



**An investigation on barriers affecting
deployment of ICT in rural schools**

Maruping TE

orcid.org/0000-0002-2464-1596

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requirements for the degree *Master of Commerce in
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West University

Supervisor: Prof M. Velempini

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Student number: 21482195

DEDICATION

I dedicated this work to

My lovely late mother,

Dimakatso Patricia 'Kgakgamatso' Maruping

For the love, sympathy, believe and courage that she showed me at all times

I have worked hard to make you proud as I have promised you.

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ABSTRACT

Information and communication technology (ICT) development is continuously growing faster than before and ICT skills have become as essential in our lives as being able to read, write and compute. Learners are presented with a challenge that assignments, projects and presentations need to be typed at school and sometimes, they need to submit online (via email, a learning portal, etc.). The implementation of ICT in the Republic of South, North West Province, particularly the Rekopantswe Area Office in Ngaka-Modiri Molema District has been in the pipeline for years now and nothing is happening. Various companies have donated ICT gadgets to schools but so far, most of learners from rural schools cannot switch on a computer or connect a data projector, and even some educators are unable to do this.

The study aimed at revealing all the issues affecting the successful deployment of ICT in rural schools. Researcher visited few well-resourced schools in terms of ICT in the area to assess the actual implementation of ICT in schools as to see whether the Department of Education is achieving it's in goal of integrating ICT in teaching and learning.

The study highlights the plight of schools in rural areas where they are more disadvantaged than other areas in the country, however, it is very important that keep on dwelling much on this issue of economic status and inclusivity is not a solution as the question of ICT integration in teaching and learning in rural schools is not a negotiable one if South African learners are not kept abreast with trends in other parts the world. This will disadvantage South African learners, especially those from rural areas to be globally competitive in the market place. ICT integration in rural schools has been analysed and it was noted that in most schools, classrooms are crowded, schools lacks ICT planning, support from the Department, and motivation of the educators concerning the use of ICT in classroom, they are working with limited funds (Budget), educators lack time to explore ICT peripherals and lastly, educators lacks ICT training and technical support. In addition, the study concludes with necessary recommendation as to assist the Department in achieving their goal and the study also raises some of the key concerning issues with regards to ICT implementation in rural schools.

DECLARATION

I, Thabang Edwin Maruping hereby affirm that the entire work contained in this paper is my own original work and that all sources or material consulted have been duly acknowledged by means of the Harvard referencing style. I confirm that the content of this work has not been previously submitted in any recognised institution of higher Education for any qualification.

Signature :

Date :

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NORTH-WEST UNIVERSITY
YUNIBESITHI YA BOKONE BOPHIRIMA,
NOORDWES-UNIVERSITEIT

Private Bag X6001, Potchefstroom
South Africa 2520

Tel: (018) 299-4900
Faks: (018) 299-4910
Web: <http://www.nwu.ac.za>

Institutional Research Ethics Regulatory Committee

Tel: +27 18 299 4849
Email: Ethics@nwu.ac.za

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Project Leader:	Dr M Velempini		
Student:	TE Maruping		
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Approval date: 2015-11-10	Expiry date: 2018-11-10	Category:	N/A

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Yours sincerely

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Digitally signed by Linda du Plessis
DN: cn=Linda du Plessis, o=NWU,
ou=North West Campus,
email=linda.duplessis@nwu.ac.za,
c=ZA,
Date: 2015.11.11 20:11:28 +0200

Prof Linda du Plessis

Chair NWU Institutional Research Ethics Regulatory Committee (IRERC)

Declaration

This is to declare that I, Annette L Combrink, accredited language editor and translator of the South African Translators' Institute, have language-edited the dissertation by

THABANG EDWIN MARUPING (21482195)

With the title

**AN INVESTIGATION ON BARRIERS AFFECTING
DEPLOYMENT OF ICT IN RURAL SCHOOLS**



Prof Annette L Combrink

Accredited translator and language editor

South African Translators' Institute

Membership No. 1000356

Date: 21 March 2017

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ABBREVIATIONS

CAPS	: Curriculum Assessment Policy Statement
CUT	: Central University of Technology
DVD	: Digital Video Device
E-Education	: Electronic Education
EMDP	: Educator Mentorship and Development Programme
FET	: Further Education and Training
ICTs	: Information and Communication Technology Services
IT	: Information Technology
LCD	: Liquid Crystal Display
M-Ubuntu	: Mobile Ubuntu
NGO	: Non-Governmental Organisation
NQF	: National Qualifications Framework
OBE	: Outcomes-Based Education
OLPC	: Open laptop per Child
SPSS	: Statistical Package for the Social Sciences
STEM	: Science, Technology, English and Mathematics
UK	: United Kingdom

CHAPTER 1: ORIENTATION

1.1. Introduction

Information and communication technologies (ICTs) are “technological tools and resources that are used to communicate, create, disseminate, store and manage information” (Blurton, 2008). They include hardware, software and Network as well as “institutional, financial, cultural and application-related parameters that determine how ICTs will be shaped and developed by society at large” (Blurton, 2008). ICT has grown to be an integral part of most organizations, business and schools at large (Zhang & Aikman, 2007). The implementation of ICT in schools is very effective because it provides opportunities for learners to learn how to operate in an information technology age. With the coming of new technologies, ICT in education has been an issue on the table, open for discussion in the sense that technology is useful for teaching and learning. Studies have shown that interacting through ICT in education as compared to the traditional way, makes things very easy, innovative and more effective for teaching and learning (Hartley, 2007). Although researchers have shown that the integration and implementation of ICT in school can make a significant impact on teaching and learning, there are some barriers on ICT integration (Hew & Brush, 2007).

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The integration and implementation of ICT in education is critical to implement in schools. Despite the massive investment of ICT resources donated by some private companies to assist the government with ICT infrastructure, and NGOs investing in human resources, integration of ICT still remains as the main issues to be addressed. Integration of ICT in schools can definitely enhance the quality of teaching and learning by developing teachers and making their work much easier and learners will learn more effectively. School teachers will still play a crucial role in the school in preparing their lessons and integrating ICTs into the curriculum (ISTE, 1999; Keating & Evans, 2001; Roblyer & Edwards, 2000). “Integrating ICT in education is a very multifaceted course of action and one that may encounter a number of difficulties. These difficulties are known as barriers. A barrier is defined as any condition that makes it difficult to make progress or to achieve an objective” (Schoepp, 2005).

Keywords: ICT in school, ICT implementation, the use of ICT in schools, Obstacles to integration of ICT in education, ICT barriers, ICT obstacles, ICT integration problems, ICT enablers.

1.2. Background to the study

Since 1994, the South African government has been trying to implement ICT in schools across the country distributing ICT facilities to take the lead in achieving their goal which is technology transfer to support learning or developing teachers by integrating ICT in education, however, technology is growing with a rapid rate, this transformation or integration has not yet taken place. South Africa has a policy for e-education for the Further Education and Training (FET) college sector; there is a dynamic debate on the optimal ways to implement the policy. It has been like a decade now since schools received ICT equipment but yet not being fully utilized.

In this transformation, there has been a completely documented policy in the form of a complete new national qualifications framework (NQF) and a new curriculum structure for schools based on the concept of outcomes-based education (OBE). The national qualifications framework is mainly for creating a democratic educational and training system in South Africa with redress, access, mobility and progression as key objective. On the other hand, outcomes-based education OBE is a learner-oriented approach which considers learning as an interactive process between the two parties who are educator and learner.

Recently, the Department of Education revisited the National Qualifications Framework (NQF) and the curriculum framework, and revised them to include ICT in education. They came up with a revised curriculum assessment policy statement (CAPS) which is a single, comprehensive and concise policy that emphasizes the integration of ICT in schools.

1.3. Research problem statement

The main problem here is the failure to integrate ICT into rural schools' curriculum. Private companies such as Telkom Foundation, Eskom, M-Ubuntu, learning academies worldwide, Vodacom, have donated ICT devices to schools and they continue to do so on an annual basis. Unfortunately, they are not being fully utilized, integrated and implemented in the schools' curriculum. Most schools have received computers, mobile phone and modems with data bundles for Internet access from companies in partnership with the Department of Education but they are now white elephants (Amedzo, 2007).

1.4. Research question

The main research questions that guide this investigation of the ICT integration and implementation challenges affecting the deployment of ICT in rural schools are broken down as follows;

1. What are the main barriers that schools face in integrating ICT?
2. What are the possible enablers for integrating ICT into schools according to the stakeholders?
3. Is there enough infrastructures in place? Can educators and learners access them?
4. How can ICT change the education environment in rural area? (Benefit of using ICT)
5. Are all the stakeholders aware and ready to use ICT devices in teaching and learning?

1.5. Research objectives

The main purpose of this study is to investigate factors that contribute to the lack of ICT implementation in schools. The researcher aims to reveal barriers that are encountered by schools in the integration of ICT and devise strategies on how best can the Department of Education address those identified barriers in deploying ICT in rural schools. It is believed this study will provide a detailed report how ICT implementation in rural schools should unfold in the near future in other rural areas.

The researcher intends to uncover barriers that hinder the successful implementation of ICT in rural schools and give recommendations for integrating and implementing ICT in teaching and learning in rural schools.

1.6. Importance of the study

The significance of this study is that it will enable the researcher to investigate the obstruction of ICT integration in rural schools, as well as assist the Department of Education in knowing and considering the effectiveness of ICT in schools. This study will go further to check whether the current framework or anything that is in place to ensure the use of ICT in schools is well implemented to benefit the school at large. The research claims some uniqueness in proposing to solve the current problem by developing a framework that the Department of Education can use and be well suiting to all schools in terms of integrating ICT in teaching.

1.7. Theoretical background

This study is an investigation - it aims to provide explanations as to why ICT integration is failing and it is thus necessary for the researcher to adopt a theory that guides the study. The theory provides the underlying logic of the occurrence of a phenomenon by explaining the drivers and outcomes of the study (Bhattacharjee, 2012). The researcher is concerned about the non-utilization of ICT peripherals in schools and the fact that some schools are turning out to be dumping sites as companies as they feel that some ICT devices are old, they then donate them to rural schools, therefore the study seeks to uncover the factors hindering the successful integration of ICT in schools and then recommending possible solution.

In this context, Information and Communication Technology (ICT) introduces a new approach in teaching and learning to enhance diffusion of information and assist in addressing challenges faced in integrating ICT in schools.

1.8. Quality

1.8.1 Validity and reliability

According to Elliot (2005: 23), "Reliability is generally defined as the reliability or stability of research findings; validity refers to the ability of research to reflect an external reality or to measure the concepts of interests". This means therefore that there is an interrelationship between reliability and validity and that research findings should be consistent and be able to be proved as a reality. Hardey and Bryman (2004:23) note that "validity is concerned with the issue of whether a variable really measures what it is supposed to measure".

This means, therefore, that in this research the answers that will be given by the principals, educators and learners will give me an idea of whether the ICT is adequately used in learning and teaching programmers in rural high schools. In order to ensure that observations had been carried out properly, the researcher will be part of the participant observation scheme to observe real life situations in which rural high schools carry out their ICT responsibilities.

White (2003:25) explains that reliability relates to the consistency or the reliability of a measure. In order to ensure reliability and consistency during the data-collection process, principals, educators and learners of the rural high schools were interviewed using semi-structured interviews. Semi-structured interview schedules allow flexibility in phrasing questions in order to make sure that the participants understand the questions and answer appropriately.

Reliability is the degree to which a tool or test measures the same thing each times it is administered. If the interviews are reliable, the interviewers should come to similar conclusions about the interviewees' qualifications (White, 2003:26).

1.9. Limitation of the study

The study was confined to Rekopantswe Area Office only. The sampled schools may not necessarily be the representative sample for the whole district. This is due to financial constraints predicted. Travelling definitely required lots of money. Another limitation is the small scale on which the research is conducted, and it may favour only the sample purposively selected and might not hold the truth for the entire area. Some of the participants showed reluctance to share information. However, as the research design combines ethnographic qualitative paradigm and qualitative approaches, the size of the chosen sample is justifiable.

1.10. Research layout

Chapter 1: Research orientation

This chapter gives the overall concept about the research report, special attention is paid to the rationale of the study, statement of the problems, research questions; aims of the study, limitations of the study as well as division of chapters. This also includes the motivation for the research study as a whole and the problem statement.

Chapter 2: Literature review

The literature review touches on material about the problem of the study and how other researchers have argued their cases. It represents a literature review of the study, which portrays an abbreviated history of the development and workings of user acceptance. Different articles were collected and analysed to get a clear understanding of phenomenon.

Chapter 3: Research methodology

This chapter deals with the general plan regarding how this study was conducted. This is a detailed explanation on what research tools were used to collect data and how to analyse it, bearing in mind the issues of trustworthiness of the study (validity and reliability) as well as ethical issues.

Chapter 4: Analysis and presentation of data

This chapter presents the results in form of statistics, graphs, tables and descriptions about different researched phenomena. It represents the collection of data and analysis of it using statistics software (SPSS), and the processes used for the collection of data

Chapter 5: Discussion of findings and recommendations

This chapter discussed issues raised in chapter 1 during the problem statement with the research framework with summary including recommendation and the solution to the challenges experienced. The report aims to achieve the main objective of the research study and answer the questions. It summarises the whole study, presents a critique of the findings and gives recommendations as a way forward about the study.

1.11. Conclusion

The study indicates that there is nothing we can do in this world without using ICT. The reasons for relying on ICT were extensively articulated in the literature review. Various authors shared their views about ICT and its importance. Research design and methodology emphasised paradigms, and shed light on the interpretivist paradigm. The importance of using this paradigm was clearly explained. The focus of the study was also elaborated in depth and also chapter outline. More issues of ICT are discussed in the next chapter which is the literature review.

The next chapter is chapter 2, which is the literature review. It covers the matrix which includes the combined information from the reviewed articles.

CHAPTER 2: LITERATURE REVIEW

2.1. Introduction

This chapter provides a broad review of the literature that relates to the challenges affecting the deployment of ICT in rural schools. In the development of this chapter, almost every item of literature from whatever source has been explored in order to give a picture of what has been left out by previous researchers. A desktop search was done through ICT related documents, reports, journals, reviews and publications.

The aim of this study has been to focus on ICT in rural schools, predominantly on challenges which affect the deployment of ICT in education in remote areas. Challenges regarding the implementation and the use of ICT in rural schools are still a huge concern to a number of researchers.

ICTs are making a tremendous change in the society by influencing all the spheres of our lives. The impact of ICT is more important and necessary for the school as it can influence the teaching and learning environment in a very positive way (Tinto, 2012). Isaacs, Mogale and Broekman (2010) define ICT as the utilization of technology in processing data into information in various methods. ICT is defined in the *white paper* (Department of Education, 2010) as of a combination of hardware, software and network, as well as the means of communication, collaboration and engagement that enable the processing, management and exchange of data, information and knowledge). In research conducted by Ephraim Kofi Amedzo in 2007, ICT implementation in rural schools was at a foundation stage where schools were beginning to acquire ICT resources and the effect of ICT implementation was moderately positive. The paper did not give more information on challenges hindering successful implementation of ICT in rural schools. Another researcher, M.E Herselman (2003), investigated what has been done about ICT implementation in rural areas in South Africa looking into programmes like SchoolNet programme in Mpumalanga. So this paper intends to investigate the challenges hindering the adequacy and effectiveness of ICT implementation in rural areas of the North West Province.

2.2. Role of ICT in schools

The world is evolving as societies live in an information age. Almost every process is automated and everyone needs basic ICT skill/knowledge of how to use any IT-related gadget to be more productive at work. ICT skills are important for almost everyone regardless of age or profession. ICT can provide learners with educational resources and shall be considered as a key pedagogical framework to the most and effective independent learners. ICT can enhance learners' level of understanding and attainment in their respective learning areas (Freeman, 2011).

Several studies conducted argue that the use of ICT in school is necessary for providing opportunities for learners on how to operate in an information age. ICT in education can make tremendous changes. ICT is multi-faceted and dynamic and despite the fact that some people find it difficult to understand, it is still very important in this modern world. When one needs to know the need for ICT in the education system, the understanding of digital literacy becomes more interesting. This is nothing other than making use of ICT in a productive way for learners. It is about teaching people how to be competent-basic users of ICT because it can help to be successful at both the work place and at all level of education and to efficiently participate in modern society. The National Institute of Multimedia Education in Japan emphasized that "ICT can lead to improved student learning and better teaching methods. It also proved that an increase in student exposure to educational ICT through curriculum integration has a significant and positive impact on student achievement" (NIME, 2010).

In 2008, Yelland hinted that traditional education seems not suitable for teaching and learning the new generation and further argued that "schools that do not integrate ICT in teaching and learning cannot seriously claim that they prepare learners for life as they are growing in an information age as technology seems to be taking the whole world".

Yelland's argument is supported by Grimus (2008) who pointed out that pupils should be taught ICT skills in primary schools as they are being prepared to face future development based on proper understanding.

John O'Dowd (2014) adds that ICT is part of critical skills such as literacy and numeracy and gives learners an advantage and opportunities in the working environment in future. He also highlights the ability of ICT to help and to connect with pupils, and to deliver teaching that suits the needs of individual children. "Digital technology offers the flexibility to personalise learning and to engage with pupils with different learning styles, particularly less confident pupils" (O'Dowd, 2014).

This clearly states that the successful implementations of ICT in school can bring about a significant change in teaching and learning. Schools need to address the challenges that they are facing in order to benefit from the implementation of ICT in schools.

Watson (2008) made a point that if educational institutions can continue to teach learners using old methodologies which are still part of an old system, it will be a waste of time. The reason behind such an argument is simply because learners will be trained and equipped with yesterday's skill that will enable them to operate in today's world. Today each and every job needs someone with computer skills. So, learners with yesterday's skills are not really fit or and operational effective to face today and tomorrows' world challenges as ICT is everywhere.

According to Mikre (2011), many countries including the Western world have invested a lot in ICT over many years. The educational system has significantly improved as learners are now using more computers than before. Several studies have revealed that there is a vast difference between both ICTs and non-ICTs users. Learners who are using ICTs have an upper hand over the ones that are not using ICTs. It is proved by their performance in different learning areas. This statement is from a study conducted by Kulik in 1994 which reveals that learners who use computer tutorials obtain higher marks on assessment test than others. The study further depicted those primary school learners who also use tutorial software in reading scores higher than others.

In 2012 Volman hinted that the use of ICTs in education contributes to constructivist learning and learners become be more responsible and endowed with a good skill. The Constructivist learning's role is to support, coach and advise learners as how to

go about using ICT for teaching unlike merely transmitting knowledge to them in a traditional method where an educator does everything alone.

2.3. Current ICT in South Africa

All countries are making global revolutions in education and training as this is driven by the changing nature of work, the realities of the information age, new global partnerships and an awareness of the need for equal distribution of educational opportunities. The application of ICT is a need to develop a new syllabus that will ensure the adequate application of ICT into the school's curriculum. This will give learners skills to compete at the highest level with other learners from other countries because they are doing the Cambridge syllabus and they are doing computers in their syllabus (OECD, 2008).

