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BACHELOR OF SCIENCE EDUCATION HONORS DEGREE IN PHYSICS

AN INVESTIGATION INTO THE CHALLENGES FACED BY O' LEVEL PHYSICS EDUCATORS WHEN INTEGRATING INFORMATION COMMUNICATION AND TECHNOLOGY IN RURAL SECONDARY SCHOOLS IN BUBI DISTRICT

BY

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SUPERVISOR

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APPROVAL FORM

The undersigned certify that they have read and recommend to the Bindura University of Science Education the acceptance of a dissertation titled:

"An investigation into the challenges faced by O' Level physics educators when integrating information communication and technology in rural secondary schools in Bubi district"

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DEDICATION

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ABSTRACT

The thrust of this study was to better understand the difficulties faced by physics educators when integrating information communication and technology (ICT) into their instruction in rural secondary schools in the Bubi District. The Ministry of Primary and Secondary Education has called on physics instructors to use ICT to teach physics in all Zimbabwean schools. To help with implementation, the 2016 ICT policy on Education for Primary and Secondary Education in Zimbabwe has also been developed. There are several challenges that have a detrimental outcome on the integration of ICT in the teaching of physics as a result of the various ICT environments and situations in schools. The study also sought to determine how ICT affected physics instruction. The researcher also spoke with physics educators, heads of department in the physics, and school administrators to get insight into the obstacles that prevent ICT integration in the teaching and learning of O'Level physics in Bubi district secondary schools. The basic random sampling technique was used on a sample of the participants. The research tools employed in this study were questionnaires, interviews, and observation. The study's conclusions showed that, despite educators' willingness to incorporate ICT in the teaching of physics, there remain obstacles in their way. As a result, ICT integration is used less frequently in Bubi district Secondary School. These issues include a lack of ICT resources, a lack of ICT proficiency among physics educators and learners, as well as inadequate ICT integration support.

ABBREVIATIONS AND ACRONYMS

ICT – Information communication and technology

O' LEVEL – Ordinary Level.

MoPSE – Ministry of Primary and Secondary Education

SH – School head

HOD – Head of science department

PE – Physics educator.

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CHAPTER ONE: INTRODUCTION

1.1 INTRODUCTION TO THE STUDY

This chapter contains the background to the study. The problem statement and research questions are also included. The study's limitations and delimitations are emphasized. The study's significance is mentioned in his chapter. The study includes definitions of key terms and concepts. The research will go on to highlight the study's assumptions, and this section will conclude with a summary that highlights each of the major topics that will be covered.

1.2 BACKGROUND TO THE STUDY

The daily activities of humans have witnessed a widespread use of information and communication technologies in the 21st century. According to Zeng's (2012) theory, nations have established objectives aimed at promoting the worldwide adoption of information communication and technology. Governments and other organisations have created policies to guide implementation of information communication and technology. According to Yount (2014), people worldwide have come together to discuss how information communication and technology can be effectively integrated into various departments and sectors. One sector that has been cited as embracing information communication and technology is the department of education. Information communication and technology must be used to strengthen educational systems, according to Chien, Wu and Hsu (2014). He also realized the critical role information communication and technology can play in order to transform education worldwide for the better. The idea is to promote effective use of information communication and technology in the education sector. The Incheon Declaration stated by Chien etal (2014) in Japan was positively welcome by members from various states who sought to put the idea of information communication and technology inclusion in education into practical use. As a result, there have been several attempts by countries to come up with strategies of implementing information communication and technology in education and other sectors.

The World Instruments Systems for declaration of principles and plan action adopted in Geneva in 2010 by heads of states and governments invited governments to create policy environments that facilitate the development and utilization of information communication and technology. The education systems of many countries in the world have been affected by this. As such, policies have been put in place by various countries to guide and facilitate the implementation of information communication and technology in education. Ministries and departments responsible for information communication and technology issues have been established in some countries.

The UNESCO information communication and technology Competency Framework for educators (2011) which was developed by the educators of the globe aims at increasing the extent at which new technology is used by learners through incorporating technology into the school curriculum. The major goal is to uphold the idea of integrating information communication and technology in teaching and learning environments in schools. As such, there have been calls by policy makers in the education sector to encourage adoption of information communication and technology as well. Since Physics is a subject offered in the curriculum of many countries, Physics educators are not left out and are also encouraged to embrace information communication and technology in the teaching of physics at secondary level. It has been established by some researchers that use of information communication and technology in teaching of Physics has a positive outcome on learning. A research by Dunpath (2014) in the United Kingdom brings it out that use of information communication and technology in the teaching of Physics can enable educators to present scientific materials in ways most suited to individual and personal needs.

In Malaysia an investigation done by Munro (2012) found out that information communication and technology helps facilitate understanding of Physics as a subject. This clearly shows the advantage that use of information communication and technology may have in aiding educators to an effective teaching of quality physics. In South Africa, a study by Scielz (2010) discovered that integration of information communication and technology and multimedia into physics lessons improve a broader

understanding of content and enhance quality teaching. Thus information communication and technology is being regarded as a tool to improve the teaching of Physics.

In Zimbabwe, the Nziramasanga Education Commission report (1999) recommended the introduction and mainstreaming of computer based teaching and learning in the pedagogy of our schools, colleges and other institutions of higher learning. Zvogbo (2006) alluded that the enquiry brought forward the need for Zimbabwean education system to incorporate information communication and technology. It advocated for an information communication and technology based learning environment. Closely in line with the recommendations of the Nziramasanga Commission, the former President of Zimbabwe, Comrade R. G. Mugabe donated computers to some schools from 2000 under various programs initiated by the government. Verma (2016) added that there was the Presidential Schools Computerization launched in 2000 and the Presidential e-Learning Programme established in 2011 among others. All these programs were meant to equip schools with information communication and technology facilities. The recipients of the information communication and technology equipment such as computers have been both urban and rural schools in the country. All these efforts are meant to make the implementation of information communication and technology in teaching and learning possible and achievable.

Zvogbo (2006) elaborated that Zimbabwe also took a stance towards encouraging the integration of information communication and technology through establishing the 2005 information communication and technology Policy. The policy aims at providing equitable access to information communication and technology and enabled education and training in all parts of the country including disadvantaged communities. It also aims at embedding information communication and technology literacy in the pedagogy of schools, colleges and universities. This is an endeavor to promote information communication and technology use in teaching.

The 2005 information communication and technology policy was revised by the 2015

national information communication and technology Policy. This one aims to provide connectivity in all schools further bridging the urban - rural digital divide and enhancing teaching and learning through the use of technology tools and promoting universal computer literacy in Zimbabwe's schools. The Ministry of Primary and Secondary Education formulated the information communication and technology policy for Primary and Secondary Education (2016) to improve the quality of education. The policy stresses the integration of information communication and technology in education. It is also an effort towards facilitating the realization of integrating information communication and technology in the teaching and learning setups in schools to achieve quality of education.

Milton (2008) highlighted that currently in Zimbabwe, Educator's colleges and universities make it compulsory for educators to undergo an information communication and technology program as part of their teaching course. In a way this is meant to equip educators with relevant information communication and technology skills so that they can easily integrate information communication and technology once they are in schools. The updated curriculum launched in 2015 by the Ministry of Primary and Secondary Education places strong emphasis on the integration of information communication and technology in teaching. The updated Physics syllabus also stipulates that information communication and technology should be compulsory in the teaching and learning of Physics.

Bubi district secondary schools in Matabeleland North Province offer Physics in their curricula. The district has also made some considerable efforts towards embracing information communication and technology in teaching and learning. This is evidenced by a number of information communication and technology workshop seminars conducted in the district information communication and technology under the facilitation of skilled information communication and technology personnel. The district has some schools which has also benefited from computers donated under the Presidential scheme.

Some rural secondary schools in Bubi district have information communication and technology tools and facilities that have computers and internet access. Some rural secondary schools have few computers compared to the enrollment of learners doing O'Level Physics. Other rural schools do not have information communication and technology facilities at all. Physics catalyst website (2017) argued that some educators are computer literate while some possess a very limited or low level of computer literacy. Thus Bubi district schools have different conditions on the status of availability of information communication and technology tools. Therefore, this study seeks to investigate the challenges faced by Physics educators when integrating information communication and technology in the teaching of quality physics in Bubi district rural secondary schools.

1.3 PURPOSE OF THE STUDY

The purpose of this study is to *investigate the challenges faced by O'Level physics educators when integrating information communication and technology in rural secondary schools considering Bubi district as the case study.*

1.4 STATEMENT OF THE PROBLEM

The Nziramasanga commission report (1999) stated that it has been more of a requirement from the Ministry of Primary and Secondary Education for educators to integrate information communication and technology in the quality teaching and learning of Physics. This study focuses on investigating the challenges faced by O'Level physics educators when integrating information communication and technology in the quality teaching and learning of Physics to improve quality education in Bubi district rural secondary schools.

1.5 MAIN RESEARCH QUESTION/ RESEARCH AIM

- What are the challenges faced by educators when integrating information communication and technology in the teaching and learning of physics?
- In what ways does the integration of information communication and technology impact the quality teaching of Physics?
- How can the challenges faced by educators when integrating information communication and technology in the teaching of physics in schools be addressed?

1.6 SUB QUESTIONS/ RESEARCH OBJECTIVES

- How can shortage of ICT tools/resources be addressed?
- What are strategic plans which can be used to improve ICT literacy?
- How can shortage of power supplies be addressed?
- In what way can internet connection be improved?
- How can the abuse of ICT gadgets by learners be addressed?

1.7 HYPOTHESIS/ASSUMPTIONS

H_0: There are no challenges faced by physics educators in integration of information communication and technology to improve quality teaching and learning physics in Bubi district rural schools.

H_1: There are challenges faced by physics educators in integration of information communication and technology to improve quality teaching and learning physics in Bubi district rural schools.

1.8 SIGNIFICANCE OF THE STUDY

The study is meant to assist Physics educators on how they can overcome the challenges they come across when integrating information communication and technology in the quality teaching and learning of physics. Learners would also benefit from effective use of information communication and technology in the learning of physics since challenges experienced would be unveiled and ways of overcoming these challenges put forward. The school administrators can use the results of the study for planning purposes on the requirements of the physics learning area in regards of information communication and technology tools to achieve quality education.

1.9 DELIMITATIONS OF THE STUDY

The study was narrowed down to rural schools in Bubi district so that the study could become manageable to the researcher. Not all the rural secondary schools and Physics educators were studied because of the geographical location of schools. They are sparsely located; hence they will be randomly sampled. This study concentrated on educators as participants and educators provided the bulk of information for this study.

Furthermore, the teaching of Physics involves learners who play a pivotal role during the study. This is because the study involves teaching and learning of quality physics targeting mostly educators and learners, hence educators and learners are in a position to provide the much needed data on the challenges faced in integration of information communication and technology in the quality teaching and learning of physics. On the same note, literature about learners' views and perceptions on the integration of

information communication and technology was reviewed. These delimitations imply that the findings of the study are guided and based on information given by educators and learners. The findings are from the perspectives of educators and learners.

1.10 LIMITATIONS OF THE STUDY

The limitations of this study emanate from some of the research instruments which will be used such as questionnaires which may not be accurately filled in. The use of observation may also be a threat to internal validity as people may display behavior which is not genuine during observation. The researcher has little finance and no transport to travel to various areas within Bubi district. Furthermore, it will become less possible to generalize the findings of this study to other environments such as urban and peri-urban contexts because the study was restricted to information communication and technology from rural secondary schools.

To minimize the limitations arising from research instruments, the researcher will employ triangulation and use varied instruments such as questionnaire, observation and interviews to collect data so that information collected can be compared.

1.11 DEFINITION OF KEY TERMS

ICT - The acronym stands for Information communication and technology Statistics Canada (2010) defines information communication and technology as a field of work and study that includes technologies such as desktop and laptop computers, software, peripherals and connections to the internet that are intended to fulfill information processing and communications functions. The other definition comes from UNESCO (2012) which states that information communication and technology is the combination of informatics technology with other related technologies specifically communication technology. information communication and technology is also defined as a wide range of information and communication tools, that is, devices, applications and services associated with the collection, storage, manipulation accessing, sharing and communication of data and information in electronic/digital forms, Dogo (2010). In short, information communication and technology is characterized by use of modern

technologies which enhances communication. The use of the internet is also an integral part of information communication and technology.

Challenges - the difficulties or obstacles that students and educators face in the learning process, Chapelle (2011). In simple terms challenges are barriers and hardships educators face in successfully teaching learners in the classrooms.

Physics - a subject which constitutes the curriculum of many countries worldwide. According to Milton (2008), is the branch of science concerned with the nature and properties of matter and energy. The subject matter of physics includes mechanics, heat and other radiation, sound, electricity, magnetism and the structure of an atom. According to the researcher, physics can be defined as a natural science based on experiments, measurements and mathematical analysis with the purpose of finding quantitative physical laws for everything from the world.

1.12 ORGANISATION OF THE STUDY

This study is organised into five chapters with chapter headings and sub divisions which are ordered as follows:

Chapter 1 is the introduction which consists of background of the study, purpose of the study, statement of the problem, research question and sub questions, significance of the study, delimitations, limitations, as well as definition of key terms and organisation of the study. Chapter 2 is literature review which comprises; the introduction, research questions, research gaps and its chapter summary. Chapter 3 deals with research methodology which comprises of the introduction, research design, research methods, ethical issues. Chapter 4 looks at data presentation, analysis and discussion and the chapter summary. Chapter 5 is made up of the summary, conclusions and recommendations.

1.13 SUMMARY

This chapter focused on the problem and its setting. The research questions of the study were also highlighted. Thereafter, delimitations and limitations of the study were

given. Key terms and concepts were also defined as they relate to the study.

CHAPTER TWO: LITERATURE REVIEW

2.1 INTRODUCTION

This chapter focuses on literature review. Various authorities were consulted to find out what has been discovered around the globe about integration of information communication and technology in education as well as in the teaching of physics. The outcome of ICT in the teaching of physics is outlined. Challenges faced by physics educators worldwide in the integration of information communication and technology are also implored. How the challenges faced by O'Level physics educators can be addressed is also discussed in this chapter.

2.2 INFORMATION COMMUNICATION AND TECHNOLOGY POLICIES ON EDUCATION AND THEIR AIMS.

Different nations have established guiding frameworks to facilitate and direct the integration of information communication and technology in their education systems. Jones and Kozma (2013) state that information communication telecommunications in education policies provide a rationale, a set of goals and a vision of how education systems work if information communication and technology is introduced into teaching and learning and they can benefit learners, parents, educators and the general population of a given country. According to Olson (2016) information communication and technology policies on education are expected to provide guidance and failure to do so means that individual school and classroom innovations would be unlikely to be sustained. In a way, information communication and technology policies on education are of paramount importance in order to create an organized system and strategies in which implementation of information communication and technology should follow. These information communication and technology policies provide a frame work which outlines the goals and aims of integration of information communication and technology in education. They show the vision of a nation in relation to information communication and technology integration in the education system.

To embrace information communication and technology in education, the ministry of

education in Malaysia formulated an information communication and technology policy in 2011, Chan (2012) points out that the policy is aimed at giving learners an opportunity to use information communication and technology and reduce digital gap amongst schools.

This Malaysian information communication and technology policy advocates for greater integration of information communication and technology to ensure uniformity in schools in terms of digital status.

In France, the ministry of education has also taken a stance towards information communication and technology integration in education. According to the French country report on information communication and technology in education (2015), the information communication and technology policy aims to provide broad band access, equipment in infrastructures and facilities in schools, so that teaching staff can develop daily activities using resources and digital services and engage in innovative practices.

This clearly shows that the French government considers that information communication and technology integration in schools have to start with provision of critical information communication and technology resources for implementation of the policy to be possible. In line with this, Russia has also taken a move in embracing information communication and technology integration in education. Robson (2019) points out that the government of Russia realizes that information communication and technology in education is a key tool in development of the national economy and the Russian information communication and technology in education policy is expected to promote and lead to prosperity and educational superiority of the country. Thus the Russian government believes information communication and technology has the potential to transform the education system as well as the economy hence the move towards information communication and technology integration in education.

