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BED COMPUTER SCIENCE

AN INVESTIGATION INTO THE CHALLENGES IN THE ADOPTION OF INFORMATION COMMUNICATION AND TECHNOLOGY IN A SELECTED PRIMARY SCHOOL IN WARREN PARK.

BY

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DECLARATION

I, Nyarai Mushinga do hereby declare that this project is my original and independent work and is a result of my own investigation, other sources are acknowledged by references and affirm that this piece of work has not been submitted to any other university.

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Abstract

Lack of ICT resources has negatively impacted on the full and effective adoption of ICT in education as well as the implementation of the new curriculum in the Zimbabwean context. ICT was adopted in the primary schools but the level of adoption is still in its infancy stage due to mainly shortage of resources and facilitators who lack ICT skills. This study sought to dig deeper into the challenges that are hindering the effective adoption of ICT in the primary school. Questionnaire, Interviews and Observations were used for data collection in this research study. A sample of 41 participants was selected from a target population of 409 teachers and students. Selection of teachers was done using purposive sampling and students using random sampling. Mixed method paradigm was used and the research design employed was a case study. Data were analysed using frequencies and percentages. Findings revealed that effective ICT adoption is mainly hindered by shortage of ICT tools and lack of expertise. Recommendations were made to the Ministry of Primary and Secondary Education through the district do some follow ups in the primary schools in order to ensure that ICTs are being used in teaching and learning. The ministry can as well can facilitate the purchasing of ICT by engaging companies that sell ICT equipment so that the schools can procure them at favourable prices and conditions. The schools can also harness the adoption by adopting the tablet computers to use in classrooms. The recommendations would promote the effective and full of adoption and integration of ICTs in the primary schools.

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CHAPTER ONE

THE PROBLEM AND ITS CONTEXT

1.1 Introduction

This study aims to explore the challenges in the adoption of Information Communication and Technology at a selected school in Warren Park. This chapter outlined the background of the study and the statement of the problem followed. Research questions were clearly spelt out. The relevance and usefulness of the study was justified in the in the significance of the study. This chapter also delved on the assumptions of the study, limitations and delimitations. Key terms were also defined and the summary of the key points concluded the chapter.

1.2 Background of the study

It is the desire of every school to embrace the application of ICTs in schools. A remarkable growth in the use of ICT in schools was noted over the past decade. ICT has become embedded in the community of today and the gap between people from different backgrounds has been narrowed and this surely made an impact on the society (Kenya School Net, 2009). Africa is failing to keep up the pace in comparison to countries in the developed world as far as use of ICT in the education system is concerned hence there is a demand the application of ICT in primary schools.

In Singapore, three master plans were drawn and a crucial foundation was laid down and this saw teachers getting training in harnessing ICT in the classroom. The first master plan was intended to provide the teachers and students with access to ICT. The second master plan took ICT integration in education to higher levels (Choo and Seng, 2008). Furthermore, mass customization of programmes was adopted offering training to the teachers. According to Choo and Seng (2008), in 2006 families were presented with computers which are already connected to internet and this was of benefit to about 90% of children who are of school going age from families with little or no possessions. The third master plan for ICT in education intended to improve the schools' ICT

infrastructure and to enhance teaching and learning. The focus of the master plans was on bridging digital divide by providing equal access to ICT and broadband infrastructure to all people inclusive of those from the rural areas. According to Global Competitiveness Report, Singapore is regarded as second in the world in terms of Internet access in schools (Ness and Lin, 2015).The connectivity of schools enabled students to use portable computer devices and accession to media rich interactive resources for learning in and outside the class (Ching et al, 2015). By the end of 2008 research showed that students were competent in using ICT tools. deFerrant cited in Wigdor (2013) said that, Singapore has excelled in teaching ICT skills. Tan et al (2017) lament that Singapore established a strong foundation which saw all schools integrating ICT into the curriculum. Choo & Seng (2008) state that a number of projects were piloted and introduced in the use of ICTs in the teaching and learning process in the schools. The projects included the use of Computer Assisted Instruction (CAI). An important development of ICT saw the use of tablet computers such as the Apple iPad in the primary schools (Tay and Lim 2013). Furthermore, these mobile devices are being introduced into the classroom.

Rwanda has made some serious attempts in the transformation of the country from an agrarian based to a technology based one and this saw the introduction of ICT throughout the entire education system (Karareba et al, 2017). They launched the program known as One Laptop Per Child (OLPC) and this programme was launched in the primary schools in 2008 (Finger & Sultana, 2012). During that period, primary schools received 10 000 laptops and Rwanda was ranked in the top five buyers after purchasing the laptops. In 2014, Rwanda was considered third largest deployment site in the world for the child designed laptops (Karareba et al, 2017). A major transition was noted with respect to ICT. The initiative saw the installation of a vast number of computer systems in every primary school under the project OLPC. Starting from 2006 government efforts included the placement of computers notwithstanding the school or the location. Both private and public schools benefited and the objective was to ensure that every school had received an identical number of computers (Karareba et al, 2017). A mobile penetration of more than 80% has been noted and it has been said that “a mobile in every pocket rather than chicken in every pot” (Finger and Sultana, 2012:74).

Zimbabwe just like other nations realized the potential for ICT to improve the general quality of education. Therefore, it was not left behind in the venture of infusing ICTs in the school curricula.

It all started when the former president donated some computers to schools in both urban and rural areas in a bid to improve teaching and learning in the country. Giving the computers was a way to bridge the digital divide between learners (Shizha, 2013). Contrary in Zimbabwean context, technology based education is not yet viable (Dube and Scott, 2014). The Zimbabwe National ICT Policy (2016) points that, ICTs are being used in Zimbabwe, but significant gaps of access to ICT enhanced educational opportunities remain.

There seems to be some challenges which are being faced in the adoption of ICTs in teaching and learning in primary schools. It is on this basis that an investigation on the challenges hindering the effective adoption of ICT in primary schools in Zimbabwe was conceptualized.

1.3 Statement of the problem

An exponential growth in the use of ICT was noted over the past years and this made an impact in education in many parts of the world. However, the adoption rate in Zimbabwe is still minimal particularly in primary schools. This research seeks to explore **the challenges that are impeding the effective adoption of ICT at a primary school in Warren Park.**

1.4 Research questions

The major research question that this study seeks to address is: **How can ICT be effectively adopted and implemented in Warren Park primary schools.**

The first questions to be answered first were:

1. What are the benefits of using ICT in the teaching and learning process in primary schools?

2. What is the extent of ICT adoption in teaching and learning in primary schools?

3. Are there adequate and functioning ICT tools in primary schools?

4. What are the challenges faced by primary schools in adopting ICT?

5. What can be done to improve the adoption of ICT in the primary schools?

1.5 Significance of the study

The study focused on highlighting the importance of ICT as well as making efforts in devising strategies to overcome the challenges so that the teachers become effective technology adopters.

Therefore, digging deeper on the matter in search for the truth that revolve around this topic will keep the teachers abreast with the barriers to ICT adoption and understanding the extent to which these are affecting the teaching and learning process . In addition, the teachers would be equipped with the skills to tackle these problems. The government is responsible for drafting policies which the schools are supposed to adhere to. This study will help in the designing of the policy on the use of ICT in schools. If these are clearly communicated to schools, adoption and integration of ICT in the classroom will be effective soon.

1.6 Assumptions of the study

The following assumptions were made:

- Effective adoption of ICT would improve the quality of education and performance in all learning areas.
- It is believed that all schools are now offering computer lessons and that they are using Information Communication Technology tools as stipulated in the updated curriculum which became functional in January 2017.
- ICT is merely taught as a subject but not integrated into the curriculum.

1.7 Limitations

Magwa and Magwa (2015) assert that, limitations are related to the potential shortcomings of the methods and procedures employed to achieve the anticipated results. The limitations stand as hindrances to the achievement of set objectives. The research study was confined to a selected school in Warren Park. The findings of the research could not be a true reflection of the whole district and Zimbabwe at large. Being a full time classroom practitioner, the time was very limited to thoroughly investigate the matter at length.

1.8 Delimitations

Choga and Njaya (2011) define a delimitation as setting of limits or boundaries within which the research was carried out. This research was based on a selected school in Warren Park which is in Harare Metropolitan Province. The teachers, school head and learners constituted the population for the study. Other schools in Zimbabwe and across the globe were used as examples but the main

focus is on the selected school. The school in question has no proper laboratory and the classroom was converted into a laboratory and tools to use in the teaching and learning process.

1.9 Definition of terms

Information Communication and Technology (ICT): refers to any system or device that allows storage, retrieval, transmission, receipt of digital information and it covers hardware such as computers, software systems and internet, broadband, broadcasting technologies such as radio and television and telephony (Doyle, 2008).

Adoption: Using electronic devices in the process of teaching and learning (Ayo and Ayo, 2017).

ICT Adoption: is the combination of ICT planning and appropriate strategies in ensuring that an organization implements ICT applications that can produce a competitive advantage (Bondarouk and Olivas-Lujan, 2014).

Challenges: These are obstacles that are faced by teachers in the adoption of electronic platforms in the teaching and learning process (Ayo and Mbarika, 2017).

1.10 Summary

This chapter served as the introductory chapter of the whole study. The entire chapter was based on the problem and the justification for the need to research on the problem. Assumptions were clearly spelt out. The chapter was wrapped up by looking at the limitations and delimitations of the study.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

A literature review is a written document used to present a case that is logically argued from authentic evidence based on researches previously done and gives a comprehensive understanding of the current state of knowledge (Machi & McEvoy, 2012).

This chapter will unpack the facts laid down by other scholars concerning the adoption of ICT in schools. Literature review provides research findings from previous studies on the topic under study in order to gain a broader understanding.

2.2 Benefits of ICT adoption in education.

Teachers can view ICT in the curriculum in quite a number of contexts through use by practitioners to support teaching and learning and cross curricular use as a tool in subjects (Simmons & Hawkins, 2009). They went further to elaborate that using ICT as a tool would consolidate skills and ICT was recognized as a transformative tool. Passey et al (2004) quoted in Simpson & Toyn 2012) articulate that a current statutory requirement pertaining to use of ICT across subjects is mainly the reason for the consideration of technology outside ICT lessons and this would go a long way in enriching and inspiring learning. According to Manichander (2009), ICT has influences in education in a number of ways. It is affecting every aspect of education ranging from teaching and learning to assessment and evaluation. Furthermore, ICT has been described as an instrument that facilitates mobile learning as well as inclusive education. The integration of ICT in education is said to be a global concern. Use of computers in the education fraternity promises better and improved methods of the delivery of content as well as expanding the available teaching and learning resources (Muema & Mula, 2011). ICT resources are very crucial for education because they improve the processes of teaching and learning and they also facilitate innovation in terms of content, methods and pedagogy (Huang et al, 2014).