According to the former minister of Department of Education, Ms N. Pandor in the White Paper on e-Education in 2010, she stated that the National Department of Education sees the application, integration and implementation of ICT into schools systems improving education in South Africa (Department of Education, 2010).

The goal of transforming South African educational systems is not only the government's concern but also the private sector's concern. They are also worried and they are doing something at the moment to change that as they are contributing towards that goal. There are projects that are already started by various organisations aiming to introduce ICT in schools like Telkom foundation which run some few projects.

The Educator Mentorship and Development Programme (EMDP) is a co-operative venture between the Telkom Foundation and the Central University of Technology (CUT) to develop empower and mentor in Science, Technology, English and Mathematics (STEM). The programme also aims to stimulate the interest of learners in learning areas and careers within the fields of Information Communication and Technology (ICT).

The Telkom Foundation is in collaboration with the Department of Basic Education to enhance the quality of teaching and learning in rural schools through the provision of computers and interactive boards (Department of Education, 2010).

To date, the Telkom Foundation has donated computers and internet connectivity to more than 700 schools. Schools are being added to the list every year. In 2010, 45 schools were provided with full computer labs and in 2012, 21 schools were provided with full labs and over 60 schools were given interactive white board packages. All the schools that have received full computer labs have also been provided with furniture for the ICT laboratories.

The Telkom Foundation in partnership with the Telkom Centre for Learning has developed a training programme to address the ICT gap in schools, particularly, schools benefiting from the Telkom Foundation's ICT programme. The training programme has supported 90 educators from different provinces. Modules covered include computer applications and the internet. The aim of the training is to assist and integrate educational content with ICT for the improvement of teaching and learning.

The Telkom Foundation and Mind-set Network partnered to install satellites and televisions to 45 schools in five provinces to ensure the delivery of educational content and revision in mathematics, science and technology. This equipment provides learners with life lessons from a team of learning area experts and assists learners to deal with learning area challenges. The Telkom Foundation through its partnership with the Department of Basic Education implemented the ICT and Literacy Mobile Units project to assist 50 multi-grade schools in Limpopo, Eastern Cape, Kwa-Zulu Natal, Mpumalanga and North West Provinces. This project provided multi-grade classrooms with a trolley fitted with laptops, books, LCD, DVD and educational materials and content.

This project was successful, where all 50 schools benefited by getting those trolley-fitted laptops but the challenge is that educators are not computer-literate and skilled to use those laptops. This posed a challenge to the school as utilising those resources and learners are not benefiting as planned by Telkom (Department of Education, 2010).

Learning academies worldwide provided six schools with mobile phones loaded with learning area content like maths, physical science, accounting in various format. Those mobile phones help learners to learn on their own everywhere and M-Ubuntu

donated solar charger for those mobile phones as to help learners living at the rural areas with no electricity.

Vodacom, working closely with provincial and district education officials, has rolled out nine ICT resource centres across South Africa, one for each of the schooling districts the Department of Basic Education has selected for its educator training initiative. The centres are the hub of the district's educator-training programme, and are outfitted with a computer classroom and an internet café. Ganyesa ICT Resource Centre is strategically situated at the rural village of Ganyesa in the North West Province.

There are 30 secondary schools attached to this centre of which 20 are located in Dr Ruth Segomotsi Mompati district and another 10 in Ngaka Modiri-Molema district. It also serves the communities which are geographically situated closer the centres. The main challenge that Vodacom and Telkom encountered is a lack of effective school leadership with a positive influence in the implementation of ICT in schools. Leadership plays a crucial role in a sense that school management need to facilitate and support the idea of implementing ICT in school. School management needs to be aware that implementing ICT is about transformation of learning, teaching and management of their school therefore they need to be hands-on (Laaria, 2012).

Many schools were donated computers, mobile phones and other devices by big companies to enhance education across the world like; two schools in North West Province had sprint mobile phones from a company in Switzerland named of U-Ubuntu.

Telkom Foundation has also donated computers to most of the schools here but, like the problem statement clearly states they are not being utilized. In some instances, equipment has been removed from designated facilities and is not being used.

There are so many issues that which hamper successful ICT integration in schools, like lack of ICT support from the school and lack of project management experience (Van Wyk, 2012).

Unsuccessful implementation of ICT in rural areas is influenced by challenges such as lack of financial support from the government in order for schools to take care of

the high costs of computer installation and maintenance as well as professional computer literacy educators.

It is further hinted at by Herselman (2013; 945) saying rural residents are struggling to meet their basic needs as rural schools are faced with challenges like in some instance where classrooms are overcrowded or some don't even have a class, they attend school under trees, five learners share a desk that accommodates three pupils, sometimes there are no textbooks at school, no toilets, learners travel more than 10km to school walking and those schools see ICT implementation as expensive and out of reach for them. Even though some rural schools are faced with challenges, there are some schools trying by all means to grab the opportunity to use computers with both hands. There are a few with computer literacy skills that use computers to prepare for the lessons, do research and use interactive white boards in class.

Educators are encouraged to learn how to use computer and smartphones as it will simply their work (Department of Education, 2010). They even assist school management to source computers for the school, maintenance and any form of support from other organisation as to integrate ICT in schools. There are some non-government organisations (NGOs) that have recruited unemployed graduates and placed them in schools that have computers but need a tutor to assist in offering computer literacy to the learners, but the only problem is that tutors need to be paid, and rural schools have very small budgets as they are no-fee schools and again computer literacy will not form part of the learners academic report.

There are some communities that have also acquired used computers, refurbished them and set-up a computer lab for the school which and learners can use for free. This clearly shows that the rural communities and schools are really trying but the need some support to fully implement ICT in rural schools exists. There is a challenge where rural schools are turning out to be dumping sites as some companies provide them with old and out-dated computers that cannot run or are not compatible with the latest application and system software.

2.4. Some practicalities experienced by schools

According to people who have been trying to support the integration of ICTs in school, they have recognised that there are some difficulties related to access and equity. Rural schools are unlikely to benefit from the integration of ICT and this will create a discrepancy in education (Cawthera, 2008). Several authors have pointed out barriers that affect the success of ICT implementation and integration in rural schools. According to Amedzo (2007), lack of electricity, improper buildings, lack of proper ICT infrastructure, lack of IT qualified and competent staff and proper governance are among them. In this study, the researcher has noted that some of the schools have no electricity, some does not have proper and well secured infrastructure and most educators are computer illiterate.

Isaac, Broekman and Mogale (2010) pointed out some of the factors that schools need to think about when implementing ICT which are Financing ICTs, securing ICT equipment, developing ICT policy for the school and staff development and support. Hew and Brush (2007) hinted that success of implementation of ICT in school is obstructed by lack of resources, knowledge and skills as well as attitudes and beliefs and they are also categorised at different levels.

Barriers are different and classified according whom it concern, like as for educators; there is lack of appropriate software, lack of time for training, lack of technical support skill. For the school, there is an absence of ICT infrastructure, insufficient ICT equipment, and old and poorly maintained hardware. Knowledge and skills barriers are also categories at different levels which face educators and schools.

As for educators, they lack competence to use ICT, lack of follow-up of new ICT skills, lack of differentiated training programs, the difference between gender in ICT and as for the school, there is limited project related experience, difficulties to re-organise innovative practices involving ICT.

According to Amedzo (2007), authors have suggested solutions to some of the barriers of ICT integration and implementation in rural schools and proposed that the Department of Education or any institution or individual willing to support ICT in school need to consider.

2.4.1. Educators' preparedness

Inadequate ICT training to equip educators' readiness for using ICT peripherals will not enhance the integration of ICTs in rural schools. Most schools in rural areas lack educators with relevant ICT skills and experience in key subjects like computer literacy. Educators need to acquire appropriate skills and expertise in ICT so that they can be able to use ICT and transfer the skill to the learners. According to Capper (2013), most South African schools do have computers but the problem is not all educators in schools are using them and sometimes not even one educator. Capper also hinted that most educators who have access to computers in their respective schools are not using them – and this might be because they do not have knowledge, they do not want to change their methods of teaching, they lack time to spend on preparing for a lesson using ICT and lastly some feel that the use of ICT is too much of a burden of work which is unnecessary with technical difficulties.

Capper is also cited by Amedzo (2007) when he urged that integration of ICT in Education will see a drastic change from the traditional method of teaching to digital teaching methods even though it is going to take time. This results in learners from rural schools not being adequately prepared for tertiary education where they need computer knowledge (Jenkin, 2012).

Educators need a continuous and extensive development to address their abilities and competencies for using ICT, and the Department of Education in partnership with some relevant and interested parties can conquer this problem by initiating ICT awareness workshops throughout the year and schools having in-service training where they gather together and someone with ICT skill and knowledge shares with rest of the people.

There are various organisations which have already started with developing and equipping educators to use ICT in classrooms, the likes of Vodacom-SA, Telkom and SchoolNet have launched ICT centres or digital classrooms across the country where teachers have access to computers and internet together with the mentors to assist them in researching information, downloading videos and even making videos for themselves. Vodacom went further by donating laptops, modems, projectors and interactive whiteboards to rural schools.

The Department of Education should also ensure that educators are trained for ICT in the universities and ensure that ICT forms part of the educators' training and they can even have a bursary for educators' ICT professional development so that educators can attend ICT-related courses to enhance themselves.

2.4.2. Internet connection

Lack of appropriate ICT infrastructure is affecting connectivity in rural schools in a very bad way. Herselman (2013) suggested that the Department of Education can form an educational network so that rural schools can benefit from urban school with an internet access at a very cheap rate but with high performance. Schools can combine ICT peripherals and establish an ICT resource centre to save costs. The isolation of rural schools from urban areas typical is another impediment as those schools are inaccessible which makes it difficult for resources and facilities to reach them (Jenkin, 2012). Hence infrastructure is another issue, rural schools have no telephone lines to transmit data and encounter poor reception which makes it difficult for the schools to access internet (Bartman, 2013). In South Africa especially, in rural areas, internet access relies on telephone connections and internet service providers (ISP) and Telkom is the only organisation with connection infrastructure and might be bit costly for the rural schools.

With the emerging technology connection technology, wireless connection which uses satellite is considered as the potential alternate option to the telephone lines and to expensive cost, rural schools can choose because it is cost reasonable (Baria, 2013). Recently, Telkom and Vodacom engaged in providing internet access to rural schools with limited access, but it is not all schools. Vodacom gives selected schools 1 (one) gigabyte of data every month and Telkom gives them access to basic sites like Department of Education portal, Thutong and the departmental intranet. Cawthera (2011) suggested InfoSat as another technique of gathering data from the web in areas where there are no telephone lines and this technique consists of various ways of connection to the web which are sending and receiving information from the web. InfoSat technique transfers information from a satellite to a recipient dish to the computer and telephone connection is needed to transmit signals to the satellite and inform it on which web pages to transmit down. In rural areas with no telephone lines, connection can be made through a Global System for

Mobile telecommunication (GSM) that is used by mobile phones, alternatively rural schools can connect through solar power combined with GSM systems for rural areas with no electricity and telephone lines.

According to Levy (2013), rural schools can connect with an emerging technology and a cheap method of connectivity that can best suit rural schools which is Wireless Fidelity (Wi-Fi) is a networking technique that runs on a band of spectrum dedicated for industrial Scientific and Medical (ISM) application. Levy (2013) further hinted that Wi-Fi technology is far cheaper and does not need a wired connection and is also very easy to deploy everywhere.

2.4.3. Finance

This is one of the barriers that militate against the integration and implementation in rural school. Irrespective whether computers are bought or donated, proper management with proper planning remains the key as they need to draw up a budget that will ensure the smooth running of ICT in school. They can acquire donated computers from companies like Telkom Foundation, and also internet but maintenance can be little bit strained for the poor and disadvantaged schools.

Schools find ICT peripherals too costly to acquire as it is not a once-off cost but a recurring expenditure and rural schools have a limited budget. ICT resources are too expensive, from acquiring, maintaining, repair, training, insurance as well as setting up the entire computer laboratory (Cawthera, 2011).

Herselman (2013) hinted that most rural areas live below the poverty line and are impoverished because they lack basic infrastructure. Due to the poverty levels in rural areas, it must be noted that businesses in the rural community are not making an appreciable turnover and they cannot make a meaningful donation to schools. Schools need to engage in fundraising activities that will involve the entire community for support and raise funds.

Bakia (2013) suggested that schools should network their computers to reduce costs as networked computer will not require hard-drives as they will be centralised. The will be very cheap for schools unlike when computers are operating as standalones. They will be connected to either a local server or internet. By so doing, computers

will require little maintenance; upgrades will only be done on the server. The only problem will be when the network is down; computers will not operate unlike when they are standalone.

There are other ways in which rural school can use to ensure that they acquire some ICT requirements. Schools can approach private sectors, non-profit organisations (NPOs), non-governmental organisations (NGOs) and request donations in order to ensure that their computers are up and running effectively to strive to achieve school goals.

Donations can be in form of money that schools can use to buy their own ICT resources or sponsoring ICT training for schools and even sponsor connectivity in the school (Amedzo, 2007). In our target group, there are some schools that were offered computers by NGOs and Companies, like Telkom but still they are still not being utilised.

2.5. Strategies implemented by other countries

Studies show that some countries like Botswana, Kenya, Nigeria, China and the United Kingdom (UK) developed some strategies in addressing the ICT challenges in schools. Studies show that other countries have initiated different programmes aiming to address ICT implementation and making educators and learners use ICT in their everyday teaching and learning in schools. African countries like Kenya, Zambia, Nigeria and Ghana started a long time ago by investing in ICT in schools. They designed policies and invested money, and all of this was to make educators adopt and use ICT in schools (Zama, 2011).

While other countries continue to advance in ICT, others still experience some challenges/problems that hindered their dreams about ICT growth in schools. According to Rajesh (2013), policy plays a very vital role in adopting and implementing ICT. Implementation of ICT in schools depends to a very large extent on the degree to which the policy-makers recognise the role of ICT in teaching and learning. India has realised the role of ICT in enhancing and bettering the knowledge of their people as they have developed a new information technology act in 2009 which was passed by their parliament. Most countries have paid less attention to the

policy which will guide them. Rajesh also mentioned that policy alone is not enough as also it needs intentions and support - most particularly financial support.

Matyokurehwa (2013) hinted that the government needs to buy in and support schools in all aspects for successful delivery of ICT. Most government schools have a very limited budget which cannot allow them to pay for ICT expenses (Internet, maintenance, security etc.). The number one country in ICT readiness (Sweden) has set aside a huge budget to support their schools financially for the successful implementation of ICT.

The Sweden a report stated that in order for the government to aid ICT service in schools, there is a need for a well-maintained ICT infrastructure. The Swedish government further continued showing commitment by appointing the commission of inquiry on the measures to improve the usage of ICT.

The Kenyan government developed ICT policy for education with a section emphasizing that the government will encourage implementation and use of ICT in schools through different channels.

According to GOK (2006), the Kenyan government proposed that they were going to promote affordable ICT infrastructure in all schools in order to enhance e-learning, enable a conducive environment for integration ICT in school curriculum and promoting and facilitating awareness or training of educators so as to enable them to set-up ICT equipment in class and give them a bit of ICT technical skill.

Keengwe and Onchwari (2011) indicated that despite all the ICT initiatives and ICT infrastructure (Internet, software, well-maintained computer labs) that have been put in place for educators and learners in schools, it appears that most educators are not ready for adopting and implementing ICT in the classroom. ICT interest, skills and attitude appear to be the main challenges.

Jimoyiannis and Komis (2007) indicated that countries like UK, Singapore, China, Australia and the European Union instigated several programmes aiming at enhancing and improving important skills in adopting and using ICT during teaching and learning. Khan (2012) also highlighted that researchers need to consider

initiating an ICT teacher preparation programme that will equip and prepare ICT educators for the essential success of ICT in class.

In a bid to address ICT challenges in schools, America and Uruguay have adopted an OLPC (One Laptop per Child) initiative which allows learners and educators to have their own laptops which they have access to them 24/7 in order to enhance to enhance their ICT skills. The OLPC programme is very good most especially for young learners as they can easily catch up which in South Africa, it can be a dream to be realised with donor-aided funding (Matyokurehwa, 2013).

Another country, Scotland, introduced a product called Glow in addressing effective ICT adoption and implementation. Glow encourages collaboration and communication by bringing schools, educators and learners together, sharing ideas and information through its well-secured website. Glow encourages educators and learners to interact in teaching and learning.

According to Herselman (2013), Oosthuizen developed a programme called Learn-O-Vision to provide rural schools with necessary ICT facilities. Oosthuizen developed a Learn-O-Vision concept after discovering that some school in Garankuwa (rural area in Gauteng) with no classrooms where teaching is taking place under trees. He then developed a Learn-O-Vision because he believed that there was no need for rural scholars to suffer the consequences of the government failing to build classrooms.

Oosthuizen indicated that Learn-O-Vision offers schools solar-powered ICT equipment (computer, television, interactive whiteboards etc.), housed in a mainframe computer-sized portable box.

Herselman (2013) hinted out that Learn-O-vision gives rural schools access to the internet and makes it possible for them to use ICT in their schools. The device has writing boards where an educator can write notes for the learners, it has a computer which is mounted at the back and works with the batteries that are charged by a solar panel at the top of the device. The batteries that are used on this device can last for about 24 hours and it can also be plugged into electricity.

Amedzo (2007) also indicated that a biogas energy programme can also assist in cases where rural schools need electricity and maybe the sun is not enough to recharge the learn-o-vision device. Biogas energy projects were created to support the solar power at Myeka high school where solar was supplying 12 kWh per day where the school needed about 20 kWh per day and there was a shortage of 8 kWh per day.

According to Maphephetheni (2008), the initial objective of the biogas energy programme was to create a working example of supplying electrical energy to the needy rural areas using gas-generated from anaerobic digestion of human excrement. Rekopantswe area consists of rural areas that do not have electricity and the schools are facing a very serious challenge, thus the biogas energy project might be very helpful for them.

2.6. Conclusion

In this chapter, the authors considered various forms of literature concerning the integration and implementation of ICT in rural schools as other authors uncover the benefit of using ICT in schools together with challenges faced by rural schools as they try to incorporate the use of computers and the internet. Through the review, the researcher noted and discussed benefits of ICT in school, and further uncovered barriers and drawbacks that hamper the success of ICT integration in schools and tried to come up with solutions that might be beneficial to the rural schools which are intending to implement ICT so as to transform the traditional and old way of teaching where educators are using chalk and talk the whole lesson. Despite strategies developed by different countries, ICT is not yet fully implemented in schools. There are still serious challenges that need to be considered and addressed properly.

CHAPTER 3: RESEARCH METHODOLOGY

3.1. Introduction

In this chapter, we discuss how the study is being conducted in terms of data collection, analysis and interpretation; research design, population and sample, data gathering, reliability and validity, pretesting the questionnaire, ethical considerations, limitations and data analysis. A chapter conclusion follows as it summarises all the aspects of research methodology and design that have been discussed in this chapter.