In Brazil, an effort has also been made by the ministry of education towards

incorporation of information communication and technology in education. A report of the survey on information communication and technology in education in Brazil (2013) states that the information communication policy in education aims to promote actions to disseminate information communication and technology use in schools to improve the teaching-learning process. This reveals that this policy acknowledges that information communication and technology integration can develop the education system hence there is need for promotion of information communication and technology use in teaching and learning.

African countries have not been left behind when integrating information communication and technology in their school system. Tanzania came up with information communication and technology policy in education known as the national information communication and technology policy in 2012 which aims at expanding and developing the teaching of information communication and technology at all formal and informal levels of the national education system and using information communication and technology to improve the quality of education and training in all areas including distance learning. The policy proposes to develop and deploy a nationwide, e- education system that interconnects schools and higher education training facilities across the country with each other, (Hennessey, 2013).

Closely looked at, the Tanzanian information communication and technology policy in education shows the desire by Tanzania to facilitate a large scale use of information communication and technology in education with the purpose of transforming the country's education system ranging from school level to other higher levels of education, (Hennessey, 2013).

Namibia has also taken a stance towards creating a framework to guide its implementation of information communication and technology in education. A report by the minister of higher education, training and employment in conjunction with the minister of basic education, sport and culture (2005) reports that by integrating information communication and technology education and training into the education

and training system, Namibia updated her national information communication and technology policy for education which requires curricula to be maintained and indicate exactly what is expected of learners, and educators in regards to information communication and technology in education.

The report further highlights that the goals of the policy put more emphasis on the pedagogical use of information communication and technology as an integrated tool in the teaching-learning process at all the levels in the educational system. This Namibian information communication and technology policy on education clearly indicates Namibia's commitment of intensive incorporation of information communication and technology in the sphere of education. The goals of the policy also demonstrate the willingness by the Namibia to fulfill the terms of the inch on declaration is as far as integration of information communication and technology in education is concerned.

Botswana has also taken a move in the inclusion of information communication and technology in education through her revised national policy of education. Dunphath (2014) reports that the revised school national policy of education underscores the importance of proficiency in computer use by learners and their educators and has pursued an aggressive roll out campaign to equip all secondary schools with fully networked computer laboratories with at least twenty computers and access to the internet. This demonstrates the extent at which Botswana aims at accomplishing the idea of information communication and technology integration in the education system.

South Africa has also responded to the call of information communication and technology integration in education. This is revealed in the e- education white paper which was adopted in 2004. Isaac, (2016) reports that the goal of the e- education white paper policy is that every learner in primary and secondary school sectors should be capable by 2013 and to achieve this, schools were expected to be developed into e-schools consisting of a community of both educators and learners. This shows that South Africa had planned to speed up the integration of information communication and technology at a larger scale to be achieved in 2013. Information communication

and technology appears to be treated more like a compulsory element in the education system of South Africa.

Zimbabwe has also not been left out in the attempts of integrating information communication and technology in education. The need to integrate information communication and technology was emphasized by the Nziramasanga commission of enquiry which was established by the president of Zimbabwe, to investigate on the nature of the education system. Zvogbo (2006), highlights that the commission recommended the introduction and mainstreaming of computer based teaching and learning in the pedagogy of our schools, colleges and other institutions of higher learning.

Nine years after the recommendation of computer based education by the Nziramasanga commission, the Zimbabwean government came up with the national information communication and technology policy (2015). The policy aims to provide equitable access to information communication and technology enabled education and training in all parts of the country including disadvantaged communities and also to embed information communication and technology literacy in the methodology of schools, colleges and universities. This clearly shows that the aims and goals of the 2005 national information communication and technology policy were largely influenced by the recommendations of the Nziramasanga commission. The policy thus aimed to facilitate the putting of the recommendations into practical through integration of information communication and technology in education.

A decade later, Zimbabwe revised its 2005 national information communication and technology policy through the 2015 national information communication and technology policy. The revised information communication and technology policy aims to provide connectivity in all schools further bridging the urban rural digital divide and enhancing teaching and learning through the use of technology tools and promoting universal computer literacy in Zimbabwe's schools. It has to be noted that both the 2005 and 2015 national information communication and technology policies advocate

for inclusion of information communication and technology in the education sector.

However, the 2015 national information communication and technology policy spells out how the idea of access to information communication and technology will be achieved and that is through providing connectivity to all schools in order to ensure integration of information communication and technology in education across all areas in Zimbabwean schools including Bubi district.

The ministry of primary and secondary education as guided by the national information communication and technology policy formulated the information communication and technology policy for education. The information communication and technology policy for primary and secondary education (2016) has a vision of seeing information communication and technology being used effectively and efficiently throughout the education sector enabling all learners to achieve to their full potential and become productive and responsible citizens. The vision of the policy is to take all learners and all schools aboard in as far as information communication and technology integration in teaching and learning is concerned.

Even though, Zimbabwe has a clear policy of information communication and technology integration in education, it has to be noted that what is outlined in the information communication and technology policies may not be exactly what is happening in every Zimbabwean school. In Zimbabwe, particularly in Bubi district rural schools' integration of ICT during teaching and learning has become difficult as a number of schools lack resources for integration of ICT. These challenges may differ from context to context and from subject area to subject area. The researcher will investigate the challenges faced by physics educators in Bubi rural district on the integration of Information communication and technology in secondary schools to improve quality education in the Teaching of physics.

2.3 INFORMATION COMMUNICATION AND TECHNOLOGY IN THE TEACHING OF O'LEVEL PHYSICS IN ZIMBABWE.

The Zimbabwean education system has made some endeavors to integrate information communication and technology in the teaching of all learning areas and physics included as it is a component of the secondary school curriculum. The move to integrate information communication and technology in teaching is informed by the recommendations of the Nziramasanga commission of enquiry on education and training (1999) which recommended the introduction and mainstreaming of computer based teaching and learning in the pedagogy of our schools, colleges and other institutions of higher learning. Aggarwal (2014) postulates that integration of information communication and technology in physics involves the adoption of general component of technology in teaching.

In the process of adoption of the recommendations of the commission, the ministry of primary and secondary education came up with the updated curriculum in 2015. The updated curriculum strongly advocates for integration of information communication and technology in teaching and learning in all the learning areas which make up the curriculum. The updated curriculum, “aims to foster lifelong learning in line with the opportunities and challenges of the knowledge society through embracing information communication and technology and e- learning." (The curriculum framework for primary and secondary education 2015-2022:6).in embracing information communication and technology, in the teaching of physics, the curriculum framework further states that due to technological and social developments over the last three decades, access to information, knowledge especially through information communication and technology is now virtually unlimited and educators are no longer seen as the sole sources of knowledge and information hence they are now expected to help learners develop competencies to access and process information independently and responsibly as well as to develop broader life skills. The curriculum objectives with regards to information communication and technology, clearly states the aim of the ministry of achieving information communication and technology integration in the teaching and learning setup. The ministry appreciates the technological developments of the 21st century and hence aims not to be left behind in as far as education is concerned. This is also supported by Adesote and Fatoke (2012) who conclude that the sustenance and

relevance of physics in the 21st century in our educational institutions today require the application of modern technologies like video tape, televisions, internet, cd tape and other multimedia.

On integration of information communication and technology in the teaching of physics, the curriculum framework for primary and secondary education (2015-2022) further spells out that in line with the updated curriculum, a educator should be the one who possesses intercultural understanding, life skills, economic and entrepreneurial education, media education and information communication and technology e- learning. Moreover, it is being indicated that information communication and technology is expected to be a critical element in the education system through its use in teaching and learning.

As guided and informed by the aims and goals of the information communication and technology policy in education, physics syllabuses were designed. The secondary level physics syllabus was also a product of the process of designing new syllabi and the issue of information communication and technology integration in the teaching of physics is part of the syllabus contents. The physics syllabus (2015-2022) is designed to enable learners to develop practical skills in technology and innovation. This can only be achieved if information communication and technology is integrated in the teaching and learning of physics. In aims, the physics syllabus has it, that it enables learners to apply information communication and technology skills in the study of physics and one of its objectives is that by the end of form four, learners should be able to use information communication and technology in the study of physics. It is revealed that information communication and technology is expected to be a major feature in physics lessons.

In addition, on the part of pedagogy, the physics syllabus encourages the use of learner centered and multisensory approaches such as video and film shows and e-learning among others. A look at the structure of content, objectives and learning activities clearly shows that each and every topic under suggested learning resources include

information communication and technology tools. Basing on the aims and objectives, it is clear that information communication and technology integration in teaching of physics is more of a requirement than an option. This has to be fulfilled in every Zimbabwe secondary school. However, limitations may arise due to different conditions found in Zimbabwean schools in as far as information communication and technology is concerned.

2.4 IMPACT OF INFORMATION COMMUNICATION AND TECHNOLOGY IN THE TEACHING OF PHYSICS

Researchers have established that information communication and technology can play pivotal role in enhancing the quality of teaching and learning of physics. Proper and effective use of information communication and technology in the teaching of physics leads to fruitful teaching and learning as well. The role of information communication and technology in the teaching of physics is outlined below:

ICT creates an exposure to different Physics sources

Subject matter for physics is derived from physical sources which are mainly experimental information, written records and information communication and technology. Physics educators and learners need to utilize these resources in the teaching of physics in order to get more information about matter, energy and measurements in daily life events. Credit is given to information communication and technology because it enables exposure to a variety of physics sources to educators and learners. This is supported by Nontshikiza (2024) in a study conducted in south Africa who discovered that the internet can facilitate familiarization with information literacy in the form of written, experimental, oral and audio visual sources so that the learner can understand physics in real life.

Jan (2019) concurs with Nontshika's discovery and brings it out that information communication and technology particularly the internet gives the educator access to a wide range of information, experimental sources and media types which would be otherwise not be readily available. It can be noted that Bubi district rural schools'

information communication and technology integration in the teaching of physics is of benefit to both the educator and the learner. Hennessey (2015) also highlights that information communication and technology and multimedia fit well with the multisource nature of physics, they can give a total information communication and technology and allow learners to integrate theory into practical. Both the educator and the learner widen their knowledge base through interaction with the internet which is also a component of information communication and technology.

ICT allows use of a variety of teaching methods

Use of multiple teaching methods is encouraged in today's teaching and learning environment. Physics as a learning area requires a variation of teaching methods so as to liven up lessons and enhance understanding of concepts being taught. It is more likely for educators who adhere to a variety of teaching methods in physics to achieve their set teaching outcomes. This is revealed by Fisher (2015) in a study in New Zealand who states that using computers can help to promote different learning styles in the classroom and may also help learners improve their practical understanding.

Generally, it is the goal of each and every physics educator to ensure understanding of physics concepts being taught. Through information communication and technology, the physics educator can use such approaches to teaching as the discovery methods, experiment method, group discussions as provided by various information communication and technology facilities. Different approaches to the teaching of physics can be a motivational factor in stirring the learner's interest in the learning area and is a preventive measure to dull and monotonous physics lessons.

ICT allows research on physics information

Research by both educators and learners is critical for them to get information on physics concepts and events of societies using practical approach. It is through research that physics educators may get to know on the different perspectives, theories and practical of physics scholars so as to deepen their understanding of matter, instruments, energies and structures. According to Hull (2015), for a physics educator

to deliver quality instruction to his/her learners, he/she needs to be well versed and with current information hence teaching physics is a discipline that relies so much on information both current and past. A study conducted in Nigeria by Martin (2014) is in line with the above view as it reveals that information communication and technology ensures reliability and authenticity of information since physics uses information communication and technology through its multimedia facet, creates room for learners and educators to acquire new knowledge, fasters enquiry and exploration of facets and adoption of new approaches to teaching and learning process of physics.

Discussing, the use of information communication and technology in the teaching of physics, Jenkins and Turpin (2012:43), observe that " the internet is an unparalleled tool and resource for teaching which, when used with discrimination, is of immense value." in a way information communication and technology makes handling and teaching of physics easier for the educator through providing educators with an opportunity to do research on physics concept.

ICT develops twenty first century physics skills among learners

One of the key elements in the quality teaching and learning of physics is to develop and nurture some intellectual skills among learners. As learners consume physics information, they acquire some critical skills. According to Fisher (2015), physics is a subject that teaches important content and skills, both of which are necessary in the education of informed, knowledgeable, critical thinking citizens who have an understanding of the past, an appreciation of the present and a realistic and balanced vision for the future. These range from low order skills to high order skills. Low order skills include interpretation and comprehension while high order skills include analysis and synthesis skills.

The physics skills developed in a learner assist learners to make informed and valued judgments in handling Physics content and applying practical in daily life experiences. Norton (2019) asserts that ICT is a significantly a powerful tool for physics as it helps selection, data handling and allows access to interpretations and sources, helps to

develop practical physics skills, allows learners to leap frog the lower skills and move into high quality, allows weaker learners to these higher skills. This is an advantage to both the educator and the learner. Equipped with high order skills, learners are able to critique the validity and factuality of the physics information at their disposal in order to widen their understanding of physics.

Furthermore, Offsted (2015) realized that word processing was the most common form of information communication and technology use in physics in schools and its potential to develop physics thinking was also identified. Another research by Ncet (2014) in the United Kingdom highlights that using the database to perform low level tasks such as sorting and ordering data allows the learners to concentrate on higher order thinking patterns they wish to look for and the information they want to extract. Thus ICT proves to be a worthy instrument in developing and shaping different practical physics skills. This justifies why educators should integrate information communication and technology in the teaching of physics as it is the dream of every educator to produce physics learners who are with both the low order and high order practical scientific skills.

ICT allows physics educators to meet individual learner needs

In the teaching of physics, educators are exposed to learners with different needs. The intellectual, physical and emotional needs of these learners vary and it is advised for educators to meet the individual needs of learners. Adesote and Fatoke (2012) postulate that information communication and technology promotes individualized learning in physics. In support of this, Butler (2013) posts that information communication and technology can enable educators to present scientific materials in ways most suited to individual and personal needs. This implies that all the learners with their differences are taken on board in the quality teaching and learning of physics in Bubi district rural school and teaching becomes fruitful to all. Some learners maybe gifted and be quick at grasping concepts while some are slow learners. Information communication and technology has facilities which accommodate learners in these different intellectual levels. The result is an improved quality teaching and learning of

physics in Bubi district rural school.

ICT promotes learner participation in the teaching of physics

Teaching of physics is a process which involves interaction between educators and their learners. Dogo (2010) observes that the power of information communication and technology places at the disposal of learners to access, manipulate, modify, store, retrieve information that will promote greater autonomy in learning thereby altering the role of a learner from being a listener by empowering him/her with more choice over how and when he/she should study with less influence from the educator. On the same note, Akbayrak (2016) highlights that information communication and technology can make teaching of physics more effective and productive. Objectives of teaching and learning of physics can be achieved if learners are fully involved during learning activities. On the same note, a report by Adesote and Fatoki (2012) conclude that through technology-facilitated approaches which encourage learners to take responsibility for their own learning. Information communication and technology facilities can also be utilized as media during teaching of physics which is cardinal as it generates learner interest in physics and captures the attention of learners to the content being delivered.

ICT enhances understanding of concepts taught

Basically, the outcomes of teaching of physics are to ensure that learners understand the concepts being taught. Information communication and technology assist physics educators to achieve syllabus objectives as they deliver physics lessons. A study in Malaysia by Brink (2016) brought out that information communication and technology facilitate understanding of physics. Concurring with this idea is Shiel (2014) who observes that integration of information communication and technology multimedia into physics lessons improve a broader understanding of content and enhance quality teaching. This is so because information communication and technology allows educators to research more about the subject, use varied teaching methods as well as media to help learners deepen their understanding. Taylor (2013) concluded that computer simulations allow complex scientific processes to be presented in a more

dynamic way and allow learners to gain a better understanding of how key decisions in physics were affected by the environment and the pressure of the time. Omeje (2011) in Nigeria also observed that appropriate use of information communication and technology in the teaching and learning of physics in the classroom instruction help in making learning concrete and thus makes physics a practical subject rather than the study of matter only. The use of variety of media appeals to many senses of learners thereby fostering comprehension of physics concepts because there is reinforcement to make concepts stick on the learners' minds.

2.5 PERCEPTIONS OF PHYSICS EDUCATORS WHEN INTEGRATING INFORMATION COMMUNICATION AND TECHNOLOGY IN THE TEACHING OF O'LEVEL PHYSICS.

