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Understanding's barriers of implementing ICTs in Moroccan High Schools from teachers' perspectives

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Abstract

Today, the enormous progress in Information and Communication Technologies (ICTs) has encouraged many countries to take advantage of ICTs in education. Morocco is not in isolation from this. Yet, the progress has often been insufficient. There is still a substantial gap concerning the availability of ICTs and their implementation methods in the Moroccan High schools, resulting in several thoughtful questions being raised for decision-makers and teachers equally. One of the main questions is what factors affect the successful implementation of ICTs in Moroccan High schools? Hence, the prominence of this paper is to find the answer to this question and other related questions from teachers' perspectives. This study uses both qualitative and quantitative stances. A closed questionnaire was used to collect data from (134) Moroccan high school teachers, and semi-structured interviews were conducted with (20) other teachers. Generally, the results showed that ICTs were a vital device in improving teaching and learning outcomes. However, lack of resources, ICT skills among teachers, the insufficiency in ICT training, and deficiency of clear ICT policies, among other influences, were some challenges that affect the implementation of ICTs in Moroccan high schools.

Keywords: Information and Communication Technologies (ICTs); ICT skills; ICT implementation; Moroccan High Schools

1. Introduction

Today, many countries appreciate investing in the educational sector by implementing ICT with the required skills to prepare students for the future [2- 19]. Information Communication and Technology has become a supply for teaching and learning environment to develop the quality of education [15]. Therefore, it is discovered that with ICT resources in the classroom, students get involved more energetically in the learning process as opposed to the traditional classrooms, where students are passive observers and listeners [5]. Other benefits of ICT in education include encouraging collaborative learning, equipping students with problem-solving skills and offering flexible learning opportunities [3]. Similarly, many authorities conclude that having advanced skills in using ICT is the direct support and pillar to successful involvement in the labour market [2- 5- 19].

In the same vein, the Moroccan Ministry of education has realised the importance of investing in the ICT sector to develop the educational field. Substantial changes have been brought to the teaching and learning settings in specific contexts concerning this last ground. In Morocco, the Ministry of Education has hurled numerous projects, namely INJAZ, GENIE, NAFIDA and MARWAN, aiming to promote ICT in education as one of the most important axes of the educational reform. In this context, Morocco's National Charter of Education and Training (1999) implemented this reform, predominantly, Article (10) of the charter, which focuses on integrating ICT in education.

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Over the last years, though, there have been many studies on ICT implementation in the Moroccan educational context. Yet, its effective integration into Moroccan high schools is complex and multifaceted. Many factors, such as training, curriculum and pedagogy, school readiness, teacher competencies, and long-term financing, come into play. This means that positive implementation of ICT in the Moroccan high schools requires identifying what factors affect its implementation. As a result, the value of using ICT in the Moroccan high school contexts may be significantly enhanced if ICT tools fit the school objectives and visions.

2. Research Problem

Though there is increased support to improve the use of ICT tools by the Moroccan Ministry of education, it has often been disappointing to know that there is a gap between the availability of ICT devices and their implementation in Moroccan high schools. To explain more, even if the Moroccan Ministry of education strives to develop an effective strategy for ICT implementation in the education sector, still, there is no clear premeditated framework towards equipping ICT in Moroccan high schools. Consequently, there is no sense in investing huge amounts of money in providing these schools with ICT tools; unless they are used effectively. Furthermore, how to support the implementation of ICT in Moroccan high schools, what hinders the successful implementation of ICT in Moroccan High schools remain serious questions for decision-makers and teachers to answer. Accordingly, this paper explores the factors that affect ICT implementation in Moroccan high schools to suggest well-thought-out methods for more successful implementation of ICT in Moroccan high schools in the future.

3. Significance of the Study

The importance of this study initiates from its aim, which is to explore factors that hinder the implementation of ICT in Moroccan high schools. In general, many factors that hamper ICT implementation in Moroccan education have been the subject of many studies [2-3-15]. Yet, few studies have examined what factors hinder ICT implementation in Moroccan high schools' contexts. For this reason, this paper attempts to fill in this gap in the literature, recommending a framework to gather essential data that emphasises the areas where the hindrances mainly lie and how they can be resolved in Moroccan high schools. As a result, further investigations need to be undertaken to examine Moroccan high schools' current situation to determine the challenges that prevent the successful implementation of ICT. Finally, the findings of this study could assist the Moroccan Ministry of education and other decision-makers to make informed inferences regarding ICT implementation in the Moroccan educational system in general and in Moroccan high schools in particular.

4. Research Question

This study is limited to Moroccan high school teachers in Meknes city. It focuses on the main factors that hinder ICT implementation in Moroccan high schools. Therefore, and based on the research aim of the study, this paper aims to answer the following research question: What factors (if any) that hinder ICT implementation in the Moroccan educational system in general and in Moroccan high schools in particular?

5. Review of Literature

According to many previous studies [1-14], successful implementation of ICT in education is strongly related to the school culture. In the same respect, teachers' roles in ICT implementation are also a critical factor confirmed by several studies [9-10]. This means that teachers' roles in encouraging their students to use ICT are essential; their supervision and evaluation of using ICT in their lessons are noteworthy. Teachers should employ ICT tools in their teaching courses and operative pedagogical practices to involve students and develop their skills to use ICT in their learning process. Similarly, the educational sector's decision-makers should play a significant role by developing clear strategies and policies, translated into actions [3-2]. They should play an essential role in the preparation and training of qualified teachers [14], providing a suitable infrastructure with means of safety. Finally, financial support, mainly technical tools, is indispensable in successful ICT implementation [4].

The review of theories concerning ICT implementation in education, strategies, and policies have highlighted the study gap by identifying several factors that should be considered when applying ICT in education. This provides a suitable recognition of ICT implementation issues in Moroccan high school contexts. Accordingly, this study concluded with two fundamental factors (internal and external) that affect ICT implementation in Moroccan high schools in general. Yet, each main factor has several sub-factors with several criteria.

5.1. Internal Factors: School Culture

A growing number of studies [10-12-14] have examined the impact and the role of culture and beliefs in integrating ICT in education. In the same vein, [10] stated that school culture should be considered in adopting new technologies and teaching practices needed for the ICT operation. In this context, [3] said that cultural differences directly or indirectly affect the degree of ICT implementation into the learning environment. Other studies have shown that one of the primary factors in effective ICT implementation is teachers' commitment and attitudes towards ICT implementation [1]. To explain more, teachers' views and perspectives may either motivate or discourage them from putting on ICT tools in the classrooms. Thus, personal thoughts and attitudes play a crucial role in integrating ICT and its quality. In the Moroccan context, teachers' views and perspectives regarding ICT implementation in education revealed that competent teachers with quality training consider traditional teaching methods less beneficial for students. Therefore, most Moroccan high school teachers have positive views and attitudes towards using ICT tools in their classrooms.