The research questions that guide the study are: 1) what are the main barriers that schools face in integrating ICT? 2) What are the possible enablers for integrating ICT into schools according to the stakeholders? 3) To what extent can learners and educators use a computer? 4) What is the infrastructure in place and can educators and learners access them? 5) How can ICT change the education environment in rural area?

3.2. Research paradigm

This methodology is concerned about both ways in which the research is being carried out like the way it is structured as well as its processes and the manner in which information is analysed, since we know that positivism leads to a scientific, systematic approach to the research and also leads to the use of quantitative methodology as outlined in a table of characteristics above (Coolican, 2004). This kind of research philosophy is associated with this research strategy which is quantitative. Quantitative methodological approaches usually (but not always) concentrate on the confirmatory stages of the research cycle, that is, the formulation of a hypothesis and the collection of numerical data to test this hypothesis.

The researcher followed a positivist paradigm with a quantitative approach as a questionnaire used due to the fact that positivism is preferred as accurate quantitative data (Neuman, 2007). A positivist approach was adopted to uncover the obstructions of ICT deployment in rural schools as the researcher distributed questionnaires to the participants in order to get answers to the research questions outlined in Chapter 1 and gather data to analyse the relationships among the variables (Creswell, 2012).

Positivist approaches depend on experimental and manipulative methods. Most of these methods ensure that there is a distance between the subjective biases of the researcher and the objectivity reality of studies. This generally involves hypothesis generation and testing as of proving or refuting as quantitative method are used (Cohen & Crabtree, 2006).

According to Hughes (2010), a research study needs to be guided by a paradigm, a theoretical framework that frames a research topic. There are several approaches or paradigms used in this study but the researcher believed that the positivist paradigm is fit for investigating barriers associated with implementing ICT in rural areas because it is one of the research philosophies that is stable and can be observed and described from an objective point of view (Webster, 2011). A positivist approach is actually derived from the concept of epistemology which believes things to be true. The positivist paradigm is based on rigid rules, measurements, truth, absolute principles and prediction (Hughes, 2010).

The Table below tabulates the characteristics of the positivist paradigm as to justify why the researcher chose this paradigm for this study. These are the important aspects of positivism that make it different from other paradigms.

Table 3.1: Characteristics of the Positivist paradigm (Source: Creswell, 2008).

Facts	Description
Purpose	Allows researcher to forecast and explain results of participants
Research method	Quantitative
Data	Measurable outcomes from questionnaire data
Sample	Clear and precise data

3.3. Research design

According to Wimmer and Dominik (2008), research design is a control guide of conducting research with controls to be implemented in order to control dynamics that might interfere with validity and accuracy of data. A research design is a strategy of how the study is going to be conducted and where, which data is going to be collected, analysed and interpreted.

3.3.1. Quantitative method

Research is guided by a research method, which can be qualitative, quantitative or triangulated, it is influenced by on the type of data and research data-collection method. If the data is collected through interviews, it is qualitative and for questionnaires it is quantitative (Leedy *et al.*, 2010).

A qualitative paradigm aims to get an in depth-understanding in order to draw up a conclusion and it uses observation for data collection. Amedzo (2007) pointed out that quantitative researchers can be objective observers whose inquiry is focused on specific hypotheses that ideally remain consistent through the investigation. Quantitative methods require an understanding of a statistical or computational data and models.

The researcher deployed a quantitative approach for the study defined as a prescribed, independent and efficient paradigm which is used to obtain information about a particular study. It is about getting people's views in a structured way so as to identify the characteristics of a phenomenon and study the relationship between two or more phenomena.

In this study, researcher used quantitative research as it is a principle of positivism and neo-positivism as it adheres to the standards of a firm research design that is developed prior to the study (Adams *et al.*, 2007). In a quantitative method, the researcher gathers data using structured questions in form of a questionnaire and uses a scientific technique to represent findings, also produce possible conclusion based on the results.

3.3.2. Descriptive approach

According to Amedzo (2007), descriptive research examines/describes a situation and categorizes it in a particular perspective way. It intends to provide an accurate and valid demonstration of the influences that are relevant to the study. Exploratory research intends to describe and test relationships that are supported by clinical theory. It predicts the effects of one variable on the other and is guided by a set of hypotheses. Both exploratory and descriptive techniques can be combined depending on the research question as whether is experimental or observational.

As the researcher intended to uncover the main barriers that hinder the successful implementation of ICT in schools and expects to get accurate and valid views of how schools have failed to integrate ICT, descriptive research is the best technique to be used. Descriptive research best suits this kind of study as the researcher will gather data and plot it in statistical software where results will be produced in statistical form and enable the researcher to draw conclusions. This type of research will use statistical tools like mean, median, and correlations between two variables. The researcher will not manipulate anything but will take everything as it is (Amedzo, 2007).

3.4. Research setting

A research setting describes the geographical area where the study is going to be conducted and the participant pool. It even defines the pattern of the participants are going to be sampled. The study was conducted in the Rekopantswe area of Ngaka - Modiri Molema District of North West Province, which consists of rural schools that are about 60km from Mahikeng which is the capital of North West Province.

Rekopantswe area has four circuits, namely Montshioa, Kopano, Makgobistad and Lotlhakane. There are eighteen (18) government high schools in the area and five (5) private schools. The study took place in five (5) randomly selected rural and government schools and in different circuits.

3.5. Population and sampling

According to Bopape (2008), the population in a study refers to the specific group of people that will play a crucial part of data collection by providing responses for the study. Researchers need to collect data from a certain group or subset because in some instances a population is so big that it is not possible to handle it. Amedzo (2007) hinted that sampling means taking any portion of a population as representative of that population and further research needs to develop a strategy that will be used to choose a subgroup from a large group and make use of the selected subgroup to make inferences about the large group. Sampling increases the utility of information obtained from small samples where participants are chosen because they are likely to be knowledgeable and informative about the phenomenon that is examined in the study.

The researcher specified the characteristics of the population of interest and located individuals with those characteristics. The researcher used, from an array of possible sampling procedures, purposive sampling because the rural high schools are expected to utilize ICT devices to equip learners with knowledge.

These learners are in their final phase of high school and in a year's time they are going to tertiary institutions. All schools sampled in this study received donations of ICT peripherals (Computers, Laptops, Modems, Projectors, Mobile phones) from various organisations. Some of the nine schools have computers and got free internet access from Telkom in partnership with Department of Education. Telkom Foundation donated computers to two selected schools and learning world-wide academy in partnership with M-Ubuntu donated mobile phones to one school and other two schools received laptops, projectors and modems.

The population of this study comprises the 15 departmental officials, 10 principals and Deputy Principals from 5 rural high schools, 25 educators (5 from each school) and 50 learners (10 Grade 10-12 learners from each school). A sample of 100 participants was selected randomly. This sample was chosen because they are relevant for this research. The researcher chose 5 schools that are relevant for the topic of the study. It was convenient for me as the researcher to collect data for the study.

A stratified random sampling was used to select schools from the entire area in order to ensure that all Rekopantswe area office circuits were adequately represented in the sample. Researcher focused on schools that have bigger budgeted (section 21) than others and that where previously donated ICT equipment. Most of the schools sampled are high schools because the researcher felt that the demand of ICT implantation and integration is in demand in high schools than primaries as learners are prepared for higher tertiary institutions, where ICT skills and knowledge are needed more. Researcher could have extended the sample but the researchers had some challenges that affected sampling size like, some schools failing to cooperate with the researcher and for the fact that researchers did not have enough resources and time, played a crucial role in sampling.

3.6. Data-gathering strategy

Data is important in any form of study as it is needed for high quality and valid establishment of acceptable conclusions to come up with concrete solutions to the problem (Delpont, 2012). Data can either be primary or secondary depending on the source. Primary data is gathered directly from the horse's mouth and other than that is secondary. Bopape (2009) indicates that primary data that can be collected through questionnaires and secondary data can be collected from published articles, journals and other sources. The nature of the study determines data-collection methods and how it should be implemented. Hence it has been mentioned above that this study is descriptive and used a quantitative method. It is indisputable that rich and diverse data is needed to answer research questions in detail.

According to Adams *et al.* (2007) there are different approaches that can be used to gather original data. The research method guides a data-collection technique. A quantitative approach was used which means data was drawn from different sources and questionnaires played a crucial role in this stage as they are often used for descriptive or explanatory researches, where descriptive research allows the researcher to categorize and describe the validity in different phenomena and the questionnaire here will be brief and seek only information to the research project (Leedy & Ormrod, 2010).

3.7. Questionnaire

This is an extremely important part of the research project and data-collection tools which aim to ascertain some aspect of the phenomenon under study. According to Robson (2012), a questionnaire is regarded as the most efficient data-gathering tool because it works best with consistent questions that give a researcher a confidence that respondents will interpret the questions in the same way.

Questionnaires can be used for types of research being neither descriptive nor explanatory as it intensifies the validity of the study. In descriptive research, a questionnaire allows a researcher to define variability in several phenomena (Bopape, 2008).

According to Leedy *et al.* (2010), a questionnaire for the research study should be designed in a specific way to achieve the main objectives of the study. Leedy *et al.* (2010) pointed out that questionnaires should be brief and relevant to the phenomena; questions should be brief but more informative in order to grab the needed attention.

It is imperative for the researcher when choosing a method and tools of data-gathering to consider certain factors that might hamper the successful completion of the research in time, like area of study to check if the respondent would be able to read and write and also their availability to complete the questionnaires. The researcher considered time available to complete the research project and the financial constraints (Bopape, 2008). According to Amedzo (2007) questionnaires are very good as they collect data quickly and relatively cost-effectively.

In this study, the researcher used questionnaires as a method of data gathering as mentioned above that the study is a quantitative and descriptive type of which the reality is objective and focuses in concise and narrow ways as it deals with one reality. Data was gathered by means of questionnaires or surveys and presented in the form of numerical values with all sorts of graphs and lastly, were restricted to open-ended questions.

The questionnaire established factors that contribute to lack of ICT implementation in schools, divulge barriers that are encouraged by schools in the integration of ICT and propose potential solutions after evaluating the current prominence of ICT in rural schools, looking at the adequate resources, knowledge, skills, attitudes beliefs, assessments and subject culture and develops a framework that can be implemented by all schools that want to integrate ICT. The researcher distributed questionnaires to sampled schools within the designated circuits of Rekopantswe Area. They were handed over to the school principal or educators responsible for ICT in the school.

3.7.1 Types of questions

According to Saunders *et al.* (2007) a research questionnaire can consist of either open-ended questions or closed questions. Open and closed questions can be used as the other one (Open) will give the respondent an opportunity to express him/herself when answering the questionnaire. It gives them an alternative way of answering a question unlike closed questions which limit the respondent by giving them lists or possible answers to choose from.

This type of question (open and closed) is sometimes called open-ended and close-ended respectively; they mean the same as open and closed (Sanders *et al.*, 2003). The researcher designed a questionnaire in such a way that both open-ended and close-ended questions were there as to give respondents an opportunity to express themselves when answering the questions as it might help and give a researcher their opinion about the phenomena under study. Questions were structured as all participants were asked the same questions in the same way.

3.7.2 Designing a questionnaire

A research questionnaire consists of research questions of the study with their sub-questions which intend to address the research problem. A questionnaire is divided into three sections. The first section is a permission request, the second section is for the respondents' personal particulars and the last section focuses on the research questions in detail.

The layout of a questionnaire also plays a crucial role as sometimes participants are lazy to read and now they will end up just answering for the fact of answering of which now will affect the results of the study. Questionnaire should be designed in a palatable manner in order to embrace participants' attention. The researcher ensured that the overall layout of a document mattered and included that formatting, wording, spacing and font should be of a very good quality and questions should be clear, easy to understand and straightforward. Wording of a questionnaire is very important as it can change the meaning of a question and result in inaccurate data being collected.

There are a few things that need to be taken into consideration also when developing a questionnaire like the appropriateness of the content, level of complexity of language as well as the sequence of questions (Streiner, 2004). The other aspect of developing a questionnaire which needs to be considered is the mode of administration. Since this is quantitative research, the researcher opted for self-administered questionnaires. This type of questionnaire requires distribution of questionnaires and it is recommended by the researcher because it can reach a large sample size over a wide geographical area, and cover a wider population so that it is mostly cost-effective.

The Questionnaire is designed in such way that it is easy to be interpreted by the respondents and questions were derived from the main research question and structured in the following manner:



Table 3.4.: Layout of research questionnaire (Source: Bopape, 2008).

SECTION A – PERMISSION	
	Permission to use the response for academic research
SECTION B – PARTICIPANTS DETAILS	
	Includes information like Gender, Age, Race, Computer literacy, Internet access etc.
SECTION C- RESEARCH QUESTIONS	
	To what extent do learners and educators use a computer?
	What are the main barriers that schools face in integrating ICT?
	What are the possible enablers for integrating ICT into schools according to the stakeholders?
	What is the infrastructure in place and can educators and learners access them?
	Are all the stakeholders aware of and ready to use ICT devices in teaching and learning?

3.7.3 Questionnaire standardisation

As mentioned above, the design of a questionnaire should convey the same question to all participants and they interpret it in the same way. It is imperative that research questionnaires should undergo a validation process so as to ensure that it accurately measures what is intended regardless of the respondent.

The researcher conducted a pilot testing after developing a questionnaire, sent it to a few people, including the supervisor and one ethics committee member in order for them to peruse it so as to evaluate whether the questionnaire was addressing the research questions. The pilot test initially gave an assurance that the questionnaire

was simple and viable, adequate for the problem intended to solve, reliable and precision in the wording as well as reflecting underlying phenomena to be measured (Leedy *et al.*, 2010).

3.7.4 Types of variables

Diamantopoulos and Schlegelmilch (2004) defined *variable* in research as an observable characteristic of some incident that might occur in more than one value or response category. A questionnaire can be used to collect different variables of information. According to Bopape (2008), types of variables that can be collected are opinions, attributes and behaviours. Opinion is more about what do you think, like giving own opinion about something, whereas behaviour is more about what happened before, currently and about future and attributes variable is in contrast to opinion and behaviour as it records the characteristics of the respondents (Saunders, Lewis & Thornhill, 2007).

3.8. Data handling

This is a part in a research project where the researcher needs to ensure that privacy and confidentiality are observed. Participants' information needs to be kept safe to protect their rights and ensure that information does not reach a wrong person who might use it for reasons apart from research purposes. This ensures that disposed data that form part of the study is protected at all times after the completion of the project. Data needs to be administered, handled safely either electronically or non-electronically (Taskakkori & Teddlie, 2003).

In this case, the researcher ensured that respondents' data or information did not reach the hand of any third party by making sure that after gathering data and analysing it, destroyed all the answered questionnaires and would not disclose names or any traceable personal information in a questionnaire. Names were optional and there was be no need to write an identification number or a student number.

3.9. Data analysis

The researcher collected data from the sampled participants through a questionnaire and defined it properly. Responses were analysed using descriptive and inferential statistics. Data was coded and prepared for analysis using a Statistical Package for the Social Science (SPSS). Themes defined information according to its relevance in addressing the research objectives. Means and the standard deviation together with correlation of the questionnaire were calculated. Inferential analysis was used to examine the significant differences among the respondents.

The researcher then, after analysing that in SPSS, presented results in the next chapter in graphic form like frequency tables and correlation co-efficient for interpretational purposes. The respondents were informed about the findings.

3.10. Reliability and validity

Creswell (2003) defined reliability as a stability of research findings and validity as the ability of research to reflect an external reality and measure the concepts of interests. There is an interrelationship between reliability and validity and the fact that research findings should be consistent and be able to be proved as a reality. Hardey and Bryman (2004) emphasized that "validity is concerned with the issue of whether a variable really measures what it is supposed to measure".

Creswell (2003) further explains that reliability relates to the consistency or the reliability of a measure. In order to ensure reliability and consistency during the data-collection process, principals, educators and learners of the rural high schools were given questionnaires so as to allow flexibility in order to ensure that participants understood the questions and answered properly. Reliability is the degree to which a tool or test measures the same thing each time it is administered. If the interviews are reliable, the interviewers should come to similar conclusions about the interviewees' responses.

The respondents gave the researcher an idea of whether the ICT is adequately used in learning and teaching programmers in rural high schools. In order to ensure that observations had been carried out properly, the researcher was part of the participants' observation schemes to observe real life situations in which rural high schools carry out their ICT responsibilities.

3.11. Ethical considerations

The main focus of this section is to address legal and acceptable measures of the study, addressing ethical issues as well as maintaining participants' privacy and confidentiality. The study involves participants who particularly raised special issues of informed consent and potential risk. The principle here is to ensure quality and integrity of the study, respect the confidentiality and anonymity of the respondents and illustrate the independence and impartiality of the study.

The gatekeeper has been identified as the Area Manager for a targeted cluster. The researcher submitted a formal letter requesting permission to conduct the study in a targeted area. The researcher obtained the following from the university so as to support his request, viz. student confirmation letter from the university, reference letter from the supervisor and approval of research proposal. In terms of maintaining privacy and confidentiality, the researcher distributed questionnaires to the voluntary participants and indicated to them that their identity was used for only the study purpose and nothing else and participants would not be exposed to any risk and respondents would remain anonymous.

The researcher's population target group was high school learners and educators and learners were described as vulnerable participants by Common Federal Policy (1991). According to Weijer and Emanuel (2007), participants are considered vulnerable if they are not in a position to provide informed consent, due to their position or not possessing adequate intellectual capacity or being younger than 18. The researcher distributed consent forms to all the parents of the learners that voluntarily participated in the study. As for distribution of consent forms, the researcher approached the learners and explained the purpose and importance of the study. The researcher further explained the process of obtaining permission from the parents and distributed consent forms to the volunteering participants for their parents to grant permission by completing and signing those forms. The researcher indicated to the participants that after analysing data, any documents would be destroyed.

3.12. Limitations

The study was subject to some influences that were beyond the researcher's control and they restrict methodology and conclusion of the results. This might negatively impact on the results of the study as the researcher used a quantitative method and sampled a certain number and generalised findings.

The inability of the researcher to ensure a sufficient high return rate was also a contributing factor to that. The researcher could not avoid having data enclosed by preference of one sort or another (Leedy *et al.*, 2010).

The study was confined to Rekopantswe Area Office which forms part of Ngaka-Modiri Molema district which has four (4) area offices. The sampled schools may not necessarily be a representative sample for the whole district. This is due to financial constraints indicated already. Travelling definitely required lots of money. Another limitation is the small scale on which the research was conducted, and it may favour only the sample purposively selected and might not hold the truth for the entire area. Some of the participants may show reluctance to share information. However, as far as research design quantitative approaches are concerned, the size of the chosen sample was justifiable.

3.13. Conclusion

This chapter outlined research design where things like paradigm, methods and approach were discussed in detail. The researcher also discussed data required, research setting, population and sample, reliability and validity, ethical considerations, as well as limitations of the study. Since there are research questions developed in Chapter 1, by collecting data using relevant tools as well as analysis, the researcher was able to uncover the barriers that affect deployment of ICT in rural schools.

Questionnaires are very instrumental and influential as they allow collection of valid and relevant data that helps in the conclusions drawn from the study. The next chapter deals with data analysis and interpretation, where data collected from the targeted respondents and analysed using statistical tool called SPSS and presented in tables, graphs and chart format. The researcher interpreted the results in narrative form.

