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The Information and Communication Technology Directors', Head-teachers', Teachers' and Students' Perspectives on the Factors that lead to Saudi Arabian Secondary Schools implementing successfully Information and Communication Technology (ICT)

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Abstract:

It is recognized globally that Information and Communication Technology (ICT) has a role in education. Accordingly, many developed and developing countries have made significant ICT investments in their education sectors. Saudi Arabia has made, also, huge ICT investments in its education sector but there continues to be slow progress in its successful implementation. Consequently, both educators' and decision-makers' general disappointment has led them to ask a number of searching questions. The most important question is as follows:

'What factors affect ICT being implemented successfully in Saudi Arabian secondary schools?'

Therefore, from the head-teachers', ICT directors', students' and teachers' perspectives, this paper's main objective is to answer both the above and other related questions. Consequently, for the purpose of this study, the researchers have used primarily qualitative data collected from semi-structured interviews with two ICT directors, four head-teachers, four teachers and four secondary school students. Generally, the results show that the participants considered ICT to be an important tool in improving learning experiences, performance, learning outcomes, and collaboration. Notwithstanding, there remain some challenges that need to be overcome if ICT is to be implemented successfully in Saudi Arabian secondary schools. These challenges include the schools lacking sufficiently clear ICT policies; the staff lacking the necessary ICT skills and training opportunities; and the lack of ICT resources. However, the participants recognized that, if these obstacles could be overcome and could become positive rather than negative factors, ICT could be implemented successfully in Saudi Arabian secondary schools.

Keywords: Head teachers; Teachers' and Students' Perceptions; ICT Integration; ICT Directors; Saudi Arabian secondary schools; ICT in Education; successful implementation; positive factors.

1. INTRODUCTION

ICT is a fundamental element of global teaching and learning processes. Education for All (EFA) [1-3] states that there are, "Unlimited possibilities for effective learning, knowledge, and development of additional efficient institute service could be achieved by the use of technologies". Therefore, in order to help their communities improve people's everyday lives; countries globally are implementing ICT applications either in their education or other sectors. Nevertheless, there remains the need to overcome key barriers in terms of the general strategic planning of ICT policies and, more specifically, in terms of accessibility, connectivity and professional and content development (UNESCO-UNIVOC, 2014 as cited in [4-6].

For example, as a developing country, India has used ICT tools to re-organize its tertiary and vocational education systems in order to ensure that India makes the best use of its people's skills [7, 8]. Similarly, Uganda has improved its education system in order to make the best use of the country's ICT tools and, in turn, boost its economy [8, 9].

It is noteworthy that the Saudi Arabian Government has made huge investments in ICT in order to improve the country's public education system and, in 2007, invested almost £2 bn in ICT. Furthermore, the Saudi Arabian Government has revised the public education curriculum and is providing teachers with electronic devices to facilitate their teaching. In addition, teachers have received training and developmental programs in order to ensure that they make the best use of ICT tools [8, 10]. In 2015 and in addition to the already massive investment in the education sector, the Saudi Arabian Government allocated more than £36 billion (about 25% of the overall budget) in order to provide the country's secondary schools with ICT facilities and to ensure the successful implementation of such tools [11, 12].

However, despite this massive spending and Government support, Saudi Arabia continues to lag behind those global

countries that lead the way in improving their education sectors through the use of ICT [12-14]. Consequently, there is a continuing gap between the ICT tools, provided to Saudi Arabian secondary schools, and the methods used to implement such tools. For example, the findings of recent studies [14-17] reveal that the Saudi Arabian Government needs to develop an effective strategy so that ICT is implemented successfully in its secondary schools. From his study's findings, Almadhour in [14] concludes that:

For education, the government of Saudi Arabian has allocated funds to integrate ICT but there is no clear strategic framework to integrate the ICT in the secondary school.

More globally, North American studies' findings show that greater investments in ICT or its availability in classrooms do not translate necessarily to improved academic achievement. This is due mainly to poor ICT implementation strategies [18-21].

Against this background, this paper aims to explore the factors that lead to ICT being implemented successfully in teaching practices. This is achieved by answering the research question:

> '***From examining the relevant ICT strategies in Saudi Arabian secondary schools, what are the factors that lead to implementing ICT successfully?***

In addition; ***What are the barriers that hinder the education sector from implementing ICT successfully?***

It is noteworthy that there is interchangeability between its words, model and framework in this paper and that it refers to the framework's various components as elements.

