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**COLLEGE OF EDUCATION AND BEHAVIORAL STUDIES
DEPARTMENT OF EDUCATIONAL PLANNING AND
MANAGEMENT**

**Teachers' Practices and Challenges in the Use of Interactive White
Board at the Diamond Academy Primary School**

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in Partial Fulfillment of the Requirements for the Degree of Masters in
Educational Planning and Management**

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Abstract

The main objective of this study was to investigate teachers practices and challenges in the Use of Interactive White Board in the case of Diamond Academy a school located in Yeka sub-city, Addis Ababa. To achieve this objective the researcher used, both quantitative and qualitative research (mixed research) method. The targeted population was purposively selected, 75 teachers and 2 school directors of Diamond Academy. Data was collected using questionnaire interview and observation. The quantitative data was analyzed using statistical package for social sciences (SPSS) while the qualitative data were analyzed in a narrative way. The study findings revealed that the factors that hinder teachers from using the interactive white board are, lack of technical support for teachers and absence of trainings from experts in using interactive white boards and also teachers lack of confidence, negative attitudes towards the IWB, time constraint, work load to prepare lessons coinciding with the IWB, lack of skill, lack of preparation were identified as challenges to use the IWB to bring the intended positive outcomes on students with the aid of the interactivity nature of the IWB. The results of this research suggest the school needs to provide technical support for teachers and increase the number of technicians. Applied pedagogical trainings from experts in using interactive white boards should be provided for teachers. School leaders should include digital tool use in teachers CPD programs.

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CHAPTER ONE

1. Introduction

This chapter presents the general framework of the study that encompasses background of the study, statement of the problem, objective of the study, significance of the study, delimitation of the study, limitation of the study, operational definition of key terms and organization of the study.

1.1 Background of the Study

It is certainly true that Educational Technology has greatly changed education. It has morphed how teachers teach and how learners learn. These changes do not change the fundamental learning approaches, but they have changed the way people do things and how they see them. Educational Technology refers to hardware and software, which are being used in educational setting to enhance the teaching and learning environment. Interactive Whiteboard (IWB) is one of the technologies that transform classroom activities and teachers' role. By finger-touch, a user can write, draw, drag an object, manipulate a text or shape something. It is true that IWB is a teaching tool and learning resource at the same time. A teacher can bring the outside world inside the classroom through the Internet (Walker 2002).

Interactive White Board plays a vital role in teaching and learning process and have proved to have several inherent advantages when well utilized (Grabe and Grabe 1998).IWBs helps to provide students with the necessary experiences, concrete or simulated and integrate prior experiences as well (Dale1969).Hence, a student who has an advantage of reacting to well-selected instructional technologies can learn more effectively than those who are provided largely through verbal information. IWBs provided a unique dynamic to classrooms by incorporating the power of computer technology with the indispensability of traditional blackboards. There are many studies in the literature demonstrating that this mixed technology contributes to academic achievement and that this contribution can be further enhanced (Levy, 2002; Geer & Barnes, 2007; Kennewell& Beauchamp 2007; Lewin, Somekh& Steadman, 2008; Wood &Ashfield 2008; Sunkur, Arabaci&Sanli, 2012). These contributions come in the form of enabling student interaction, having positive motivational effects on students, diversifying

instructional materials teachers can use, placing teachers to a more effective position, helping students in reifying the topics in their minds by supporting imagination, rendering lessons more interesting and enabling saving the lessons on the board (Wall, Higgins & Smith, 2005; Geer & Barnes, 2007; Tataroglu&Erduran, 2010; Adiguzel, Gurbulak& Saricayir,2011.).The teachers, who undertake the tasks of thoroughly planning, implementing and reviewing processes of teaching -learning and putting in effort for developing each and every phase of these (Levy, 2002), also have an important role in enabling these technologies to contribute to the process.

Technological tools available to teachers grow every year (Lenhart, Madden, &Hitlin, 2005).Educators do this partly because they are aware that today's students are growing up as part of a global society that is connected by computers and the Internet. This new and rapidly changing environment has the potential of giving students the opportunity to develop their information gathering and analyzing skills, work collaboratively, share and publish their ideas, and most importantly, learn from one another. Interactive white boards afford educators opportunities, but unless properly implemented, these tools will do little to change the way we teach and learn (Cuban, 2001).

In Ethiopia, schools need an increasing pressure to use instructional technologies in imparting knowledge and skills needed in the 21st century. Previous research has shown that the main reasons for the limited use of all the features of the IWB for the teacher are like using technology, time and money (Bidaki&Mobasheri, 2013; Kennisnet, 2008). Prior research also found that these barriers are most crucial for the integration of ICT in education. When there is no internet or an IWB that is not working properly the teacher cannot work with ICT. However, when these barriers are resolved there are still some other barriers of importance for the right use of ICT, including the IWB. Those are when it comes to the use of the IWB, like knowledge, attitude and beliefs (Bidaki&Mobasheri, 2013; Turel& Johnson, 2012; Kennisnet, 2010a; Bingimlas, 2009).

According to the literature about these barriers and IWB use, teachers need to have a positive attitude towards the IWB, have the appropriate technical knowledge and skills, and need to combine them with the appropriate content and pedagogical knowledge to be able to use the IWB in a good manner (Beauchamp &Kennewell, 2013; Kennisnet, 2013; Sweeney, 2013; van Laer, Beauchamp &Colpaert, 2012; Kennisnet, 2010a).

In consideration of these basic premises although smart board technologies are installed in each classrooms of Diamond Academy elementary school ,and there is also an internet access provided for the teachers in each department, to what extent these Interactive White boards are used to support the teaching learning process and what factors hinders teachers to achieve the intended positive outcome on the students despite the fact that the necessary installations are available in the classrooms they attend to.

1.2 Statement of the Problem

The IWB can enrich classroom instruction, for example by supporting the instruction of the teacher with images, sounds, and videos and let the teacher save digital lessons (Kennisnet, 2011). The added value of the IWB for education is: (a) more vivid presentations, (b) clear organization of resources, (c) motivated pupils, (d) more interaction, (e) more insight in the learning process with voting machines, and (f) more collaborative learning (Kennisnet, 2010a).

However, the added value can only be achieved when teachers use the IWB the right way, and research states that this is often not the case (Beauchamp & Kennewell, 2013; Bidaki & Mobasher, 2013). To achieve a positive influence on students' learning process and achievements with the help of the IWB, an interactive school culture is needed (Digregorio & Sobel-Lojeski, 2010). Teachers have to stop seeing the IWB as a set of tools which substitutes or supplements traditional teaching resources and start seeing the IWB as an aid to orchestration of the classroom. This means that the teacher has to arrange, organize or build features of the classroom (including the resources on the IWB) in such a way that they are appropriate for their pupils' characteristics, just like with other teaching materials. And the teacher continuously manipulates features of the classroom in response to students' actions (Beauchamp & Kennewell, 2013).

As the researcher experienced working the same school under study for four years and observed teachers lack in contributing to the preparation of students to participate in global setting through technology integrated instruction by using IWBs in their lessons as they teach their students and also the deficit in studies pertaining to teachers practices of IWB use and identifying the challenges triggered the researcher to do the study in this area.

So this study aims to investigate if the Interactive white boards in Diamond academy are used in a way that interacts or engages students to achieve the intended outcome. Investigating teachers' practical experience of using the interactive whiteboard, type of professional training teachers have, the type of technical support teachers have. Moreover, how technical support facilitated the use of the Smart Board inside the classrooms, teachers and students interaction in using the IWBs and if the use of the interactive whiteboard engaged, motivated students, enriched their learning may help identify what factors hinders teachers from using IWBS to bring about the intended outcome. So this study aims to investigate teachers' practices and Challenges in the use of Interactive White Board in the Case of Diamond Academy, Addis Ababa, a school located in Yeka sub city.

1.3. Research questions

1. What are the practices of primary teachers of Diamond Academy utilization of the available interactive white board technology?
2. What type of professional training do teachers have in using the IWB?
3. What type of technical support do teachers have?
4. What problems do teachers face when they use the IWB?

1.4. Objective

1.4.1 General objective

The overall objective of this research is to investigate Teachers practice and challenges of using the interactive white boards in class rooms.

1.4.2. Specific objectives

1. To investigate the available practices of using Interactive white board.
2. To explore the type of professional training teachers have in using the IWB.
3. To identify the type of technical support teachers have.
4. To identify the problems teachers face when they use the IWBs.

1.5 Significance of the Study

This research study is an attempt to gain better understanding and the findings hopefully

- ✚ help the school teachers to seek to understand technology and the important role of Ict skills that helps use the IWBs effectively for education.
- ✚ help teachers to find solutions for the difficulties they face in using IWBs.
- ✚ help teachers and school directors find relevant points to their decision in bringing classroom IWBs in to effective use of it to engage their students and also help teachers use their full potential to integrate the technology in their classroom.
- ✚ Stimulate further research in the area of education involving the use of IWBs. Further, the study will provide information on the extent to which the use of IWBs prepares both teachers and students for the world of technology.

1.6 Limitations

One of the limitations I faced was the lack of literature available by Local researchers. IWBs use is relatively in its infant stage in Ethiopia's schools so the study incorporated only one school. Besides, the sample size of the study was limited to only 75 teachers who were teaching in the sample school for the purpose of this research. As a result, the findings of the study may not be sufficient to make generalization at the country level. It would be better and more effective if much number of schools and participants were to be included in the study to gather adequate information to make sound generalization.

1.7 Delimitation of the Study

This research is specific to primary school teachers in Diamond Academy, Addis Ababa, Yeka Sub city, to investigate the practice and challenges of teachers in using the interactive white board in their class room. The School includes elementary and secondary schools. But the primary school is selected with purposive sampling. Among the very few primary schools in Ethiopia with Interactive Whiteboards this school is selected because all of its primary classes have interactive white boards and all subject teachers are using it. This study is specific to IWBs and doesnot address other technology tools.

1.8. Organization of the study

This study is organized into five chapters. The first chapter deals with background of the study, statement of the problem with its basic questions, objectives, significance, limitation and

delimitations of the study. The second chapter presents review of related literature. The third chapter presents research design and methodology including the sources of data, the study population, sample size and sampling technique, instrument of data collection, and method of data analysis. The fourth chapter deals with data presentations, analysis and interpretation. The fifth chapter presents the summary, conclusions and recommendations of the study.

1.9. Operational definition of terms

Interactive whiteboard (IWB) is a large display board that connects to a computer and/or projector. The computer's screen is projected onto the board and users control the computer using a pen, finger, stylus, or other device from the board. The IWB is typically mounted to a wall or floor stand. Promethean and Smart Board are brands of IWB that are sometimes referred to in the literature. A Promethean IWB is utilized in this study.

21st Century Learning Skills: A set of skills that are needed to compete on a global level and be able to successfully work in the 21st century; the skills include critical thinking and problem solving; communication; collaboration; creativity and innovation; information, media, and technology skills; life and career skills; initiative and self-directions; social and cross-cultural skills; productivity and accountability; and leadership and responsibility (Partnership for 21st Century Skills, 2009).

Active Classroom: The result of the implementation of the Active Board. It creates a connective educational environment where educators engage and empower students to create a new world of learning for students (Marzano, 2009a).

Pedagogy: Methods and practices of teaching (Pierson, 2001; Prensky, 2005b). It is the art, science, or profession of teaching. Pedagogy refers to the way of teaching students, whether it is the theory or practice of educating. It is a relationship between the culture and techniques of learning. The main aim of pedagogy is to build on previous learning of the students and work on the development of skills and attitudes of the learners. Pedagogy enables the students to get a thorough understanding of the subject and helps them in applying those learnings in their daily lives outside of the classroom.

CHAPTER TWO

REVIEW LITERATURE

2. Introduction

This chapter provides the literature review of the relevant sources on IWB. In particular, role of the teacher in using the IWB, benefits of using the IWB, the importance of professional development, the use of technical support and the challenges in using the IWB are taken into account.

2.1 Smart boards

Over the past several decades, technology has come to play an important role in many areas of education. One of the technological tools is smart board which is also named as Interactive Whiteboard (IWB) and it can be defined as a new generation board that has been regarded as a helpful technology that enhances students' learning and motivation, and facilitates instruction for teachers (Türel&Demirli, 2011). By virtue of the supported features of IWB software, IWBs allow users to design and use their own course materials in any file format such as IWB software files, PowerPoint presentations, and Flash animations.

By touching on the board with a finger or an IWB stylus, teachers and/or students can control any application running on the computer. Thus, users can manipulate and interact with the course content on the computer from the board by making use of various facilities including highlighting, annotating, drag-and-drop activities, screen shade, zooming, screen-sharing over the Internet, and connection to web-based applications (Türel&Demirli, 2010). Due to the use of different terminology for the same device, in this article, the terms smart board and interactive white board (IWB) are used interchangeably in this paper.

2.1.1 Interactive White Board as a Teaching Tool

Teachers could implement interactive whiteboards for various reasons. These include retaining learners' attention, clarifying complex ideas, simplifying teaching process, and enhancing learners' interaction (Jang & Tsai, 2012). Teachers may employ IWB to present magnificent

interactive multimedia in their teaching classes, utilizing various kinds of digital material with the touch of a finger (Isman et al., 2012). Higgins (2006) implied that the use of IWBs could encourage instruction, describing the boards as “pedagogical tools for the advancement of interactive instruction for the entire class”.

Similarly, Wallace (2007) suggested that IWBs allow more meaningful contact between learners and the content through simulation activities that are displayed in an accessible manner. The use of these boards may add a type of “theatrical tension” in the classroom, thereby creating a more attractive learning environment. When used properly as a presentation tool, the IWB suggests a dynamic, varied, multi-faceted and expressive type of instruction (Glover & Miller, 2001). Previous research conveyed that the IWB could provide some recognizable assistance to learner’s productive communication and thinking (Kershner, Mercer, Warwick, & Kleine, 2010). Via the use of IWBs, teachers can improve interactivity in the classroom since the touch screen feature permits learners to interact directly with teaching activities and tasks (Baran, 2010; Celik, 2012). IWBs can enhance the delivery of presentation as well (Shelly & Vermaat, 2010). The integration of interactive whiteboards in educational settings has shown that this technology can enhance learners’ motivation and performance (Syh-Jong, 2010).

2.1.2 Added value

According to Kennisnet (2010a) the added value of the IWB is: more vivid presentations, clear organization of resources, motivated pupils, more interaction, more visible learning with voting machines, and more collaborative learning. This corresponds to the four main characteristics of a powerful learning environment for optimizing learning in the classroom (Smeets, 2005). This powerful learning environment consists of (1) rich contexts and tasks that are as authentic as possible, and are provided to present connections to the world outside school, (2) active and independent learning that is stimulated, (3) cooperative learning that is stimulated, and (4) the curriculum that is adapted to the needs and capabilities of the individual pupils.

The IWB can support in achieving this powerful learning environment in the classroom. The connection to the internet brings the teacher in contact with a large amount of text, videos, pictures and digital learning materials which can bring the world outside the school into the classroom (1). Another advantage of the internet connection is that of all the materials support

the teacher in creating interactive lessons (2) with content that is relevant for the pupils. Since the teacher has access to such a large amount of content, it is possible to adapt content to the needs and capabilities of an individual pupil (4) (Glover & Miller, 2001). The interactive lessons and digital features of the IWB, like the use of voting boxes, can change the interaction between pupils and teachers, and between pupils (Kennewell, Tanner, Jones & Beauchamp, 2008). The latter in particular can increase collaboration between pupils (3) (Levy, 2002; cited in Kennisnet, 2010a), but on the other side also independent learning can be stimulated by the IWB. This can be done by differentiate between the different learning levels of the pupils. When working and discussing together pupils will share different views with each other which will increase the learning effect (Kennisnet, 2010a).

