Original Research Article

English as a Medium of Instruction for Science: Teacher and Student Perspectives

ABSTRACT :

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| This study aims to investigate the attitudes of Moroccan high school science students and teachers toward English as a Medium of Instruction (EMI), and to identify the challenges they face with French, the current language of instruction for science subjects. Conducted across several Moroccan cities between February and April 2025, the study employed a convergent mixed-methods design. Quantitative data were collected through a bilingual 30-item questionnaire completed by 110 students, while qualitative data were obtained via semi-structured interviews with 17 science teachers. Quantitative data were analyzed using descriptive statistics via SPSS, and qualitative responses were thematically coded. The results reveal that most students experience significant difficulties studying science in French, including limited comprehension, reliance on translation, and poor classroom communication. Teachers confirmed these difficulties and reported frequently switching to Arabic or Tamazight to facilitate understanding. Despite French being the first foreign language taught in Morocco, 98% of students indicated a clear preference for English as the language of instruction. Teachers also expressed strong support for EMI, provided that appropriate training and curriculum support are ensured. Both groups associated English with academic opportunity, global mobility, and better access to scientific knowledge. These findings suggest growing support for a shift toward EMI in Moroccan high schools, particularly for science education. However, successful implementation will require comprehensive policy planning, investment in teacher development, and early exposure to the English language. This study offers timely evidence for policymakers and curriculum designers aiming to reform language-in-education policy in Morocco. |

*Keywords: English as a Medium of Instruction, language attitudes, Moroccan high schools, science education, student perspectives, teacher perspectives*

1. INTRODUCTION

The language of instruction refers to the language or languages used to teach and communicate the curriculum in formal or informal educational settings. it encompasses both spoken and written forms of classroom discourse, which may be new to learners and are essential for understanding and engaging with educational content (UNESCO, 2006; Council of Europe, 2007), which means that it plays a pivotal role in shaping students’ learning experiences and academic success. Also, it is not merely a medium through which content is delivered but a fundamental tool that influences cognitive development, comprehension, and participation in educational settings. Choosing the appropriate language of instruction can significantly affect students’ ability to access knowledge, engage with complex concepts, and develop critical thinking skills. In this regard, Lev Vygotsky underlines that the language of instruction is the primary tool through which thinking is mediated and developed, stating that “language and culture play essential roles both in human intellectual development and in how humans perceive the world” (Vygotsky,1978).

Given the critical importance of the language of instruction in shaping educational outcomes, the Moroccan government has been actively working to enhance its education system since gaining independence. These efforts encompass various initiatives and policy changes aimed at enhancing the effectiveness of instruction and boosting student achievement, particularly in science education. A significant aspect of these efforts is fostering openness to foreign languages, with a particular focus on English due to its status as an international lingua franca and its prominence in the fields of science, technology, engineering, and mathematics (STEM). Although English is recognized as a valuable language for scientific and technological advancements, the primary medium of instruction in Moroccan high schools for science subjects such as mathematics, physics, chemistry, and Earth and Life sciences remains French. This coexistence fosters a multilingual educational environment that reflects the country's rich historical and cultural heritage. In recent years, however, there have been growing calls and policy discussions advocating for the increased integration of English as a medium of instruction (EMI) across various educational levels, particularly in non-English-speaking countries (Dearden, 2014; Macaro et al., 2018), such as Morocco.

This global shift is often justified by the perceived benefits of EMI in enhancing students’ international competitiveness, academic mobility, and access to scientific knowledge. Building on this policy trend, emerging research has shown that AI-mediated English instruction can significantly enhance learners’ academic achievement, motivation, and self-regulated learning compared to traditional pedagogical methods (Wei, Wang, & Ma, 2023; Zawacki-Richter et al., 2019). These findings underscore the transformative potential of integrating EMI policies with advanced educational technologies to foster more effective and personalized learning experiences.

