RESEARCH PROJECT

AN INVESTIGATION OF THE FACTORS AFFECTING ADOPTION AND INTEGRATION OF ICT AS A PEDAGOGICAL TOOL IN THE TEACHING AND LEARNING OF MATHEMATICS: A CASE OF BONDAMAKARA CLUSTER

BY

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The undersigned certify that they have read and recommended to the Bindura University of Science Education for acceptance of a research project entitled An investigation of the factors affecting adoption and integration of ICT as a pedagogical tool in the teaching and learning of mathematics: A case of Bondamakara Cluster, submitted in Partial fulfilment of the requirements of the Honours Bachelor Of Science Education Degree at Bindura University of Science Education.

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DEDICATION

I dedicate this work to the following people who inspired me during my research period.

(a) My wife who supported me during the three year study.

(b) Mutoko District (DSI) for giving me warm welcome when I visited his office asking for permission to distribute my questionnaire to selected schools in Mutoko District.

(c) The headmasters of the selected schools where I distributed my questionnaires to be answered.
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ABSTRACT

The study investigated the factors affecting adoption and integration of ICT as a pedagogical tool in Bondamakara Cluster in the teaching and learning of mathematics. In Zimbabwe, there are existing initiatives to support the use of ICT in education; however there is low to none adoption and integration of ICT as a pedagogical tool particularly in rural secondary schools. The current syllabus focus more on teaching ICT as a subject and less on using ICT as a pedagogical tool. In addition, technology uses in primary and secondary education suffer from lack of funding and there was no proper documentation. When majority of education systems around the world are shifting from teacher-student-textbook model to the blended learning model empowered by digital educational resources, it is a big challenge for a developing country to succeed without axis rigor planning. The research objectives were to determine factors that affect adoption and integration of ICT as a pedagogical tool in Bondamakara Cluster in the teaching and learning of mathematics and to establish the level of ICT usage in learning and teaching of mathematics in Bondamakara Cluster. A descriptive survey research design was adopted using a sample size of 40 teachers (N=40). Primary data was collected using questionnaire with a five point likert scale and interviews. The data was analysed using SPSS (version 21.0) and inferential statistics. The results of research revealed that lack of proper infrastructure and unavailability of electricity in schools to a very great extent affect the adoption and integration of ICT as pedagogical tool in secondary schools located in Bondamakara cluster. It was also indicated that teacher’s lack of knowledge and skills, lack of funding from government, high software costs inhibiting acquisition of appropriate software and expensive hardware to a great extent influence the adoption of ICT in secondary schools. The study therefore recommended that ICT is an influential instrument for the development of quality teaching and learning in educational systems around the world, as well as a means for fundamental transformation into the existing school principles and practices for the preparation of students in meeting the innovations in the global arena. Thus, the government should promulgate a dedicated ICT policy in education supported by a dedicated budget from the national coffers. The government should come in and subsidize ICT equipment’s that are used in schools. The government should consider waving import tax for ICT equipment for schools.
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CHAPTER I

INTRODUCTION

1.0 Introduction

This chapter discusses the background of the study, statement of the problem, purpose of the study. It also covers objectives, statement of problem, research questions, assumptions, significance of the study, delimitations, and limitations, importance of the study, definition of key terms and summary of the study.

1.1 Background of the study

Attempts to improve education with modern machines such as the phonograph, lantern slides and television date from the early 20th century (Castro, 2004; Earle, 2002; Reiser, 2001). For the most part such inventions come and go, yet what happens in the classroom looks pretty much the same (Callister, 1992). Information and communication technologies (ICT) were also introduced in schools to transform teaching and learning processes and to improve strategies for better educational attainment (Kozma, 2003; Sunkel, 2006). Global investment in ICT to improve teaching and learning in schools have been initiated by many governments. For example in United Kingdom, the government spending on educational ICT in 2008–09 in the UK was £2.5bn (Nut, 2010), in United States, the expenditure on K-12 schools and higher education institutions was $6 billion and $4.7 billion respectively in 2009 (Nut, 2010) and in New Zealand, the government spends over $ 410 million every year on schools ICT infrastructure (Johnson, 2009). Despite all these investments on ICT infrastructure, equipments and professional development to improve education in many countries, Gulbahar (2007) claimed that huge educational investment have produced little evidence of ICT adoption and use in teaching and learning especially in Turkey.

The knowledge and competences of teachers’ ICT pedagogical application are key attributes for the future of secondary education success (Pilkington, 2008). The goal for use of any new technology in classrooms should always be to support enhancement of effective education as the highest priority (Brás, Miranda, and Marôco, 2014; Loveless & Ellis, 2003, p. 43). A shift in
teacher roles from an ICT user to a facilitator retains the need for teachers to serve as leaders in technology enhanced classroom (lesson planning, preparation and follow-up) (Cubukcuoglu, 2013). Integrating ICT into the teaching and learning process should be seen as beyond the technology use only; it is what new technologies could do to promote learners understanding (Merrill, and Bishop, 2014). Using new tools, starts from finding a best fit, followed by experimentation and then practices (Somekh, 2008).

Information and communication technology is a fundamental tool that is widely integrated in the teaching and learning process at all levels (Pilkington, 2008). The ability of teachers to practice pedagogical ICTs is highly influenced by the knowledge, competences, and skills they received during college years (Thomas et al., 2013). In Tanzania existing policies support the use of ICT in education (United Republic of Tanzania, 2007); there is a low intake of the pedagogical ICTs among tutors in teacher training colleges (Andersson, 2014). Teachers’ decision to use technology in classroom is mainly influenced by access to resources, quality of software and hardware, ease of use, incentives to change, commitment to professional learning and background in formal computer training (Malhotra, 2013). By studying ICT integration in schools, it was determined that the way in which this takes place depends on the educational context. As part of this context, the following factors were also identified: pedagogical approaches and beliefs (Trucano, 2005), teacher confidence, attitudes and skills relating to ICT; school ICT infrastructure, supervision and technical support, involvement and leadership of school principals and time spent by teachers on meetings, training, exercises and lesson planning (Hayes, 2007; Pelgrum, 2001).

Thus, after 30 years of research, the main lesson to have been learned is that integrating ICT in education is not a technical matter (Earle, 2002). ICT should be the tool with which we deliver content and implement educational practices in better ways, based on curriculum and learning principles (Lai, 2008). Integration is determined not by the quantity or type of ICT used, but by how and why it is used (Trucano, 2005). Hereafter, when ICT is used to support teaching and learning activities, we refer to it as technology-enhanced instructional design or Technology-Enhanced Learning (TEL) (Dillenbourg, 2008). There is need for all stakeholders in the education sector to work towards coming up with a policy that will promote the utilisation of ICT in teaching and learning in secondary schools. Bondamakara Cluster is made up of rural
schools with little to no capacity to offer computer studies due to a plethora of challenges chief amongst is non-connectivity to electrical power supply. This paper explores the main barriers to integration of ICT in Bondamakara Cluster in the teaching and learning of mathematics.