2.1.3 IWB Use

Although technology may hold a great advantage for education, it is the teacher who influences the integration process and therefore decides whether the potential of the technology gets achieved (Niederhauser&Stoddart, 2001). When teachers use the IWB they can progress from a novice user, who uses the IWB as a substitute of the blackboard, to an experienced user, who is confident in using the technology and has developed synergy between themselves, the technology and their pupils (Beauchamp, 2004).

2.1.3.1 Factors related to IWB use

Many different factors influence the instructional practice of the teacher. Wilkins (2008) studied a descriptive model with the factors: knowledge, beliefs and attitude that relate to the instructional practice of the teacher. Because the IWB in education is an instructional tool (Jang & Tsai, 2012) it is interesting to investigate the same factors only with the focus on the IWB use of the teachers instead of the instructional practice of the teacher.

2.1.3.2 Teachers knowledge

Teachers have to combine three basic elements to teach a lesson using the IWB, according to Koehler and Mishra (2009). Technological, pedagogical and content knowledge form the basic elements. The ability of teachers to integrate content knowledge with appropriate pedagogical approaches. Koehler and Mishra (2009) added technological knowledge as technology is nowadays an indispensable part of education.

2.1.3.3 Attitude towards the IWB

Attitude influences the IWB can be assumed by several studies indicate that there is a relation between attitude and ICT use, or ICT integration. For example, Sang, Valcke, van Braak and Tondeur (2010) concluded that attitude toward computer use in education is the strongest predictor of prospective computer use.

The attitude of teachers towards ICT in education has a strong effect on the actual use of ICT by teachers (Inan&Lowther, 2010). Teachers with a positive attitude towards computer use in education are more likely to favor the features of computers to enhance education (van Braak, 2001). Although the drawback is that a negative attitude means a significant barrier for the ICT use in education (Bingimlas, 2009). Because the IWB is an ICT device, it can be assumed that when teachers have a positive attitude towards the IWB this will influence their IWB use accordingly.

2.1.4 Role of the Teacher

In using IWBs, as well as other technology, in the classroom, one recurring question is what role the teacher should take. Northcote et al. (2010) found that in order to be the most effective, the IWB should be used to facilitate student learning, rather than teacher centered control of the board. The teacher first needs to gather information, then build the curriculum, and finally be a learner alongside the students (Harlow, 2010).

Making meaningful changes to the curriculum, such as introducing new technology, can bring forward surprising results. Vincent (2007) reported a teacher who had previously engaged her students in cooperative, problem solving activities, actually began to teach in a manner that was more teacher directed when she introduced the students to the IWB. It was only after engaging in critical reflection about her strategies that she realized the shift in pedagogy, and made significant changes to create a cooperative learning environment for her students.

The teacher also is essential for providing the reflective aspect for the students in the classroom, as well as using scaffolding to guide their learning (Kennewell et al., 2008). Although the teacher is seen as a supporter, he/she is not without responsibility.

While IWBs are shown to increase physical and emotional engagement, it is still required that the teacher be available and engaged to foster cognitive involvement on the part of the students (Jones et al., 2011). Implementation of new technology can be beneficial, but should not be used at the expense of known best practice (Hansen, 2008).

While some adults showed periods of guided ICT is only as effective as the teacher operating it. When the teacher lacks the skills or knowledge to use the IWB effectively, it can be more distracting than advantageous. Once the teacher becomes competent, even skilled, it allows his/her focus to be on the students rather than the delivery of content (Slay et al., 2008).

Some teachers can be hesitant to use new technology, as it takes them out of their comfort zone. While technology cannot replace teachers, those teachers who do not use technology will be replaced by teachers who do (Hansen, 2008). The research shows that students become more motivated when using new technology, such as the IWB. Harlow (2010) reports that one teacher claims the IWB creates an environment of “awe and wonder” for the students. The students were given Research has determined that the success of implementing interactive lessons using IWBs and other forms of technology relies on the teachers being comfortable and confident when using the technology themselves, Morgan (2010) Researchers agree that the need for reflection on how to use new technology is essential, as technology is only as effective as the teacher who implements it (Vincent, 2007; Morgan, 2010).

Teachers must be willing to change their pedagogical strategies, as well as the way classroom activities are resourced in order to successfully integrate interactive lessons using new technologies (Vincent, 2007). Another study found that using computers in classroom can have a positive effect on learning, as long as the software is developmentally appropriate and the teachers feel competent in using the technology themselves (Vernadakis et al., 2005).

Training is essential for teachers to develop confidence and competence to use new ICT. Vincent (2007) says that teachers must have a willingness to integrate new technology into the curriculum. Hansen (2008) found barriers to implementing ICT as well. Among those reported are lack of time to explore and understand the software, as well as teachers not having a full understanding lacked confidence to use the technology for quality instruction. Issues related to a teacher’s competency can disrupt the flow of the class to the point where little learning can take

place (Slay et al., 2008). Going too slow isn't the only time related barrier. Once the teacher becomes competent with using the technology, he/she can speed up the pace of the lessons and leave less room for cooperative reflection (Kennewel et al. 2008).

For educators who may be uncomfortable or lack basic technology skills, the interactive whiteboard can be a hindrance to their teaching and classroom management (Kaufman, 2009). Policymakers and other administrators must realize, however, that is a long-term process in which users need time to reflect on, experiment, and produce lessons that incorporate even the most basic functions of interactive whiteboards. However, in order for technology in general to become an integral part of education, "there may need to be a new wave of professional development in information and communications technology (ICT) which takes account of the extended list of ICT's features and the need to embed them in teachers' pedagogical knowledge and reasoning" (Kennewell & Beauchamp, 2007).

2.2 Pedagogy

Smith (1996), Joyce et al. (1997), Touhy (1999), Collins and Cook (2000) and Glover and Law (2002) provide evidence of the need for greater understanding of the match between teaching approaches and the learning style favoured by individuals and groups in schools.

Research reports on pedagogy offer many examples of the way in which the IWB has been used to link teaching and learning style to pupil needs. These include general coverage of learning in progress such as the Becta Research Bursary reviews (2003), and specific subject application such as the DfEE (2001) view of the way in which literacy can be taught from the IWBs. Amongst others, Gerard et al (1999) looking at modern foreign languages have indicated the importance of lesson planning so that the sequentially of learning is preserved. Elvers (2000) has shown a similar need for a conceptual and cognitive framework in social science teaching, and Wiggins and Ruthmann (2002) have indicated the integration of audio and visual learning in music education.

As teachers become more fluent in their use of the technology and recognize the link to pedagogic change the IWB becomes the focus of changed approaches. These are illustrated in literature concerned with the development of generic or subject specific techniques. . Damcott et al (2000) measure the gains from visualization of concepts, Nonis and O Bannon (2001) deal

with the requirements of pupil questioning to maximize board use and involvement where the IWB becomes the focus of the lesson, and Olive (2002) outlines techniques to foster an active style of teaching and learning based upon constructivist principles so that conceptual learning contributes to cognitive understanding.

Other research evidence points to the pedagogic gains to be made from IWBs use as Carr (1999) considers whole class use of the IWB and the pressures of classroom management of movement, work programming and differentiation that may occur. Blane (2003) deals with motivation in the primary classroom; Cogill (2003) elaborates the techniques that enhance teaching effectiveness also in the primary context; Clemens et al (2001) describe the gains from the IWB when used in learning enhancement for slower learners, and Bell (2000) describes attempts to use the technology to help those with literacy learning problems. All these reports outline the link between the capacity of IWB technology to enliven presentation, motivate pupil participation and reinforce learning.

2.2.1 Pedagogical Support

A radical transformation of learning environments is taking place. Teachers are no longer dispensers of knowledge; they are facilitators and guiders of learners' learning. Some studies have reported the great potential of the IWB to prompt change in teacher's pedagogy and produce enriched learning environment.

Glover, Miller, Averis and Door (2005, p. 155) state that, there is an increasing awareness of the need to understand the match between technology and pedagogy in the development of interactive learning supported by IWB in schools. Miller and Glover added that, "pedagogic structures developed to enhance conceptual cognitive understanding and awareness of interactivity as the key to this enhanced understanding" (Miller & Glover, 2006, p.2).

2.3 Use of the Interactive Whiteboards

Learning to use computer and the Internet is an easy task, but mastering ICT use as an effective tool to improve teaching and learning processes is not. ICT presents new challenges to teachers. Teachers need training not only in computer literacy but also in the pedagogical application of

those skills to improve teaching and learning. Technical support and pedagogical support are issues. They play important roles in implementing Smart Board in teaching and learning.

2.3.1 The Benefits of Using an IWB

Instructors and students have positive impressions of IWB use (Fekonja-Peklaj&Marjanovic-Umek, 2015; ad, 2012; Wall et al., 2005), and the literature suggests that IWBs help both teachers and students (Fekonja-Peklaj&Marjanovic-Umek, 2015; ad, 2012; Wall et al., 2005). (Ormanci et al., 2015). Across the published literature, the benefits and drawbacks of IWB technology are quite consistent (Fekonja-Peklaj&Marjanovic-Umek, 2015; Higgins et al., 2007). It's fascinating to compare how students and teachers evaluated IWB technology, especially since much of the study has focused on teacher use rather than student use (McQuillan, Northcote, & Beamish, 2012).

Different academic areas have been studied, including arithmetic, reading, and science (Benett&Lockyer, 2008). (Ormanci et al., 2015). "Most of the teachers considered the IWB as an additional resource, although a powerful one, to complement their teaching," Shenton and Pagett (2007) wrote (p. 132). Efficiency, student motivation, student engagement and attention, student attainment, flexibility and versatility, multimedia and multi-sensory presentation, and student interaction are all common themes in the literature regarding the positive effects of IWB technology on both teaching and learning.

2.3.1.1 Efficiency

Throughout the literature, IWBs are highlighted as helping efficiency inclusive of quickening the tempo of instructions (Ball, 2003; BEAM, 2002; Benett&Lockyer, 2008; Kennewell et al., 2007; Levy, 2002; Şad&Özhan, 2012; F. Smith et al., 2006; Torff&Tirota, 2010; Whitby et al., 2012). In Ashfield and Wood (2007) study, teachers were particularly positive about how the IWB permitted the pace of the lessons to boost. In another study, a fifth-grade teacher suggested, "It's so convenient to move from one thing to another, this maintains the pace going" (Shenton&Pagett, 2007) Walker (2002) quotes another elementary teacher as saying that the classes were considerably 'pacier' because the teacher didn't have to go back and look at notes.

There will be no disruptions in the flow of the lesson if the teacher uses the board to prompt (Slay et al., 2008). Teachers pointed out in Fekonja-Peklaj and Marjanovic-Umek (2015) that

they can rapidly obtain content on the internet, access materials they prepared at home, and easily find earlier knowledge that was addressed or displayed when needed. Within a single lesson, IWB technology allows for better transitions between different activities (Benett&Lockyer, 2008; Fekonja-Peklaj&Marjanovic-Umek, 2015). A total of 184 structured classroom observations were undertaken in one study that looked at differences between lessons where teachers utilized and did not use IWBs.

They saw that the IWB lessons moved at a significantly faster rate than the non-IWB lessons, and they concluded that this was due to an increase in the overall number of interactions between the teacher and pupils (Higgins et al., 2005). The usage of an interactive whiteboard (IWB) aided in the faster completion of instructional content. This allowed for additional time for elaboration, topic repetition, and test preparation. Lessons were noted to be faster paced by primary children due to the ease with which teachers may change screens (Shenton&Pagett, 2007).

2.3.1.2 Student Motivation

Research on the use of interactive whiteboards in schools has yielded promising results in terms of influencing students' motivation, or their desire to participate in the learning process (FekonjaPeklaj&Marjanovic-Umek, 2015; Huang, Liu, Yan, & Chen, 2009; McQuillan et al., 2012; ad &zhan, 2012; Thompson &Flecknoe, 2003; Whitby et al., The wide screen, multimedia capability, and element of "fun" boosting the presentational parts of a lesson have all been credited with IWBs' motivational impact on pupils (Miller & Glover, 2002; ad &zhan, 2012; Wall et al., 2005).

Students are more engaged in lessons with an IWB, according to Becta (2003), since it engages them more and increases student participation by allowing them to interact with the board and change text and graphics. Similarly, Levy (2002) and (ad &zhan, 2012) said that IWBs engaged students because of the information's great visual and intellectual appeal, as well as the ability to physically interact with it (Yáez& Coyle, 2011). IWB technology, according to a teacher in the study, allowed students to get up to the board and interact with it.

Teachers also expressed that the children loved seeing their work displayed on the interactive whiteboard (Wall et al., 2005). Both primary-aged pupils and their teachers expressed that the IWB was stimulating the student learning in Fekonja-Peklaj and Marjanovic-Umek (2015).

"Pupils prefer to view video clips and information provided in multiple modalities on the IWB," one teacher said (p. 1,005). Using the IWB in the classroom boosted students' motivation to learn, according to 67 of the 68 teachers interviewed by Higgins et al. (2005). "Children are always enthusiastic and show heightened motivation when it is employed in the classroom," Richardson (2002) said, "and in my experience it produces increased attention and eagerness to participate and answer" (p. 12).

Teachers noted that students' motivation had obviously increased in Miller and Glover (2002), with 14 of the 35 teachers in the study mentioning improved behavior for some or all of their pupils. With the IWB, easily distracted children paid more attention for longer periods of time.

The usage of IWB technology was linked to students' self-reported levels of motivation in mathematics in a treatment/control research including 773 upper-elementary students and 32 teachers (Torff&Tirota, 2010). A five-question student survey was used to assess motivation, with responses on a four-point Likert scale (strongly disagreed = 1 to strongly agreed = 4). In comparison to students in the control group, students in the treatment group reported increased levels of motivation when using an IWB. However, the effect was minimal, and teachers' views of the influence of IWB on motivation were significantly higher than students'.

These findings provided some controlled-study evidence that an IWB can boost student motivation, but the motivation-boosting effect was minor (Torff&Tirota, 2010). Although IWB technology has a good impact on student motivation to learn, its long-term impact has not been properly investigated or analyzed. Greater student engagement and interaction have been connected to increased student motivation when using an interactive whiteboard (Beeland, 2002b; ad &zhan, 2012). Furthermore, including incentive elements into academic activities for all children, including students with ASD, can lead to increased work completion, reduced problem behavior, and increased engagement (Koegel, Singh, &Koegel, 2010). However, the quality of instruction, not only the technology, has a significant impact on motivation (Digregorio&Sobel-Lojeski, 2010).

2.3.1.3 Interaction of students

With an IWB, a variety of teacher-directed and student-centered teaching styles can be used; nevertheless, teacher-directed whole-class teaching was the most frequently seen

(Benett&Lockyer, 2008; Digregorio&Sobel-Lojeski, 2010; F. Smith et al., 2006). Frequently, a teacher will demonstrate or model something on the IWB, then have students conduct follow-up tasks that do not require the use of the IWB (Benett&Lockyer, 2008). During lessons, students are less likely to be seen interacting with the IWB (Benett&Lockyer, 2008). Students remark that using the IWB on their own is inspiring, but this is rarely permitted (Digregorio&SobelLojeski, 2010; Wall et al., 2005). Additionally, well thought-out usage of IWB technology has been reported to promote student interaction (Kennewell et al., 2007).

The first step toward interactivity is for teachers to urge students to approach the interactive whiteboard (Beauchamp & Parkinson, 2005), and well-designed software could be one way to boost student participation with the IWB (Digregorio&Sobel-Lojeski, 2010). The same study found that effective IWB training necessitates an element of interactivity in the methodology. Although IWBs are best suited to whole-class instruction, they can support teacher-centered pedagogy when not used interactively. p. 265) (Digregorio&Sobel-Lojeski, 2010). To put it another way, in an ideal classroom, both teachers and students should employ IWB technology to create an engaged learning environment (Armstrong et al., 2005; Beauchamp & Parkinson, 2005; Schmid, 2008b).

