Using Chatbots for English Learning

Choices	I struggle to stay motivated	I over-relyon these chatbots	I find it difficult to understand chatbots' responses
Numbers	10	27	13
Percentage	20%	54%	26%

As we can see in the table, (54%) of students find themselves excessively depending on chatbots in their English language learning, which leads them to other difficulties in real life

situations. (26%) find chatbots' answers difficult and challenging to understand as they give complex explanations to their questions, and the last (20%) feel less motivated when they use chatbots because of the repetitive answers they provide.

Question 2: How do you find the use of chatbots in addressing your language learning needs? Effective/to some extent/ineffective/not sure

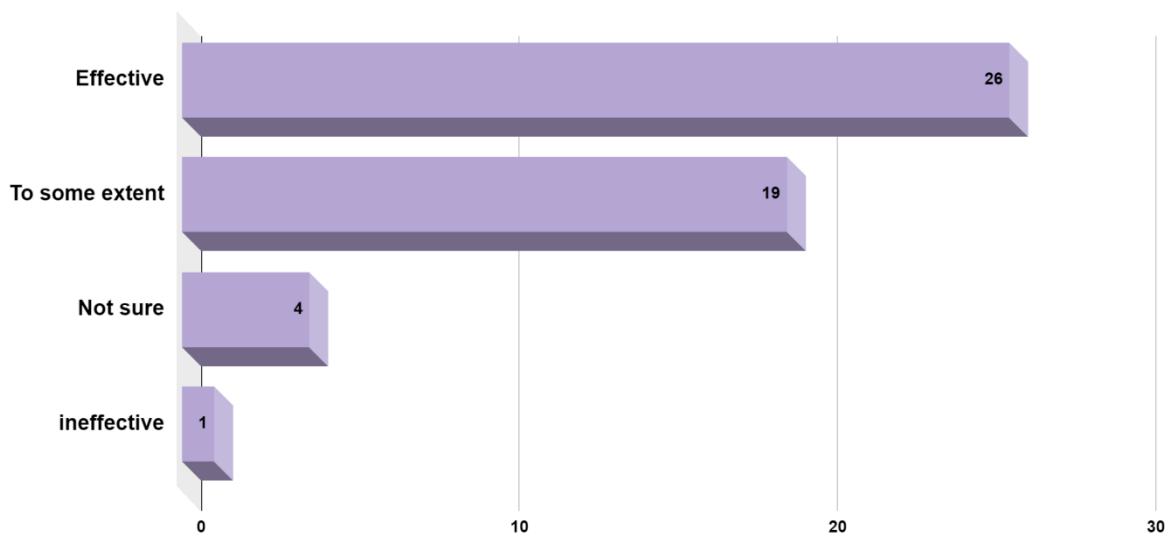


Chart 6: Student Perspectives on the Efficacy of Chatbots for Language Learning Needs

Choices	Effective	To some extent	Ineffective	Not sure
Numbers	26	19	1	4
Percentage	52%	38%	2%	8%

The last chart highlights that 52% of students believe that chatbots are effective tools that play a crucial role in their language learning needs. Other students (38%) claimed that they

are effective to a certain extent, while 4 students (8%) were not sure, and only 1 student said they are ineffective.

3.2.3 Results from the Analysis of Teachers' Interview

The interviews with the teachers provided valuable insights into their current level of English proficiency and the challenges and opportunities of using English as a medium of instruction. They also revealed their preparedness to teach in English and their perspectives on the use of chatbots in the classroom.

Question 01: What is your current level of English ?

The teachers reported different levels of English proficiency. Teacher 01 said that currently, his English level is basic. He can understand and convey simple ideas, but he needs extra support to teach complex scientific concepts in English. Teacher 02 answered that, at the moment, his English proficiency is limited. He can manage basic conversations and understand straightforward instructions, but he may find it challenging to express scientific ideas in English. Teacher 03 said that her English level is intermediate, while teacher 04 said that he considers himself proficient in the English language and has no problem with teaching science and technology topics in English. The fifth teacher said, "I would say I'm good at English, and I have always loved this language." The last teacher answered, saying that English is not his strong suit. He can understand some basic English, but he is not ready to teach scientific students in English.

Question 02: According to your experience and knowledge, what are the main challenges and opportunities you face as a teacher after the shift towards English as a medium of instruction in science and technology programs?