5.1.1. Teachers' Roles and Responsibilities towards ICT Implementation

Teachers are the key source of change in the educational system. Their roles and practices in using ICT tools in classroom activities are decisive and fundamental, as its success depends on every teacher's skills, desires and competencies [18]. Still, some Moroccan teachers frequently explain their reluctance and hesitancy to use ICT tools in their classrooms because they believe their skills are poorer than those of their students. In this context, teachers' anxiety about their probable failure suggests their refusal of the practicality and effectiveness of ICT in education. Hence, pedagogical and technological skills have always been an imperative prerequisite for teachers to successfully use ICT in the teaching process [2].

Teachers' lack of ICT skills is the most commonly mentioned factor or barrier in successfully implementing ICT in teaching and learning. This case is the same in Morocco; since the research evidence shows that Moroccan teachers lack the basic skills to implement ICT in their classrooms [11-2]. Hence, teachers should be encouraged to take courses in computer use because such training could provide them with guidance to put on ICT tools through the pedagogic process. Also, teachers should be provided with more training programs to be qualified teachers. Lastly, the success of teachers' technological skills is more related to their desires and self-motivations to develop their skills and to raise their awareness about the importance of ICT in their classrooms. There are disparities in ICT employment in the Moroccan high schools due to many factors, such as schools' conditions. Sometimes teachers do not feel that there is collaboration in school settings concerning ICT implementation and lack of administrative support.

5.2. External Factors: ICT Education Policy and its Strategies

The education policies are plans and strategies that explain the general philosophies of the administration based on its objectives regarding the educational process. Therefore, administrators and executives of educational institutions should be aware of this policy [16]. In the Moroccan context and since the current world cannot function without Information Communication technologies, the Moroccan administration should realise a decisive necessity to apply ICT tools in the educational sector through a clear education policy to become a competitive country. Thus, decision-makers need to address the most pressing problems of contemporary Moroccan society, particularly educational ones.

One of Morocco's most important axes of educational reform is integrating ICT into the teaching process. This restructuring was employed by the National Charter of Education and Training of 1999. In this respect, Article 10 of the Charter focuses on integrating ICT in education and promoting distance education and learning. In the same vein, the Moroccan educational policy covers most areas in ICT implementation. Yet, since the Ministry of Education lacks administrative stability, many ministers have helmed the Ministry of Education, which stopped or disabled several projects. It also contributed to the lack of clarity in the Ministry's future vision, which led to weakness in the ICT Policy and strategies to be translated into action. In addition, some Moroccan teachers also believe that the lack of clarification of ICT educational policy and its process is one among other difficulties that hinder the implementation of ICT in Moroccan high schools.

5.2.1. Follow-up and Supervision of the Moroccan Ministry of Education

Another problem hindering ICT implementation in Moroccan high schools is the Ministry of Education's lack of follow-up and supervision. To explain more, lack of regular control explains the futility and the ineffectiveness of ICT incorporation in Moroccan classrooms. Therefore, an ongoing evaluation is essential for founding the effectiveness of any reform inventiveness. This follow-up and supervision certify diverse faults and corrections before they escalate. Additionally, ICT teachers should be supervised and controlled, and the relevant authorities should verify their teaching plans.

5.2.2. ICT Training

ICT training is also another key factor for the successful implementation of ICT in Moroccan classrooms. ICT training focuses on the growing consciousness of educational technology. This could help change negative views and attitudes towards educational technology by enhancing technical efficiency; this might also be a solution for the issue of incompetence and poor results [3]. Accordingly, Moroccan ICT policy should inspire teachers to use ICT in Moroccan classrooms. It also should give more attention to teachers' ICT training by providing them with several opportunities to gain and improve their ICT skills.

5.2.3. Technical Support and Financial Resources

Technical support and financial resources are imperative factors in integrating ICT in classrooms. According to [13], teachers will have no interest in using ICT if they face technical problems that need a long time to fix. For this reason, when schools are equipped with ICT resources but there is no technical support, any technical situation will deteriorate or worsen ICT access; until the problems are resolved. In this respect, it is also argued that there is a relationship between the lack of technical support and teachers' access to ICT equipment at school [8]. Thus, limited technical support for ICT is another major obstacle in implementing ICT in education. In Morocco, financial support for high schools is distributed independently, and every school has an independent yearly budget. Despite this budget and the government's efforts to equip these schools with ICT facilities and infrastructure, some high schools face difficulties providing financial resources to solve day-to-day problems, such as cleaning and purchasing printer ink and printing papers.

To conclude, the literature review of this study has presented relevant literature to the study objectives. It looks at the social and cultural features and how they have a massive impact on the appropriateness of ICT implementation in classrooms. In addition to the Moroccan Ministry of education's roles in determining the direction of ICT use in Moroccan high schools through supervision and control. The Moroccan Ministry of education has invested in various ICT programs; yet, still, there is a gap in the quality of what is being brought because of some teachers' traditional beliefs and attitudes towards ICT implementation in Moroccan high schools.

6. Research Methodology

This section aims to describe the research design and data collection methods. This study is exploratory and explanatory research. Not only does it explore the phenomenon, but it also explains and describes why it happens. This study intends to explore the current implementation of ICT in Moroccan high schools; it mainly focuses on examining different factors that affect ICT implementation in Moroccan high schools. The study used semi-structured interviews with high school teachers in many other high schools in Meknes city (n=20). The interview questions were piloted before conducting the actual discussions to avoid leading questions and ensure that they were clear enough and covered all relevant aspects of the research topic. Each interview lasted approximately an hour. All participants were asked to identify factors affecting or hindering ICT implementation in Moroccan high schools.