CHAPTER 4: PRESENTATION, ANALYSIS AND INTERPRETATION OF RESULTS

4.1. Introduction

This chapter presents data obtained through a questionnaire as an instrument administered to learners, educators and principals in five selected schools as well as departmental officials in the Rekopantswe Area Office. The data from the questionnaire is presented and analysed in the light of the research objectives of the study. The questionnaire was divided into the following two broad sections: Demographics Information and General Questions. In this section, only data for the general questions is presented. The demographics information is presented in the annexure.

The results show that most of the stakeholders are not aware about the government's initiative of integrating ICTs in rural schools and that makes it difficult for participants to take part. The results show that most of educators are not computer literate and they are willing to learn if the Department can arrange an in-service ICT training to equip educators with necessary ICT skills and knowledge in order for them to be the role players in integrating ICT in teaching and learning.

4.2. Response rate

The total number of questionnaires distributed to respondents was 100. All the questionnaires were administered in the Rekopantswe Area Office.

Out of the total of 100 questionnaires distributed to the sampled schools, 66 were completed and returned, which comprises 39 learners, 18 educators, 9 principals and departmental officials and this gives a 66% response rate. The survey targeted learners, teachers, principals and Area Manager, Circuit Mangers, Curriculum Co-coordinator and Subject advisors (Departmental Officials).

4.3. Responses from learners

Overall, 39 completed questionnaires were received from learners out of the 50 questionnaires distributed to the targeted group of learners.

Thus 78% of the questionnaires distributed were completed and received. This high return rate may be attributed to the fact that the questionnaire was dealing with an issue where learners are urged to learn how to use of those ICT gadgets that are not being utilized to the fullest.

The remaining 11 (22%) who did not return the questionnaires may be due to the fact that those learners are not conversant with some items in the questionnaires or learners might not have responded due to the fact data was collected during the examination period and some grades had already finished writing and it is a norm in public and rural schools that learners when they're not writing, should not come to school. Another fact may be that learners may not have been comfortable answering the questions and thus did not bother to return them. The responses are graphically presented and analysed under the following headings;

- Awareness and readiness for ICT integration
- Attitude and belief towards ICT integration
- ICT infrastructure in school



Figure 4.3.1 presents the awareness readiness results of the participants (Learners) of the study

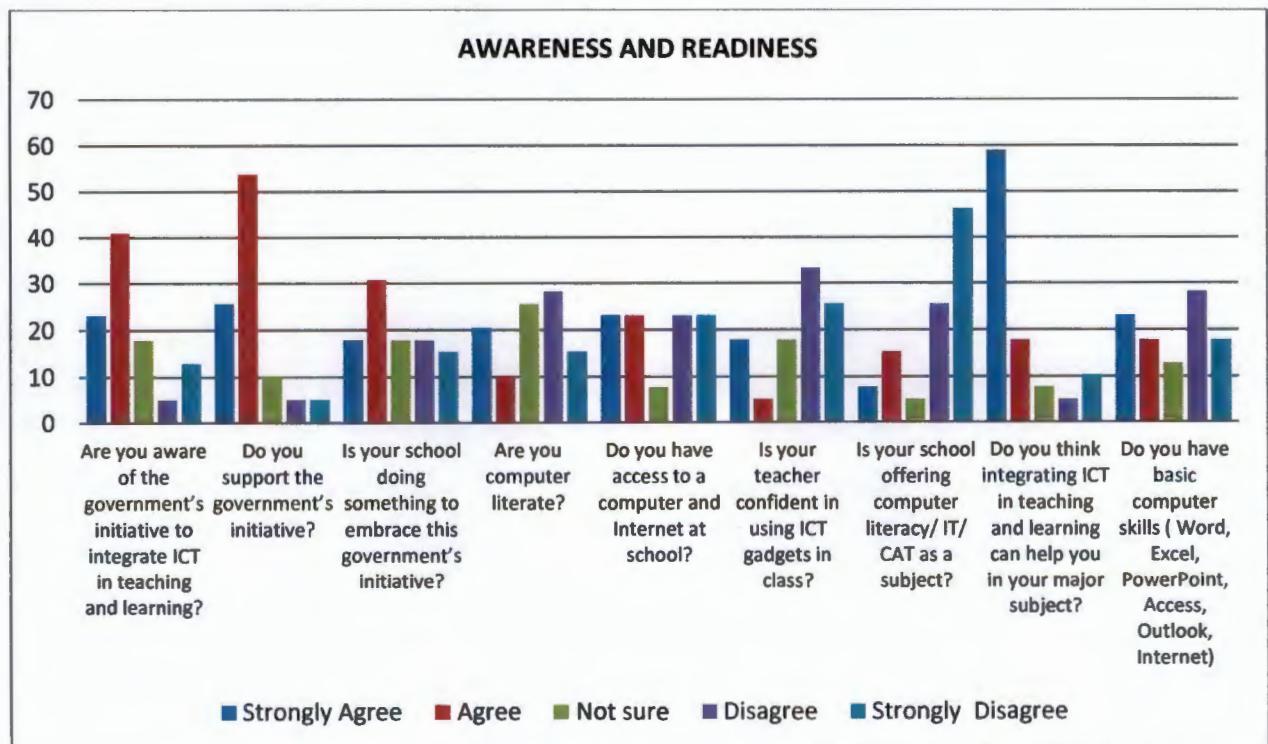


Figure 4.3.1 Awareness and readiness

Figure 4.3.1 presents the responses to the questions relating to awareness and readiness. The respondents were requested to respond to fourteen statements. They were asked to rate each item on a scale of 1 to 5 (1=strongly agree; 2=agree; 3= not sure, 4= disagree and 4= strongly disagree). Accordingly, 64.1%(23.1% and 41%) of the respondents agreed that they were aware of the government’s initiative to integrate ICT in teaching and learning, 79.4%(25.6% and 53.8%) of the respondents agreed that they supported the government’s initiative, 48.7%(17.9% and 30.8%) of the respondents agreed that their school was doing something to embrace this initiative, 43.6%(28.2% and 15.4%) of the respondents disagreed that they were computer literate.

A 46.2%(23.1% and 23.1%) of the respondents agreed that they had access to a computer and Internet at school, 58.9%(33.3% and 25.6%) of the respondents disagreed that they did not have confident teachers using ICT gadgets in class, 71.8%(25.6% and 46.2%) of the respondents disagreed that their school offered computer literacy/ IT/ CAT as a subject, 76.9%(59% and 17.9%) of the respondents agreed that they thought integrating ICT in teaching and learning can help you in your major subjects and 46.1%(28.2% and 17.9%) of the respondents disagreed that they had basic computer skills (Word, Excel, PowerPoint, Access, Outlook, and Internet).

Figure 4.3.2 presents the attitude and belief results of the target population (learners)

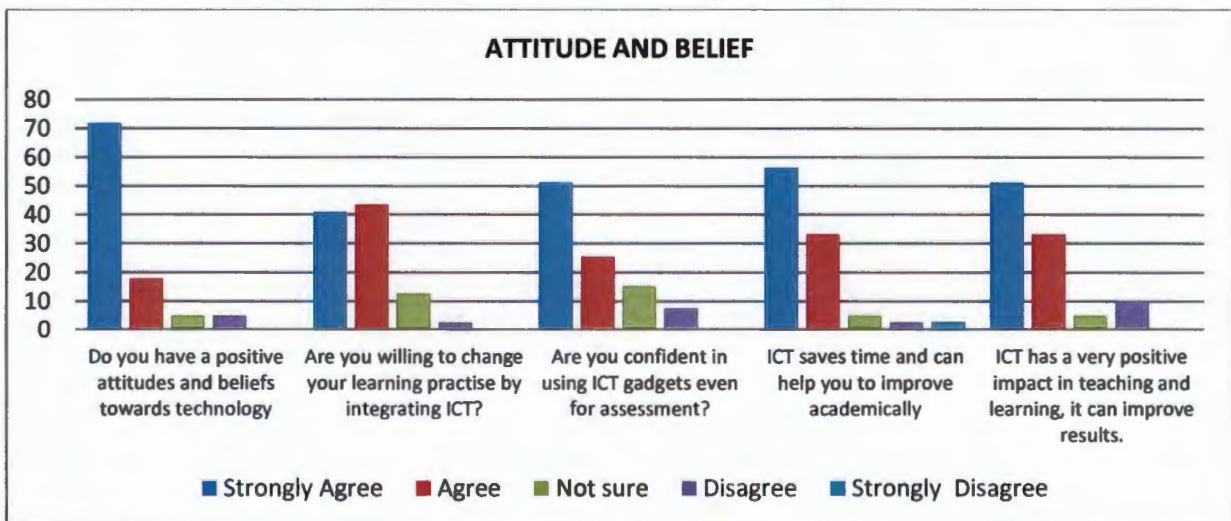


Figure 4.3.2 Attitude and belief

Figure 4.3.2 presents the responses to the questions relating to attitude and belief. The respondents were requested to respond to five statements thereof. They were asked to rate each item on a scale of 1 to 5 (1=strongly agree; 2=agree; 3= not sure, 4= disagree and 4= strongly disagree).

Accordingly, 89.7%(71.8% and 17.9%) of the respondents agreed that they had a positive attitude and beliefs towards technology, 84.6%(41% and 43.6%) of the respondents agreed that they were willing to change their learning practices by integrating ICT, 76.9%(51.3% and 25.6%) of the respondents agreed that they were confident about using ICT gadgets even for assessment, 89.7% (56.4% and 33.3%) of the respondents agreed that ICT saved time and could help them to improve academically, and 84.6%(51.3% and 33.3%) of the respondents agreed that ICT has a very positive impact in teaching and learning, it can improve results.

Figure 4.3.3 presents the results of the ICT infrastructure of the target school

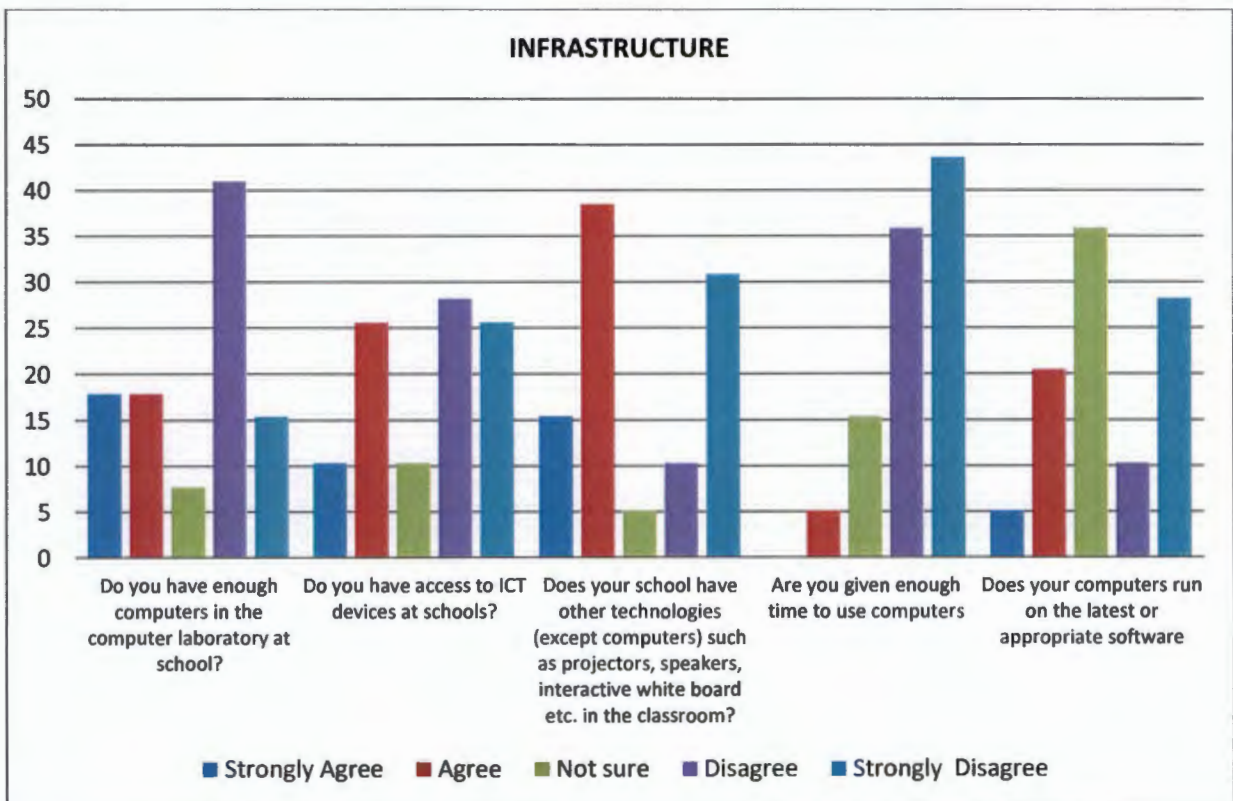


Figure 4.3.3 Infrastructure

Figure 4.3.3 presents the responses to the questions relating to infrastructure. The respondents were requested to respond to five statements. They were asked to rate each item on a scale of 1 to 5 (1=strongly agree; 2=agree; 3= not sure, 4= disagree and 5= strongly disagree).

Accordingly, 56.6%(41.2% and 15.4%) of the respondents disagreed that they had enough computers in the computer laboratory at school, 53.8%(28.2% and 25.6%) of the respondents disagreed that they had access to ICT devices at schools, 53.9%(15.4% and 38.5%) of the respondents agreed their school had other technologies (except computers) such as projectors, speakers, interactive whiteboards etc. in the classroom, 79.5%(35.9% and 43.6%) of the respondents disagreed that they were given enough time to use computers, and 38.9% (10.3% and 28.6%) of the respondents disagreed that their computers ran on the latest or appropriate software.

4.4. Responses from teachers

Out of the 25 questionnaires that were distributed to educators, only 18 (72%) were completed and returned. It was noted that a total of 7 (28%) of educators did not return the questionnaires. They kept on giving excuses such as being busy with examination invigilation, forgetting questionnaires at home and some said that they did not have time for questionnaires.

The responses are graphically presented and analysed under the following headings:

- Awareness and readiness for ICT integration
- Attitude and belief towards ICT integration
- Curriculum
- ICT infrastructure in school
- Possible barriers hindering the successful integration of ICT in schools.

Figure 4.4.1 presents the awareness readiness results of the participants (educators) of the study

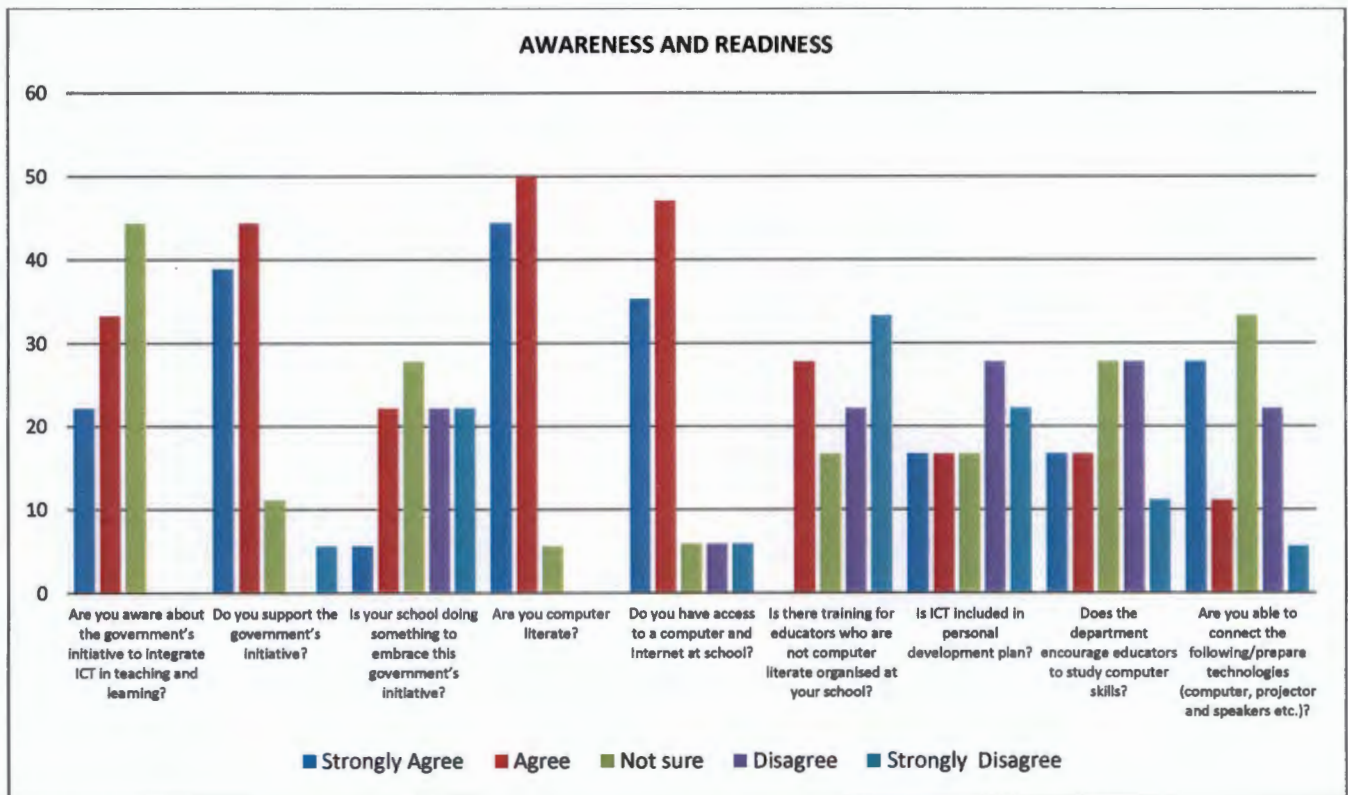


Figure 4.4.1: Awareness and readiness

Figure 4.4.1 presents the responses to the questions relating to awareness and readiness. The respondents were requested to respond to fifteen statements. They were asked to rate each item on a scale of 1 to 5 (1=strongly agree; 2=agree; 3= not sure, 4= disagree and 4= strongly disagree).

Accordingly, 55.5%(22.2% and 33.3%) of the respondents agreed that they were aware of the government's initiative to integrate ICT in teaching and learning, 83.3%(38.9% and 44.4%) of the respondents agreed that they did support the government's initiative, 44.4%(22.2% and 22.2%) of the respondents disagreed that their school was doing something to embrace this government initiative, 94.4% (44.4% and 50%) of the respondents agreed that they were computer literate, 47.1% of the respondents were not sure that they were willing to learn or undertake

ICT training courses, and 82.4%(35.3% and 47.1%) of the respondents agreed that they did have access to a computer and Internet at school.