The shift towards English as a medium of instruction has presented both challenges and opportunities for the teachers. Teacher 01 said that students have some difficulties understanding the materials delivered in English because not all of them master the language. However, he emphasised the importance of this shift, saying that it will improve the quality of learning, which will indeed give the Algerian university a global reputation.

Teacher 02 said that students are used to French and Arabic as a language of instruction, so they do not show interest in learning in English, so we as teachers are in between the curriculum demands and the students demands, but we are satisfied with this shift. He added that this decision is in its infancy and requires more efforts from both teachers and students to make it effective because English is the most used language today and we need to evolve with the global landscape.

Teacher 03 answered that the training that they had passed was not really enough, and she added that some of the teachers did not attend for personal reasons, so they are not ready to deliver the content in English. She said that overall, we are sure of the benefits that this step will bring to us. Adopting English in Algerian universities will broaden teachers and students' horizons, providing many professional and personal opportunities.

Teacher 04 said that each time he presents the content in English, he needs to translate again for students or code switch between English, Arabic and French, and this does not facilitate the full embracement of English in the classroom. Concerning the opportunities, the teacher answered by saying that the Englishization of the Algerian universities helps them as teachers to collaborate with other researchers from all over the world. They can also write their scientific articles and works in English to reach a global scale.

Teacher 05 said most students have low proficiency in the language. He needs to teach in a language that all students can understand so that he will not waste his time. He expressed his

satisfaction with this transition, saying, “ I have no doubt this shift towards English instruction for science and technology students provides many opportunities for both teachers and students. On one hand, students can broaden their understanding of scientific concepts and knowledge since many scientific articles, journals, and books are in English. On the other hand, teachers can keep updated on the recent advancements in academia, particularly science and technology, and we can also represent our university at international events to expand our professional networks.”

Teacher 06 responded, “When I teach in English, most students do not interact with me; they become passive learners, so I need to either translate my words to French and Arabic or code-switch between the three languages.” He added that if students know the importance of this shift, they will gain many opportunities, such as studying abroad and engaging in international conferences, workshops and collaborative research projects. Moreover, we can showcase our research and teaching methodologies at international events and conferences.

Question 03: Do you feel prepared as a teacher to effectively deliver your courses in English?

The teachers showed different levels of readiness in their ability to effectively deliver courses in English. Teacher 01 said, "I must admit that I am not fully prepared to deliver my courses in English at this time, as I have a basic English level that needs additional improvement.”

Teacher 02 replied by saying that he is not ready and that it is a challenge for him that requires more time and training to deliver effective content for science and technology students.

Teacher 03 said , “ I can prepare my lessons in English, but I cannot explain those complex words. I need to work on my speaking skills.”

Teacher 04 answered, “Yes, I can say that I am prepared to deliver my courses in English for science and technology students. I have been working on improving my proficiency in the English language and adapting the teaching materials to meet learners’ needs.”

Teacher 05 said, “ I believe I am prepared to deliver my courses in English, but I have to acknowledge the ongoing need for professional development. We need in-service training to improve our language proficiency and teaching techniques to meet our learners' needs.”

Teacher 06 answered, “ I may encounter some difficulties with pronunciation, the accent, and the vocabulary or students’ comprehension, but I am ready for this big step that can open doors for both teachers and students. So, I think we need more training to help us overcome the challenges.”

Question 04: With regard to your students’ performance inside the classroom, have you recently noticed if they started using some chatbots in their learning process?

All six teachers answered with yes. They have all noticed an increasing number of their students using chatbots in the classroom.

Question 05: Do you support the idea of using chatbots in the classroom?

The teachers had mixed feelings about using chatbots in the classroom. Teacher 01 said, “Yes, I can support the use of these chatbots in the classroom in some cases, such as looking for clarification or translating complex words, but I forbid the use of these chatbots in tests and exams as a tool for cheating.”

Teacher 02 said, “ I have a mixed feeling about the use of these chatbots. We can not deny the fact that they can offer many benefits, but the over-use of these chatbots may hinder students’ ability to work critically and independently.”

Teacher 03 answered, “ I think there is no problem with the use of chatbots if students know how to use them in a responsible way. We are in the age of technology, and we need to keep pace with the advancements. However, like everything else, chatbots have both advantages and disadvantages. While they offer numerous benefits for both teachers and students, they should be employed thoughtfully.”