1.2 Statement of the problem

The use of ICT as a pedagogical tool in Bondamakara Cluster in teaching and learning of mathematics is infinitesimal. In Zimbabwe, there are existing initiatives to support the use of ICT in education (GoZ, 2010); however there is low to none adoption and integration of ICT as a pedagogical tool particularly in rural secondary schools. The current syllabii focus more on teaching ICT as a subject and less on using ICT as a pedagogical tool. In addition, technology uses in primary and secondary education suffer from lack of funding and there was no proper documentation. When majority of education systems around the world are shifting from teacher-student-textbook model to the blended learning model empowered by digital educational resources, it is a big challenge for a developing country to succeed without axis rigor planning. Hence the researcher seeks to explore factors affecting adoption and integration of ICT as a pedagogical tool in Bondamakara Cluster in the teaching and learning of mathematics.

1.3 Aim of the study

To investigate the factors affecting adoption and integration of ICT as a pedagogical tool in Bondamakara Cluster in the teaching and learning of mathematics

1.4 Objectives

- To determine factors that affect adoption and integration of ICT as a pedagogical tool in Bondamakara Cluster in the teaching and learning of mathematics.

- To establish the level of ICT usage in learning and teaching of mathematics in Bondamakara Cluster.

1.5 Research questions

- What factors are affecting adoption and integration ICT as a pedagogical tool in Bondamakara Cluster in the teaching and learning of mathematics?

- What is the level of ICT usage in learning and teaching in Bondamakara Cluster?
1.6 Assumptions

It is assumed that the sample taken will be a true representative of the population under study.

It is assumed that use of ICT as a pedagogical in Bondamakara Cluster is affected by various factors.

It is assumed that the response rate on the questionnaires is going to be significant that the researcher would obtain complete, accurate and relevant data and thus draw valuable conclusions.

It is also assumed that the selected individuals will respond within a reasonably time frame to enable the researcher to conclude the research timely.

1.7 Significance of the study

To the Researcher

The researcher will broaden his understanding on the factors affecting use of ICT as a pedagogical tool in rural secondary schools. It will also enable the researcher’s to gain research skills, and experience to conduct research in the future and to combine academic theories with practical procedures.

To the organisation (Ministry of Primary and Secondary Education)

The study is also expected to be useful to educational policy makers when formulating policies with regards to the use of ICT in learning and teaching.

To School administration and teachers

The findings of this study may be used by school administrators and teachers to understand factors that affect adoption and integration of ICT as a pedagogical tool in secondary schools.

1.8 Delimitations of the Study

The study is going to look at factors affecting use of ICT as a pedagogical tool in Bondamakara Cluster situated in Mutoko District in Mashonaland East Province covering the period 2017 to 2018.
1.9 Limitations

There is limited time for carrying out the research. Inaccurate data may be supplied to the researcher and also the results from the research cannot be generalised to other schools in Zimbabwe.

1.10 Definition of Terms

**Pedagogical tool** - a pedagogical tool is something that relates to teachers or teaching. A pedagogical tool is anything that a person uses to learn or teach. Some pedagogical tools such as textbooks are considered "traditional," but as the needs of students and teachers change, less-traditional items are becoming pedagogical aids. Exactly what a person considers a pedagogical tool varies by age and education level, but virtually anything can be a pedagogical tool in the right circumstances.

**ICT** - Information and Communications Technology (ICT) is an extended term for information technology (IT) which stresses the role of unified communications and the integration of telecommunications (telephone lines and wireless signals), computers as well as necessary enterprise software, middleware, storage, and audio

**ICT integration** - ICT integration is defined as the use of ICT to introduce, reinforce, supplement and extend skills (Pisapia, 1994). ICT integration has been attracting a great deal of interest among researchers in professional development communities and human-computer interaction circles.

**Secondary School** - A secondary school refers to a school intermediate between elementary school and college and usually offering general, technical, vocational, or college-preparatory courses. A secondary school is a school for pupils between the ages of 11 or 12 and 17 or 18.

1.11 Summary

The chapter highlighted the background to the study, statement of the problem, research objectives, and research questions, assumption of the research, significance of the study and definition of terms. Delimitations and limitations of the study were also discussed.
CHAPTER II

LITERATURE REVIEW

2.0 Introduction

Saunders et al. (2009, p.98) state that “a critical review of literature is necessary to help one to develop a thorough understanding of, and insight into, previous research that relates to your research question(s) and objectives”. This chapter examines the theoretical framework, empirical evidence, gap analysis being guided by the research objectives

2.1 Theoretical framework

This research shall be founded on the TPACK model

2.3 The TPACK Framework

The TPACK framework is a generative framework that guides course design and evaluation for pre-service and in-service teachers’ intention to integrate ICT into classrooms (Chai, Koh, Tsai, and Tan, 2011). The framework arose in the context of teacher education (Oliver, 2011), with the complex interplay of three primary forms of knowledge – Technological Knowledge (TK), Pedagogical Knowledge (PK), and Content Knowledge (CK) – that goes beyond seeing these three knowledge bases in isolation (Koehler and Mishra, 2009). The reviewed studies (Chai, Koh, and Tsai, 2011; Koh, Chai, and Tsai, 2010) reported TPACK as a multiplicative framework that continue to guide course design and evaluation for teachers’ preparation to integrate ICT into classrooms. A study by (Chai, Koh, and Tsai, 2011) reported that TK, PK and CK have positive influences on TPACK while TK and PK have positive influences on TPK leading to TPK positively influencing TPACK.
The Pedagogical Content Knowledge (PCK) defines teacher's ability to pedagogically adapt content to students of diverse abilities rather than just delivering subject content knowledge (Abbitt, 2011). Content Knowledge (CK) refers to the body of information that teachers teach to students in a given subject area such as facts, concepts, theories, and principles (Ball, Thames, and Phelps, 2008; Kleickmann et al., 2013). A Content Knowledge (CK) strategic thinking incorporates knowing when, where, and how to use domain-specific knowledge and strategies for guiding students’ learning with appropriate digital, information and communication technologies (Ronau, Rakes, and Niess, 2012). The TPACK constructs TK, PK, CK, TPK, TCK and PCK are the basic inputs used to explore pre- and in-service teachers’ technology use and can be used to adjust training to improve areas that face limitations.

