Exploring the Effects of the Use of Interactive Whiteboard on Teachers Professional Development in South African High Schools

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Abstract: The paper evaluates the effects teacher development in the use of the interactive whiteboard (IWB) when teaching. This comes as a result that technology continuously evolves and requires teachers using the interactive whiteboard to remain lifelong learners in the area of technology. More time and resources should be allocated to facilitate professional development of teachers and make teachers familiar with the interactive features of the IWB. A literature review approach in this paper highlights inputs from different writers and later discusses findings and provides recommendations from a South African perspective on professional teacher development in the use of IWBs. This paper takes the form of a qualitative method and as a result a case study research design was selected for this study. Data were collected by means of interviews and observations. Data were analysed using ATLAS.ti version 6.2. The education district involved in the study has 41 high schools with about 1457 teachers but only 36 high schools had the IWBs installed and functioning. A non-probability sampling called convenience method was used to sample the population and 23 teachers from 22 schools were sampled. The results show that challenges encountered by teachers relate to the ineffective training methods, lack of follow-ups sessions as well as the lack of on-going training. In a study conducted in Tshwane North district, South Africa, the following question was asked: How is the teacher professional development conducted on the use of IWBs in teaching and learning? The study further revealed that teachers received professional development on the use of IWB. However, it was found in this study that the trainining was not enough in terms of the duration, and that training was only about how to learn the technical use of the IWB. Most of the teachers reported that training took two hours in the afternoon, three months, twice a week, every Wednesday, and after school. The study further revealed that poor IWB development caused frustrations when teachers had to utilise the IWB in class. When effectively used, IWB add the visual impact, assist in the learning process, increase active participation and engagement, and creates excitement and a positive attitude to learning. We recommmed that professional teacher development in the use of IWB in both technical and pedagogical aspects be a priority for successful use of this technology in schools. In this regard adequate teacher development could assist in eliminating a trend where the IWB is used by teachers as a projector to show videos or books but promote the interactivity provided by the features of this tool.

Keywords: Interactive whiteboard, Professional development, High Schools, South Africa

1. Introduction

Globally, the interactive whiteboards (IWB) has gained popularity and wide acceptance in classroom teaching and learning processes most of the school has invested in them. The advent of the 4th industrial revolution driven by automisation economy whereby the world is becoming more and more digitalised, this drives the education to follow suit (Kloos, 2018). In fact, Education 4.0 promotes the use of current technologies such as interactive whiteboard in education because of the nature of resource presentation and on learning processes, affecting the development of thinking skills, encoding and retention of information, and interaction between students and teachers (Kloos, 2018). In this case, IWB support education to meet the requirements of the 4th industrial revolution. In the current decades, the IWB is relatively common educational tool in high schools that also supports Education 4.0. The concept of Education 4.0 arises from the fourth industrial revolution whereby education is expected to align itself with. Thus the introduction of information and communication technologies (ICT) in education saw education taking advantage of the technology but with massive challenges (Intelitek, 2018). And, there should a revisit to the educational paradigms to accommodate technology (Intelitek, 2018).

In this case the benefits of the use of the IWB include improvement of whole-class teaching, fostering

of student engaging learning, and can be used as an experiment tool in teaching practical subjects (Gregorcic, Etikan & Planinsic, 2018). This benefit is further stressed by Shi, Peng, Yang & Macleod (2018) where they stated that IWB develops high levels of academic self-efficacy and invigorate more opportunities for students to interact with their teachers, fellow students and the content being taught. The benefits of the IWB go further to influence the teaching strategies the 21st teacher. This view is supported by Kearney, Schuck, Aubusson & Burke (2018) and White (2018) where they point out that the IWB is used and valued for instructional purposes. The benefits in the use of IWBs in teaching and learning further stated by Schneider (2018:19), "Students who utilised the IWB in their classrooms showed improvement in focus, enthusiasm, and academic focus".