Teacher 04 replied, saying that since the language of instruction is English, students may find some difficulties, so they may use chatbots to facilitate comprehension or learn the language itself. He said that he allows his students to use chatbots for translating difficult words or looking for additional learning resources. However, he does not support the repetitive use of these chatbots inside the classroom, so he advises students to use them as supplementary tools outside the classroom.

Teacher 05 said, “ I personally use some chatbots, so I do not have a problem with students using them inside the classroom. However, I insist on the careful and ethical use of these AI tools.”

Teacher 06 stated that he does not support the use of these chatbots inside the classroom because he believes they can distract them and hinder their critical thinking skills.

Question 06: From your perspective, do you believe that these chatbots contribute to the development of students' communication skills in the target language?

The teachers generally believed that chatbots could enhance students' communicative skills. Teacher 01 said that he believes these chatbots can improve students' communicative skills. He said that the students whom he observed using chatbots regularly were noticed to be actively engaging with him.

Teacher 02 believes these chatbots can contribute to the development of students' communication skills. He stated that he always tells his students to use chatbots at home to learn and develop their language skills. After a period of observation, he noticed that they showed an improvement in their language proficiency compared to previous times.

Teacher 03 also agrees on the idea that chatbots can contribute to the development of students' communication skills. She observed that most of her students are taking these chatbots seriously to learn the language and enhance their communication skills.

Teacher 04 stated that he strongly believes that these chatbots can contribute to the development of students' communicative skills in the target language. He conducted an experiment in which he divided his students into two groups and asked both groups to work on some exercises. He asked only the first group to use chatbots, and the second group was not allowed to use them. The result of the experiment showed that the first group who had used chatbots were more active and confident in their answers, and their spoken language was better than the second group. They could write their ideas clearly and made fewer grammar mistakes than the second group.

Teacher 05 stated that he had also conducted an experiment inside the classroom since he noticed some students using chatbots, so he wanted to evaluate the impact of chatbots on their performance. He asked students to write a paragraph on a specific issue in half an hour, and they were allowed to use chatbots to seek clarification or translation. The other 30 minutes, they were asked to write another paragraph on another issue without the use of chatbots. After reviewing and correcting students' works, the teacher found that students who had used chatbots during the first task showed good writing abilities; they managed to write coherent ideas with fewer mistakes. On the other hand, students who did not use chatbots in the second task faced some difficulties with the language, which made their ideas disorganized. This

shows that the use of chatbots can improve students' communication skills, specifically their writing skills.

Teacher 06 said, “ As I have said before, I do not support their use inside the classroom; I always tell my students to use them as support outside the classroom. I have noticed that most of the students are showing an increasing improvement in all four skills. So I think yes, they can contribute to students' communication skills development.”

3.3 Discussion of the Findings

Based on the analysis of the data and the findings presented, we can draw some conclusions that show the effectiveness of our hypotheses. Regarding the use of chatbots in students' academic activities, the data collection tools used in this study indicate that the majority of science and technology students use chatbots in their academic pursuits. The questionnaire revealed that 54% of them always use chatbots for language learning, while the interviews with teachers confirmed an observed increase in students' use of chatbots in the classroom. This shows that students find these chatbots to be valuable and effective tools that help them develop their language proficiency and facilitate their comprehension skills. Therefore, the findings strongly support the hypothesis that science and technology students frequently employ chatbots in their academic activities.

A significant number of students (88%) said that they liked the English language and most of them use it in their daily activities. However, (82%) of them agreed that their limited English language proficiency leads them to use chatbots; they explained that (58.3%) of them cannot speak well, and (40%) are intermediate listeners. Additionally, (46%) are intermediate readers in English, and (60%) of them find it difficult to write and express their ideas clearly in English. Despite their positive attitudes towards the English language and their willingness

to use it in their academic activities, their limited language proficiency represents an obstacle to their communication and academic success. Therefore, they tend to use chatbots to learn the English language, as these latter offer students many benefits that can meet their needs. Students can access chatbots anytime and anywhere, offering them a supportive learning environment where they can practise their language skills.