Recognizing these developments, policymakers and educators in Morocco are increasingly exploring strategies to implement English as a medium of instruction (EMI) across educational institutions. This shift aims to improve students' English skills, digital literacy, and readiness for international academic and professional opportunities (Dearden, 2014; Macaro et al., 2018). The Moroccan Ministry of Education has recently introduced reforms supporting the gradual adoption of EMI, especially in science and technology fields, reflecting a broader effort to align the country's education with global standards. At the same time, the integration of AI-supported English instruction is gaining attention, with recent studies showing its effectiveness in boosting learners' academic performance, motivation, and self-regulation (Wei, Wang, & Ma, 2023; Zawacki-Richter et al., 2019). These changes suggest a promising synergy between EMI policies and emerging educational technologies to enhance language education in Morocco.

1. **English language and linguistic situation in Morocco**

Morocco is a multilingual nation characterized by its complex and diverse language landscape, where various varieties of Arabic and Amazigh compete for prestige and practical use. The official languages are Amazigh and Modern Standard Arabic. Additionally, French is the primary foreign language, followed by English as a second foreign language, with Spanish and German spoken by smaller communities (Ezzaki, 2007). Classical Arabic holds a prestigious status as a highly varied language, particularly in North Africa and Morocco (Grandguillaume, 1990; Ennaji, 2005). During the French Protectorate (1912-1956), French was introduced and primarily used by the elite, government, and educational institutions, which also created differentiated educational paths for Europeans, Jews, Muslims, and Berbers, catering to these groups (Baker, 2012). Most Muslim and Berber Moroccans received only fundamental French education, while Europeans and Jews gained advanced French training and associated socioeconomic benefits. After independence, Morocco launched Arabization initiatives aimed at decreasing French influence and promoting Standard Arabic. Nevertheless, French remains highly valued, especially in government, business, and higher education, where it is associated with social status and economic opportunities (Baker, 2012). Today, French and Arabic serve distinct yet complementary roles in Moroccan society, with their ongoing presence fueling social tensions and debates on language policy and national identity (Baker, 2012).

Unlike the French language, the presence of English in Morocco was limited to some diplomatic and economic relations with countries such as the United Kingdom and the United States. Apart from this, English did not have native speakers or learners in Morocco, as historians noted. After the independence, and given the prevalent use of English as an international language, media language, and as a lingua franca, Morocco, like many other countries, has, by force or choice, joined the rest of the countries in accommodating the new dominant linguistic variety (Zouhir, 2013, as cited in English Today, 2022).

1. **English as the language of science**

English has emerged as the most commonly used language in science worldwide, a trend that developed after World War I and solidified in the post-World War II era (Englander, 2014). This shift has provided scientists worldwide with access to a vast scientific literature and facilitated international communication (Drubin & Kellogg, 2012). The rise of English in science has been attributed to various factors, including geopolitical changes and the decline of other languages in specific scientific fields (Wood, 2001). Notably, in Morocco, English is gradually becoming the primary vehicle for technological transfer and modernization, gradually replacing French as Morocco's second language among youth and educators (Soussi, 2020). This shift is reflected in official policies, with the Ministry of Higher Education promoting English through requirements at the doctoral level and in faculty recruitment (El Kirat El Allame & Laaraj, 2016). Furthermore, it is worth noting that the recent growth of private schooling in Morocco, which offers the English language as a special feature, differing from what public schools previously offered, reflects a noticeable change in societal attitudes that aligns with economic needs. On this point, the growth of American schools in the country is part of a broader trend of internationalization in higher education (Othmane Zakaria, 2023).

Additionally, due to globalization, internet access, and social media, the English language has become increasingly popular in Morocco. This has sparked discussions regarding the importance of language in education and its possible effects on other languages, especially Arabic and French (Soussi, 2020; El Kirat El Allame & Laaraj, 2016). In addition to that, the growing preference for English as a medium of instruction in Moroccan higher education, particularly in science and technology fields is a new debatable topic in the language policy of the country, both professors and students exhibit positive attitudes toward English, viewing it as critical for academic research, career prospects, and global competitiveness (Belhiah & Abdelatif, 2016; Chihab et al., 2024

1. **Language** **attitudes**

Language attitudes play a crucial role in shaping educational policies and their implementation, and offer a toolkit for predicting future considerations. According to Baker (2011), language attitudes serve not only as reflections of societal values but also as predictive tools for understanding policy reception and resistance. Therefore, this study primarily examines how teachers and students perceive the use of English as a language of instruction. In this regard, research has shown that positive attitudes toward mother tongue education are essential for stakeholder involvement and policy success (Jones, 2012). Additionally, in multilingual contexts such as the Philippines, long-standing language policies that favor English have created attitudes that may hinder mother-tongue-based education initiatives (Mahboob & Cruz, 2013).