In this regard, technology continuously evolves and requires teachers using the IWB to remain lifelong learners in the area of technology. In fact, more time and resources should be allocated to facilitate professional development of teachers and make teachers familiar with the pedagogical interactive features of the IWB. The effective use of IWBs requires teachers to understand the methods of interactive teaching. Consequently, this needs more appropriate training but also teachers need continuing professional development to ensure their growth and improvement (Ninlawan, 2015). It is argued that teacher training is important because teachers are critical agents in mediating the software; integration of the board and software into the subject aims of the lesson (Bayar, 2014). This research carried out in South Africa shows that many teachers attended the basic training for using the IWBs when it was first introduced. On the other hand, the challenges encountered by teachers in professional development relate to the ineffective training methods which include among others lack of follow-ups sessions as well as the lack of on-going training (Gutierez & Kim, 2017). It is pointed out that teachers discontinue using IWBs in the regular classroom lesson delivery, because of the lack of ongoing and practical training on the integration and use of this technology (Gutierez & Kim, 2017).The paper would like to answer the following research question: How is the teacher professional development conducted on the use of IWBs in teaching and learning? In order to answer the main question participants were asked to participate in four observation questions and two interview questions. The observation were based on the following: How do teachers use IWB during the lessons; How efficient are teachers using the IWB in presenting the lesson; By using the IWB what is the confidence or self-esteem of the teacher; And what are the challenges encountered by teachers during the lesson when using IWB; The interviews were based on the following questions: Did you receive training on the use of IWB? Yes/No elaborate on the training, and How do you use IWB in class?

2. Literature Review

Professional development of teachers is argued that it has a potential to deal with the main pedagogical orientations in the use of IWBs and should be regarded as essential (Burke, Schuck, Aubusson, Kearney, & Frischknecht, 2018; Comi, Argentin, Gui, Origo, & Pagani, 2017). However, Richards, Bladek & Okamoto (2018:11), and Karsenti (2016) argue that IWB training should focus on the interactive features of the IWB. This is a view shared by Sanders & George (2017) that the focal point of professional development should not only be on the technical use of IWB or pedagogical aspects in isolation but should instead include ICT skills, pedagogy, and subject teaching in every respect. Furthermore, McKnight, O'Malley, Ruzic, Horsley, Franey & Bassett (2016) stress out that the discharge of technologies in schools should not center on the technology itself but that attention should be on teacher-centered professional development. This view is further stressed by Schneider (2018:34) that, "We must promote interactivity in the teacher training in order to promote our teachers to teach interactively".

In addition, Gregorcic, Etkina & Planinsic (2018) point out that more time and resources should be allocated to facilitating professional development of teachers in the utilisation of IWBs. This view is supported by Aksu & Öztürk (2018) wherein some instances teachers using the IWB in teaching and learning indicated that it was essential for them to receive training on the use of IWB. Accordingly, Tatli & Kiliç (2016) propagate the inclusion of IWB training programs for undergraduate students and pre-service teachers. Schneider (2018) emphasises that the level of training in the use of the IWB by teachers and level of interactivity when using the IWB has a great impact on education results. In addition, White (2018) found out that in some instances teachers training focussed mainly on the practical operations of the features of the IWB ignoring its importance

as a teaching tool. White (2018) further highlighted that it was a common practice for teachers to be afforded little training which on the one hand compromises the effective use. Proper training leads to the creation of interest in learners and makes teaching easy as it motivates learners to learn (Sheikh, Ahmad-Baig, Munir, Habib & Gulzar, 2018).

However, Gregorcic *et al*. (2018) and White (2018) identify negativity towards the use of IWBs by teachers due to lack of training, enthusiasm for the new technology, or training been too short to prepare teachers adequately. Furthermore, Sheik, *et al*. (2018) states that in some situations schools received IWBs with little training been offered and that resulted in the project failing due lack of professional development. In some instances, insufficient and not satisfactory professional development is observed (Ackay, Arslan & Guven, 2015).

2.1 The Importance of Professional Teacher Development

The importance of teacher professional development on the use of IWBs is stressed by McKnight *et al*. (2016) who argues that teachers who successfully implement technology change the way they teach the curriculum and some other teachers can learn by observing their peers using the IWB (Richards, Bladek & Okamoto, 2018). This is a view shared by Tunaboylu & Demir (2016) who points out that IWBs allows the use of diverse classroom instruction models in order to offer effective and efficient learning which caters for learning differences among learners. Accordingly, Alghamdi & Higgins (2015) highlighted the benefits of adequate professional development on the use of IWBs as production of active lessons; enhance teachers' satisfaction and desire for teaching; increase teachers' skills, confidence and enjoyment; enhance teaching abilities and improve creativity; aid teachers to be autonomous and self-guided learners, and develop teachers' IWBs skills.