ICT liberates both the teacher and the learner in the scholarly enterprise by taking off traditional boundaries and restrictions to knowledge (Alias et al, 2016). ICT use can connect regions which are geographically dispersed (Kulkarni, 2008). In other words it means that education is no longer

restricted to the four walls of the classroom. Using technology brings optimism and opportunity for education and adoption of it would put students in the driver's seat (Alias et al, 2016). According to studies, students' performance is enhanced when cognitive tools perspectives such as the application of ICTs is used as a learning tool. Huang et al (2014) concur with the notion that using ICTs bring positive results. Findings also showed that primary school students who used tutorials in reading scored higher in reading (Shizha, 2013). To close poor performance gap, computer integration is required into the learning environment as a way of improving performance (Ntirandekura, 2018). Traditional ways of learning are criticized for failing to prepare students to face challenges so the current education is focused on the learner centered constructivist approaches (Shizha, 2013).

Technology increases motivation and participation and it creates more fun in the classroom when the tools are frequently used (Hennessey, 2007). Dick and Martin (2002) say that, ICT is a useful tool because it provides pupils with sources of information and tools to capture, process as well as saving this information. Use of ICTs during teaching and learning has the potential to motivate and to deepen children's skills. Empirica (2006) states that, students get motivated when ICT based approaches are being used in class. These methods call for active participation by the pupils. ICT tools enhance the building of great passion for learning amongst the learners and this could be done through games, puzzles and quizzes (Patil, 2012). Audain (2014) has the same view and says that, ICT has potentials in motivating children in quite a number of ways through: trial error review whereby changes to work can be done in an unlimited number of ways and the child will continue to try and improve their work. Furthermore, reward with goals was talked about whereby large tasks are made achievable through the use of computers and solving problems in different ways .It can be disadvantageous to learn without ICT tools because it means that the learners would have been denied opportunities to acquire skills in order to become full participants in the globalized world.

ICT has the ability of dissolving boundaries whether between countries or subjects. It can afford opportunities to various students who need additional support in the classroom and it also a tool for inclusion because it accommodates even those with special needs (Florian & Hergaty, 2004). Crawford (2013) described ICT as a patient teacher. Pupils with learning impediments are able to carry out tasks at their own time and at their own pace and this will enable them to do their

corrections through the use of computers (Patil, 2012). Thus, use of ICT in education will enable the students to learn at their own paces and repeatedly until they accomplish their goals

Kazma (2005) propounds that, ICT allows pupils to have access to digital libraries to keep pace with the latest development. Waxman (2003) described Internet as a gold field of knowledge. In addition, it was said to be the newest and powerful tool in the computing world. Integrating ICT fosters better teaching and improved achievements of pupils. It can be viewed as a change agent and would improve the quality and accessibility of information.

The role of the teacher has been shifted from being a knowledge transmitter to a facilitator (Oliver, 2010). Use of ICTs facilitate learner-centered education. Three opportunities were identified namely; learner to learner and teacher to learner interactions, learners interacting with the content and learners interacting with ICT. This will inherently ease tension between the two paradigms that is between learner and teacher centered approaches (Nafukho, 2015).

2.3 Extent of ICT adoption in the primary schools

In Egypt, ICT is taken as a national development priority and a new ministry for that purpose was established in 1999 in order to achieve the information society which aims at harnessing the benefits of ICT in education. In Tunisia, the government was assisted by organizations such as Apple and Microsoft in implementing ICT, staff training programs, providing networking opportunities (Fayez, 2012). In Ghana, the policies and projects that were intended to introduce ICT into the classrooms of all schools have not materialized. This was attributed to incoherent policies and lack of co-ordination between stakeholders. This means that integrating ICT into the classrooms has not been easy (Douglas, 2013). Farrell & Isaacs (2007) quoted in Daniel (2010), point that, the process of adoption and diffusion is still in the transitional stage from a decade of experimentation. It was noted that most of the countries now have ICT policies in the education sector and the policies are trying to integrate ICT into the classroom rather than merely having it as a subject. In addition, a remarkable progress has been made throughout Africa in the adoption and diffusion of ICT in education. Studies by Abedalaziz et al (2013), reflected that the government of Malaysia took an innovative decision to let private players in the installation of ICTs and rollout programmes in education in a bid to increase the speed and reach of the gadgets. The schools together with the district offices of education engaged vendors to install equipment and teachers were trained in the use of ICT tools. This initiative was a success and Budhedeo

(2016) says that, 65% of schools in urban areas in Malaysia had Internet access and interactive boards in the classrooms. Establishment of intranet within schools was a step further towards the adoption of ICTs. Mauritius has made great achievements in as far as ICT adoption is concerned. Since 2011, the government of Mauritius has done huge investments in primary schools by ensuring that the schools had digital classrooms complete with a projector and interactive white boards and improving Internet connectivity (Williams & Arinto, 2018). This was done through the Sankore Project.

The adoption of ICTs in Kenyan schools remains limited. The slow pace of adoption was blamed to deep levels of poverty and corruption in the government departments (Trucano, 2010). This was evident that the National Policy in Education was not properly implemented (Mingane, 2013). Thus, proper implementation would lead to the achievement of goals stipulated in the ICT policy.

As a commitment to transform Zimbabwe into a knowledge based society, a national policy was developed and adopted in 2005. Largely, the policy was aimed at enhancing ICTs in education (Makura & Meda, 2017). As a measure to speed up ICT adoption in Zimbabwe, the former president launched the presidential e-Learning programme in 2011 (Majoni & Majoni, 2015). As a build to the programme another project was launched again in 2010 known as 'connect a school; connect a community' which was a way of empowering the disadvantaged schools. According to Musarurwa (2011), the presidential computerization scheme was launched with over ten schools per province benefiting from this initiative. The national ICT Policy spells out the need for infrastructure facilities, computer hardware and software, internet connections and to teach computer literacy. The Zimbabwe National ICT Policy (2016) states that, the new curriculum incorporates the integration of ICT in infant and junior levels in primary schools. The new curriculum which became functional in January 2017 emphasizes on the adoption and integration of ICT into the classrooms and it is a pre-requisite to infuse ICTs in teaching and learning. Furthermore, the government embarked on a teacher capacity building programme which commenced in 2015 in partnership with local universities to train teachers to be effective and competent in the integration of ICT.

2.4 Adequacy and functioning ICT tools in primary schools.

Kozma (2011) identifies the barriers which ranged from lack of access to computers which are in good working order to lack of software. One major obstacle that schools saw as a factor impeding

the attainment of ICT supported goals was simply lack of sufficient number of computers (Howies et al, 2005). There are no sufficient resources and equipment in the schools (OECD, 2005). This has been a huge drawback in most schools because the computer –pupil ratio would be unbearable and the reason being that other machines would be dysfunctional. Kafyulilo (2011) says that the delay in integrating ICT in education is caused by insufficient resources from the government. Dick & Martin (2002) assert that, each primary school should at least have three computers per class and that the teachers should at least devise a method on how to utilize them to the best effect. They advocated for connectivity so that the machines would provide the class with a huge information database. Investments have been made in the United Kingdom and this made some improvements in the computer pupil ratio. In 1980s it was 1:400, in 2001 it became 1:12 and 1:7 in 2013. Furthermore, pupils spend half of their time exposed to various types of technologies such as interactive boards, laptops and mobile devices (Grigg, 2014). From a study that was done, it emerged that inadequate equipment was one of the key challenges in as far as the adoption of ICT is concerned (Scheffknecht & Council of Europe, 2000). Plomp et al (2009) state that, in schools there are various types of hardware and some of the computers are old and some run under Windows 98. The situation is not convenient for installing software that needs multimedia environment. Ministry of Primary and Secondary Education ICT Policy (2016) indicated that as at 30 June 2014, the ratio of functional computers to learners was at 1:167 and 303 primary schools had integrated e-Learning programmes into day to day teaching and learning against the desired 1:1 for effective teaching and learning with ICTs. ICT equipment is located mainly in the school laboratories and barely found in the classrooms Bottimo 2003; Huang et al (2014).

2.5 Challenges faced by primary schools in ICT adoption

ICT adoption has been slow in primary schools due to some challenges that schools are encountering. These challenges would be discussed in this section.

Kozma (2011) pointed that, from research conducted it emerged that it is not strategic to use technologies to the existing activities which are already done in the classroom without changing the habitual teaching practices as this will not yield any positive results in the children's learning. The majority of teachers are not proficient computer technology users. In addition, challenges also range from access to computers which are in good working order, lack of software, lack of support from administration as well as lack of internet access. Shizha (2013) concurs by saying that,

infusing ICT is a noble and proper gesture, challenges are faced and chiefly the problem is of connectivity and skilled personnel to man and operate the technologies. The problem of connectivity is not only experienced in rural areas but also in the urban areas. In most schools, teachers cannot integrate ICT because they lack technical expertise. Mohanty and Vohra (2006) state that teacher's lack of knowledge is an obstacle to ICT in education.

Adopting technology is not easy because that would take much of the time of which the practitioners already have a busy schedule and there is also fear of using unfamiliar methods and technical glitches would also disrupt the flow of the lesson (Alias & Waran, 2016). Liquidity challenges in the financial sector have been pointed as possible factors contributing to low usage of the internet and for purchasing educational material (Meda & Makura, 2017). Balanskat (2006) states that, poor quality and inadequate maintenance of hardware are challenges faced by schools. This is quite evident in the schools because many cannot afford to service the computers already in the schools. School buildings are viewed as being architecturally unsuitable, teachers incompetent or uninterested in integrating ICT into their teaching and learning. Administrators are said to be lacking direction (Sewlyn et al, 2010). Infrastructure remains a major challenge in developing countries (Howie et al, 2005). There is a growing need for Internet but unfortunately it is unavailable in most schools. Classrooms are converted into computer labs and they are unsuitable for widespread networked technology (Sewelyn, 2010).

The attitudes of teachers play a significant role in the adoption of ICT (Mikre, 2011). According to Miima (2013), teachers' lack of interest is one of the barriers to ICT adoption. However the resistance to change maybe an indication of the presence of some other problems which include lack of technical skills and knowledge. It is quite complex to integrate ICT into teaching and learning (Bingimlas, 2010). Lack of competent teachers, lack of confidence, resistance to change, negative attitudes, lack of infrastructure and technical support (Korte & Husign, 2007). Although ICT gadgets are available in the schools, the teachers have not been capacitated to utilize the technologies. These technologies require continuous training since technology seems to be revolving so the teachers and administrators should be kept abreast with the new technology. This means that they should be equipped with skills to operate these sophisticated tools such as interactive white boards.