In the Moroccan context, language attitudes play a crucial role in shaping language education policy and classroom practices. Bouziane (2020) finds that students' perceptions of local and foreign languages show a strong preference for English and French, mainly influenced by personal motivation and goals rather than official language policy. Similarly, Aknouch (2023) demonstrates that high school students’ attitudes toward English as a foreign language are consistently positive, motivated by aspirations for academic success, global mobility, and self-development. Expanding the scope to educators, Ben Hammou and Kesbi (2023) explored the perceptions of secondary school science teachers towards EMI, noting that there is general support for its implementation, but also highlighting practical challenges such as limited English proficiency and a lack of pedagogical training.

While these studies offer valuable insights, they tend to examine students and teachers in isolation or focus predominantly on higher education. What remains underexplored is the intersection of teachers' and students' attitudes toward EMI at the high school level, particularly in light of Morocco’s ongoing educational reforms that emphasize the integration of English across disciplines. Accordingly, this study aims to investigate the attitudes of both high school teachers and students toward the increasing use of English in Moroccan secondary education, to inform more context-sensitive curricular planning and teacher development initiatives. Understanding Teachers' and students' attitudes allows educators to gain a more realistic insight into what goes on inside their heads, including their fears, sources of motivation or anxiety, and preferences. Therefore, through this inquiry, we aim to investigate the perspectives and attitudes of students and teachers toward the future integration of the English language in high schools as the language of instruction for science subjects. In addition, we aim to identify the challenges that students/teachers encounter when using French in their Science studies as currently implemented. The questions we aim to answer are as follows.

a. What are the challenges that the change in the medium of instruction to the French language poses for students and teachers?

b. What attitudes do students and teachers hold toward English as a medium of instruction (EMI) for science subjects, and how prevalent are these attitudes?

1. **English as a Medium of Instruction (EMI)**

As previously discussed, thanks to Globalization and the competitive global educational market, English as a medium of instruction (EMI, hereafter) has become a rapidly growing trend worldwide, generating strong research interest and sparking debates among educators and policymakers. In Morocco, recent years have also seen a push towards expanding the teaching of English, in part in response to economic exigencies and the observation that employment around the world favors the English language and many studies have shown that the Moroccan society carries gradually growing positive attitudes toward English language thanks to the global role it plays as a lingua franca and as the language of science and ICTs. On this subject, a British Council study on “Shift to English in Morocco” has shown that one of the main findings related to media is that young people confirmed that English is most often used in connection with the internet, in movies, TV series, and in news and other media. Above all, the study revealed a strong consensus among young Moroccans that English should become the country's first foreign language, with 74% agreeing that Morocco should opt for English instead of French.

Hassan Belhiah & Abilkassem Abdelatif (2016) reported that the incorporation of English in Moroccan education as a medium of instruction for higher education science students has become a necessity, as their study revealed that Moroccan doctoral students are gradually perceiving English as a vital language in higher education. The study also highlights the inefficiency of current measures to reinforce the status of English in higher education, despite decision-makers continuing to emphasize the importance of English for the country’s development. Another important finding of this study is that French appears to be less useful for these students, despite being the first foreign language in the country and the language of instruction for science subjects.