Generally, teacher development is viewed as an important aspect of empowering teachers (Carpenter & Linton, 2018). The above mentioned view is stressed by Schneider (2018:33) that, "Through training and practice, teachers will become comfortable enough to effect students' learning outcomes through the interactive use of Smart Boards and all interactive whiteboards". Training of teachers in the use IWB plays a vital role as proper, adequate and continued training reduce anxiety among teachers (White, 2018). IWB poses the possibilities to improve pedagogy if effective training on how to use the technology is implemented (Habeeb, 2018).The importance of training teachers on how to use IWB also brings diversity in the classroom, allows teachers to keep notes and it is reported that using the IWB in teaching and learning is more effective than any other ordinary teaching aid in schools (Hasan & Ibraheem, 2018).

3. Methods and Materials

A qualitative method was used in this study. This method was preferred based on the type and size of the targeted population and sample. Furthermore, a case study research design was selected for this study.

3.1 Population and Sampling

Population of this study is 1457 high school teachers who use or had functional IWBs installed in their classrooms in the Gauteng province, Tshwane North District of South Africa. Participants were selected using convenience sampling. The participants were selected because they were available, accessible and the statistical inferences were made about the data (White, 2005; McMillan & Schumacher, 2001). The researchers sampled 18 teachers from 18 schools for interviews and 5 teachers were sampled from a different set of four schools to participate in the observations. In total 23 teachers were sampled from 22 of the 36 high schools who had IWBs installed.

3.2 Data Collection Instruments and Procedure

Instruments used in the collection of data were observation tools and semi-structured interview questionnaire. The observation tool was prepared beforehand. The lesson observations were conducted in a non-interference approach. Interviews provided much greater depth of understanding of the research questions especially when it is semi-structured interviews. The interviews were conducted individually at sampled schools. The researcher interviewed 18 teachers from 18 schools and the interviews were conducted at schools during lunch breaks. The interviews were recorded using a smart phone. Trustworthiness was used to assure qualitative data. Confirmability was ascertained by focusing on different findings from the qualitative

Figure 1: Primary Documents

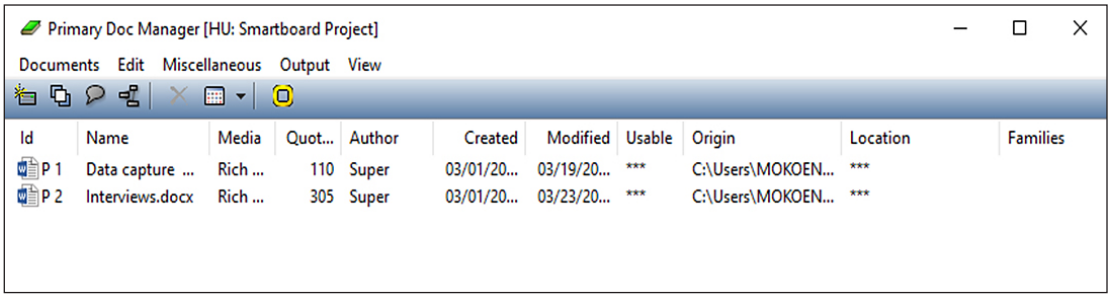

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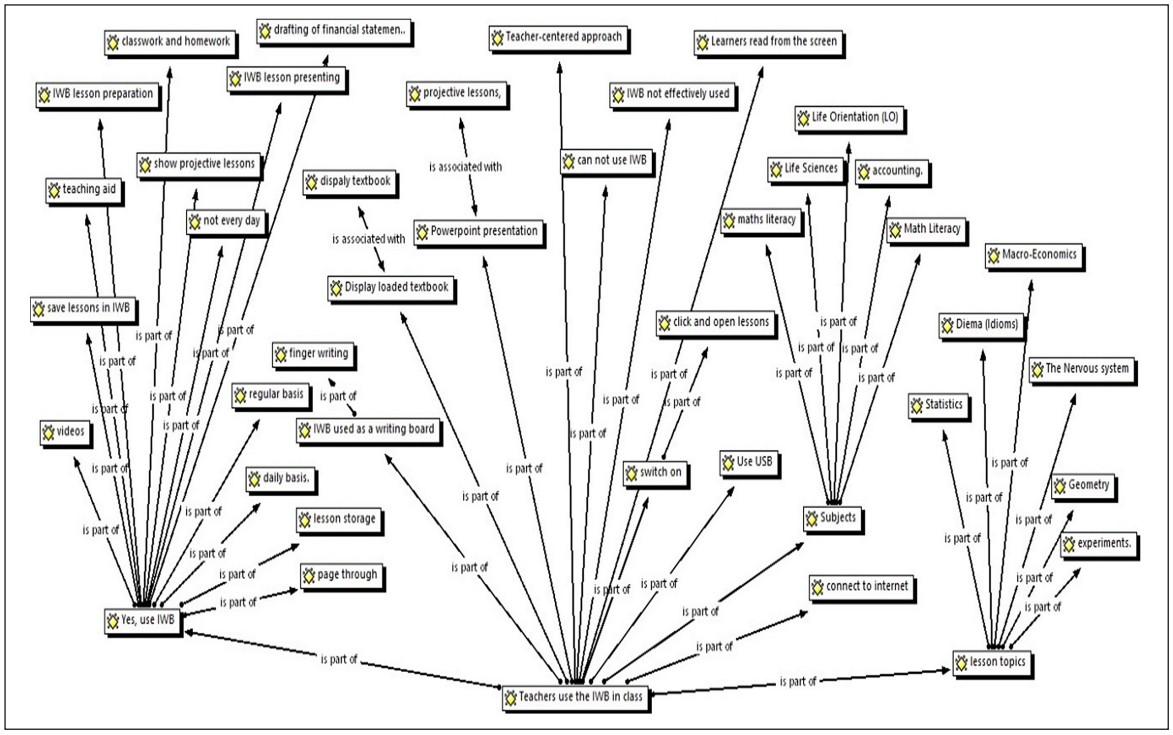
Figure 2: The Network or Conceptualisation Relating to Teacher Use of IWB in the Class