Physics educators possess different views on the issue of information communication and technology integration in the teaching of physics. Some educators positively view and appreciate the move towards use of information communication and technology in the teaching of physics. Information communication and technology is viewed as an instrument meant to develop the teaching of physics and the entire education system. In a study conducted by Brink (2016) in Germany, educators consider information communication and technology as a learning tool and as a means of communication for fostering learning and as means of communication for fostering learning regarding important learning goals, such as the construction of meaningful and understood scientifically information and its transfer to applicable knowledge. This shows that it has dawned to some educators and they realize the great potential which information communication and technology have in transforming teaching and learning of physics for the better.

In support of the above mentioned point, Kumar (2015), in a study conducted in Lithuania found out that physics educators consider information communication and technology as a catalyst which may speed up the development of the teaching of physics in various levels. Again, in Bubi district learners shows an appreciation of integration of information communication and technology in the teaching of physics. Some physics educators seem to be welcoming the use of information communication

and technology in the teaching and learning environment.

In Bubi district some educators are for the view of integration of information communication and technology in their delivery of physics lessons, some are skeptic in the way they consider information communication and technology in the teaching of physics. In a study conducted by Besi (2017) in Italy, some physics educators pointed out that use of information communication and technology for learners is complex and involves a lot of qualities, it implies the acquisition of a good technical competence.

Mupinga, Mbano and Ndagijimana (2022) observe that the concept of teaching and learning through information communication and technology is highly complex and the introduction of information communication and technology into a learning environment does not in and of itself bring about change in pedagogical practice. This observation by some educators raises some conditions and requirements which accompany the integration of information communication and technology in the teaching of physics. Thus successful integration of information communication and technology in the teaching of physics can only be achieved if certain competencies are acquired by both educators and learners hence some educators seem to be relaxed in implementing integration of information communication and technology in the teaching of physics. In a way, some physics educators do not overlook the dark side of the complexity nature of information communication and technology integration in the teaching of physics.

2.6 RESEARCH GAPS

The challenges faced by educators as they use information communication and technology in the teaching of physics hinder the successful and effective implementation of information communication and technology in the teaching of physics. Pokhrel (2024) observes that it is now recognized that the integration of information communication and technology into the teaching and learning is a complex and challenging process. The challenges are discussed below.

Lack of information communication and technology resources

For information communication and technology to be utilized in the teaching of physics,

ICT resources and facilities have to be available in learning institutions. Margaret (2013), states that information communication and technology include a broad field encompassing computers, communication equipment and the services associated with them. Thus a set of information communication and technology gadgets and materials need to be sourced for information communication and technology to be integrated in the teaching of physics. However, some schools are not adequately equipped with information communication and technology resources, yet it has been discovered that in order to provide advanced forms of information communication and technology assisted instruction including computer assisted instruction, computer resources and internet connectivity must be established, keeping pace with demand based enrollment, (Zeng, 2012). This indicates that availability of information communication and technology resources should be a pre requisite for information communication and technology integration in education to be realized. Because some schools lack in this respect, physics educators are also negatively affected and cannot be able to successfully integrate information communication and technology in the teaching of physics.

Singh and Singh (2021) also reveals that lack of adequate information communication and technology equipment and internet access is one of the key problems that schools specifically in rural areas face. Thus lack of proper information communication and technology facilities is a major challenge faced by educators when integrating information communication and technology in the teaching of physics and this challenge seems to be more acute in rural schools. This is supported by a report from Adesote and Fatoki (2012) which revealed that the readiness of information communication and technology in the Sub Saharan Africa is still very low with most countries experiencing strong lags in connectivity because of insufficient development of information communication and technology infrastructure. Still, this report also emphasizes unavailability of information communication and technology supporting structures as an obstacle which negatively affects integration of information communication and technology in education. In such a setting, his educators face challenges when integrating information communication and technology in the teaching

of physics.

Lack of information communication and technology skills by Physics educators.

The use of information communication and technology requires the users to possess some certain skills, therefore it is also of paramount importance that physics educators also acquire these skills for them to achieve information communication and technology integration in the teaching of physics. In a study in Ireland, Sullivan (2015) found out that there is need to ensure that all educators are equipped with the knowledge, skills and confidence to integrate information communication and technology into their practice just like in Bubi. Lack of information communication and technology skills is a barrier for educators to use information communication and technology in the quality teaching and learning of physics. In a study by Aggarwal (2014), some educators admitted they were reluctant information communication and technology users because they worried they might get embarrassed that the learners knew more about technology than they did. On the same note, a study in Ireland by Hennessey (2015) reported that educators who did not develop sufficient confidence avoided using information communication and technology.

Confidence in information communication and technology use emanates from being able to use information communication and technology gadgets and facilities properly. It is revealed that lack of information communication and technology skills is another major challenge which is also encountered by physics educators as it is undoubtedly that some of them lack these information communication and technology skills.

The issue of educators having information communication and technology skills is critical otherwise information communication and technology resources may not be used even if they are available. In support of this, Oecd (2015) highlights that embedding information communication and technology in teaching, learning assessment is a complex endeavor and the mere presence of information communication and technology in schools does not equate to its effective use. Cohen (2023) is of the same view and posits that for information communication and

technology equipment to mean anything educators must be conversant in utilizing them to implement an integrated approach in information communication and technology use and new approaches. This further emphasizes the need for educators to acquire information communication and technology skills and the extent at which lack of proper information communication and technology skills is a challenge which affect educators. Some physics educators are possibly not an exception on this regard. Some of them are affected by lack of skills.

It has to be noted that challenges have been identified in relation to the integration of information communication and technology in the teaching of physics but most of these challenges generally apply to the education system as a whole. Not so many studies have been conducted to narrow down these challenges to the experiences of a physics educator, more so in a rural setting especially in Zimbabwe paying particular attention to Bubi district rural information communication and technology.

2.7 WAYS OF OVERCOMING CHALLENGES FACED BY PHYSICS EDUCATORS WHEN INTEGRATING INFORMATION COMMUNICATION AND TECHNOLOGY IN THE TEACHING OF PHYSICS.

Various strategies can be put in place in order to address the challenges faced by physics educators when integrating information communication and technology in the teaching of physics. Of paramount importance is to ensure availability of information communication and technology facilities in schools. To start with, Mupinga etal (2022) recommends that schools should have an information communication and technology plan drawn up in consultation with all relevant stakeholders and the plan should have clear emphasis on integration of information communication and technology in teaching and learning throughout the curriculum. The plan will show the importance of information communication and technology integration in teaching and learning and will outline strategies to be implemented in order to achieve provision of information communication and technology facilities in schools. Shiel (2014) asserts that schools should provide information communication and technology infrastructure and the school self-review should include regular checks of information communication and technology facilities in all classrooms and subjects. Making information communication and technology resources available will promote its use in the teaching and learning of physics.

Another strategy to address challenges faced by physics educators when integrating information communication and technology in the teaching of physics is equipping educators with information communication and technology skills. It will be possible for educators to integrate information communication and technology in the quality teaching and learning of physics once they are competent in information communication and technology skills. Stack (2013) in support of this, points out that schools should monitor training needs of their staff, develop and implement professional development plans appropriate and profession developments for educators should concentrate on integration of information communication and technology in teaching and learning. Thus it is easier for educators to partake in training seminars facilitated and provided by the school. If schools are to organize such

opportunities for educators their skills gap will be reduced and they will embrace information communication and technology in teaching and learning set ups.

However, more strategies have to established on how challenges faced by physics educators in integration information communication and technology in teaching paying more attention to their different contextual information communication and technology environments.

2.8 SUMMARY

This chapter concentrated on literature review thereby consulting various authorities in relation to the topic understudy. What other researchers have discovered in terms of the outcome of information communication and technology in the teaching of physics was outlined. In reviewing literature, the researcher also found out on the challenges faced by physics educators when integrating information communication and technology in the teaching of physics. Further consultation of existing sources of information explained how the challenges faced by physics educators can be addressed.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 INTRODUCTION

This chapter focuses on the research design adopted in the study. The sample is described and sampling techniques employed are also outlined. There is also unpacking of the research instruments that were used for the purposes of data collection. Part of this, chapter is the description of data collection procedures which is followed by a highlight of the ethical considerations. The data analysis and presentation plan is also stated in this chapter.

3.2 RESEARCH DESIGN

A research design is important in guiding the plan of action which the researcher will follow. Cresswell (2018) posits that a research design is a prearrangement of circumstances for data collection and analysis in a fashion that intends to join the significance to the research purpose with the most economy in the process. According to Chisi etal (2017), a research design refers to a description of format and theoretical structure under which the study will be carried out. Thus choosing a research design is of paramount importance in order to guide the researcher on the action plan to be employed throughout the research. In this study the researcher opted for a descriptive survey as a research design because it is cost effective and time efficient as it can be administered to many participants simultaneously in person also ensures that the data collected is consistent, making it easier to analyse. By definition, Cresswell and Poth (2018) state that it is a research design which is devoted to the gathering of information about prevailing conditions or situations for the purpose of description and interpretation.

3.2.1 Research Paradigm

The descriptive survey is suitable for this study because the researcher sought to investigate the prevailing conditions in Bubi district ICT rural secondary schools investigating on the challenges faced by educators when integrating information communication and technology in the teaching of Physics.

Finding out about current information communication and technology statuses in Bubi district information communication and technology rural secondary schools, role of information communication and technology in the teaching of Physics and educators opinions towards integration of information communication and technology in the teaching of Physics were also the purpose of this study hence a descriptive survey was a proper design to use. Moreover, due to the geographical location of Bubi rural secondary schools which are sparsely located, the researcher studied six schools and then drew conclusions about all Bubi district information communication and technology rural high schools. The descriptive survey is one research design which allows the researcher to do so.

Chiromo (2016) asserts that a descriptive survey entails studying a limited number of cases with the view of drawing conclusions that cover the generality of the whole group under study. In support of this Creswell (2018) points out that descriptive survey designs are procedures in research in which you administer a survey or questionnaire to a small group of people to identify trends in attitudes, opinions, behaviors or characteristics of a large group. As such the researcher as permitted by this research design used a limited number of schools and Physics educators to represent all the schools and Physics educators to curb geographical constraints posed by the location of Bubi rural secondary schools. Generalizing the research findings was also possible because the study was focusing on rural schools and it was more likely that they have similar conditions because they are all in the same setting.

Furthermore, the descriptive survey was appropriate for this study because it allows use of a variety of data collection instruments. This was an advantage to the study because comparison of data collected could be done. More and detailed information collected from many data collection instruments also revealed in depth information about issues under study and also increased accuracy of the research findings.

3.3 RESEARCH METHOD

3.3.1 POPULATION AND SAMPLING

3.3.1.1 POPULATION

Population is a key element of any research study. Yount (2014) asserts that population consists of all the subjects you want to study. On the same note, Opie (2017), points out that population is the entire cohort of subjects that a researcher is interested in. This indicates that the population refers to the individuals and all other things which the researcher focuses on and interacts with for the purpose of achieving the objectives of the study. This is further supported by Kumar, Zhang and Leskovec (2021) who describe the population as the totality of individuals, units, objects or events that will be considered in a research project. The population of this study consisted of eight rural secondary schools in Bubi. In these rural secondary schools, the study involved Physics educators, heads of science department and school heads. Physics educators were involved because the purpose of the study center on them. They are the ones who have direct experiences when integrating information communication and technology in the teaching of Physics. It is the Physics educators who were in a better position to highlight the challenges they face and hence could also recommend more relevant and practical solutions to these challenges hence bulk of data for the study came from them.

On the other hand, school heads were in a position to provide information about information communication and technology situations in their schools for they are responsible for facilitating provision of resources in schools. Heads of department of Physics were also be part of this study. The heads of science department are immediate supervisors of the Physics educators. They were also aware of the information communication and technology resources in the Physics department. As such, the head of departments in Physics were in a better position to provide valid and reliable information about challenges faced by O'Level Physics educators and had an information communication and technology of the outcome of information communication and technology in the teaching of Physics.

3.3.2 SAMPLE AND SAMPLING TECHNIQUES

A sample is established through sampling. Yount (2014) defines sampling as the

process of selecting a group of subjects for a study in such a way that the individuals represent a larger group from which they were selected. In support of this, Borg and Gall (2018) highlight that sampling is selecting a given number of subjects from a defined population targeted as a representative of that population. In other words, sampling implies identifying a limited number of subjects to be studied which represent the entire population. The product of sampling is a sample and Cohen (2023) defines a sample as a portion of the population. In this study, six out of eight rural high schools were sampled and this was 75% of the total number of rural secondary schools. From the sample of six rural high schools, seven Physics educators out of a total of nine physics educators were sampled in the six schools and the percentage of the sample was 77.8%. Six heads of science department and six school heads were sampled and the percentage was 75% of the total of eight heads of science department and eight school heads.

SAMPLING TECHNIQUES

Sampling techniques are strategies which are employed by the researcher to come up with a sample. The sampling techniques are categorized into two types that are probability and non -probability sampling. In this study, the researcher used probability sampling. By definition, Cohen, Manion and Morrison (2012) posit that it is the kind of sampling in which every element in the population has equal chance of being selected. In other ways, probability sampling leads to a representative sample which reflects the population fairly and this suit well with the research design chosen by the researcher. Probability sampling also have some different categories and the researcher used simple random sampling. Bardzel and Bardzell (2021) explain that the characteristic of simple random sampling is that all members of the population have an equal and independent chance of being selected. By using this method, the researcher wrote down the names of the eight rural high schools in Bubi district on small pieces of paper. The small papers were then put in a box, shaking of the box was done and the researcher handpicked one paper and put it aside. This was repeated up until six rural high schools were picked from the eight schools to make a sample. The seven Physics educators, six heads of science departments and six school heads from these six rural high schools

constituted the sample.

3.3.3 RESEARCH INSTRUMENTS

Research instruments play a pivotal role in any study as they are used to collect data upon which the objectives of the study will be arrived at Saunders, Lewis and Thornhill (2012) point out that a research instrument is a tool used to collect data as well as designed to measure knowledge, attitudes and skills. Thus research instruments gather all the desired information about the topic under study. The use of many research instruments is encouraged in any study so as to increase accuracy of the findings and promote a greater understanding of the topic under study. This is supported by Kumar (2020) who emphasizes that the use of a variety of tools is important to a study. The researcher used questionnaires, interviews and observation as methods of collecting data in this study. These instruments are described in detail below.

QUESTIONNAIRE

Cohen (2023) defines a questionnaire as a form of enquiry which contains a systematically compiled and organized series of questions that are to be given to the population studied. Another definition of a questionnaire is given by Kumar and Gupta (2022) who assert that it is a data collection tool which consists of a set of coherent questions presented to a respondent for answers. In other words, a questionnaire has a list of questions which solicit for answers from the participants. Questionnaires have many types and for this study semi- structured questionnaires were used. By definition, a semi-structured questionnaire consists of a mixture of closed and open ended questions, (Kumar, and Gupta 2022). A combination of closed and open ended questions is an advantage in collecting data as it allows the participants to give detailed and more explained data. These questionnaires were self-administered. Harlroyd and Herlen (2016) define a self-administered questionnaire as one that is presented to the participants by the researcher or by someone in an official position such as school head educators. One questionnaire was designed for heads of science department.

The major advantage of a questionnaire makes it easy to adhere to ethical principles of

research such as anonymity, confidentiality, and non-traceability. This is meant to not disclose identity of the participants and make the participants to be comfortable in giving accurate information. Akbayrak (2016) asserts that anonymity is one of the features sought in questionnaires and anonymous questionnaires generate a high and better quality of responses. This is so because the participants felt secure in providing data as they were safe from exposure.

According to Cohen (2023) a questionnaire also lies in that it is less costly and less time consuming to both the researcher and participants. Jacobson (2018) supports this by stating that administration of questionnaires is comparatively inexpensive and easy even when gathering a vast amount of information from large numbers of people spread over a wide geographic area.

Furthermore, questionnaires have an advantage that they have a greater response rate especially the self- administered questionnaires which will be used in this research. Scott (2017) states that in a self-administered questionnaire, the purpose of the questionnaire is explained and the respondent is left alone to complete therefore there is high response rate and minimum of bias, providing necessary explanations and giving the benefit of personal contact. On the same note, Fin and Jacobson (2018) highlight that many people are familiar with questionnaires and may feel more comfortable to responding to questionnaires than participating in interviews. A high response rate was critical and it positively contributed to the study as the researcher was availed with more information.

