

Language Policy in Teaching STEM in Morocco: Teachers' Perspective of Using French in Moroccan STEM classes

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Abstract

This chapter is an exploratory study of the effect of changing language policy on students and teachers in studying/teaching STEM (Science, Technology, Engineering, and Mathematics) in Arabic language to French. It examines the challenges they both face in the use of a foreign language in academic, personal, and social levels, taking into considerations various factors of gender, education, and social status. This investigation goes beyond the political struggles and ideologies to shed light on those directly affected by these changes; students and teachers. The program started in 2014-2015; almost a decade has passed since its launch, providing teachers with more than enough time to accumulate insight into the failure or success of this language policy as well as the real challenges facing its implementation.

Keywords: *STEM language; language policy; Moroccan education; moroccan teacher*

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Introduction

Language policy plays a crucial role in educational settings, particularly in teaching STEM subjects. STEM, which stands for science, technology, engineering, and mathematics, relies heavily on the accurate communication and understanding of complex concepts. In Morocco, there is ongoing debate and discussion regarding the use of French as the language of instruction in STEM classes, as the country recognizes the importance of preparing its students to meet the demands of the global economy. Moreover, recognition of the importance of Science, Technology, Engineering, and Mathematics as national concerns has been the subject of multiple reports over many years (Wick et al., 2022). Hence, Moroccan educators, policymakers, and stakeholders have been grappling with the question of whether French, Arabic, or English should be used as the language of instruction in STEM classes.

In an effort to address the concerns surrounding the quality of STEM education in Morocco, it is important to examine teachers' perceptions of the use of French in these classes. By providing teachers with comprehensive STEM training, they can better prepare and manage the learning process in their classes, ultimately equipping students with the necessary knowledge and skills for the labor market (Nurwidodo et al., 2023). However, empirical research shows that Moroccan teachers have varying perceptions regarding the use of French in STEM classes. While some teachers believe that using French as the language of instruction in STEM classes can enhance students' understanding and mastery of scientific concepts, others argue that using French as the medium of instruction in STEM classes can be a barrier for students who do not have strong command of the language. Furthermore, teachers' perceptions of STEM education pose a challenge to its effective implementation in Moroccan classrooms (Anabousy & Daher, 2022). To address these challenges and barriers, it is crucial to understand teachers' beliefs and concerns about the use of French in STEM classes.

Method

This study aims to assess the changes occurring at the level of teachers. To achieve this objective, a quantitative methodology was employed. A survey was distributed among Moroccan STEM teachers; online, in several teachers' groups on social media along with hard copies in different institutions. The questionnaire focuses on assessing the usage of the French language in both the daily lives and academic environments of teachers. It aims to gauge their language proficiency levels and gather their opinions regarding the use of French in their STEM classes. We used Likert scales, agree/disagree statements, and an open question. The latter allows writing long paragraphs for teachers to express their opinions. Finally, the data is presented in pie and bar charts.

Results and Discussion

Historical Framework

Science, Technology, Engineering and Mathematics i.e. (STEM)'s language policy has been a controversial issue in Moroccan educational system since the colonial period between the years 1912 and 1956. During the pre-colonial period, there were only Islamic and Jewish schools. Education was traditional and religious. However, the colonial period witnessed the launching of modern French schools. they were introduced to Moroccan society where French was the language of instruction. in fact, "French was imposed as the official language of administration, education, and communication [...] during the colonial period." (Makoni & Pennycook, 2007). Whereas, in the post-colonial period, the nationalist movement fought for Arabic to be the language of instruction in Moroccan schools. The latter ended up adapting a hybrid system; French and Arabic were both used in different subjects in education. STEM subjects were taught in Arabic while French was introduced as a foreign language along with English up to the end of high school. However, the debate has never sought an end with two parties, each with its own ideology and political driven goals.