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aspects (ATLAS.ti 6.2) that is findings from observations and interviews to see if they corroborated each other. To address issues of objectivity in this study, the instruments were discussed with supervisors in order to assure issues of objectivity. And to comply with respondent validation, (Bless *et al*., 2013), the interview transcripts data were discussed with participants for them to verify if what was interpreted is what they meant.

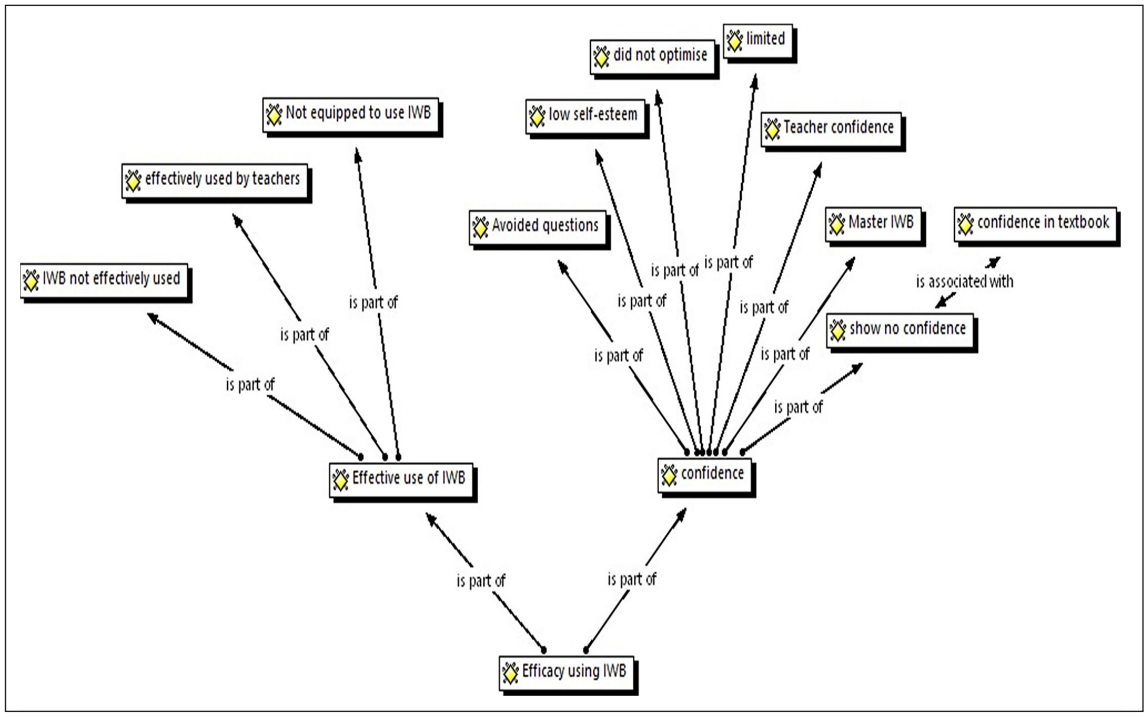
3.3 Data Analysis

In analysing qualitative data, the qualitative analysis software ATLAS.ti 6.2 was used. Firstly, the researcher started by creating the hermeneutic unit called smart board Project. In this hermeneutic unit, two primary documents were uploaded. P1 represents data form observations and P2 represents data from interviews. From these documents, the researcher coded 366 codes. The system generated 415 quotations. See Figure 1.