A study was done on finding out the challenges that hinder the adoption of ICT in schools and it emerged that there is shortage of relevant books and lack of funding (Ayo & Mbarika, 2017). It is evident in most schools that there are no ICT books. The high cost of ICT resources is beyond reach of many schools and this results in low level computer literacy rate among African students. Access to utilization of ICT tools such as the Internet has been low in many areas (Adeoye, 2014). This is common in schools where internet is only used for administrative purposes at the office so the teachers and the learners cannot use it. Another challenge that hinder the integration of ICT in institutions is the acute shortage of connectivity and other scholars observed that bandwidth is the blood of knowledge in today's education (Agustino, 2011).

Use of ICT in teaching Mathematics in Rwanda is still minimal and multiple challenges are faced such as lack of electricity supply, problem of maintenance of the resources, expanding number of student population against the low number of computers (Halai & Tennant, 2016). According to Ottevanger et al (2007), some of the challenges such as poorly resourced schools, large classes and insufficient teacher education programmes have impact on the adoption of ICT.

In Ghana, most of the teachers fear the use of computers due to their low self-esteem and lack of knowledge of ICT integration techniques and above all shortage of ICT tools at home for students (Douglas, 2013). Thus, teachers need training because they are the implementers of ICT in the classrooms and they need training in order to make them confident and competent in the use of ICTs.

2.6 Improving challenges associated with ICT adoption

There are quite a number of ways that can be employed to improve the challenges which are being faced in the primary schools. These include:

- **Training teachers and students**

Fallows & Bhanot (2005) assert that, ICT adoption requires training and development opportunities for the students and the staff. There is need for some training in order to maximize the effectiveness of skills development. In addition, purchasing of equipment is insufficient but it is also necessary to invest in the development of the people who would use it. Some level of proficiency in technological skills is required for the integration of ICTs effectively (Wang & Chen, 2006). In Singapore, teachers were given extensive training in harnessing ICT in the

classroom (Choo & Seng, 2008). Unwin (2009) asserts that, training of administrators is a fundamental component and if possible the refresher courses can be done on site in selected schools for teachers and the school heads in the area. Teachers are undoubtedly the key change agents behind the adoption of ICT (Robinson & Latchem, 2004). They should receive pre-service and in service training for effective adoption of technologies into the teaching and learning process. The schools should conduct some training courses for teachers to gain knowledge when it comes to operating the new devices and using new teaching methods. Aribini (2012) states that, provision of training and professional development helps in the creation of positive attitudes among teachers. This means that teachers who are already in the field need some training and eventually adopt ICT in the classrooms and a digital classroom is only possible if the teacher gets some training of education reform. Teachers and the administrators should be given training at the same time. Follow up activities are important and they are done to refresh teachers' skills and to bring up areas of concerns and questions about integrating technology in teaching and learning. According to Toure et al (2008), ICT would not bring about some change in the quality of education, but the mindsets to use them effectively and strategically in the teaching and learning. This includes doing away with paradigms of the teacher as a master (Toure et al, 2008). This means the new technologies contribute to active and interactive methods.

- **Embracing the new technologies**

Voogt & Knezek (2008) say that, computer technology has become mobile and personal, stand-alone computers are replaced by laptops, PDAs or mobile phones. Schools are now using E-learning, M-learning and web based education. To modernize the instructional methods, provision of portable teaching and learning devices such as mobile devices, iPads, and notebooks can be adopted (Cohen, 2012). The challenge that lies ahead is to embrace and respond to the extraordinary pace of change. People should not underestimate how rapidly things are changing and are encouraged not to miss an opportunity (Beauchamp, 2016). This would help to improve learning outcomes and this saw many schools using E-learning, Mobile- learning etc. ICT is constantly developing, methods for teaching and learning are continually evolving as well for example devices and Internet can no longer be placed in fixed positions. Mobile technologies can be adopted so as to access Internet wherever and whenever. A crucial development in the classroom was the introduction of tablet computers around the world (Tay & Lim, 2013). This is

a good move for schools to adopt such developments in primary schools. Technology is fast changing therefore teachers need to be lifelong learners so that they can keep up with the technological changes (Balanskat 2006). Some teachers are lagging behind others in as far as adoption of ICT innovation is concerned and they need to keep pace with time and change their pedagogical tools to embrace such change (Zhu, 2011).

- **Procurement of adequate ICT tools**

OECD (2005), advocates for access to adequate technology for successful adoption as this will in turn improve the teaching and learning process. Learning is facilitated when students access resources on the Internet. Schools can reutilize the obsolete equipment previously stored and recycle them in order to improve computer-pupil ratio (Mehdi, 2014).

- **Infrastructure development**

Quality of infrastructure and hardware are very essential for adoption of ICT (Fujita, 2018).There is need for appropriate buildings to house the ICTs and to ensure that proper wiring has been done, cooling, ventilation not leaving out security and safety (Wag & Woo, 2007). Educational leaders should draft a budget and put in place ways of getting extra funding in order to put in place the required infrastructure (Chan, 2000). According to Manichander (2009), ICTs are not panacea for gaps that exist in education but the right conditions need to be put in place before the educational advantages of integrating ICTs can be fully harnessed. The integration should be done systematically.

- **Ensuring that policies are adhered to**

Having sufficient and other resources is not enough, instead ICT integration plans and policy guides for every school is a recipe for the success of educational technology projects (Agustino, 2011). According to Keengwe (2017), Malawi's ICT policy stipulates that there should be enough and reliable computers. The policy further states that adequate and quality ICT services would help to reduce the current illiteracy levels hence increasing knowledge and information base among the population.

- **Technical support**

Lack of technical support in the school is likely to cause irregular maintenance of equipment and this would result in a higher risk of breakdowns (BECTA, 2004). This usually causes the teacher to become reluctant in using these ICT tools.

- **Government's intervention**

Public and private partnership is a tactic in improving access to ICTs in education. This is practical when both sectors come together in funding the sector. The government can collaborate with corporates to drive changes at a large scale. Broadband deployment, provision of online services, digital literacy programmes are strategies that a government can create through collaborations (Bracey &Culver, 2005).

2.7 Summary

This chapter reviewed literature from different scholars. The chapter discussed the benefits of adopting ICT, extent of adoption in various countries and the challenges that hinder the effective adoption of ICT in primary schools. The initiatives needed to improve the challenges wrapped up the chapter. The next chapter is going to look at how the research was carried out.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

This chapter outlines the methods used in the research study. The data collection methods, data analysis techniques are discussed in depth in this chapter. The population, sample and sampling procedure and research instruments were also discussed. The study relied on questionnaires, interviews and observations for data collection. Furthermore, reliability and validity were elaborated and ethical consideration issues wrapped up the chapter.

3.2 Research Design

The research paradigm that was used in the research to accomplish the objectives of the study is the mixed method paradigm. The paradigm was chosen because it involves the collection of data qualitatively and quantitatively in a single project (Leavy, 2017). According to Creswell (2014) mixed research offer the combination of qualitative and quantitative approaches and provides an understanding of a research problem than either approach alone. Combining qualitative and quantitative methods is necessary because using one data set may be insufficient to answer the research questions (Ivankova, 2014). Mixed methods help to answer questions that either qualitative or quantitative approach cannot answer alone (Creswell & Clark, 2011). A mixed method research enables researchers to simultaneously ask confirmatory questions hence verifying and generating a theory in the study (Teddlie & Tashakkori, 2009). It is less likely that the researcher would miss something important or make a mistake when qualitative and quantitative researches are combined (Johnson & Christensen, 2012).

A research design is a procedural plan and structure of an investigation adopted in order to obtain answers to research questions accurately and objectively (Kumar, 2010). According to Saunders et al (2010) a research design is a general plan of how research questions are answered. Furthermore, they elaborate that the choice of a research design highly depends on the phenomenon under research. According to Yin (2009) a research design deals with a logical problem not a logistical problem. The major purpose of a design is to ensure that the evidence

addresses the research questions. Maxwell and Loomis (2003) model outlines that a research design has five components namely:

- Purpose: This is justification for carrying out a research to ensure that the research is worth doing (Maxwell, 2012).
- Conceptual model: It talks about the theory being developed or the theory that the research is developing (Teddlie and Tashokkori, 2009).
- Research questions: These are the questions guiding the study (Yin, 2009).
- Methods: These describe how the research would be undertaken (Teddlie & Tashokkori, 2009).
- Validity: This is the ability of a research to address threats to the truthfulness of the conclusions of the study (Maxwell, 2012).

Swanborn (2010) defines a case study as the study of social phenomena carried out within boundaries of a social system such as an organization. Yin (2013) indicates that a case study is appropriate for the study of complex and social phenomena as well as real life events. A case study may be based on one case. A case study is associated with qualitative methods of analysis (Gerring, 2006). Several sources such as observation, interviews and questionnaires maybe used to obtain data for a case study (Ariola, 2006). Case studies are detailed and descriptive in nature combining subjective and objective data (Manion et al). Yin (2009) assert that a case study has a great advantage when how and why questions are asked and contemporary phenomenon are investigated. A case study guides other researchers to try out either new technologies or existing ones (Benz et al, 2008). Thus, the researcher used a case study research design to address the research problem.

3.3 Population

Singh & Nath (2010) define population as any group of people who have similar characteristics that are of interest to the researcher. Gray (2010) views population as the totality of people from which results are going to be generalized. Therefore, this means that the population is a target group from which information was collected. The information will in turn be used to answer the research questions. In this context, the target population for this study was a selected primary

school in an urban set up. The school has an enrolment of 369 pupils and 40 teachers inclusive of the head therefore the population for the study is 409 people.

3.4 Sample and Sampling procedure

A sample is a small portion of a population that has been selected for observation and analysis (Singh & Nath, 2010). Sampling is selecting a subset of a population for inclusion in the research (Daniel, 2011). Sampling includes selection of a population for observation so that results may be drawn about the whole population (Thompson, 2010). Purposive sampling was used in the selection of teachers to take part in the study. (Chiromo, 2009) defines purposive sampling as choosing samples on the basis of the researcher's knowledge of the population as well as purpose of the study. Therefore the participants were chosen by virtue of their in depth knowledge and expertise. The researcher used her own discretion to select the sample. The researcher selected the sample by taking into consideration that participants were implementing the new curriculum. Blackenship (2010) purposive sampling can be used in two ways that is expert sampling and selection of subjects on the basis of their representation of the population. With expert sampling, the researcher selects the experts who possess the information that the researcher needs in order to answer the research questions. In addition, the method is frequently used with a qualitative study such as a case study. The technique was used because it provides a focused effort in gathering data to answer questions. The technique was blended with random sampling which was used to select students. Salkind (2010) says, in random sampling each element has an equal chance to be selected. A sophisticated way was used whereby pupils wrote their names on small pieces of paper and they were placed in a small box and then the pupils were randomly selected.