2. The Factors That Lead to Saudi Arabian Secondary Schools Implementing ICT Successfully and The Factors That Hinder Such Implementation

Developed countries have employed many strategies and frameworks to implement ICT successfully in their education sectors. For example, New Zealand's Ministry of Education 2006 research paper entitled 'ICT Strategic Framework for Education' explains that the New Zealand Government provided its schools with ICT tools in order to achieve its objective of improving the country's education. Their study began with the question:

'Why should there be an ICT strategic structure for learning?'

In answering this question, the New Zealand Government considered that it was essential to establish good cooperation between their educational centers and Government institutions. Consequently, the New Zealand framework takes account of the challenges facing those who work and study in educational environments [22].

Similarly, the Australian Government's Department of Education's national ICT framework aims to achieve sustainable and significant change to teaching and learning within the country's educational institutions by providing school students with additional teaching so that they can learn more about the digital age. This framework aims to reduce the barriers by dealing with the leadership factors so that teachers respond to their students' needs by expanding their education through individual tuition; extending learning beyond that offered by the institution; enhancing the appraisal of students by giving them feedback, and by using existing information about the students' knowledge of ICT to quantify and advance their proficiencies. In addition, the framework consists of the existing technical and expert protocols to ensure that the teachers adhere to education procedures; maintain expert instruction, and make use of commercial procedures in providing their students with a dependable infrastructure [23].

Although the Australian framework includes crucial elements that address the student factors and technical barriers, it pays little attention to the factors that affect head-teachers and teachers. In addition, the Australian framework contains elements that may pose limitations if something similar was implemented in Saudi Arabia. For example, unlike Australia, Saudi Arabia does not have sufficiently developed systems and enabling policies that help the curriculum and the environment [24]. Nevertheless, the well-structured Australian framework contains ten elements that are essential if ICT is to be implemented successfully. Consequently, bearing in mind the structure of Saudi Arabia's education systems, these key components can improve how Saudi Arabian secondary schools implement ICT. A particularly good example is the vital need for enabling leadership if the country's secondary schools are to implement successfully the Saudi Arabian Government's ICT strategy. Currently, there is a clear gap between the Saudi Arabian Government's ICT policy and its implementation by the country's secondary schools. In this respect, the Ministry of Education has failed to work in partnership with school head-teachers [15, 25, 26]. It is apparent that some headteachers lack the necessary leadership skills to overcome the various barriers if ICT is to be implemented successfully in their secondary schools. Therefore, this paper aims to identify the necessary solutions to this problem [22].

As shown by the findings of the study in [14], there is a need for frameworks, processes, and systems that can evaluate the learning processes and can manage and support professional learning. Therefore, when considering the learning processes, the Australian national framework is particularly relevant to Saudi Arabia. Accordingly, this study investigates the elements, such as the ICT capabilities, leadership roles, and current infrastructures, not only from the head-teachers' and teachers' perspectives but, also, from the students' perspectives.

Lee et al. in [27] South Korea study investigated how the country's e-learning practices changed the manner in which learning focused on the student rather than on the teacher.

The South Korean model enables the teachers to raise learning

standards among high numbers of the country's student population. However, Saudi Arabia has a markedly different system since it focuses on the teacher's role. The study findings in [27] show that ICT overcomes the space and time barriers to learning and, therefore e-learning is cost-effective, efficient and an alternative to traditional learning methods. However, it is noteworthy that, if ICT is to be implemented successfully and the educational objectives and students' needs are to be met, it is essential to adopt a multidisciplinary approach when designing the task-driven model.