The ongoing controversy over adopting English as a teaching language, especially in science education, along with students' challenges in continuing their studies at universities where English is the main language of instruction and accessing scientific resources in English, presents a significant obstacle. To better prepare students for academic success and global opportunities, it is essential to consider introducing English as a medium of instruction in high schools, particularly during the last three years of secondary education, given its critical role at the post-secondary level. Previous studies in the Moroccan context (Bouziane, 2020; Aknouch, 2023; Ben Hammou & Kesbi, 2023) have already highlighted generally positive attitudes toward English among both students and teachers. These studies collectively indicate a strong instrumental motivation for learning English and reveal emerging challenges in implementing English-medium instruction. Building on these findings, this study aims to explore how these attitudes manifest specifically in high school settings, where recent policy reforms have a direct impact on both teachers and students.

2. Methodology

1. **Introduction**

The study aims to investigate the opinions of scientific instructors and students regarding the employment of English as a teaching language in Moroccan high schools. Along with identifying the difficulties, they encounter amid the recent switch to French as the language of instruction. A total of 110 students participated in the study, comprising 53 females (48.2%) and 57 boys (51.8%), all from various high schools in Morocco. An online survey was given to them as our quantitative data. Our participants for the qualitative data were 17 teachers in all.

1. **Research design**

This research uses a mixed-methods approach, combining exploratory and descriptive elements, and employs both quantitative and qualitative data collection methods through surveys (questionnaires) and interviews. According to Creswell (2012), quantitative research often involves surveys given to samples or entire populations to gather information about personal attributes, opinions, or behaviors. Complementing this, interviews are considered one of the most effective qualitative methods for exploring human attitudes and perceptions (Krueger, 2014). This study adopts a Convergent Design, where quantitative and qualitative data are collected at the same time and analyzed separately before merging the findings during interpretation. This design was chosen to thoroughly understand high school students’ and teachers’ attitudes toward English as the medium of instruction in science subjects, aligning with the research objectives.

1. **Participants**

Our concerned participants are high school students and teachers. Since we are interested in attitudes, they are key stakeholders whose opinions are essential, especially because they are the main figures in the teaching and learning process. Therefore, 110 students completed a questionnaire, including 53 females (43.2%) and 57 males (51.8%). Additionally, 17 teachers from different high schools participated in individual interviews.

1. **Data collection**

To collect data for this research paper, two main tools were used: a questionnaire and interviews. The questionnaire was used to gather information from students, considering that the number of participants needed to be at least over a hundred, and because the study was conducted within a short time frame.

The questionnaire included 30 statements written in both English and Arabic. The items were selected based on the research's purpose or predefined question that meant to serve the objectices of the research. It was distributed digitally (online) through social media, specifically WhatsApp, to high school students from various parts of Morocco, including the cities of Tanger, Sale, Agadir, Tinghir, Ouarzazate, and Errachidia. We believe this method ensured a fair distribution and reached a diverse group of students representing Morocco's multilingual society.

As for the second tool, the interview consisted of nine questions, some of which contained compound questions. Interviews were conducted in both Arabic and Tamazight online via different platforms, depending on the participants' preferences. We chose to conduct interviews with teachers for two reasons. First, interviews are the best way to explore teachers’ views and attitudes because they are among the most effective research methods for understanding human attitudes and perceptions (Krueger, 1994), and they provide immediate insight into participants’ perceptions, feelings, and thought processes. Additionally, interviews often produce richer and more detailed responses than questionnaires. When participants are willing to engage in a conversation with an interviewer, it typically indicates genuine interest in sharing their thoughts and experiences.

1. **Validity and reliability**

The validity and reliability of research depend heavily on the validity and reliability of its instruments. Therefore, during the piloting stage, we focused on enhancing the validity of our questionnaire, paying particular attention to the face validity of its presentation and the feasibility of the questions. The structure of the questionnaire is divided into three sections: the first provides an overview of the research topic and the researcher, while the two subsequent sections address the main questions supporting our research objectives. The feasibility of the questions is evident in the translation of each item and the ease with which participants can select and answer them. This same approach applies to the interviews concerning validity. For the reliability of the questionnaire, we tested it using the SPSS Cronbach’s Alpha test. The result of the test is as follows:

*Table.1: Cronbach’s Alpha test.*

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| *Reliability statistics* |  |
| Cronbach’s Alpha  N of Items | .603  30 |

The Cronbach’s Alpha scored at ***.603***, indicating that reliability is moderate, and the items are consistent and unidimensional. In this regard, Pallant (2001) states that a Cronbach's Alpha value above 0.6 is considered high reliability and an acceptable index (Nunnally & Bernstein, 1994). Conversely, a Cronbach's Alpha value less than 0.6 is considered low. <https://stats.oarc.ucla.edu/spss/faq/what-does-cronbachs-alpha-mean/>.