A total of 41 participants were selected to take part in the study that is 21 pupils and 20 teachers.

3.5 Research instruments

Research instruments are devices used to obtain information relevant to a study (Wilkinson & Burmingham, 2003). According to Kumar (2010) any means of data collection for the study is called a research tool or instrument. An instrument is a mechanism used for gathering and recording of information for assessment, decision making as well as maximum understanding in the end. A questionnaire is used to acquire factual information and to support observations (Colton & Covert, 2007). Examples are questionnaires, observations and interview schedules. No single

research instrument is more superior to any other (Wilkinson & Burmingham, 2003). To add richness and balance to data collected, the researcher must use more than one data collection instrument (Saunders et al, 2010). This research used questionnaires, interviews and observations to collect data pertaining to the challenges that are being faced in primary schools in the adoption of ICT.

3.5.1 Questionnaire

A questionnaire is any written instrument that presents the respondents with a series of questions to answer and this can either be by writing the answers or selecting among the existing answers (Dornyei & Taguchi, 2009). Questionnaires can cover many subjects or issues. They can be less resource intensive if managed well and can gather huge amounts of information (Wilkinson & Burmingham, 2003). Questionnaires can be classified and into two groups namely: open ended and closed ended questionnaires. Both types can be included in a questionnaire (David & Sulton, 2011). Open ended questionnaires require respondents to fill in their answers while closed ended questionnaires may require selection of answers from the given options. Questionnaires were chosen in this study due to their high levels of anonymity, confidentiality and cost effectiveness nature. In this research both types of questionnaires were used.

To obtain rich data, questionnaires were used and the selected teachers were given to answer questions on the challenges of ICT adoption in teaching and learning. The researcher self-administered the questionnaires and collected them on a later date after completion.

They have a high degree of confidentiality as there is no space to indicate the names and this will enable the respondents to comfortably write their opinions about ICT adoption in primary schools. Questionnaires were used because they can be anonymously answered, therefore adequate information is collected without challenges or fear. (Gillham, 2007) articulates that some people feel freer in an anonymous style of responding to questions. Ariola (2006) has the view that questionnaires preserve the anonymity and confidentiality of the participants' answers. The questionnaires allowed the researcher to collect data from various people at the same time therefore they are economic. Questionnaires allow or give room for analysis of the answers by simply referring to the responses to the questionnaire.

Nevertheless, some shortcomings are evident when using questionnaires, for example respondents may consult each other on the best way to answer and this may automatically means that the information would be biased instead of getting what is exactly on the ground. This was actually catered for by interviews and there are guarantees that no consultations would take place. Questionnaires largely depend on whether the respondent personally knows you or whether the questionnaire is of interest or worthwhile to complete (Gillham, 2007).

3.5.2 The Interview

In any type of interview, it is crucial for the interviewer to make a preparation of key questions to be covered so that important aspects are not missed and the interview follows a logical progression (Wilkinson & Birmingham, 2003). An interview is a purposeful discussion involving two or more people which is used to collect valid information. Gray (2010) asserts that interviews can be used in conjunction with other research tools. According to Ariola (2006) an interview is an oral questionnaire. Interviews can solicit information by simply asking questions. Questions may be repeated, modified or rephrased in order to make some clarifications (Cargan, 2007). The purpose of the interview is to verify information collected from written sources, clarify points, update information as well as collect data (Ariola, 2006).

Standardized interview is whereby the sequence of the questions and wordings are fixed. The questions are carefully prepared and logically ordered which are asked the respondent (Ariola, 2006). Wilson (2013) views a structured interview as a verbal questionnaire and the interaction is limited to a certain extent. A script is used and there is a fixed sequence of questions.

Unstandardized interview is flexible and the sequence, wordings of the questions are up to the interviewer (Ariola, 2006). A semi structured interview is a combination of predetermined questions similar to those in structured with open ended of unstructured interview (Wilson, 2013). Semi structured interview is based on preplanned questions. During the interview process participants are invited to raise and pursue some issues that are relevant to the study but were not part of the preplanned ones (Efron & Ravid, 2013). In addition, the interviewer probes further in order to make the participants deepen their responses and follow up questions are asked. Pope & Mays (2013) say that the interviewer and interviewee may diverge in pursuit for a view point or more details. Semi structured interviews require the researcher to be well informed about the phenomenon under study and to be versed with the domain in order to ask questions which are

pertinent to the initial research questions (Gubrium et al, 2012). The purpose of the interview with the school head was to make some clarifications on the research questions so as to collect more in depth data. The school heads usually have tight schedules so it became difficult for them to fill out the questionnaires and therefore an interview was ideal. The researcher carried out an in depth interview using semi structured interview technique and it was used to augment the information obtained from the questionnaires.

However respondents may feel that their responses are not actually anonymous and may be less frank in their replies (Cargan, 2007).

3.5.3 The Observation

An observation may be defined as perceiving data through the senses. In addition, mostly the sense of sight is commonly used when conducting an observation. There are two basic features that are possessed by an observation namely; what is it that has to be observed and how the recording is to be done (Wilkinson & Birmingham, 2003). Observation is considered the most direct way used in studying human behavior (Ariola, 2006). Bailey (1994) is of the view that observations are most preferred when one wants to research in greater detail the behavior that happens in some particular setting or institution. Ariola (2006) says that a non-participant observer is merely a bystander observing the group. The researcher does not take part in the group's activities and does not pretend to be a member (Bailey, 1994). The researcher used this type of observation to listen and watch the groups' activities in order to make conclusions.

Structured observation is whereby the observation concentrated on particular aspect(s) of things under observation and it can be a thing, behavior, condition or situation. Hawthorne effect is not an issue when using the observation technique. Annum (2015) says observations are advantageous in the sense that first-hand information is obtained. Observations were used to get a true picture of what is actually on the ground.

Bias is prevalent when researchers interpret their observations or data collected. Usually more attention is paid to data that support the researcher's theory (Jackson, 2007). The shortcomings of observation were curbed by blending them with interviews and questionnaires in order to get reliable information

.

3.6 Reliability and Validity issues

Validity refers to the ability of an instrument to demonstrate that it is finding out what it has been designed to and reliability refers to consistency in its findings when used repeatedly (Kumar, 2010). According to Thyler (2010) an instrument that is regarded as a good one would have undergone testing to evaluate its validity or truth and reliability or repeatability. Both sides of the measurement validity or credibility criterion are relevant if the study is mixed (Teddlie & Tashakkori, 2009). Furthermore, they articulated that by using the multiple mixed measure there is a greater opportunity to assess the overall goodness of data. Denzin (1994) cited in Benz et al (2008) propound that, validity is present where there is truth and the main purpose of reliability is either to support or improve validity. Validity and Reliability are very important indicators for quality (Baumgarten, 2012). Guba & Lincoln (1985) cited in Guest et al (2011) highlighted that validity does not exist where there is no reliability. Validity is regarded as the most important concept of the two. Reliability was taken as a pre-condition for validity. According to Ridenour and Newman (2008) mixed methods produce research findings which are valid particularly the qualitative–quantitative continuum. Guba and Lincoln's (1985) criteria for developing trustworthiness of a qualitative study are still in use today and they include credibility, dependability, transferability, applicability and confirmability. These are indicators that reflect validity and reliability in a qualitative research (Kumar, 2010). The criterion are used in order to enhance truth value in a research. According to Yanow et al (2006) to rival internal validity and credibility another criterion was added which is known as authenticity and it is viewed as appropriate for qualitative research in comparison to validity.

Credibility: It was identified as paralleling validity. Credibility refers to the confidence in the truth value of data as well its interpretation (Polit & Beck, 2010). Credibility is achieved when the readers believe the research and connect what is reported to their own experiences (Kumar, 2010). Some strategies can be adopted by the researcher to increase the credibility of results. Among them are triangulation, prolonged engagement, member checks, persistent observation, and peer debriefing (Mertens, 2005). Therefore the researcher employed triangulation for instruments. The validity of the observation, questionnaire and interview was guaranteed by asking questions that sufficiently addressed the research problem.

Confirmability: This seeks to reduce the influence on the judgement of the observers. It also seeks to confirm that there are no researcher's fabrications in the data and their interpretations. Tracing can be done through a confirmability audit (Guest et al, 2011). The audit can trace data to their original sources and confirm the process of data synthesis to reach conclusions using evidence (Mertens, 2005).The criterion assures that the data is a representation of what was provided by the participants as well as the interpretations of those data are not from the researcher's imagination (Polit & Beck, 2010). Confirmability is achieved by making the processes of developing constructions specific and trackable so that their justification can be confirmed by the outside reviewers (Sugarman, 2004).

Dependability: According to Polit & Beck (2010) credibility can only be attained in the presence of dependability. The dependability question asks about whether the research findings would be the same if repeated with same participants in the same context. It is demonstrated by documenting carefully evidence of how conclusions were reached and this is demonstrated through the concept of an audit trail. Audit trails help to increase transparency. These trails will keep track of the whole process of data analysis (Guest et al, 2011). Therefore documentation was done in every step of the way in this study.

Transferability: This is when findings of the study hold up in other situations or settings (Ridenour & Newman, 2008). Transferability is parallel to generalizability and refers to the extent which the research findings are applicable to other settings or groups (Polit & Beck, 2010). The usefulness of a qualitative research is judged by its ability to make a representation of how informants feel and making sense of their experiences and effectiveness in the communication of what the information means and lessons learnt (Teddlie & Tashakkori, 2003). This study adopted a single case study design and detailed information was obtained. It means that it is suitable to generalize the findings to other schools.

3.7 Data collection procedures

An introductory letter was obtained from Midlands State University's faculty of Education seeking permission to conduct a research. Permission to collect data from schools was granted by Ministry of Primary and Secondary Education and the school head. After being granted, the researcher started collecting data using questionnaires, observations and interviews. The questionnaires were used to avoid a low response rate. The researcher did some observations while lessons were

underway to establish the challenges and to investigate the effective use of ICT in teaching and learning. Face to face interview was done with the school head. Questionnaires were distributed and the researcher had to wait for a few days in order for the respondents to complete and collected them to ensure that all questionnaires were returned. The researcher booked for an appointment with the school head and the interview was done on a tentative date. Notes were taken down for analysis purposes. Confidentiality and anonymity were guaranteed to the respondents in a bid to overcome biased assertions which threaten validity and reliability of the study.