Similar to South Korea, Saudi Arabia has experienced a rapid growth in ICT. However, few empirical studies have investigated the adoption of e-learning and whether or not the learners have accepted its implementation [8, 17]. Consequently, this study's model aims to deal with access to e-learning, the lack of space and the environmental barriers encountered by Saudi Arabian secondary schools. Since these are vital elements to its successful implementation, this model's key variables concentrate on teacher characteristics, learning materials, and design. There is a need to ensure that the ICT tools, developed for this purpose, match with the students' needs [28]. Therefore, so that the students accept e-learning, it is crucial that they consider the ICT tools to be useful to them [8]. In addition, in order to be compatible with one of the study's objectives, this model measures the participants' perceptions of ICT. In this regard, the author in [15] emphasizes the importance of investigating teachers' characteristics (attitudes, beliefs, and views) and, more particularly, the extent to which the students consider them to be helpful in meeting their aspirations. Also, when providing ICT tools, it is crucial to understand the learning contexts for which they are designed so that they can be delivered both accurately and consistently [22]. An additional factor is the extent to which students enjoy learning and believe that e-learning enhances their results [29]. Finally, it is important, also, to understand the students' intentions to participate in e-learning. However, none of these objectives can be achieved without having in place a proper ICT strategy along with a framework for its implementation. If this model is to be successful, it is critical to assess correctly the teachers' and students' abilities to use ICT tools [27].

With regard to the implementation of ICT, the authors in [30] examined the strategies that two primary and two junior colleges Singapore schools and used to manage the barriers both inside and outside the classroom. Their findings show that based on the observations of ICT lessons and face-to-face interviews with ICT directors, head-teachers and teachers, the schools' ICT strategies consisted of six elements. These were: collaboration among teachers; training of student ICT helpers; time for teachers to prepare for ICT; training for teachers on how to use ICT tools in the classroom; technical support staff and support provided by head-teachers in addressing teachers' ICT concerns. This framework is central to this study's research questions and the knowledge gaps that it aims to fill. Accordingly, this study evaluates these factors in terms of the teachers' and the students' use of ICT tools. Also, in the context of Saudi Arabian secondary schools, this study assesses the availability and the roles of technical support; the training of teachers and their skills in using ICT tools; and the head-teachers' support in addressing the teachers' ICT concerns. It is noteworthy that, if Saudi Arabian secondary schools are to implement ICT successfully, the challenges are not limited to technical issues.

Although there are other critical factors, according to Newhouse in [31], ICT resources are the most important factor. In his framework, Newhouse argues that there is a strong relationship between the curriculum and either the availability or lack of ICT resources. Namely, in turn, these influence and support the provision of logistics on how ICT is delivered in terms of pedagogy, learning outcomes and content. Newhouse's framework reinforces, also, the authors in [30] thinking that, without technical support, it is difficult to integrate at the school level the available ICT tools. Consequently, Newhouse adopts a systematic approach with a view to all relationships having an impact on each other. For example, the availability of ICT resources, with technical support but with no skills or knowledge to implement ICT in the classroom, suggests that there will not be a positive outcome [31].

However, Newhouse's systematic framework does not address issues such as policies and strategy; the integration of ICT in the school curriculum; and the head-teacher's key role in the implementation process. However, his framework includes a number of interacting factors that are similar to this study's objectives [31].

This study reviews the Newhouse framework's core elements applicable to Saudi Arabia. However, this review takes neither a systematic nor a linear approach because of ICT's continuing development in Saudi Arabian secondary schools [16].

On the other hand, the lack of such factors can lead to the perception of negative barriers rather than a positive approach. The author in [32] has categorized the internal and external factors that obstruct the implementation of ICT in schools. In this regard, the authors in [33] describe an organization's internal obstructions as people-related barriers such as the roles of head-teachers and various teachers and their views and attitudes. On the other hand, external obstructions are external factors such as the lack of an ICT policy, the lack of ICT resources and the lack of technical support. All such factors stem from the actions of Saudi Arabia's Ministry of Education. The following paragraphs discuss how these barriers can have a negative impact on the implementation of ICT in Saudi Arabian secondary schools.

The author in [15] study findings showed that 39.8% of secondary school teachers regarded Saudi Arabia's education ICT policy as lacking sufficient explanation. In addition, the authors in [14, 16, 17] study findings highlight the need for the Saudi Arabian Government to develop and put it into practice an effective ICT strategy for the country's secondary schools.

The studies findings in [17, 34] show that the head-teacher plays a major role in the implementation of ICT in secondary schools. For example, if the head-teacher does not provide the teachers with adequate support and encouragement, be a good working classroom environment that motivates teachers

to make use of ICT tools. In addition, the authors in [35] confirm that, if head-teachers' and teachers' attitudes and beliefs do not support the implementation of ICT tools in the classroom; it is unlikely that the schools will accept ICT and implement it successfully.