In addition to semi-structured interviews, the Likert scale is also used to gather participants' views about a set of consistent questions about the implementation of ICT in Moroccan high schools. Additionally, piloting questionnaires were distributed to ten teachers to add any comments regarding the items' clarity and suitability. The questionnaire items were reviewed and discussed with two other high school teachers to assess the content validity. Six (5) items were changed, and three (3) items in the availability of ICT tools were deleted. For this study, questionnaires' statements have been categorised into seven (7) sections. Each section contains many items /questions answered on 5-points (Likert scales). The concluding form of the questionnaire consisted of the following areas:

- Section 1: Perceptions of Moroccan High School teachers about ICT implementation
- Section 2: The current ICT situation in Moroccan high schools,
- Section 3: Teachers' ICT skills and their levels of ICT training
- Section 4: Degree of satisfaction with the current ICT situation in Moroccan high schools
- Section 5: Teachers' roles towards ICT implementation in Moroccan schools.
- Section 6: Teachers' awareness and understanding of Moroccan ICT education policy.
- Section 7: Challenges that could hinder the use of ICT in Moroccan high schools

6.1. Sampling

Purposive or judgmental sampling was selected in this study for interviews. Therefore, individuals invited to participate were chosen from different Moroccan high schools in Meknes city based on their backgrounds, responsibilities, and

qualifications to represent the current ICT situation in Moroccan high schools. Accordingly, the number of targeted schools was (20) schools. The total target number of participants was (134), yet only (110) were valid. As such, a response rate of (82.08%) was achieved, which is an acceptable response rate according to [17]. (See table 1).

Table 1 Surveys Sample

Participants	Male	Female	Distributed	Total Response			Response Rate
				Male	Female	Total	
Teachers	76	58	134	63	47	110	82.08%

Participants' ages varied: (31) participants (23.13%) had an age between 28-34 years' old; (47) participants (35.07%) had an age between 35-41 years' old; while (37) participants (27.61%) had an age between 42 and 46 years old. Finally, (19) participants with (14.17%) had an age between 47 and 53 years old. By looking at their qualifications, all the teachers had a bachelor's degree in different disciplines (See figure 1)

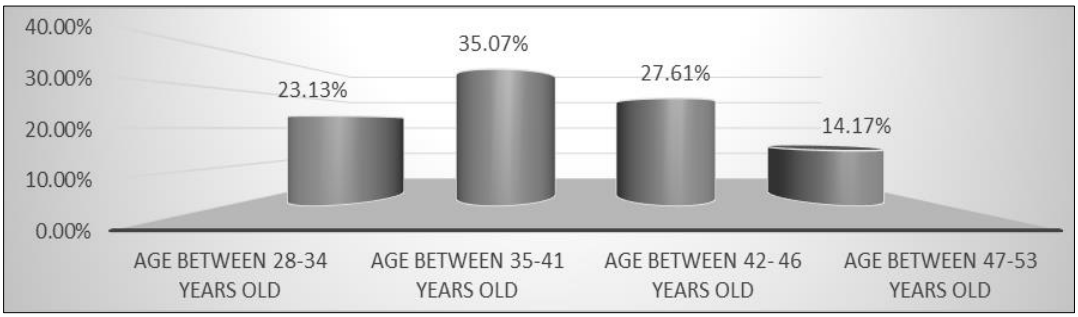

Figure 1 Teachers' Age

The results also showed that the participants had different experience levels in education. 29 Participants (21.64 %) had 5- 10 years of experience; 43 (32.08%) had 11-15 years of experience; 37 (27.61%) had 16-21 years of experience finally; (25) participants (18.65%) registered more than 27 years of experience (see figure 2)

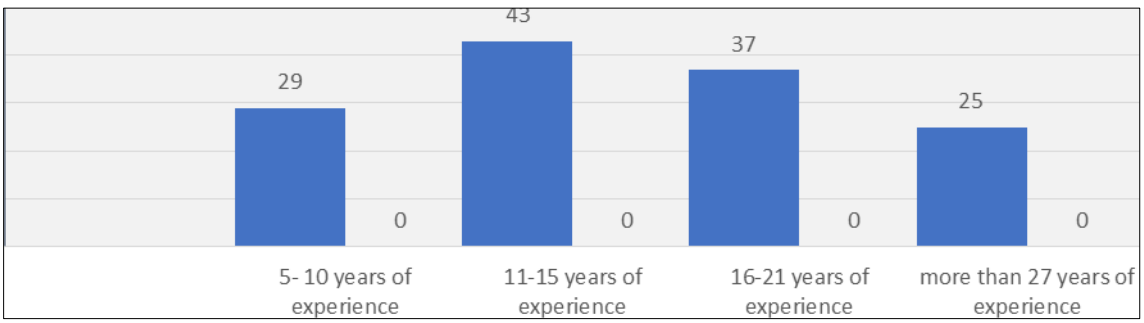

Figure 2 Teachers' Level of Experience

6.2. Data Analysis Procedures

This study uses two data collection techniques (qualitative and quantitative) with different analysis procedures associated with each one of them. Therefore, this part is divided into two pertinent parts.

6.2.1. The Interviews' Qualitative Data Analysis Procedures

In order to identify, analyse and report patterns within the data (interviews), the study used the *'Thematic Analysis Method'*. According to [7], this method helps the researcher identify, analyse, and report patterns within the data. For this reason, this method suggests six stages (each based on the previous one) that the researcher should follow to attain the objective of qualitative data analysis, mainly (1) *Familiarising the researcher with data, (2) Generating initial codes*, *(3) Searching for themes, (4) Reviewing themes, (5) Defining and naming themes* and (*6) Producing the report.*

In this study, the researcher used all the outlined steps to analyse the data for this study. Accordingly, the interview texts were transcribed and re-read several times to immerse deeply in the data. All codes have been classified under many themes and sub-themes, already identified in the study's theoretical framework. After reviewing the initial codes repeatedly, it became clear that ideas were repeated. Therefore, the codes have been reduced to the study questions and objectives. All codes, themes, and sub-themes have been reviewed to ensure they relate to relevant content.

6.2.2. Quantitative Data Analysis Procedures

This section focuses in-depth on the views and perceptions of Moroccan high school teachers towards implementing ICT in Moroccan high schools. It also emphasised the current ICT situation in Moroccan high schools, teachers' ICT skills and their levels of ICT training, roles, and awareness of Moroccan ICT education policy. Finally, the challenges that hinder ICT use in Moroccan high schools. This section aims to present the quantitative data results of the main findings of the questionnaire, which was designed based on the study's theoretical framework created from the literature review and the findings generated from the interviews.