3.8 Data management sources

Data collected in this research was stored on the computer hard drive. Some measures were put in place to ensure safety of the information collected. Back up was done in the form of a flash drive and google drive. This was mainly done to avoid data loss due to threats such as viruses that may occur.

3.9 Data analysis plan

Data analysis refers to analysis of data to make sense out of it (Saunders et al, 2010). Data was collected qualitatively and quantitatively. Data collected in this research was presented in tables and charts. Responses from the questionnaires were counted and presented. Some of the data was presented in percentages to highlight the common trends of the responses. By doing this, the researcher would make informed inferences in line with the research findings. This process of data analysis allows for the interpretation of data findings as well as for making the conclusions.

3.10 Ethical Considerations

Magwa and Magwa (2015) is of the view that ethics have to do with respect for being. Gray (2010) lists some ethical issues such as confidentiality, informed consent, anonymity and privacy. Thus ethics are values and principles guiding the research. Respondents were not asked to disclose their identities in questionnaires in order to ensure anonymity. The questionnaires clearly indicated that respondents were not supposed to write their names. They were assured that the information provided was confidential and not to be disclosed to any parties except for the supervisor. The researcher ensured that there was no intrusion of privacy regarding information provided.

The main thrust for the research was justified so that respondents voluntarily took part in the study. The participants were informed that they had the right to participate or withdraw at any moment during the course of the study hence participation is voluntary.

The research instruments were accompanied by approval letters from the Midlands State University and Ministry of Primary and Secondary Education to conduct the research in the schools under its jurisdiction.

3.11 Summary

This chapter delved on the research design that was used in the research study and a mixed method approach was used. A case study was employed in this study. Data was collected using questionnaires, interviews and observations. Reliability and Validity of the instruments was also discussed in this chapter. This chapter was wrapped up by discussing the ethical considerations. The next chapter presents and analyses data collected.

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS AND DISCUSSION

4.1 Introduction

The main thrust of this chapter is to present, analyze and interpret data that was collected using research instruments discussed in the previous chapter. Analysis from questionnaires, interviews and observations formed the core of this chapter. The analysis sought to present answers to initial research questions which were highlighted in chapter one. Research findings were also presented in this chapter.

4.2 Data presentation, analysis and discussion.

Data pertaining to each question was analyzed and presented in the form of tables, pie charts and graphs. 40 questionnaires were distributed and 35 respondents returned the questionnaires, therefore the response rate was 88%. Interviews and observations were done in order to gather as much data.

4.2.1 Research question 1: *Do you think ICT is beneficial in the teaching and learning process?*

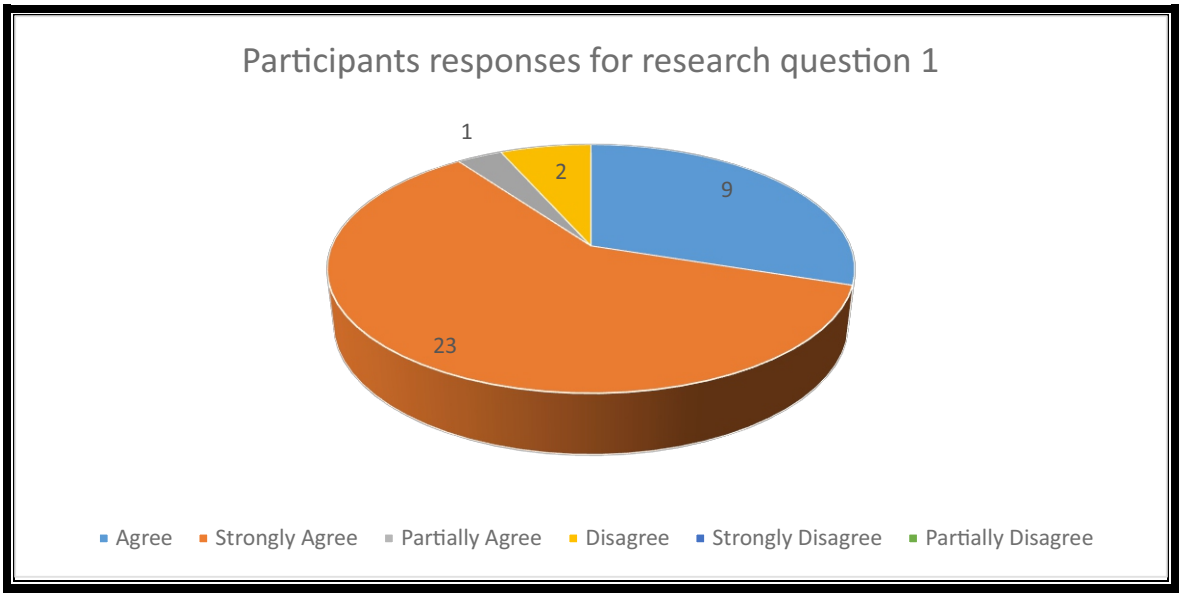

Figure 4.1: Showing whether ICT is beneficial in the teaching and learning process.

The pie chart reflected that the respondents highly think that ICTs bring positive results in the teaching and learning process.

In a bid to get the answers to the first research question, the head was interviewed and the following remarks were obtained.

"ICT is important because it brings positive results and the learners would enjoy school and this will also improve retention of concepts"

The head indicated that ICT plays a pivotal role in education and that the children are not left out and they can easily fit into the community.

From the observation, it was evident that the teachers valued ICT through having ICT corners in the classrooms.

Discussion

The first research question required the respondents to state whether ICT is beneficial in the teaching and learning process. According to responses obtained from the questionnaires, most of the respondents were of the view that use of ICT in teaching and learning benefits the learners. From the interview, the school head concurred with other respondents. This reflects that ICT is beneficial and has more value in teaching and learning. However only two respondents were of the different view, they disagreed with the fact that ICT has benefits in education. The results revealed that, the respondents indicated that ICT use in teaching will motivate the learners and they also indicated that use of ICTs is likely to improve performance of the learners. Huang et al (2014) also says that using ICTs bring positive results. Hennessey (2007) concurs with the notion that use of technology increases motivation and participation and fun is created when these tools are used frequently. As a child centered approach, learners access vast information from others and their peers using e-mails. The respondents also indicated that learners tend to remember very well concepts that were done on the computer. Teachers were seen using their phones to find answers to different questions so this reflected that ICT plays a pivotal role in teaching and learning. From the findings and literature, ICT carries with it some benefits in education. Up next is a discussion of the findings for question 2.

4.2.2 Research question 2: *What is the extent of ICT adoption in the teaching and learning in primary schools?*

Extent of ICT adoption is viewed as whether the ICT tools were being used for teaching and learning and it measures the degree to which ICT is used in the classroom. The research question required the respondents to state and explain the extent of ICT adoption in the primary schools. The responses to the question were shown in the table below.

Table 4.1: Showing the extent of ICT adoption in the primary school.

Respondent	Yes	No	Sometimes
Teachers and pupils	10	2	7

The table revealed that the school has adopted ICT, however there are some who are not even using ICTs in the teaching and learning.

The interviewee was asked the question on the extent of ICT adoption in teaching and learning in the primary school and she responded as follows:

"*The school has adopted ICT although at a slower pace due to financial constraints and we are really making efforts to improve from where we are currently positioned. "*

The researcher observed that there were some laptops and a projector which were purchased by the school for use in the classrooms at grade level and there are a few computers in the computer laboratory.

Discussion

Findings from the questionnaires revealed that the school has adopted ICT although to a limited extent and the respondents highlighted the causes for this. 10 respondents indicated that ICTs were being used in the classrooms while the 2 respondents revealed that they did not use ICTs in teaching and learning. 7 respondents indicated that they sometimes use ICTs in the classroom and some did not indicate. It was observed that the classes have some learning centres where they can refer to when they are teaching and this is evidence that ICT use has been adopted in the classroom by some of the teachers. It has been noted that most of the respondents, one way or another are

using the ICTs in their classrooms and it shows that there is little progress towards the adoption of ICT. However the findings do not show the frequently used tools and the frequency as well. The findings of this research seem to agree with the following scholars and this makes the results authentic. Farrell & Isaacs (2007) quoted in Daniel assert that the adoption process and diffusion are still at the transitional stage in developing countries.

4.2.3 Research question 3: *Are there adequate and functioning tools in the primary schools?*

The diagram below shows the responses by respondents on the availability of adequate and functional ICT tools in the primary school.

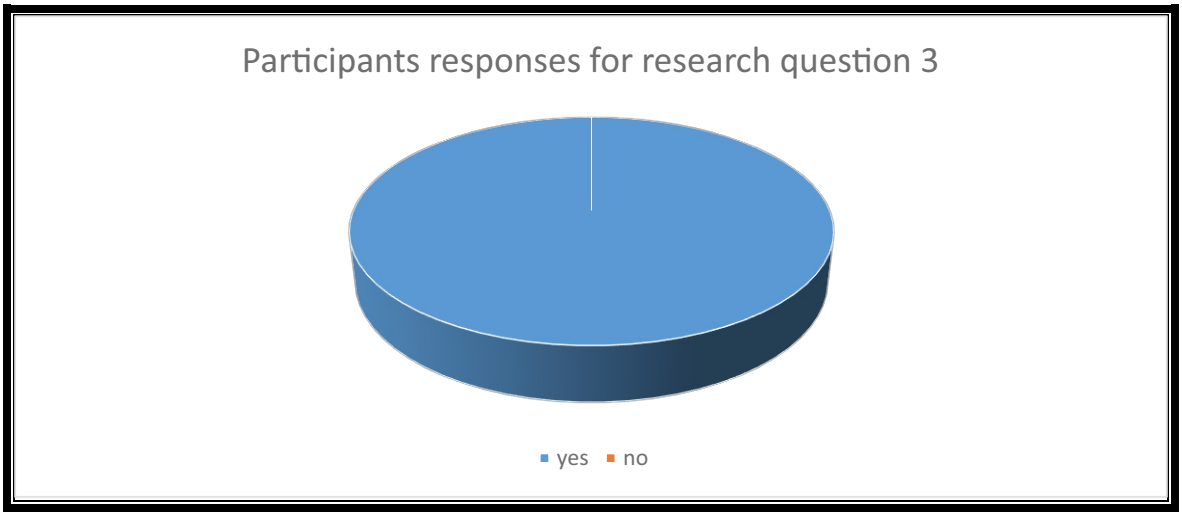

Figure 4.2: Showing the adequacy and functional ICT tools in the primary school.

As shown in Figure 4.2 above, 100% of the respondents indicated that there are no adequate and functional ICT tools in the school and none had a different view.

The school head was also interviewed about the availability of adequate and functional ICT tools at the school.