On the one hand, the conservative nationalist movement wanted Arabic to be the "national language" (EL Fassi, 2011) of teaching and learning. It called for four principles in education; Arabization, unification, "Moroccanization", and popularization. These principles were believed to guarantee accessibility to education for all Moroccans regardless of their social or financial level. (Al Hilali, 2022) The first principle was called for to ensure the maintenance of the country's "national language". The second was meant to achieve unity among different regions in Morocco. It was an attempt to unify what French colonialism had torn apart. The third one is implementing Moroccan culture and identity in the curriculum of schools while the last one allowed education to reach all Moroccans regardless of their social or financial status.

The process of Arabization started in the post-colonial period, but its establishment was rather a thorny issue. It encountered many obstacles as the country was still coming out of war; the government budget was limited and unable to support the significant change in the educational system. However, the intellectual class used French as the language of communication, and school system relied on French curriculum. (Meraouhi, 2022). Arabization meant the need to bring teachers from Arab countries or prepare an intellectual class that recognizes Arabic as a means of instruction. The country was torn out because of the war, both options were expensive and needed long time and commitment.

While on the other hand, there are the technocrats who adopted French as the language of science and development. The colonial period witnessed the emergence of a Moroccan intellectual elite class who was educated by the French protectorate in French schools. (Slahj, 2002) They remained after the end of the colonial period and defended the existence of the French language in the educational system.

The never-ending debate has known some interesting turns. Since independence, Arabic was formalized gradually and became the language of STEM instruction. It replaced French in all levels of education except university. The latter stayed since independence until today, relying on

French language -all STEM majors without exception-. Thus, its prestigious reputation was only reinforced. Students finish high school only to be blocked in university by the sudden change of instruction's language in STEM majors.

In 2016, Arabization was repealed with a bilingual system that recognizes both French and Arabic as languages of instruction in public education. The re-introduction of French in the educational system allowed it to reclaim its previous position step by step. All STEM subjects are to be taught in French starting from the secondary level all through high school.

In 2019, the House of Representatives Committee on Education, Culture and Communication approved, by majority, a draft Framework Law No. 51.17 related to the system of education, training and scientific research, which is included within the strategic vision of reform 2015/2030, especially in the part related to the "Frenchization" of education. (Nibli, 2019)

The debate is still present, from considering it a "linguicide" to the official languages of Morocco; Arabic and Tamazight, to adopting it as a "language alternation" system that enriches the country and enhances its openness to the world. However, it is still purely political and any discussion about the topic neglects the most important part of it; the classroom. Teachers and students have had barely any say in this language 'tornado'. Hence, this paper is an attempt to shed light on the triangle of learning/teaching process, teachers, and students. The aim is to investigate the effect of this changing language policy on them. In this spirit, the study intends to answer the following questions:

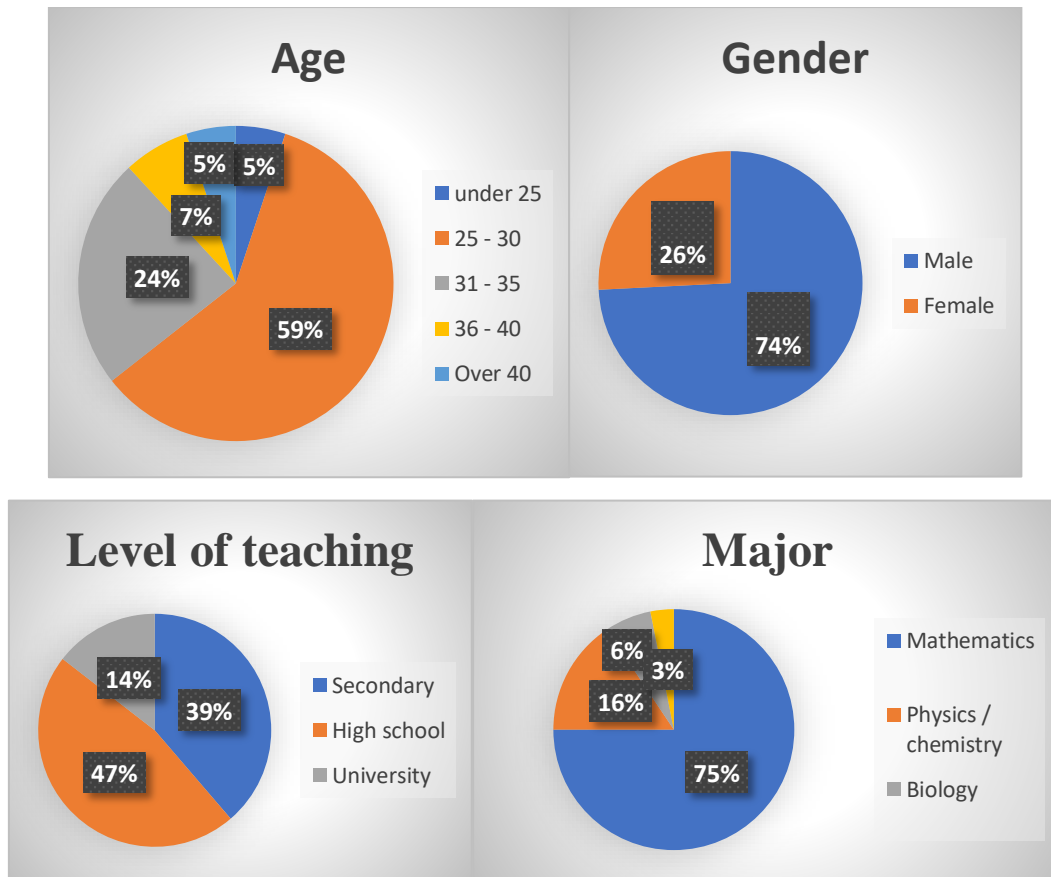
1. What are the challenges teachers face in the use of French in STEM classes?
2. To what extent are students and teachers capable of using French in STEM classes?
3. How efficient is the learning/teaching process using French language?

Teachers' Responses to The Language Policy

This study is done to assess these changes on the level of teachers. To attain this goal, a quantitative method was followed. A survey was distributed among Moroccan STEM teachers; online, in several teachers' groups on social media as well as hard copies in different institutions. The questionnaire targets the use of French language both in daily and academic life of the teachers, their language level, as well as their assessment of the use of this language in their STEM classes. We used Likert scales, agree/disagree statements, and an open question. The latter allows writing long paragraphs for teachers to express their opinions. Finally, the data is presented in pie and bar charts.

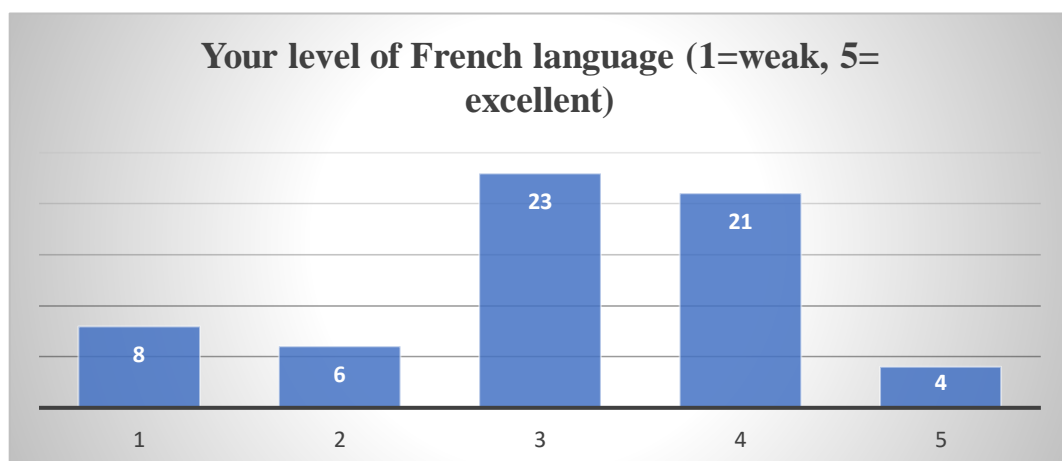
Participants

The research opts for a simple probability sampling method. The majority of data gathering is done online to reach teachers from different parts in Morocco. It includes the following demographics; 59% of the respondents are between the age of 25 and 30 while 74% of them are males. Furthermore, 47% of the sample is high school level, most of which are mathematics teachers. The survey is distributed among online groups of teachers; therefore, gender, majors, and age of the respondents are hard to control or affect.