7. Results of the study

7.1. Results of Qualitative Data

This section analyses the interview data and shows the study results from teachers' perspectives. The interviews discuss and interpret the current ICT implementation situation in Moroccan high schools and identify the most critical factors (internal and external) that affect its implementation. Therefore, and based on the classification of this framework, the qualitative data analysis results will be presented under three main themes: *(1) School level*, namely views and attitudes towards integrating ICT tools in education, school culture and teachers' roles in ICT implementation; *(2) Government level,* which includes Moroccan Ministry of educations' ICT policy and strategy, and *(3) Challenges,* mainly influences which affect ICT implementation in Moroccan high schools.

7.1.1. Perceptions and Attitudes towards Integrating ICT Tools in Education

The question about participants' views and attitudes towards ICT implementation in Moroccan high schools was asked to explore teachers' perceptions of their classroom performance. The results display that the majority of participants have positive and encouraging views towards integrating ICT in education, approving that,

"ICT makes the tasks easier, teaching more pleasant, changes the daily monotonous, improves students' accomplishment, and saves time".

Teachers also agree that students should be supported to become more involved in ICT implementation. This is well illustrated by one of the participants, stating that

"We must not deprive students of learning through technology; in fact, we (teachers) should guarantee that students are involved in this area because the use of educational technology has become a reality that cannot be overlooked, especially at present."

Using ICT in teachers' lessons has significantly impacted the teaching process. Indeed, ICT has updated teaching, and much has changed. One of the participants explained, "*The change between the past and the present is amazing, especially in the use of educational technologies."* Therefore, this change is identified by other interviewees who noted that *"Day by day, the school milieu is dramatically changing with the uprising of ICT tools."*

Although there were positive views about the importance of ICT in education, there was also a contradiction in some participants' beliefs and attitudes towards ICT implementation in Moroccan high schools. For instance, most participants did not agree that applying ICT was their responsibility; some believed that it was the responsibility of the headmaster and the Ministry of Education. This was deduced when one of the participants was asked about teachers' attitudes towards ICT implementation. He expressed his displeasure stating that "*this was not teachers' duty; instead, it was the responsibility of the Ministry of Education and the headmasters."*

Another issue is that some teachers prefer using traditional teaching methods to use ICT tools. Such attitudes could be explained as teachers lack interest in ICT, or possibly their lack of understanding of the education policy, or other reasons, such as shortcomings in raising teacher awareness about the benefits of these ICT tools in education or insufficient collaboration between teachers themselves. This lack of interest could lead to structural problems, with

roles and responsibilities being shifted and not assigned to the right individuals, resulting in individuals being unwilling to take on the responsibility of applying ICT in their classrooms.

7.1.2. Degree of Satisfaction towards the Present Situation in Moroccan High Schools

This section focuses on participants' satisfaction with ICT availability and its implementation in the Moroccan high schools. As explained previously, the degree of satisfaction among high school teachers could give intimations about the current situation. For instance, teachers' high level of satisfaction could indicate a successful ICT implementation and vice versa [6]. However, the study found a deficient level of satisfaction, with 100% of the participants feeling that there is still a vibrant gap between the current situation (the reality) and their prospects. Vis-à-vis teachers' satisfaction about the convenience and use of ICT tools in Moroccan high schools, some participants explained,

"We all the time give our schools titles such as 'School of the Future' or 'Smart School,' yet they don't have even the minimum basic conditions mandatory to use ICT tools. Honestly, the existing situation is more frustrating and annoying."

Regarding the Moroccan Ministry of Education and ICT partnership in Moroccan high schools, there was also a lack of satisfaction with the unequal distribution of ICT tools in terms of quality and quantity; it is another factor that also affected the perceptions and levels of approval. In this respect, some participants reported.

"The way that the Moroccan Ministry of Education deals with needs seems to be different. Each school is treated differently. We have more schools that lack suitable services and other facilities".

Many interviewees expressed their dissatisfaction, so many asked for a change to improve the school organisation's infrastructure, training, ICT maintenance, and the delivery of more ICT resources, with other frustrations reported, such as slow internet connection speeds. Therefore, many participants see that ICT integration in all school areas is still far below prospects. They gave some specific reasons why they are not satisfied with the current situation, confirming that.

"We are not at all gratified with the distribution and supervision coming from the Moroccan Ministry of Education. Therefore, attitudes of some educators towards ICT devices and the partnership in ICT engagement (between the Ministry of education, teachers and the administration); therefore, If the present situation endures, it will be a dark future. We can't see any possible progress in this matter."

7.1.3. Teachers' Roles and Responsibilities in ICT Implementation in Classrooms

Participants were asked many questions: What roles should teachers play in easing and enabling ICT implementation in Moroccan high schools? In this respect, most participants reported that their headmasters were sometimes encouraged to apply ICT tools in the educational process. Most teachers appreciated their headmasters' help. For example, some teachers commented, *"We always find our headmasters helpful; they always inspire and support teachers trying to use ICT in their classrooms".* Furthermore, teachers have varied views on their roles in ICT implementation. Some participants, for example, urged for a complete change in the school mentality and the way teachers' roles are viewed, which were currently seen as the only source of information. Some teachers insisted that their role should also be perceived as a guide and facilitator of teaching. Yet, other teachers have not included the implementation of ICT devices in their classrooms.

7.1.4. Teachers' ICT Skills and their Levels in ICT Training

This section aims to explore teachers' ICT skills and their levels of engagement in ICT training programmes. In general, all the participants had wide-ranging ICT skills and training levels and almost 90% of teachers with only limited basic skills. This could form a key barrier to confident views about ICT and its implementation. In this study, teachers reported only a few ICT skills as a leading factor in the unsuccessful ICT implementation. Most teachers described their skills as poor, describing themselves as intermediate level, relating to their ICT skills. As far as the level of teachers' engagement in ICT training programmes, one of the teachers clarified the views of his colleagues regarding training, stating that,

"I debated training problems with some of my friends. One of them teaches Arabic Studies, and he told me, 'I don't like going to training sessions; it's just a waste of time, and to be honest, I don't have any drive to use ICT in my teaching'. He added*, "One of them told me, 'Why do I have to go for training? I teach the Arabic language, and I don't think I need to use these apparatuses in Arabic classes; that is why I prefer the traditional methods, and I think I'm all the more professional for it".*

Some teachers do not participate in ICT training programmes from the aforementioned extract. This lack of provision and quality was evident in participants' views. About 90% of teachers aren't qualified in ICT (skills), most of them don't even like training, making ICT implementation in Moroccan high schools very poor.