The results further show a 55.5%(22.2% and 33.3%) of the respondents disagreed that there was training for educators who were not computer literate organised at their school, 50%(27.8% and 22.2%) of the respondents disagreed that ICT was included in personal development plans, 38.9%(27.8% and 11.1%) of the respondents agreed that the department encouraged educators to study computer skills, 38.9%(16.7% and 22.2%) of the respondents disagreed that the department supported ICT projects financially, etc. and at least 38.9% (27.8% and 11.1%) of the respondents agreed they were able to connect the following/prepare technologies (computer, projector and speakers, etc.).

Figure 4.3.2 presents the attitude and belief results of the target population (educators) of the study

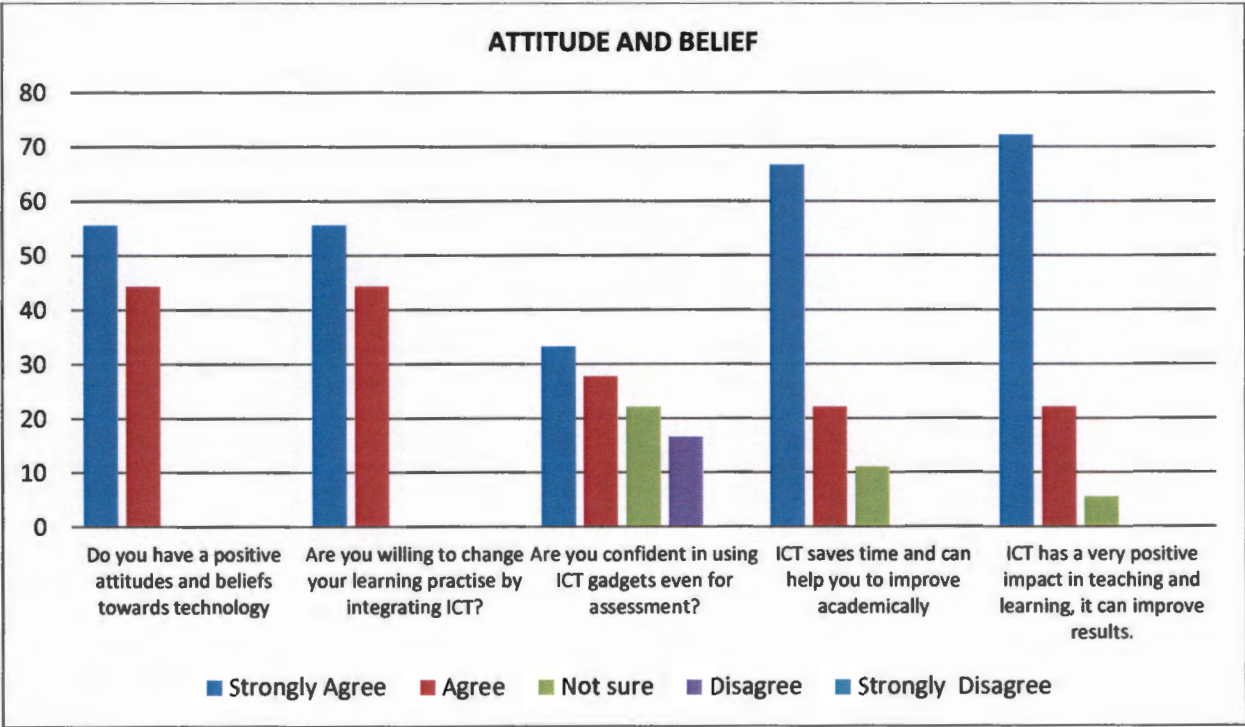


Figure 4.4.2: Attitude and belief

Figure 4.4.2 presents the responses to the questions relating to attitude and belief. The respondents were requested to respond to five statements. They were asked to

rate each item on a scale of 1 to 5 (1=strongly agree; 2=agree; 3= not sure, 4= disagree and 4= strongly disagree).

Accordingly, 100 % (55.6% and 44.4%) of the respondents agreed that they had positive attitudes and beliefs towards technology, 100% (55.6% and 44.4%) of the respondents agreed that they were willing to change their teaching practice to integrate ICT, 61.1%(33.3% and 27.8%) of the respondents disagreed. Are you confident enough to uses ICT gadget in class during a lesson, 88.9%(66.7% and 22.2%) of the respondents agreed ICT has a very positive impact in teaching and learning, it can improve results, and at least 94.4%(72.2% and 22.2%) of the respondents agreed that ICT saved time, making teaching easier for educators.

Figure 4.4.3 presents the results (from educators) about the curriculum of targeted schools

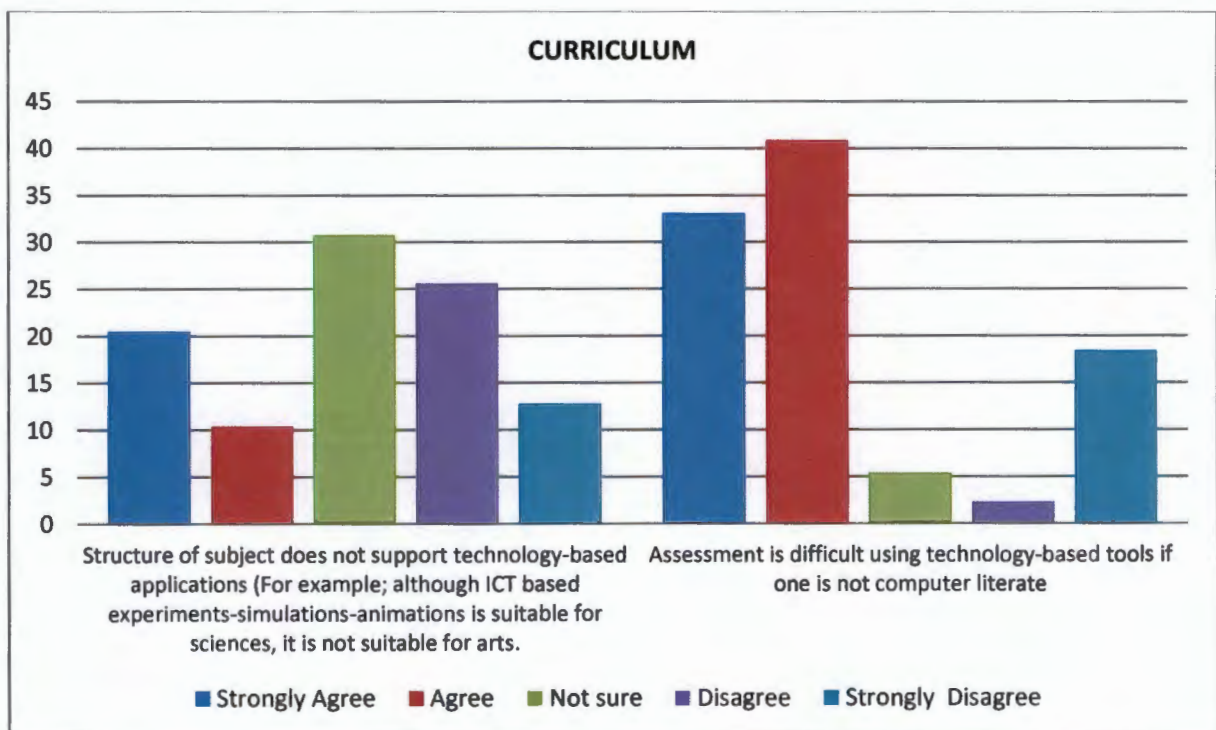


Figure 4.4.3: Curriculum

Figure 4.4.3 presents the responses to the questions relating to curriculum. The respondents were requested to respond to two statements. They were asked to rate each item on a scale of 1 to 5 (1=strongly agree; 2=agree; 3= not sure, 4= disagree and 4= strongly disagree).

Accordingly, 61.1% (50% and 11.1%) of the respondents disagreed that the structure of subjects did not support technology-based applications (for example, although ICT-based experiments-simulations-animations are subfigures for sciences and 44.4% of the respondents were not sure that assessment had difficulty in planning the technology-based tools in evaluation.

Figure 4.4.4 presents the results (from educators) of the ICT infrastructure of the target school of the study

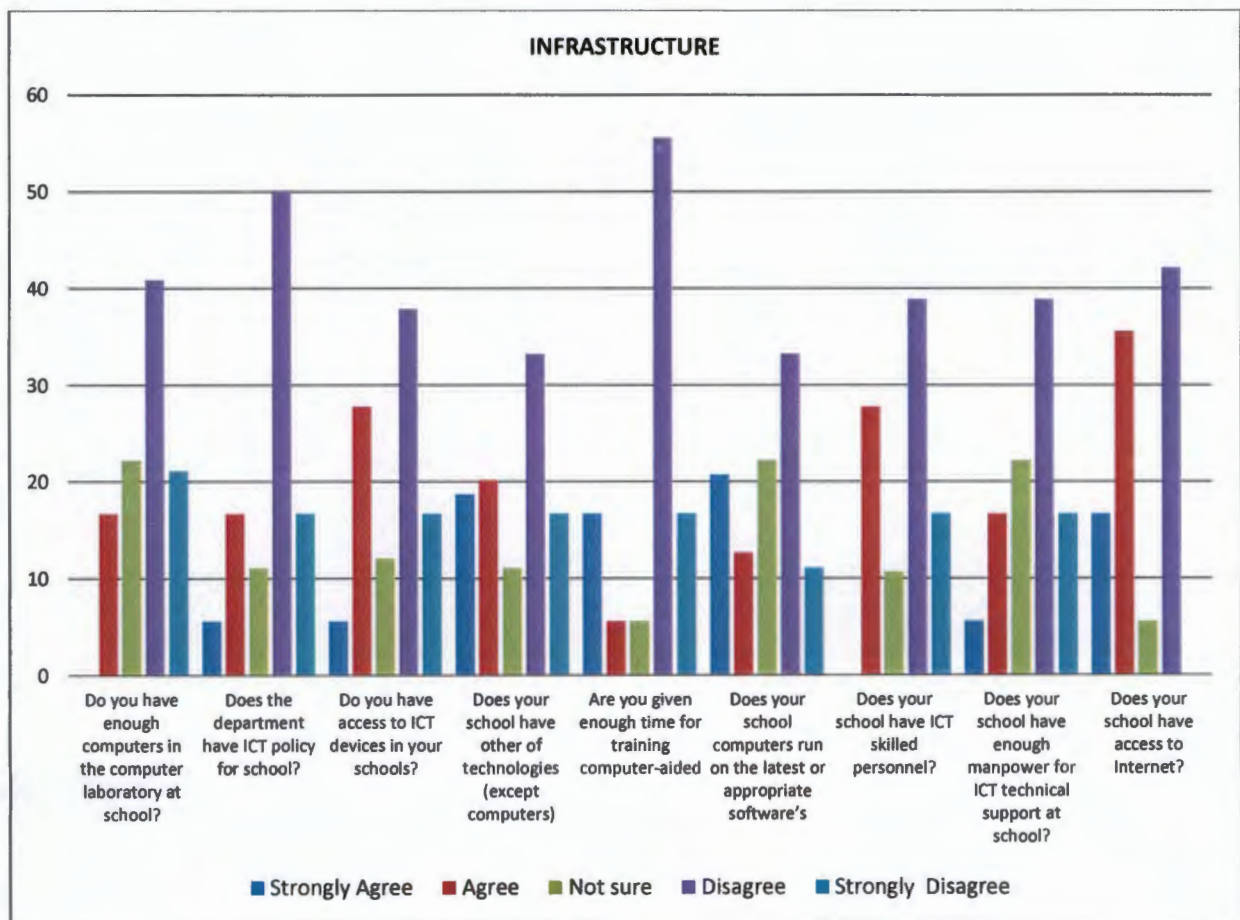


Figure 4.4.4: Infrastructure

Figure 4.4.4 presents the responses to the questions relating to infrastructure. The respondents were requested to respond to six statements. They were asked to rate each item on a scale of 1 to 5 (1=strongly agree; 2=agree; 3= not sure, 4= disagree and 4= strongly disagree).

Accordingly, 61.1%(38.9% and 22.2%) of the respondents disagreed that they had enough computers in the computer laboratory at school, 50% of the respondents were not sure that the Department had an ICT policy for schools, 38.9% of the respondents were not sure that they had access to ICT devices in their schools, 50% (33.3% and 16.7%) of the respondents disagreed that their school had other technologies (except computers) such as projectors, speakers, interactive whiteboards etc. in the classroom, 72.3% (55.6% and 16.7%) of the respondents disagreed that they were given enough time for training in computer-aided teaching, 33.4% (16.7% and 16.7%) of the respondents agreed that their school computers run on the latest or appropriate software's, 38.9% of the respondents are not sure that their school have ICT skilled personnel, 55.6%(38.9% and 16.7%) of the respondents disagreed that their school had enough manpower for ICT technical support at school, and 72.3% (16.7% and 55.6%) of the respondents agreed that their school had access to Internet.

Figure 4.4.5 presents the results (from educators) of the barriers hindering the successful integration of ICT in schools for the target school of the study

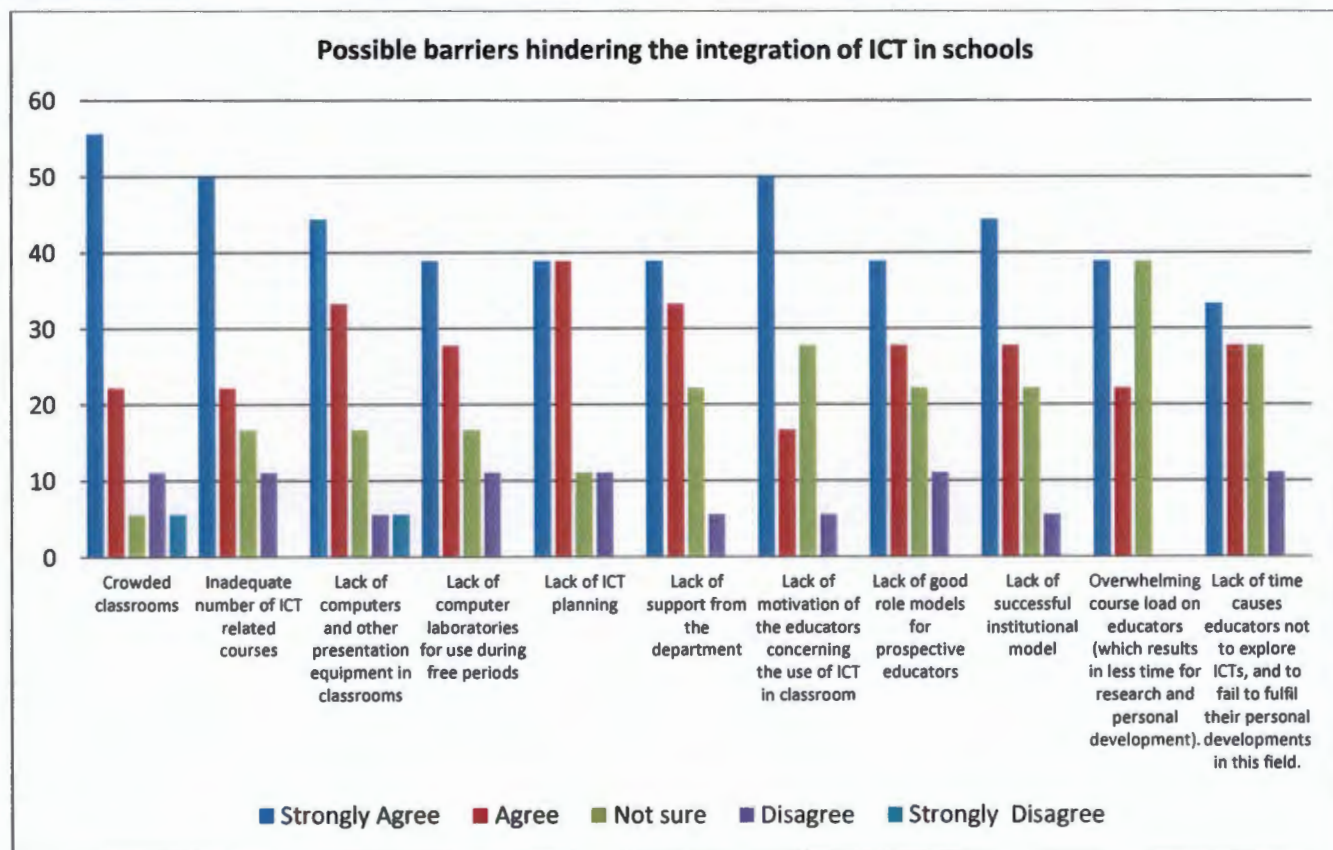


Figure 4.4.5 Barriers hindering the successful integration of ICT in schools

Figure 4.4.5 presents the responses to the questions relating to barriers hindering the successful integration of ICT in schools. The respondents were requested to respond to twelve statements. They were asked to rate each item on a scale of 1 to 5 (1=strongly agree; 2=agree; 3= not sure, 4= disagree and 4= strongly disagree).

Accordingly, 77.8%(55.6% and 22.2%) of the respondents agreed that there were crowded classrooms, 72.2%(50% and 22.2%) of the respondents agreed that there were inadequate numbers of ICT related courses,77.7%(44.4% and33.3%) of the respondents agreed that there was a lack of computers and other presentation equipment in classrooms, 66.7%(38.9% and 27.8%) of the respondents agreed there was a lack of computer laboratories for use during free periods, 77.8%(38.9% and 38.9%) of the respondents agreed there was a lack of ICT planning, 72.2%(38.9% and 33.3%) of the respondents agreed there was a lack of support from the department, 66.7% (50% and 16.7%) of the respondents agreed that there was a lack of motivation of the educators concerning the use of ICT in classroom, 66.7% (38.9% and 27.8%) of the respondents agreed that there was a lack of good role models for prospective educators, 72.2% (50% and 22.2%) of the respondents agreed that there was a lack of successful institutional model, 61.1% (38.9% and 22.2%) of the respondents agreed that educators did not integrate ICTs into their classrooms due to lack of interest caused by lack of expertise and skill in the field, 61.1%(38.9% and 22.2%) of the respondents agreed that overwhelming course loads on educators (which results in less time for research and personal development), 61.1% (33.3% and 27.8%) of the respondents agreed that there was a lack of time, causing educators not to explore ICTs, and to fail to fulfil their personal developments in this field, and at least 66.6% (33.3% and 33.3%) of the respondents agreed that the school management team supported ICT.

4.5. Responses from principals

Of the 10 principals who were selected to complete and return the questionnaires, only 4 (40%) completed and returned the questionnaires as expected. About 6 (60%) did not return the questionnaires. This high rate was attributed by the fact that the researcher was dealing with a topic/issue that most principals are not familiar with as

most of them are computer illiterate and some claim that they are too old for the ICT innovation.