The TPACK model both focuses on technology integration in classroom. Three major characteristics differentiate ICT frameworks: (1) promoting technology use based on learning enhancement capabilities, (2) technology use technical knowhow, for instance general knowledge of how to use hardware and software and, (3) infrastructure and institutional capacity building for instance availability of computers, software and Internet access devices (Van Braak, and Valcke, 2007). The TPACK framework looks at the Technology, Pedagogy and Content, and argues that teachers need knowledge of all the three components (Abell, 2008; Moroder, 2013).
The TPACK presents a graphical framework for teachers to comprehend the effective integration of technology in classroom practices (Koh, Chai, and Tay, 2014).

2.4 Factors affecting use of ICT as a pedagogical tool in schools

While information and communication technology (ICT) is not a panacea for all educational problems, today’s technologies are essential tools for teaching and learning (Moroder, 2013). To use these tools effectively and efficiently, teachers need visions of the technologies’ potential, opportunities to apply them, training and just-in-time support, and time to experiment. Only then can teachers be informed and confident in their use of new technologies (Bowes, 2003). ICT integration into teaching and learning is very complex and one can easily encounter a number of difficulties and these difficulties are popularly known as “barriers” (Schoep, 2005). Stockdill and Moreshouse (1992) identified the variables that need to be assessed regarding successful adoption and integration of ICT as follows: user characteristics, technological considerations, content characteristics and organizational capacity. Balanskat et al. (2007) found that barriers for the successful implementation of ICT are found at teacher-level, school-level, and system-level.

According to Sherry and Gibson (2002), barriers to implantation of ICT can be individual, technological, organizational, and/or institutional. Other barriers to integration of ICT into education programs include the following: lack of in-service training (Beggs, 2000; Schoep, 2004), lack of appropriate software/materials (Brush et al. 2003; Bullock, 2004; Mumtaz, 2000; Williams et al, 1998), lack of basic knowledge/skills for ICTs (Brush et al. 2003; Williams et al. 1998), lack of hardware (Beggs, 2000; Brush et al. 2003; Bullock, 2004; Mehlinger& Powers, 2002; Mumtaz, 2000; Schoep, 2004; School Net Africa, 2004; Williams et al, 1998), lack of technical support (Brush et al. 2003; Bullock, 2004; Schoep, 2004), lack of appropriate course content and instructional programs (Mehlinger and Power, 2002; Schoep, 2004), lack of time (Beggs, 2000; Brush et al. 2003; Mumtaz, 2000; Schoep, 2004), lack of appropriate administrative support (Schoep, 2004; School Net Africa, 2004).

Becta (2004) proposes that there are two levels of barriers affecting teachers’ adoption and integration of ICT in teaching, namely, individual (teacher-level barriers) and institutional (school-level barriers). The teacher-level barriers include lack of time, lack of confidence, and resistance to change and the school-level barriers include lack of effective training to solve the
technical problem and lack of access to the resources. Snoeyink and Ertmer (2001) also propose two types of barriers that affect implementation of ICT in schools. The first order barrier includes lack of equipment, unreliability of the equipment, lack of technical support and other resource-related issues and the second order barrier includes school level factors such as organizational culture, and teacher-level factors. Pelgrum (2001) names two kinds of obstacles to ICT adoption, namely, material and non-material. The material conditions include insufficient computers or software, and the non-material conditions include lack of teachers ICT knowledge and skills, difficulty of integrating ICT based instruction and insufficient time for teachers (Ibid).

In most countries of Sub-Saharan Africa, inadequate technological infrastructure, such as lack of hardware and software, and internet, limit individual and community access to ICT and also pose a barrier to its integration with the curriculum in schools (Menda, 2006; Janczewski, 1992). In addition to the commonly listed issues of infrastructure, the African region faces “many external systemic factors such as electricity, transport networks, import duties” (Jensen, 2005), technical faults and network configuration problems (Minishi-Majanja, 2007). The available literature confirms the well-known fact that the East African countries face a shortage of electrical energy supply. In Tanzania, the national electricity grid is limited to commercially viable areas missing out most of the schools in the rural areas. This, together with frequent power breakdowns and power cuts, has increased the cost of owning ICT infrastructure (Farrel, 2007) and made it almost impossible for schools in the rural areas to access and use ICT in education.

2.4.1 Affordability of technology and Insufficient funds

Available technology needs to be affordable by schools if it is to be adopted (Beggs, 2000). At the national level, affordability could be limited by the high cost of putting infrastructure in place, and is linked with the issue of poverty (Ibid). At the individual or organisational level, expensive hardware and software as well as high costs of communication and services restrict access to ICT (Beggs, 2000). Most schools in Africa do not have the means to purchase expensive computers and hardware, and provide training for their staff (Bullock, 2004).

Effective and efficient use of technology depends on availability of hardware, software and having access to resources by teachers and students and administrative staff (Schoep, 2004). Most of the computers in the schools are as a result of donations or projects from private
companies or foreign donors (Mumtaz, 2000). When the project is still funded by the donor, the maintenance of the computers as well as funding for the teachers is included. Immediately the project comes to an end, then the government has to take over and that is the beginning of the problems (Ibid). The schools realising that there is no funding coming from government, and they want to maintain the computers and the subject be taught in the school then the parents have to pay for the computer classes which is the maintenance of the computers and the teacher’s salary (Mumtaz, 2000). In most developing countries it is very hard when it comes to implementing technology into education systems because it involves substantial funding by the government (Williams et al, 1998).

Computers are still very expensive and despite spirited efforts by the government agencies, NGO, corporate organizations and individuals to donate computers to as many schools as possible, there still remains a big percentage of the schools unable to purchase computers for use by their pupils (Mehlinger and Power, 2002). Using up-to-date hardware and software resources is a key feature in the diffusion of technology but a rare experience in educational institutions (Ibid). The computers are also not enough for the schools, some classes are very large and therefore, it becomes a problem when teaching the students when you do not have enough computers (Bullock, 2004).

2.4.2 Economic and political factors

Chege (2003) cites lack of acceptance of ICT as an urgent national need as a reason for slow penetration of ICTs in the Africa. Technology is still considered a luxury by many within the region and extreme poverty necessitates countries to choose between feeding the hungry and sheltering the homeless over investing in enhancing technological infrastructure and thereby improving access (Ibid). Schools themselves are under-funded and have little resource to spend on technology. Absence of policies to regulate the growth and use of ICT in the country creates a barrier. Minishi-Majanja (2007) mentioned that computers and related items are often treated as luxury items and heavy government taxes are imposed which increases the cost of such equipments. Deregulation of polices related to satellite communication and other telecommunication links, and regulating ISPs, government and cross-border data flows is needed. Mutula (2004) has argued for government subsidy on technology to educational institutions.
Minishi-Majanja (2004) identifies financial sustainability as one of the major constraints for ICT use in schools.

