Barriers to using the Interactive Whiteboards in Tatweer Primary Schools in Saudi Arabia

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Abstract— **This paper is a part of a larger study aimed at identifying the problems that faced teachers, both males and females, in Tatweer primary schools in the city of Jeddah in Saudi Arabia when using the interactive whiteboards in classrooms. Mixed methods approach was employed in this study using, a questionnaire, classroom observations, and semi-structured interviews. 587 teachers (301 female and 286 male) completed a self-reporting questionnaire mainly designed for this study. Twenty teachers (10 female and ten male) were interviewed. Additionally, seven female teachers were observed teaching in their classrooms or in learning resources rooms. Both quantitative and qualitative findings indicated that the top three difficulties that face teachers (both males and females) in Tatweer primary schools when using IWBs are the lack of training courses, technical problems, and the lack of assistance and support. The bottom three barriers facing teachers in the sample in using these technologies were difficulties relating to student use, their location in the learning resources rooms, and challenges in integrating these technologies in teachers' lessons.**

Keywords— Interactive Whiteboards; Saudi teachers; Tatweer project; Difficulties in using IWBs.

I. INTRODUCTION

Although IWBs have several benefits for both the teaching process and student learning, some practical and educational obstacles have been acknowledged in the research. These obstacles relate to IWBs as technological tools and their users in classrooms, including both teachers and students ([38]; [43]).

The Saudi Education System is now measured as one of the most significant sectors in Saudi Arabia and has been identified as the main concern in the Saudi government's improvement policies [37]. This improvement reflects that the government of Saudi Arabia has made enormous efforts and expended a considerable amount of money to develop its educational system. The Saudi government has invested huge sums on ICT equipment and the computer learning of its residents [5]. This high investment led to the integration of many new technologies in the Saudi educational system. 25% of the overall Saudi budget in 2016 was spent on the education sector, with 23% of the Saudi budget allocated for education in 2017 [36]. These numbers give a clear picture about the strong focus of the Saudi government on the education sector and the implementation of ICTs in schools. However, technology has not been integrated effectively in Saudi schools, despite the prosperous economy of this country ([37]; [8]).

Therefore, projects have been constructed which demonstrate the effort of the Ministry of Education in Saudi Arabia, aiming to improve the education system and the use of technology. Tatweer project is a large-scale project established in Saudi Arabia, started in 2007 and aimed to develop the quality of education in all public schools to achieve the necessities of the 21st century [44]. The learning environment in classrooms was improved by introducing modern technologies such as the Interactive White Boards (IWBs), demonstrating technologies, communications systems, and web services.

There are several studies that investigate the use of ICTs in general in Saudi Arabia ((([2]; [37]; ([10]; ([9]; ([12]; [23]). However, few studies have been conducted in Saudi Arabia, mainly focusing on the IWBs. All these studies focused only on investigating teachers' use or their attitudes towards using IWBs in Saudi classrooms. However, only two similar small-scale studies [3] and [20] examined the difficulties that face English teachers relating to IWBs. Moreover, as the educational system in the context of Saudi Arabia is based on single-sex schools, all the studies that were conducted in this context regarding the use of IWBs had single gender participants. Thus, there is a lack of studies that focused on examining the obstacles that faced teachers both males and females when using IWBs in a large-scale project (Tatweer project). Consequently, this study aims to investigate the difficulties and challenges that faced teachers (both males and females) in Tatweer primary schools in Saudi Arabia when using IWBs.

II. LITERATURE REVIEW

Technology is susceptible to weaknesses and faults, and this is true of IWBs, which experience some shortages and technical problems that lead to a decrease in their potential in education settings. Therefore, there are some faults and technical issues which have been distinguished by either students or their teachers. The greatest common issue is related to the software used to operate IWBs, electricity supply, and the hardware used in these technologies ([47]; [6]). Other technical problems have been investigated in a small-scale study [34], which focused on the introduction of IWBs in two secondary schools in Sheffield. The problems that had occurred before or during lessons included problems in the association between some parts of the smart boards, a delay in reaching the IWB software, unresponsive images, and technical issues relating to digital pens. Indeed, teachers usually have difficulties dealing with IWB technical problems when they occur [40].