The responses are graphically presented and analysed under the following headings;

- Awareness and readiness for ICT integration
 - Possible barriers hindering the successful integration of ICT in schools
- Figure 4.5.1 presents the awareness readiness results of the participants (Principals) of the study

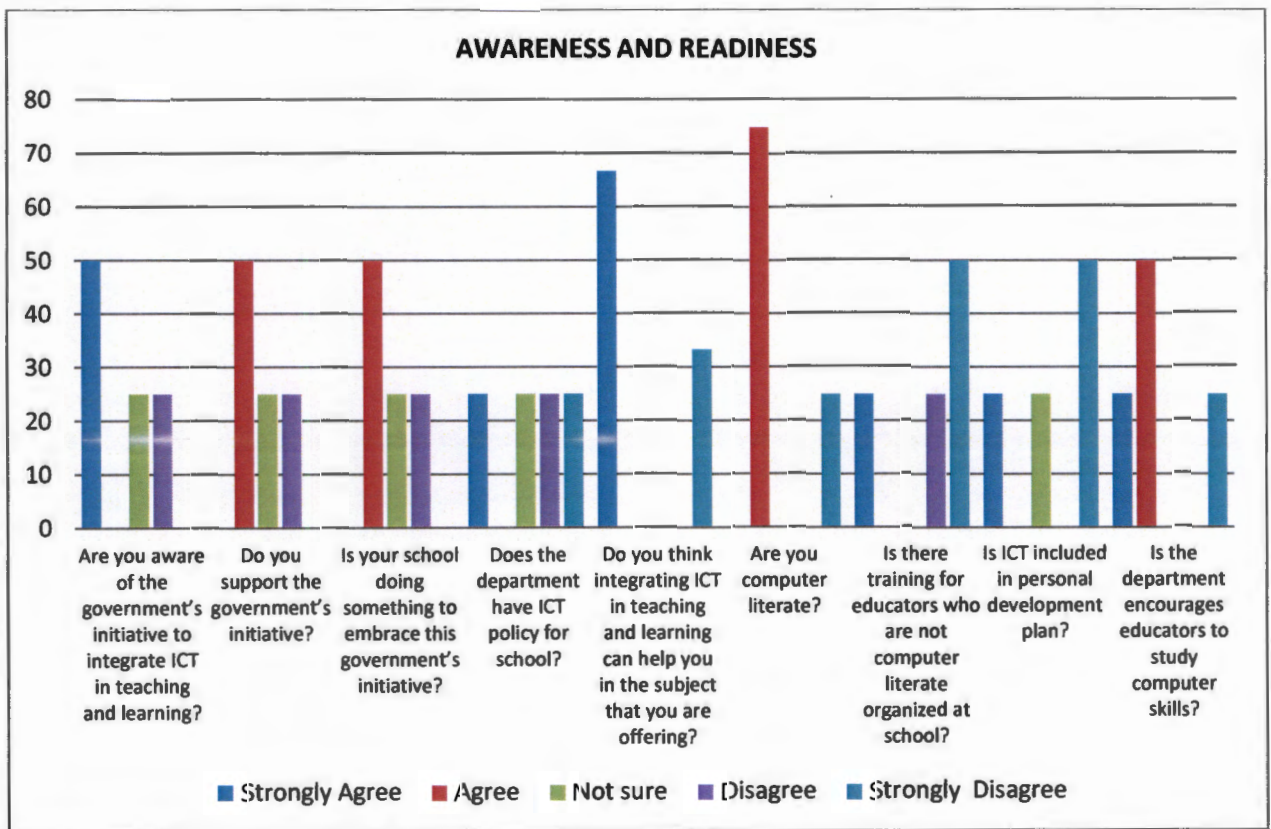


Figure 4.5.1 Awareness and readiness

Figure 4.5.1 presents the responses to the questions relating to awareness and readiness. The respondents were requested to respond to fourteen statements thereof. They were asked to rate each item on a scale of 1 to 5 (1=strongly agree; 2=agree; 3= not sure, 4= disagree and 4= strongly disagree).

Accordingly, 50% of the respondents agreed that they were aware of the government's initiative to integrate ICT in teaching and learning, 50% of the respondents agreed that they supported the government's initiative, 50% of the

respondents agreed that their schools wanted to embrace this government initiative, 50% (25% and 25%) of the respondents disagreed that the department had an ICT policy for schools, 66.7% of the respondents agreed that they thought integrating ICT in teaching and learning could help you in the subject that they were offering, 75% of the respondents agreed that they were computer literate, 100% of the respondents disagreed that they were willing to learn or undertake ICT training courses, 75%(25% and 50%) of the respondents disagreed that there was training for educators who were not computer literate organized at school, 66.7%(33.3% and 33.4%) of the respondents disagreed the training was effective. 50% of the respondents disagreed that ICT was included in personal development plans, 75%(25% and 50%) of the respondents agreed that the department encouraged educators to study computer skills, 75%(25% and 50%) of the respondents agreed the department supported ICT financially, etc., 75% of the respondents agreed they were knowledgeable and competent about computer basic Microsoft application (Word, Excel, PowerPoint, Access, Outlook, E-mail, and internet), and 75% of the respondents agreed that they could connect/prepare technologies (computer, projector and speakers etc.).

Figure 4.5.2 presents the results (from educators) of the barriers hindering the successful integration of ICT in schools for the target school of the study

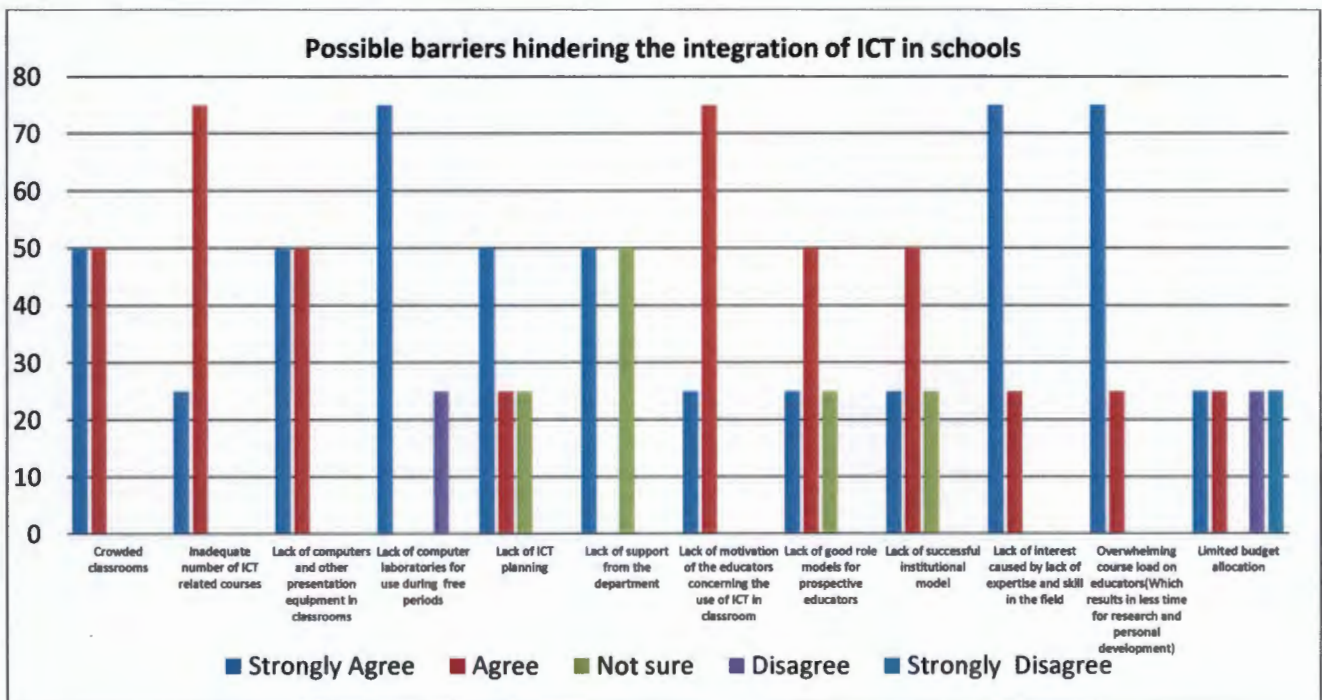


Figure 4.5.2 Barriers hindering the successful integration of ICT in schools

Figure 4.5.2 presents the responses to the questions relating to barriers hindering the successful integration of ICT in schools. The respondents were requested to respond to fourteen statements. They were asked to rate each item on a scale of 1 to 5 (1=strongly agree; 2=agree; 3= not sure, 4= disagree and 5=strongly disagree). Accordingly, 100%(50% and 50%) of the respondents agreed there were crowded classrooms, 100%(25% and 75%) of the respondents agreed that there were inadequate numbers of ICT related courses, 100%(50% and 50%) of the respondents agreed there was a lack of computers and other presentation equipment in classrooms, 75% of the respondents agreed that there was a lack of computer laboratories for use during free periods, 75%(50% and 25%) of the respondents agreed that there was a lack of ICT planning, 50% of the respondents agreed that there was a lack of support from the Department.

Further 100%(25% and 75%) of the respondents agreed there was a lack of motivation of educators concerning the use of ICT in classrooms, 75%(25% and 50%) of the respondents agreed that there was a lack of good role models for prospective educators, 75%(25% and 50%) of the respondents agreed that there was a lack of successful institutional models, 100%(75% and 25%) of the respondents agreed that educators did not integrate ICTs into their classrooms due to a lack of interest caused by a lack of expertise and skill in the field, 100%(75% and 25%) of the respondents agreed that the overwhelming course loads on educators (which results in less time for research and personal development), 75% of the respondents agreed that there was a lack of time causing educators not to explore ICTs, and to fail to fulfil their personal developments in this field, 50%(25% and 25%) of the respondents disagreed that ICT reflected in the school budget, 75%(50% and 25%) of the respondents disagreed that the school management team supported ICT.

4.6. Responses from departmental officials

Overall, 5 out of 15 questionnaires were completed and returned by the departmental officials, thus gives us a 33.3% return. The remaining 10 (66.7%) which did not return the questionnaires may be due to the fact that those officials are not conversant with some items in the questionnaires or it is for the fact may be that department officials are too busy and could not find time to complete the questionnaires as per request. The responses are graphically presented and analysed under the following headings;

- Awareness and readiness for ICT integration
- ICT infrastructure in school
- ICT support and maintenance
- Possible barriers hindering the successful integration of ICT in schools

Figure 4.6.1 presents the awareness readiness results of the participants (Department officials) of the study

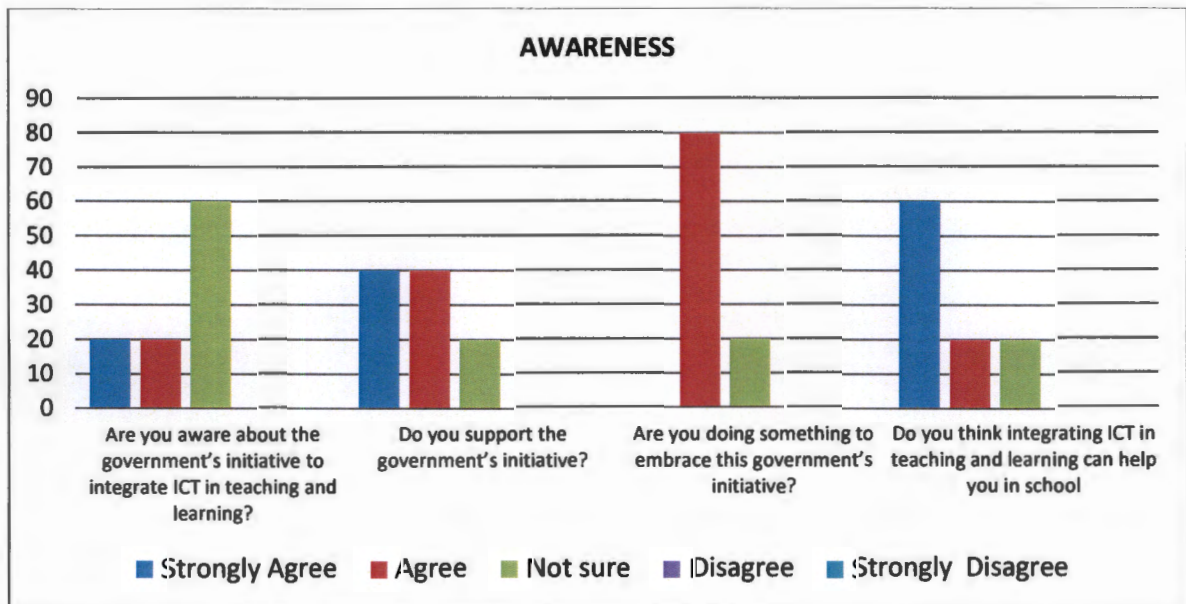


Figure 4.6.1: Awareness and readiness

Figure 4.6.1 presents the responses to the questions relating to awareness and readiness. The respondents were requested to respond to four statements thereof. They were asked to rate each item on a scale of 1 to 5 (1=strongly agree; 2=agree; 3= not sure, 4= disagree and 4= strongly disagree).

Accordingly, 60% of the respondents were not sure about the government's initiative to integrate ICT in teaching and learning, 80%(40% and 40%) of the respondents agreed that that they supported the government's initiative, 80% of the respondents agreed that they were doing something to embrace this government initiative, and at least 80%(60% and 20%) of the respondents agreed that they thought integrating ICT in teaching and learning could help you in school.

Figure 4.6.1 presents the ICT infrastructure results of the participants (Department officials) of the study

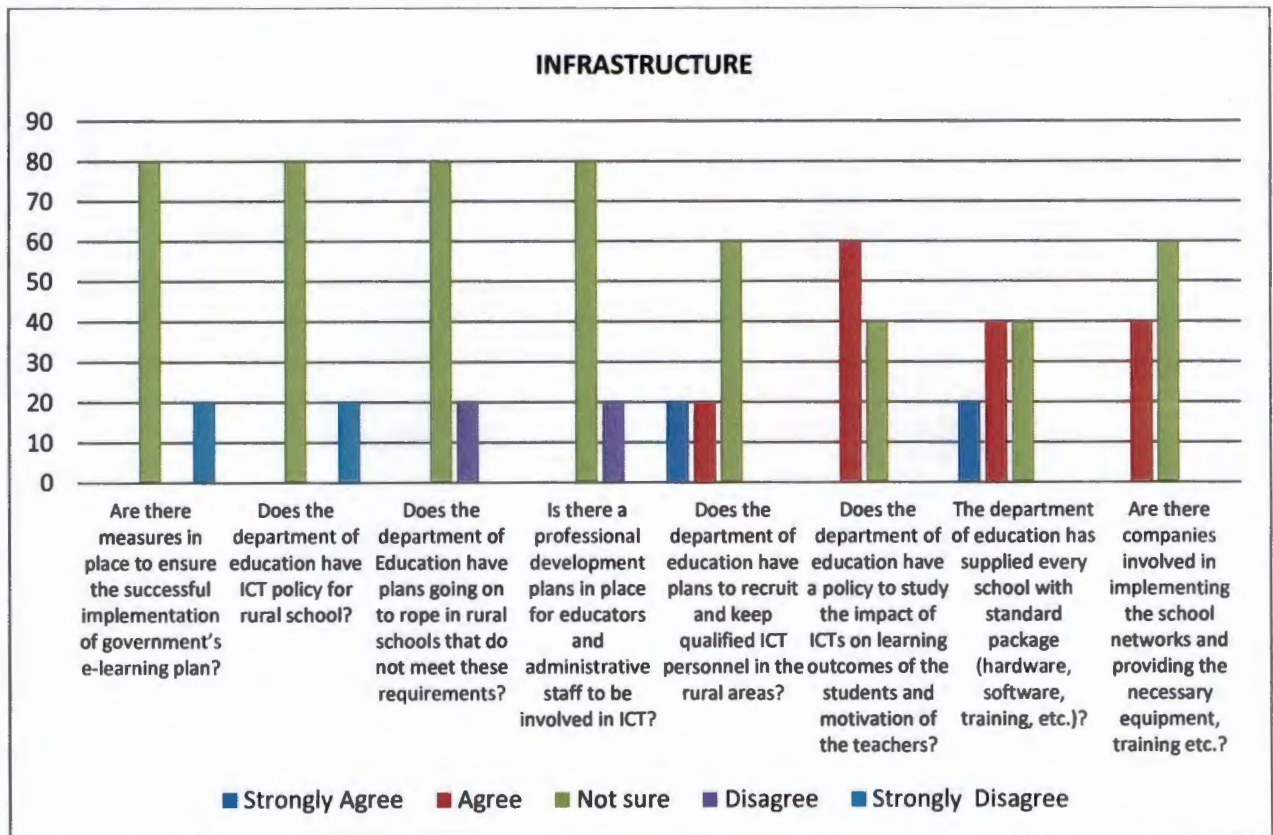


Figure 4.6.2 Infrastructure

Figure 4.6.2 presents the responses to the questions relating to infrastructure. The respondents were requested to respond to eight statements. They were asked to rate each item on a scale of 1 to 5 (1=strongly agree; 2=agree; 3= not sure, 4= disagree and 4= strongly disagree).

Accordingly, 80% of the respondents were not sure that there are measures in place to ensure the successful implementation of government’s e-learning plan, 80% of the respondents were not sure that the Department of Education had an ICT policy for rural school, 80% of the respondents were not sure that the Department of Education have plans going on to rope in rural schools that do not meet these requirements.

80% of the respondents were not sure that there was a professional development plan in place for educators and administrative staff to be involved in ICT, 60% of the respondents were not sure that the Department of Education had plans to recruit and keep qualified ICT personnel in the rural areas, 60% of the respondents agreed that the Department of Education had a policy to study the impact of ICTs on learning outcomes of the students and motivation of the teachers, 60%(20% and 40%) of the respondents agreed that the departments of education supplied every school with standard packages (hardware, software, training, etc.), and at least 60% of the respondents were not sure that there were companies involved in implementing the school networks and providing the necessary equipment and training.

Figure 4.6.3 presents the support and maintenance results of the participants (Department officials) of the study

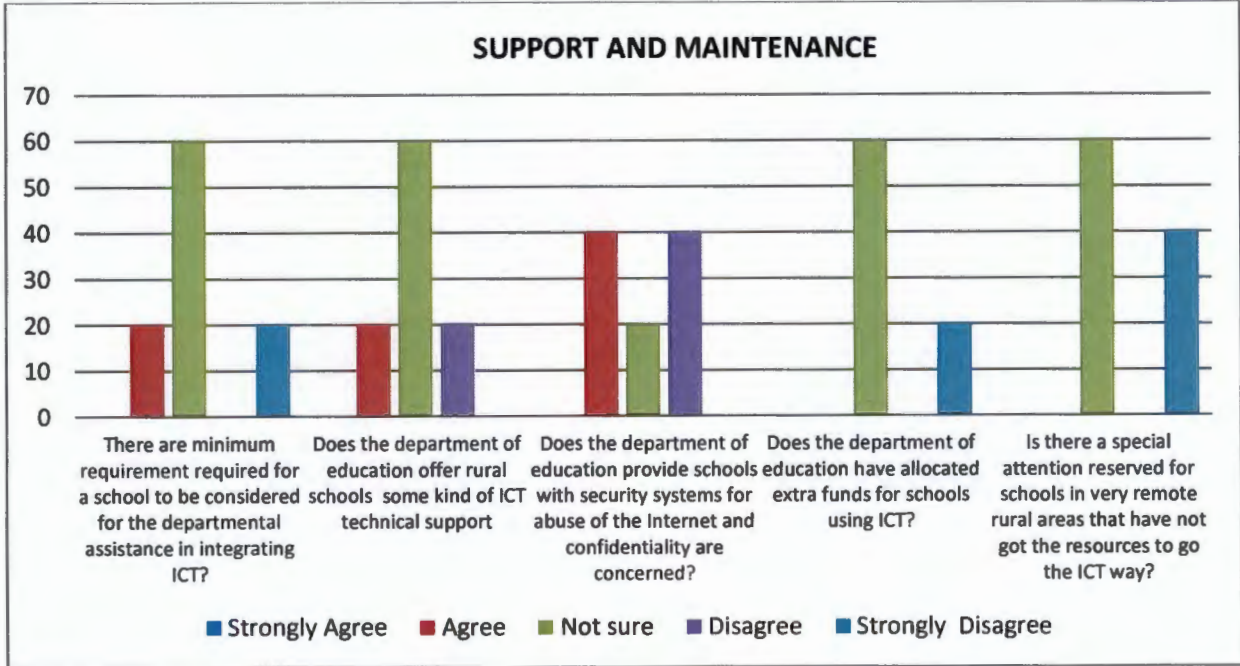


Figure 4.6.3 Support and maintenance

Figure 4.6.3 presents the responses to the questions relating to support and maintenance. The respondents were requested to respond to six statements. They were asked to rate each item on a scale of 1 to 5 (1=strongly agree; 2=agree; 3= not sure, 4= disagree and 5= strongly disagree).