Language Competence

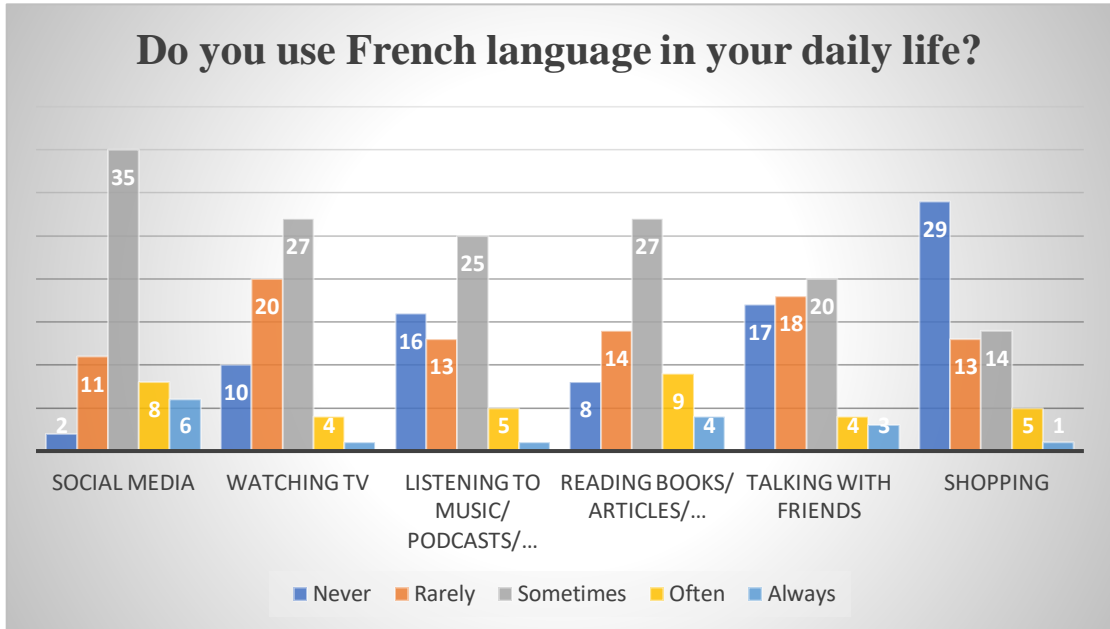
The teachers evaluate their level of French Language on the scale of 1 to 5; 1 refers to weak and 5 to excellent. The majority of teachers scaled their French between 3 and 4. This result is expected and understandable since the scientific majors at the university level are all taught in French without exception. However, little attention is paid to the communication part in these majors, leaving the language use completely technical. Their self-evaluation of the French proficiency is consistent with the reality of the educational system they are engaged with.