Moreover, IWBs are considered costly compared with other display technologies [27]. Therefore, the cost of these technologies might play a major role in reducing their existence

in schools. According to [40], cost restrictions are considered one of the reasons for the limited use of IWBs in classrooms.

IWBs may have a significant role in inspiring and attracting students in classrooms. However, these technologies may also have some difficulties that could destructively affect their learning. The size of the IWB is one such problem that may have a negative impact on students because of the inability of some students, particularly those who have a seat at the back, to see the screen because of the small size of these technologies [25]. Moreover, young and short students may have difficulties reaching high-level icons on the top of the board ([16]; [41]). Indeed, this issue could affect educators as well. According to [24], students showed no tendency toward IWB technology because of mechanical problems, the difficulty to watch what is presented on it while they are sitting far away from it, and the limited teachers' skills.

Importantly, students in IWB classrooms may focus on and view this technology as a technical tool instead of concentrating on what is being taught by their educators ([39]; [40]). However, this adverse effect usually exists only at the start of using IWBs in classrooms, when students are unaccustomed to using new technologies [45]. This difficulty seems to be overcome when students become familiar with the technology, once they use it more repeatedly in their various classroom activities, such as doing presentations and playing games through IWBs (ibid.). In time, students consider IWB technology as a regular educational tool in classrooms.

Moreover, there are some difficulties relating to the effectiveness of educators' use of IWBs in classrooms. An essential problem is their lack of availability and training ([3];[6];[11];[14];[20];[30];[37];[41];[43]).Technical problems, lack of technical support, and lack of knowledge and training were also huge obstacles faced by teachers in Slovenia in a study conducted by [43]. Educators usually have limited skills to solve IWB technical problems [40]. Thus, when technical difficulties occur, teachers become more likely to use traditional methods to introduce their content ([15]; [18]). Therefore, they need consistent training on both technical and pedagogical abilities to be more capable when they use IWBs in classrooms ([16]; [27]; [46]).

Additionally, the insufficiency of educational software linked to the curriculum was also a significant concern among teachers in a case study conducted by [42], to examine the new inclination of IWB's investment in primary and secondary schools in Turkey. In this study, the quantity and quality of the educational resources were the second concern among teachers that could decrease their chances of using this technology. Teachers' concerns usually focus on the deficiency of instructive software, and therefore they need such resources [22]. Similarly, digital learning resource shortages, as well as the time invested in organizing lessons, were the main problems named by educators in a pilot project conducted by [35]. Indeed, this lack of suitable digital educational resources may cause failures regarding introducing the content [47] and resistance from educators who use technology [21]. Therefore, these resources are crucial for both teachers and students, and producing these educational resources may ensure that teachers

will improve their effectiveness in using IWBs [16]. Correspondingly, particular teaching skills and educational resources are important requirements for effective use of IWBs in classrooms [33].

Moreover, educators also have other reasons that prevent them from using IWBs such as the lack of availability of installed IWBs in all classrooms ([11];[13];[35]; [40]; [43]) and the fact that teachers do not have enough time to design pedagogical lessons using IWBs ([26];[43]). A study was carried out by [21] to investigate the use of IWBs by 35 primary teachers and their views of the benefits and problems of this technology. Data were collected using a questionnaire, observations, and interviews. The lack of time for designing lessons and unavailability of a technical consultant were the major difficulties that teachers encountered in this study. Similarly, a lack of technical support was also indicated by the teachers in a study conducted by [37] to investigate the use of ICTs in Saudi secondary schools, in Riyadh City, in Saudi Arabia.

A study conducted by [31] investigated teachers' concerns regarding the use of technology in their teaching; it reported that time and syllabuses were the greatest difficulties that kept them from using technology daily. A study conducted by [32] indicated that teachers in Bangladesh have busy schedules; therefore, they had a lack of time to prepare technology resources and integrate them into their teaching or to attend training courses. Similarly, the lack of time was also reported in several studies as one of the main restrictions to integrate technologies into the teaching and learning processes ([1]; [29]).