2.4.3 Lack of knowledge, skills and time

Teacher’s lack of knowledge and skills is one of the main hindrances in the use of computers in primary education (Reeves, 2008). A study of 42 schools surveyed showed that 66% of the teachers that teach ICT in Swaziland have not been taught how to teach the ICT (Ibid). The teachers were hired to teach the subjects in their areas of expertise and are expected to teach ICT as well. The demand for ICT learning has been tremendous and the number of teachers who are trained to teach ICT cannot meet the demand (Pilkington, 2008). There are more students willing to be taught computing skills than there are teachers to transfer the skills (Ibid).

Teachers have been found to be the major predictors of the use of new technologies in instructional settings (Penuel, 2006). The teachers teach more than one subject and then they have to teach ICT which means they have a heavy load (Ibid). These teachers do not have time to design, develop and incorporate technology into teaching and learning. The teacher needs time to collaborate with other teachers as well as learn how to use hardware and software (Penuel, 2006).

2.4.4 Maintenance

There have been several initiatives from the Ministry, the private sector and international partners to introduce computers in schools in the country (Robertson, 2002). Government initiatives have been limited by budgetary constraints (Ibid). Schools that had computers donated by the private sector or bought by government have had challenges in the maintenance and upgrading of the computing equipment (Roblyer, 2005). In the case of a project, at the inception of the project the computer laboratories have all the resources needed as well as networking the computers and Internet connectivity facilities (Ibid). When the project phases out, the maintenance of the computer has to be borne by the students. While a good number of schools have benefited from donated used computers, they have not been adequately equipped with the same on maintenance and repair, hence its very common to see a schools computer lab full of broken down computers, some repairable and some not (Roblyer, 2005).
2.5 Empirical Evidence

Pelgrum (2001) found that the lack of knowledge and skills, insufficient number of computers, lack of infrastructure and difficulty in integrating ICT based instruction in the classroom are the factors that negatively affect the implementation of ICT by teachers in education. A study by Martins et al. (2004) revealed that observability and trialability are the significant factors that affect the implementation of ICT. Studies conducted by Winnans and Brown (1992), Dupagne and Krendl (1992) and Hadley and Sheingold (1993) found that barriers to implementation of ICT are: lack of teaching experience with ICT; lack of on-site support for teachers using ICT; lack of help supervising children using computers; lack of ICT specialist teachers to teach students computer skills; lack of computer availability; lack of time required for successful integration of ICT into the curriculum; and lack of financial support. A report from Ghana indicated that limitations imposed by the inadequate number of the computers in institutions, poor trained educators, and the lack of internet connectivity are the major challenges to implementation of ICT in teaching and learning (Mereku et al. 2009).

A research result from Gomes (2005) shows that the science teachers are usually resistant to adopt new strategies so new strategies become obstacles to integration of ICT in science teaching. Özden (2007) and Toprakci (2006) found that in Turkey lack of in-service training programs for science teachers is the main problem preventing implementation of ICT in schools. Toprakci (2006) found that the limited number of computers, oldness or slowness of ICT systems and scarcity of educational software in schools are the main barriers that affect to implement of ICT in science education. Beggs (2000) found that one of the top three barriers to adoption of ICT is the lack of training for teachers. A study conducted in Saudi Arabia by Al-Alwani (2005) found that lack of time is the main barrier affecting teachers’ implementation of ICT. Similarly, a study conducted in Canada by Sicilia (2005) showed that teachers take more time to prepare ICT based lessons compared to traditional methods.

Cox et al. (1999) study revealed that a lack of ICT resources in schools and insufficient time to review software prevents teachers from using ICT. Bisht (2013) found the following reasons for lack of implementation of ICT in schools: lack of access to technology, lack of ICT training and practice in teaching, lack of connection between personal uses of ICT students learning with the help of technology, lack of connection between personal uses of ICT to teaching students to learn
with technology attitude towards computers, lack of self-confidence, lack of technical and instructional support, and finally the lack of mentor teachers. Research results from Afshari et al. (2009), Beggs (2000), Newhouse (1999), and Ihmeideh (2009) suggest that time is the biggest factor that negatively affects implementation of ICT in education. A study conducted in Europe by Empirica (2006) found that lack of access, lack of computers, lack of adequate materials and lack of skills are the biggest barrier to use ICT in teaching by teachers. Korte and Hüsing (2007) found that in European schools infrastructure barriers such as broadband internet inhibits implementation of ICT by teachers.

A study conducted by Kessy et al. (2006) found that corruption is one of the main factors that affect implementation of ICT in education. Mamun and Tapan (2009) state that huge budgets are passed to buy ICT peripherals to improve teaching and learning but because of corruption only minor improvements are found in the technical and vocational education sector. Teachers’ lack of knowledge and skills is one of the main barriers to use of ICT in the education sector (Mamun and Tapan, 2009; Pelgrum, 2001; Ihmeideh, 2009; Williams, 1995). Furthermore, they also state that lack of knowledge of how to use ICT and lack of skills regarding ICT tools negatively affects the implementation of ICT in teaching and learning in Bangladesh. Furthermore, several factors found by researchers that directly and indirectly affect the implementation of ICT in education in Bangladesh include poor administrative support (Keengwe et al. 2008), the poor quality of training for teachers (Copley and Ziviani, 2004; Mamun and Tapan, 2009; Afshari et al. 2009) and lack of highly qualified ICT coordinators who can assist teachers to integrate ICT into the classroom, laboratory, and school culture (Afshari et al, 2009; Lim, 2002; Tearle, 2003).

2.6 Research gap

Many researches have been carried out in developed nation exploring the factors affecting adoption and integration of ICT as a pedagogical tool in schools and there is little information on the same about developing nations like Zimbabwe and in particular information about rural schools.
2.7 Summary

This chapter has covered literature review, introduction of the topic, theoretical framework and empirical evidence to the study of factors affecting adoption and integration of ICT as a pedagogical tool in schools.
CHAPTER III

RESEARCH METHODOLOGY

3.0 Introduction

Research Methodology is the description of all activities and procedures undertaken during the course of the research (Creswell, 2009). The chapter looked at the activities and procedures used in researching during the course of the research. Having reviewed the relevant literature, the chapter focuses on the research plan, population samples, research tools and the procedure in which gathered data would be presented and analysed.