Accordingly, 60% of the respondents were not sure that there were minimum requirements required for a school to be considered for departmental assistance in integrating ICT, 60% of the respondents were not sure that the Department of Education offered rural schools some kind of ICT technical support, 40% of the respondents agreed that the Department of Education provide schools with security systems for abuse of the Internet and confidentiality are concerned, 60% of the respondents are not sure that the Department of Education have allocated extra funds for schools using ICT, 60% of the respondents are not sure that the Department save schools from becoming dumping grounds for old computers, and 60% of the respondents are not sure that there is a special attention reserved for schools in very remote rural areas that have not got the resources to go the ICT way.

Figure 4.6.4 presents the responses (from Department officials) to the questions relating to barriers hindering success of integrating ICT in schools.

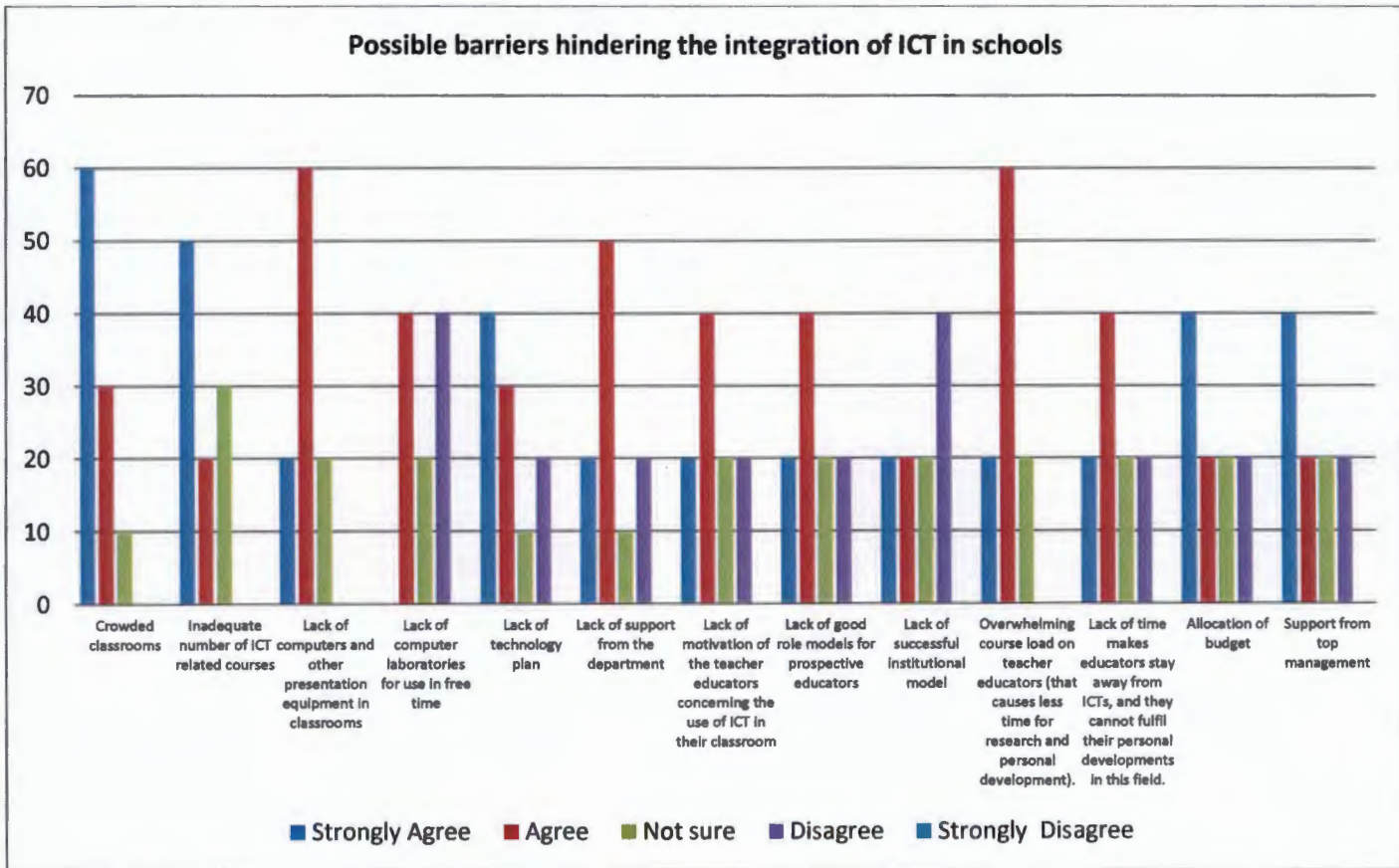


Figure 4.6.4 Barriers hindering success of integrating ICT in schools

The respondents were requested to respond to fourteen statements. They were asked to rate each item on a scale of 1 to 5 (1=strongly agree; 2=agree; 3= not sure, 4= disagree and 4= strongly disagree).



Accordingly, 80%(60% and 20%) of the respondents agreed there were crowded classrooms, 80%(60% and 20%) of the respondents agreed there were inadequate numbers of ICT related courses, 80%(20% and 60%) of the respondents agreed that there was a lack of computers and other presentation equipment in classrooms, 60%(40% and 20%) of the respondents agreed that there was a lack of computer laboratories for use in free time, 60%(40% and 20%) of the respondents agreed there was a lack of a technology plan, 60%(40% and 20%) of the respondents agreed that there was a lack of support from the Department, 60%(20% and 40%) of the respondents agreed that there was a lack of motivation of the teacher educators concerning the use of ICT in their classroom, 60% (20% and 40%) of the respondents agreed that there was a lack of good role models for prospective

educators, 60% (40% and 20%) of the respondents agreed that there was a lack of a successful institutional model.

A 60% (40% and 20%) of the respondents agreed that the educators did not integrate ICTs into their classrooms due to disinterestedness caused by their inadequate ability and knowledge in the field, 80% (20% and 60%) of the respondents agreed that the overwhelming course load on teacher educators (that causes less time for research and personal development), 60% (20% and 40%) of the respondents agreed that there was a lack of time making educators stay away from ICTs, and they could not fulfil their personal developments in this field, 60% (40% and 20%) of the respondents agreed that there was allocation of budget, and at least 60% (40% and 20%) of the respondents agreed that there was support from top management.

4.7. RELIABILITY

In both qualitative and quantitative research, researchers agreed that findings need to be reliable and valid. Krishnaswamy, Divakumar and Mathirajan (2009) further explained the difference between validity and reliability by stating that validity is concerned with endorsing the truth-value or authenticity of the findings that will be established by the researcher. This simply means that the extent to which the data provides insight while reliability focuses on identifying and detailing recurrent accurate and consistent features (Krishnaswamy *et al.*, 2009).

Validity refers to the degree to which an instrument measures what is supposed to be measured hence the reliability looks into the degree of constancy. In this study, the researcher used Cronbach's alpha as an instrument to measure attributes.

Cronbach's alpha is an instrument used to test model or survey constituency. It is also called a scale reliability coefficient. This actually looks into the reliability of rating. A score is computed from each test item and the overall rating, called a 'scale' is defined by the sum of these scores over all the test items.

The cut-off point is 0.7, meaning an alpha value less than 0.7 is not acceptable. When using Likert-type scales it is imperative to calculate and report the Cronbach's

alpha coefficient for internal consistency and reliability for any scales or subscales one may be using (Parson, 2006). The reliability analysis is presented in the table below:

Table 4.1 The reliability analysis

Data	Cronbach's Alpha	Items	Comments
Respondents	0.808	30	Excellent and consistent

The reliability of the questionnaire collected was tested using descriptive statistics using Cronbach's alpha coefficient. The alpha value is 0.808 which is higher than the cut-off and it means that it is acceptable.

4.8. CONCLUSION

Chapter 4 presented empirical data. The data was cross-tabulated for ease of presentation and interpretation. However, the raw data had been processed through the SPSS system, and the SPSS (Statistical Packaging for Social Science) output was input into the Figures. The next chapter discusses the results and concludes with recommendations.

CHAPTER 5: DISCUSSIONS OF THE FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1. Introduction

This chapter presents and discusses findings from the study and the researcher draws conclusion and suggests best possible strategies to be employed in resolving the research findings. The discussion is based on the results obtained from the survey conducted. In this study, some specified questions were raised with a view of getting answers from data collected from the respondents and analysed using descriptive statistics application. Finally, areas that need further research are proposed.

5.2. Response to the research questions / findings

The main aim of the study was to identify issues that are affecting the deployment/integration of ICT in rural schools negatively to an extent that some schools are not using those donated ICT gadgets hence they have them and they turn out to be white elephants. In the process of this study, questions were raised and information collected so as to try to answer those questions and the results discussed below;

5.2.1. Barriers that schools face in integrating *ICT*

The results of the study revealed that there are crowded classrooms and inadequate numbers of ICT-related courses. In terms of infrastructure the results revealed that there was a lack of computers and other presentation equipment in classrooms. Furthermore, the study revealed that there are lacks of computer laboratories for use during free periods. The results revealed that there is lack of ICT planning, support from the Department, and motivation of the educators concerning the use of ICT in classroom.

The study found that schools lack good role models for prospective educators, successful institutional model, educators do not integrate ICTs into their classrooms due to lack of interest caused by lack of expertise and skill in the field.

Overwhelming course loads on educators (which results in less time for research and personal development) and lack of time cause educators not to explore ICTs, and to fail to fulfil their personal developments in this field. Key barriers that hinder the integration of ICTs in schools are noted as:

- There are crowded classrooms
- Lack of ICT planning, support from the Department, and motivation of the educators concerning the use of ICT in classroom
- Limited funds (Budget)
- Lack of computers and other presentation equipment in classrooms(ICT infrastructure)
- Lack of time causes educators not to explore ICTs
- Lack of educators ICT training
- Lack of Technical support and maintenance

5.2.2. Possible enablers for integrating ICT into schools

The study revealed the barriers that are hindering the successful implementation of ICT in schools need attention from all relevant stakeholders to better prepare schools to overcome these barriers. This clearly shows that enablers are necessary, as they are the corrective measures to ensure that all those barriers identified are addressed. Barriers need possible solutions which serve as enablers which can make the government's initiative feasible and effective enough. Barriers found in the study are overcrowded classrooms, Inadequate number of ICT-related courses (CAT/IT), lack of computers and other presentation equipment in classrooms, Lacks good role models for prospective educators, lack of interest caused by lack of expertise and skill in the field, lack of time causes educators not to explore ICTs and the overwhelming course loads on educators (which result in less time for research and personal development).

Possible solutions (enablers) for the above identified barriers are as follows: have a technological plan in place, designing appropriate syllabus that includes IT and CAT, allocate more budgets to allow schools to buy needed equipment, support, motivate and encourage educators to build their skills and knowledge, offer in-service training for educators and offer a bursary for educators to study ICT-related courses.

The study shows the solid agreement among participants as they mentioned some of the enablers - like having more computer labs in the school, the department should ensure that each educator has a computer and other presentation equipment to use and also recruit educators with ICT technical skills and equip each educator with the ICT-related technical skills.

5.2.3. ICT infrastructure and access

The results of the study revealed that schools have no other technologies (except computers) such as projectors, speakers, interactive whiteboards and employees are not given enough time to learn computer-aided instruction methods. Furthermore, the results revealed that schools have not enough manpower for ICT technical support at school. Some respondents indicated that they have enough computers in the laboratory at schools and they can access internet. Again their school computers run on the latest or appropriate software. But there are cases where respondents were not sure what is happening, cases such as ICT policy in their schools is it implemented or not. Key points regarding ICT training and infrastructure are:

- The availability of computers, technical support and a clear structure for how to access this in laboratories.
- Recognition of the need for time to learn and develop meaningful practice.
- Not enough manpower for ICT technical support schools.

5.2.4. ICT can change education in rural school

The whole schools view is that they know the benefits of using ICT. The principal's view is that ICT is going to be used across the whole school to enhance and teaching and learning. The results revealed that learners and teachers agreed that they think the government's initiative will benefit their schools. But the respondents revealed they are experiencing technical faults with ICT equipment given to their schools. Key issues relating to whole school attitude to ICT are:

- The principal's vision, belief and commitment for ICT use across the school.
- Principals believe the use of ICT will enhance teaching and learning.
- Users experience technical faults with ICT equipment.

5.3. Recommendations

This initiative is very vital and crucial in all stakeholders and it must be encouraged to embrace so that the future of the country is ready to compete with the entire world. After this study, the Government of the Republic of South Africa most particularly the Department of Education needs to put some appropriate strategies in place and ensure that they are carefully considered in order to ensure that ICT is successfully integrated in rural schools without any difficulties.

- **Technological plan**

Proper planning plays a crucial role when implementing a new idea, especially for a huge project like implementing ICT in teaching and learning. Failing to plan would obviously yield wastage and white elephants. The Department of Education should have a technology plan in place and be effectively implemented in order to facilitate the successful integration in schools. A technological plan is one of the key enablers of a successful ICT integrating in schools as the plan would be tabled and formalized.

- **Awareness and campaign**

The study reveals that 35.9% of learners, 44.5% of Educators, 50 % of Principals and 40% of Departmental officials, which in totals shows that 27 (40.9%) out of 66 (100%) respondents are not aware of the governments initiative. This clearly shows that there is a need for an extensive awareness campaign that will make stakeholders realize the need for integrating ICT in schools and how effectively it can enhance teaching and learning.

The Department of Education can make use of all possible strategies for the awareness campaign. They can make use of Media platforms by designing posters and posting them on the billboards, publish articles on magazines, have an ad on TV or slot Radios during pick hours programmes, hold ICT indabas/sessions and educational campaigns in rural schools. The Department can also explore all possible ways to establish ICT information centres in all District, Circuit offices and clusters areas as to encourage educators to develop an interest on ICT and access to all information available about the benefits of ICT in schools.

- **ICT Training for principals and educators**

Lack of ICT knowledge and skills is one of the key barriers in integrating ICT in schools which need effective training. There are not enough training opportunities for educators in the use of ICTs in schools. The study shows that 5.5% of educators and 25% of principals are not computer literate and the other percentage is not confident enough to connect the ICT peripherals and operate them in a class and it is clear that there is a need to train and build educators' skill and confidence around utilizing ICT for teaching and learning as transferring skill to the learners. The Department needs to take educators through a professional development programme that will assist educators in improving their ICT skills, motivate and encourage them. The Department of Education should identify those educators who need professional development in terms of ICT and place them in an introductory ICT programme that will enhance educators with necessary ICT skills. This programme can be conducted by those educators who have knowledge of ICT or maybe the Department can send educators to computer training institution.

Training is very important as it helps educators to understand how to use ICT equipment, software or educational programmes to broaden their traditional method of educating. The Department of Education should take an initiative to offer in-service training and bursary for educators whom are computer literate to study ICT related courses as to train them on how to use the technology and what is known as how to integrate it into the curriculum. They can also have ICT seminars and workshop on a quarterly basis, formulate groups and encourage educators to share ICT skill on regular basis.

- **Technical support**

Most of the rural school educators lack appropriate ICT technical skills and experience. It is very challenging for most of rural school educator to connect and switch on a computer or a data projector. The study reveals that 38.9% of the respondents are not sure that their schools have ICT skilled personnel, 55.6% of the respondents disagreed that their schools have enough manpower for ICT technical support at school. This clearly shows the need of qualified IT technician/any technical personnel to assist schools with ICT equipment and also teach educators on some technical issues.

The Department of Education needs to take good care of the ICT equipment in schools by maintaining them to ensure effective running to ensure that educators are not encountering any technical error that can compromise their teaching time. The Department can set up technical offices (Help Desks) to attend to all calls in the schools, employ well-trained ICT technicians to train some educators in schools so as to reduce costs. They can also identify learners who are interested in ICT and train them to assist educators.

- **Allocation of more budget to allow schools to buy all needed equipment**

The target area of this study is rural areas, which are dominated by schools which are classified as non-fee schools which means learners are not paying school fees and the schools depends on the Government Section 21 funds determined by the number of learners in a school. They differ according to the needs of the school, and in most cases you find that those funds are very limited.

Funds allocation plays a very crucial role in integrating ICT in schools. The Department of Education needs to ensure that there is enough budget allocated specifically for ICT in schools. In that way, schools will be able to cover things like building safe media / computer rooms, acquisition of ICT resources that they might need installation, internet connection, security (network and physical), repair and maintenance. Then, the Department of Education can take responsibility for employing qualified staff, training those who need training to ensure continuity and successfully implementation of ICT in schools. A genuine budget needs to be drawn up to reliably support the Government's initiative.

The study also indicated that limited ICT resources are among the main barriers in integrating ICT in teaching and learning most especially in rural areas as the focus of the research. Most rural schools have a limited number of computers and other ICT peripherals which are not enough for the school and limit access for both learners and educators hence there is a need for an adequate budget so that the school can buy other ICT equipment to cater for all learners and educators in the school. Once there is enough equipment, learners will be in a position to use those computers on their own so that they can get used to them and educators also can use them to prepare for a lesson so that it can be easier for them to gain confidence.

5.4. The need for further research

Through the study, the researcher noted some researchable topics which relate to the study in which the researcher could not investigate further due to the fact that it was were outside the scope, and realized that if they can be investigated, the result can contribute positively to the integration of ICT in rural schools. Some of those topics that need to be addressed are the way in which the whole rural school culture and ethos, also further discover the relationship between collective and individual attitudes of teachers aging between 50-65 years towards ICT and the role ICT plays in rural schools.

Researchers can also investigate to see whether implementing ICT in rural school would be cost-effective, and if not then a model to raise funds for rural schools must be developed so that learners in rural schools can benefit from this Government initiative.