Similarly, time issues have also been confirmed by several Saudi research studies ([2]; [37]; [4]; [8]; [3]). For example, a study was conducted by [4] to investigate the issues facing the employment of computers in teaching English as a Foreign Language (EFL) in secondary schools in Al-Qaseem in Saudi Arabia. He stated that educators' resistance to the use of ICTs and providing virtual learning in Saudi Arabian schools was linked to the inflexible and overcrowded curriculum, as well as insufficient teacher training programs. Moreover, more than 42% of teachers in a study conducted by [3] reported that they had long schedules that affect their use of IWBs. Similarly, time restrictions were one of the main challenges that affect teachers' usage of ICTs in a study carried out by [37]. In a study conducted by [2], teachers indicated that they had a heavy workload and were required to do other tasks besides teaching, which left no time for them to improve the integration of technology into their teaching.

Furthermore, teachers encountered some difficulties in integrating IWBs in their current teaching methods in a study conducted by [38], to investigate the use of multimedia for teaching the English language in a classroom supported by interactive whiteboard technology. Therefore, when teachers face these problems, they may reject using IWBs. The lack of teachers' skills and the difficulty of integrating IWBs in the teaching were also found in several Saudi studies ([3]; [11]; [14]; [20]; [23]; [30]).

Importantly, the location of IWBs' installation is considered essential for successful use. It is essential to install resources in the appropriate place, and therefore IWBs should not be

installed in a computer room. If they are inside classrooms, they can then be used as a tool for simplifying curriculum learning as teachers can make full use of them [28]. Moreover, IWBs should be located in an appropriate place in the classroom to enable visualization for the whole class [21]. However, the installing of IWBs should not eliminate the importance of the presence of traditional whiteboards in classrooms. Indeed, providing traditional boards in classrooms that have IWBs may also be important in case of technical problems, as well as to write some important concepts or ideas which can remain on display throughout the lesson period [19]. Thus, school administrators should provide both types of board in each classroom to give teachers a variety of possible options that fit with the content of their lessons.

III. METHODOLOGY

A. The Sample

587 teachers from Tatweer primary schools (301 female and 286 male) participated in the first stage of this study and completed a self-reporting questionnaire mainly designed for this study and also based on the literatures. In the second stage, twenty teachers (10 female and ten male) were interviewed, and of these seven female teachers were also observed teaching in their classrooms or in learning resources rooms.

B. Data collection and Analysis

The mixed methods approach was employed in this study, mainly used a sequential explanatory strategy [17]. A questionnaire was employed in the first stage of data collection, followed by the qualitative methods (classroom observations and semi-structured interviews) in the second stage. The Statistical Package for Social Sciences (SPSS v 21) was used to analyze the quantitative data; whereas thematic analyze was used with the qualitative findings.

C. Validity and Reliability

All the three instruments were piloted first before conducting the formal study with 15 teachers, who were studying Ph.D. program, in the field of educational technology, in the UK. Regarding the questionnaire, both face-validity and content-validity were tested and, therefore, some useful changes were made. Moreover, the internal reliability of the questionnaire was examined using Cronbach's alpha (α= 0.876), which indicating an acceptable level of reliability.

IV. FINDINGS

A. The Quantitative Findings

Fig. 1 shows the difficulties and challenges that face primary school teachers in Tatweer project when using IWBs. Most educators (54%) selected the option of "*Lack of training courses*" as the greatest challenge for them in using IWBs, followed by the option "*Technical problems when using IWBs*", which was chosen by 52% of participants. However, 48% of teachers chose the "*Lack of assistance and support*" option as a serious problem faced when using IWBs in classrooms. 34% of teachers also chose the option of "*Lack of educational resources*". Moreover, 28% of educators revealed that they did not have enough time to design educational resources. More than a quarter of respondents to this questionnaire (27%) indicated that they did not have IWBs in their classrooms. In contrast, "*students find difficulties with IWBs*", "*location of IWBs*", and "*difficulties in integrating