This was an advantage to both the participants and the researcher as they were not heavily strained during the process of collecting data.

On the other hand, questionnaires can bring some disadvantages. The disadvantage of questionnaires is that some participants may not complete the questionnaire or some may not finish completing. This can negatively affect the outcome of the study. However, this loophole can be minimized by designing questionnaires which are easy to

complete. Dillman (2015) posits that shortened questionnaires and respondent friendly questionnaires improve response rate. As such the researcher applied this in designing questionnaires so as to motivate participants to complete them as required and expected.

The other challenge with questionnaires is that some participants may not be honest enough and give other people to complete the questionnaire. This is revealed by Srivastava and Nagarajan (2020) who states that given lack of contact with the participants, the researcher never knows who really completed the questionnaires. To reduce this disadvantage, the researcher used self-administered questionnaires so that participants may attach some importance and seriousness to the distributed questionnaires.

INTERVIEWS

Interviews will also be used in data collection. Hull (2015) defines an interview as a structured conversation where one participant asks questions, and the other provides answers. Jones and Kozma (2013) also assert that an interview is a one-on -one conversation initiated by the interviewer for the specific purpose of obtaining research relevant information and focused by the researcher on content specified by research objectives of systematic description, predicted information communication and technology or explanation. This indicates that the interviewer should set the direction of the interview as guided by the objectives of the study. For this study, the researcher employed semi structured interviews. Akbayrak (2016) explains that for semi-structured interviews, a list of closed and open ended questions are asked, the content and procedures are organized in advance. The interviews will be conducted with the educators and the school heads.

The interview has an advantage that it allows the researcher to get more information about the issues under study because they offer direct interaction with the participants. This is supported by Kitwood (2016) who highlights that an interview is a flexible tool for data collection enabling multi- sensory channels to be used, verbal and non- verbal.

This makes the interviewer to have a bigger picture of the issues discussed. Cohen (2023) also emphasizes that in an interview, the interviewer can press not only for complete answers but also for responses about complex and deep issues.

To add on, the chances of poor response rate are eliminated when using interviews. Chiromo (2016) reveals that interviews have a high response rate. This is so because when they are conducted there is a live action between the researcher and participants. A high response increased the amount of information collected.
Moreover, the main advantage of interview is more personal and individualistic, as compared to questionnaire allowing us to have high pressure response rates and real life issues with in-depth understanding are excavated in their natural setting.

It needs to be highlighted that interviews are time consuming as one of the disadvantages. Cohen (2023) points out that interviews are time consuming. This is so because they require a one- on -one interaction between the researcher and the participants. However, this was minimized by limiting the number of open ended questions so that not much time is consumed and the interviews are not lengthy.

Furthermore, interviews are affected by researcher bias. Researcher bias may affect the outcome of data collected and has to be controlled and the researcher has to stick to the objectives of the study and the interview guide during interviews.

OBSERVATION

Cohen, etal (2012) asserts that observation is a way of gathering data by watching behaviour, events, or noting physical characteristics in their natural setting. In other words, the researcher in an observation is presented with an opportunity to observe behavior, actions of people as well as the physical environment. During observation, the researcher took the observer as participant role. Cohen (2023) report that an observer as participant is where the researcher may interact with subjects enough to establish rapport but do not really become involved in the behaviors and activities of the group. This indicates that the researcher may have a limited or short time with the group under

observation. The people being observed are also aware of the observation.

In this study, the researcher observed Physics lessons so as to assess the extent at which information communication and technology was used in the teaching of Physics and to identify challenges encountered by Physics educators when integrating information communication and technology in their teaching.

One of the strengths of observation is that it provides firsthand information to the researcher as activities take place. This is supported by Jacobson (2018) who states that observation collect data where and when an event or activity is occurring. As a result, the researcher gets a better information communication and technology of what is happening and can be in a position to make informed conclusions basing on things which were directly observed. This is further reinforced by Fin and Jacobson (2018) who indicate that in an observation, the researcher directly see what people do rather than relying on what they say they do.

It has to be highlighted as a disadvantage that observation especially when participants are aware (overt) maybe affected when they tend to change their behavior for the purposes of that particular observation. Jacobson (2018) points out that the Hawthorne effect may occur in observation and this is where people usually perform better when they know they are being observed. This was reduced by explaining the purpose of the observation to the participants.

3.3.4 DATA COLLECTION METHODS

The researcher sought for permission from the Ministry of Primary and Secondary Education through the office of the Provincial Education Director of Matabeleland North Province to be given a go ahead to collect data in Bubi district information communication and technology. Permission was also sought from Bubi district information communication and technology Schools Inspector as well as school heads to conduct the study in their institutions.

Some particular strategies were used to administer the research instruments. Questionnaires were self-administered meaning that the researcher distributed the questionnaires and some were given to the school head of sampled schools for distribution to the educators. However, the participants completed the questionnaires on their own. The reason for self-administration of questionnaires was to enable the researcher to explain the purpose, objectives of the study to the participants in order to increase the response rate. Direct online interviews were conducted with participants who were school heads at individual level. The researcher liaised with the participants and arranged for a time for the interview to be conducted. The researcher was also permitted by the interviewees to meet at a central school Inyathi High in Bubi district since the selected schools are located far apart from each other.

Direct interviews were preferred in this study so that they allow the researcher to interact with the participants and hence gather a lot of information from them. The researcher was also presented with an opportunity to read non-verbal expressions of the participants which reinforced the information being gathered through verbal expressions.

In conducting observation, the researcher took the role of participant observer. This allowed the researcher a period of time though short for the researcher to observe Physics lessons in order to assess the integration of information communication and technology in the teaching of Physics. Field notes were taken down during observation. The observer's participant role was suitable for this study because the researcher is committed at work and was not be able to spend a lot of time with the participants. Also this method is in line with ethical considerations of research because the participants will be informed and will be made aware of the presence of the researcher in their settings.

3.3.5 DATA ANALYSIS AND PRESENTATION PLAN

Data collected was analyzed by the researcher using the thematic method which is a research approach that identifies, analyses and report patterns themes. This means that data was categorized according to themes contained ensuring that they accurately

capture the essence of the data, allowing the researcher to uncover rich and nuanced insights into the experiences and perspectives of her participants. Data collected from various research instruments used which were questionnaires, interviews and observation was analyzed and presented according to the objectives they cater upon.
In presenting data, the researcher used word descriptions. Some information was presented in the form of tables, graphs and pie charts.

3.4 RELIABILITY AND VALIDITY

The instruments were subjected to the review against the research questions to ensure acceptable validity. Triangulation was adopted for reliability since data triangulation is facilitated through the use of a closed questionnaire, interview guide and observation to collect the same information. The use of different tools further ensured the reliability of data. According to Kumar and Gupta (2022) reliability refers to the stability. Reliability was guaranteed by data triangulation. This was achieved through the use of multiple data gathering tools as questionnaire, interviews and observation
The methods were used to solicit the same information with respect to concepts under investigation and to convergence of analysed data Nontshikiza (2024) advises that for validity, a research instrument must measure what it is intended to measure. To ensure validity, these research instruments were pilot-tested on six purposively sampled Physics educators and Head of schools who were interviewed and on six Head of science department who completed the questionnaires.

3.5 ETHICAL ISSUES.

In conducting this study, the researcher observed some ethical considerations. These include seeking permission, informed consent, anonymity and as well as confidentiality. Prior to collecting data, the researcher had to seek permission from the relevant authorities to conduct the study in Bubi district information communication and technology rural high Schools. These are the Provincial Education Office, District

information communication and technology Education Office and the school Office. Cohen (2017), highlights that the researcher must get an approval for the project from his/ her institutions. This was meant to prevent the researcher from creating conflict with the relevant authorities during the research.

The researcher also observed informed consent during the study. This is linked to the people who participated in the provision of data. Henessey (2013) assert that this is when individuals choose whether to participate or not in an investigation after being informed of facts about the study. The researcher outlined the purpose and objectives of the study to the participants for them to make a decision on participation.
The participants in this study were also assured of confidentiality. Kitwood (2016) states that this means that although the researcher know who provided the information or are able to identity participants from the information given, they will in no way make the connection publicly known. In other words, privacy about the participants will be observed. Anonymity was also considered in this study. According to Mc Taggart (2019) the essence of anonymity is that information provided by participants should in no way reveal their identity. This was also meant to protect the participants and for interviews and observations, participants were given identity tags when recording data such as letters of the alphabet especially with regards to interviews.

Lastly, reciprocation was also considered in this research. Chisi, etal (2017) reports that researchers need to give participants something in return for their time, effort, cooperation and just tolerating their extended response. To achieve this, the researcher will have to avail the findings of the study to the participants that is physics educators, heads of department and school heads. The researcher collected data within a period of one month.

3.6 SUMMARY

This chapter outlined the research design, population, sample as well as the research instruments which were employed in this study. Reference was also made to ethical

considerations observed in this study. There was also an indication of the data collection procedures as well as the data analysis and presentation plan.

CHAPTER FOUR: DATA PRESENTATION, ANALYSIS AND DISCUSSION/ INTERPRETATION.

4.1 INTRODUCTION

This chapter contains data analysis, presentation and discussion. Data gathered through questionnaires, interviews and observation is interpreted and analyzed then presented so that conclusions about the topic under study are made. The participants were school heads, heads of science departments and physics educators, drawn from six secondary schools in Bubi District Matabeleland North Province. The identification of participants in this study is coded as follows: **SH**= School head 1-6, **HOD**= Heads of science department 1-6 and **PE**= Physics Educators 1-7

4.2 General and demographic information

The thrust of this research was *an investigation into the challenges faced by physics educators when integrating information communication and technology in rural secondary schools in Bubi district*. The integration of information communication and technology has become more of a requirement than an option in the teaching and learning of physics. The research also aimed at finding the outcome of information communication and technology in the teaching of physics as well as establishing the challenges faced by educators and how these challenges can be addressed or minimized.

The population has nine physics educators, eight heads of the science department and eight school heads from eight schools. From the population, six high schools were sampled to provide a sample of seven physics educators, six school heads and six heads of department in the Physics learning area. The six schools were also studied to establish how they are equipped in terms of ICT resources. The demographic information is illustrated in the table.

TABLE 4.1a Showing the sample and population of schools

Number of schools in Bubi District (Population)	Number of the schools selected (Sample)	Percentage of the sample (%)
8	6	75

Table 4.1b showing targeted population and sample of participants

Category	Population in the District	Sample			Percentage of the sample (%)
		Female	Male	Total	
Educators	9	5	2	7	77.8
Heads of Science Departments	8	2	4	6	75
Heads of schools	8	1	5	6	75
Totals	25	8	11	19	76

4.2.1 GENDER OF SAMPLE

The sample consisted of eight females of which five of them are Physics educators; two are head of science department while one of them is a school head. There are eleven males, two of them are physics educators, four of them are heads of science department and five are school heads. The graph shows the gender of sample.

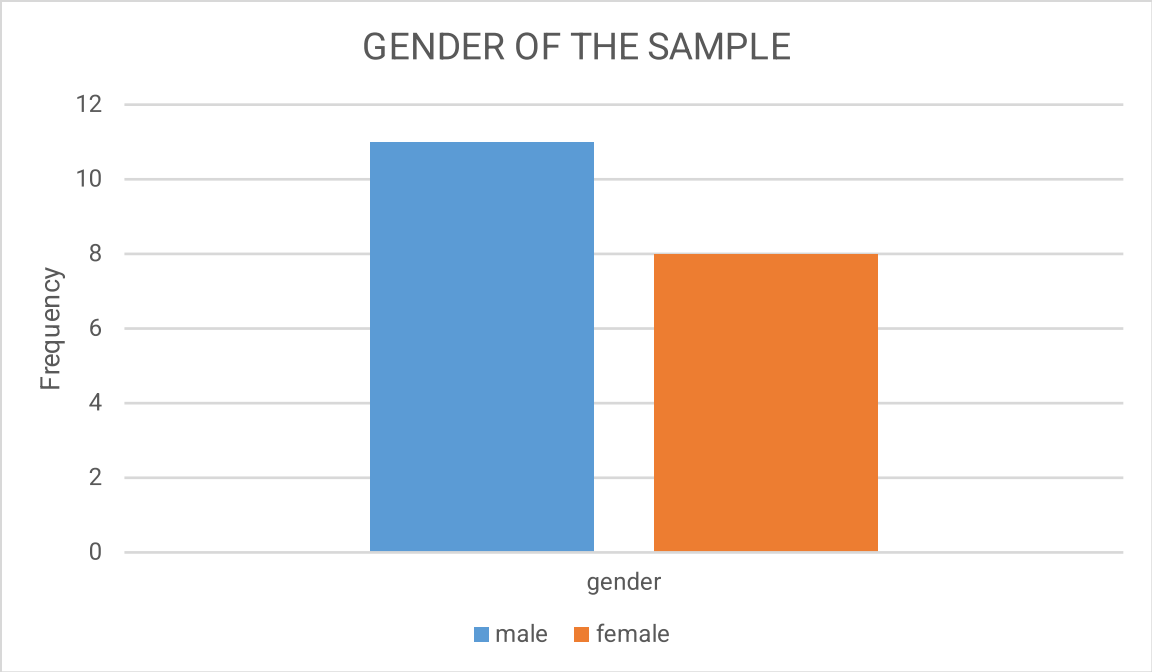

Figure 4.1: graph showing the gender of the sample.

4.2.2 PROFESSIONAL QUALIFICATIONS OF PHYSICS EDUCATORS.

The coned graph shows information on the professional qualifications of physics educators. The qualifications of Physics educators range from diploma in education to first degree. There are five female educators who are holders of Diploma in Education and only one male educator. For the first degree, there are no female educators and there is only one male educator.

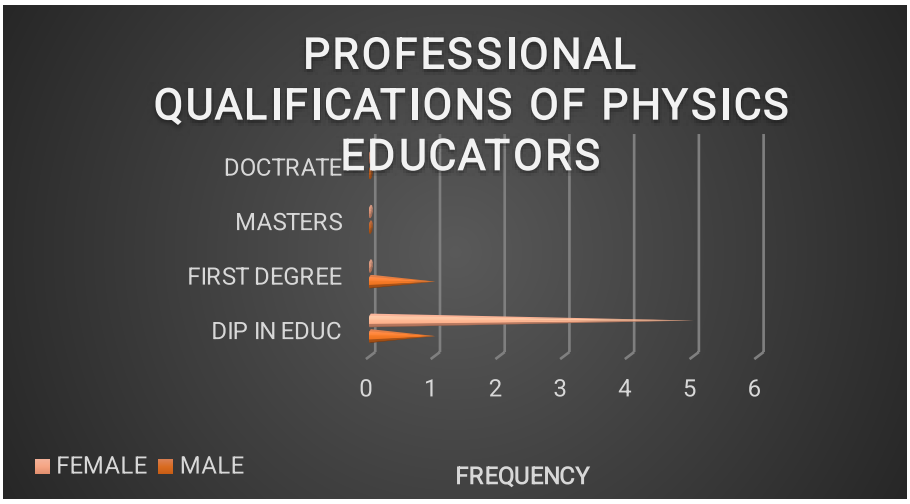

Figure 4.2: Coned graph showing professional qualifications of Physics educators.

4.2.3 TEACHING EXPERIENCE OF PHYSICS EDUCATORS

The teaching experience of Physics educators ranges from zero to fifteen years. In the zero to five years range, there are two females and one male educator. From six to ten years, there are only two females. The eleven to fifteen years range has one female and one male educator. This shows that a greater number of Physics educators have a considerable lengthy period as educators hence they can be described as experienced educators. The graph illustrates the teaching experience of educators in years and according to their sex.