4. Results and Discussion

Firstly, researchers observed how teachers used the IWB during the lessons. In this regard data was gathered during lessons. The following categories were identified: *Yes I use IWB, IWB used as a writing board; display loaded textbook, PowerPoint presentation, teacher-centred approach, and Cannot use IWB.* The following network relating to teacher use of IWB in the class was created. See Figure 2.

Figure 3: The Conceptual Network Relating to Efficacy Using IWB



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In terms of the second observation item, *teacher use of IWB in the class*; teachers were observed using the IWB in class when teaching. Furthermore, teachers were observed using the IWB as a writing board. The researchers further observed teachers writing on the screen using their fingers. We further observed teachers display pre-loaded materials and display textbook on the IWB and learners were made to read from the screen. The researchers further observed teachers using a USB to load a slide presentation resulting in a PowerPoint presentation, researchers further observed that teachers cannot use the IWB.

Secondly researchers observed how efficient are they using the IWB in presenting the lesson and by using the IWB what is the confidence or self-esteem of the teacher. In this regard the following categories were created: *Effecting use of IWB* and *confidence,* as shown in Figure 3.

In case of effective teaching using IWB, researchers observed that teachers effectively used IWB for slide presentation. Furthermore, researchers observed that the IWB's built-in features were not utilised, and that the IWB was used as a writing board. With regard to teacher confidence, researchers observed that teachers were limited to the use of USB, were not properly equipped to use the IWB, and from the researchers' observational point of view that was an indication of low self-esteem when using the IWB. Furthermore, researchers observed that teachers seemed to have confidence in the textbook rather than the IWB.

Thirdly researchers observed the challenges encountered by teachers during the lesson when using IWB. In this case the following categories were created: *board stuck, restart the board, takes time, resorting to textbook, lack of audio enhancement, cannot draw graphs, cannot add information, takes time, lack of the Internet connection, shuts down, lesson smooth, and no problems*. Figure 4 on the next page shows the conceptual network relating to IWB challenges. These were challenges expressed by teachers in connection with their usage of the IWB.

In this case researchers observed that the IWB got stuck and froze in the middle of the lesson. It was also observed that the IWB took time to load information when used in the classroom. Furthermore, it was observed that the IWB lacked audio enhancement and internet connection. In this case teachers were observed to be resorting to the use of textbooks instead of the IWB.

In the research questions, firstly teachers were requested to respond to the question: Did you