IWBs in teaching lessons*" were classified as the bottom three barriers faced by teachers in the sample when using IWBs.
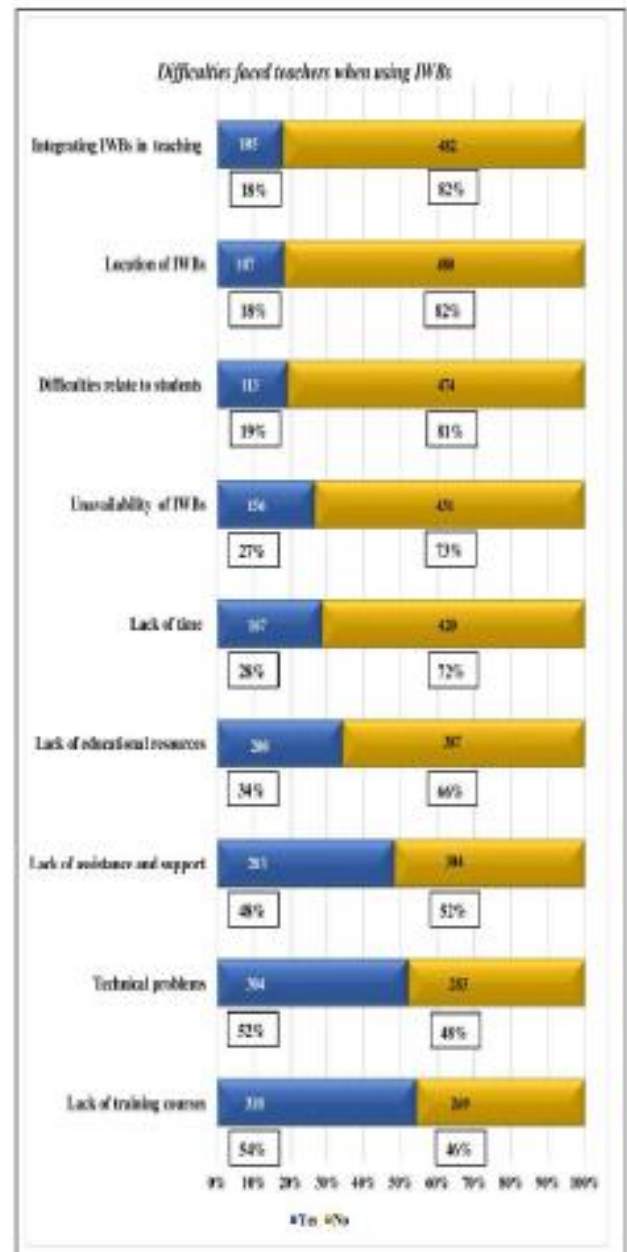

Fig.1. Difficulties that faced teachers when using IWBs

B. The Qualititaive Findings

During the seven observed lessons, the location of IWBs in the resources rooms and the lack of assistance and support were noted four times. This was followed by technical problems, insufficient skills, and difficulties in integrating IWBs in teaching lessons where each of them was ranked three times. Only one teacher, who had high workload (20 classes per week), reported a lack of time as a difficulty that faced her. Moreover, the absence of educational resources was only reported by two teachers. Students found difficulties in managing the colouring pens in two observed lessons.

Moreover, the twenty interviewees reported five types of problems when using IWBs in their lessons. The majority of them reported that the lack of training courses is the major problem that negatively affected their use of IWBs, followed by technical problems when using IWBs, and then the lack of assistance and support. The lack of time for designing educational resources and the location of IWBs were indicated by only one or two teachers.

V.   DISCUSSION

According to the quantitative findings of this study (see Fig. 1), the top three difficulties faced teachers in *Tatweer* primary schools when using IWBs were "*Lack of training courses*" selected by most educators (54%), then "*Technical problems when using IWBs*", chosen by 52% of the teachers, and "*Lack of assistance and support*", selected by 48% of teachers. These three difficulties were also reported by the interviewees as their major problems when using IWBs. The majority of the respondents (nine teachers) indicated that the lack of training was the major issue that affected their use of IWBs negatively. For example, one male teacher said, *"I did not have any training courses; therefore, I think this is the biggest problem for me"*. Similarly, another female teacher indicated, *"The lack of training courses that clarify the use of IWBs in effective ways is the most major problems that faces me."*

Technical difficulties when using IWBs were also mentioned by eight teachers. For instance, one female teacher said, *"There are some faults in the program itself; sometimes it cancels some of the features without any reason known to us."* Similarly, a male teacher said, *"I find difficulties when technical problems happen, such as power failure or computer malfunction."*