3.1 Research paradigm

Tuli, (2010) said that roots of positivism is in the belief that knowledge is based on observable facts positivist paradigm asserts that reality is stable and events can be observed empirically, quantifiable, and can be explained with logical analysis and described objectively. As positivism paradigm is most appropriate for quantitative sort of research so this research considered positivism approach. Research concepts concerning ontology argues that knowledge exist and it should be studied using objective methods and discovered using quantitative methods (Bassey, 2005). Considering the ontological approach, this study is to examine factors affecting adoption and integration of ICT as a pedagogical tool in rural secondary schools in the teaching and learning of mathematics. Epistemological research design concerns with the framework to get knowledge closer to reality and is reliable by empirically observing and manipulating the reality often using experimental methods (Denzin and Lincoln, 2000). Considering the epistemology approach this study was based on empirical findings. The nature of this research was descriptive as a model is developed by reviewing the literature.

3.2 Research design

Research design is a detailed blue print used to cause a research study towards its desired objectives (Orodho, 2003). Research design ensures that the data collected meets the informational needs of the decision maker. The researcher sought to achieve the research objectives by using primary data. Primary data is defined as data, which was collected directly
from targeted respondents (Creswell, 2009). Research design was concerned with turning research questions into a testing question and deals with at least four questions that is; what question to study, what data are relevant, what data to collect and how to analyse the results. After determining the research design, the researcher established the research method.

3.2.1 Descriptive Research

Descriptive research design is one that will allow the researcher to collect data that is descriptive in nature and tells us more on what is going (Kothari, 2004). This study was conducted using the descriptive survey approach. As a research design, the descriptive survey is used to obtain information concerning the current status of a phenomenon. The method was chosen because it is more precise and accurate since it involves description of events in a carefully planned way (Flyvbierg, 2006). Furthermore, descriptive survey design allows observation of subjects in a completely natural and unchanged environment and yields rich data that leads to important recommendations.

3.3 Target Population

Kumar (2003) defined a population as the set of all objects that possess some common set of characteristics with respect to some research problem. According to Kumar (2003) population comprises all elements or units under investigation for a specific study. In this research the targeted population was teachers from Bondamakara Cluster which are Bondamakara High School, Mutoko High School, Mutoko Central Secondary School, Mutoko Government High, Allsouls High School and Rukau Secondary School that teach mathematics.

3.4 Sampling Technique- Census

The study used a census. A census is a study of every unit, everyone or everything, in a population (Robson, 2009). It is known as a complete enumeration, which means a complete count. The researcher opted for the census because the universe is not vast as the total number mathematics teachers in Bondamakara Cluster is 40. The major advantage of census is that it provides a true measure of the population (no sampling error).
3.4.1 Sample size

The research used a sample size of 40 teachers. Kothari (2005) states that sampling frame is a physical representation of the target population which comprises of all units that are potential members of a sample. The sample size was influenced by many factors such as the objectives of the study, available resources such as time, money, personnel, among others.

3.6 Research instruments

Data collection involves the acquiring of useful data relating to the research topic (Creswell, 2009). The environment in which the data was collected affects the technique to be used. The researcher used questionnaires and interviews.

3.6.1 Questionnaires

The researcher came out with various definitions of the term questionnaire. Some authors (for example Kervin (1999) reserve it exclusively for surveys where the person answering the question actually records their own answers. Others (for example Bell 1999) use it as a more general term to include interviews that are administered either face to face or by telephone. Questionnaires can be self-administered where answers are recorded by respondent or interviewer administered where answers are recorded by interviewer. Self-administered questionnaires can be on-line, postal or mail and, delivery and collection. Questionnaires made it possible for the researcher to quantify various aspects of research that are being studied. The researcher used the questionnaire based on the following advantages according to Saunders (2009); the respondents can put thought and verification into the process as they are not under pressure to respond immediately, if the questions have been prepared and designed correctly, the questionnaire can provide accurate and straightforward responses; hence relevant information for the project can be obtained, it is the cheapest method of gathering data relative to other data gathering methods such as interviews, a questionnaire allows for better comparability of responses because of the uniformity in the questions that all respondents are asked.

3.6.2 Interview guide and Interviews

According to Nordquist (2010), an interview is a conversation in which one person (the interviewer) elicits information from another person (the subject or interviewee). The following
are advantages as cited by Nordquist (2010); Respondents usually respond when confronted in person, Personal interviewing is not rigid but flexible and Interviewer has control and can also probe some more issues.

3.7 Reliability and validity

The validity of a questionnaire relies first and foremost on reliability. Validity refers to whether the questionnaire or survey measures what it intends to measure (Gliem and Gliem, 2013). Also defined as a degree to which a research study measures what it intends to measure. To ensure validity, accuracy and validity of results, the researcher used Kendal coefficient for examining validity of the questionnaire and approved models in drawing sample size. The questions used where simple, short and not ambiguous so that they can solicit valid answers.

Reliability pertains to a measure whereby similar results are generated overtime and situations (Raulin and Graziano, 2012). Moreover it is also a degree to which measures are free from errors by giving up consistent results. In this study reliability of the questionnaire was examined through Crocbachs’ Alpha value generated by SPSS.

3.8 Data Analysis and Presentation

3.8.1 Data Analysis

The researcher checked for completeness of questionnaires and performs editing, coding and general cleaning of the data. Data collected was analyzed using Statistical Package for Social Sciences (SPSS Version 21.0) program and Microsoft Excel for generation of reports. Since the study is descriptive in nature, descriptive analysis was made on the data. For descriptive analysis, the mean, mode, variance and standard deviation was used to determine the respondents’ agreement or otherwise with statements under each variable.

3.9 Ethical Considerations

According to Polit and Hungler (2006), ethics are systems of moral values that are concerned with the degree to which research procedures adhere to professional, legal and social obligations. In this research, the researcher sought authority and permission from school authorities and from the respondents. The participant’s voluntary freedom to participate or
withdraw from the exercise was clarified. All study participants were treated with respect, fairness and dignity. Anonymity, confidentiality and privacy of study participants was explained to the participants that their personal data is not going to be used to link results to them, and names did appear anywhere on the questionnaire so that completed questionnaires cannot be linked to the participants.

3.10 Summary

This chapter discussed the research design, target population, sampling techniques and sample size, research instruments, data collection procedure and data analysis.
CHAPTER IV

DATA ANALYSIS, PRESENTATION AND INTERPRETATION

4.0 Introduction

In this chapter data findings were analysed, presented and interpreted as they relate to the theory that underlies the study. Data was analysed from the findings obtained through interviews and questionnaires. These findings were linked to those of literature review and to the research objectives. For the analysis, tables, bar charts, pie charts and simple percentage was used to present data. Furthermore, in order to reduce the bulkiness of data, the data presented and analysed are those that are considered relevant to the problems and objectives of this research study. Findings were analysed to come up with a reasonable conclusion on the factors affecting the adoption and integration of ICT as a pedagogical tool in rural secondary schools. Data was presented on the material and information obtained by the researcher throughout the research. A sample of 40 was chosen. Analysis of data presented was made using SPSS and descriptive statistics analysis.