Science and technology students have also mentioned other reasons for their use of chatbots. They use chatbots for the following reasons:

- To seek clarification on concepts or topics
- To receive immediate assistance with coursework or assignments
- To practise English language skills
- To understand technical or scientific knowledge

Another important reason that (84%) of students have mentioned is that their English language teachers are not competent enough to teach them English for science and technology. They stated that they are absent all the time, and they send them the lessons on Moodle. This shows that students lack the essential components of effective language learning and instruction. They have no direct engagement and instruction with their teachers, which may hinder their ability to receive instant feedback, seek clarification, and engage in meaningful conversations with their teachers and classmates in English. Furthermore, students added that their teachers are more personalised in literary English, and they focus on teaching grammar instead of the English used in science and technology. As a result, students may face some difficulties in understanding technical materials and complex ideas related to their discipline.

Moreover, the other teachers of the different modules of science and technology stated that they have limited language proficiency and may encounter some difficulties when they

deliver their content in English. When teachers themselves face language barriers, it not only affects their ability to convey information clearly but also affects students' comprehension and engagement in the classroom. This shows a need to address these challenges and requires additional support and training programs to enhance teachers' language skills and the specific instructional strategies for science and technology students. All the above findings represent the reasons that led science and technology students to use chatbots, and they closely align with the hypothesis that says science and technology students may use chatbots because they do not understand the lessons delivered in English.

Moreover, both teachers' and students' answers demonstrate the same results regarding the impact of chatbots on students' communication skills. They have both agreed on the fact that these chatbots can contribute to the development of students' communicative skills. Some of the teachers have conducted some experiments to evaluate their effectiveness on students' communicative skills. The results revealed that students using chatbots showed an increasing improvement in the four skills. In speaking skills, students explained that through regular interaction with chatbots, they could practise their speaking skills and express their ideas confidently in English. In listening skills, they explained that through interactive conversations and instant suggestions and clarifications from chatbots, they can enhance their listening comprehension. In reading skills, science and technology students explained that these chatbots can provide them with many scientific resources, books and articles. So they can improve their reading skills and gain new knowledge, concepts and vocabulary related to their fields of study. In writing skills, they said that instant feedback and corrections to students' responses can help them refine their writing abilities in the English language. These points suggest that personalised feedback and the interactive learning environment that chatbots provide can empower students to improve their language skills and convey their

ideas effectively. Moreover, the same findings strongly support the hypothesis that chatbots contribute to the development of students' communicative skills.

From the students' responses, a small minority of students (20%) feel less motivated when they use chatbots because of the repetitive answers they provide, while (54%) of students admitted that they excessively depend on chatbots for English language learning. There are several reasons that lead students to use these chatbots. One of these reasons is that these chatbots offer students immediate feedback and corrections to their answers. They create a non-judgmental learning environment where students can feel comfortable practising language skills. They also adjust the level of the exercises' difficulty according to the students level of proficiency. To ensure a balanced learning experience for students, teachers should address these points carefully. They should create a supportive learning environment where students can be encouraged to take risks and learn from their mistakes. They can incorporate these chatbots into their learning activities to cater to the different learning styles of students. From these findings, the hypothesis that students encounter challenges such as motivation, comprehension of responses and over-dependence on chatbots can be confirmed.

It is important to note that despite the lack of English language proficiency of both students and teachers, they expressed their satisfaction with the transition towards English as the medium of instruction in Algerian higher education. They recognized the importance and benefits of English in their academic and professional careers and expressed their willingness to improve their English language skills.

In conclusion, the analysis of the findings validates all the hypotheses related to the frequency of chatbot use in students' academic activities, the reasons for their use, the contribution of these chatbots to their communication skills development, and the challenges that students face when using these chatbots. However, other results were found. Indeed,

science and technology students may use chatbots to learn the English language because they find it difficult to understand the lessons delivered in English. However, results demonstrated that there are other reasons that lead students to use chatbots. One of these reasons is that English language teachers are not competent enough to teach students English for science and technology. They are more personalised in literary English, and they focus on teaching grammar instead of the English used in science and technology, which makes students dissatisfied and unmotivated to attend their classes. Additionally, another reason that was found is that the other teachers of the different modules have limited English language proficiency, which led to other difficulties when delivering their content in English. Concerning the challenges that students face when using these chatbots, indeed, students may struggle to stay motivated when using chatbots because of their repetitive answers, but another result was established, which is over-relying on them.

3.4 Limitations

One of the limitations of this research study was the limited number of participants, which consisted of 50 students. This limited sample may not reflect the different experiences and perspectives of all science and technology students. As a result, the findings may not be relevant to larger populations of science and technology students. Another limitation was our inability to reach and conduct interviews with English language teachers for science and technology. It would have given us an opportunity to gather valuable information on how language is taught and learned in the context of science and technology education.