Figure 4: The Conceptual Network Relating to IWB Challenges

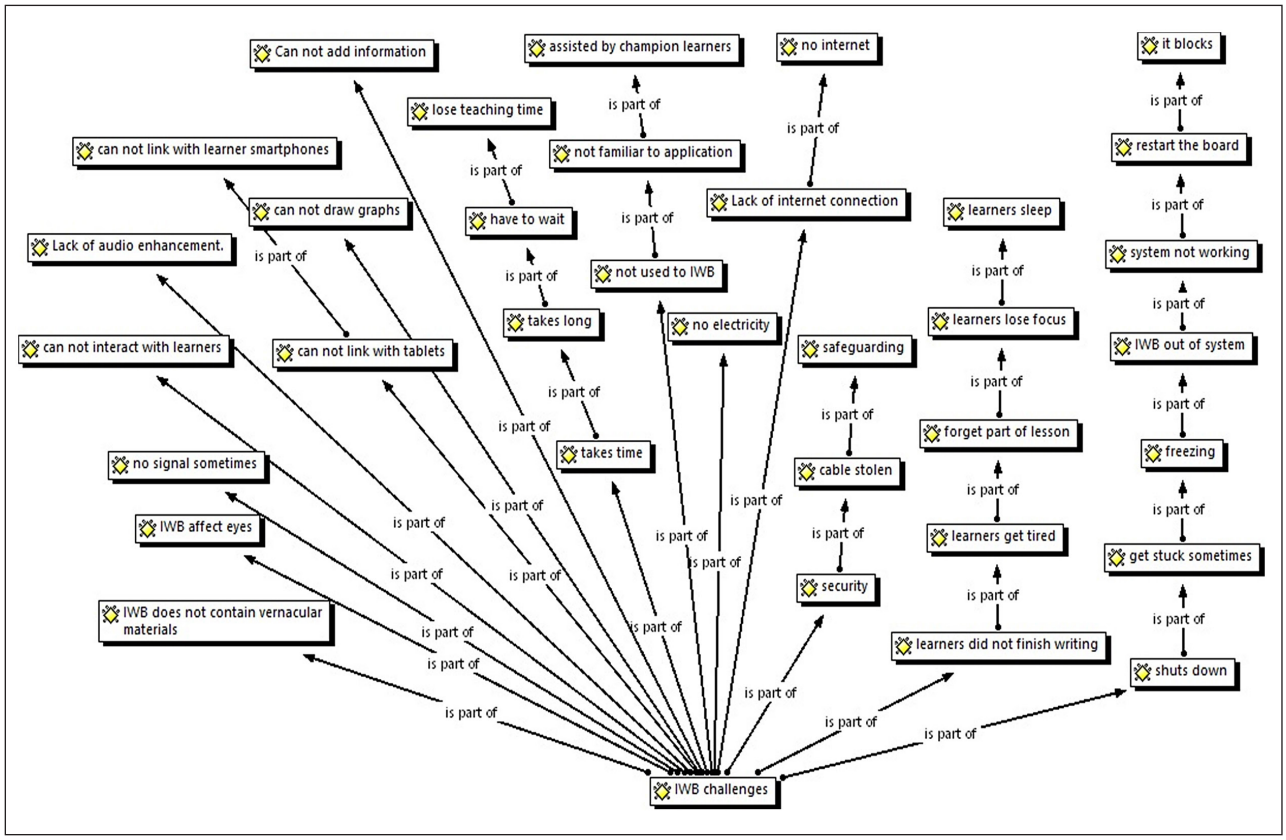

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Figure 5: The Conceptual Network Relating to IWB Training