2.3.1.4 Student Attention and Engagement

IWBs have been found to increase student involvement and attention during the learning process (Becta, 2003; Benett&Lockyer, 2008; Fekonja-Pekljaj&Marjanovic-Umek, 2015; McQuillan et al., 2012; Miller & Glover, 2002). The multimodal nature of technology improves learning (Ashfield& Wood, 2007), and students found using multimedia tools engaging (Levy, 2002; Schmid, 2008a; Wall et al., 2005). Students' interest in learning was also increased as a result of the element of surprise that IWBs provided to classes (Miller & Glover, 2002).

A two-year study that included observations of 184 reading and numeracy courses in elementary schools found that using interactive whiteboards engaged students (F. Smith et al., 2006). At least one instructor stated that pupils were eagerly anticipating what would be written next on the board (Levy, 2000). Goodison, 2002; Hall & Higgins, 2005; Levy, 2002; McQuillan et al., 2012; ad &zhan, 2012; Schmid, 2008a; Shenton&Pagett, 2007; Wall et al., 2005) underlined that the IWB technology was fun, interesting, and brought enjoyment to their studying. This was

especially true when students used interactive whiteboards to play games (Benett&Lockyer, 2008; Shenton&Pagett, 2007; Wall et al., 2005).

Overall, when IWBs were used in classrooms compared to classrooms without IWBs, engagement levels were higher; however, switching between teacher-centered and student-centered assignments on the IWB also increased engagement levels, according to McQuillan et al. (2012). An interactive whiteboard (IWB) could help create a more learner-centered learning environment. Teachers began to share their direct instruction via the IWB, according to López (2010). Students were given direct teaching entirely through the IWB at times, and students only interacted with the IWB when urged to do so by a teacher.

In-class IWBs promote class interactions, particularly between the teacher and the students (Beeland, 2002a; Hall & Higgins, 2005; Levy, 2002; López, 2010). One aspect of an IWB that leads to the claimed improvement in student attention and engagement is teacher-student interactions. Students' attention and behavior improved, according to both students and teachers (Beeland, 2002b; Levy, 2002; López, 2010; Schmid, 2008a).

According to Higgins et al. (2005), the IWB helped most of the 70 primary-aged pupils they interviewed pay greater attention during instruction. During the intervention, four kids with known behavioral issues were observed for one week, and observers saw beneficial changes in all of the students' behavior. Students were given direct teaching entirely through the IWB at times, and students only interacted with the IWB when urged to do so by a teacher. In-class IWBs promote class interactions, particularly between the teacher and the students (Beeland, 2002a; Hall & Higgins, 2005; Levy, 2002; López, 2010).

One aspect of an IWB that leads to the claimed improvement in student attention and engagement is teacher-student interactions. Students' attention and behavior improved, according to both students and teachers (Beeland, 2002b; Levy, 2002; López, 2010; Schmid, 2008a). The IWB allowed teachers in the Fekonja-Peklaj and Marjanovic-Umek (2015) study to highlight certain information, allowing pupils to focus entirely on what was truly relevant.

Beeland (2002a) conducted an action research study to see how the usage of interactive whiteboards affected student involvement. Positive factors on involvement were mentioned in both teacher and student questionnaires. The majority of the professors used words like

"engaged" and "extremely attentive." Music clips, diverse sounds, interaction, and graphics were highlighted by teachers as active aspects of the IWBs. Different modes of learning and processing information were supported by IWBs. Students commented on how much they enjoyed the multimedia possibilities and how helpful the animations were in their learning.

Following conversations with focus groups that included classroom teachers and students about their impressions of the usage of IWB technology in classrooms, Ashfield and Wood (2007) conducted a case study. Students' concentration, motivation, and attention all improved, according to the researchers. Clipart graphics and photos, sound, animations, video, and hyperlinks, according to the teachers interviewed, all used to enrich their instruction in beneficial ways. They believed that incorporating these qualities helped to focus the children's attention, keep them focused, and motivate them to learn (Ashfield & Wood 2007).

The usage of information and communications technology (ICT) in the class was described by Richardson (2002) as such that the pupils were so enthralled by the activity that there were no signs of distractions. Solvie (2004), on the other hand, found different outcomes in a research comparing literacy instruction with and without the use of a SMART board in a first-grade classroom, which looked at student attention and involvement. Despite the fact that there was no statistically significant difference in student attentiveness when classes were taught with the SMART board vs sessions delivered without it, students in the study exhibited interest in the SMART board and seemed enthusiastic about it.

IWBs have been shown to boost student attention and motivation to learn (Levy, 2002). In a case study conducted in South Africa by Slay et al. (2008), students reported that the IWB improved visibility of classroom content and cited the "large screen" as one of the IWB's finest characteristics, possibly contributing to improved student attentiveness. Teachers reported in Fekonja-Pekljaj and Marjanovic-Umek (2015) that when content was displayed on the IWB, pupils paid more attention than when it was explained verbally.

2.3.1.5 Attainment of Students

Some experts believe that IWBs can help students enhance their academic performance (BEAM, 2002; Ozerbas, 2012). IWBs have been shown to improve student achievement in surveys and interviews with students and teachers (Beeland, 2002b; Higgins et al., 2007; Levy, 2002;

Schmid, 2008a; Slay et al., 2008; Wall et al., 2005); however, there isn't a lot of quantitative evidence to back this up (Ozerbas, 2012; ad, 2012). Studies examining the academic outcomes of IWBs, according to Torff and Tirotta (2010), are needed. According to Higgins et al. (2005), 85 percent of the 68 teachers polled in their survey believed that IWBs would result in higher student achievement. The outcomes of research that employed achievement as a dependent variable, on the other hand, were varied. Students in the experimental group used smart boards to complete a project, whereas students in the control group used more traditional learning methods to complete the same project.

There were statistically significant variations between the pretest and posttest accomplishment tests in both groups, according to the findings. However, the experimental group's posttest scores ($M = 77.80$, $SD = 12.42$) differed slightly more from their pretest scores ($M = 77.80$, $SD = 11.37$) than the control groups' posttest scores ($M = 63.40$, $SD = 14.98$) did from their pretest scores ($M = 21.00$, $SD = 12.33$). (Ozerbas, 2012). The author attributed this to the usage of smart boards, saying that the findings revealed that smart board use influenced students' academic performance positively.

López (2010) discovered statistical significance that IWB use in third-grade mathematics and fifth-grade mathematics and reading classrooms linked to enhanced student achievement for English language learners (ELL) children when compared to ELL students in classrooms without IWB use. Thompson and Flecknoe (2003) investigated the effects of an IWB in a second-grade classroom on student achievement. The results of term assessments were evaluated, and student scores at the end of the spring semester were compared to those from the fall semester. At the end of the fourth-grade year, the kids' performance on term tests was re-evaluated. Overall, math achievement improved by 14.1 percent in the first term and 22.1 percent in the second. Overall, there was a 39.4 percent improvement across the two-term intervention period. "Interactive whiteboard-based teaching has helped learners absorb ideas and concepts more quickly, as indicated by their rapid progress through national curriculum levels," Thompson and Flecknoe (2003) found (p. 32).

When comparing the usage of a standard chalkboard, overhead projector, and projection screen for sixth-graders, Huang et al. (2009) discovered that using an IWB for statistics, pie charts, and solid diagrams was the most successful technology for learner comprehension and retention.

Higher achievement exam results were used to arrive at this conclusion. Miller and Glover (2002) found that two schools evaluated improved significantly in achievement as judged by National Key Stage One (five and six-year-olds) examinations. "You cannot argue that the whiteboards have brought about change... they have been part of a new strategy that has involved us in looking at how children learn," one instructor pointed out. The length of time children are taught with an IWB may have a significant impact on their progress.

According to Lewin, Somekh, and Steadman (2008), the amount of time students were taught with an IWB had a significant impact on their achievement. They discovered evidence that when teachers utilized the IWB for two or more years, all students in the research, ages seven to eleven, demonstrated considerable academic development as judged by national literacy tests. There was little evidence of gains in student achievement at the end of the first phase of data collection (18 months). However, Lewin, et al. (2008) discovered significant gains in student performance on formal assessments after the second round of data collection (another 18 months later). This suggested that IWB technology had a beneficial impact on student achievement if it was properly incorporated and made useful inside instruction.

2.3.1.6 Versatility and Flexibility

Another recurring topic in the research was the flexibility and variety that IWB technology provided in the classroom (Huang et al., 2009; Kennewell et al., 2007; Miller & Glover, 2002; Shenton & Pagett, 2007; Slay et al., 2008; Yáez & Coyle, 2011). "The boards can be utilized with any software," Beeland (2002b) remarked, "they are exceptionally versatile for numerous tasks and do not require the purchasing of additional software" (p. 2). Photo, animation, video, PowerPoint presentations, graphics, any computer program, and the Internet can all be used by teachers (Benett & Lockyer, 2008; ad, 2012; Wall et al., 2005).

Teachers can use the IWB to get rapid access to the Internet, which gives them access to a wide range of websites and videos (Fekonja-Peklaj & Marjanovic-Umek, 2015; Yáez & Coyle, 2011). One instructor stated that if she had to pick between an IWB and desktop PCs for her classroom, she would select the IWB due of its versatility in terms of individual and whole-class evaluation (Edwards, Hartnell, & Martin, 2002). Teachers indicated that IWB resources may be used effectively to react to a variety of student needs, including presentations that can be readily

altered throughout lessons to address the needs of students with both high and low skills (Beauchamp & Parkinson, 2005; Levy, 2002).

Teachers in classrooms altered presentations swiftly to match the requirements of individual pupils, according to two studies (Miller & Glover, 2002; Schmid, 2008a). Additionally, teachers can deliver multiple directions to their students at the same time (Fekonja-Peklaj&Marjanovic-Umek, 2015). Teachers praised the IWB's adaptability when dealing with a variety of demands in a single class (Miller & Glover, 2002; Slay et al., 2008; Walker, 2002). In a study of fifth and sixth-grade students conducted by Hall and Higgins (2005), the children were pleased about the IWB's adaptability and ability to execute a variety of tasks competently in the classroom. IWBs also allow teachers to easily and rapidly switch between materials when unanticipated needs occur during a session, as well as to link content from different subjects together (Fekonja-Peklaj&Marjanovic-Umek, 2015).

2.3.1.7 Various Learning Styles

IWB technology serves individual needs, which coincides with UDL concepts (López, 2010; McQuillan et al., 2012; Slay et al., 2008; Thompson &Flecknoe, 2003). (Stockall et al., 2012). "Interactive whiteboards can support the whole variety of learning styles," Warren (2003) remarked (p. 3). Goodison, 2002; Higgins et al., 2005; Maher, 2011; Thompson &Flecknoe, 2003; Wall et al., 2005; Yáez& Coyle, 2011) discovered several references to multimodality boosting student learning. According to Yáez and Coyle (2011), the IWB's multimodality is a demonstrated advantage because it caters to children's various learning styles.

Individual learning styles are supported by features such as the capacity to incorporate music, video, text, and animation, as well as the flexibility to combine these elements in ways that suit certain groups of learners. "The board can accommodate varied learning styles," Bell (2001), whose research covered the use of IWB technology in classrooms, said, "Tactile learners gain from touching and writing on the board, aural learners can participate in class discussions, and visual learners can see what is happening at the board as it unfolds"

When teachers integrated a number of various multimedia sources, the IWB was able to support a variety of learning styles, according to Slay et al. (2008) and Levy (2002). Teachers were thrilled with the IWB's versatility, or its ability to do a variety of jobs competently in the

classroom. Good visual materials, according to teachers and students (Ashfield& Wood, 2007; BEAM, 2002; ad &zhan, 2012; Schmid, 2008a; Shenton&Pagett, 2007; Wall et al., 2005), aid visual learners. Color, music, audio, sound effects, speech, and movement can be added or enhanced to every lesson by the teacher (Beeland, 2002a; ad, 2012). This is consistent with the findings of the Levy (2002) study, which found that IWB information has a strong visual and intellectual appeal, which encourages students to participate in whole-class conversations.

The huge screen and boosted sound allowed students in the Shenton and Pagett (2007) study and Fekonja-Peklaj and MarjanovicUmek (2015) study to see and hear the teachings more clearly. Enlargement via a magnifier, text exploration, and the capacity to alter information are all options available on the IWB to direct visual attention to information (Slay et al., 2008). Colors can be used to highlight distinct elements on IWBs (Wall et al., 2005).

Removal and substitution of alternate words and phrases, as well as the usage of hypertext, are some of the IWB's tools. "There is a tremendous diversity of visual pictures available on a computer, and they are enhanced by introducing movement... This often delivers an incredibly powerful boost to cognition," Warren (2003) continued (Warren, 2003, p. 3). Tactile learners benefit from the touch-sensitive screen since they can touch the board, write on it, or draw on it (Beeland, 2002a). Students in the Fekonja-Peklaj and Marjanovic-Umek (2015) study also said that drawing on the IWB with the pen and using different colors was fun for them.

2.3.1.8 The nature of interactivity

In developing techniques for optimal use of the IWB in teaching McCormick and Scrimshaw (2001) have demonstrated the need for a rapid movement along a continuum from more attractive presentation of materials, through sustained pupil motivation, to the achievement of sustained and interactive learning approaches by the teachers involved. It is this element of interactivity that is now recognized as the key to both learning and sustained interest. This has two dimensions the interaction between pupils and teachers, pupils and pupils, and teachers and teachers as indicated by Birmingham et al (2002); and the interplay of multimedia as elements in the learning process as evidenced by Buckley (2000) working with.

Whilst Robison (2000), and Jones and Tanner (2002) offer evidence to show that interactivity is most effectively sustained through effective questioning as well as a wider range of activity.

Miller et al (2004) have provided evidence that effective interactivity requires structured lesson planning, with stepped conceptual learning, pace in activities and a cognitive review, all of which offer opportunities for sustained use of a variety of IWB techniques.

The link between pedagogy and practice has led to further exploration of the way in which interactivity can assist learning. Latane (2002) has demonstrated that interactivity with all technologies needs to be between pupil and pupil as well as between pupil and teacher; Glover and Miller (2002) have indicated the need for immediacy of response and the opportunity to explore ideas as an adjunct to enhanced presentation of material and the need for the co-ordination of pictorial, textual and audio materials. In the humanities interactivity has been seen as an aid to traditional classroom teaching rather than as the driving force for understanding.

Cox and Abbott (2003a, 2003b) demonstrate how ICT has provided an answer to this because it can promote flexibility, sequentiality and reinforcement in the learning process and the matching of learning to pupil learning styles. Within this they show how the IWB can enhance the learning process. Without this it is possible that like the language laboratories of the 1970s and 1980s, the new technology will be installed and then neglected once it has lost its novelty value (Malavet, 1998; Greiffenhagen, 2000).

Best practice requires that the pedagogic gains are seen to be such that a reversion to conventional learning is no longer tenable. Mauve (2003) looks at the way in which pupil-teacher interaction can be helped through the use of individual pupil slates and points to the immediacy of assessment that results. Young (2002) provides a useful bridge between the technology and pedagogy involved by stressing the importance of inbuilt interactivity in all software development to secure changes thinking about teaching and learning.

2.4 Disadvantages In terms of IWB usage,

Several topics in the literature demonstrate the positive effects of IWB technology on teaching and learning; yet, disadvantages "tend to be of a practical or logistical nature" have been found in the same research (Higgins et al., 2007, p. 215). Lack of competent personnel, access, professional development and support, technological support, and continued use are among them.