3.5 Suggestions

Based on the discussion of the findings, we can suggest some solutions to address the challenges faced by both teachers and students in teaching and learning English and to enhance the use of chatbots in students' academic activities.

The following suggestions are for improving English language proficiency for students and teachers:

- Implementing continuous training programs for science and technology teachers on how to deliver their courses in English. These training programs should focus on strengthening their English language skills and proficiency and addressing their specific needs, such as explaining complex scientific and technical vocabulary in English, effective communication strategies, etc.
- English language teachers can collaborate with science and technology teachers to develop a curriculum that not only enhances students' English language proficiency but also facilitates their understanding of scientific concepts.
- English language teachers should integrate interactive learning activities into their courses. These activities can help students learn English or apply their language skills to real-life scientific contexts.
- Organising workshops where teachers from different disciplines can be invited to share their practices and the different methodologies they follow to teach in English. These workshops can help teachers learn from each other's experiences and knowledge and improve their proficiency in delivering the content effectively in English.
- Establishing language labs and communication clubs for students where they can practise speaking, listening, reading and writing skills. Language labs involve the use

of multimedia resources and technological tools to reinforce language skills. This can create an engaging learning environment for students where they can engage in debates, presentations and conversations and gain the confidence to use the English language.

The next suggestions are for improving the use of chatbots and addressing the issues of overdependence and motivation :

- Teachers can encourage students to use chatbots to enhance their English language learning and class preparation. Students can engage with chatbots to foster their understanding of complex topics and practise their English language skills before attending the classes. During the class, they can apply what they have learned and engage with the teacher in discussions, debates and other activities.
- Teachers should be actively involved in guiding the use of chatbots and providing feedback for students to help them apply what they have learned from chatbots.
- If teachers allow the use of chatbots in the classroom, then they should incorporate them into the activities that require group discussions and debates. This can help students engage with each other, not only with the chatbots.
- Teachers should create a supportive learning environment for students where they can feel comfortable expressing themselves and their ideas without any fear of judgement or the fear of making mistakes. They should also teach students how to depend on themselves to reduce their overdependence on chatbots.

Overall, these strategies would certainly help both teachers and students develop a more successful and enriching educational experience.

3.6 Recommendations for Further Research

While conducting this research, we found that there is a lack of research on English for science and technology. So, for further studies, it would be interesting to study how English language teachers teach English for science and technology and investigate the different methodologies they follow to address students' language needs in this field. Further research could also explore the challenges these teachers face in delivering their content. Moreover, this research aims to inspire other researchers to explore similar issues among students of other majors.

4. Conclusion

After analysing and interpreting the results of our investigation, we have reached some significant conclusions. First of all, the study demonstrates that chatbots are widely used among science and technology students as they find them effective tools for enhancing their academic activities, particularly for English language learning. Second, despite students' positive attitudes towards English, most of them face some language proficiency challenges. These challenges lead science and technology students to rely on chatbots to improve their speaking, listening, reading and writing skills. The findings also highlight other reasons for the use of chatbots, which are the inadequacies of science and technology teachers in teaching their modules in English, as these teachers have limited English language proficiency. Additionally, English language teachers focus more on literary English and grammar than the specific language needs of science and technology students, which led the students to show their dissatisfaction and demotivation to attend their classes. Furthermore, based on teachers and students' answers, the study reveals that these chatbots positively contribute to the development of students' communicative skills. However, the overreliance on these chatbots is one of the main challenges students face. Finally, despite all the

challenges mentioned, both teachers and students expressed their satisfaction with the transition to English as the medium of instruction in Algerian higher education. They recognize its importance for their academic and professional success. Therefore, we have suggested some solutions to overcome those challenges and create a more effective and engaging learning environment.

General Conclusion

The present study focused on investigating the use of chatbots among science and technology students. It also aimed to evaluate the impact of these chatbots on the development of students' communicative skills after the shift towards English as a medium of instruction. Throughout our investigation, which was centred on the recent *Englishization* of Algerian higher education, we aimed to investigate four main issues. First of all, we examined the extent to which science and technology students employ chatbots in their academic activities. Then, we explored the main reasons that led these students to use chatbots. Additionally, we investigated whether these chatbots contribute to the development of students' communicative skills in technical and scientific contexts. Finally, we identified the challenges that science and technology students face when using chatbots. By addressing these factors, our research contributes to a better understanding of the future of technology, specifically chatbots in education and language learning.