Turning to the role of the teacher, several studies findings [15, 23, 36] show that teachers play a vital role in ensuring that ICT is implemented successfully. It is apparent that within education the integration of ICT is a highly comprehensive process that necessitates changes to be made to every level of the system. More particularly, as the providers of information and knowledge, teachers require to adhere to the new strategies in order to ensure the relevance of their contributions to the learning process. Otherwise, teacher resistance to change can become another barrier to making the best use of ICT in education. The teachers' reluctance or resistance to using ICT can result from several factors such as teacher competency, school digital infrastructure, technophobia and access to ICT tools. Consequently, teachers' reluctance can mean that they are unenthusiastic about using computers in their teaching practices and, thereby, they hinder the full-scale implementation of ICT in Saudi Arabian secondary schools [22]. Against this background, the beliefs and attitudes of individual teachers towards the successful implementation of ICT can have a significant influence on their performance in the classroom [22]. In addition, as stated by Al Asmari in [37], Saudi Arabian teachers suffer from insufficient time to prepare ICT materials for lessons. In other words, in order to integrate technologies successfully into the classroom, they must be given the necessary additional time so that they make appropriate use of ICT tools. Therefore, the Saudi Arabian Ministry of Education, ICT directors, head-teachers and teachers need to collaborate constantly if ICT is to be implemented successfully in secondary schools [37].

Bingimlas study findings in [22] highlight several obstructions that may limit the successful implementation of ICT in institutions of learning. These are, for example, the growing number of classroom students; insufficient amounts of ICT resources and technical support and maintenance; and the absence of incentives for teachers to use ICT tools in their classrooms.

The previous relevant literature highlights some of the barriers that may hinder the utilization of ICT within education. In addition, the literature reveals that there is a need to pay attention to certain factors if ICT is to be implemented successfully therein.

3. METHODOLOGY

This study uses the 'Onion Design' developed by Saunders et al in [38]. This design is divided into the following six parts:

- **Research philosophy**

This study seeks to understand the participants' perceptions of the research phenomenon and their answers to the research questions. Therefore, it complies with the interpretivism philosophy which places greater emphasis on the development of socially constructed knowledge [39].

- **Research approach**

Based on the research phenomenon, this study is predominantly exploratory research and, therefore, is somewhat explanatory and descriptive in nature. The combination of these three approaches has helped the researchers to explore not only the phenomenon but, also, to explain and describe why it occurs. For example, this study explores the factors required to implement ICT successfully in Saudi Arabian secondary schools. Accordingly, by focusing on descriptions of the problems (barriers) to ICT being implemented successfully in Saudi Arabian secondary schools, it aims to explain the dimensions of all the problems and their causes [38].

- **Methodological choice**

According to Saunders et al in [38], when choosing the research methods, the researcher should select either the 'Mono method' (single method) or 'Multiple methods' (more than one data collection technique and analysis procedure). Accordingly, the researchers selected qualitative analysis (single method) for this study.

- **Research strategies**

The research strategy is based on three conditions. The first condition requires the use of certain types of research questions such as "what" and "how". Many research strategies, relating to experiments, surveys, case studies, and archival analysis, have used this condition [40]. Therefore, in using case studies, this study's questions are:

- What factors lead to the more successful implementation of ICT within education?
- What are the obstacles that prevent the implementation of ICT?
- How can these obstacles be overcome?

- **Time horizons**

In terms of time horizons, research studies are either cross-sectional or longitudinal in design. A cross-sectional research study is one that investigates a phenomenon at a particular time whereas a longitudinal research study is one that investigates a change in development over time [38]. In this respect, the researchers found that, in this case, it was impossible to conduct a longitudinal study.

- **Interviews**

For example, interviews, observations and focus groups are

the most common data collection methods used in a qualitative research study to collect the participants' responses [12]. According to [41], a qualitative study often uses semi-structured interviews in order to generate positive results.