The lack of assistance and support was reported by seven teachers, as a male teacher said, *"I think that the lack of assistance is the most important issue that should be offered in all schools with IWBs."*

A female teacher, moreover, reflected that she suffered from a lack of assistance and support in her school as she reported,

> *The lack of assistance and support is also considered a problem for teachers; therefore, when I face any problem I usually search the Internet or call some private professionals, which is considered time-consuming.*

Indeed, these major problems have also been identified in several research studies. For example, a study was conducted by [3] to investigate the difficulties that face English teachers during their use of IWBs in Jeddah. The lack of training courses, technical problems, and lack of assistance and support were reported by teachers in this study. Approximately half of the teachers faced difficulties in managing IWBs. Moreover, all teachers indicated that they had a lack of knowledge about fixing IWB problems. Similarly, technical problems, lack of technical support, and lack of knowledge and training were also huge obstacles faced by teachers in Slovenia in a study conducted by [43]. The teachers in a study carried out by [21], to investigate the use of IWBs by 35 primary teachers and

their views about benefits and limitations of this technology, criticized the lack of a technical consultant to provide them with immediate instructions when technical difficulties occur.

Moreover, the lack of sufficient training in using IWBs was also reported in several Saudi studies ([11]; [14]; [20]; [30]). For instance, the lack of training courses was one of the major difficulties facing Saudi female educators, who teach English in secondary schools in the city of Riyadh, when using IWBs in a recent study carried out by [20]. Similarly, the lack of suitable professional development and training courses in using computers in teaching was an important difficulty reported by 79% of teachers in a study conducted by [7]. It identified the difficulties of using a computer and the internet by mathematics teachers in the intermediate boys' schools in Al-Taif city in Saudi Arabia. Furthermore, lack of training and technical support were also indicated by the teachers in a study conducted by [37], to investigate the use of ICTs in Saudi secondary schools, in Riyadh, Saudi Arabia.

According to the quantitative findings in the current study, 34% of teachers chose the option of "*Lack of educational resources*" as a difficulty (see Fig.1). Similarly, this finding was confirmed by extracts of the interviews indicated by some observed teachers. An observed female teacher said, *"Actually, I need a variety of educational resources specific for mathematics lessons to introduce more interesting lessons to my students"*. In the same vein, another teacher indicated, *"I have not found useful educational resources for this lesson, and I wish the educational department would provide us with such resources"*. This difficulty was also identified by Saudi male teachers, in a study carried out by [3], who revealed that the interactive learning materials provided by school's administrations were inadequate. Similarly, the responses of Saudi female teachers in a study conducted by [20] indicated that the lack of the applicable curriculum content was one of the obstacles encountered by them when using IWBs. Similarly, the shortage of digital learning resources, as well as the invested time in organizing lessons, were the main problems indicated by teachers in a pilot project conducted by [35]. Moreover, the lack of digital educational resources was also a significant finding reported by teachers in a case study conducted by [42] to examine the new inclination of IWB's investment in primary and secondary schools in Turkey. [22] state that teachers' concerns usually focus on the deficiency of instructive software, and therefore they need such resources.

Furthermore, 28% of the respondents to the questionnaire in this study revealed that they did not have enough time to design educational resources (see Fig.1), possibly because of their high workload of more than 20 classes per week. This quantitative finding was also qualitatively supported by the interviews and classroom observations. The lack of time for designing educational resources was reported by an observed female teacher (who teaches Mathematics) as a problem that faced her when using the IWB. She said, *"The lack of time for designing educational resources is another problem that affects me when applying the IWB in my lessons"*. Similarly, another male teacher (who also teaches Mathematics) indicated that he had an overlong curriculum to cover in a specific time. As he said in the following extract,

I like to attend training courses. However, most training sessions were not related to the use of IWBs and, most importantly, the time of these courses was not suitable for me as a math teacher with a huge curriculum that I have a specific time to finish.

Similarly, another male teacher (who teaches Islamic sciences) reported that he had long teaching schedules that limited his chances to train, and he suggested reducing his classes per week as he stated,

I have 24 classes per week, and that could affect my ability to develop my IWB skills. Therefore, I suggest reducing the teachers' workload to provide more time for teachers to train.