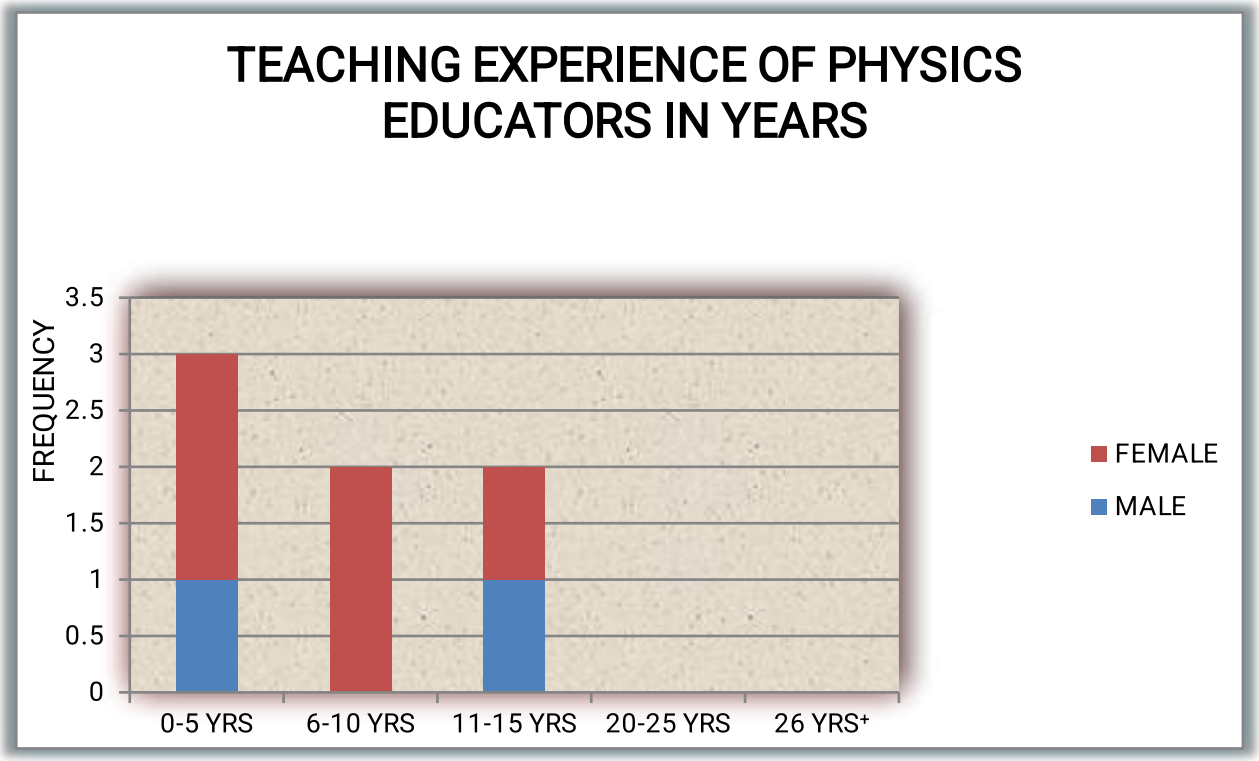

Figure 4.3: Graph showing teaching experience of Physics educators

4.2.4 CHALLENGES FACED BY PHYSICS EDUCATORS WHEN INTEGRATING INFORMATION COMMUNICATION AND TECHNOLOGY IN THE TEACHING OF PHYSICS IN RURAL SECONDARY SCHOOLS

Data collected revealed that there are a number of challenges faced by educators when integrating information communication and technology in the teaching of Physics in Bubi rural secondary schools. The challenges are as follows

4.2.5 Resources based challenges

Inadequate information communication and technology tools or gadgets.

Participants were asked on the availability of ICT tools in their respective schools. It came out clearly from their responses that schools have inadequate ICT tools. Some responses were as follows:

HOD 4 postulated:

There are no enough computers since the department has only one computer and no projectors.

HOD 2 stated:

ICT tools are inadequate at the school since the computers are available but not enough for the learners to access.

PE 1 pointed out:

That ICT tools are a challenge one computer is being used to accommodate fifteen learners, therefore the learner computer ratio is large.

SH6 asserted:

ICT tools are not available at the school as the school does not have any computers and projectors.

From these responses it shows that most schools are poorly equipped as they do not have the full set of basic information communication and technology gadgets such as projectors and computers. Data obtained from school heads also concurred with the information from the educators as school heads testified that their schools are hit by

shortage of ICT tools. It was further revealed from observation that schools are challenged by lack of information communication and technology gadgets. The researcher witnessed some notable deficiencies in ICT tools in the six schools which were visited.

Lack of internet access

Pertaining to the accessibility of internet, the participants had the following responses:

SH 2 echoed:

Educators have no access to internet due to lack of funds to accommodate them in the school Wi-Fi.

HOD3 stated:

There is lack of internet access due limited data allocation to enable the connectivity of computers.

HOD4 pointed out:

Physics educators have no access to internet because it is only connected to administrators and its distance coverage is limited within the administration block.

PE5 said:

Only administrators have access to internet at the school due to lack of funds to have unlimited Wi-Fi.

PE2 echoed that:

Lack of internet access makes it difficult to access digital educational resources.

PE4 said:

Lack of internet results in missing out current educational information.

The responses revealed that most schools had challenges on reliable access to internet in schools in their quest to integrate information communication and technology in the

teaching of physics. Only two schools have internet connection out of a total of six high secondary schools which were studied. This is indeed a serious hurdle because internet access is a cardinal element of ICT enabling facilities hence its absence undermined the process of information communication and technology integration in the teaching of Physics.

Absence of power source

It was availed on this question that the ineffective integration of ICT in the teaching and learning is due to unavailability of reliable power source. The participants were asked if the school have reliable power source. It came out from participants that there are no reliable power sources at most of the schools. The following are some of their responses:

HOD1 said:

Availability of reliable power source is a challenge to educators to integrate ICT in their teaching although computers and software are available.

SH4 concurred:

There is no power source at school.

PE3 stated that:

Reliable power source is a challenge since computers are connected directly from the power source and can be not be charged.

From the responses, only three schools have a source of power although not reliable. Source of power is very important for ICT tools and gadgets to be functional and operated by both educators and learners. As a result, it is very difficult for schools without electricity to fully integrate information communication and technology in the teaching of Physics. Availability of electricity is very vital in order for information communication and technology integration in the teaching of physics to be successfully achieved in rural secondary schools.

Lack of physics software

Participants were further asked if they have physics software to integrate in their teaching. The participants had this to say:

PE6 postulate:

The school have computers but no physics software to enable learners to play games related to subject matter to explore more than relying on theory.

PE4 confirm that:

Lack of physics software makes it difficult to teach complex physics content which require virtual assimilation.

It can be noted from responses of participants only one physics educator had a software which was in the form of a video game called balance of power. It is important for Physics educators who have information communication and technology facilities at their disposal to make use of such programs so as give more value to ICT integration in the teaching of Physics. The software can be installed in computers and assist educators to enhance concept understanding in the teaching of Physics. This software may include games which are designed in such a way that they portray scientific events and when learners play them, they acquire some knowledge of physics skills, physics events and concepts.

The bar graph shows a clear summary of the status of some major information communication and technology enabling facilities in the six schools which were studied.

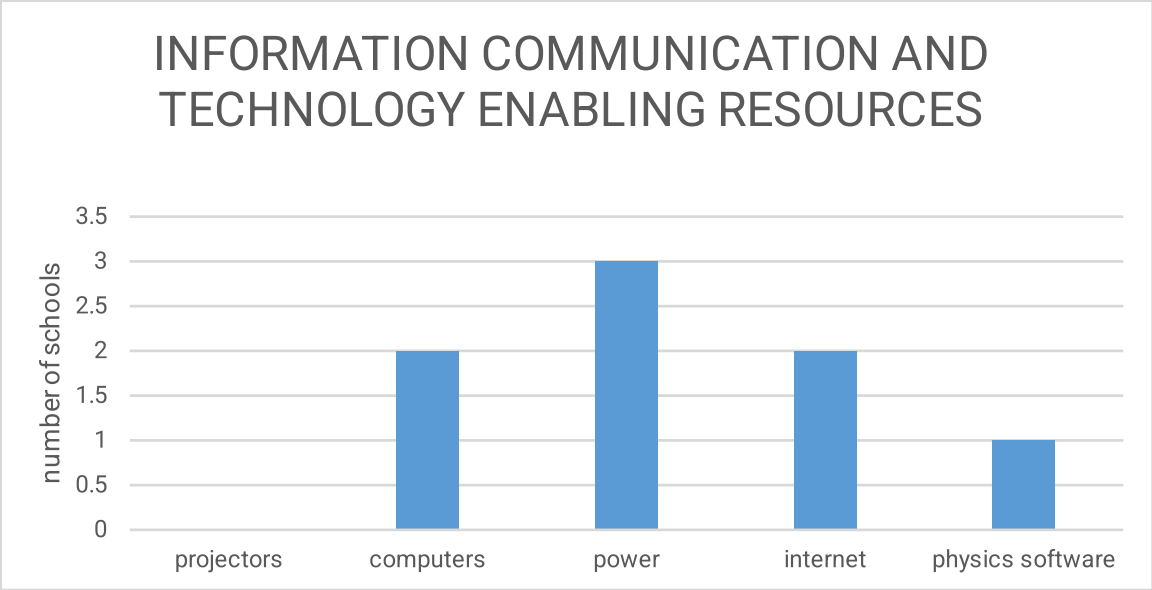

Figure 4.4: Graph showing the status of information communication and technology enabling resources

The graph shows that in six schools, only two have computers, while three have electricity. Two schools have internet connection and in only one school the educator has Physics software. All the schools do not have projectors. This shows that there is an acute shortage of information communication and technology enabling resources and facilities in most of these schools. With such conditions of information communication and technology facilities in schools, integration of information communication and technology in the teaching of Physics maybe very impossible to achieve. As a result of scarcity of ICT resources educators are embracing information communication and technology in the teaching of Physics to a lesser extent.

Data was collected from lesson observation showing the level at which ICT was used in Physics lessons.

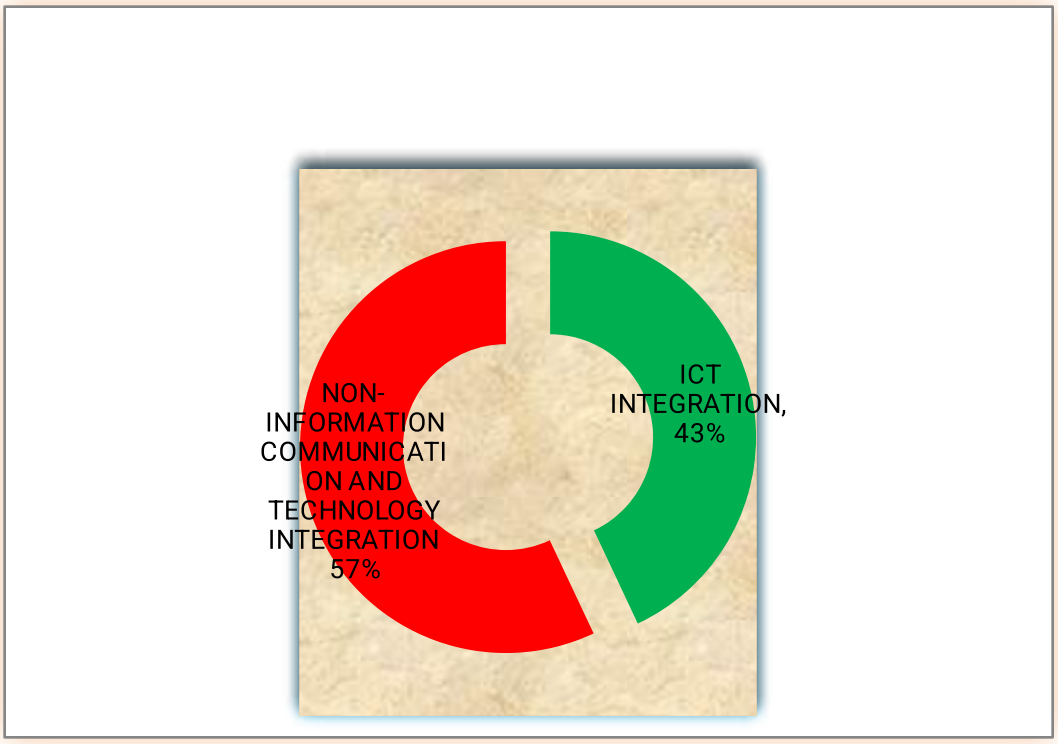

Figure 4.5: An exploded doughnut showing the level of ICT integration in Physics lessons.

The exploded doughnut illustrates that a bigger number of observed Physics lessons did not feature information communication and technology. There was absence of information communication and technology in four lessons out of the seven. The educators only used other forms of teaching media which are not information communication and technology related and this makes 57%. On the other hand, three out the seven lessons were characterized by use of information communication and

technology, making 43%. The information communication and technology tools which were used in these lessons are videos viewed on computers, geographical location of some African countries which was also viewed on a computer. The other educator distributed handouts in the form of printed notes of the topic being taught.

The major reason for absence of information communication and technology in the other lessons was lack of information communication and technology enabling facilities in these schools. Hence, data from observation reinforces data from questionnaires which revealed that there was lack of information communication and technology facilities in school. This implies that inadequate information communication and technology resources is a barrier hindering or lowering information communication and technology integration in the teaching of Physics in most of these rural secondary schools.

4.2.6 TECHNICAL BASED CHALLENGES

Lack of information communication and technology competencies amongst physics educators

Through questionnaires, educators admitted that the other challenge they are facing when integrating information communication and technology in the teaching of physics is shortage of information communication and technology competencies. Thus educators have a knowledge gap to operate information communication and technology tools or gadgets. The information provided on the information communication and technology qualifications of educators showed this. Heads of Science department as well as school heads lamented on the issue of staff development of educators on information communication and technology skills. The table displays the information communication and technology qualifications of Physics educators.

TABLE 4.2: showing information communication and technology qualifications of physics educators

INFORMATION COMMUNICATION AND TECHNOLOGY QUALIFICATIONS	NUMBER OF PHYSICS EDUCATORS
Degree In Information Communication And Technology	0
Diploma In Information Communication And Technology	0
Certificate In Information Communication And Technology	1
Short Information Communication And Technology Courses [Without Certificates]	2
No ICT qualifications	4

The table 4.2, shows that only three educators out of seven have information communication and technology qualifications. Only one educator had a certificate in information communication and technology whilst two attended short courses and were without certificates. Other four educators were with no ICT qualifications. The given information shows that educators cannot effectively embrace information communication and technology in the teaching of Physics because some of them need staff development on computers. Therefore, integration of information communication and technology becomes a mammoth task to them. In such instances, information communication and technology integration in the teaching of Physics remains impractical.

Lack of information communication and technology skills amongst the learners

The educators raised concern over the fact the learners are not able to use information communication and technology tools. This is because there are no information

communication and technology lessons in all the six schools which were studied even in those few schools where there are computers. Because of this, learners are not exposed to operating information communication and technology tools, they are not familiar with the gadgets and this makes it so difficult for an educator to successfully use information communication and technology in the teaching of Physics. Integration of information communication and technology in the teaching of Physics largely requires active participation between the educator and the learners. Therefore, if learners lack information communication and technology skills, there is no way they can be active participants and as such educator may end up being reluctant to use information communication and technology gadgets in the teaching and learning Physics.

Poor support of information communication and technology integration in teaching of physics from parents.

Physics educators as well as the heads of the Physics departments highlighted in their questionnaires that the parents were not forthcoming in as far as supporting information communication and technology integration in the teaching of Physics. This was further emphasized by school heads that parents were not fully supporting information communication and technology integration. Some educators indicated that if parents were asked to contribute towards the processing of some information communication and technology materials, they showed a negative response. For example, one educator highlighted that parents were asked to contribute towards printing of some Physics handout notes for the learners and only a few contributed thereby making the whole exercise to fail.

A closer look at this issue shows that the efforts of information communication and technology integration in the teaching of physics is more likely to be crippled and have hiccups as long as parents are not fully behind the idea. This is so because parents are major stakeholders at the school and their input is needed in financing the provision of information communication and technology resources to educators as well as learners. Therefore, they also need to embrace the move of information communication and

technology integration alongside with the educators for it to be a success.

Abuse of information communication and technology facilities by learners

The Physics educators from schools where some ICT resources such as computers and access to internet highlighted that at times they were having problems with learners who abuse information communication and technology gadgets. This is a situation whereby learners use the information communication and technology facilities for other activities not in line with the teaching and learning of Physics. This can be a harmful practice which may seriously affect even learner performance in Physics because of concentration to other activities not related to the learning of Physics. If not addressed, such practices may taint the genuine rationale behind information communication and technology integration in the teaching and learning of Physics.