The interviewee had this to say:

"*We have quite a number of computers in the school which are not working and the software is outdated. In an effort to mitigate this, we bought a laptop and a projector for each grade level which of course is not enough.*"

The head actually concurred with the fact that the tools at the school are not enough for the effective adoption and integration of ICT in teaching and learning.

Through some observations, the researcher discovered that there are ICT corners in the classrooms with gadgets that are not functional. The teachers are not frequently using the laptops because it is difficult to share the few resources.

Discussion

The findings from the questionnaires revealed that there are no adequate ICT tools to use in the classrooms. All the respondents shared the same view that there are no adequate resources and the head concurred with what was reflected on the questionnaires that there are no enough functional gadgets at the school. Laptops and projectors are not enough for everyone within the school. It was also highlighted that even during computer lessons the computer pupil ratio is too high. Observations revealed that the use of ICTs is limited to computer lessons mainly. Huang et al (2014) concur with the notion that ICT equipment is largely found in the laboratory and barely in the classroom. There was limited if no use of ICTs and this was mostly attributed to few resources at the school. Thus, the full adoption of ICT in the primary schools in teaching and learning is ineffective since the available tools are inadequate and some are not functional. Buabeng-Andoh (2012) confirmed the findings when he assert that access to computers, updated software and hardware were the key elements to the successful integration of ICT in teaching and learning. Therefore in the absence of these, adoption and integration becomes difficult.

4.2.4 Research question 4: *What are the challenges faced by primary schools in the adoption of ICT?*

The fourth research question required the respondents to identify the challenges which were hindering the full adoption of ICT in the teaching and learning. The respondents gave similar responses and these were shown by the questionnaires. The challenges that were shown by the questionnaires are indicated in Table 4.2 below.

Table 4.2: Showing challenges faced by primary schools in the adoption of ICT in teaching and learning.

Responses	Frequency	Percentage
Shortage of ICT Tools	17	57
Lack of expertise and skills	12	40
Lack of support from Admin	7	23
Internet connectivity	11	37
Lack of funds	11	37
Lack of infrastructure	5	17
Technophobia	1	3
Negative attitude	6	20
Power problems	4	13

The results from the findings in the table above shows that shortage of ICT resources is a major drawback to the full adoption of ICT in the classrooms followed by lack of technical expertise. The least challenge was technophobia.

When the interviewee was asked about the challenges in the adoption of ICT in teaching and learning, she reiterated that:

"*The major challenge that we have as a school is that we do not have enough resources and this is attributed to shortage of funds and frankly speaking we are not versed with these latest technologies such as the interactive boards. From my viewpoint, I think the teachers also have a negative attitude because I hardly see them using the few resources that we have at the school."*

The researcher observed that the internet could not be accessed by everyone at the school and in the classroom. She tried to connect but could not access it in the classrooms but only at the administration area. Another challenge that was reflected on the questionnaire was that majority of teachers highlighted that they could operate at most two gadgets.

Discussion

The findings from the questionnaires revealed that the greatest challenge was on shortage of resources. A total of 17 respondents indicated that there is shortage of resources as reflected on the table. 12 respondents indicated the issue of lack of expertise as the second drawback to the effective adoption of ICT in the classroom. Ottenvenger et al (2007) say that poorly resourced schools and insufficient teacher education programmes have an impact on the adoption of ICT. Two other challenges highlighted which had the same number of respondents were lack of internet connectivity and shortage of funds and both have 11 respondents each. The least challenge was on technophobia where only 1 participant indicated that it is a problem. The interviewee indicated that the school had inadequate resources. It was observed that there are no sufficient resources. Kall and Goh (2012)'s studies suggested that the teachers and learners should have full access to tools so that they can learn at their own spare time. The overall picture shows that the findings concur with the scholars. The findings and the literature correspond and this means that the problems represent what is exactly on the ground. Shortage of tools and lack of technical expertise hold back the progress in the adoption of ICT in teaching and learning. The suggested ways of mitigating the identified challenges would be discussed in the next question.

4.2.5 Research question 5: *What can be done to improve the adoption of ICT in the primary schools?*

Research question five intended to come up with the strategies to curb the problems which were highlighted in the previous section. The answers that were obtained are shown below.

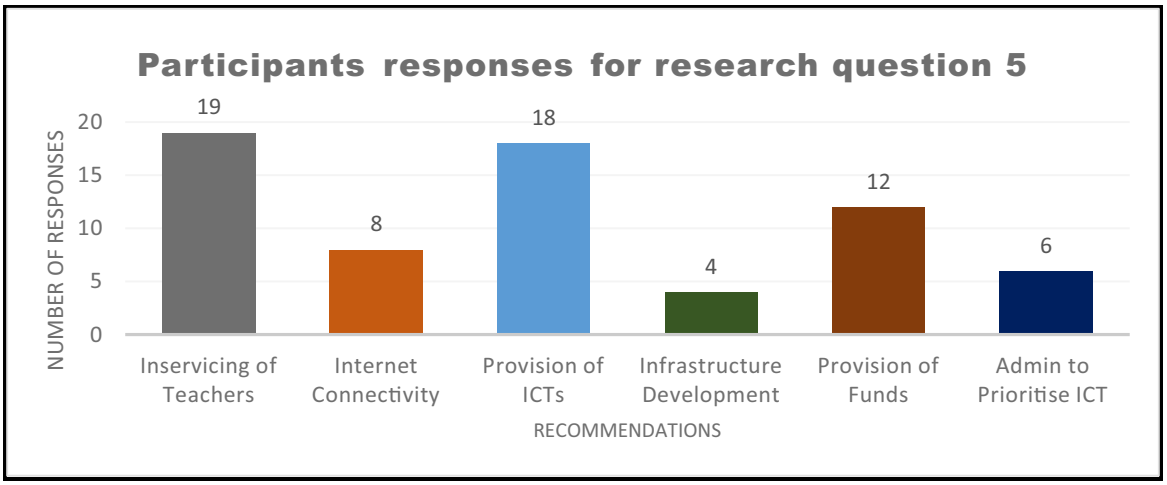

Figure 4.3: Showing the suggestions from respondents on the ways to improve the adoption of ICT.

As shown from the above graph, the highest number of respondents suggested that the teachers should receive intensive training which is followed by provision of ICTs. The least was to develop infrastructure, particularly by adding power points in the classrooms.

The interviewee suggested the following when she was asked about how the challenges that hinder full adoption of ICT can be improved:

”W*e should introduce a computer levy in order to improve the computer pupil ratio and to hire technical experts to teach the teachers on how to use ICTs in the classroom and the school will ensure that internet coverage will improve.”*

Discussion

The graph shows that the highest suggestion was on cushioning the teachers ICT knowledge by having formal training with 19 respondents and the questionnaires revealed that teachers should undergo some training through workshops and staff development programmes or even hire technical experts to teach the teachers how they should use the ICT tools. Fallows & Bhanot (2005) assert that the adoption of ICT requires training and development opportunities for both staff and students. The ICT tools which were suggested by respondents include purchasing computers, projectors, interactive boards and tablets. 18 people indicated that enough resources must be purchased for use during teaching and learning time. Tay & Lim (2013) say that an important development in the classroom was to introduce tablet computers. Provision of funds was also highlighted as one of the critical areas on which the other solutions rest on. 8 respondents indicated that internet should be connected to the classroom. The least suggestion was on infrastructure development with 4 respondents. The findings were relevant to the literature reviewed in chapter 2.

4.3 Summary

This chapter focused mainly on data presentation, analysis and interpretation. Data was presented in the form of tables, pie charts and a graph. The analysis of the data was the actual process of evaluating the challenges impeding full adoption of ICT in the primary school. It emerged that lack of resources and lack of technical skills are the major drawbacks in the adoption of ICTs. The majority of teachers and learners cannot operate most of the ICT tools. The thrust of the next

chapter will be to give summary, conclusions and recommendations basing on the findings of this research.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter mainly focusses on the summary, findings and conclusions and recommendations. The conclusion will give answers and reveal the relationship between the findings and the theory. Recommendations were also made in relation to the information gathered during the research and the chapter will conclude this study.

5.2 Summary

The study explored the challenges into the adoption of ICT in the primary schools in Zimbabwe. The aim of this research was to dig deep into the challenges which are faced by schools in the adoption of ICT in primary schools. The research answered five research questions which are: What are the benefits of using ICT in the teaching and learning process in primary schools?, what is the extent of ICT adoption in teaching and learning in primary schools?, Are there adequate and functioning ICT tools in primary schools?, What are the challenges faced by primary schools in adopting ICT? and what can done to improve the adoption in the primary schools?. The research is of great importance in the education fraternity and to other stakeholders. The study was limited to a selected primary school in Harare Metropolitan Province. Chapter two was literature review which looked at what other scholars and previous researchers had to say about the challenges impeding the adoption of ICT in the primary schools and how they can be mitigated. Literature revealed that the major drawbacks to full adoption of ICT in primary schools were lack of training of the teachers, shortage of ICT tools, shortage of funds and lack of internet connectivity. The next chapter looked at the research methodology used in the collection of data which was required for the study. Mixed research paradigm was used and a case study was employed while the observations, questionnaires and interviews were used to gather data. A selection of forty-one participants was done from the target population of four hundred and nine people. Chapter four then presented and analyzed the collected data at length.

5.3 Findings and Conclusions

It emerged that ICT has some benefits in education. The majority of the respondents revealed that ICT enables the learner to gain more knowledge, motivates learners and using ICTs in education can force the teachers to deviate from the traditional methodologies to child centered approaches which cater for the individual differences and this will in turn improve learners' performance. This concludes that ICT has some benefits in teaching and learning.

Research findings showed that the schools have already begun the adoption process although at a slower pace. The classrooms are furnished with ICT gadgets in the learning centers although they are not working. Shortage of ICT tools is hindering the full adoption and effective integration of ICT in the classroom. It can be concluded that the adoption of ICT in the schools is still in its early stages.

In light of the findings, there are limited number of ICT tools in the school. Computers are dysfunctional and this was also evident of lack of maintenance. The ones that are working are inadequate and the computer pupil ratio is very high, therefore using them becomes difficult. Internet connectivity is limited and is used for administrative purposes and is not accessed in the classroom because schools are not financially fit to meet the costs.

Lack of training of teachers to use technologies, lack of ICT tools and lack of funds are major drawbacks in the full adoption of ICT in the school. It was also highlighted that priority is not being given to ICTs. It was proven that these are hindering the effective adoption of ICT. This means that the availability of these will make the adoption process faster hence exposure of the teachers and learners. When teachers are incapacitated, the adoption process would also be negatively affected.