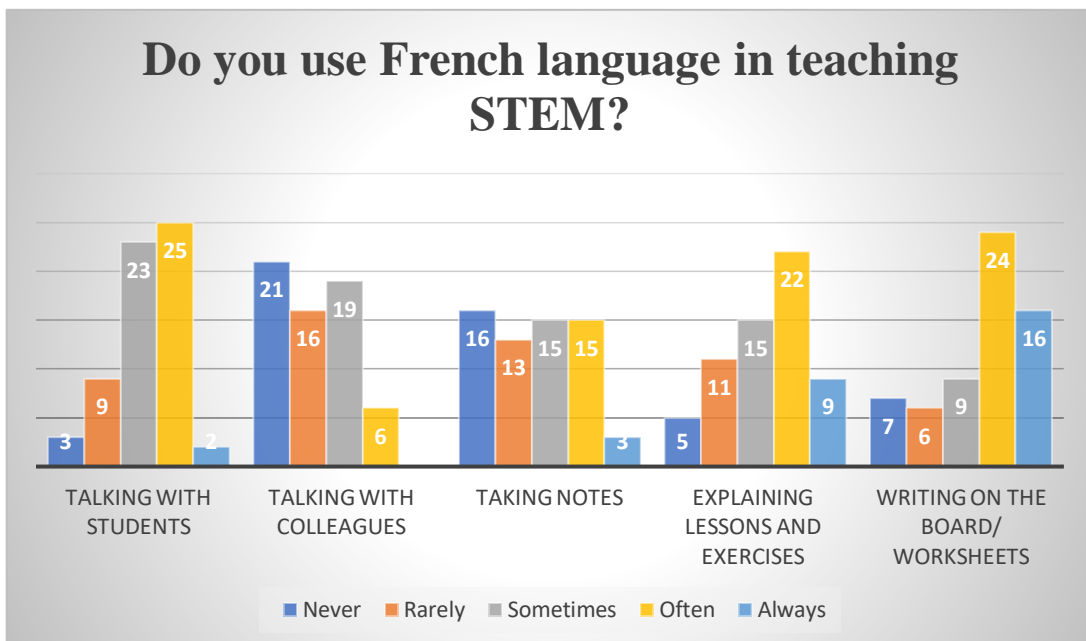
The use of French language

Given that French is the language of instructions for these teachers, the following diagram investigates its use in their daily lives. They were asked to scale their use of French language in several indoor and outdoor daily activities. As for social media, watching TV, listening to music and

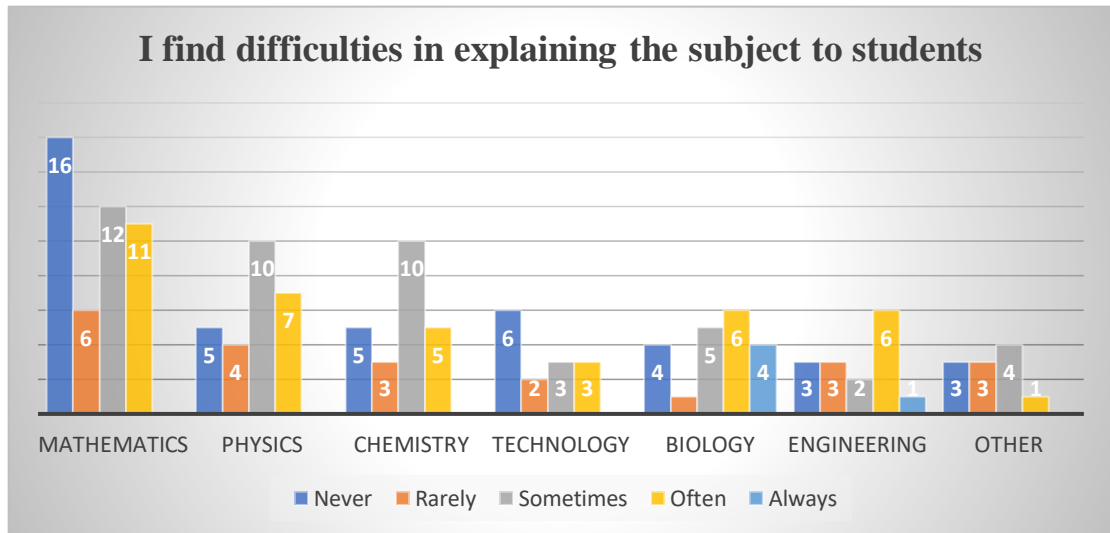
podcasts etc., reading books the majority uses French sometimes. While answers to friends talks varied between never, rarely, and often, the majority never uses it during shopping. The results suggest that there is a level of exposure to French language outside of the classroom even if limited. This could enhance their language skills regarding communication. However, the fact that the majority never uses French language in shopping might indicate a level of discomfort in using it in social non-formal situations.