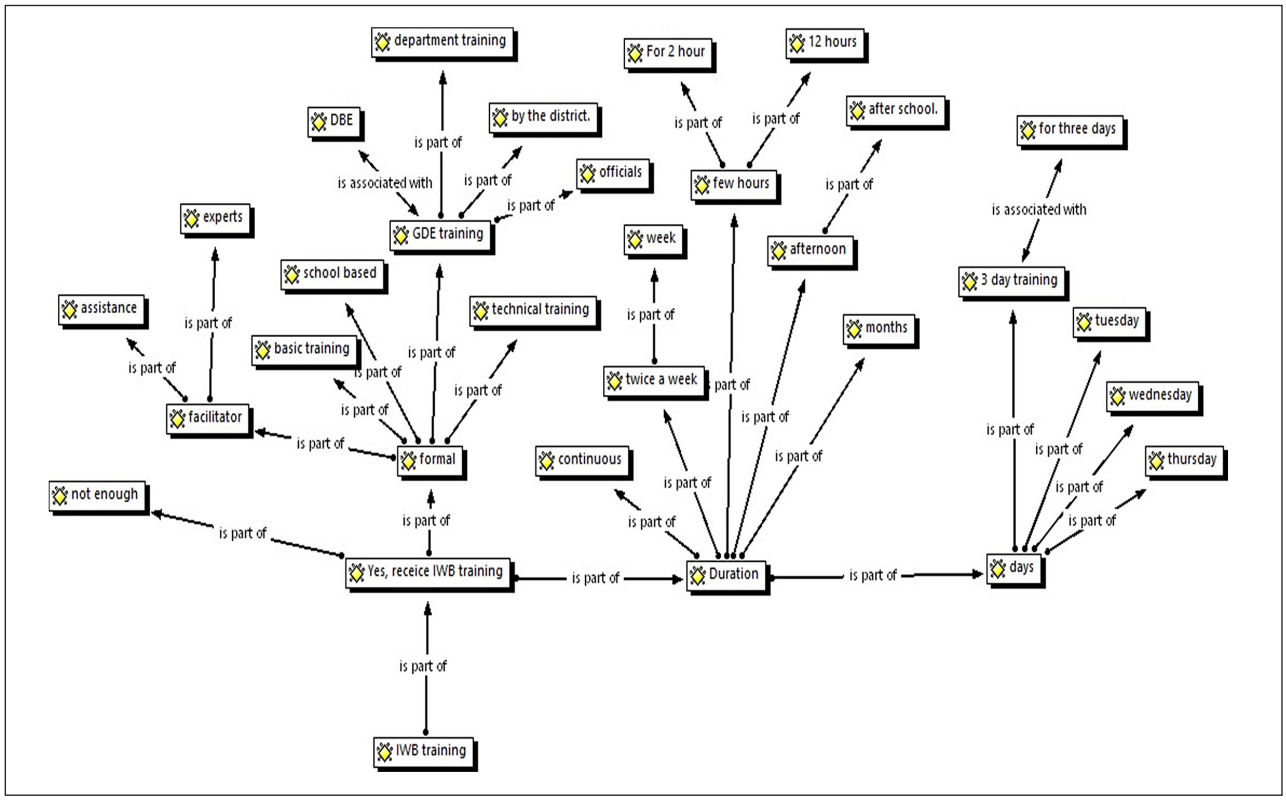

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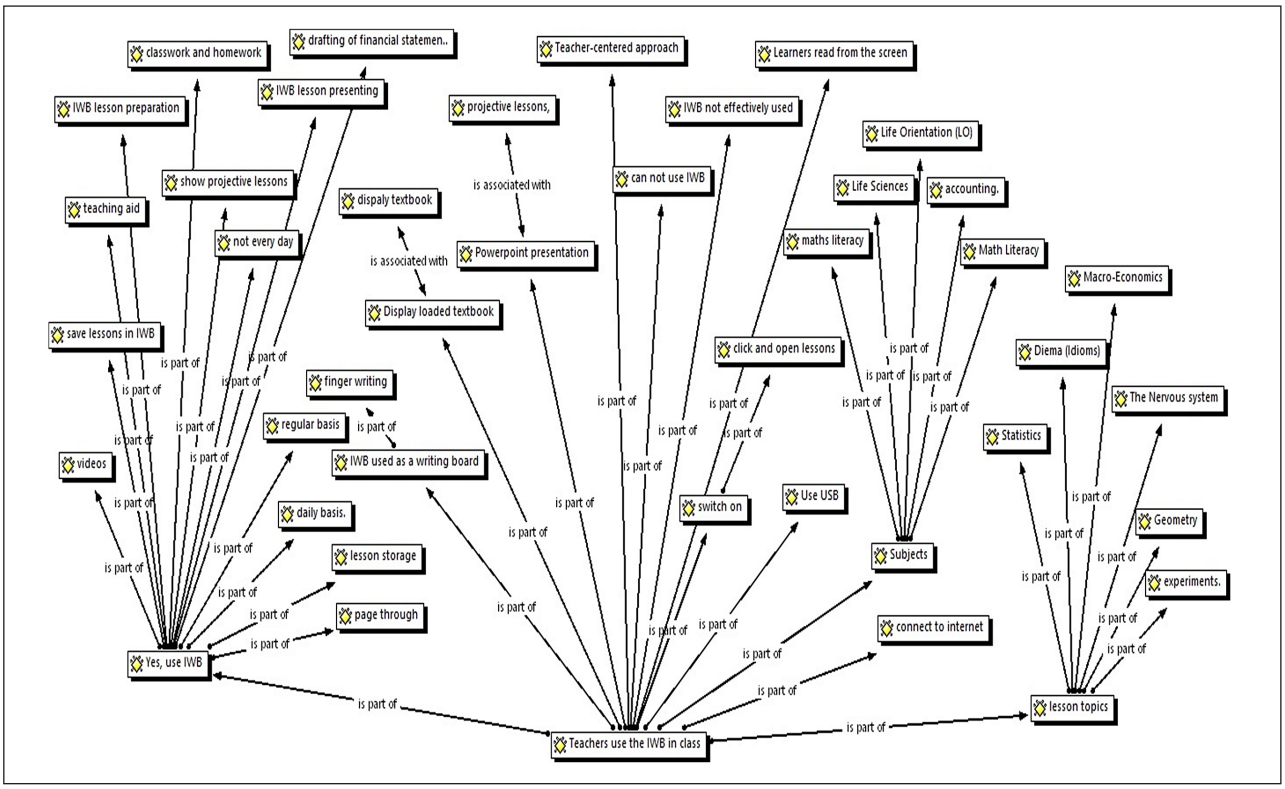
Figure 6: The Conceptual Network Relating to Teachers Use of IWB in Class



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receive training on the use of IWB? Yes/No elaborate on the training. Here the following categories were created: *yes; receive IWB training, not enough, duration, and days*. These categories are shown in Figure 5 on the previous page as the conceptual network relating to IWB training.

In this case teachers revealed that they attended the IWB training however teachers indicated varying patterns and levels of training. In this study teachers showed that IWB training was not enough in terms of duration, the research further showed that IWB training durations varied from two hours, five hours, and was conducted in the afternoons or after school hours. Teachers revealed that lack of or insufficient training frustrated them sometimes because they needed to do some of the things on the IWB but could not because they were not properly trained to use the IWB in their lessons.