In conclusion, the findings revealed that most of the participants were of the same view that the teachers should get intensive training and learn to operate various and latest technologies. It also emerged that the school should purchase adequate tools and engage in fundraising activities, levying parents and this would make the adoption process and integration of ICT tools in the classrooms successful.

5.4 Recommendations

In view of the findings that were made on the challenges that are impeding the adoption of ICT in primary schools, the following recommendations were made:

- Schools can hire people with technical expertise to train the teachers to use the various ICT tools and how to solve simple technical problems. Staff development workshops can be done by schools in order to train the teachers who lack technical expertise. The trainings should be done regularly so as to keep teachers abreast with the latest technologies. Teachers can also be taught to make their own software so that they can ensure that learners will stick to authorized sites.
- Schools can engage the School Development Committee (SDC) to solicit for funds to procure more ICT tools. They can do some fundraising projects to cushion the levy so that it becomes possible to acquire tools like projectors, laptops, tablets and many others.
- The government through the Ministry of Primary and Secondary Education can put in place programmes to in service all teachers in order for them to gain relevant technological skills.
- The schools can increase the internet connections so that every class benefits from this noble move since there are not enough books for the new curriculum.
- The Ministry of Primary and Secondary through the district offices can make follow ups on the adoption levels of ICT in the schools within their districts.
- Schools can include provisions for servicing of tools and this can be included in the annual school budget.
- The Ministry of Primary and Secondary Education should engage and recommend ICT companies which are able to provide equipment to schools at affordable prices. This will definitely bring standardization of materials in schools and the current position is that there is no uniformity in schools.

REFERENCE

Abedalaziz, N. Shahrir, J., & Chin, H. L. (2013). *Measuring attitudes toward computer and internet usage among post graduate students in Malaysia. The Turkish online Journal of Education, 200-214*

Adeoye, B. F. (2014). *Globalisation on Teaching and Learning*. Hershey: IGI Global.

Albirini, A. (2006). *Teacher's attitudes toward Information and Communication Technologies: A case of Syrian EFL teachers. Computers and Education, 373-398.*

Agustino, D. (2011). *Adaption, resistance and access to instructional technologies: Assessing future trends in education*. Hershey: IGI Global.

Alias, A. N., & Luaran, J. E. (2016). *Student driven learning strategies for the 21st century classroom: Advances in education technologies and instructional design*. Hershey: IGI Global.

Annun, G. D. (2015, September 21). *educadium.com. Retrieved from Research Instruments for data collection: http//www.campus.edu caduim.com*

Ariola, M. M. (2006). *Principles and methods of research*. Manila: Rex Book Store.

Audain, J. (2014). *The ultimate guide to using ICT across curriculum (for primary teachers): Web, widgets, whiteboards and beyond.* Bloomsbury: A & C Black.

Awan, R. N. (2011). *What happens to teachers' attitudes and classroom ICT use when teachers are made to play computer games? International Journal of Information and Education Technology, 354-359.*

Ayo, C. K., & Mbarika, V. (2017). *Sustainable ICT adoption and integration for socio-economic development.* Hershey: IGI Global.

Bailey, K. D. (1994). *Methods of social research*. (4th ed). New York: Simon and Schuster.

Balanskat, A. (2006). *A Review of study of ICT*. New York: Bostom.

Beauchamp, G. (2016*). Computing and ICT in the primary school from pedagogy to practice*. (2nd ed). London: Taylor & Francis.

BECTA (2004). Enabling teachers to make successful use of ICTs. London: BECTA

Benz, C. R., Ridenour, L. S., & Newman, I. (2008). *Mixed methods research: Exploring the interactive continuum*. Carbondale: SIU Press.

Bingmalas, R. A. (2009). *Barriers to the success and integration of ICT in the teaching and learning environments: renew of literature. Eurasia Journal of Mathematics, Science and Technology Education, 3(5) 235-245.*

Blankenship, D. C. (2010). *Applied research and evaluation methods in recreation*. Champaign: Human Kinetics.

Bondarouk, T., & Oliva-Lujan, M. R. (2014). *Human resource management, social innovation and technology*. Bingley: Emerald Group Publishing Limited.

Baumgarten, M. (2012). *Paradigm wars- validity and reliability in Qualitative Research*: Essay. Norde-stedt: GrinVerlag.

Bracey, B., & Culver, T. (2005). *Harnessing the potential of ICT for education: A multi-stakeholder approach: Proceedings from the Dublin Global Forum.* New York: United Nations Publications.

Budhedeo, S. H. (2016). *Issues and challenges in bringing ICT enabled to Rural India. International Journal of Scientific research and Education, 4759-4766.*

Cargan, L. (2007). *Social Research.* Maryland: Rowan and Littlefield.

Chan, C. Y., & Chen, C. H. (2006). *The effect of different evaluative feedback on student self-efficacy in Learning PHD Thesis, Faculty of Education, University of Hong Kong.*

Chan, G. (2009). *Education research: An introduction*. Nairobi: Longman.

Ching, S. C., Lim, C. P., & Tan, C. M. (2015). *Future learning in primary schools, A Singapore perspective*. New York: Springer.

Choga, F., & Njaya, T. (2011). *Business research methods*. Harare: ZOU.

Cohen, E. B. (2012). *Issues in informing Science and information technology volume 9*. California: Informing Science.

Cohen, L., Manion, L., & Morrison, K. (2007). (6th ed). *Research methods in education.* Oxon: Routledge.

Colton, D., & Covert, R.W. (2007). *Designing and constructing instruments for social research and evaluation*. San Francisco: John Wiley & Sons.

Crawford, R. (2013). *The ICT teacher's handbook teaching, learning and managing ICT in the secondary school*. (2nd ed). London: Routledge.

Creswell, J. W. (2014). *Research Design. Qualitative, quantitative and mixed methods approaches.* London: Sage.

Creswell, J. W., & Clark, V. L. P. (2011). *Designing and conducting mixed research*. (2nd ed). Thousand Oaks: Sage.

Daniel, D. (2018). *Teacher training and professional development concepts, methodologies and applications: Concepts, methodology, tools, applications, management, association, information resources*. Hershey; IGI Global.

Daniel, J. (2011). *Sampling essentials: Practical guidelines for making sampling choices.* Thousand Oaks: Sage.

Daniel, J. L. (2010). *Mega-schools, technology and teachers: Achieving education for all*. New York: Routledge.

Dhivyadeepa, E. (2015). *Sampling techniques in education research*. North Carolina: Lulu.com.

Dick, R., & Martin, H. P. (2002). *History: Primary ICT handbook*. Cheltenham: Nelson Thomes.

Douglas, M. (2013). *Mobile pedagogy and perspectives on teaching and learning*. Hershey: IGI Global.

Dornyei, Z., & Taguchi, T. (2009). *Questionnaires in second language research: Construction, administration, and processing*. (2nd ed). New York: Routledge.

Doyle, S. (2008). *Essential ICT for AQA. ICT for education, development and social justice*. Buckinghamshire: Folen Publishers.

Edwards, R., & Holland, J. (2013). *What is qualitative interviewing?* London: A & C Black.

Efron, S. E., & Ravid, R. (2013). *Action research in education: A practical guide*. New York: Guilford Press.

Eggleston, J. A., & Black, C. (2004). *Teaching and learning design and technology: A guide to recent research and its applications*. London: A & C Black.

Elston, C. (2007). *Using ICT in the primary school*. London: Sage.

Empirica, C. (2006). *Delivering research methods*. United Kingdom: Happer Collins Publishers.

Fallows, S., & Bhanot, R. (2005). *Quality issues in ICT based higher education*. New York: Routledge Falmer.

Fayez, A. (2012). *Information systems applications in Arab*. Hershey: IGI Global.

Finger, M., & Sultana, F. N. (2012). *E Governance, a global journey*. Amsterdam: IOS Press.

Florian, L., & Hegarty, J. (2004). *ICT and special educational needs*. Berkshire: McGraw-Hill Education.

Fujita, H. (2018). *New trends in intelligent software methodologies, tools and technique. Proceedings of the 17th International conference SoMeT_18*. Amsterdam: IOS Press.

Gerring, J. (2006). *Case Study research: Principles and practices*. New York: Cambridge University Press.

Gilham, B. (2008). *Developing a questionnaire*. (2nd ed). London: Education Real World Research.

Gok, T. (2010). *National ICT Policy*. Nairobi: Government Printers.

Grigg, R. (2014). *Becoming an outstanding primary school teacher*. New York: Routledge.

Grosclaude, J., Pachauri, R. K., & Tubiana, L. (2014). *Innovation for Sustainable Development*. New York: The Energy and Resources Institute (TERI).

Gubrium, J. F., Holstein, J. A., Marvasti, A. B., & Mokinney, K. D. (2012). *The Sage Handbook*. (2nd ed). Thousand Oaks: Sage.

Guest, G., MacQueen, K. M., & Namey, E. E. (2011). *Applied thematic analysis*. Thousand Oaks: Sage.

Halai, A., & Tennant, G. (2016). *Mathematics education in East Africa towards harmonization and enhancement of education quality.* Dar es Salaam: Springer.

Hennessy, S., Ruthven, K., & Brindley, S. (2007). *Teacher perspectives on integrating ICT into subject teaching, commitment, constraints, caution and change in Journal of Curriculum Studies, 37(2).*

Howie, S. J., Muller, A., & Peterson, A. (2005). *Information and Communication Technologies in South African secondary schools.* Cape Town: HSRC Press.

Huang, R., Kinshuk, & Price, J. K. (2014). *ICT in education in global context: Emerging trends report 2013-2014.* New York. Springer.

Ivankova, N. V. (2014). *Mixed methods applications in action research: From methods to community action*. New York: Sage Publications.

Jackson, S. L. (2007). *Research methods: A modular approach*. Belmont: Cengage Learning.

Johnson, B., & Christensen, L. (2012). (4th ed). *Educational research quantitative, qualitative and mixed approach.* Thousand Oaks: Sage Publications.

Kafyulilo, A. (2011). *Practical use of ICT in Science and Mathematics teachers' training at DUCE: An analysis of prospective teachers' technological pedagogical content knowledge Master's Thesis*. Norderstedt: GRIN Verlag.

Karareba, G., Clarke, S., & O'Donoghue, T. (2017). *Primary school leadership in Post- Conflict Rwanda: A Narrative Arch.* Cham: Springer.

Kazma, L. (2005). *Internet development and creativity in Nigeria Program 39(3) 257-268.*

Keengwe. J. (2017). *Handbook of research on digital content, mobile learning and technology integration models in teacher education.* Hershey: IGI Global.

Kenya School Net, (2009). *Preparing a workforce for the evolving information economy: A survey on ICT access and use in Kenya secondary schools*. Nairobi: Summit Strategies Limited.