2.4.1 Staff's Technology Skills

In Slay et al. (2008), the most noted disadvantage of the IWB by teachers was the lack of ICT (information and communication technology) skills among staff. For example, Higgins et al. (2007) said: Good teaching remains good teaching with or without technology; the technology might enhance the pedagogy only if the teachers and pupils engaged with it and understood its potential in such a way that the technology is not seen as an end in itself but as another pedagogical means to achieve teaching and learning goals.

Teachers must have the fundamental technical skills to use IWB effectively (Hall & Higgins, 2005; Shenton&Pagett, 2007; Slay et al., 2008; H. Smith et al., 2005; Wall et al., 2005). "It would be a pity if the gains that could be achieved through more open, collaborative, and inventive applications of ICT and IWB were thrown away just because we failed to adapt to the demands of the new technology," Hall and Higgins (2005) write (p. 114). When teachers lack the necessary skills to use an IWB, it might lead to classroom management issues (Ozerbas, 2012). It takes a lot of effort, experience, and trial and error to become technically adept (Benett&Lockyer, 2008; Higgins et al., 2007).

According to Armstrong et al. (2005), it is critical for teachers to have everyday access to IWBs in order to take advantage of the entire range of capabilities they provide. It has also been stated (Greiffenhagen, 2002) that IWBs are only useful when they are integrated into the usual classroom routine. There is also the chance that restricting students' access to IWBs will interfere with interaction, involvement, and familiarity with the technology (Hall & Higgins, 2005; Wall et al., 2005). In their rounds of observed lessons, Shenton and Pagett (2007) noted that the IWB was mostly used by teachers, not pupils. They found that only two classrooms allowed children to operate the controls, and only one class allowed pupils to interact with the IWB on their own. IWBs will not be used to their full potential in an educational environment that does not promote student and instructor access.

Finally, IWB technology must be properly incorporated into education and linked to learning outcomes (Armstrong et al., 2005; Benett&Lockyer, 2008).Sad(2012)concluded, "These negative impacts of inadequate or incorrect smart board utilization can be averted at best by teacher training, which is another problem as emphasized in the relevant research," Professional

Development Sad (2012) stated (p. 902). The majority of researchers felt that the interactive whiteboard (IWB) is a beneficial tool to have in the classroom, but technology alone will not bring about change (López, 2010). In technology matters, teachers must feel confident and capable. "More shared kinds of teaching would only come about with the support for educators in professional development," F. Smith et al. (2006) concurred (p. 455).

Teachers must have the appropriate training and development in order to successfully integrate IWB technology (López, 2010; McQuillan et al., 2012; Miller & Glover, 2002). Although formal training in the use of IWBs is critical, Shenton and Pagett (2007) found that most teachers in their study had had minimal first training. Most teachers learned how to utilize the IWB while on the job, and as a result, they spent a great amount of time developing materials. Professional development with the Interactive Whiteboard appears to be a crucial component in teachers' ability to use this technology; otherwise, "this relatively expensive investment turns out to be fruitless" (ad, 2012, p. 901).

It is critical to provide ongoing IWB support to staff and teachers; additionally, Shenton and Pagett (2007) stated that teacher training should incorporate the entire context of teaching interactively using an IWB. It is beneficial to design differentiated support strategies for instructors during initial training and ongoing developmental support (Benett&Lockyer, 2008; Higgins et al., 2007; Levy, 2002). Shenton and Pagett (2007) also advocated for aiding instructors in making better use of the IWB. They argued that instead of a traditional or professional model of training, teachers needed a "bottom-up" approach that was more teacher-centered. For successful deployment, technology must be integrated into curricular training (John, 2002).

According to the research, if schools do not train teachers to use IWBs, they may become an underutilized and costly piece of technology. Teachers require sufficient time to learn how to use interactive whiteboards, and if that time is not provided, teachers will not use them (Bell, 2001). Miller and Glover (2002) claimed that the potential benefits of introducing IWBs into schools are contingent on instructors being willing to (a) build and use the technology, and (b) changing their minds about how classroom activities are planned. "With sufficient planning, preparation, and training, it is a potent educational tool, which can be customized for use with a wide range of

subjects and ages," Beeland (2002a) stated (p. 2). In addition, Armstrong et al. (2005) advocated for more research into how to best assist teachers' IWB professional development.

2.4.2 Professional development

As stated before, teacher support is essential when increasing teachers' use of all the IWB features and gain the added value for education (Beauchamp & Kennewell, 2013; Bidaki & Mobasheri, 2013; Hockly, 2013; Sweeney, 2013; Turel & Johnson, 2012; Mathews-Aydinli & Elaziz, 2010; Wood & Ashfield, 2010; Kennisnet, 2008).

Studies show some directions for a good and efficient IWB teacher training focused on improving teachers in the use of IWB (Jimoyiannis, 2010; Kennisnet, 2012). Teachers and professionals have to work together, by asking critical questions, to learn from each other. During the teacher training there needs to be some practical assignments to design technology enhanced curriculum materials, those assignments can lead to an automatic integration of ICT in education. And when teachers' experiences will be combined with expert information this creates a sophisticated way of learning (Ng, Nicholas & Williams, 2010).

2.4.2.1 IWB Professional Development's Importance

Prior knowledge and experience with technology tools in the educational setting can impact how a new technology tool is approached and implemented (Armstrong, Barnes, Sutherland, Curran, Mills & Thompson, 2005, p. 456). Teachers who adapt their classes to include IWBs may "make sense of it in terms of previous experiences with older technologies...[and] are likely to use digital whiteboards as an extension of the nondigital whiteboard," according to the study (Armstrong et al., 2005, p. 456). However, it is critical to understand that IWBs are not typical whiteboards and should be viewed as instruments for presenting information and content (Armstrong et al., 2005, p. 457). Both students and instructors have expressed concerns about the need for enough professional development to ensure that teachers are fully informed of how to fully utilize the IWB (Smith et al., 2005, p. 98).

Armstrong et al. (2005) agreed that without professional development, teachers may not know how to use IWBs to their full potential or have the abilities to do so (p. 465). If there is a lack of "practical and methodological" professional development, teachers who want to use IWBs for interactive instruction may be unable to do so and grow frustrated (Smith et al., 2005, p. 98).

Even employing interactive whiteboards as computer extensions "restricts full interaction and spontaneous use of the entire spectrum of multimedia resources" (Glover & Miller, 2001, p. 271).

Teachers who are resistant to adopting interactive whiteboards for instruction may not believe they have developed the requisite abilities to do so (Beeland, 2002, p. 6). Professional development and ongoing support are essential for successful IWB integration, which goes beyond simply installing them in the classroom (Armstrong et al., 2005, p. 466). Installing IWBs without a support mechanism for instructors just adds to their stress as inexperienced IWB users (SMART Technologies, 2009b, p. 9).

Any technology tool can become an unneeded source of stress in the absence of professional development and resources, negating the purpose of technology as a beneficial tool (SMART Technologies, 2009b, p. 3). "The literature and marketing of [IWBs] emphasizes on their ability to reform pedagogy, that is, to give alternatives to teacher centered forms of delivery...and to widen the options for classroom dialogue beyond teacher presentation of facts" in an effort to promote the use of IWBs (Jones et al., 2011, p. 39). A pedagogical shift is required if technology is to become a "transformative vehicle to increase learning" (p. 258).

Installing IWBs without a support mechanism for instructors just adds to their stress as inexperienced IWB users (SMART Technologies, 2009b, p. 9). Any technology tool can become an unneeded source of stress in the absence of professional development and resources, negating the purpose of technology as a beneficial tool (SMART Technologies, 2009b, p. 3). "The literature and marketing of [IWBs] emphasizes on their ability to reform pedagogy, that is, to give alternatives to teacher centered forms of delivery...and to widen the options for classroom dialogue beyond teacher presentation of facts" in an effort to promote the use of IWBs (Jones et al., 2011, p. 39). A pedagogical shift is required if technology is to become a "transformative vehicle to increase learning" (p. 258).

2.4.3 Technical Support

Understanding the techniques used in IWB presentation minimizes difficulties. It is common that teachers face technical problem when working in technology-integrated-classroom. An insufficient training in digital literacy might make it a challenge for teacher to use IWB in the

classroom. Technical support is considered a significant factor for successful integration of ICT in the teaching and learning processes. In addition to a lack of understanding of how to use the IWB, one of the IWB's limitations was the teachers' inability to obtain basic technical support (Becta, 2003). In addition, unforeseen break-downs (Ozerbas, 2012) and simple equipment problems, such as software, the PC, dust on the light bulbs, or pens that need calibration (Beeland, 2002a; Fekonja-Pekljaj&Marjanovic-Umek, 2015; Hall & Higgins, 2005; McQuillan et al., 2012; ad &zhan, 2012; H. Smith et al., 2005; Wall.

Teachers are frustrated by these minor technology issues, and they are less willing to pursue technology integration in the future (Levy, 2002). The prevalence of calibrating difficulties was one of the top concerns among teachers (Beauchamp, 2004). Other installation issues included poor location and ease of access, resulting in sunlight reflecting on the screen and producing visual challenges for pupils (Hall & Higgins, 2005; Levy, 2002; ad &zhan, 2012). Technical difficulties might occur inside classroom as a result of:

1. Run out of electronic pen (stylus).
2. No connection between the interactive whiteboard and computer.
3. Orientation of the data projector.
4. No correlation between board and projector–jamming of handwriting.
5. The system does not enable immediate interactivity between the movement of users' hands and Smart Board – slow boot/delay loading.
6. Virus problems, which lock programs and files.
7. Low qualities of speakers.
8. Computer programs which are not updated such as multimedia program
9. Dust on projectors lens causes unclear picture on the board.
10. Sun light affects the visual element - learners cannot see what is on the board.
11. Some types of IWB do not support some programs and files - they are not compactable with interactive whiteboard software.

2.5 Other Challenges

IWBs are likely to become a standard piece of equipment in future schools, as they are being used in an increasing number of classes. The cost of IWB technology has been identified as a problem (Ozerbas, 2012; Wall et al., 2005). This could exacerbate the digital divide between

schools that can afford technology and those that can't. In addition to the initial installation and teacher training costs, continuous technical support, software upgrades, and ongoing teacher training must be included in.

Teachers noted in Fekonja-Peklaj and Marjanovic-Umek (2015) that it was sometimes difficult when they were absent since substitutes did not have the digital abilities to access pre-prepared content that involved the IWB. The use of IWB technology in education will be influenced by issues such as technical difficulties with equipment, learning demands for some teachers, and the need for both basic technical training and tailored development (Levy, 2002; Wall et al., 2005); thus, what is the use of IWBs in classrooms if the technology is unreliable and the teachers are not properly trained to use them?

For best results, IWB technology and pedagogy must be combined (Beauchamp, 2004; Digregorio&Sobel-Lojeski, 2010; ad &zhan, 2012). "From a pedagogical standpoint, it can be declared that IWBs are an effective and stimulating instructional tool for learning, but only if they are employed in accordance with the suitable teaching strategies, methods, and procedures,"Şad (2012) concluded (p. 901).

2.6 Teachers as an obstacle to Classroom Technology

The current educational system was not created with today's pupils in mind (Prensky, 2001, p. 1). It is currently led by an older generation known as "digital immigrants," who did not grow up in a technologically advanced environment and are resistant to accepting new technologies (Prensky, 2001, p. 1). One notable distinction between former students and today's students, whom Prensky (2001) dubbed "digital natives" (p. 1), is that they have grown accustomed to digital media and using technology to meet daily demands.

Computers, videogames, digital music players, video cameras, mobile phones, and all the other toys and gadgets of the digital age, as well as "computer games, email, the Internet...and instant messaging" are not uncommon objects that should only be used on special occasions or under adult supervision. To capture the attention of students in the classroom, it is the teachers who need to adapt their instruction to a new, technology rich way of learning (Prensky, 2001, p. 2).

It is not the “digital natives” who need to adapt to learning environments similar to how generations before them learned. The manner in which information is presented plays a large role in whether or not the students will learn it (Prensky, 2001, p.5). However, access to technology tools and attending training sessions does not necessarily mean that teachers subsequently applied the new knowledge and skills to instruction. Abel (2010) examined the development of technology in classrooms between 1995 and 2010 (p. 1). Teachers must adapt their instruction to a new, technology-rich manner of learning in order to catch students' attention in the classroom (Prensky, 2001, p. 2).

It is not the "digital natives" who must adjust to learning settings that are similar to those used by previous generations. The way material is presented has a big impact on whether or not pupils will remember it (Prensky, 2001, p. 5). However, having access to electronic tools and attending training sessions does not guarantee that instructors would use the new knowledge and abilities in their classrooms. Between 1995 and 2010, Abel (2010) studied the evolution of technology in schools (p.1). "Evolving learning technology standards, the development environment, and the status of mainstream adoption of learning technology," according to Abel (2010), are all factors that influence the use of technology in the classroom (p. 205).

Organizations who saw standards as a way to build up-to-date strategies for using technology to improve learning backed the standards movement (Abel, 2010, p. 206). Technology entered classrooms as a result of teachers following the standards. Incorporation of "technology infrastructure in terms of networks, Internet connections, interactive white boards, classroom management systems, and other..." in educational environments has become the norm (Abel, 2010, p. 211). Despite the fact that technology is readily available in classrooms, it is not always employed in a pedagogically suitable manner (Abel, 2010, p. 211).

Technology in the classroom has offered instructors and students the ability to do old activities in new ways (Abel, 2010, p. 211), but only if they are willing to use or learn to use technology to their advantage. Teachers may not be using technology tools to their full potential or in a proper means-to-end manner due to a lack of change in teacher behavior. As a result, teachers may not be using technology tools to their full potential or in a proper means-to-end manner (Abel, 2010, p. 211).

Technology use that is appropriate is a component of technology-promoting standards. Both the teacher and the pupils may be shortchanged if a teacher does not adjust his or her classroom behavior to integrate the right use of technology. As a result, it's worthwhile to look at what behaviors and perceptions teachers have in the classroom that may be inhibiting them from correctly using technology in accordance with technology standards and the tool's intended use.

2.7 Smart boards as Technology Tools in the Classroom

An interactive whiteboard (IWB) is a technology tool that can help bridge the gap between "digital natives" learning styles and "digital immigrants" teaching styles (Prensky, 2001, p. 1). The use of an interactive whiteboard (IWB) in the classroom can help students connect their digital lifestyle outside of the classroom to what they learn in class (SMART Technologies, 2009a, p. 10). An IWB can only display what a projector displays onto it because it is "a projection surface, not a monitor" (SMART Technologies, 2010, p. 138).

The feature that allows the computer to be operated if the screen is touched is the most significant difference between an IWB and other technologies that combine the usage of a data projector and computer (Smith, Higgins, Wall & Miller, 2005, p. 93). Touch technology can be applied by a teacher using his or her own finger or a nonproprietary pen. Instead of trying to teach from a motionless position, such as behind a computer, touch-sensitive technology allows the operator to directly "interact with digital content and multimedia" in front of a group of pupils (SMART Technologies, 2006, p. 5).

Teachers can keep "conventional 'control' of the group" during a class by remaining visible in front of pupils (Glover & Miller, 2001, p. 260). Teachers may be encouraged to use IWBs because of their conventional and strategic location in front of the class. Teachers may be hesitant to employ new technology unless they believe they have classroom management under control (Glover & Miller, 2001, p. 271). Nearly half of the teachers in Türel and Johnson's study "agreed or strongly agreed" that IWB use had altered instruction delivery, leading Türel and Johnson (2012) to conclude that "some level of pedagogical change may have occurred due to IWB technologies" (p. 390).