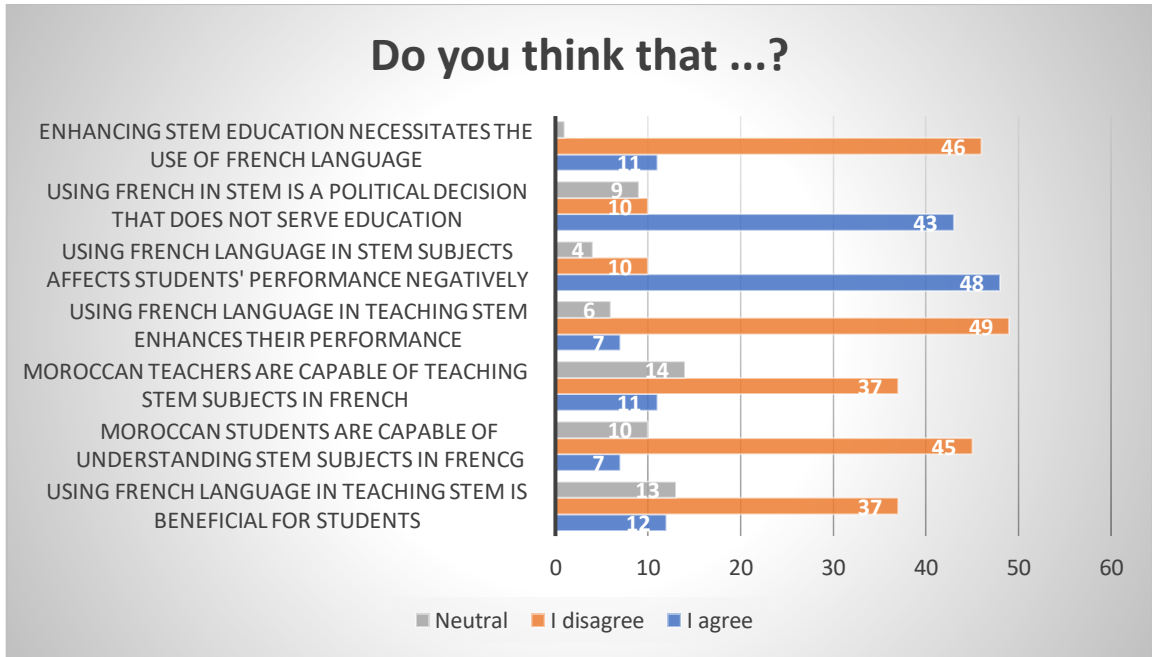
It is important to note that all participants are teaching international streams, meaning that French language is supposedly the language of instruction in their classes. In their answers to use in teaching STEM, teachers sometimes and often talk with their students using French. However, when talking to their colleagues, the majority never uses French. While in taking notes, answers vary between never and often, the majority often explain the lessons, give instructions, and write on the board using French language. These results indicate that the use of French language in the teaching context is more prominent than professional one, which might suggest that there is a disconnection between the teacher and the language itself.



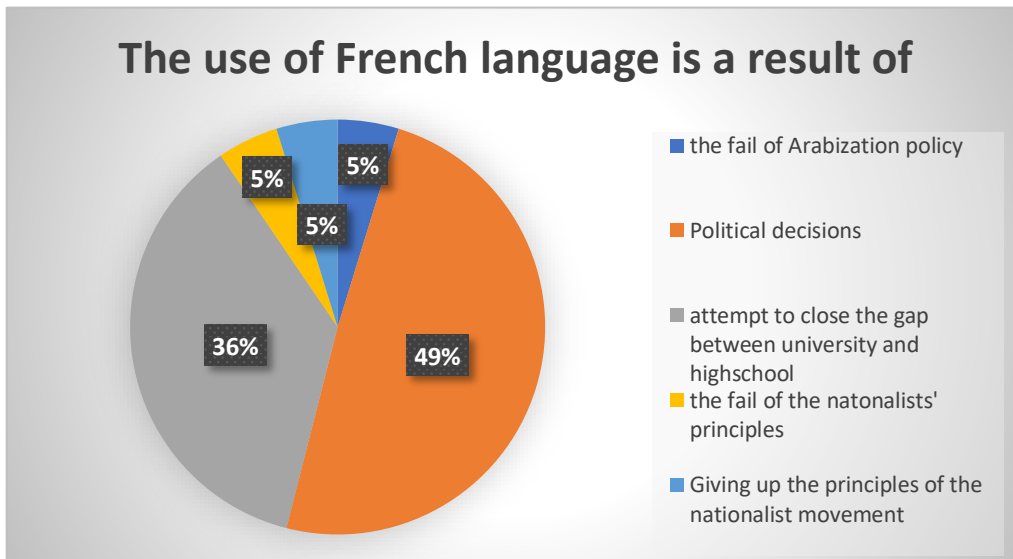
The chart in question is meant to measure the frequency at which teachers face difficulties in teaching STEM subjects. Mathematics teachers' answers vary between never, sometimes, and often. Physics and chemistry tend to agree on sometimes and often. The majority of technology teachers chose never. As for biology teachers, they often find difficulties just like engineering ones. The results show that different STEM teachers are presented with varying levels of difficulty. Despite the proficiency level of teachers in the language, they appear to encounter some consistent challenges in their classes. This could be related to the complexity of the course they are teaching and students' background knowledge. Moreover, this could be due to the level of students and their readiness to use it as a language of instructions. As we will see in the next diagram.