Korte, W. B., & Husign, T. (2007). *Benchmarking access and use of ICT in European schools*. Baltimore: University Park Press.

Kozma, R. B. (2011). *Transforming education: The power of ICT policies*. Paris: UNESCO.

Kulkarni, M. V. (). *Benefits of ICT- based learning strategies for Students*.

Kumar, R. (2010). *Research methodology: A step-by step guide for beginners*. London: Sage.

Leavy, P. (2017). *Research design, quantitative, qualitative methods: Arts based and community-based participatory research approaches*. New York: Guilford Press.

Machi, L. A., & McEvoy, B. (2012). *The literature review: Six steps to success*. London: Corwin Press.

Magwa, S., & Magwa, W. (2015). *A guide to conducting research: A student's h andbook. (1st ed)*. Washington: Strategic Book Publishing and Rights Company.

Majoni, V., & Majoni, C. (2015). *Views of primary school teachers on the use of ICTs in teaching and learning, Global Journal of Advanced Research*, 2(11), 1799-1806.

Manichander, T. (2009). *Emerging Trends in Digital Era through Educational Technology*. Lulu.com.

Marcus, A. (2014). *Design, user experience design for diverse interaction platforms and Environments.* New York: Springer.

McWha-Hermann, I., Maynard, D. C., & Berry, M. O. (2016). *Humanitarian work and Psychology and the global development agenda. Case Studies and interventions*. New York: Routledge.

Meadows, J. (2012). *Science and ICT in the primary school: A Creative approach to big ideas*. London: Routledge.

Meda, L, & Makura, A. H. (2017).*Technology driven curriculum for 21st century higher education students in Africa.* Bamenda: Langaa Research and Publishing.

Mehdi, K. (2014). *Educational technology use of design for improved learning opportunities*. Hershey: IGI Global.

Mertens, D. M. (2005). *Research and evaluation in education and Psychology: integrating diversity with quantitative, qualitative and mixed research. (2nd ed*). Thousand Oaks: Sage.

Mikren, N. J. (2011). *Information technology implementation research: A technological diffusion approach. Management Science 36(2).*

Miima, S. (2013). *"Teachers perspectives about integrating ICT in teaching and learning and Swahili language schools in Kenya' International Journal of Arts and Commerce, 27-32.*

Mingane, L. (2013). *Challenges in the implementation of ICT in public secondary schools in Kenya. International Journal of Social Science and Education, 224-238.*

Ministry of Primary and Secondary Education (2016). *ICT Policy for Primary and Secondary Education.* Harare: Government Printers.

Mohanty, L., & Vohra, N. (2006). *ICT Strategies for schools: A guide for school administrators.* New Delhi: Sage

Muema, T., & Mula, R. (2011). *Challenges of adoption in technical training institutions within Nairobi County.* Nairobi: Grin Verlag.

Musarurwa, C. (2011). *Teaching with and learning through ICTs in Zimbabwe's teacher education colleges.* Gaborone: University of Botswana.

Nafuko, F. M. (2015). *Handbook of research on innovative technology integration in higher education.* Hershey: IGI Global.

Ness, D., & Lin, C. L. (2015). *International education: An encyclopedia of contemporary issues and systems.* New York: Routledge.

Ntirandekura, E. (2018). *Bachelor Thesis, Laptop Academic Performance Scores on University Students*. Grin Verlag.

Nyambane, C. O., & Nzuki, D. (2014). *Factors in influencing ICT integration in teaching. International Journal of Education and Research, 1-18.*

Ottenvanger, W., Akker, J. J. H., & deFeiter, L. (2017) . *Developing Science, Mathematics and ICT education in Sub- Saharan Africa. Patterns and promising practices*. Washington: World Bank Publications.

OECD. (2005). *Education Policy Analysis*. Paris: OECD Publishing.

Oliver, P. (2010). Understanding the research process. London: Sage.

Pixel. (2014). *Conference proceeding ICT for Language Learning*. Padova: liberiaunivertaria.it Edizioni.

Plomp, T., Anderson, R. E., Law, N., & Quale, A. (2009). *Cross- national information and communication technology policies and practices in education*. Greenwich: Information Age Publishing.

Pope, C., & Mays, N. (2013). *Qualitative Research in health care*. (3rd ed). Massachusetts: John Wiley & Sons.

Robinson, B., & Latchem, C. (2004). *Teacher education through Open and Distance Learning: World review of distance education and open learning. (Vol 3)* . London: Routledge.

Salkind, N. J. (2010). *Encyclopedia of research design*. (Vol 1). Thousand Oaks: Sage.

Salmons, (2015). *Qualitative online interviews: Strategies, design and skills*. (2nd ed). Thousand Oaks: Sage Publications.

Scheffknecht, J. J., & Council of Europe. (2000). *Council for cultural co-operation, information technologies in schools: Reasons and strategies for investment*. Council of Europe.

Selwyn, N., Potter, J, & Cranmer, S. (2010). *Primary schools and ICT learning from pupils perspectives, continuum*. London: International Publishing Group.

Seng, K. T., & Choo, L. S. (2008). *Information communication technology in education: Singapore's ICT masterplans 1997-2008*. Singapore: Toh Tuck Link.

Simmons, C., & Hawkins, C. (2009). *Teaching ICT: Developing as a reflective secondary teacher.* London: Sage.

Singh, Y. K., Nath, R. (2010). *Research methodology*. New Delhi. APH Publishing.

Sharma, U. (2003). *Women Empowerment through Information Technology*. New Delhi: Authors Press.

Shizha, E. (2013). *Restoring the educational dream. Rethinking educational transformation in Zimbabwe*. Pretoria: Africa Institute of South Africa.

Simpson, D., & Toyn, M. (2012). *Primary ICT across the curriculum.* (2nd ed*).*London: Sage.

Swanborn, P. G. (2010). *Case Study research: What, Why and How?.* London: Sage.

Tan, O. S., Law, E. L., & Hung, D. (2017). *Lee Yew's educational legacy: The challenges of success.* Gateway East: Springer.

Tay, L. Y., & Lim, C. P. (2013). *Creating holistic technology- enhanced learning experience. Tales from a future school in Singapore*. Rotterdam: Springer Science and Business Media.

Toure, K., Tchombe, M., & Karsenti, T. (2008). *ICT and changing mindsets in education.* Mamenda: Langaa Research and Publishing CIG.

Thompson, S. K. (2012). *Sampling. (3rd ed).* New Jersey. Wiley Publishers.

Unwin, T. (2009). *ICT 4D: Information and Communication Technology for development.* Cambridge: Cambridge University Press.

Vallance, M. (2006). *The Impact of synchronous internetworked teacher training ICT integration*. United Kingdom: Durham.

Vogt, P. W., Gardner, D. C., & Haeffele, L. M. (2012*). When to use what research design*. New York: Guilford Press.

Voogt, J., & Knezek, G. (2008). *International handbook of Information Technology in primary and secondary education.* New York: Springer Science & Business Media.

Wag, Q., & Woo, H. (2007). *"Systematic planning for ICT integration in topic learning. Education Technology and society* 10(1), 148-156.

Wigdor, M. (2013). *No miracle. What Asia can teach all countries about growth*? Burlington: Ashgate Publishing.

Wilkinson, D., & Birmingham, P. (2003). *Using research instruments: A Guide for researchers*. London: Psychology Press.

Williams, C. H., & Arinto, P. B. (2018). *Adoption and impact of OER in the Global South*. Capetown: African Minds.

Wilson, C. (2013). *Interview Techniques for UX Practitioners: A user centered design method.* Woutham: MA Newnes.

Yin, R. K. (2009). *Case study research: Design and methods. (4th ed)*. Thousand Oaks: Sage.

Yin, R. K. (2013. *Qualitative research from start to finish* . New York: Guilford Press.

Zhu, M. (2011). *Information and management engineering International Conference ICCIC 2011, Wuhan, China, September 2011 proceedings, Part VI, Nanchang.* Heidelberg: Springer Science & Businesss Media.

Appendix A

Questionnaire for teachers and students

Dear Participant.

My name is NYARAI MUSHINGA. I am a student in the Faculty of Education at Midlands State University pursuing a Bachelor of Education Degree in Computer Science under the supervision of Dr C. T Kangara. The title of my dissertation is: AN INVESTIGATION INTO THE CHALLENGES IN THE ADOPTION OF INFORMATION COMMUNICATION AND TECHNOLOGY IN A SELECTED PRIMARY SCHOOL IN WARREN PARK .

Please take note of the following:

- Do not write your name on the questionnaire.
- Your participation in this study is completely voluntary and you are free to withdraw from the study at any point.
- Your participation in this study does not include any compensation.
- Confidentiality will be maintained and your identity will in no way be linked to your responses to the questions.

Before completing the questionnaire please tick in the appropriate box that corresponds with your answer:

Are you computer literate?

yes	**no**

Which ICT tool(s) can you operate?

SMARTPHONE	
LAPTOP/DESKTOP	
PROJECTOR	
PRINTER	
INTERACTIVE BOARD	

YOU ARE KINDLY ASKED TO ANSWER THE FOLLOWING QUESTIONS

Do you think ICT is beneficial in the teaching and learning process?

Agree	**Strongly agree**	**partially agree**	**disagree**	**strongly disagree**	**partially disagree**

Explain your answer in the space provided below.

i……..
ii……
iii……
iv……
v……

What is the extent of ICT adoption in teaching and learning in primary schools?

i……..
ii……
iii……
iv……
v……

Are there adequate and functioning ICT tools in primary schools? **Yes** ☐ **No** ☐

Give reasons for your answer in the spaces provided

i……
ii……
iii……
iv……
v…….....

What are the challenges faced by primary schools in adopting ICT?

i……..
ii……
iii……
iv……
v……

What can be done to improve the adoption of ICT in the primary schools?

i.....
ii.....
iii.....
iv.....
v.....

Thank you in advance for taking part in this research.

For any questions, views or comments, feel free to contact the researcher at 0773 540 265 or e-mail nyaraimushi@gmail.com

Thank you.

Mushinga Nyarai

BED In Computer Science

Appendix B

Interview guide

The Head's interview guide

Are you computer literate?

Among the following ICT tools which one(s) can you operate?
Smartphone
Laptop/Desktop
Projector
Interactive board

Do you think ICT is beneficial in teaching and learning? Explain your answer.

What is the extent of ICT adoption in teaching and learning in primary schools?

Are there adequate and functioning ICT tools in primary schools?

What are the challenges faced by primary schools in adopting ICT?

What can be done to improve the adoption of ICT in the primary schools?

Please provide any other comments.