Jones, Kervin, and McIntosh (2011) cautioned that an IWB: is by no means a neutral tool; its impact on the classroom is significant, citing a change in pedagogy as a result of IWB use for

instruction. Entering into the discourse as a bearer of content, it influences the design and pacing of activity and hence interactivity. It has the ability to influence the nature of curriculum knowledge in the classroom." (see p. 57)

An interactive whiteboard (IWB) is more than a technology-based source of classroom amusement; it may also be utilized to improve instruction. "Flexibility and versatility, multimedia/multimodal presentation, efficiency, assisting planning and the creation of resources, modeling ICT skills, and interaction and involvement in classes" are some of the possible advantages of employing an IWB for instruction (Smith et al., 2005, p. 92). Despite the reported educational benefits of IWBs, possible benefits backed up by evidence from "longitudinal studies" have yet to be established (Smith et al., 2005, p. 94).

Jones et al. (2011) point out that there are differing viewpoints on whether or not IWBs are justified as an economic investment in educational environments (p. 38). An interactive whiteboard (IWB) is more than a technology-based source of classroom amusement; it may also be utilized to improve instruction. "Flexibility and versatility, multimedia/multimodal presentation, efficiency, assisting planning and the creation of resources, modeling ICT skills, and interaction and involvement in classes" are some of the possible advantages of employing an IWB for instruction (Smith et al., 2005, p. 92).

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2.8Lack of Teachers' Motivation in Using the IWB

Even if an IWB is accessible, instructors may also now not be encouraged to use IWBs for education if they lack training. Organizing "connected multimedia" for use in instruction necessitates a significant amount of planning time as well as training. If teachers lack IWB "technical ability," it's possible that they won't use them (Somyürek, Atasoy, & zdemir, 2009, p. 370). Teachers also see "technical issues and failure in the classroom" as a concern since it disrupts lessons and "undermines teachers' confidence" (Levy, 2002, p. 16). Teachers must be prepared in the event that the IWB fails and spend time creating a back-up lesson to prevent

being taken off guard. As a result, teachers must complete twice as much work in order to present a single session.

2.9 Using Interactive Whiteboards to Improve Classroom Instruction

"As a tool to enhance teaching, and as a tool to facilitate learning," an IWB can be used (Smith et al., 2005, p. 92). If IWBs are available, they can help teachers be more efficient when planning and delivering classes by allowing them to readily incorporate multimedia information. IWBs can be used to improve student motivation, attention, engagement, and interaction in the classroom.

IWBs can also bring students together in the classroom while they are learning. IWBs may provide teachers with a support system that allows them to better incorporate varied instruction and be more flexible as the class progresses and students' learning requirements change.

2.10 Access to the IWB on a Regular Basis

If IWBs are to improve instruction, teachers must first have consistent IWB access. Glover and Miller (2001) found that if teachers had daily access to IWBs in their own classrooms, they will be able to use them to their maximum potential (p. 270). Armstrong et al. (2005) found that teachers must engage in "long-term, persistent engagement with new technologies" before a new technology can be used to its full potential to "support and enhance students' learning" (p. 463). Prior to installation, extended access to an IWB may help with "building confidence and skill in utilising the IWB's full range of potentials" (Armstrong et al., 2005, p. 464). IWBs should be permanently installed in classrooms, according to Beeland (2002), as this would eliminate many of the concerns teachers and students have about using them for instruction (p. 6). Teachers need time to acquaint themselves with an IWB and practice on their own, even if formal professional development is valuable. One aspect contributing to the growth of teachers' IWB skills, according to a study done by the British Educational Communications and Technology Agency (BECTA) (2007a), is "exploratory use" (p. 5).

2.10.1 Teacher Self-Efficacy in Using Interactive Whiteboards

The existence or absence of confidence in using an interactive whiteboard for instruction is related to a teacher's self-efficacy in using an IWB. There are various aspects that influence a teacher's self-efficacy in using the interactive whiteboard. Teachers' perceived value of IWBs as technology tools in the classroom, for example, is connected to frequency of IWB instructional

usage, training and support, and perceived self-efficacy of IWB use. Participants who "reported higher levels of school training and support had better perceived IWB value, IWB self-efficacy, and views of student accomplishment" as a result of IWB use, according to Peled, Medvin, and Domanski (2012). (p. 6).

In the same study, participants who also reported "greater levels of training and support, particularly technological components, as well as better instructor self-efficacy and perceived value" of IWBs had lower levels of apprehension around their use (Peled, Medvin&Domanski, 2012, p. 6). Collaboration with peers and building a community centered on IWB instructional use "contributed to the advancement of their skills while teaching with the IWB," according to participants in Gregory's (2009) study, which enhanced their IWB self-efficacy (p. 57).

Green (2005) stated that if instructors want to improve their self-efficacy, they need time to communicate and learn from one another, as well as time to practice what they've learned. Warwick and Kershner (2008) emphasized the need of professional development opportunities for teachers to help them integrate course content and pedagogy with the technological abilities required to run interactive whiteboards. Self-efficacy in regard to IWB instructional use originates not only from using an IWB for instruction, but also from the training and support that exists outside the classroom, as these studies show.

2.10.2 IWBs help teachers be more efficient.

IWBs may help teachers spend less time planning, delivering, and modifying lessons than they would otherwise need if they didn't have one (SMART Technologies, 2009b, p. 1). Although teachers spend time preparing and designing resources for use with IWBs at first, as teachers "store, share, and re-use instructional materials," time spent on lesson preparation should reduce (Smith et al., 2005, p. 94). IWBs can support "efficient and more effective learning, with tighter planning and the implementation of lesson plans," according to a study led by BECTA (2005). If teachers are given time to develop materials in conjunction with access to technological support, IWBs can support "efficient and more effective learning, with tighter planning and the implementation of lesson plans" (p. 13). According to BECTA (2005), teachers can efficiently revise lessons as needed to meet the needs of their pupils (p. 16).

Instead of wasting time reinventing courses from year to year, the ability to develop lessons rather than starting from scratch allows classes to be continuously enhanced and updated. A further BECTA (2007b) study confirmed that IWBs do help teachers save time when preparing and implementing lessons (BECTA, 2007b, p. 10). In a 2007 BECTA research, 47 percent of elementary teachers said that IWBs helped them save time in planning and 50 percent said that IWBs helped them save time while executing lessons (BECTA, 2007b, p. 10).

Although the initial planning of IWB-supported lessons may take some time, teachers recognize that this time is well spent because IWB lessons can be reused and enhanced as needed (Levy, 2002, p. 16). Teachers can save time in class planning and delivery by using interactive whiteboards to modify, record changes, and create "a sequential lesson that flows effortlessly from a single control point" (Glover & Miller, 2001, p. 260). Because of the ability to store photos and notes as needed, content recorded during a class is never lost to erasure, and anything written on the screen with the electronic pens can be saved and revisited as needed (SMART Technologies, 2009b, p. 6). Teachers "enjoy the practical and instructional benefits of preserving work that is generated dynamically during sessions," according to Levy (2002). (Levy2002, p.9). When preparing IWB-integrated lessons, the capacity to prepare lessons at home on a computer or laptop with IWB software is critical for teachers to fully benefit from the timesaving elements connected with the usage of an IWB." (Glover and Miller, 2001, p.269).

2.10.3 Multimedia Capabilities of the IWB.

Teachers can use still, moving visuals, and music when presenting lessons on an IWB since it acts as a multi-modal portal (BECTA, 2007a, p. 5). Teachers value IWBs' multimedia capabilities, according to Glover and Miller (2001). (p. 262). "The ability to efficiently offer a variety of multimedia resources is also suggested to aid boost pupils' recollection," according to the study (Smith et al., 2005, p. 96). Teachers that have a multimedia tool at their disposal can efficiently operate a "broad range of materials throughout a class and use a bigger number and wider diversity of resources" (Smith et al., 2005, p. 93). Teachers can even "write over digital documents and Internet pages" using multimedia capabilities, which helps students remember concepts given during class (SMART Technologies, 2006, p. 10).

2.10.4 The Interactive Whiteboard (IWB) as the Center of Attention in the Classroom

IWBs serve as a center for pupils, providing regular "visual reinforcement to complement instruction" and encouraging them to stay focused and involved in the subject at hand (SMART Technologies, 2009a, p. 9). In addition, according to BECTA (2007a), IWBs provide a focus for students' attention and encourage participation in "whole-class instruction" (p. 5). Teachers may visually "reinforce ideas and concepts" and "give more vivid visuals and better explanations" than they could without an IWB since students direct their attention to it (Levy, 2002, p. 10). When students are encouraged to use interactive whiteboards to exhibit their own work, the interactive whiteboard becomes a focal point for "teacher-student and student-student conversation and evaluation" (Levy, 2002, pp. 9 - 10).

2.10.5 The use of interactive whiteboards (IWBs) increases student engagement, attention, and motivation.

In a research done by Levy (2002), classroom observations revealed that "the quality of students' attention in many IW-based classes is generally strong" (p. 10). Student involvement and interest in IWB-based classes may be attributed to a bigger pool of available resources and tools to provide increased explanation, which allows students to grasp ideas and concepts more easily, according to Levy (2002). (p. 10). As a result, adopting interactive whiteboards for teaching may "enhance learning outcomes and motivate learners" (Levy, 2002, p. 10).

Beeland (2002) also supported the use of IWBs in the classroom, noting that they improve student involvement in a course (p. 6). Beeland (2002) stated, based on the results of a student poll, that "there was a correlation between how highly the whiteboard was scored based on the sort of media that was used" (p. 6). During a class, Beeland (2002) took into account "the frequency with which text, images, video, and sound" appeared (p. 6). IWBs, according to Beeland (2002), lead to "enhanced student engagement" because of their "visual features" (p. 7).

Despite evidence suggesting interactive whiteboards (IWBs) improve student engagement, attention, and motivation, Levy (2002) found that some teachers believe that enhanced attention levels might be attributed to "novelty-value," and that the IWB's impact may diminish with time (p. 10). According to Glover and Miller (2001), the usage of IWBs in the classroom may appear

to excite students and encourage them to be more attentive, but this could just be due to students' familiarity with a computer-oriented, digital world (p. 265).

2.10.6 Enhancement of Classroom Interaction through IWB Use

Conclusions by Levy (2002) found that a lot of teachers suggested that using the IWB to make introduction demos and presentations can be more efficient, leaving "greater time for contact between the students and teacher, as well as for task-related activity" (p. 9). Some teachers believed that using an interactive whiteboard fostered "greater levels of student participation in whole-class debate than would otherwise be the case, maybe due to the strong visual and conceptual appeal of the material and learning tools exhibited" (Levy, 2002, p. 9). According to Levy (2002), using an IWB in the classroom might encourage "active and participatory approaches to learning in the sense that certain students are eager to use the medium to present their work" (pp. 9-10).

2.10.7 IWBs: Reuniting Students in the Public Sphere of Learning

Learning can take place in two types of spaces: public and private, as a lesson moves between individual, small group, and whole-class activities (SMART Technologies, 2008, p. 2). Students participate in "lectures, demonstrations, whole-class discussions, debates, and question-and-answer sessions" in public learning, whereas private learning allows students to collaborate with peers in small groups or individually in and out of school (SMART Technologies, 2008, p. 2). When handheld computer devices are employed as learning tools, "one-to-one computing environments" are created, allowing students to work in their own space (Liu & Kao, 2007, p. 285).

One challenge to overcome in classrooms that enable handheld computing devices is that they were designed for one user at a time and "restrict encouragement of interaction among groups of learners" and individual pupils (Liu & Kao, 2007, p. 286). Students can become so engrossed in their handheld computing devices and their personal accomplishments that they forget to collaborate and instead work side-by-side (Liu & Kao, 2007, p. 286). Another disadvantage of using handheld computer devices in a private setting is that pupils must be crammed together to obtain a peek of the device's screen (Liu & Kao, 2007, p. 286).

Teachers can use IWBs to bring all students together in the public arena to transition between "whole-class, individual, and small-group learning, and stimulate student participation and interaction" (SMART Technologies, 2008, p. 3). Instead of everyone focused on their various devices in a room devoid of eye contact, there should be one spot where the entire class can focus at the same time as a classmate or small group shares what they have accomplished (Liu & Kao, 2007, p. 288).

Learning opportunities are supported through smooth communication among individuals and small groups, ensuring that every student is included in information sharing. With a central focal point for all students to easily view, working with a sense of collaboration, and effectively sharing individual or small group progress with all peers, learning opportunities are supported through smooth communication among individuals and small groups (Liu & Kao, 2007, p. 286). According to instructor feedback in a study done by Levy (2002), an IWB can promote cohesive and participative whole-class learning by uniting the class and encouraging engagement across the board (p.12). Individual computers will not be able to bring a group together.

Individual computers cannot unify a class in a public space setting, however IWBs encourage the use of computer technology in courses without requiring a large number of students to squeeze in front of a single computer, hence eliminating disruptive movement within the classroom (Levy, 2002, p. 8).

2.10.8 IWB-based instruction with flexibility

The "flexibility and versatility" of an IWB can let teachers offer lesson content in new ways and create modifications for students during class (Smith et al., 2005, p. 92). IWBs can be utilized "flexibly and spontaneously" when teachers respond to various demands and situations, according to Levy (2002). (p. 8). Teachers like the "flexibility with which IW materials can be controlled," and they emphasize the benefits of being able to "move effortlessly between resources in response to needs that arise during lessons" (Levy, 2002, p. 8). If pupils appear to be learning at a faster rate than expected, the IWB's "flexibility and spontaneity" allow teachers to quickly offer "more advanced information" (Levy, 2002, p. 8).

2.10.9 Differentiated Instruction is facilitated by IWBs.

Today's classrooms have evolved into a diversified learning environment, requiring teachers to create and implement lessons that target a large number of different learners at the same time. Forlin (1998) concluded that instructors "have become more responsible for kids with a wide variety of abilities inside their classrooms" (p. 4). With this in mind, teachers may need to differentiate instruction to fit the requirements of their pupils, as an effective teacher is one who "understands and responds to the range of learning needs and learning styles within the group being taught" (Glover & Miller, 2001, p. 258).

Differentiated instruction, according to George (2005), is "the tailoring of classroom tactics to students' various learning interests and needs so that all students experience challenge, success, and satisfaction" (p.189). Differentiated education allows teachers to adjust "material, instruction, and assessment to match the requirements of individual students" (George, 2005, p. 189). Learning can be "effective, efficient, and meaningful" when teachers create lessons with the goal of differentiating instruction (George, 2005, p. 190). IWBs have the ability to satisfy the needs of students with a variety of learning styles while also engaging them in the learning process (Beeland, 2002, p. 2).

According to BECTA (2005), IWBs can be utilized to "produce efficient and more effective learning" when differentiated instruction is applied (p. 13). IWBs allow teachers to use the same prepared materials in a variety of ways to reach different types of students (BECTA, 2005, p. 13). Teachers can use interactive whiteboards in their classrooms to teach students about the "three modes of learning," which include visual, aural, and tactile learning (Beeland, 2002, p. 1). The extent to which each modality is used in education may reflect how interested and motivated students are in their learning (Beeland, 2002, p. 1).

Visual learners benefit from notes placed on the IWB "in addition to diagramming and manipulating objects or symbols," according to IWBs (BECTA, 2007a, p. 5). On the other hand, some students may struggle with text as a sole form of communication; therefore, incorporating a variety of multimedia approaches into a class may better fulfill the needs of various pupils (BECTA, 2007a, p. 5). Teachers may meet the needs of auditory learners by include sound in a class, while teachers can address the needs of kinesthetic learners by "reinforcing learning

through exercises involving touch, movement, and space," both of which are feasible using the capabilities of an IWB (SMART Technologies, 2006, p. 9).