Table 4.1- The Response Rate of Questionnaires

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Rate %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Questionnaires distributed</td>
<td>40</td>
<td>100</td>
</tr>
<tr>
<td>Questionnaires returned</td>
<td>40</td>
<td>100</td>
</tr>
<tr>
<td>Interviews conducted</td>
<td>5</td>
<td>100</td>
</tr>
</tbody>
</table>

The table above depicts a 100% response rate on the questionnaires and this is quite a good response that was considered as good for analysis for the research. This indicated that the respondents contributed much to the gathering of information by the researcher. The high
response rate was attributed to the fact that the questionnaires were delivered and collected by hand and hence there was a close contact and follow-up with the respondents.

4.1 Descriptive Statistics

This section will focus on the descriptive statistics to illustrate the characteristics of the sample studied and present the frequencies for the questions that are contained in the questionnaire.

4.2 Profile of Respondents

The respondents’ characteristics were in the first section of the questionnaire. Descriptive statistics of the respondents are presented in below sections.

4.2.1 Gender of respondents

![Gender of respondents](image.png)

Figure 4.1 Gender of respondents

Figure 4.1 above depicts that of the respondents that were selected from six different schools, 65% were male and 35% were female. The results revealed that the majority of mathematics teachers in Bondamakara cluster are male since most women regard science subjects as most difficult.
4.2.2 Age of respondents

The research results revealed that the majority of respondents (52.2%) were aged between 26 to 40 years followed by those within the age group 41-50 years (26.1%). However the least two categories were those below 25 years of age (13%) and those above 50 years of age (8.7%).

Figure 4.2 Age of respondents
4.2.3 Academic Qualifications

![Figure 4.3 Academic Qualifications](image)

The results from figure 4.3 above show that the majority (47.8%) of mathematics teachers in rural schools have attained a Diploma in IT as their highest level of academic qualification. The second group of respondents 34.8% had a degree as their highest level of academic qualifications and finally 13% had masters. 4.3% were classified as others.

4.3 Instrument reliability test

The questionnaire was tested for reliability for every item using Cronbach Alpha value on SPSS

Table 4.2 Reliability Statistics

<table>
<thead>
<tr>
<th>Cronbach's Alpha</th>
<th>N of Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>.969</td>
<td>21</td>
</tr>
</tbody>
</table>
Instrument reliability was tested and Cronbach Alpha value of 0.969 was obtained for the all items on the questionnaire. The alpha coefficient ranges from 0 to 1, and it is common practice to take 0.60 as the minimum acceptable alpha value. Smith et al. (2011) argued that a reliability coefficient in the order of 0.60 is acceptable, while De Vaus (2002) and Bryman and Bell (2011) suggest a minimum alpha value of 0.70 and 0.80, respectively, for reliability purposes. The alpha value indicated that the instrument was highly reliable.
4.4 Factors affecting use of ICT as a pedagogical tool in schools

The research probed factors affecting use of ICT as a pedagogical tool in schools using a five point Likert scale (strongly disagree =1; disagree =2; uncertain =3; agree =4; strongly agree= 5). The responses were computed in the form of mean values as shown on table 4.3 below

<table>
<thead>
<tr>
<th>Table 4.3 Factors affecting use of ICT as a pedagogical tool in schools</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
</tr>
<tr>
<td>Statistic</td>
</tr>
<tr>
<td>Lack of proper infrastructure</td>
</tr>
<tr>
<td>Unavailability of electricity at our school</td>
</tr>
<tr>
<td>Teacher’s lack of knowledge and skills.</td>
</tr>
<tr>
<td>Lack of funding coming from government</td>
</tr>
<tr>
<td>High software costs inhibiting acquisition of appropriate software</td>
</tr>
<tr>
<td>Expensive hardware</td>
</tr>
<tr>
<td>Teachers do not have time to design, develop and use technology in teaching and learning.</td>
</tr>
<tr>
<td>High costs of maintenance of the ICT resources</td>
</tr>
</tbody>
</table>

The research findings indicated that lack of proper infrastructure with mean value of 4.9 and standard deviation (SE±0.06) to a very great extent affect the use of ICT as a pedagogical tool in schools in Bondamakara cluster. The factor was rated at first position. The study sought to explore the availability of the ICT infrastructure in the secondary schools because this has a direct effect on the use of ICT. The uptake of ICT is not possible unless the necessary equipment
and supporting infrastructure is present in the schools. The results were consistent with the findings of the study conducted by Jensen (2005) who concluded that proper and adequate infrastructure is vital for the adoption of ICT in learning and teaching. To effectively introduce technology into schools is largely dependent upon the provision of ICT resources such as hardware, software and communications infrastructure. If ICT resources cannot be accessed by the teacher, as in so many education settings in Sub-Saharan Africa (SSA), then it will not be used (Hennessy, et. al 2010). Unavailability of electricity at schools (mean =4.7; SD=0.5) was also ranked on second position on the list of factors. The factor to a great extent influences the adoption of ICT as a pedagogical tool and these results were in agreement with Farrel (2007) views that in many rural schools in Africa there is no connectivity to power or electricity hence this militates against the use of ICT for learning and teaching.

The results also indicated that lack of funding (mean=3.7; SD=0.4) coming from government was to a great extent influencing the use of ICT in schools. Use of ICT for teaching and learning in a capital intensive program requires financing from the government or other agencies like non-government. Beggs (2000) revealed that technology must be affordable, at the national level, affordability could be limited by the high cost of putting infrastructure in place, and is linked with the issue of poverty which is rife in many rural schools. High software costs inhibiting acquisition of appropriate software (mean= 3.7; SD= 0.5) and expensive hardware (mean=3.7; SD=0.5)to a great extent influences adoption of ICT as a pedagogical tool in schools and this is also coupled by the aforementioned factors of lack of funding.

The study findings indicated that teachers do not have time to design, develop and use technology in teaching and learning (mean=3.4; SD=0.9) and this to a great extent affects use of ICT in teaching and learning in schools. High costs of maintenance of the ICT resources with mean value of 3.3 and standard deviation of 0.8 (SE±0.17) was also cited as one of the factors that influences adoption and integration of ICT as a pedagogical tool in schools. These results were similar to the findings by Mehlinger and Power (2002) the Philippines were he observed that one of the major obstacles to optimizing computer use in high schools has been the lack of timely technical support and maintenance. In some extreme cases involving schools in remote areas, disabled computers take months to be repaired since no technician is available in the
immediate vicinity and so the computers have to be sent to the nearest city hundreds of kilometres away.