4.2.7 EFFECTS OF INFORMATION COMMUNICATION AND TECHNOLOGY IN THE TEACHING OF PHYSICS.

Response from heads of science department.

The participants were asked to elaborate on the impact of integrating ICT in the teaching and learning of physics. The participants exposed that information communication and technology is one element which improves the teaching and learning of Physics. The following are some of the participants' views:

HOD2 pointed out:

The use of ICT improves teaching and learning of physics since it brings reality in teaching of abstract concepts in physics.

HOD6 concur that:

ICT tools have a positive impact in the teaching and learning of physics since it enables the educator to simplify physics concepts and also makes learners to enjoy learning through the use of video games.

From the responses above it can be seen that ICT integration has a positive outcome in the teaching and learning of physics. The use of ICT enables creativity among learners

and ensures virtual experiments to be done which cannot be done practically. Hence information communication and technology integration is a necessity in the teaching of physics.

The round doughnut illustrates the responses of the Physics departments on the outcome of information communication and technology in the teaching of physics.

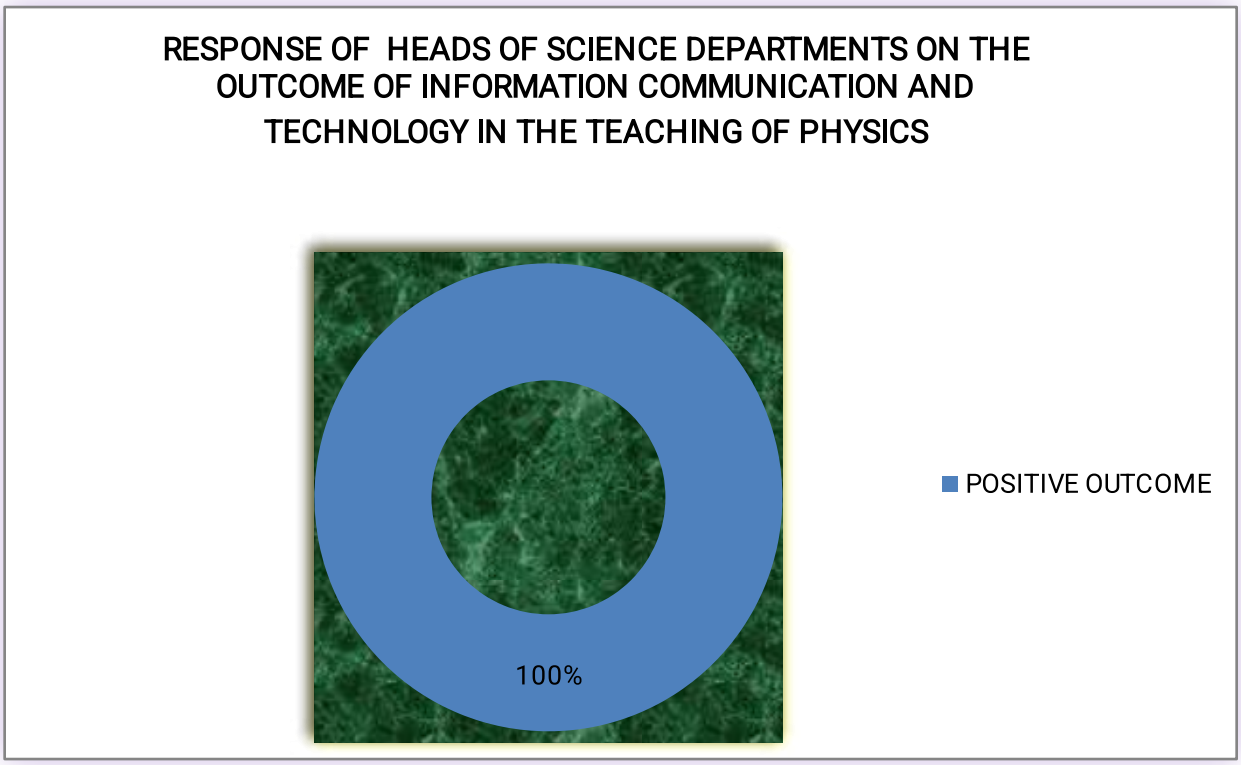

Figure 4.6: Round doughnut showing responses of heads of department in Physics on the outcome of ICT integration in the teaching of Physics.

Response from Physics educators.

The Physics educators revealed that information communication and technology has a positive outcome in the teaching and learning of physics. The following were their views:

PE6 stated that:

ICT gives a positive outcome since the learners can learn their own through video games and it promotes creativity to the learners.

PE4 concurred that:

ICT have a positive outcome but learners should be monitored as they use these ICT gadgets to ensure that intended objectives can be achieved.

PE7 asserted that:

ICT can be abused by learners as they can use for other purposes which are not school related.

The responses revealed that although ICT has positive outcomes but sometimes learners abuse information communication and technology tools such as computers and use them for activities not related to the learning of physics. The pie chart on figure 4:6, shows the responses of Physics educators on the outcome of information communication and technology in the teaching and learning of physics.

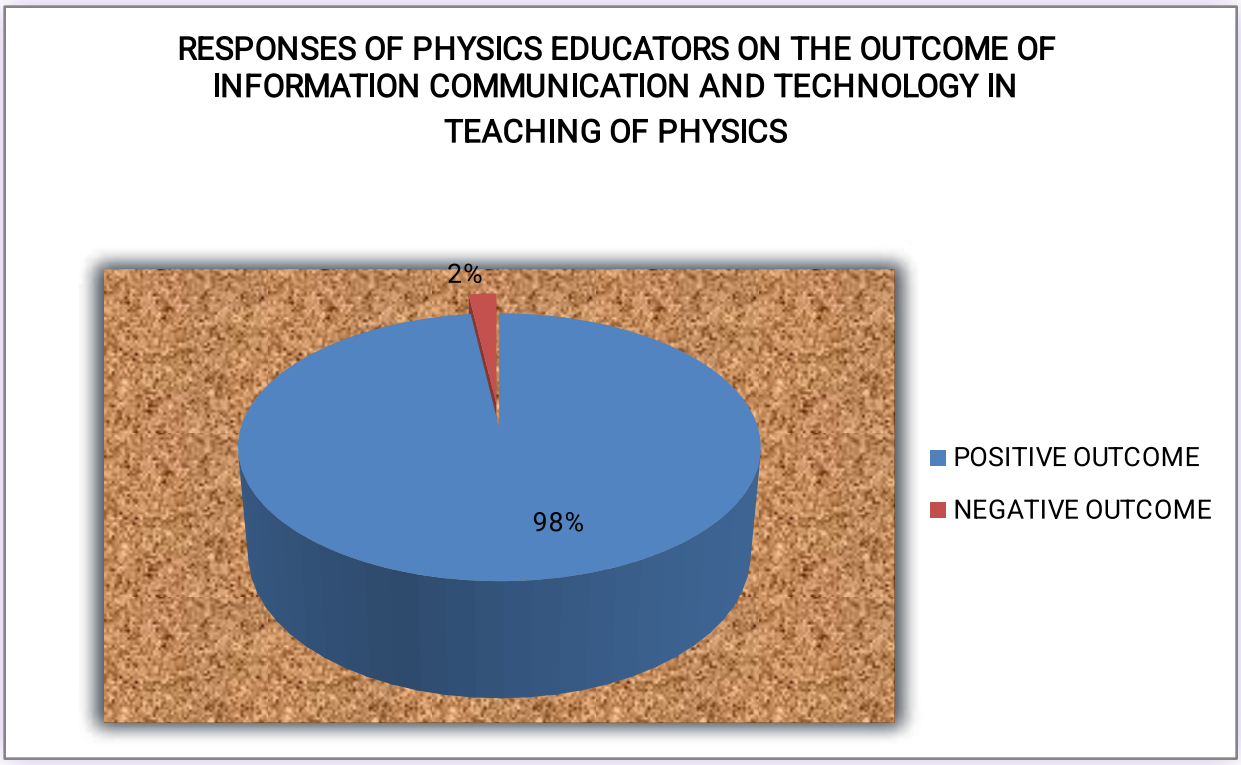

Figure 4.7: pie chart expresses response from Physics educators on the outcome of information communication and technology in the teaching of quality physics

The pie chart above shows that there is a loophole of integration of information communication and technology in the teaching of physics even though to a limited extent. This was revealed by educators who use information communication and technology in the teaching of physics as they have direct experience of information communication and technology integration in the teaching of Physics. As such the

negative part needs not to be ignored because if learners are not monitored on the use of information communication and technology in the teaching and learning of Physics may sometimes not achieve the desired and intended results. Thus educators need to be on high alert.

Response from school heads.

Response from school heads on the outcome of ICT in the teaching of physics from the interviews conducted with school heads indicate that information communication and technology has a positive outcome in the teaching of Physics. The participants' views were as follows:

SH6 pointed out:

There is effective teaching and learning of physics when ICT is being integrated since learners are able to build bridges virtually through the use of physics software.

SH4 said:

ICT brings positive outcomes since it enables educators to use computers and projectors to prepare and deliver lessons effectively.

From the above responses most of the school heads have witnessed effective teaching and learning in the Physics lessons which they observed where there was integration of information communication and technology. The response from the school heads is displayed on figure 4:7.

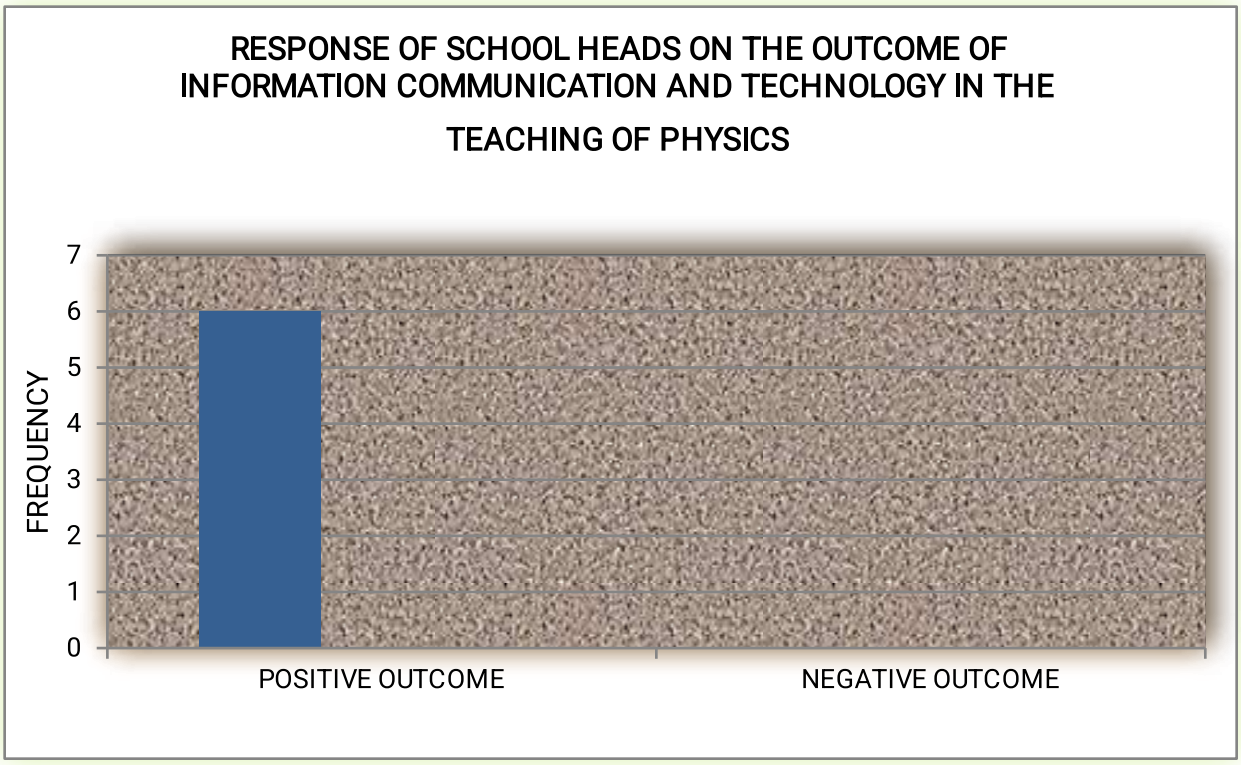

Figure 4.8: Graph indicates response from school heads on the outcome of information communication and technology in the teaching of quality physics.

The vertical bar graph above shows that the six school heads also highlighted that integration of information communication and technology is advantageous in the teaching Physics as it outcomes positively. This further portrays information communication and technology as a key ingredient to improve the teaching and learning of Physics.

4.2.8 Data from observation on the outcome of ICT in the teaching of quality physics.

Data from observed lessons is in line with what was brought forward by Physics educators and the Physics heads of departments. The researcher also noted that information communication and technology has a positive outcome in the teaching of physics from the three lessons where information communication and technology was integrated during lesson delivery.

TABLE 4.3 showing data from observation the outcome of information communication and technology in the teaching of physics

POSITIVE OUTCOME	NEGATIVE OUTCOME
• Stimulates learner interest in concepts taught	
• Promotes learner participation during Physics lessons	
• Aids explanation of concepts being taught	
• Livens up Physics lessons	

The above table displays that no negative outcome was noted by the researcher during lesson observation to determine the outcome of information communication and technology in the teaching of physics. Basing from the above information, information communication and technology appears to be an instrumental tool which improves the teaching of physics.

4.2.9 A compilation of the positive outcome of information communication and technology in the teaching of Physics

After compiling data from Physics educators, heads of the Physics department, school heads and data from observation, the positive outcome of ICT in the teaching of physics is as follows:

- It enhances the teaching and learning of Physics because it is child centered

in nature.

- It saves time during lesson delivery as handouts can be issued to learners compared to chalkboard illustrations on everything taught
- It makes it easier to simplify concepts to the level of the learners because it is flexible in the presentation of concepts.
- Interaction with information communication and technology facilities exposes learners to different works of art related with Physics and that boosts their creativity and innovation.
- It offers a wide research platform in Physics for educators and learners.
- Some information communication and technology facilities such as video clips and films can be used as teaching media.
- Exposure to a variety of scientific material facilitates the acquisition of Historical skills amongst the learners.

4.2.10 Negative outcome of ICT

Some information communication and technology facilities such as computers are prone to be abused by learners as they can be used for activities not related to the teaching and learning of Physics.

4.2.11 HOW THE CHALLENGES FACED BY EDUCATORS WHEN INTEGRATING INFORMATION COMMUNICATION AND TECHNOLOGY IN THE TEACHING PHYSICS CAN BE ADDRESSED.

The participants suggested various ways in which the challenges faced by educators when integrating information communication and technology in the teaching of Physics can be addressed or minimized. The strategies raised are illustrated in the following table

TABLE 4:4 showing the challenges faced by educators when integrating information communication and technology in the teaching of physics and suggested solutions

CHALLENGE	SUGGESTED SOLUTIONS
1. Lack of information communication and technology infrastructure related challenges	Ensure provision of information communication and technology infrastructure through: Prioritizing provision of information communication and technology facilities in the Physics department's budget Partnering with relevant local authorities on provision of information communication and technology enabling facilities such as source of power and mobile network connection. Having income generating projects in the school to provide source of funds to buy information communication and technology resources. For example, agriculture based projects such as poultry and gardening. Making the government aware of the information communication and technology resources not available so that it can assist where possible.
2. Lack of skills related challenges	Teaching learners information communication and technology skills so that they can be able to operate information communication and technology facilities. Individual educators and the school to facilitate staff development training on information communication and technology skills.
3. Abuse of information communication and	Educating learners on proper use of information communication and technology.

	technology tools by learners	Monitoring learners when they operate information communication and technology tools.
4.	Poor support of information communication and technology integration by parents	Raise awareness among the parents on the rationale and importance of information communication and technology integration in the teaching and learning of Physics.

The above table illustrates the solutions which were raised by participants in order to overcome challenges faced by Physics educators when integrating information communication and technology.