Smith et al. (2005) found that "it is debatable whether physical interaction with the board itself enhances learning, other than to motivate pupils to pay attention, unless the physical interaction is somehow directly relevant" and concluded, "It is debatable whether physical interaction with the board itself enhances learning, other than to motivate pupils to pay attention, unless the physical interaction is somehow directly relevant" (p. 97). IWBs make differentiated instruction easier. Today's classrooms have evolved into a diverse learning environment, requiring teachers to design and implement lessons that cater to a diverse group of students at the same time. According to Forlin (1998), teachers have become more responsible for kids with a wide array of skills inside their classrooms (p.4).

Teachers may need to differentiate instruction to meet the needs of their students, since a good teacher "understands and responds to the range of learning needs and learning styles within the group being taught" (Glover & Miller, 2001, p. 258). According to George (2005), differentiated instruction is "the customizing of classroom strategies to students' diverse learning interests and needs so that all students experience challenge, achievement, and pleasure" (p. 189).

CHAPTER THREE

Research Design and Methodology

3.0. Introduction

As indicated earlier, this study is done to investigate teachers' practices and challenges in using the interactive white board in Diamond academy a school located in Yeka sub city. This chapter highlights the following: research method, sample population and sampling techniques, source of data, data gathering and instrument and procedure of data collection.

3.1. Research Methodology

The study was conducted by using a descriptive survey design. Sproul (1995) states that; a survey research design collects background information. He recommends the technique for research where attitudes, ideas, and comments on a problem under investigation. It is suitable in determining reasons or causes for the current status under study. This is supported by Bless and Higson (1995). Babbie (1992) adds that a careful reporting methodology of the descriptive survey promotes replication later by other researchers and re-testing the finding. Survey technique does secure situations that identify standards or norms in order to plan the next step, says (Best and Kahn 2000), Borg and Gal (1989) note that, descriptive survey research is intended to produce statistical information aspects of education that interests policy makers and educators.

3.2. Research Design

This study used both quantitative and qualitative techniques in collecting and analyzing data. Quantitative involved the collection of numerical data in order to explain, predict and or control phenomena of interest: data analysis was mainly statistical. Qualitative technique involved the collection of extensive narrative data in order to gain insights into phenomena of interests: data analysis included the coding of the data and production. It was studying the phenomena as they were in natural setting (Gay, 1996 and Locke et al. 2004). To achieve this, the researcher employed different methodologies and data collection strategies. The design chosen for the study was suitable because it will help the researcher to:

- i. Describe Teachers practice of using Interactive White Boards in the teaching and learning in elementary school in Diamond Academy.
- ii. Describe the challenges teachers face in the use of interactive white board.

3.3. Population, Sampling Technique and Sample Size

3.3.1. Target population

Population in a research context refers to all items to be included in any field of inquiry (Kothari, 2007). Total population sampling was used in this study because of its manageable size. Gleaning information from the total population often gives deeper insights in to a target population than partial samples would be capable of. It has the potential to allow a researcher to paint a much more complete picture and greatly reduces guess work. It also eliminates the risk of biased sample selection that is often encountered in would be random study samples (Fraenkel and Wallen1993).

The researcher is interested in having a deeper understanding of the phenomena being studied Meridith et al(1996).The population selected suits the purpose of the study. For this reason, Michael Patton as cited by Meridith at el. (1996) describes this type of procedure is purposive sampling. The author further contends that in purposive sampling the goal is to select cases that are likely to be “information-rich” with respect to the purpose of the study .In this case therefore; the researcher used purposive sampling to pick the targeted population that were used in the study. Kerlinger (1973) observes that purposive sampling is characterized by the use of judgment and deliberate effort to obtain representative samples by including presumably typical areas or groups of the sample. According to Patton (1990) purposive sampling helps a researcher to use flexibility and meet multiple interests and needs. Accordingly all subject teachers and principals in the elementary school will be part of the study.

3.4. Sample size

Total population sampling was used for this study. It is a type of purposive sampling where the whole population of interest (i.e., a group whose members all share a given characteristic) is studied. It is most practical when the total population is of manageable size, such as a well-defined subgroup of a larger population. Accordingly the researcher targeted 75 teachers and 2

principals from the school. Thus the researcher will gather information from those who are available and who fully represent the targeted population

3.5. Source of data

The necessary data for this study was collected from primary source.

3.5.1. Primary data source

Primary sources refer to individuals from whom information has originated directly as a result of the particular problem under study. Primary data pertinent to the study collected through questionnaire and interview.

3.6. Data collection instruments

According to Wellington (2000), in carrying out a research, a researcher should use methods which provide high accuracy, generalizability and explanatory power with minimum management demands with administrative convenience. Mwiria and Wamahiu (1995) note that: “the qualitative researcher uses technique for data collection in order to obtain holistic view of the respondent”. The instrument of data collection for the research was a questionnaire , observation, and an interview for the school’s principals.

3.6.1. Questionnaires

Questionnaire was used for data collection in the study. According to Kothari (2004), some of the merits of the questionnaire are; low cost, freedom from the Interviewer’s bias as answers are in respondents own words and that it gives respondents adequate time to give well thought answers. Thus questionnaire was developed for the teacher with sections as Nkpa (1997) advises. i) Biographical information, ii) closed ended questions weighted on a Likert scale of 1-5 with questions on Strongly Agree, Agree, Undecided, Disagree and Strongly Disagree, iii) Open ended type of questions. The questionnaires are developed to address specific objectives just as Orodho (2008) notes. This type of questions saved time, they will be direct in analysis and they ensure that the respondents have a similar range of options to choose from, thus making coding more convenient on practice of using the interactive white board in teaching and learning

process as they allowed respondents to choose from the available alternatives provided. The researcher was be guided by the study objectives when constructing this instrument.

3.6.2. Interview

Kane (1995) states that, interviews can be modified to fit needs of the situations, they can convey empathy, build trust, collect rich data and provide a clear understanding of the respondents view.

However, the researcher chose interview technique because it gave her an opportunity for in depth-data, ensuring high response rates and it encouraged naturalness (Nkpa1997). Thus, ensuring that more information was obtained just as Stone et al. (1984) and Bell (1993) notes. To get in depth information interview questions were prepared to principals and face to face communications interview guide questions prepared with the main focus to get detail information in relation to the research questions.

The researcher designed a semi-structured interview .The purpose of interview was to gather data on practice of teachers in using Interactive White Board. These were Interviews for the principals of selected elementary school. Totally 2 principals were taken. The process of interview was conducted in English. The researcher conducted the interviews for the interviewees at their schools during the work time and by taking notes used to write the relevant data qualitatively.

3.6.3. Observation

As to Kothari (2004), observations are important tools that can be employed in different qualitative research types for gathering genuine and pertinent data in the actual setting. The researcher selected 47 of the teachers with convenient sampling. I took the position where my presence did not disturb the class. In other words, the observation was made without intervention in any way. To this end, voluntary teachers were selected for observations and the sections were chosen on random basis, and observed each of them using structured observation checklist. Accordingly, the goal of the observation was to check whether or not the teachers practice using IWB in their classes. Also it was intended to make a systematic observation and instrument was designed to document 47 observed teachers in the context of ongoing classroom instructional-learning processes.

Teachers were observed with reference to their interactions with students in using the IWB, whether the lesson was conducted using the IWB was of a direct, seatwork, or learner-centered orientation; the teacher's instructional practices which included uses of IWB technology; As a result, structured observation checklist which consisted of ten categories with two scales showing agreement and disagreement, i.e. "Yes" and "No" was designed to examine the practice of teachers' use of IWB in their classroom. Accordingly, the classrooms of the teachers were observed in different days.

CHAPTER FOUR

4. Presentation, Analysis and Interpretation of the data

Analysis and presentation of the data collected from the participants via questionnaires and interviews are made in this chapter. The study was mainly aimed at investigating the current practice of teachers' use of interactive white board. In order to achieve this purpose, 75 questionnaires were distributed to the selected primary school teachers, out of the 75 distributed questionnaires were properly filled and returned by 100% of the respondents, 2 principals were interviewed.

4.1 Characteristics of respondents

Under this section, the background information of respondents was presented. In the first part of the questionnaire, respondents were asked to provide their general background information. The following tables present the demographic characteristics of respondents.

Table 4.1 shows the gender proportion was female 36% and male 64%. So the researcher observed that there was distribution of both genders. But, the number of female respondents was not equal to male.

From this information, we may learn that female teachers were relatively small in number in Diamond Academy primary school. As a result of this, the male and female teacher respondents involvement in this study was not equivalent.

Table 4.1 Characteristics of respondents by Sex, Age, Education, and Workexperience

| No | Variable | Category | No(Frequency) | Percentage (%) |
|----|-------------------|----------------|---------------|----------------|
| 1 | Sex | Male | 48 | 64% |
| | | Female | 27 | 36% |
| | | Total | 75 | 100 |
| 2 | Age | 20-25 years | - | - |
| | | 26-30 years | 4 | 5.3% |
| | | 31-35 years | 29 | 38.7% |
| | | 36-40 years | 35 | 46.7% |
| | | 41-45 years | 7 | 9.3% |
| | | Above 45 years | - | - |
| | | Total | 75 | 100 |
| 3 | Educational Level | Diploma | - | - |
| | | BA/BSC | 66 | 88% |
| | | MA/MSC | 9 | 12% |
| | | Total | 75 | 100 |
| 4 | Service Years | 1-5 years | - | - |
| | | 6-10 years | 10 | 13.3% |
| | | 11-15 years | 19 | 25.3% |
| | | 16-20 years | 32 | 42.7% |
| | | 21-25 years | 12 | 16% |
| | | Above 25 years | 2 | 2.7% |
| | | Total | 75 | 100 |

Concerning the age of respondents, the majority of the teachers 35(46.7%) age was between 36-40 years age. While the remaining, 29 (38.7%) of them were between 31-35 and 7(9.3%) of them were between 41-45 and 4(5.3%) of them were between 26-30 years age groups respectively. This may reveal that most of the total respondents were physically matured enough to give reliable information. Moreover, they have ample time to serve their country. Thus, they might have access to upgrade their qualifications and serve a lot before retirement. Therefore, it can be concluded that the respondents are enough capable to give necessary information for the study.

As we can see from table 4.1, the majority of teachers 66(88%) of them were degree holders. On the other hand, 9(12%) of them were master holders, respectively. From this, we can conclude that majority of teacher respondents are first-degree holders.

However, for this study the primary teachers in Diamond Academy educational background is good enough to understand the study questionnaire and to complete the questionnaire successfully.

Regarding respondents' years of service, the majority of teachers 32(42.7%) of them served 16-20 years. While the remaining 19(25.3%) of the respondents served 11-15 years, 12(16%) of the respondents served 21-25 years, 10(13.3) of the respondents served 6-11 years and 2(2.7%) of the respondents served above 25 years respectively. This may show that most of the teachers had adequate work experience to provide the necessary information for this study. From this information, it is possible to conclude that, majority of teachers have good work experience and life experience to give the necessary information for the study.

4.2 Professional qualification of principals

A total number of 2 principals were interviewed results shown in table 4.2

Table 4.2 professional qualification of principals

| Educational Level | Frequency | Percentage (%) |
|-------------------|-----------|----------------|
| Diploma | - | - |
| Degree | - | - |
| MA/MSc | 2 | 100% |
| Total | 2 | 100 |

Table 4.2 results show that 100% (N2) have MA/MSc. The result shows that the qualified principals were competent in leading in the school, and it is possible to conclude that, both principals have good work experience and life experience to give the necessary information for the study.

4.3 Analysis of classroom observation

Structured observation checklist which consisted of ten categories with two scales showing agreement and disagreement, i.e. "Yes" and "No" was designed to examine the practice of teachers using the IWB in their classroom. Accordingly, the classrooms of 47 teachers were observed.

4.3 Practices of using the Interactive White Boards by Teachers

| No | practices | Total frequency | | | | Total | |
|----|--|-----------------|------|----|------|-------|-----|
| | | Yes | | No | | | |
| | | N | % | N | % | N | % |
| 1 | The teacher uses the touch sensitivity nature of the board | 3 | 6.4 | 44 | 93.6 | 47 | 100 |
| 2 | The teacher uses the smart board only as a projector for teaching. | 34 | 72.3 | 13 | 27.7 | 47 | 100 |
| 3 | The teacher encourages students to write and display their works on the board | 4 | 8.5 | 43 | 91.5 | 47 | 100 |
| 4 | The teacher is comfortable using the IWB | 23 | 48.9 | 24 | 51.1 | 47 | 100 |
| 5 | The teacher uses good IWB resources in his/her lesson. | 10 | 21.3 | 37 | 78.7 | 47 | 100 |
| 6 | The class was interactive with the help of the IWB | 8 | 17.1 | 39 | 82.9 | 47 | 100 |
| 7 | The teacher struggle to manage the smart board. | 29 | 61.7 | 18 | 38.3 | 47 | 100 |
| 8 | Lessons are better prepared and more organized coinciding with the IWB. | 13 | 27.7 | 34 | 72.3 | 47 | 100 |
| 9 | The teacher applies student centered method of teaching with the IWB. | 9 | 19.1 | 38 | 80.9 | 47 | 100 |
| 10 | Teacher prepare lesson with attractive and engaging flipcharts to be displayed on the IWB. | 20 | 42.6 | 27 | 57.4 | 47 | 100 |

During the observation session **For item 1 table 4.3** Majority of teachers 44(93.6%) sits behind the computer, neglecting the added functionality of the IWB which is touch recognition. Only 3(6.4%) of teachers were using the stylus or their finger.

Many of the teachers **For item 2 table 4.3** 34(72.3%) were limited to what they are presenting and use the IWB only to magnify the notes their students have to copy. Only 13(27.7%) were using the board to interact with their students.

For item 3 table 4.3 Only 4(8.5%) were inviting students to display their work on the board. Majority 43(91.5) of the teachers do not engage students.

For item 4 table 4.3 Majority of teachers 24(51.1%) are more comfortable with giving verbal instructions and lessons rather than using resources from the internet. 23(48.9%) were comfortable enough browsing for resources online.

For item 5 table 4.3 37 (78.7%) of teachers were not trying to access to various sources to enhance and support their lessons with video, articles, images, learning tools, educational games. 10(21.3%) were trying to reach resources.

For item 6 table 4.3 29(61.7) of teachers get tired of to restart or trouble shoot the device when they face technical problem. Only 18(38.3) of the teachers try to solve the problem when it occurs.

For item 7 table 4.3 38(80.9) of the teachers were limited to lessons presentation be lecture and students were seen tune out throughout the class only 9(19.1%) of teachers were trying to engage students.

For item 8 table 4.3 Majority number of teachers 34(72.3) were observed that their lessons were not well prepared and organized to coincide with the IWB. Only 13 (27.7) of teachers prepared lesson that goes with the IWB.

For item 9 table 4.3 Majority of teachers 38(80.9%) were not engaging their students with the board. Only 9(19.1%) of teachers try to engage their students in to the lesson with the aid of the IWB.

For item 10 table 4.3 Majority of teachers 27(57.4%) do not prepare their lesson with attractive and engaging flipcharts to be displayed on the IWB. Teachers' flip charts lack videos that are used to clarify concepts with visual mode. Only 20(42.6%) of teachers flipcharts or lesson plans were well prepared and are more likely engaging.

4.4 Analysis of teachers' questionnaire

As it is described under the methodology part of this study 75 teachers were selected as a respondent of the questionnaire to collect the desired data. To investigate teachers' practice and challenges of using Interactive white board some major questions were raised for the respondents which are open and close ended types with alternatives and rating.

The respondents were asked to put their degree of agreement. The weight of the choices was represented as follows: 5= strongly agree; 4= agree; 3= neutral; 2=; disagree and 1= strongly disagree. And this was calculated by mean and since the scale consists 5 points 2.5 was taken as

average; results exceeding 3.0 as high. Whereas scores less than 2.5 were regarded as low, mean scores between 2.5 and 3.0 was considered to be moderate.