Concerning interviews, we would say that the reliability of our interviews is in their convenience and effectiveness in serving research purposes, with no subjective or biased questions.

3. results and discussion

This part is devided into two main sections. The first one will discuss the data gather from students, preseting their perspectives. The second, will be devoted to teachers’ answers. Both sections will be followed with a general emerging summary.

**3.1. Students’attitudes**

The findings of this research highlight some interesting issues related to the challenges students face when using the French language in science subjects, as well as their attitudes toward the English language.

* *French language as a Medium of instruction: challenges*

The results showed that most students find studying their scientific subjects in the French language challenging, while a significant number of students appear to rely on translation. On the other hand, an equal weight of votes admitted that they found no difference with the new change of the language of instruction, or they found it better in terms of understanding. Concerning their comprehension of the lessons, students have shown their comprehension is partial as they rely on the use of translation and the aid of experiments and visual aids. In accordance, students revealed that the major difficulties they encounter with the use of the French language as the language of instruction are related, at first place, to the wide gap between scientific terms and everyday speech, and translation of scientific terms to Arabic is not helpful. A significant number of students agree on their inability to communicate.

* *English language as a medium of instruction: attitudes*

Results have revealed that a significant number of students have shown strong support for English as the medium of instruction in their science subjects, indicating a positive attitude toward the language. This is reflected in their understanding of what makes the English language an effective medium of instruction, as most have agreed on several points: the global nature of the language, its use outside the classroom in video games, music, and social media, and its status as the language of science. Furthermore, the respondents confirmed that they enjoy the language and find it easy to learn.

When it comes to their scientific careers, most students showed interest in English as the international language and its broader communication. The remaining participants expressed equal interest in studying abroad and improving job opportunities. Additionally, fewer votes were given for English as the language of research and science, although higher education research and references are primarily in English. This indicates that these students are not yet fully aware of the importance of English in a scientific career, especially in higher education where research and literature are mostly in English. However, it is clear that communication, better job options, and studying abroad are their main goals. Notably, students have chosen English as their preferred language of instruction, receiving a very high number of votes, while the current language of instruction, French, received only two votes out of 110. This suggests that Moroccan attitudes are changing towards these two languages, with English gradually gaining significant importance according to students’ views.

**3.2 Teacher’s attitudes:**

The main challenges to science education, as raised by teachers, are ***linguistic*** and ***educational.*** We present each theme separately below.

* *Proficiency in French*

Teachers claimed to have a good command of the French language, of moderate to advanced. However, when it comes to students’ Proficiency in the French language, teachers have described it as weak and substandard. Hence, they are obliged to provide translation and correct the language from time to time.

* *Translation To Arabic and Tamazight*

The translation is an indispensable tool for understanding scientific terms, given the change in the medium of instruction at high school levels. However, according to the teachers, it is not without problems. Most of the teachers have confirmed that they use Arabic or Tamazight and then represent the lesson in French; otherwise, their lesson objectives and transmission of scientific knowledge would have been in vain, yet they are required to do it again in French. This may affect lesson time, especially if teachers are obliged to finish the

programs, as in the case of the second baccalaureate year. Furthermore, participants revealed

The use of experiments, visual aids, and images helps them avoid the use of translation to an extent. However, the remaining problem is to what extent the Moroccan high schools are equipped with the necessary materials used for science experiments, which teachers described as poor.

* *Communication & performance*

Teachers have revealed that due to the insufficient command of the French language that students have, their communication and performance are unsatisfactory and unachievable. students sometimes choose to remain silent because of their inability to form well-structured sentences in the French language or opt for their mother tongues, such as Arabic and Tamazight, when approved by their teachers. the absence of communication from students will affect their learning process. If teachers do not get insights on students’ understanding of the course, there will be no feedback, as a result, students will walk out of their class with either not fully understanding or misunderstanding the lesson. We can also conclude that students’ poor proficiency in the French language raises their class anxiety, which eventually will affect their motivation and confidence in learning.