- **Sample**

For this study, the researchers used the 'purposive sampling technique' which is referred to often as 'judgment sampling'. The researchers chose the participants, who had various qualifications and experiences, to represent the current circumstances of the implementation of ICT tools in Saudi Arabian secondary schools. The researchers chose the interview questions and the facets and arranged them carefully in order to deal with the different aspects of this study [42]. Before conducting the interviews, the researchers tested the questions in order to review their relevance and quality, their length and to test the recording tools. It is recognized that testing the questions reduces interview bias and improves their quality before conducting the final interviews [42]. For the purpose of this study, the researchers triangulated theoretical methods, data collection, and analysis during the various stages of data collection, sampling, design, and data analysis. More specifically, the researchers triangulated the data collected from interviews with six head-teachers, six teachers, six ICT directors, and six end-user students of ICT tools. In addition, the researchers aimed to strengthen the reliability and validity of their findings from both the semi-structured interviews and reviewing the literature [43].

- **Data techniques and procedures**

For this study, the researchers used the constant comparative method that enabled the data to be broken down into discrete 'units' [44] or 'incidents' [45] and, then, coded into 'themes' and 'sub-themes' [46]. For more information about this method refer to [47].

4. FINDINGS AND DISCUSSION

In this section, the researchers present the results of the qualitative data and discuss them in parallel with the outcomes of the literature review. This section discusses, also, the internal and external factors that impact whether or not ICT is implemented successfully in Saudi Arabian secondary schools [48].

- **Lack of confidence (skills and knowledge)**

The Lack of confidence of teachers toward ICT implementation in the classes is considered a problem that inhibits ICT success in schools despite the presence of ICT resources, the fear of failure is the reason behind the lack of confidence [49]. Also, the lack of teachers' knowledge about ICT makes them aware of the use of ICT [50]. Most of the responded teachers were afraid of classroom entering without adequate ICT skills [51]. Limited technology experience hinders the confidence of teachers toward using ICT in the class [50, 52].

Nowadays, teachers explain their general reluctance to using ICT tools in classrooms by referring to their beliefs that their skills are poorer than their students' skills. Teachers' anxieties about their potential failures suggest that they are not fully convinced about the usefulness and effectiveness of ICT in education. In contrast, when the teachers are confident about using ICT, this supports and enhances their beliefs that ICT is making a positive contribution to teaching and individual development and that. in this respect, there is a need for future expansion [22]. In this regard, one of the respondents says;

"Most of the teachers don't prefer to integrate ICT in teaching because they are not able to use ICT devices".

Teachers' reluctance to using computers in classroom activities can be explained by a variety of other obstacles that include their competence, school digital infrastructure and access to ICT tools. Therefore, teachers, who lack ICT skills, are unenthusiastic about using computers in their teaching practices and integrating them into supplementary learning. Consequently, this creates a vicious cycle that precludes the full-scale successful implementation of ICT in Saudi Arabia's secondary schools [22].

Some studies show that the teachers' lack of confidence level differs from country to country as this obstacle in developing countries is remarkably high [53]. As an example, this barrier in Syria was mentioned as the main barrier by [54]. Also, in the kingdom of Saudi Arabia, the author in [33] mentioned it as a major barrier. The results of the study [20]that was conducted in Denmark indicated that teachers are avoiding ICT use in the classes because of the deficiency of the skills of ICT. Nevertheless, the lack of confidence was not a main barrier to ICT integration in the classrooms in the Netherlands.

- **School's culture (beliefs, attitudes, and views) towards ICT**

The results show that all participants held positive views and attitudes towards the successful implementation of ICT tools in Saudi Arabia's secondary schools and that, in this respect, this study encompasses most matters that can affect the implementation process. In this regard, the study findings in [55-57] indicate that the perspectives of the head-teachers and their staff are integral to ICT being implemented successfully in Saudi Arabian secondary schools. Therefore, it can be argued that their beliefs and attitudes are critical factors for ensuring the success of the ICT implementation process in their schools. Furthermore, in response to the negative results about the use of the Internet in schools, ICT directors, head-teachers and teachers have identified the need to improve student attitudes towards ICT as a learning tool and the use of the Internet for educational purposes. In this regard, one of the respondents says;

"Most of the teachers don't prefer to integrate ICT in teaching because they cannot ensure that all students are using the internet in the classroom safely".