7.1.5. Moroccan Ministry of Education ICT Policies and Strategies

Understanding the issues regarding the present ICT education policy, two key questions were asked: *(1)* what roles do Moroccan Ministry of education play in facilitating ICT implementation in Moroccan high schools? And *(2)* to what extent do teachers understand the ICT education policy? To answer these two questions, teachers were asked to identify the degrees to which they conform interactively to the canons and guidelines of the Moroccan ICT education policy and what roles they play in applying this policy into actions in Moroccan high schools. Most participants agreed that the Moroccan Ministry of Education should focus more on the ICT policy. This also means that the Moroccan Ministry of Education needs to be more actively engaged in establishing their policy, particularly preparing teachers for future ICT implementation. They also have to ensure that teachers are familiar with and follow the guidelines of this policy. One of the participants commented,

"*For me, the Moroccan Ministry education policy is clear. Yet, the problem is that it is not clear to other teachers. I think it's the role of the Ministry of Education to take the essential steps to make sure that all teachers are aware of their policy. I could also say that the Ministry of Education should be blamed because there is stronger in this issue; they should educate teachers and make them aware of ICT policy and its guidelines".*

The results show a gap between the Moroccan Ministry of education's policy on documents and teachers' classrooms. For instance, when one of the participants was asked about his views about ICT policy, he said, "*It's just expired letters on papers, and up till now, I don't think we've grasped the essential purposes yet*". When questioned about the ICT guidelines, he replied,

"Yes we, endlessly receive guidelines about ICT, and we sign them, but the problem is that there are no ICT tools available, concerning the Ministry policy, I think it's still unclear".

From the above extracts, greater mindfulness of ICT policy is crucial and decisive. All the participants suggest increasing awareness by stressing the value of ICT and its use in education. One of the participants calls for enhanced plans and strategies for communicating the Minister's policies at the school level, stating that,

"There must be operative plans and strategies from the part of the Ministry of Education vis-à-vis the implementation of ICT in education; up to now, there's no clear policy. There is a failure in most Moroccan high schools due to the lack of schedule. I have worked in several different high schools, and I have come across a lot of technological equipment which are sometimes out of order, and I think one of the reasons for this is linked to the lack of ICT policy clear planning and strategy".

This displayed that most teachers agreed that much effort must be made on the Moroccan Ministry of education to improve the education policy.

7.1.6. Challenges that affect the use of ICT in Moroccan Schools

This part aims to provide teachers with insights and perspectives on the main challenges of ICT implementation in Moroccan high schools. This section is divided into two shares: (1) *External challenges*, which are related to the administration roles (Ministry of Education) and (2) *Internal challenges*, which are related to all internal factors (within the schools)

Although the Moroccan Ministry of education has assigned a vital budget to support the incorporation of ICT in Moroccan high schools, the study results indicated a great deal of antagonism stated by the majority of the teachers. This challenge was viewed as one of the main hindrances that might affect ICT implementation in schools. The problem of inaccessibility or a lack of resources was evident in many targeted schools (15 out of 20). While other schools, in contrast, had a left-over ICT gadget. This leads us to a remarkable point raised by many teachers regarding unbalanced distribution by the Ministry of Education, which is another serious obstacle to ICT implementation; one of the participants maintained that,

"Some schools have extra gadgets. Sometimes they just send us what we don't need because they just want to get rid of some apparatuses, so their purpose is the storeroom and not the use of it".

A lack of good ICT gadgets was very significant. Something reported in many schools and one of the participants detailed, "*We have five students per one computer».* Therefore, this contradicts the Moroccan Ministry of education's policy that outlines the provision of one computer per student. Thus, for any Moroccan high school to implement ICT as a source of knowledge, they should have sufficient resources to build on skills that can be transmitted and improved at home, not vice versa". The study also found that lack of training is the most cited factor that prevents ICT implementation in Moroccan high schools. All the participants acknowledged that ICT training is a necessity. Yet, their responses indicated that the training programs are few and do not help achieve even the minimum objectives to raise teachers' skills. Concerning this issue, many teachers commented,

"The majority of teachers aren't trained; up to 70% or 80% of teachers either have not yet received any training or have only received elementary training in ICT skills".

In general, most teachers are self-trained. They learn by trial and error, and most participants have had no formal training yet. Other teachers also reported that,

"Training is accessible, but the problem is that it is usually unsatisfactory, because as teachers sometimes we receive training from people who are unqualified, so they transfer their experiences and knowledge unproductively".

To successfully implement ICT tools in the classroom, teachers should have a comprehensive knowledge of technology, pedagogy, and content. Therefore, these elements provide an understanding of content delivery using the most appropriate pedagogy and technology. In this context, teachers should receive ICT training and pedagogical training. One of the participants suggested that pedagogical training should come first before using ICT tools and even before training how to use them. He pointed out,

"Teachers still insist on educating other teachers as the first step, rather than the training coming afterwards; teachers need to follow this order: educating, training and then the provision of ICT tools".

Therefore, most participants also agree that self-motivation is the most crucial factor, inspiring teachers to adapt and adopt technology in the classroom. Some participants commented,

"Self-incentive and inspiration are the most vital factors. If teachers are persuaded of the paybacks of ICT tools in teaching, they will be capable of breaking down any barriers that hinder ICT implementation. Teachers can find the right place to use it; they can teach themselves how to use it and develop new teaching methods. The problem is that we have some careless and uncaring teachers; they all the time ignore ICT devices without logical motives".

7.1.7. Summary of Qualitative Main Findings

From teachers' perspectives, qualitative results revealed that the implementation of ICT tools in Moroccan high schools is affected by many factors. Some are related to the Moroccan Ministry of Education (external factors), and others are related to the school milieu (internal factors). Accordingly, although a great deal has been achieved regarding the investment in ICT tools in Moroccan high schools, the Moroccan Ministry of education has a long way to realise its planned ICT guidelines and strategies. There is a prominent absence of clarity in the education policy, teachers are inadequately prepared, and ICT remains weak and undeveloped. There are also insufficient resources and technical teams to support the ICT implementation. Teachers' skills, the availability of ICT tools, participants' attitudes, with older teachers' resistance to change are all factors that have shaped ICT implementation in Moroccan high schools. The lack of teachers' skills has resulted in different views on implementing ICT in the classroom at the school level. There is also a necessity to improve coordination between teachers and the administration about ICT. Consequently, implementing these suggestions will contribute immensely to enhancing ICT use in Moroccan high schools.