Regarding teachers' assessment of the language policy adopted by the ministry, there is a general agreement on several points as shown below. The majority of teachers do not think that French is beneficial in teaching STEM, nor that Moroccan students are capable of understanding these subjects in the said language; it certainly does not enhance their performance. Hence, its use does not necessarily implicate enhancing STEM education. Moreover, the majority agree that it is a political decision that does not serve education while affecting negatively the performance of students. There is a general consensus among teachers that the current language policy is not effective in promoting STEM education in Morocco. The language obstacle presents a major barrier in teaching and learning STEM subjects.



Next, teachers were asked to provide their intake on the decision. Nearly half of the respondents (49%) explicitly describe the decision to be politically motivated without any educational considerations. On the other hand, 36% of the respondents are convinced that it is an attempt to bridge the gap between high school and university in terms of language differences. This suggests that some teachers see a potential educational value in using French as an instruction language in STEM classes. Overall, the results indicate that the majority of teachers have negative views towards the language policy adopted by the ministry, which may have implications for the implementation and effectiveness of the policy.



At the end of the questionnaire, teachers were asked the following open-ended question: “As a teacher, how do you see the ten-year experience of using French in STEM classes?”. Some teachers expressed negative opinions, describing it as “failed”, “failure”, “obstacle”, “disastrous”, and even a “crime”. While others go to provide the alternative as being the mother tongue or English. However, as logical the last choice might seem, it is important to note that to integrate English as an instruction language, STEM teachers need to obtain a proficiency level in the said language, which is not the case.

On the other hand, some answers highlighted the fact that the gap is not closed but rather shifted from university to secondary. Instead of having the transition at the university, today, students face it moving from primary to secondary level. Hence, the language policy is not serving the students or at least it is not the focal center of the decision. This contradicts the principle of the ministry that says that the student is the center of the learning/ teaching process. Moreover, this language policy appears to create differences among different social classes and divide the classes into high and low achievers' ones. The former use French as the language of instruction while the latter use Arabic.

On a political level, the policy seems to benefit solely the interests of the French government. Morocco produces a high profile and intellectual class that is easy for France to allure without spending so much on preparing them. Thus, France seems to benefit from establishing its francophone domination over the country.

That being said, other comments find the decision to be positive as it permits continuity of learning for students at university level, but they also suggest improvements at the level of translation, lowering language level barrier, number of students in class, and lowering the frustration level of students while dealing with it.

Conclusion

The discussion regarding language policy in Morocco continues to be very controversial. In fact, the situation today is leading towards a complete "Frenchization" of STEM classes in the Moroccan educational system regardless of the situation at the classroom level. The latter is obviously facing a number of challenges in establishing this policy for both teachers and students. The former has an average level of French while the latter are generally weak. It is due to the modest presence of French in both their social and academic lives.

The results show that teachers generally seem skeptical about the usefulness of this decision on students' performance. They are challenged by students' level of readiness to use French in the learning process. For them, the negative impact seems to overshadow any positive aspect of this policy. It appears that the majority have a pessimistic approach to its outcomes on the long run. Unfortunately, what teachers think or believe has little to do with the policy adopted by decision-makers.

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