4.4 Types of professional training teachers have

Table 4.4 professional training teachers have

| No | Items | Rating | | | | | | | Mean |
|----|---|--------|------|------|-----|-----|-----|-------|------|
| | | | 5 | 4 | 3 | 2 | 1 | Total | |
| 1 | The initial training teachers received on IWB use in to teaching was inadequate. | N | 30 | 42 | - | 2 | 1 | 75 | 4.3 |
| | | % | 40 | 56 | - | 2.7 | 1.3 | 100 | |
| 2 | The in service training on how to integrate smart board in to teaching is not enough. | N | 20 | 50 | - | 3 | 2 | 75 | 4.1 |
| | | % | 26.7 | 66.7 | -- | 4 | 2.7 | 100 | |
| 3 | The professional development program for teachers to upgrade their skills of using computer is insufficient | N | 31 | 42 | 1 | - | 1 | 75 | 4.4 |
| | | % | 41.3 | 56 | 1.3 | - | 1.3 | 100 | |
| 4 | There is lack of training on technical skills for teachers. | N | 20 | 52 | - | 3 | - | 75 | 4.2 |
| | | % | 26.7 | 69.3 | - | 4 | - | 100 | |

Table 4.4 shows professional training teachers have.

Table 4.4 item 1 shows 96% of the teachers agreed that The initial training teachers received on IWB use in to teaching is inadequate, none were neutral while 4% disagreed ,so majority of teachers agreed with the mean value of 4.3. Initial training with the Interactive Whiteboard appears to be a crucial component in teachers' ability to use this technology; otherwise, "this relatively expensive investment turns out to be fruitless" (Sad, 2012, p. 901). It is critical to provide ongoing IWB support to staff and teachers; additionally, Shenton and Pagett (2007) stated that teacher training should incorporate the entire context of teaching interactively using an IWB. It is beneficial to design differentiated support strategies for instructors during initial training (Benett&Lockyer, 2008; Higgins et al., 2007; Levy, 2002). Shenton and Pagett (2007) also advocated for aiding instructors in making better use of the IWB.

Table 4.4 item2 93.4% of teachers agreed that there is insufficient in service training on how to integrate smart board in to teaching, none were neutral while 6.7% disagreed. Majority of teachers agreed with the mean value of 4.3 on this item too .

Table 4.4 item 3 Majority of teachers with the mean value of 4.4 revealed that there is no adequate professional development program for teachers to upgrade their skills of using computer; 97.3% agreed, 1.3% were neutral while 1.3% disagreed. Professional development and ongoing support are essential for successful IWB integration, which goes beyond simply installing them in the classroom (Armstrong et al., 2005, p. 466). Installing IWBs without a support mechanism for teachers just adds to their stress as inexperienced IWB users (SMART Technologies, 2009b, p. 9).

Table 4.4 item 4 Majority of respondents agree with the mean value of 4.2 that there is lack of training on technical skills for teachers; 96 % agreed, none were neutral while 4% disagreed. Studies show some directions for a good and efficient IWB teacher training focused on improving teachers in the use of IWB (Jimoyiannis, 2010; Kennisnet, 2012). Teachers and professionals have to work together, by asking critical questions, to learn from each other.

4.5 The type of technical support teachers have

Table 4.5 Technical support teachers have

| No | Items | Rating | | | | | | | Mean |
|----|--|--------|------|------|----|------|------|-------|------|
| | | | 5 | 4 | 3 | 2 | 1 | Total | |
| 1 | I can solve more common technical difficulties when they occur. | N | 10 | 13 | - | 32 | 20 | 75 | 2.5 |
| | | % | 13.3 | 17.3 | - | 42.7 | 26.7 | 100 | |
| 2 | The number of technicians to deal with all classroom demands is not satisfying | N | 30 | 45 | - | - | - | 75 | 4.4 |
| | | % | 40 | 60 | -- | - | - | 100 | |
| 3 | The technical support was not helpful in providing technical in service training on interactive board for teachers | N | 29 | 43 | - | 2 | 1 | 75 | 4.3 |
| | | % | 38.7 | 57.3 | - | 2.7 | 1.3 | 100 | |
| 4 | When something goes wrong with an IWB I can easily get help to resolve it | N | 3 | 4 | 3 | 40 | 25 | 75 | 2.0 |
| | | % | 4 | 5.3 | 4 | 53.3 | 33.3 | 100 | |

Table 4.5 shows the teacher participants response on the technical support teachers have

On Table 4.5 item 1 30.6% respondents agreed that they can solve more common technical difficulties when they occur, , none were neutral while 69.4% disagreed and the response rate for this item was moderate with the mean value of 2.5. Organizing "connected multimedia" for

use in instruction necessitates a significant amount of planning time as well as training. If teachers lack IWB "technical ability," it's possible that they won't use them (Somyürek, Atasoy, & zdemir, 2009, p. 370). Teachers also see "technical issues and failure in the classroom" as a concern since it disrupts lessons and "undermines teachers' confidence" (Levy, 2002, p. 16).

Table 4.5 item 2 Majority of teachers responded numbers of technicians are not enough to deal with all classroom demands with mean value of 4.4 , 100% agreed, none were neutral, none disagreed.

Table 4.5 item 3 Majority of respondents revealed Technical support is not helpful to give technical in service training on smart board for teachers with mean value of 4.3 ; 96% agreed, none were neutral while 4% disagreed.

Table 4.5 item 4 Teachers respond with low mean value 2.0 for the item when something goes wrong with an IWB I can easily get help to resolve it; 9.3% agreed, 4% were neutral while 86.6% disagreed.

4.6 Problems teachers face while using the IWBs

Table 4.6 problems faced by teachers in using the IWBs

| No | Items | Rating | | | | | | | Mean |
|----|---|--------|------|------|---|------|-----|-------|------|
| | | | 5 | 4 | 3 | 2 | 1 | Total | |
| 1 | I don't have confidence in my ability to use the IWBs | N | 20 | 30 | - | 20 | 5 | 75 | 3.5 |
| | | % | 26.7 | 40 | - | 26.7 | 6.7 | 100 | |
| 2 | There is a difficulty in managing the students behavior while applying such technologies like the interactive white board | N | 34 | 25 | - | 7 | 9 | 75 | 3.9 |
| | | % | 45.3 | 33.3 | - | 9.3 | 12 | 100 | |
| 3 | I fail to see any advantage in working with the IWB | N | 33 | 28 | 3 | 5 | 6 | 75 | 4.0 |
| | | % | 44 | 37.3 | 4 | 6.7 | 8 | 100 | |
| 4 | My skill level is not much sufficient to use the smart board effectively | N | 28 | 37 | - | 8 | 2 | 75 | 4.1 |
| | | % | 37.3 | 49.3 | - | 10.6 | 2.7 | 100 | |
| 5 | I have limited time to search for resources to use with the IWB. | N | 49 | 23 | - | 2 | 1 | 75 | 4.6 |
| | | % | 65.3 | 30.7 | - | 2.7 | 1.3 | 100 | |
| 6 | I am not motivated to use the interactive white board in regular basis | N | 14 | 52 | - | 5 | 4 | 75 | 3.9 |
| | | % | 18.7 | 69.3 | - | 6.7 | 5.3 | 100 | |
| 7. | Time restricts me from letting students display their works on the smart board | N | 43 | 29 | - | 2 | 1 | 75 | 4.3 |
| | | % | 57.3 | 38.7 | - | 2.7 | 1.3 | 100 | |

Table 4.6 shows respondents response on problems teachers face when they use the IWB.

Table 4.6 item 1 With the mean value of 3.5 majority of teachers agreed that they lack confidence in their ability of using IWBs 66.7% of the respondents agreed that they don't have confidence in their ability to use the IWBs, none were neutral while 33.4 % disagreed. The existence or absence of confidence in using an interactive whiteboard for instruction is related to a teacher's self-efficacy in using an IWB.

Table 4.6 item 2 With high mean value of 3.9 teachers revealed that they have difficulty in managing their students while using IWBs 78.6% of teachers participants agreed that there is difficulty in managing the students while applying such technologies, none were neutral , 21.4% disagreed.

Table 4.6item 3 Majority of teachers with mean value of 4.0 respond that they fail to see any advantage in working with the IWBs 81.3% of respondents agreed that they fail to see any advantage in working on the IWB, 4% were neutral while 14.7% disagreed. The attitude of teachers towards ICT in education has a strong effect on the actual use of ICT by teachers (Inan&Lowther, 2010).

Table 4.6 item 4 Majority of teachers with mean value of 4.1 revealed that their skill level is not much sufficient to use the smart board effectively; 86.6% agreed, none were neutral while 13.3% disagreed.

Table 4.6 item 5 The respondents respond that they have limited time to search for resources to use with the IWB was very high with mean value of 4.6 ; 96% agreed, none were neutral while 4% disagreed.

Table 4.6 item 6 The respondents respond thatthey are not motivated to use the interactive white board in regular basis was high with the mean value of 3.9; 88% agreed, none were neutral while 12 % disagreed.

Table 4.6 item 7 The respondents respond thattime restricts them from letting students display their works on the smart board was very high with the mean value of 4.3; 96 % agreed, none were neutral while 4 % disagreed.

4.4. Qualitative Result Description

4.4.1 In- depth interview for the school principals

To understand, the gaps perceived by the principals, interviews were held. Study participants provide significant inputs and based on intensive study, practices and challenges were identified and analyzed. Specifically, the researcher conducted an interview with 2(two) principals. During the interview, the interviewees were asked to discuss the school relation to utilization of IWB

Principal 1 stated that:

“I can boldly say that the school is the only school with all classrooms equipped with the IWB with the idea to ease teachers burden to use their time efficiently and facilitate a lesson with more vivid and clear presentation and also Wifi is available in each department to help teachers update their lessons by browsing different resources. Though the school facilitates things to work with this IWB, I am afraid the teachers are not using this equipment to bring the intended outcome in regular basis.”

Principal 2 added:

“Though the school installed the IWB in every class and provides the necessary things like laptop, internet for each teacher I informally observed teachers entered their class without their laptop this shows they are teaching against the school plan and continue teaching with the traditional board neglecting the role of the interactive white board.”

And also, the interviewees were asked to describe the role of teachers in utilization of IWB. One of the principals clearly states that:

“During supervision I witnessed that most teachers stand at the front and use the board as mere projector to magnify the objects they want to display rather than leaving ground to interact with their students using the IWB.”

Principal 2 also stated that:

“I can assure you that the teachers do little to bring about the intended outcome using this technology and continue with the traditional teacher centered method and the teaching resources from the IWB friendly software are not fully utilized.”

The interviewees were also asked to state challenges that negatively affected utilization of interactive white board.

One of the principals has highlighted:

“Teachers do not take time to acquaint themselves with an IWB and do not practice on their own even if formal professional development is valuable. Teachers also complain time constraint is one drawback for them to browse different teaching resources.”

Principal 2 also stated as:

“Teachers lack adequate preparation this in turn lead them to lack of confidence and also teachers do not use the IWB in frequent basis instead prefer to use the traditional whiteboard.”

On the other hand, interviewees were asked to state ways regarding the school could provide better support

As principal 1 clearly states that:

“Teachers need training on how to integrate IWB usage in their lesson every new school beginning year to update themselves. Whenever a new teacher is appointed he or she should be provided with the IWB usage before jumping to class.”

Principal 2 stated as:

“Professional training is inevitable to support teachers prepare lesson that goes with the IWB and how to prepare lesson with the software to integrate their lesson with the IWB.”

At last, the interviewees were asked to mention the possible measures to be taken to avoid such challenges.

As both the interviewees emphasized that:

“Well organized trainings by experts on how to operate the IWB, how to use the active inspire software (an interactive white board friendly software) to prepare lesson, how to browse for teaching resources to support them incorporate their lesson with the IWB. And also frequent supervision and follow up mechanisms must be there to check teachers usage of the IWB in frequent basis and properly.”

4.5 discussions of the findings

The findings of this study during the class observation to see what actually teachers' practices in using the IWB revealed that there is a huge gap between teachers' practice of using the smart board and pedagogical understanding of the interactive white board. Majority of teachers sits behind the computer, neglecting the added functionality of the IWB which is touch recognition that benefits the teacher to interact with the lesson content and increased the students' engagement.

Many of the teachers were not using the IWB to present the class with a problem, and do not passover the interactive white board to the students to let them solve it. The teachers were limited to what they are presenting and use the IWB only to magnify the notes their students have to copy.

The teachers do not engage students. Merely present a static material with a lecture style, the teachers do not invite students to the screen to draw or highlight elements of presentation. Students were absorbing information passively rather than enjoying the tactile sensation of engaging physically with the board.

Majority of teachers are more comfortable with giving verbal instructions and lessons rather than using resources from the internet, and find it hard to spend time creating presentations and referring to infinite resources for data online.

The interactive white boards were connected to the internet which gives the teachers a resource of online tools and information. But teachers were not trying to access to various sources to enhance and support their lessons with video, articles, images, learning tools, educational games.

Teachers get tired of to restart or trouble shoot the device when they face technical problem. The teachers were impatient to call technician, so they just get on to their work without the IWB.

Teachers were limited to lessons presentation be lecture and students were seen tune out throughout the class. Used properly students-not teachers should be working at interactive white boards throughout the school day. Physically active students absorb more information than students sitting at their desks all day. One of the best things that teachers can do to help students

grasp new information is to get them out of their chairs, working at the IWB and using the boards' virtual manipulative.

Teachers were observed that their lessons were not well prepared and organized to coincide with the IWB. With the help of the IWB teachers can be benefited in upload document, slides images and videos from cloud sources and help bring life to their presentation. They have the power to make any topic interesting with a variety of tools available at their finger tips, visualize their lesson any way they like with drawing toolsets and use more creative ways to use white board videos in the class room

Majority of teachers do not prepare their lesson with attractive and engaging flipcharts to be displayed on the IWB. Teachers' flip charts lack videos that are used to clarify concepts with visual mode.

The findings from questionnaire with teachers revealed the initial, inservice training teachers received on IWB use in to teaching is inadequate, Initial training with the Interactive Whiteboard appears to be a crucial component in teachers' ability to use this technology; otherwise, "this relatively expensive investment turns out to be fruitless" (Sad, 2012, p. 901). It is critical to provide ongoing IWB support to staff and teachers; additionally, Shenton and Pagett (2007) stated that teacher training should incorporate the entire context of teaching interactively using an IWB.

It is beneficial to design differentiated support strategies for instructors during initial training (Benett&Lockyer, 2008; Higgins et al., 2007; Levy, 2002) that there is insufficient in service training on how to integrate smart board in to teaching, there is no adequate professional development program for teachers to upgrade their skills of using computer; in contrary Professional development and ongoing support are essential for successful IWB integration, which goes beyond simply installing them in the classroom (Armstrong et al., 2005, p. 466). Installing IWBs without a support mechanism for teachers just adds to their stress as inexperienced IWB users (SMART Technologies, 2009b, p. 9).

Lack of training on technical skills was also revealed if teachers lack IWB "technical ability," it's possible that they won't use them (Somyürek, Atasoy, &zdemir, 2009, p. 370). Teachers also see

"technical issues and failure in the classroom" as a concern since it disrupts lessons and "undermines teachers' confidence" (Levy, 2002, p. 16).

The study revealed that the problems teachers face when they use the IWB were they lack confidence in their ability of using IWBs. The existence or absence of confidence in using an interactive whiteboard for instruction is related to a teacher's self-efficacy in using an IWB. There are various aspects that influence a teacher's self-efficacy in using the interactive whiteboard. Teachers' perceived value of IWBs as technology tools in the classroom, for example, is connected to frequency of IWB instructional usage, training and support, and perceived self-efficacy of IWB use.