7.2. Results of Quantitative Data

This section describes the quantitative data and interprets the questionnaire's findings based on the study's theoretical framework and results generated from the interviews. The questionnaires' statements have been categorised into seven (7) sections, which aim to achieve the purpose of the study. Teachers' questionnaire contains several items /questions answered on 5-points (Likert scales).

7.2.1. Perceptions of Moroccan High School Teachers about ICT Implementation

Teachers' perspectives and attitudes on ICT in education were assessed through (10) items. All the participants rated their level of agreement with items presented (ranging from strongly agree to disagree strongly). In doing so, it is

evident that *'the necessity to prepare schools for ICT before starting to apply it'* received the highest agreement (78.2%). It was also agreed that *'ICT tools make teaching enjoyable, changes the classroom routine'* (68.4%). Teachers also agreed that *'ICT tools make their work more accessible* (62%).

Table 2 Teachers' perceptions of ICT in education

Teachers' Perspectives In ICT In Education	S.A.	Agree	Neutral	Disagree	S. D
We need to prepare schools for ICT	78.2%	17.8%	1%	0.0%	3%
ICT makes teaching enjoyable	68.4%	29.6%	1%	0.0%	1%
ICT makes our work easier.	62%	33%	4%	0.0%	1%
Using ICT can save time and effort.	58.4%	34.7%	5%	1%	1%
ICT increases cooperation between teachers and students.	53.5%	40.6%	4%	1.0%	1%
I 'm very interested in learning about ICT and use it	59.8%	32.4%	3.9%	0.0%	3.9%
ICT is an essential part of teaching and learning.	55.4%	33.7%	7.9%	2.0%	1%
ICT weaken student results.	31%	41.4%	26.7%	0.0%	1%
Traditional methods are better than teaching using ICT.	28.7%	39.4%	13.8%	11.7%	6.4%
Using ICT is a dull activity.	17.8%	47.5%	12.9%	17.9%	3.9%

On the other hand, the lowest-ranked items in the highest agreement were "ICT use as a dull activity" (17.8%). Followed by the statement "Traditional methods are better than teaching using ICT."(28.7%) and "teachers prevent students from using the internet because some students use it outside the range of learning activities" (31%).

7.2.2. The Current Situation of ICT in Moroccan High schools

Table 3 Current availability and use of ICT in Moroccan high schools

Current situation (availability and use of ICT)	Available with use at all times	Available with frequent use	Available with limited use	Available with no use at all	Not available at all
Access to computers	48.5%	20.8%	10.9%	7.9%	11.9%
Use of PowerPoint	53.5%	13.9%	12.9%	5.9%	13.9%
Use of Computer's lap	35.4%	18.8%	12.5%	14.6%	18.8%
Use of Microsoft Word	39.6%	17.8%	13.9%	6.9%	21.8%
Use of Printer	19.0%	27.0%	29.0%	8.0%	17.0%
Use of School website	17.6%	14.7%	21.6%	8.8%	37.3%
Use of /Data show	40.9%	11.3%	8.2%	5.2%	34.3%
Teacher access to internet	18.8%	19.8%	20.8%	7.3%	33.3%
DVD/educational CDs	28.7%	16.8%	13.9%	9.9%	30.7%
Use of Scanner	10.7%	14.3%	14.3%	3.6%	57.1%
Students' access to internet	10.4%	13.5%	11.5%	8.3%	56.3%

In this section, Moroccan high school teachers were asked to state the availability of ICT tools and the degree to which they are used, using (11) questions. This was evaluated with responses ranging from "*available with use at all times" to "not available at all"*. In doing so, it was deduced that the most available with use was *'PowerPoint'* (53.5%) followed by *"access to Computers"* (48.5%) and *"Projector / Data show"* (40.9%).

The less available and used items were "Scanner" (57.1%), "Student access to the internet" (56.3%), and "teachers access to the internet" (33.3%)

7.2.3. Teachers' ICT Skills and their Level of ICT Training

This part deals with teachers' ICT skills. Using seven (7) items, the skills were rated from advanced to no skills. It was found that the ability in *"Working using the internet"* received the best ratings of teachers' skills (21.4%), followed by *"the use of Microsoft Word"* (18.8%) and *"Basic computer skills"* (18.0%).

Table 4 Teachers' ICT skills

Teachers' ICT skills	Advanced	Good	Moderate	Poor	No skills
Working using the internet	21.4%	35.7%	36.7%	5.1%	1.0%
Basic computer skills	18.0%	46.0%	25.0%	8.0%	3.0%
Using Microsoft Word	18.8%	33.7%	33.7%	7.9%	5.9%
Electronic Communicating with staff/ students	15.8%	31.7%	30.6%	13.9%	8.0%
Electronic communication with the Ministry	10.2%	12.4%	36.1%	26.8%	14.4%
Using Projector	6.0%	22.0%	28.0%	22.0%	22.0%
Fixing computer problems and other ICT devices	10.1%	10.1%	20.2%	22.2%	39.4%

However, it was found that teachers have poor skills in "fixing some computer problems and other ICT devices" (39.4%). Followed by "Using Projector" (22.0%) and "Electronic communication with the Ministry" (14.4%).

Teachers were asked about the level of training they have received (if any) in different programmes or skills associated with ICT tools. Table (5) below shows the frequencies of teachers' scores based on a 5-point Likert scale (advanced to no training) along with the rank of each item. The results displayed that, generally, across the majority of items the training teachers have received is considered less than moderate. "Basic computer skills" and "Microsoft Word" showed the best average (21.4%), followed by "writing Emails" (13.9%) and "PowerPoint or data show" (8.1%). On the other hand, the poorest training was received in "Computer Maintenance" (71.1%).