With regard to secondary schools' use of the Internet, the results highlight that, due to their moral, cultural and religious beliefs, most head-teachers and teachers tend to restrict its use [58]. For example, the Saudi Arabian authorities have restricted access to over 2,000 sites containing pornography or information on faiths other than Islam [59]. Accordingly, other solutions have been suggested as alternatives to school restrictions on the use of the Internet. More particularly, this is because of the need to convince both teachers and students of the importance of using the Internet in the learning process. For example, the Virginia Department of Education [60], published guidelines for schools relating to the safe use of the Internet. Furthermore, the latest Internet security software must be installed on school computers in order to monitor and filter the students' use. However, in Saudi Arabia, as highlighted by Albugami [61] study findings, there is hope that, despite the initial resistance of religious organizations, education practices will make use of ICT when dealing with the issues that arise in these contemporary times. Therefore, head-teachers, who continue to hold conventional religious beliefs about the adverse effects of implementing ICT, should be made aware of the fact that their culture can modify technologies, like the Internet, and that its use can be changed to adhere to the controls and rules of local systems.

- **Lack of accessibility**

An insufficient amount of resources for ICT generates this barrier, especially if these resources are inaccessible in time to teachers and students. The study that was conducted by Sicilia [62]revealed that teachers made a complaint about the computers unavailability because of several classes in the same time and inability to work on computers because the other teachers were using them, inappropriate software, non-maintenance of ICT resources, and ICT resources' poor organization are some factors of inability to access these resources. In a study conducted by Al-Alwani [33], a shortage of pedagogical software and no access to the internet were obstacles in ICT use in schools of Saudi Arabia. In this regard, one of the respondents (teacher) says;

"Some teachers don't prefer to use ICT devices because sometimes due to internet or maintenance issues it wastes the class time"

- **School's staff's roles**

In mentioning the importance of the head-teacher's role, the majority of the participants emphasized the need for the head-teacher to facilitate the use of ICT tools. In addition, they pointed out the importance of both encouragement and support in instilling confidence about the changes. These results are consistent with those of some other studies. For example the in [56], 'The Elementary School Principal as a Change Facilitator in ICT Integration', Schiller refers to the head-teacher's functions of developing a supportive environment; arranging training; providing consultation; and promotion, monitoring, and evaluation. Therefore, at the school level, head-teachers should be regarded as the facilitators of the successful implementation of ICT

With regard to the role of ICT directors, head-teachers, teachers and students, their first responsibility is to ensure that ICT tools are used in classrooms. In this regard, it is of crucial importance that teachers are competent in using computers because their proper competence is likely to instill confidence and positive attitudes towards the change.

Teachers' resistance to accepting changes to their teaching practices is another barrier to their using ICT. There is a general recognition of the importance of teachers' beliefs about ICT-based learning since their perceptions can have either positive or negative effects on their classroom performance [22]. In this regard, one of the respondents says;

"Most of the teachers don't prefer any change in teaching methods, because they didn't receive special training on ICT use in the classroom and they have to develop themselves by training in private institutions".

- **ICT policy**

With regard to external factors, this study's findings show that the Saudi Arabian Government's educational policy lacks clarity and that there are inconsistencies between the stated responsibilities and what is said in the instructions. For, example, there is insufficient support from the Ministry of Education. In this regard, one of the respondents says;

"In our schools, we don't have adequate ICT supervision, support, and planning strategies, this will hinder teachers'efforts to use ICT in the teaching in the classrooms"

Furthermore, the head-teachers point out that, although the Ministry of Education emphasizes the use of ICT in secondary schools, it is not committed to providing enough ICT tools, proper infrastructure, and training for all members of staff. Accordingly, without a clear ICT policy, it is crucial that the Ministry of Education identifies the necessary tasks to implement ICT successfully in the country's secondary schools. Further studies have established, also, that, although there is a Saudi Arabian ICT educational policy, it is not well known and, consequently, it has not been implemented and reinforced at the classroom level. This finding is consistent with the studies' findings in [15, 63, 64]. These results are noteworthy because, if the head-teachers or teachers do not understand the ICT policy, they are unable to implement it at the classroom level. In support of these findings, Al- Habeeb in [65], stresses that the Saudi Arabian Government should review its educational ICT policy.

- **Lack of time**

In the Kingdom of Saudi Arabia, teachers stated that the 45 minutes class time is inadequate to use ICT, also, ICT tools use wastes time, furthermore, the classrooms are crowded and

teachers lose control of class usually while using ICT [66]. In this regard, one of the respondents (teacher) says;

"In the schools, the curricula should be reduced, and the time of the class must be extended so teachers will have enough time to use ICT tools in their classes"

Teachers have inadequate time for planning of courses. Because the time of teachers is firmly limited or fragmented with the number of classes, the teachers are incapable to develop new teaching methodologies and learn new skills [67].