The dissertation consisted of three main parts. The first chapter was about the theoretical background. Its main aim was to make the reader understand the principles of integrating chatbots in language learning within the context of the *Englishization* of Algerian higher education. Thus, it dealt with different principles and concepts related to language learning and the integration of artificial intelligence, particularly chatbots, in education. As for the second chapter, it focused on the practical part of our study. It described the methodology that we had followed, including the participants and the data collection tools. Then, the last chapter was about the analysis of the data collected from the observation, the questionnaire and the interview. Also, it dealt with the discussion of the main findings, the limitations that should be acknowledged, and some valuable suggestions for the issues stated.

The findings gathered from the data collection tools confirmed the study's hypotheses. We could successfully reveal that science and technology students frequently employ chatbots in their academic activities. Moreover, we found out that there are many reasons that often lead students to use these chatbots. The primary reasons are to learn the English language and the incompetence of English language teachers in teaching English for science and technology as they focus more on literary English and grammar. Additionally, other teachers in different modules have limited English proficiency, which creates some difficulties in delivering their content in English. Through the analysis of the findings too, we could argue that these chatbots contribute positively to the development of students' communicative skills. Finally, the data showed that there are some challenges that students face when they use these chatbots. One of the major challenges is that some students struggle to stay motivated due to the repetitive answers of chatbots, and some of them tend to over-rely on chatbots.

In brief, this research was conducted to gather valuable insights into the use of chatbots, the challenges faced and their impact on students' communicative skills within the context of the Englishization of Algerian higher education.

To conclude, we recommend that further research include broader and more diverse samples to enhance the validity and generalizability of the findings. It would also be interesting to study how English language teachers teach English for science and technology and investigate the different methodologies they follow to address students' language needs in this field. Further research could also explore the challenges these teachers face in delivering their content.

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Appendix

Students Questionnaire

Dear participants,

This questionnaire is part of a research that aims to investigate the use of chatbots by science and technology students and their impact on students' communicative skills after the shift towards English in Algerian higher education. Please be sure that all your responses will remain anonymous and used only for the purpose of this research. Thank you for taking the time to complete this questionnaire.

chaouliarimene@gmail.com [Changer de compte](#)



Non partagé

* Indique une question obligatoire

Section1: English Language Proficiency and The *Englishization* Context

Please rate your current level of English proficiency (Choose one option for each) *

	Beginner	Intermediate	Advanced
Speaking	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Listening	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reading	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Writing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

How often do you use English in your academic activities? *

- Always
- Often
- Sometimes
- Rarely
- Not at all

In what ways do you think the *Englishization* of Algerian higher education would impact your learning experience? *

- Increases your opportunities to study abroad
- Improves communication with international peers and professors
- Provides access to more resources and knowledge
- Autre : _____

How much do you like the English language?

- Very much
- Somewhat
- A little
- Not at all

Do you feel confident when you communicate in English in technical or scientific contexts? *

- Yes
- No

Please explain why ?

Votre réponse _____

Do you think your English language teachers are competent enough to teach you English for science and technology?

- Yes
- No

Justify your answer, please!

Votre réponse _____

Section 2 : Chatbot Use

Does your limited proficiency in English lead you to use chatbots?

- Yes
- No

How often do you use chatbots to learn English? *

- Always
- Often
- Sometimes
- Rarely
- Never

For what reasons do you primarily use chatbots ?

(you may select more than one)

- To practice English language skills
- To seek clarification on concepts or topics
- To receive immediate assistance with coursework or assignments
- To understand technical or scientific knowledge
- Autre : _____

Do you think these chatbots improve your communication skills ? *

Yes

No

If yes, please explain how ?

Votre réponse _____

Section 3: Challenges Faced

What are the challenges you face when you use chatbots to learn English? *

(you may select more than one)

I find it difficult to understand chatbots' responses.

I struggle to stay motivated

I over-rely on these chatbots

Autre : _____

What do you think are the solutions to overcome these challenges?

Votre réponse _____

How do you find the use of chatbots in addressing your language learning needs? *

- Effective
- To some extent
- Ineffective
- Not sure

Envoyer

Effacer le formulaire