Table 5 Teachers' level of training

Teachers' level of ICT training	Advanced	Good	Moderate	Poor	No Training
Basic computer skills	21.4%	29.6%	18.4%	18.4%	12.2%
Microsoft Word	21.4%	24.6%	16.3%	19.3%	18.4%
Writing Emails	13.9%	11.9%	11.9%	32.7%	29.7%
Projector/ Data show	8.1%	15.2%	11.1%	40.4%	25.3%
Internet access	7.0%	8.0%	14.0%	26.0%	45.0%
Computer maintenance	6.2%	6.2%	9.3%	7.2%	71.1%

7.2.4. Degree of Satisfaction with the Current ICT Situation in Moroccan High schools

Teachers' satisfaction with ICT tools, in general, was judged based on nine (9) items, using the average score of a five-point satisfaction scale of extremely satisfied to extremely dissatisfied

From the frequencies mentioned in the table (6), it is evident that *"teachers' roles in ICT implementation"* gained the most satisfaction (16.7%), followed by *"their attitudes in ICT tools"* (13.7%) and *"teachers' ICT skills"* (13.7%). On the other hand, the scale with high dissatisfaction was generated for *"provision and supervision from the Ministry of Education*" (23.5%) and *"training in ICT"* (21.6%)

Table 6 Satisfaction with the current ICT situation in Moroccan high schools

Satisfaction	Extremely Satisfied	Satisfied	Neither	Dissatisfied	Extremely Dissatisfied
Your roles in ICT implementation	16.7%	32.4%	34.3%	12.7%	3.9%
Outcome of using ICT tools	13.7%	22.5%	33.3%	22.5%	7.8%
Quality of ICT tools	7.8%	29.4%	30.4%	23.5%	8.8%
Your ICT skills	13.7%	23.5%	27.5%	22.5%	12.7%
The current situation	9.8%	21.6%	23.5%	28.4%	16.7%
ICT policy (goals and clarity)	5.9%	23.5%	28.4%	25.5%	16.7%
Collaboration between staff	9.8%	19.6%	25.5%	26.5%	18.6%
supervision of Ministry of Education	6.9%	21.6%	24.5%	23.5%	23.5%
ICT training	3.9%	22.5%	25.5%	26.5%	21.6%

7.2.5. Teachers' Roles towards ICT Implementation in Moroccan Schools.

In this section, teachers were enquired about their roles in implementing ICTs in their classrooms. Teachers' roles were asked using eight (8) questions. It was found that the highest agreement is that *"teachers involve students in the use of ICT in their lessons*" (41.6%). Followed by "*asking the headmaster to help in providing ICT tools and maintenance"* (40.4%) and *"it is not teachers' responsibility to provide ICT tools in school, it is the headmaster's role"* (38%).

Table 7 Teachers' roles in ICT implementation

Teachers' roles in ICT implementation	S. Agree.	Agree	Neutral	Disagree	S.Disagree
I involve students in the use of ICT in lessons.	41.6%	38.6%	18.8%	1.0%	0.0 %
I ask headmasters to provide ICT tools	40.4%	42.5%	13.1%	2.0%	2.0%
It is not my responsibility to provide ICT tools	38%	40%	14%	4.0%	4.0 %
Encouraging students to search on the internet.	37.6%	43.6%	14.9%	3.0%	1.0%
Advising my colleagues to use ICT in lessons.	28.4%	47.1%	15.6%	3.9%	5.0%
Assessing how students employ computers	21.2%	45.5%	17.2%	10.1%	6.1%
I'm keen on employing ICT in my classroom	21.6%	29.4%	30.3%	6.9%	11.9%
I am keen to attend ICT training courses.	12.9%	33.7%	25.7%	18.8%	8.9%

7.2.6. Teachers' Awareness and Understanding of Moroccan ICT Education Policy.

Teachers' views and understanding regarding the Ministry of education ICT policy were measured using ten (10) items. The most agreement was generated to believe that "there is a weakness in explaining *ICT policy and its education goals"* (52%). Followed by the view *"The ICT policy has not been applied practically"* (35.6%) and the view that "*the Ministry of Education should raise teachers'* awareness of ICT policy" (33.3%).

Disagreement was higher for the items stating that "teachers have no idea about the policy towards the implementation of ICT" (33.7%), and finally, "ICT Education policy is clear" (23.6%).

Table 8 Teachers' views about the ICT policy

Teachers' views and understanding of the ICT policy	S.A.	Agree	Neutral	Disagree	S.D.
There is a weakness in explaining the ICT policy and its goals	52%	25.5%	17.6%	4.9%	0.0%
The ICT policy has not been applied practically.	35.6%	39.6%	15.8%	4.0%	5.0%
I receive support to use ICT in my lessons.	13.7%	41.2%	21.6%	15.7%	7.8%
I do not need to know about the ICT policy	9.0%	41%	29%	13%	8.0%
The ICT policy has a positive effect on my attitudes towards its use.	17.6%	28.4%	23.5%	26.5%	3.9%
I haven't heard about the ICT policy.	7.8%	45.1%	17.6%	13.7%	15.7%
Ministry of Education should raise teachers' awareness of ICT.	33.3%	7.8%	25.5%	24.5%	8.8%
I have no idea about the ICT policy.	2%	20.5%	20.3%	23.5%	33.7%
The ICT education policy is clear.	2.0%	6.9%	20.5%	47.1%	23.6%

7.2.7. Challenges that could hinder the use of ICT in Moroccan High Schools

Teachers encounter several challenges when implementing ICT tools in schools. Their agreement was assessed using (21) potential challenges. The most deal was generated for the *"growing number of students"* (60.0%), followed by the *"lack of understanding of ICT policy*" (50.5%), and *"Favouritism plays an important role in the distribution of ICT tools"* (47.6%).

Table 9 Challenges facing ICT implementation in Moroccan High schools

Challenges	S.A.	Agree	Neutral	Disagree	S.D.
Growing number of students	60.0%	24.0%	8.0%	5.0%	2.0%
Lack of understanding of ICT policy	50.5%	28.3%	14.2%	6.1%	1.0%
Lack of ICT training programmes	44.6%	35.6%	11.9%	7.9%	0.0%
Favouritism in distributing of ICT tools	47.6%	23.7%	17.8%	7.9%	3.0%
Lack of time for training	39.2%	32.4%	16.7%	9.8%	2.0%
Lack of maintenance	36.0%	31.0%	17.0%	13.0%	3.0%
No, or slow, internet access	32.3%	35.4%	12.1%	14.1%	6.1%
Lack of ICT tools	32.0%	35.0%	14.0%	10.0%	9.0%
Lack of building infrastructure	39.0%	20.0%	4.0%	15.0%	22.0%
Lack of financial resources	24.8%	23.8%	2.0%	14.9%	34.7%
Lack of motivations and encouragement	23.8%	31.7%	20.8%	21.8%	2.0%
Lack of time to use ICT	15.7%	46.1%	16.7%	18.6%	2.9%
Lack of supervision from the Ministry of Education	21.0%	34.0%	24.0%	18.0%	3.0%
Lack of Teachers' skills in using ICT	19.2%	35.4%	26.3%	15.2%	4.0%
Scheduling problems	33.0%	34.0%	13.0%	17.0%	2.0%
Teachers' resistance to change	9.1%	5.1%	26.3%	16.2%	43.4%
Lack of teacher collaboration	16.7%	7.8%	24.5%	19.6%	31.4%
Lack of confidence	14.7%	23.5%	34.3%	9.6%	17.8%
Lack of technical support	9.9%	31.7%	28.7%	10.9%	18.8%
Teacher resistance to change	13.1%	28.3%	23.2%	11.1%	24.2%

On the other hand, the challenges that received the highest disagreement were "teachers' resistance to change" (43.4 %), "Lack of technical and financial support" (34.7 %), "teachers' lack of collaboration in education" (31.4 %) and, finally, "Lack of building infrastructure" (22. 0%).