4.5 Level of ICT usage in learning and teaching in rural secondary schools

The study inquired about the level of ICT usage in learning and teaching in rural secondary schools. The responses were also computed into mean values as shown on table 4.4.

Table 4.4 Level of ICT usage in learning and teaching in rural secondary schools

<table>
<thead>
<tr>
<th>Description</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>There is a dedicated school budget to support the implementation of ICTs in teaching and learning.</td>
<td>40</td>
<td>1.4783</td>
<td>.10650</td>
</tr>
<tr>
<td>Learners at our school are conversant with using ICT tools.</td>
<td>40</td>
<td>1.4783</td>
<td>.10650</td>
</tr>
<tr>
<td>It is mandatory to use ICT tools for teaching and learning at our school</td>
<td>40</td>
<td>1.4783</td>
<td>.10650</td>
</tr>
<tr>
<td>It is mandatory to use ICT tools for teaching and learning at our school.</td>
<td>40</td>
<td>1.3913</td>
<td>.10405</td>
</tr>
<tr>
<td>Learners at our school are conversant with using ICT tools.</td>
<td>40</td>
<td>1.3478</td>
<td>.10154</td>
</tr>
<tr>
<td>I often use computers and the internet</td>
<td>40</td>
<td>1.3043</td>
<td>.09810</td>
</tr>
<tr>
<td>I have frequency access to computers and internet for teaching and learning purposes.</td>
<td>40</td>
<td>1.2174</td>
<td>.08794</td>
</tr>
<tr>
<td>I use ICT tools in teaching and learning of secondary school subjects.</td>
<td>40</td>
<td>1.0870</td>
<td>.06007</td>
</tr>
<tr>
<td>Valid N (listwise)</td>
<td></td>
<td>40</td>
<td></td>
</tr>
</tbody>
</table>

The results on table 4.4 revealed that the respondents disagreed that there was a dedicated school budget \(\text{mean}=1.5; \text{SD}=0.5\) to support the implementation of ICTs in teaching and learning in
rural schools. ICT use is generally weak in many schools since most of the secondary schools in the cluster do not walk the talk of ICT integration in teaching curriculum subjects. Generally, they do not give it a priority in their annual budget even though they do say ICT use, especially in management purposes, is beneficial. The study also revealed that respondents disagreed that learners at schools in Bondamakara cluster were conversant with using ICT tools (mean=1.5; SD=0.5) and also disagreed that it is mandatory (mean=1.5; SD=0.5) to use ICT tools for teaching and learning at our school. This finding may be attributed to the fact that many principals or headmasters in secondary schools have not fully embraced the use of computers in teaching and learning processes since most of them have minimal ICT skills and knowledge, a low level of ICT resources available as evidenced by low computer to student ratio (1: 162) and lack of on-site technical support. It was also revealed that the respondents hardly use computers and internet (mean=1.3; SD=0.5) and this indicated a very low level of ICT usage in teaching and learning in those schools. The results collaborated with the findings by Roblyer (2005) in secondary schools in Kenya where he concluded that ICT adoption and integration in rural schools is mainly hindered by lack or virtually no access to computers and internet by both learners and teachers.

The study further showed that teachers in Bondamakara cluster rarely use ICT tools in teaching and learning of secondary school subjects as shown by the mean value of 1.1 and standard deviation of 0.3 (SE=±0.6). This was supported by findings from the interviews whereby it was cited that teachers generally lacked training in computer use. These results echoed the research findings by Pilkington (2008) that many schools in Africa had at most one teacher sponsored for ICT training, while the rest had not. It is clear that most of the teachers had not been trained in computer use in the cluster and hence lacked the necessary skills as well as pedagogical knowledge for integrating computers in teaching and learning. This explains the low use of computers in teaching and learning as revealed by this study.

The information gathered through the interviews revealed a range of opinions as narrated below. Many good teachers are resistant to ICT with good and strong reasons that must be taken into account. Although many of them may never get actively involved in using computers in a lab (but may use a screen projector in their classroom in very few occasions), they will undoubtedly
provide a healthy and necessary tension that will impose on policy-makers the need to use rigorous arguments in favour of ICT in schools.

Some of the teachers interview’s arguments against using ICT in education were that these technologies represent a threat to their professional status because they will diminish their role (i.e. stories about software that might substitute for them), will degrade their relationship with students and will take over initiative and control within the classroom to the detriment of teachers. Other teachers are simply not willing to make changes in their teaching praxis because they perceive it adequate as it is; still others were simply afraid of using computers and similar technologies such as TV recorders, cameras and screen projectors (technophobes). The teachers also revealed that there was also the case of many schools with large classes (e.g. more than 60 children per room) without enough computers, poor Internet bandwidth, unreliable networks, inadequate software and other problems directly related with the technology that constitute a barrier for the teachers.

The school principals and the education officers admitted during their interview that there is a serious shortage and inadequate ICT equipment in the schools. They agreed that this has a direct impact on the use of e-learning in schools. Some of the gadgets and equipment are very expensive and the schools’ budget are already far much stretched to accommodate the extra items with budgetary implications they revealed. Most teachers cited insufficient access to computers as the main obstacle in ICT for education programmes. This is particularly relevant for educational institutions located in the rural areas where the school or training institution is often the only access point for computers. Although this will require massive investments in the infrastructure, it is nevertheless essential in order to guarantee equal access and overcome the digital divide (IICD, 2007).

4.5 Summary

The overall results revealed that there are various factors that influence the adoption and integration of ICT as pedagogical tool in rural schools. The next chapter will cover conclusion and recommendations of the study.
CHAPTER V

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.0 Introduction

The study aimed at factors affecting the adoption and integration of ICT as a pedagogical tool in rural secondary schools. This chapter gives conclusions and recommendations on the researcher’s topic based on a critical analysis of the research findings. Therefore in line with research objectives of this study we conclude and suggest recommendations based on the findings presented and the literature review.

5.1 Summary of the study

The research explored the factors affecting the adoption and integration of ICT as a pedagogical tool in rural secondary schools. The research objectives of the study were as follows; to determine factors that affect adoption and integration of ICT as a pedagogical tool in rural secondary schools in the teaching and learning of ICT and to establish the level of ICT usage in learning and teaching in rural secondary schools.