Teachers difficulty in managing their students while using IWBs. When teachers lack the necessary skills to use an IWB, it might lead to classroom management issues (Ozerbas, 2012). It takes a lot of effort, experience, and trial and error to become technically adept (Benett&Lockyer, 2008; Higgins et al., 2007).

Teachers fail to see any advantage in working with the IWBs. The attitude of teachers towards ICT in education has a strong effect on the actual use of ICT by teachers (Inan&Lowther, 2010). Teachers with a positive attitude towards computer use in education are more likely to favor the features of computers to enhance education (van Braak, 2001). Although the drawback is that a negative attitude means a significant barrier for the ICT use in education (Bingimlas, 2009). Because the IWB is an ICT device, it can be assumed that when teachers have a positive attitude towards the IWB this will influence their IWB use accordingly.

Teachers skill level is not much sufficient to use the smart board effectively; limited time to search for resources to use with the IWB. The study also revealed that teachers are not motivated to use the interactive white board in regular basis. If IWBs are to improve instruction, teachers must first have consistent IWB access. Glover and Miller (2001) found that if teachers had daily access to IWBs in their own classrooms, they will be able to use them to their maximum potential (p. 270). Time constraint to let students display their works on the smart board was also identified as a problem.

The interviews conducted with the principals had the following outcome. According to the principals with the school relation to utilization of Interactive white board Interactive white board is installed in every classes and internet service is also provided for the teachers to use different resources that are useful for their teaching.

The principals had common response on the role of teachers in utilization in Interactive white board that though the school is well equipped with the IWB technology teachers use is not satisfactory. Most of the teachers' use the tool merely as a projector but the tool's use is more than that if properly applied it can bring a miraculous effect on the students' achievement and it can create a highly interactive and motivating environment for the students.

The principals also noted that some of the challenges that negatively affected utilization of interactive white board are the training on the IWB usage is not enough because it is not provided by expertise rather by teachers who are experienced and also the teacher attitude towards the IWB use is not satisfying.

The principals said that the school should appoint personnel who can provide better technical and pedagogical support to promote effective teaching and learning in relation with the use of the IWB for teachers.

The principals also noted that the major challenges that negatively affect utilization of interactive white board technology in the school are during supervision most teachers still use the teacher centered method of teaching and use the tool as the traditional white board and do not engage students in to the lesson with the help of this interactive tool.

According to the principals to avoid challenges possible measures should be taken, like teachers should be given better pedagogical and technical training on how to use the interactive white board effectively and bring the intended outcome on students

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.0 Introduction

The purpose of this chapter is to summarize the major areas covered by the study and to draw conclusions based on the major findings. In the end, possible recommendations and suggestions for further study were forwarded to the practices and challenges of teachers in using interactive white board in Diamond Academy primary school.

5.1. Summary of the Major Findings

The main purpose of this study was to investigate teachers' practices and challenges in the use of interactive white board in Diamond Academy primary school. To achieve this objective, the following research questions were developed:

1. What are the practices of primary teachers of Diamond Academy utilization of the available interactive white board technology?
2. What type of professional training do teachers have in using the IWB?
3. What type of technical support do teachers have?
4. What problems do teachers face when they use the IWB?

The study was conducted in Diamond Academy primary school and it was selected purposively. Diamond Academy was selected due to the availability of the interactive white board in the school. Total population of 75 teachers were taken for the questionnaire and 2(two) principals were interviewed besides 47 teachers were observed in their classroom to see the actual practice of using the interactive white board. Accordingly the data were collected using questionnaires, interviews, and observation. Thus, for analysis of data which were gathered through close-ended questionnaire were analyzed quantitatively through using statistical package for social science (SPSS) version 23, and the obtained results were analyzed with statistical tools such as percentage, frequency, and mean.

Based on analysis and interpretation of data the following is a summary of findings of the study have been presented below in the form of answers given to the basic question:

- The practices of teachers in using the interactive white board

The findings of this study during the class observation to see what actually teachers are practicing in the use of the IWB revealed that there is a huge gap between teachers' practice of using the smart board and pedagogical understanding of the interactive white board. Majority of teachers sits behind the computer, do not use the stylus or their fingers ignoring the touch nature of the board. The teachers were limited to what they are presenting and use the IWB only to magnify the notes their students have to copy.

The teachers do not engage students. Merely present a static material with a lecture style. Majority of teachers find it hard to spend time creating presentations and referring to infinite resources for data online.

Teachers were not trying to access to various sources to enhance and support their lessons with video, articles, images, learning tools, educational games. Teachers get tired of to restart or trouble shoot the device when they face technical problem. Teachers were limited to lessons presentation be lecture Teachers were observed that their lessons were not well prepared and organized to coincide with the IWB. Majority of teachers do not prepare their lesson with attractive and engaging flipcharts to be displayed on the IWB.

- The professional training and the technical support provided for teachers

The findings from questionnaire with teachers revealed the initial, inservice training teachers received on IWB use in to teaching is inadequate, there is insufficient in service training on how to integrate smart board in to teaching, there is no adequate professional development program for teachers to upgrade their skills of using computer Lack of training on technical skills was also revealed

- The problems faced by teachers in using the interactive white board

Most of the respondents reported that the problems teachers face when they use the IWB were they lack confidence in their ability of using IWBs ,teachers difficulty in managing their students

while using IWBs .Teachers fail to see any advantage in working with the IWBs. Teachers skill level is not much sufficient to use the smart board effectively; limited time to search for resources to use with the IWB .The study also revealed that teachers are not motivated to use the interactive white board in regular basis .Time constraint was also identified as a problem to let students display their works on the smart board.

5.2 Conclusions

Realizing that teaching and learning will not be changed by technology itself, but by the way it is incorporated in to instruction, will certainly be a critical element in its integration process. Based on the findings of the study, the following conclusions are drawn: This study expands the existing literature related to teachers' practices and challenges in using interactive white board. The purpose of the study was to investigate the practices and challenges teachers face in using the interactive whiteboard. The finding of this study indicated that there is a huge gap between teachers' practice of using the smart board and pedagogical understanding of the interactive white board. Teachers do not engage students because the stylus is not used and the touch sensitivity of the IWB is neglected. The teachers were limited to what they are presenting and use the IWB only to magnify the notes their students have to copy.

The teachers do not engage students. Merely present a static material with a lecture style, the teachers do not invite students to the screen to draw or highlight elements of presentation. teachers prefer giving verbal instructions and lessons rather than using resources from the internet, Teachers get tired of to restart or trouble shoot the device when they face technical problem. Teachers were limited to lessons presentation be lecture Teachers lessons were not well prepared and organized to coincide with the IWB. Teachers do not prepare their lesson with attractive and engaging flipcharts to be displayed on the IWB. Teachers' flip charts lack videos that are used to clarify concepts with visual mode.

The findings also revealed the initial, in service training teachers received on IWB use in to teaching is inadequate, It is critical to provide ongoing IWB support to staff and teachers; It is beneficial to design differentiated support strategies for instructors during initial training. Professional development and ongoing support are essential for successful IWB integration,

The study revealed that the problems teachers face when they use the IWB were they lack confidence in their ability of using IWBs teachers difficulty in managing their students while using IWBs When teachers lack the necessary skills to use an IWB. Teachers fail to see any advantage in working with the IWBs.

Teachers skill level is not much sufficient to use the smart board effectively; limited time to search for resources to use with the IWB .The study also revealed that teachers are not motivated to use the interactive white board in regular basis . Most of the teachers' use the tool merely as a projector but the tool's use is more than that if properly applied it can bring a miraculous effect on the students' achievement and it can create a highly interactive and motivating environment for the students.

Some of the challenges that negatively affected utilization of interactive white board are the training on the IWB usage is not enough because it is not provided by expertise rather by teachers who are experienced and also the teacher attitude towards the IWB use is not satisfying. The school should appoint personnel who can provide better technical and pedagogical support to promote effective teaching and learning in relation with the use of the IWB for teachers.

To avoid challenges possible measures should be taken, like teachers should be given better pedagogical and technical training on how to use the interactive white board effectively and bring the intended outcome on students Therefore, it may be concluded teachers failed to use the interactive white board at its most to bring about the intended positive outcome on their students with the aid of this technology tool.

5.3. Recommendations

In the light of these findings the researcher recommends that technology such as Interactive white board should be used accurately in order to facilitate teaching and provide interactive learning opportunities for learners to learn. The responsibility is shared between school principals and teachers themselves to integrate the interactive white board in to teaching and learning process and reduces the challenges when they occur

- ☞ Teachers should upgrade their knowledge and skills of using computer to minimize challenges when they occur inside the classroom.

- ☞ Teachers should access a wide range of resources on the internet to aid students in instruction.
- ☞ Teachers should use the stylus or their finger to increase students' engagement physically with the board to enhance interactivity.
- ☞ Teachers should enable their students to interact with content themselves and invite them to the screen to draw images or show their work rather than passively reading lecture notes.
- ☞ Teachers should engage students with this technology, students need to use their finger and write directly on the IWB.
- ☞ Teachers should get adequate and reliable training on how to use the IWB to support effective teaching and learning to improve their IWB integration skill.
- ☞ Teachers on their part should exert maximum effort to prepare resources that best suit a specific lesson to create more interactive class with the aid of the IWB.. They should take time and prepare thoroughly before they come to class to teach.
- ☞ Teachers should be given the relevant training on how to familiarize themselves with different educational resources that are helpful to clarify concepts.
- ☞ Teachers should read about smart board pedagogy – innovation in teaching and changing in methods to meet the needs of 21st century learners.
- ☞ The school needs to provide technical support for teachers and increase the number of technicians.
- ☞ The school should minimize teachers work load
- ☞ Applied trainings from experts in using interactive white boards should be provided for teachers.
- ☞ Education technologists should be employed in the school and teachers should be subjected to supervision by these experts in terms of their levels of effectively utilizing these technologies as well as being continuously supported.

5.4 Suggestions for further studies

- i. A study could be carried out to evaluate the quality and suitability of the interactive white board used in teaching and learning process.
- ii. An in-depth study could be done to investigate the teachers and students attitude towards the use of interactive white board in teaching and learning.
- iii. A thorough study on utilization of newer technology to teach should be carried out.
- iv. A comparative study can be carried out on the impact of using Interactive White Board in schools.

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Appendices



Seek Wisdom, Elevate your Intellect and Serve Humanity



Appendix A

COLLEGE OF EDUCATION AND BEHAVIORAL STUDIES

DEPARTMENT OF EDUCATIONAL PLANNING AND MANAGEMENT

Questionnaire to be filled by teachers

Dear respondents

Welcome and thank you for sparing time to fill this questionnaire. I am undertaking a Masters Degree in Educational Planning and Management in Addis Ababa University. The purpose of this questionnaire is to Investigate Practice of Teachers in using Interactive White Board. Please complete each section as instructed. All information provided will be highly confidential and is only for academic purpose.

General instruction

1. Do not write your name
2. Read each question carefully
3. Please respond to all closed ended questions by putting“✓” marks in the boxes and to the open ended ones by writing your responses on the space provided.

Part I: General Background

1. Sex Male Female
2. Age A. 20-25
B. 26-30
C. 31-40
D. 41-45
E. above 45
3. Educational level A. Diploma B. Degree C. Masters
4. Work experience _____
5. Field of specialization_____

Part II. Practice of teachers’ use of interactive white board

The following questionnaire seeks to obtain information on the extent to which interactive technology is used in teaching and learning process. Respond to the following statements to the best of your knowledge by using the following keys: **5= Strongly agree, 4= Agree 3= Neutral, 2= Disagree, 1= Strongly disagree**

1. Type of professional training teachers have

| No | Items | 5 | 4 | 3 | 2 | 1 |
|----|---|---|---|---|---|---|
| 1 | The initial training teachers received on IWB use in to teaching is inadequate | | | | | |
| 2 | There is no in service training on how to integrate smart board in to teaching. | | | | | |
| 3 | There is no professional development programme for teachers to upgrade their skills of using computer | | | | | |
| 4 | There is no training on technical skills for teachers. | | | | | |

If any other, please specify _____

2. The type of technical support teachers have

| No | Items | 5 | 4 | 3 | 2 | 1 |
|----|--|---|---|---|---|---|
| 1 | I can solve more common technical difficulties when they occur. | | | | | |
| 2 | In terms of numbers technicians are not enough to deal with all classroom demands | | | | | |
| 3 | Technical support is not helpful to give technical in service training on smart board for teachers | | | | | |
| 4 | When something goes wrong with an IWB I can easily get help to resolve it | | | | | |

If any other, please specify _____

3. Problems teachers face when they use the IWB

| No | Items | 5 | 4 | 3 | 2 | 1 |
|----|--|---|---|---|---|---|
| 1 | I don’t have confidence in my ability to use the IWBs | | | | | |
| 2 | There is difficulty in managing the students while applying such technologies | | | | | |
| 3 | I fail to see any advantage in working on the IWB | | | | | |
| 4 | My skill level is not much sufficient to use the smart board effectively | | | | | |
| 5 | I have limited time to search for resources to use with the IWB. | | | | | |
| 6 | I am not motivated to use the interactive white board in regular basis | | | | | |
| 7 | Time restricts me from letting students display their works on the smart board | | | | | |

If any other, please specify _____

Thank you for your genuine and kind cooperation

Appendix B



COLLEGE OF EDUCATION AND BEHAVIORAL STUDIES

DEPARTMENT of EDUCATIONAL PLANNING AND MANAGEMENT

Interview questions for school principals

Dear respondents, the purpose of this interview is to collect relevant data on the study entitled “Teachers practice of using the Interactive White Board”. Your responses are vital for sure that they will not be used for any purpose rather than academic purpose your participation is volunteer based. No need of writing your name.

Thank you in advance for your genuine and kind cooperation.

Part One: General information

1. Sex -----
2. Age -----
3. Academic qualification -----
- 4 .Work experience -----
5. Current position -----

Part Two:Guideline questions for the interview

1. How do you evaluate your school in relation to utilization of Interactive White Board?
- 2 .How do you evaluate the role of teachers in utilization of Interactive White Board?
3. How has the school supported the integration of IWBs to promote effective teaching and learning environment?
4. What are ways the school could provide better support?
5. What are the major challenges that negatively affect utilization of interactive white board technology in your school?
6. What possible measures should be taken to avoid such challenges? Please make a detail clarification.

Appendix c



Seek Wisdom, Elevate your Intellect and Serve Humanity

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COLLEGE OF EDUCATION AND BEHAVIORAL STUDIES DEPARTMENT of EDUCATIONAL PLANNING AND MANAGEMENT

Observation Checklist

This checklist is intended to investigate the practice of teachers' use of interactive white board. The practices will be recorded in the category of yes /No, as they happen in the classroom. Each teacher will be observed one time.

School _____ section _____ period _____ Time _____ Observation day _____

| No | practices | Total frequency | | | | Total | |
|----|--|-----------------|---|----|---|-------|---|
| | | Yes | | No | | N | % |
| | | N | % | N | % | | |
| 1 | The teacher uses the touch sensitivity nature of the board | | | | | | |
| 2 | The teacher uses the smart board only as a projector for teaching. | | | | | | |
| 3 | The teacher encourages students to write and display their works on the board | | | | | | |
| 4 | The teacher is comfortable using the IWB | | | | | | |
| 5 | The teacher uses good IWB resources in his/her lesson. | | | | | | |
| 6 | The class was interactive with the help of the IWB | | | | | | |
| 7 | The teacher struggle to manage the smart board. | | | | | | |
| 8 | lessons are better prepared and more organized coinciding with the IWB. | | | | | | |
| 9 | The teacher applies student centered method of teaching with the IWB. | | | | | | |
| 10 | Teacher prepare lesson with attractive and engaging flipcharts to be displayed on the IWB. | | | | | | |