7.2.8. Summary of Quantitative Main Findings

The challenges in qualitative and quantitative results have been identified as internal and external factors. Handling these challenges is crucial, and without addressing them, it is impossible to implement ICT in Moroccan high schools successfully. The results displayed a lack of ICT skills among most teachers, and there are apparent deficiencies in their roles in ICT implementation. Furthermore, the identified challenges are not just limited to skills but also policies, resources, infrastructure, technical support and, more crucially, attitudes and behaviour of some resistant teachers. Other factors hinder ICT implementation, such as lack of financial resources, lack of suitable infrastructure; lack of maintenance; lack of appropriate space to use; lack of confidence in using ICT; and lack of understanding of ICT policy. The study found other deficiencies not only in ICT skills training but also in pedagogical training and supervision. Dissatisfaction with the lack of technical support, management and follow-up related to the limited number of supervisors was also a big concern. As a result, the Moroccan Ministry of education must propose a framework to improve ICT implementation in Moroccan high schools.

8. Discussion of Qualitative and Quantitative Results

This section discusses qualitative and quantitative data (parallel) to define the main factors affecting ICT implementation in Moroccan high schools. In this study, participants show poor collaboration between the schools and the Moroccan Ministry of Education. The results also show that the Moroccan Ministry of education needs to invest in better quality ICT infrastructure and ICT tools, as most participants affirm a gap in this context. Most participants also demonstrate that countries have core policies and strategies linked to advancing teachers' development, confirming that teachers should be well prepared and knowledgeable about ICT use. In Moroccan high schools, most teachers are not well ready and lack ICT training. This does not only affect their confidence in integrating the ICT tools in learning, but also it affects their attitudes and motivation.

This study confirms that there are various barriers within and outside the schools. They can improve by reducing the current complexity and challenges experienced at school and the Ministry of Education levels. In general, the results identified several factors that affect ICT implementation in Moroccan high schools. Hence, the study was able to achieve its objective successfully. The study monitored many external and internal challenges that affect ICT implementation in Moroccan high schools. Most of these factors had a high level of agreement between the study participants. The following section shows all these factors gathered from the qualitative and quantitative data.

Although the ICT challenges have been identified earlier as internal and external challenges, it has been mentioned earlier that the Moroccan Ministry of education has invested hugely in the ICT sector. However, despite this increased spending and governmental support, the progression in the ICT sector has often been unsatisfactory. There is still a vibrant break between the availability of ICT tools in Moroccan high schools and strategies or implementation methods. The Moroccan Ministry of education needs to develop an effective plan for ICT implementation in education and put it into practice. Subsequently, there is no meaning in just investing vast amounts of money in equipping schools with ICT tools unless they are used effectively. Therefore, the successful implementation of ICT requires the identification of specific problems and factors that affect ICT implementation; since the value of ICT tools is enhanced significantly when combined with school objectives and future visions.

According to most teachers who took part in the study, there are many issues related to ICT policy and strategy that have undermined the effective use of ICT. The study found many relevant factors, such as lack of clarity in education policy, lack of Moroccan Ministry of educations' supervision, lack of technical support and lack of ICT training. All these factors have led to a state of dissatisfaction. Regarding the lack of clarity in education policy, participants suggested proper guidelines and procedures, which can be a crucial foundation to ensure that each Moroccan high school and its staff know their roles and responsibilities individually. Furthermore, the follow-up and supervision can be easily monitored. There would be a clear set of information to go by when assessing progress to make further improvements. Lack of control was also stated as a barrier. Teachers said that they need help with some issues related to ICT implementation. They suggested a need for a system of monitoring and supervising technology implementation and its improvements within the school systems.

Lack of providing ICT training was another significant barrier facing ICT implementation. The study found many issues leading to the lack of activity in this respect. Firstly, the Moroccan Ministry of Education policy did not address the

limitations of ICT training programs. In this context, teachers suffered from a small number of available training programs. The quality of programs could not fulfil the needs of the teachers and, thus, they were not continuously improving the teachers' skills and knowledge. Furthermore, when training sessions were provided, teachers were expected to attend in their own time. This was often considered a barrier and prevented them from attending. Finally, teachers need encouragement to inspire them to follow regularly.

Concerning the ICT supplies and materials, it was evident from the results that there was a shortage in the number of ICT tools in Moroccan high schools. This was for various reasons, such as unbalanced delivery, favouritism, and some schools' lack of credibility about their actual need for ICT tools. Most teachers claimed a lack of justice in distributing ICT tools between schools. Teachers also stated that the Moroccan Ministry of Education must fight favouritism. They should change the strategy of distributing ICT tools with more supervision and monitoring.

Limitations of the Study

Although the study was able to achieve its primary objective, the study's limitations should be stated to present a clear picture of the work that has been completed. The major strength of this research is that it offers outcomes regarding teachers' perspectives concerning ICT implementation in Moroccan high schools in Meknes city. Among the limitations of this study, it was geographically restricted to Moroccan high schools within Meknes city. This research employed questionnaires and interviews to gather data. If there were sufficient time and resources to widen the study to other regions and alternative cities, in-depth data would have been acquired to enhance the current findings and determine if the research outcomes were generalizable over the nation or particular to teachers involved in the research.

9. Conclusion

This study has successfully achieved its primary objective by examining the current ICT implementation in Moroccan high schools. It has mainly revealed that ICT implementation in Moroccan high schools encounters many challenges. These challenges, in most respects, resulted from the gap between the views of the participants (teachers), which can lead to severe issues when incorporating ICT into the learning process. Without a doubt, weak collaboration and communication between school staff, teachers, and the Moroccan Ministry of education must be resolved.

Compliance with ethical standards

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Disclosure of conflict of interest

The author has no conflicts of interest to declare. The author alone is responsible for the content and writing of the paper

Statement of informed consent

Informed approval was obtained from all participants involved in the study.

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