The results of research revealed that lack of proper infrastructure and unavailability of electricity at our school to a very great extent affect the adoption and integration of ICT as pedagogical tool in secondary schools located in Bondamakara cluster. It was also indicated that teacher’s lack of knowledge and skills, lack of funding from government, high software costs inhibiting acquisition of appropriate software and expensive hardware to a great extent influence the adoption of ICT in secondary schools. The study also showed that the respondents were uncertain about the influence of high costs of maintenance of the ICT resources and the fact that teachers do not have time to design, develop and use technology in teaching and learning.

In determining the level of ICT usage in learning and teaching in rural secondary schools, the research findings indicated that the respondents strongly disagreed that there was a dedicated school budget to support the implementation of ICTs in teaching and learning and also that learners at their schools were conversant with using ICT tools. They further strongly disagree to
the issue that it is mandatory to use ICT tools for teaching and learning at their schools. The teachers strongly disagreed that they often use computers and the internet and have frequency access to computers and internet for teaching and learning purposes. The teachers also indicated that they do not use ICT tools in teaching and learning of secondary school subjects.

5.2 Conclusion

Despite the various efforts to enable rural secondary schools to adopt and integrate ICT as a pedagogical tool in schools, rural secondary schools have continued to face various challenges. The results from the study showed that in spite of the government visions and polices for the use and integration of ICT in schools, three very important features of integration and adoption are namely lack of proper infrastructure, human resource development in terms of skilled teachers to use ICT in teaching and learning processes was another factor that significantly influences integration of ICT in teaching and learning and lastly lack of funding from the government was found to significantly influence the level of ICT integration in teaching and learning.

5.3 Recommendations

ICT is an influential instrument for the development of quality teaching and learning in educational systems around the world, as well as a means for fundamental transformation into the existing school principles and practices for the preparation of students in meeting the innovations in the global arena. In view of the findings, the following are the recommendations:

- The government should promulgate a dedicated ICT policy in education supported by a dedicated budget from the national coffers. The government should come in and subsidize ICT equipments that are used in schools. The government should consider waving import tax for ICT equipment for schools.
- Rural schools should be equipped with relevant and adequate infrastructure for supporting the adoption and integration of ICT.
- Schools should be supplied with electrical power to enable them effectively harness the use of ICT in education and training. Alternative sources of power such as generators, solar technology and batteries should be explored in the absence of the electric power.
• That training interventions for teachers should be conducted in the use of ICT tools in teaching and learning. These training interventions should focus on promoting ICT integration in teaching and learning and should incorporate components that promote basic competence in use of ICT tools as they form the foundation for ICT integration in teaching and learning.

• There should also be more sensitization of education officers on the need to support teachers in ICT integration.

• Investments in custom-made digital materials with highly relevant content for Zimbabwean schools in rural and urban contexts are required.

• The Ministry of Education should take full responsibility for funding broadband internet connectivity in schools.

5.4 Future areas of study

This research endeavour might have made a considerable stride in the understanding of some of the factors influencing ICT integration in teaching and learning. The following are suggested areas for further research:

Future research of the same study can be done in other provinces in Zimbabwe and compare the results with this research. Data should be collected from different sources. This would include further case studies, interviews or face-to-face communication, and secondary data analysis. This would enrich and improve the study currently being carried out. It is equally important to observe ICT integration in the classroom to confirm the type of integration taking place in schools.
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United Republic of Tanzania, (2007); *Using distance learning and ICT to improve teacher quality in poor areas of western Tanzania.*


Appendix 1 Questionnaire

My name is Mutsure Chester. I am an undergraduate student at Bindura University of Science Education pursuing an Honours Bachelor of Science Education Degree. I am required to carry out a research project in partial fulfillment of the requirements for the degree. As such the student is carrying out a research on “Factors that are affecting the adoption and integration of ICT as a pedagogical tool in teaching and learning.” The researcher is kindly asking for your assistance as respondents to the research understudy by filling in the questionnaire. The responses you will provide will be treated with utmost confidentiality and will be used exclusively for academic purposes. Your co-operation will be greatly appreciated.

INSTRUCTIONS:

- Please answer all the questions honestly.
- Please kindly indicate your answers by ticking where appropriate in the boxes and writing in the spaces provided.
- Your name or identity is not required.

SECTION A: GENERAL INFORMATION

1.1. Gender of respondent

Male ☐ Female ☐

1.2. Age of respondent

Less than 25 years ☐ 26-40 ☐ 40-50 ☐ more than 50 ☐

1.3 Your Academic Qualification

Diploma ☐ Degree ☐
Masters ☐ Others ☐
1.4 Which ICTs have you found useful in teaching and learning?


1.5 Which ICTs have you found most appropriate in your teaching and learning practices?


1.6 Have you ever attended any ICTs training course, workshop, or seminar?

YES □ NO □

1.7 Indicate ICT resources that are available in your school for use by teachers

<table>
<thead>
<tr>
<th>Available resources</th>
<th>Quantity available</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>Computers (any type)</td>
<td></td>
</tr>
<tr>
<td>Overhead projectors</td>
<td></td>
</tr>
<tr>
<td>TV</td>
<td></td>
</tr>
<tr>
<td>VCD players</td>
<td></td>
</tr>
<tr>
<td>Radio/ cassette player</td>
<td></td>
</tr>
<tr>
<td>DVD players</td>
<td></td>
</tr>
<tr>
<td>Printers (any type)</td>
<td></td>
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<td>Video cameras</td>
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<td>Photo cameras</td>
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<td>Speakers</td>
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<tr>
<td>Other resources (indicate)</td>
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SECTION B: FACTORS AFFECTING USE OF ICT AS A PEDAGOGICAL TOOL IN SCHOOLS

Indicate the extent to which the following factors are affecting use of ICTs in schools


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<td>1</td>
<td>Expensive hardware</td>
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<td>High software costs inhibiting acquisition of appropriate software</td>
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<td>High costs of maintenance of the ICT resources</td>
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<td>Lack of funding coming from government</td>
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<td>Unavailability of electricity at our school</td>
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<td>6</td>
<td>Lack of proper infrastructure</td>
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<td>Economic factors (technology is still considered a luxury).</td>
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<td>8</td>
<td>Political factors (policy issues)</td>
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<td>9</td>
<td>Teacher’s lack of knowledge and skills.</td>
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<td>Teachers do not have time to design, develop and use technology in teaching and learning.</td>
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<td>11</td>
<td>I often use computers and the internet</td>
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<td>12</td>
<td>It is mandatory to use ICT tools for teaching and learning at our school</td>
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<td>13</td>
<td>Learners at our school are conversant with using ICT tools</td>
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Comments

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SECTION C: LEVEL OF ICT USAGE IN LEARNING AND TEACHING

Indicate the extent to which you agree or disagree with the following levels of ICT usage in learning and teaching at your school.


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Thank you for your co-operation.