The lack of time for designing pedagogical lessons using IWBs was also reported in several studies and reviews ([21]; [26]; [43]). Similarly, the lack of time was also reported in several studies as one of the main restrictions to integrate technologies into the teaching and learning processes ([1]; [29]; [32]).

Class time and the content of the curriculum are examples of obstacles that prevent educators from using technology regularly. In a study conducted by [31], teachers reported that time and syllabuses are the greatest difficulties that keep them from using technology daily. Moreover, the lack of time and teachers' long schedules were also confirmed by several Saudi research studies ([2]; [3]; [4]; [8]; [37]).

More than a quarter of respondents to the questionnaire (27%) indicated that they did not have IWBs in their classrooms (see Fig.1). This was confirmed in the qualitative findings, as 15 teachers from the twenty interviewees indicated that they had IWBs in their classrooms, while a quarter of the respondents (five female teachers) reported that they had IWBs in learning resources rooms. The unavailability of installed IWBs in all classrooms has also been reported in several studies ([11]; [13]; [35]; [40]; [43]).

Moreover, the quantitative findings of the current study showed that the bottom three barriers faced teachers in the sample in using IWBs were "*students find difficulties with IWBs*","*location of IWBs*", and "*difficulties in integrating IWBs in teaching lessons*" (see Fig.1). These findings were also confirmed through either classroom observations or interviews. While observing the seven female teachers in this study, students found difficulties in managing the coloured pens in the two observed lessons, whereas students did not use the board in three observed lessons.

In the current study, the location of IWBs in the learning resources room was observed in four lessons. However, some teachers did not consider this a major problem that prevented them from daily use, because they had three learning resources rooms in their schools and each was provided with an IWB. In contrast to some teachers, who had only one learning resources room in their school with one IWB, therefore, the location of this technology in the learning resources room was considered

a significant problem for them. One female teacher confirmed this when she said,

The most common problem I encounter is the location of the IWB in the resources room, and all the teachers have a specific schedule for using it. Thus, I do not use this technology daily; I only use it in some lessons.

This difficulty was also reported in an earlier study conducted by the researcher of the current study [11], where the frequent use of IWBs in classrooms was extremely connected with IWB location, whether in classrooms or the learning resources rooms. Indeed, installing resources in the appropriate place is considered an essential factor for successful use. Therefore, IWBs should be fitted inside classrooms [28] and, moreover, they should be located in an appropriate place in the classroom to enable viewing for the whole class [21].

Moreover, in the current study, three observed female teachers appeared to have difficulty integrating IWBs in their lessons and showed a lack of skills in using IWBs. This was also confirmed during the interviews, as a female teacher stated,

I need training in how to use IWB features, integrate this technology into my lessons, fix the core problems, and design active lessons because I have difficulties to find educational resources on some topics in my content.

Similarly, a male interviewee said,

I still have limited knowledge in how to integrate this technology effectively in my lessons; therefore, I need more training regarding this technology.

These findings relating to the lack of teachers' skills and the difficulty of integrating IWBs in the teaching were also found in several Saudi studies ([3]; [11]; [14]; [20]; [23]; [30]). Similarly, teachers encountered difficulties in integrating IWBs in their current teaching methods in a study conducted by [38].

VI. CONCLUSION

The findings of this study (both quantitative and qualitative) indicated that the top three difficulties that face teachers (both males and females) in *Tatweer* primary schools when using IWBs are the lack of training courses, technical problems, and the lack of assistance and support. The bottom three barriers facing teachers in the sample in using IWBs were difficulties relating to student use of IWBs, the location of IWBs in the learning resources rooms, and challenges in integrating IWBs in teachers' lessons.

Moreover, the lack of educational resources; lack of time, and unavailability of IWBs in classrooms are also difficulties that were indicated through the questionnaire and interviews. Other difficulties were observed in this study during classroom observations, such as managing the colouring pens, the location of IWBs in the learning resources rooms, difficulty in integrating IWBs in lessons, and the lack of teachers' skills when using IWBs. Thus, identifying these fundamental

obstacles encountered by primary teachers in *Tatweer* schools is considered the first step towards finding solutions to these problems. Therefore, educators should be provided with opportunities to upgrade their skills and knowledge by introducing effective training to tackle these obstacles and reduce their effects.

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