* *English as a language of instruction:*

The results demonstrated that teachers had a very favourable opinion regarding the employment of English as a teaching language. The introduction of English as a subject in primary and secondary school, as well as the language of instruction, is an example of effective measures and decisions that have suggested to strengthen the status of English as a medium of instruction for science education in high school and Moroccan education in general. This will help students learn and recognize the English terminology of science, and become familiar with these scientific terminologies

early on in their learning. It will also reduce students’ dependence on a literal translation to understand scientific terms. On the other hand, teachers should also be offered basic training that will improve their English language competencies as a language and a medium of instruction. Finally, teachers have implicitly and explicitly argued that decision- makers should not continue to underscore the importance of English for the country’s development, which aligns with the findings of this study that shows that French seems to be less useful and helpful for students even though it is the first foreign language in the country and the language of instruction for science and technology. Indeed, many participants in the study explicitly expressed this fact, arguing that French has become a significant burden to the Moroccan educational system.

4. Conclusion

This study highlights a notable gap between the language of instruction in Moroccan high schools, French, and the linguistic skills and preferences of both teachers and students. Students struggle significantly with understanding scientific material in French, often requiring the use of translation tools or visual aids, which hampers their engagement and academic performance. Teachers also observe low French proficiency among students, frequent classroom silence, and a tendency to switch to their mother tongues, Arabic and Tamazight, for comprehension. Additionally, the constant need for teachers to translate and modify content limits lesson time and reduces overall teaching effectiveness.

Both teachers and students showed overwhelmingly positive attitudes toward English as a medium of instruction (EMI), especially in science education. Students linked English to global communication, academic mobility, career opportunities, and easier access to digital and scientific information. Teachers also acknowledged the importance of early exposure to scientific terms in English, supported the move to EMI, and highlighted the need for institutional training and resources to ensure effective implementation. These results support prior research (e.g., Bouziane, 2020; Aknouch, 2023; Ben Hammou & Kesbi, 2023) and expand the literature by capturing both student and teacher viewpoints in the same context, an aspect previously underrepresented in Moroccan EMI studies.

This study confirms that, although French remains the official language of instruction for science in Moroccan high schools, it creates pedagogical and cognitive challenges for students. Despite years of formal education in French, students still struggle with understanding, communicating, and performing. Teachers notice these problems and often resort to translation or simplifying, which lowers the quality of teaching. At the same time, both students and teachers show strong support for using English as the main language of instruction for science. Students see English as linked to modernity, opportunity, and global relevance, while teachers highlight the need to prepare students for university science and international scientific dialogue. These shared views suggest that English-Medium Instruction (EMI) in Moroccan secondary science education is not only desirable but likely more effective than the current system, if issues related to teacher training, curriculum changes, and infrastructure are addressed.

## **Recommendations and implications**

* Introducing EMI for science subjects requires improving the teaching of English in secondary and tertiary education.
* To implement EMI for science classes in high schools, we must first set up training centres and programs to assist instructors in becoming proficient in the use of English as a medium of teaching for scientific topics.
* Establishing partnerships with international universities that use English as a medium of instruction.
* The provision of English-medium courses across all educational levels, with a focus on elementary schools, to provide children with a real-world exposure to the language and a solid foundation in its use.
* The minister of education, lawmakers, language planners, and all parties involved are invited to re-evaluate the challenges the French language poses to students and teachers, as well as the impact it has on the quality of science education, because students study the language from elementary school to high school, but their proficiency level remains low.

Ethical approval (where ever applicable)

This study involved voluntary participation from teachers and students, and all participants provided informed consent prior to data collection. The research followed ethical guidelines for educational research, including anonymity, confidentiality, and the right to withdraw at any time. Formal ethical approval was not required under the policies of Sultan Moulay Slimane University for non-clinical, self-led research projects.

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