- **Lack of ICT Training**

The Saudi Arabian Government is responsible, also, for the provision of enough ICT training to ensure that the teaching staffs can implement ICT successfully in the country's secondary schools. In this regard, one of the respondents (head-teacher) says;

"About 85% of the teachers in the schools are not able to use the ICT effectively, they need training courses or workshops to enhance their ability to use the ICT"

While the results show that teachers are interested in training, the training times are sometimes inconvenient. Most participants agree that, by only providing training outside of working hours and without any incentives, results in non-attendance. Similarly, studies of Western countries have identified that training time is a barrier [68-70] which has a negative effect on the implementation of ICT at the classroom level [22, 71].

In order to overcome the obstacles to implementing ICT successfully, it is important that, while ICT training should cover all facets, it should concentrate on fundamental proficiency training and the methods used to implement ICT in the teaching and learning processes [72, 73]. In this context, many solutions have been suggested to help teachers' requirements and to improve their experiences in using ICT tools. This study's findings show that in order to help them apply it effectively, there is a demand from teachers for regular ICT training.

- **Lack of technical support, maintenance, and resources**

The participants considered that one of the main barriers, which hindered the implementation of ICT tools, was the lack of ICT resources in Saudi Arabia's secondary schools. Therein, the lack of various ICT resources created a number of problems in schools. This finding of this study based on the respondents is consistent with the findings of the study in [12].

All the participants considered that the absence of maintenance and technical assistance was a hindrance and that their constant fears of technical breakdowns or failures had an adverse effect on their confidence. In this regard, Kozma [74] findings show that teachers have no interest in using ICT if they believe that they will face technical problems which will require a long time to fix [70]. The authors in [75] stress the significance of full-time technical support to aid the process of successful implementation of ICT.

- **Lack of financial resources and Infrastructure**

The results show the differences between schools in terms of their infrastructures. This situation arises from the types of buildings. While the government- built schools have good infrastructures and are better suited to facilitate ICT within them, rented buildings still suffer from poor infrastructures because these buildings were prepared initially as housing. The Saudi Arabian Government's planned solution to this problem was to dispense with rented buildings in 2015 [76]. In this regards, one of the respondents says:

"The Infrastructure of the Secondary schools must be built and prepared in advance to be ready for any Infrastructure development in the future".

Finally, the authors in [77] emphasize that, in many countries, the lack of financial resources is seen to be a significant barrier to the successful implementation of ICT. Moreover, several studies have confirmed that one of the main obstacles, faced by Saudi Arabian secondary schools, is the shortage of ICT infrastructures [12, 78, 79].

5. RECOMMENDATIONS

In order to solve the challenges of integrating ICT effectively in public schools, the following are the recommendations based on this study's findings:

- Developing countries' Governments must provide more funds for the sector of education.
- The reduction of infrastructure costs by adopting measures, for example using the hardware/software that are locally assembled instead of imported ones.
- Revising Education curricula and policy from time to time for meeting the present era demands.
- The programs of teacher training must rely on ICT integration in all subjects.
- Attitudes of teachers towards lack of confidence and ICT use could be decreased by professional development courses.
- Reducing the curricula and hiring more staff for all subjects to solve the problem of lack of time to use ICT.

6. CONCLUSION

This study's results show mixed feelings of both optimism and fear. Policymakers, ICT directors, school head-teachers, teachers and students need to overcome several barriers if ICT is to be implemented successfully in Saudi Arabian secondary schools. However, despite all the highlighted challenges, there is a general feeling that, while the current situation leaves much room for improvement, ICT has a positive role in Saudi Arabian secondary schools. Accordingly, this study concludes by listing the factors that are considered to hinder the successful implementation of ICT in Saudi Arabian secondary schools:

- There is no clear perception of the strategic plan and ICT policy;
- Lack of proper infrastructure and access to ICT resources;
- Lack of management roles;
- Lack of teachers' roles;
- Lack of opportunities for professional training /development for staff of schools
- Lack of technical support and maintenance; and
- Negative attitudes, beliefs, and behaviors towards ICT tools.
- Internet problems
- Lack of confidence (skills and knowledge)
- Lack of time
- Lack of accessibility

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