The second research question required teachers to respond to: *How do you use IWB in class?* In this regard the following categories were identified: *Yes, use IWB, IWB used as a writing board, display loaded material, PowerPoint presentation, cannot use IWB, learners read from the screen, switch on, use USB, subjects, connected to internet, lesson topics and IWB not effectively used.* These categories are shown in Figure 6 as the conceptual network relating to teachers use of IWB in class.

In this case teachers revealed that they used IWB mostly for writing. This statement is confirmed by a teacher who indicated, "I do write on it, but it is the only thing I do with the IWB". The study further revealed that the IWB has loaded textbook material but the materials are not enough. In this case a teacher from another school said, "The IWB does not have enough material related to the subject that I am teaching. So, I am currently planning my own lessons on the use of the IWB".

Teachers revealed that they prepare PowerPoint presentations at home and then in class they use the IWB for a slide presentation. This statement is supported by Teacher from another school stated commented that, "I use it for projective lessons, videos and experiments". The study further revealed that teachers could not use the IWB, another Teacher said "but I do not know how to use the IWB". The study further revealed that some teachers battled to switch on the IWB in order to use it in class, on the contrary another group of teachers reported that they can operate the IWB. In this case Teacher Pete

indicated that; "When you switch on, the problem is difficult because the textbook is behind; you find that it blocks and it freezes. You cannot even go on", while Teacher Bheki was positive that; "I can always click on the IWB and open my lesson preparation".

It is evident that teachers received some form of professional development on the use IWB. However, this study indicated that the training was not enough in terms of duration and context. Participants in the study showed that not enough time was allocated to the training. The study reported that training occurred in the afternoons, took two hours or five hours, and it that it was conducted in the afternoons or after school hours. It is based on these findings that the level of teacher professional development in the use of IWBs was not adequate, a phenomenon also noted by Pourciau (2014). The study further revealed a particular pattern on how teachers used the IWB in the classroom. Here teachers indicated that they use IWB for PowerPoint presentation to leverage more interactive teaching and learning (Burke, *et al*., 2018). Teachers also indicated that they were writing on the screen using their fingers more or the same as they did on the chalkboard, this gives an implication that teachers had substituted the chalkboard by the IWB but still apply same teaching styles. Furthermore teachers reported that the training was only about how to learn the technical use of the IWB. This was also reported by (Aksu & Öztürk, 2018; Karsenti, 2016). Reseach revealed that it is crucial to conduct IWB teacher training in order for teacher to gain confidence in the classroom when using the tool (Lewis, 2017). An observed pattern from the study was that the technical problems and malfunctioning of IWBs frustrated the already poorly trained teachers in class. The study revealed that sometimes the IWB took long to load materials, IWB froze during lessons, and teachers also could not switch them on.

5. Conclusion and Recommendations

It is reported in this study that teachers did attend the formal professional development on the use of IWB. However, it was also found out that the training received by teachers was inadequate, because not enough time was allocated for professional development. In this case, the use of IWB in class frustrated teachers and led to them reverting to using the IWB as a writing board instead of it been an interactive teaching tool. This study further reported technical challenges faced by teachers, such as lack of internet connectivity, freezing and shutting down of IWBs and lack of audio enhancement as causes of frustrations to teachers and affects teacher confidence on the use of IWBs. Generally, on the above mentioned findings, a conclusion can be made that most of the schools lacked and had poor ICT infrastructure and support systems.

It is recommended that continuous professional development in the use of IWB in both technical and pedagogical be a priority for successful use of this technology. This is a view shared by Kiilu, Nyerere and Ogeta (2018) that the success of IWB use in schools relies on continuous teacher training. The study further recommends that teacher in service training and novice teacher training should be prioritised. Furthermore, for a successful implementation and adoption of the IWB as teaching tool, it is important that the IWBs are continuously serviced for optimal functioning as it emerged from the study that teachers were sometimes frustrated by malfunctioning of the IWB. In addition, it is important that teachers do not only use the IWB as a projector where they only show videos, books or worksheets, but promote the interactivity provided by the features this tool (Kearney, Schuck, Aubusson, & Burke, 2018). To increase teacher confidence in the use of IWB, training should be both pedagogical and technical as supported by Lewis (2017). This view is further suported by White (2018) who pointed out that training must be aimed at using the IWB as a teaching tool.

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