4.2.12 Solutions to lack of information communication and technology resources based challenges

For lack of information communication and technology infrastructure, all the participants (physics educators, heads of departments and School heads) agreed that ICT resources need to be sourced for schools. The school heads highlighted that this can be done through engaging in income generating projects that will boost the school finances and then allow provision of information communication and technology facilities. Some of the school heads suggested that the schools should make the government aware of the shortage of information communication and technology resources and seek government intervention if possible. Some of Heads of department pointed out that it was vital for the administrators to partner with local authorities to ensure mobile network connection and electricity connection in schools where these information communication and technology enabling facilities were not available. Some of the physics educators stated that there was need for the administrators to prioritize purchasing of information communication and technology facilities in the physics departments when dealing with budgets. All these suggestions indicate that an intensive move has to be taken by schools in order to mobilize funds to source information communication and technology infrastructure.

4.2.13 Solutions to technical based challenges

On challenges related to lack of information communication and technology competencies, all the participants were also in agreement that something has to be done to make sure that both Physics educators and learners acquire information communication and technology skills. The Physics educators stated that there was need for them to undergo in-service training on information communication and technology. The Heads of departments and school heads also recommended that educators should get information communication and technology staff development as well as learners. This shows that there is needed for the competence gap identified amongst educators and learners to be dealt with properly and quicker for ICT to pave way for integration of information communication and technology integration in the teaching and learning of Physics.

4.2.14 Solutions to abuse of information communication and technology gadgets by learners

On abuse of information communication and technology by learners, the Physics educators who raised this issue stated that there was need for the learners to be monitored by their educators when they operate information communication and technology tools so as to ensure appropriate use. The Physics educators further highlighted that it was also necessary to educate learners on proper use of information communication and technology so as to reduce challenges of information communication and technology abuse. This shows that for information communication and technology to be properly used by learners there is need for guidance from the educators so that information communication and technology is utilized to achieve the objectives in the learning of Physics.

4.2.14 Solutions to lack of parental support on information communication and technology integration in the teaching of quality physics

Physics educators and school heads on the issue of lack of parental support of the endeavor to integrate information communication and technology suggested that

parents are needed to be made aware of the motive behind integration of information communication and technology so that they make decisions from an informed position. Some school heads stated that poor support from parents was really an obstacle because parents are major stake holders in the school who are also responsible for funding school projects. As such, there is need for them to be involved in the integration of ICT in the teaching and learning of physics so that they work together with the school to achieve successful information communication and technology integration in the teaching of Physics in the rural schools.

4.2.15 DISCUSSION OF DATA

Challenges faced by educators when integrating information communication and technology in the teaching of physics in rural secondary schools.

The results of the data collected in this study demonstrate that lack of information communication and technology resources is one of the main challenges faced educators when integrating information communication and technology in the teaching and learning of Physics. There is shortage of information communication and technology enabling facilities such as computers, internet connection and Physics software among others. In line with this, Chapelle (2011), concludes that lack of adequate information communication and technology equipment and internet access is one of the key problems that schools in rural areas are facing. Milton (2008) also discovered that in Russia city schools were equipped with modern computer facilities while rural schools had few computers and some of them were old. As such, there is need for particular attention to be paid towards provision of information communication and technology resources in rural secondary schools as stipulated by the Zimbabwe national information communication and technology policy (2015) which aims at bridging the urban rural digital divide through providing connectivity in rural schools. The status of information communication and technology resources in most rural secondary schools is pathetic and cannot successfully and effectively facilitate integration of ICT in the teaching and learning of physics.

Isaac (2013) discovered that educators' readiness and skills in using information communication and technology are playing a vital role in the use of information

communication and technology in education but most educators do not have sufficient skills to implement the technology with confidence in a classroom setting. On the same note, data collected in this study revealed that some Physics educators were with knowledge gap behind the use of computers. This is a blow to the move to integrate information communication and technology in the teaching of physics as educators maybe hesitant in embracing information communication and technology in their teaching.

It was also shown from data collected in this study that lack of ICT skills by learners was a barrier faced by educators when integrating information communication and technology in the teaching of quality physics. However, this is in contrast with a research by Chien, etal (2014) which has shown that students in schools are having high expectation on information communication and technology integration in classroom as the new generation are born and grown with technologies and could be defined as the digital-native phenomenon. In this study, learners though born in the century of technology are not widely exposed to information communication and technology facilities. As a result, they are not equipped with information communication and technology skills. The poor state of information communication and technology infrastructure rural setting which they are in does not present them with the opportunity to acquire information communication and technology skills therefore they are computer illiterate.

In Kenya, Chapelle (2011) reveals that schools with information communication and technology infrastructure are supported by parents' initiative or the community. This is not the same with this study because data shows that there is poor support of information communication and technology integration in the teaching of Physics from parents. Educators highlighted failure by parents to render full support is another setback they encounter in their move to integrate information communication and technology in the teaching of Physics. This unsatisfactory response from parents on information communication and technology integration may emanate from a low level of awareness on the outcome of information communication and technology in the

teaching of Physics. Even the lack of exposure to information communication and technology facilities in the rural areas maybe the cause.

Outcome of information communication and technology in the teaching of physics

Data from this research indicated that information communication and technology has a positive outcome in the teaching Physics to a larger extent. This is so because it was revealed that information communication and technology makes the teaching and learning of Physics fruitful as it stimulates learner participation during Physics lessons and aids educators in presenting Historical concepts in a more comprehensive manner. Concurring with this is findings from a research in Nigeria by Adesote and Fatoke (2013) who point that appropriate use of information communication and technology in the classroom help make learning concrete and thus make Physics a living subject/ discipline rather than the study of dead issues. Martin (2014) also concluded that using databases to work with large volumes of data can help learners to look for patterns, frame hypothesis, question accepted theories and place events into wider contexts. This further reinforces the findings of the study and qualifies the notion that information communication and technology integration has a positive outcome in the teaching of Physics.

It was revealed in this study that information communication and technology integration has some loopholes which outcome negatively in the teaching of Physics. Data collected showed that sometimes learners may abuse information communication and technology gadgets for activities not related to Physics. This is in line by the findings of Munro (2012) who posits that information communication and technology use in physics teaching is most beneficial when coupled with effective educator intervention to ensure learners learn at a good pace and can concentrate on physics rather than other aspects of information communication and technology. The other aspects of information communication and technology which Munro (2012) is referring to implies use of information communication and technology on activities not related to learning of physics thus pointing to the issue of information communication and technology abuse by learners. As such educators should take preventive measures to eliminate

such behavior of information communication and technology abuse by learners.

How challenges faced by educators when integrating information communication and technology in the teaching of physics can be addressed.

It was revealed in this study that one of the solutions to the challenges related to the scarcity of information communication and technology enabling resources is for school administrators to take some massive and intensive measures which will facilitate the provision of information communication and technology enabling access to internet and availability to resources such as computers. In line with this is an observation by Creswell (2018) who noted that preparations for a technology based learning and teaching should begin with proper implementation and support by the school's top management. This is so because the school's top management lays out the development plan of the school, influences decisions on resources to be made available and are responsible for provision of most resources. If ICT integration in the teaching of Physics gains consideration from the school administrators, it will pave way for easy implementation for Physics educators as well.

On the part of lack of information communication and technology competencies by Physics educators, suggestions were put forward that Physics educators should undergo information communication and technology staff development. There is no way effective integration of information communication and technology in the teaching of Physics can be achieved if the educators have challenges in the operation of information communication and technology gadgets. This is also revealed in a study by Hennessey (2016) in Canada where educators admitted that there was need for them to do information communication and technology training so that they become more equipped about technology. Equipping educators with information communication and technology skills is of paramount importance if integration of information communication and technology in the teaching of Physics is to be successfully done and this has to be done concurrently with provision of information communication and technology enabling resources. If educators are computer illiterate, even provision of information communication and technology resources maybe a futile exercise which

will be a fruitless effort to positivity in information communication and technology in the teaching of Physics is concerned.

4.3 SUMMARY

This chapter entailed presentation of data collected from the sample. Data presented was analyzed in relation to the research questions which guided this study. Data was further discussed and results were compared to other findings from previous studies conducted on the same issues or topics.

CHAPTER FIVE: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 INTRODUCTION

This chapter summarizes the research's major findings in relation to the objectives that were spelt out. It brings out recommendations and draws a conclusion from the findings of the study. These recommendations will be aimed at the integration of ICT in the teaching and learning of Physics in rural secondary schools in Bubi district to various stakeholders within the education sector.

5.2 SUMMARY OF DISSERTATION

The major objective of this study was to investigate into the challenges faced by O'Level Physics educators when integrating information communication and technology in the teaching of Physics in Bubi District rural secondary schools. The Ministry of Primary and Secondary Education (MoPSE) strongly emphasizes and advocates for information communication and technology based teaching and learning across the curriculum in Zimbabwean schools. The research is presented in form of chapters and they are five of them.

Chapter one gives an outline of the background to the study and the stating of the problem. The chapter also has the research questions guiding the study as well as an explanation of the limitations and delimitations of the study. The significance of the study is also stated and the study and the chief beneficiaries of the study are Physics educators.

Chapter two is largely characterized by reviewing of related literature by the researcher to establish what has been discovered by other researchers globally on challenges faced by educators when integrating information communication and technology in the teaching of quality physics, outcome of information communication and technology in the teaching of Physics as well as how the challenges faced by Physics educators can be addressed. The researcher noted that Physics educators were facing challenges when integrating information communication and technology in the teaching of Physics

which include resource based challenges and lack of information communication and technology competencies. That information communication and technology has a positive outcome in the teaching of Physics was established explained in chapter two.

The third chapter of this study gives an outline of the plans and procedures involved in carrying out the study. After carefully selecting a descriptive survey as a research design, the researcher came up with the sample from the identified population which was in Bubi rural secondary schools. Seven physics educators, six heads of department of Physics, six school heads and their respective six schools constituted the sample. Research instruments were designed and pilot tested for the collection of data. Permission to collect data was granted to the researcher by the Provincial Education of Matebeleland North, Bubi District information communication and technology Education office as well as from the heads of the sampled schools.

The fourth Chapter contains the data presentation, analysis and discussion/interpretation. Results of data collected revealed that the educators were facing challenges when integrating information communication and technology in the teaching of physics. The challenges can be categorized as lack of information communication and technology enabling facilities related challenges, lack of information communication and technology skills related challenges, abuse of information communication and technology tools by learners as well as poor information communication and technology integration from parents. The results of data collected also demonstrated that integration of information communication and technology in the teaching of Physics has a positive outcome to a greater extent and promotes an effective teaching and learning of Physics. How the challenges faced by Physics educators can be addressed or minimized also came out from data collected. Data was analyzed and a comparison was made of the results of the study with other findings from other researchers.

Finally, in chapter five the researcher drew conclusions and made recommendations on the topic under study as informed by the results of data collected.

5.3 CONCLUSIONS

After carrying out the research, the researcher came up with the following conclusions:

- Educators are facing challenges when integrating information communication and technology in the teaching of physics.
- Educators are willing to integrate information communication and technology in the teaching of physics.
- Most of the Physics educators in Bubi district information communication and technology rural secondary schools are computer illiterate
- Most of the rural secondary schools in Bubi district information communication and technology are poorly equipped in terms of information communication and technology enabling facilities.
- Learners in Bubi district information communication and technology rural secondary are computer illiterate.
- Information communication and technology facilities can be abused by learners for other activities not in line with the learning of Physics.
- There is need for provision of information communication and technology infrastructure in most of Bubi rural district information communication and technology secondary schools.
- Information communication and technology has a positive outcome in the teaching and learning of Physics to a greater extent.
- Physics educators and learners in Bubi district information communication and technology secondary schools need to receive information communication and technology training.
- Parents are not fully supporting integration of information communication and technology in the teaching of physics in Bubi rural secondary schools
- There is need for parents to be educated on the rationale for information communication and technology integration in the teaching of physics so that they embrace information communication and technology integration in education as a whole.

5.4 RECOMMENDATIONS OF THIS STUDY

Basing on the findings of this study, some recommendations will be addressed to the following stakeholders:

School Administrators

The school administrators should embark on extensive strategies to source funds to finance the provision of information communication and technology in school so that educators may integrate information communication and technology in their teaching. In planning, the school administrators should prioritize provision of information communication and technology resources. In addition, it is recommended that school administrators should urge parents to support information communication and technology integration during annual general meetings at the school. They should facilitate in-service training of educators on information communication and technology skills. Lastly, administrators should introduce information communication and technology as a learning area in the school curriculum so that learners are also taught how to operate information communication and technology tools.

Physics Educators.

Physics educators are recommended to increase their level of information communication and technology integration in the teaching and learning of quality Physics so that they improve their teaching in physics. Physics educators should also undergo information communication and technology staff development programs. Physics educators are also urged to monitor learners when they operate information communication and technology tools so as to minimize abuse of information communication and technology tools. Moreover, physics educators should share the information communication and technology resources they have such as physics software at cluster and district levels. Another recommendation is that Physics educators should join Physics Associations such as the Physics Educators of Zimbabwe to be able to share ideas with other educators on how to handle information communication and technology integration in the teaching of physics. Physics educators should make parents aware of the importance of information communication

and technology integrations during consultation days.

Parents

Parents should embrace ICT integration in the teaching of Physics and in education as a whole in Bubi rural secondary schools through providing necessary support required as advised by the schools.

Learners

Learners should use information communication and technology tools availed to them appropriately for educational purposes.

5.5 RECOMMENDATIONS FOR FURTHER STUDY

It is recommended for further studies to look more into the challenges faced by learners in the integration of information communication and technology in the teaching of Physics in rural secondary schools. Learners are the recipient of the policy of information communication and technology integration in education hence their views and experiences on the challenges they encounter need to be considered too for information communication and technology integration in education to be effective.

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APPENDICES

APPENDIX 1

SAMED

P Bag 1020
BINDURA
ZIMBABWE

Tel: 0271 - 7531 ext 1038
Fax: 263 - 71 - 7616

BINDURA UNIVERSITY OF SCIENCE EDUCATION

Date: 10 APRIL 2024

TO WHOM IT MAY CONCERN

NAME: DUBE KHOLWANI REGISTRATION NUMBER: B2123278

PROGRAMME: HBSc ED PHYSICS PART: 2.2

This memo serves to confirm that the above is a bona fide student at Bindura University of Science Education in the Faculty of Science Education.

The student has to undertake research and thereafter present a Research Project in partial fulfillment of the HBSCED PHYSICS programme. The research topic is:
AN INVESTIGATION INTO THE CHALLENGES FACED BY O'LEVEL PHYSICS EDUCATORS WHEN INTEGRATING INFORMATION COMMUNICATION AND TECHNOLOGY IN RURAL SECONDARY SCHOOLS IN BUBI DISTRICT.

In this regard, the department kindly requests your permission to allow the student to carry out his/her research in your institutions.

Your co-operation and assistance is greatly appreciated.

Thank you

BINDURA UNIVERSITY OF SCIENCE EDUCATION
DEPARTMENT OF EDUCATIONAL FOUNDATIONS
9 APR 2024
P. BAG 1020
BINDURA

Z. Ndemo (Dr.)
CHAIRPERSON - SAMED

APPENDIX 2: LETTER REQUESTING FOR PERMISSION TO COLLECT DATA FROM THE BUBI DISTRICT

Gloag High School

P. O. Box 106

Bulawayo

09 May 2024

The Provincial Education Director

Matabeleland North Province

Bulawayo

Sir/Madam

RE: APPLICATION FOR PERMISSION TO CARRY OUT A RESEARCH STUDY IN BUBI DISTRICT SCHOOLS

I, Dube Kholwani, ID Number 53-077546J53 stationed at Gloag High School (Bubi District), am a final year student at Bindura University of Science and Education, doing a Bachelor of Science Education Degree in Physics Registration No. B212327B, do hereby apply for permission from your esteemed office to carry out a research study in Bubi District schools in partial fulfillment of the university requirement for my degree programme.

My research topic is *"An investigation into the challenges faced by O'Level physics educators when integrating information communication and technology in rural secondary schools in Bubi district".* My sample consists of Gloag High, Inyathi High, Somvubu Secondary, Siganda Secondary, Bambanani Secondary and Mangubeni Secondary schools. Attached to this application is my university clearance letter together with the research instruments for the study.

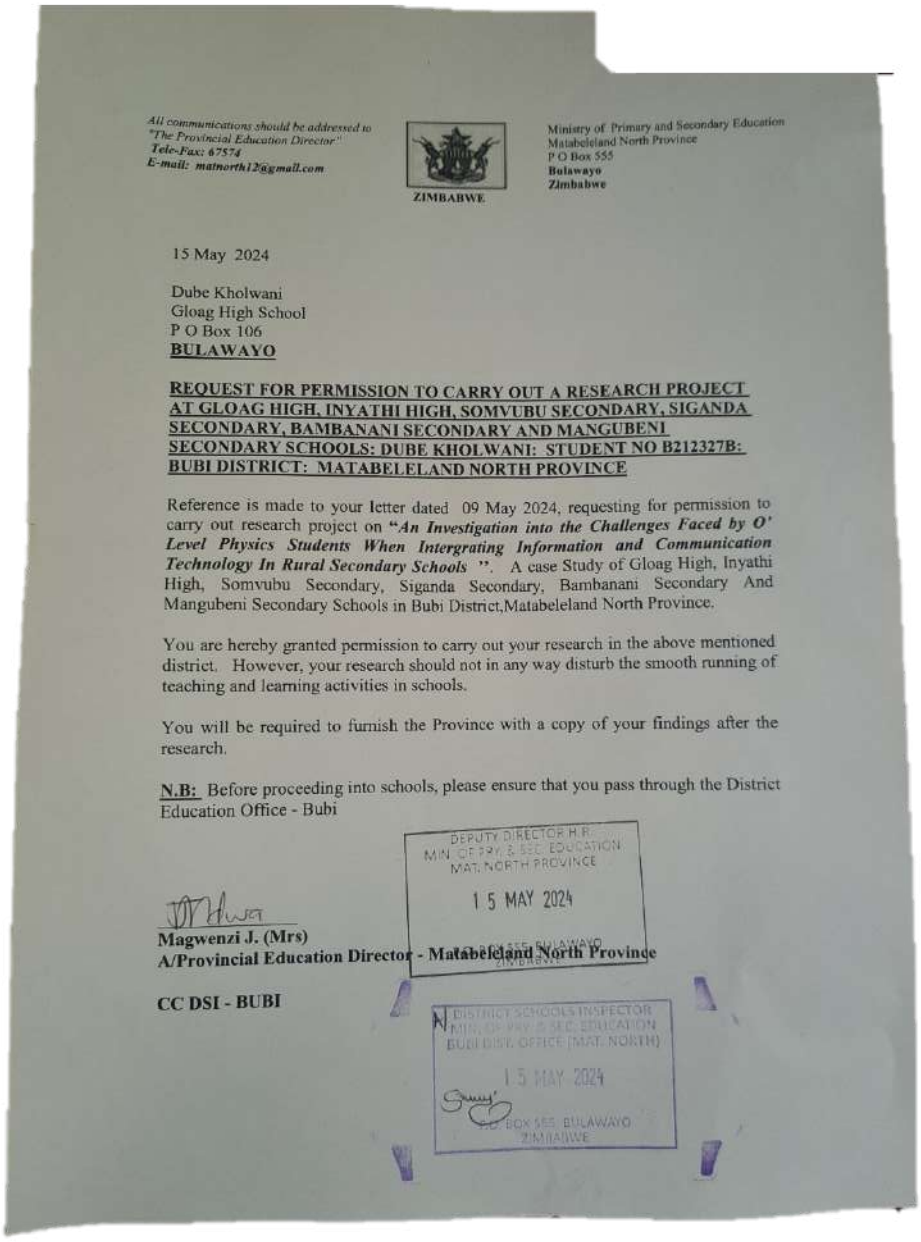
Your co-operation will be greatly appreciated.

Yours faithfully

Dube Kholwani (EC No. 5707050P)

APPENDIX 3

LETTER FROM THE MINISTRY OF PRIMARY AND SECONDARY EDUCATION GRANTING PERMISSION TO COLLECT DATA.



All communications should be addressed to "The Provincial Education Director"
Tele-Fax: 67574
E-mail: matnorth12@gmail.com

ZIMBABWE

Ministry of Primary and Secondary Education
Matabeleland North Province
P O Box 555
Bulawayo
Zimbabwe

15 May 2024

Dube Kholwani
Gloag High School
P O Box 106
BULAWAYO

REQUEST FOR PERMISSION TO CARRY OUT A RESEARCH PROJECT AT GLOAG HIGH, INYATHI HIGH, SOMVUBU SECONDARY, SIGANDA SECONDARY, BAMBANANI SECONDARY AND MANGUBENI SECONDARY SCHOOLS: DUBE KHOLWANI: STUDENT NO B212327B: BUBI DISTRICT: MATABELELAND NORTH PROVINCE

Reference is made to your letter dated 09 May 2024, requesting for permission to carry out research project on ***"An Investigation into the Challenges Faced by O' Level Physics Students When Intergrating Information and Communication Technology In Rural Secondary Schools "***. A case Study of Gloag High, Inyathi High, Somvubu Secondary, Siganda Secondary, Bambanani Secondary And Mangubeni Secondary Schools in Bubi District,Matabeleland North Province.

You are hereby granted permission to carry out your research in the above mentioned district. However, your research should not in any way disturb the smooth running of teaching and learning activities in schools.

You will be required to furnish the Province with a copy of your findings after the research.

N.B: Before proceeding into schools, please ensure that you pass through the District Education Office - Bubi

DEPUTY DIRECTOR H.R.
MIN. OF PRY. & SEC. EDUCATION
MAT. NORTH PROVINCE
15 MAY 2024
P.O. BOX 555, BULAWAYO
ZIMBABWE

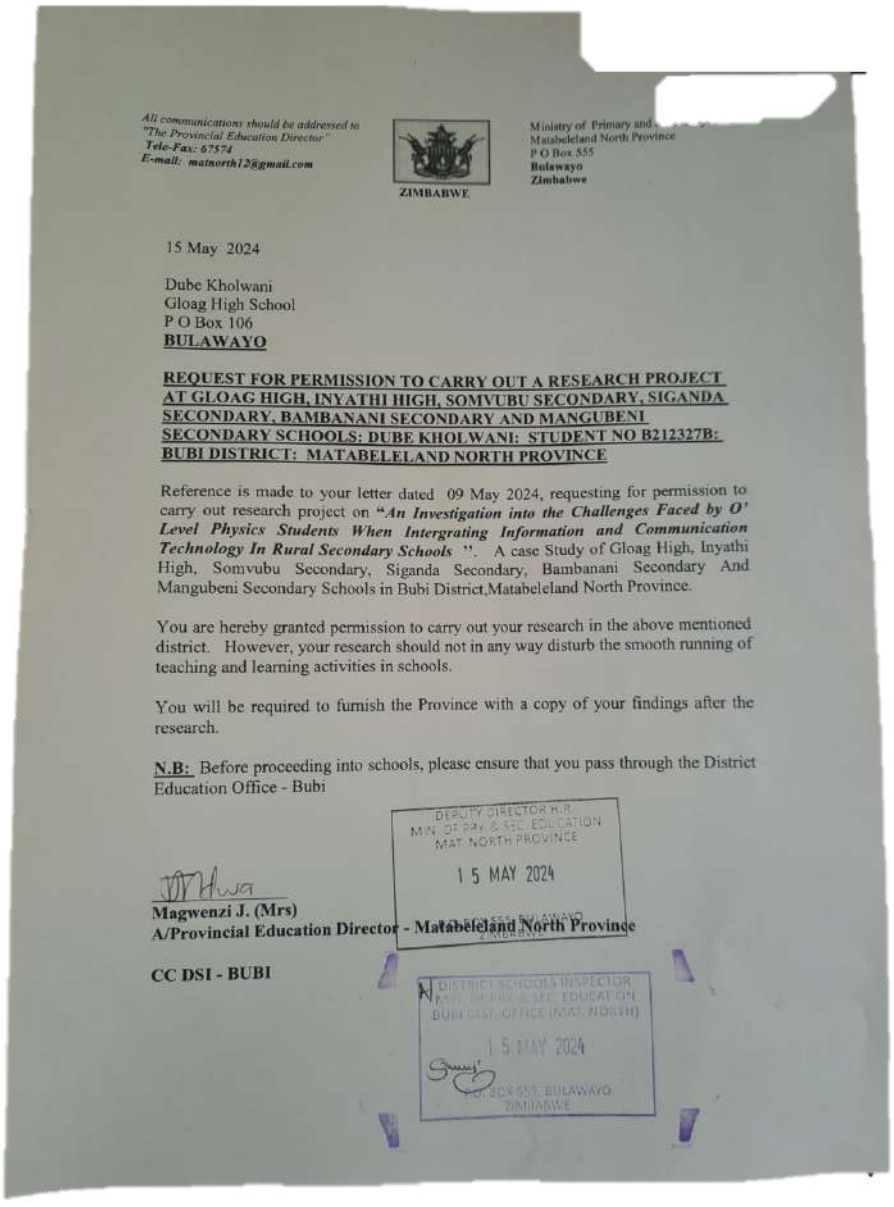
Magwenzi J. (Mrs)
A/Provincial Education Director - Matabeleland North Province

CC DSI - BUBI

DISTRICT SCHOOLS INSPECTOR
MIN. OF PRY. & SEC. EDUCATION
BUBI DIST. OFFICE (MAT. NORTH)
15 MAY 2024
P.O. BOX 555, BULAWAYO
ZIMBABWE

APPENDIX 4

CONFIRMATION FROM BUBI DISTRICT GRANTING PERMISSION TO CONDUCT RESEARCH



All communications should be addressed to "The Provincial Education Director"
Tele-Fax: 67574
E-mail: matnorth12@gmail.com

ZIMBABWE

Ministry of Primary and
Matabeleland North Province
P O Box 555
Bulawayo
Zimbabwe

15 May 2024

Dube Kholwani
Gloag High School
P O Box 106
BULAWAYO

REQUEST FOR PERMISSION TO CARRY OUT A RESEARCH PROJECT AT GLOAG HIGH, INYATHI HIGH, SOMVUBU SECONDARY, SIGANDA SECONDARY, BAMBANANI SECONDARY AND MANGUBENI SECONDARY SCHOOLS: DUBE KHOLWANI: STUDENT NO B212327B: BUBI DISTRICT: MATABELELAND NORTH PROVINCE

Reference is made to your letter dated 09 May 2024, requesting for permission to carry out research project on ***"An Investigation into the Challenges Faced by O' Level Physics Students When Intergrating Information and Communication Technology In Rural Secondary Schools "***. A case Study of Gloag High, Inyathi High, Somvubu Secondary, Siganda Secondary, Bambanani Secondary And Mangubeni Secondary Schools in Bubi District,Matabeleland North Province.

You are hereby granted permission to carry out your research in the above mentioned district. However, your research should not in any way disturb the smooth running of teaching and learning activities in schools.

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N.B: Before proceeding into schools, please ensure that you pass through the District Education Office - Bubi

DEPUTY DIRECTOR H.R.
MIN. OF PRY. & SEC. EDUCATION
MAT. NORTH PROVINCE
15 MAY 2024
P.O. BOX 555 BULAWAYO
ZIMBABWE

Magwenzi J. (Mrs)
A/Provincial Education Director - Matabeleland North Province

CC DSI - BUBI

DISTRICT SCHOOLS INSPECTOR
MIN. OF PRY. & SEC. EDUCATION
BUBI DIST. OFFICE (MAT. NORTH)
15 MAY 2024
P.O. BOX 555 BULAWAYO
ZIMBABWE

APPENDIX 5

CONSENT FORM

I, Dube Kholwani a final year student at Bindura University of Science Education registration number B212327B. I am carrying out a research entitled *"An investigation into the challenges faced by O'Level physics educators when integrating information communication and technology in rural secondary schools in Bubi district".*

This form serves to notify that the information you disclose will be kept confident and will not be used for any other purpose except for this academic research.

Participant's details

Name……..

Surname…….

Sex……

Address……

I voluntarily participate in this research study

Researcher's signature……

Date……17/05/24

APPENDIX 6 DATA INSTRUMENTS

A: INTERVIEW GUIDE FOR PHYSICS EDUCATORS

TOPIC: AN INVESTIGATION INTO THE CHALLENGES FACED BY PHYSICS EDUCATORS WHEN INTEGRATING INFORMATION COMMUNICATION TECHNOLOGY IN RURAL SECONDARY SCHOOLS. I Dube Kholwani am a student at the Bindura University of Science Education conducting a research on the "Investigation into the *challenges faced by physics educators when integrationg ICT in rural secondary schools.*" The participants are kindly asked to respond honestly. This information is confidential and will be used academic purposes only.

SECTION A

Please tick in the appropriate box

Gender Male Female

Age : 25 years & below ☐ 26 – 30 year ☐

31 – 35 years ☐ 36 – 40 year ☐

41 – 45 years ☐ 46 – 50 year ☐

51 – 55 years ☐ 56+ years ☐

Professional qualification:

Certificate in education ☐ Diploma in Education ☐

Bachelor of Education ☐ Post Graduate Diploma in Educa ☐

Master of Education ☐ Graduate Certificate ☐

Any Other.....

SECTION B

1. In your view, what are the benefits of ICT in the teaching learning process?

   ……

   ……

   ……

   ……

2. State the resources available in your school in order to facilitate the integration of ICT in the quality teaching –learning process in Physics?

   ……

   ……

   ……

3. What ICT strategies are educators currently using in the teaching–learning of physics at your school to improve pass rate?

   ……

   ……

   ……

   …… ……

4. In your own view what are the perceptions of physics educators and their learners on the use of ICTs in the teaching and learning process?

   ……

   ……

   ……

   ……

   … ……..

5. Suggest challenges that could be faced when integrating ICT in the teaching and learning process?

   ……

   ……

   ……

   …… ……..

6. Suggest any solutions to the identified challenges stated above.

   ……

   …… ……..

7. How can the use of ICTs in the teaching and learning process be improved to promote quality physics education among learners?

……

……

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…… ……..

8. Was the use of ICTs necessary during lockdown environment in online learning? Give reasons for your answer.

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9. Do you think the integration of ICTs during learning and teaching affect your learners' emotional well-being /attitudes? Please explain

   ……

   ……

   ……

   ……

10. Do you think the integration of ICTs during learning and teaching of physics has increased the risk of learners indulging in cyber-crime? Give details.

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B: QUESTIONNAIRE FOR HEADS OF SCIENCE DEPARTMENT

I am Dube Kholwani, a student at Bindura University of Science Education doing Bachelor of Science Education (HONORS) Degree in Physics. I am conducting a research on the topic: *"An investigation into the challenges faced by O'Level physics educators when integrating information communication and technology in rural secondary schools in Bubi district".* I am kindly asking you to complete this questionnaire which is part of my data collection instruments. Do not write your name on this questionnaire. You are also assured of confidentiality, anonymity and information you provide will be used for the purpose of this study only.

Your maximum cooperation will be greatly appreciated

Thank you in advance.

DEMOGRAPHIC DATA

SEX: Female Male

NUMBER OF YEARS AS H.O.D 0-5 YEARS 6-10 years 11-15years 16 years and above

SECTION B

1.How many classes take Physics at your school?

……

……

2.How many times do you supervise physics educators on lesson observation per term?

…….

3.State the ICT facilities at your school.

……

……

……

……

……

4.In your opinion, what is the outcome of ICT integration in the teaching of quality physics?

……

…… ……

5.State the challenges faced by physics educators when integrating ICT in the teaching of quality physics?

……

……

……

……

C: INTERVIEW GUIDE FOR SCHOOL HEADS.

LIST OF QUESTIONS

1. How many classes take physics at your school?

……

……..

2. Do you have ICT facilities at your school?

……

……..

3. How many times do you conduct lesson observation of physics lessons per term?

……

……

4. From the lessons observed, do physics educators integrate ICT in the teaching of Physics?

……

……

……

5. If ICT is integrated, to what extent is it used?

……

……

……..

6. If ICT is not used in physics lessons, what are the possible reasons leading to that?

……

……

……

……

7. From your point of view, what is the outcome of integrating ICT in the teaching of Physics?

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8. Are there any challenges in the school regarding provision of ICT facilities?.....

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9. How can these challenges be addressed?

……

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…….

10. Are there any future plans on provision of ICT resources at your school?

……

……

……