The researcher also discovered that sponsors are more interested in funding and donating ICT gadgets in schools and leave the implementation part of it to the Department of Education where the researcher feels the need to develop a model on how to facilitate the implementation. Very few sponsors and donors check to see that their donation is being fully implemented, utilized and is really as beneficial as expected.

5.5. Conclusion

The South African Government, especially the National Department of Education, sees as a need for the country to produce learners who are ready to compete with the world and contribute effectively to the knowledge society. The Department sees the integration of ICT into teaching and learning as a very crucial initiative in improving the lives of the South African by producing quality education. The Department of Education is trying everything in its power to ensure successful integration of ICT in rural schools but even after 21 years of democracy they are not succeeding.

The researcher intended to uncover the barriers that are hindering the successful integration of ICT in rural schools in North West Province, Ngaka-Modiri Molema District, and Rekopantswe area. The researcher discovered factors that seem be the obstacles hindering the successful integration of ICT in rural schools.

Things like crowded classrooms, lack of computers and other presentation equipment in classrooms, lack of ICT planning, support from the Department, and motivation of the educators concerning the use of ICT in classroom and lack of time cause educators not to explore ICTs. The Department of Education can possibly address barriers identified and embark on the possible enablers of integrating ICTs in rural schools and plan around the recommendations made by the researcher with a view to positive results.

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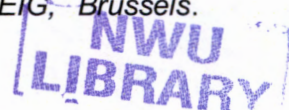
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ANNEXURE A: MATRIX

JOURNAL	THEM		
	Need for ICT integration in School	Computers in schools	Benefit of Computers
A framework for teachers' integration of ICT into their classroom practice	✓		✓
Barriers to the successful Integration of ICT in teaching and learning environments		✓	✓
Critical Success Factors for ICT interventions			
Effects of ICT: Do we know what we should know?		✓	
ICT and learning in Chilean schools - lessons learned		✓	
ICT and learning lessons from Australian classrooms	✓		
ICT implementation Issues and Challenges		✓	
ICT in Rural Areas in South Africa		✓	
ICT integration in the classroom challenging the potential	✓	✓	
Main barriers and Possible Enablers of ICT's integration into Pre-service Teacher Education Programmes			✓
Managing ICTs in South African schools	✓		
Modelling and supporting ICT implementation in schools	✓		✓
Obstacles to the integration of ICT in education		✓	
The impact of ICT in schools	✓	✓	
The implementation of ICT in UK secondary schools			
The integration of Information and Communication Technology into rural schools of South Africa	✓	✓	✓
The Kenyan methodology for ICT implementation in schools	✓		✓

ANNEXURE B: LETTER REQUESTING PERMISSION



NORTH-WEST UNIVERSITY
YUNIBESITI YA BOKONE-BOPHIRIMA
NOORDWES-UNIVERSITEIT
MAFIKENG CAMPUS

Faculty of Commerce and Administration
School of Accounting and Management Sciences
Department of Industrial Psychology
North West University
Private Bag X 2046
Mmabatho
2735

Tel: 018 309 2021
Fax: 018 309 2090

10 November 2015

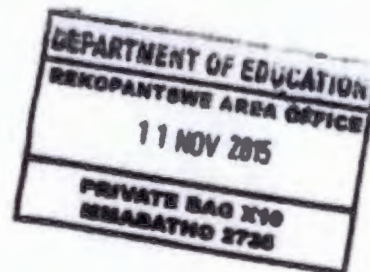
Information Systems
Mafikeng Campus

APPROVAL OF RESEARCH PROPOSALS

It gives us great pleasure to inform you that the Human Research Ethics committee formally approved the research proposal for Master student.

<u>Student Name</u>	<u>Student No</u>	<u>Ethical Clearance No</u>
Maruping, TE	21482195	NWU-00346-14-59

We wish the student success with the research.



A handwritten signature in black ink, appearing to be 'E.N. Barkhuizen', written over a horizontal line.

Prof E.N. Barkhuizen
Chair: Human Research Ethics Committee

ANNEXURE C: QUESTIONNAIRE FOR LEARNERS

You are being requested to participate as a volunteer in a research study conducted by Mr Thabang Maruping, a Master's student in Computer Science and Information Systems at North-West University. This study is designed to gather information about factors hindering successful integration of ICT in rural schools.

Kindly note that;

- Your participation is on a voluntary basis, no remuneration or allowance will be paid for the participation.
- The questionnaire will take approximately 10 minutes to complete
- Your responses will be used only for this study and will be kept confidential.
- Your personal data will not be used in this study and will not be shared with any other party.
- By completing and submitting this questionnaire, you are indicating that you understand the above statements, and consent to participate in this study.

How to complete the Questionnaire

Participants are urged to read the questions and answer them as honestly as possible. You are advised to mark each response by making a cross (X), or encircling each appropriate response with a blue or black PEN (not a pencil).

PART 1: PERSONAL INFORMATION

Gender	Male	1	Female	2
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Age	15-19	1	20-24	2	25 and above	3
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Race	Black	1	White	2	Indian	3	Coloured	4
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Position	Grade 10	1	Grade 11	2	Grade 12	3
----------	----------	---	----------	---	----------	---

Major Stream	Science	1	Commerce	2	Humanities	3
	Mathematics Physical- Sciences Other Sciences		Mathematical Literacy/ Maths Accounting Business studies Economics etc.		Geography History Etc.	

PART 2: AWARENESS AND READINESS

Kindly make use of ratings below for your response on each statement:						
1 = Strongly agree 2=Agree 3= Not sure 4=Disagree 5= Strongly disagree						
1	Are you aware of the government's initiative to integrate ICT in teaching and learning?	1	2	3	4	5
2	Do you support the government's initiative?	1	2	3	4	5
3	Is your school doing something to embrace this government's initiative?	1	2	3	4	5
4	Are you computer literate?	1	2	3	4	5
5	If you disagree/ not sure (in question 4), are you willing to learn given the necessary resources?	1	2	3	4	5
6	Do you have access to a computer and Internet at school?	1	2	3	4	5
7	Is your teacher confident about using ICT gadgets in class?	1	2	3	4	5
8	Does your school encourage learners to use ICT gadgets to study?	1	2	3	4	5
9	Are you allowed to use ICT gadgets during school hours?	1	2	3	4	5
1	Is your school offering computer literacy/ IT/ CAT as a subject?	1	2	3	4	5
1	If you agree (in question 10), are you enjoying the lessons?	1	2	3	4	5
1	If your answer in question 10 is "Disagree", what are your challenges.....					
1	Do you think integrating ICT in teaching and learning can help you in your major subject?	1	2	3	4	5
1	If you agree, how will it help?					
1	If you disagree / not sure with Question 14, what do you think could be the problem?.....					
1	Do you have basic computer skills (Word, Excel, PowerPoint, Access, Outlook, Internet)	1	2	3	4	5
1	Do you find any difficulties in using ICT devices?	1	2	3	4	5

PART 3: ATTITUDE AND BELIEF

Kindly make use of ratings below for your response on each statement:						
1 = Strongly agree 2=Agree 3= Not sure 4=Disagree 5= Strongly disagree						
1.	Do you have positive attitudes and beliefs towards technology	1	2	3	4	5
2.	Are you willing to change your learning practice by integrating ICT?	1	2	3	4	5
3.	Are you confident about using ICT gadgets even for assessment?	1	2	3	4	5
4.	ICT saves time and can help you to improve academically	1	2	3	4	5
5.	ICT has a very positive impact in teaching and learning, it can improve results.	1	2	3	4	5

PART 4: CURRICULUM

Kindly make use of ratings below for your response on each statement: 1 = Strongly agree 2=Agree 3= Not sure 4=Disagree 5= Strongly disagree						
1.	Structure of subject does not support technology-based applications (For example; although ICT-based experiments-simulations-animations are suitable for sciences, it is not suitable for arts.	1	2	3	4	5
2.	Assessment is difficult using technology-based tools if one is not computer literate	1	2	3	4	5

PART 5: RESOURCES

Kindly make use of ratings below for your response on each statement: 1 = Strongly agree 2=Agree 3= Not sure 4=Disagree 5= Strongly disagree						
1.	Do you have enough computers in the computer laboratory at school?	1	2	3	4	5
2.	Do you have access to ICT devices at schools?	1	2	3	4	5
3.	Does your school have other technologies (except computers) such as projectors, speakers, interactive white board etc. in the classroom?	1	2	3	4	5
4.	Are you granted enough time to use computers	1	2	3	4	5
5.	Do your computers run on the latest or appropriate software	1	2	3	4	5

PART 6: BENEFIT OF INTEGRATING ICT IN TEACHING AND LEARNING

Kindly make use of ratings below for your response on each statement: 1 = Strongly agree 2=Agree 3= Not sure 4=Disagree 5= Strongly disagree						
18.	Do you know the benefits of using ICT for learning?	1	2	3	4	5
19.	Do you think the government's initiative will benefit your school?	1	2	3	4	5
20.	If you agree, state how					
	Do you experience any technical faults with ICT equipment?	1	2	3	4	5
21.	Are you able to connect the following/prepare technologies (computer, projector and speakers etc.)?	1	2	3	4	5

PART 7: RESPONDENCE VIEW:

1. Reflect your experience in using ICT devices / computers.
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2. In your view, what are the factors hindering the success of integrating ICT in schools?
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Thank you very much for your response and time!

ANNEXURE D: QUESTIONNAIRES FOR TEACHERS

You are being requested to participate as a volunteer in a research study conducted by Mr Thabang Maruping, a Master's student in Computer Science and Information Systems at North-West University. This study is designed to gather information about factors hindering successful integration of ICT in rural schools.

Kindly note that;

- Your participation is on a voluntary basis, no remuneration or allowance will be paid for the participation.
- The questionnaire will take approximately 10 minutes to complete
- Your responses will be used only for this study and will be kept confidential.
- Your personal data will not be used in this study and will not be shared with any other party.
- By completing and submitting this questionnaire, you are indicating that you understand the above statements, and consent to participate in this study.

How to complete the Questionnaire

Participants are urged to read the questions and answer them as honest as possible. You are advised to mark each response by making a cross (X), or encircling each appropriate response with a blue or black PEN (not a pencil).

PART 1: PERSONAL INFORMATION

Gender	Male	1	Female	2
--------	------	---	--------	---

Age	18-35	1	36-53	2	53 and above	3
-----	-------	---	-------	---	--------------	---

Race	Black	1	White	2	Indian	3	Coloured	4
------	-------	---	-------	---	--------	---	----------	---

Position	Educator	1	HoD	2	Deputy Principal	3
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Highest Qualifications	Certificate	1	Diploma	2	Degree	3
	Honours	4	Master's	5	PhD	6

	Home Language	1	First additional Language	2	Mathematics	3
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Subject offering	Mathematical literacy	4	Accounting	5	Business studies	6
	Economics	7	Geography	8	Agriculture	9
	Life Sciences	10	Physical Sciences	11	History	12
	CAT	13	IT	14	Other	15

PART 2: AWARENESS AND READINESS

Kindly make use of ratings below for your response on each statement: 1 = Strongly agree 2=Agree 3= Not sure 4=Disagree 5= Strongly disagree						
2	Are you aware about the government's initiative to integrate ICT in teaching and learning?	1	2	3	4	5
2	Do you support the government's initiative?	1	2	3	4	5
2	Is your school doing something to embrace this government's initiative?	1	2	3	4	5
2	Do you think integrating ICT in teaching and learning can help you in the subject that you are offering?	1	2	3	4	5
2	If you agree, how will it help?					
2	If you disagree / not sure with Question 14, what do you think could be the problem?.....					
2	Are you computer literate?	1	2	3	4	5
2	If you disagree/ not sure with Question 7, are you willing to learn or undertake ICT training course?	1	2	3	4	5
3	Do you have access to a computer and Internet at school?	1	2	3	4	5
3	Is there training for educators who are not computer-literate organised at your school?	1	2	3	4	5
3	If you agree with Question 10, is the training effective?	1	2	3	4	5
3	Is ICT included in personal development plan?	1	2	3	4	5
3	Does the department encourage educators to study computer skills?	1	2	3	4	5
3	Does the department support ICT projects financially, etc.?	1	2	3	4	5
3	Do you have basic computer skills (Word, Excel, PowerPoint, Access, Outlook, E-mail, Internet)	1	2	3	4	5
3	Do you find any difficulties in integrating ICT into teaching?	1	2	3	4	5
3	Are you able to connect the following/prepare technologies (computer, projector and speakers etc.)?	1	2	3	4	5

PART 3: ATTITUDE AND BELIEFS

Kindly make use of ratings below for your response on each statement:

		1 = Strongly agree 2=Agree 3= Not sure 4=Disagree 5= Strongly disagree				
6.	Do you have a positive attitude and belief towards technology	1	2	3	4	5
7.	Are you willing to change your teaching practice to integrate ICT?	1	2	3	4	5
8.	Are you confident enough to uses ICT gadget in class during a lesson?	1	2	3	4	5
9.	ICT has a very positive impact in teaching and learning, it can improve results?	1	2	3	4	5
10.	ICT saves time, make teaching easier for educators	1	2	3	4	5

PART 4: CURRICULUM

		Kindly make use of ratings below for your response on each statement: 1 = Strongly agree 2=Agree 3= Not sure 4=Disagree 5= Strongly disagree				
3.	Structure of subject does not support technology-based applications (For example; although ICT-based experiments-simulations-animations are suitable for sciences, it is unsuitable for arts).	1	2	3	4	5
4.	Does assessment present a difficulty in planning the technology-based tools in evaluation?	1	2	3	4	5

PART 5: RESOURCES

		Kindly make use of ratings below for your response on each statement: 1 = Strongly agree 2=Agree 3= Not sure 4=Disagree 5= Strongly disagree				
6.	Do you have enough computers in the computer laboratory at school?	1	2	3	4	5
7.	Does the department have ICT policy for school?					
8.	Do you have access to ICT devices in your schools?	1	2	3	4	5
9.	Does your school have other of technologies (except computers) such as projectors, speakers, interactive white board etc. in the classroom?	1	2	3	4	5
10.	Are you given enough time for training in computer-aided instruction?	1	2	3	4	5
11.	Do your school computers run on the latest or appropriate software?	1	2	3	4	5
12.	Does your school have ICT skilled personnel?	1	2	3	4	5
13.	Does your school have enough manpower for ICT technical support at school?	1	2	3	4	5
14.	Does your school have access to Internet?	1	2	3	4	5

PART 6: BENEFIT OF INTEGRATING ICT IN TEACHING AND LEARNING

		Kindly make use of ratings below for your response on each statement: 1 = Strongly agree 2=Agree 3= Not sure 4=Disagree 5= Strongly disagree				
1.	Do you think the government's initiative will benefit your school?	1	2	3	4	5
If you agree, state how						
.....						
.....						

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PART 7: BARRIERS HINDERING THE SUCCESSFUL INTEGRATION OF ICT IN SCHOOLS

Kindly make use of ratings below for your response on each statement:						
1 = Strongly agree 2=Agree 3= Not sure 4=Disagree 5= Strongly disagree						
1.	Crowded classrooms	1	2	3	4	5
2.	Inadequate number of ICT related courses	1	2	3	4	5
3.	Lack of computers and other presentation equipment in classrooms	1	2	3	4	5
4.	Lack of computer laboratories for use during free periods	1	2	3	4	5
5.	Lack of ICT planning	1	2	3	4	5
6.	Lack of support from the department	1	2	3	4	5
7.	Lack of motivation of the educators concerning the use of ICT in classroom	1	2	3	4	5
8.	Lack of good role models for prospective educators	1	2	3	4	5
9.	Lack of successful institutional model	1	2	3	4	5
10.	Educators do not integrate ICTs into their classrooms due to lack of interest caused by lack of expertise and skill in the field.	1	2	3	4	5
11.	Overwhelming course load on educators (which results in less time for research and personal development).	1	2	3	4	5
12.	Lack of time causes educators not to explore ICTs, and to fail to fulfil their personal developments in this field.	1	2	3	4	5
13.	Does the school management team supports ICT	1	2	3	4	5

PART 8: RESPONDENTS' VIEWS:

1. Reflect your experience in using ICT devices / computers.

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2. In your own view, what are the factors hindering the success of integrating ICT in schools?

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Thank you very much for your response and time

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ANNEXURE E: QUESTIONNAIRE FOR PRINCIPALS

You are being requested to participate as a volunteer in a research study conducted by Mr Thabang Maruping, a Master's student in Computer Science and Information Systems at North-West University. This study is designed to gather information about factors hindering successful integration of ICT in rural schools.

Kindly note that;

- Your participation is on a voluntary basis, no remuneration or allowance will be paid for the participation.
- The questionnaire will take approximately 10 minutes to complete
- Your responses will be used only for this study and will be kept confidential.
- Your personal data will not be used in this study and will not be shared with any other party.
- By completing and submitting this questionnaire, you are indicating that you understand the above statements, and consent to participate in this study.

How to complete the Questionnaire

Participants are urged to read the questions and answer them as honestly as possible. You are advised to mark each response by making a cross (X), or encircling each appropriate response with a blue or black PEN (not a pencil).

PART 1: PERSONAL INFORMATION

Gender	Male	1	Female	2
--------	------	---	--------	---

Age	18-35	1	36-53	2	53 and above	3
-----	-------	---	-------	---	--------------	---

Race	Black	1	White	2	Indian	3	Coloured	4
------	-------	---	-------	---	--------	---	----------	---

Highest Qualifications	Certificate	1	Diploma	2	Degree	3
	Honours	4	Master's	5	PhD	6

PART 2: AWARENESS AND READINESS

Kindly make use of ratings below for your response on each statement:						
1 = Strongly agree 2=Agree 3= Not sure 4=Disagree 5= Strongly disagree						
39.	Are you aware of the government's initiative to integrate ICT in teaching and learning?	1	2	3	4	5

40.	Do you support the government's initiative?	1	2	3	4	5
41.	Is your school doing something to embrace this government initiative?	1	2	3	4	5
42.	Does the department have an ICT policy for school?					
43.	Do you think integrating ICT in teaching and learning can help you in the subject that you are offering?	1	2	3	4	5
44.	If you agree, how will it help?					
45.	If you disagree / not sure with No.4, what do you think could be the problem?.....					
46.	Are you computer-literate?	1	2	3	4	5
47.	If you disagree/ not sure, are you willing to learn or undertake ICT training course?	1	2	3	4	5
48.	Is there training for educators who are not computer-literate organised at school?	1	2	3	4	5
49.	If yes, is the training effective?	1	2	3	4	5
50.	Is ICT included in personal development plan?	1	2	3	4	5
51.	Is the department encourages educators to study computer skills?	1	2	3	4	5
52.	Does the department support ICT financially, etc.?	1	2	3	4	5
53.	Are you knowledgeable and competent about computer basic Microsoft application (Word, Excel, PowerPoint, Access, Outlook, E-mail, internet)	1	2	3	4	5
54.	Can you connect /prepare technologies (computer, projector and speakers etc.)?	1	2	3	4	5

PART 3: RESOURCES

1. How many computers do you have?
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2. How did you acquire them?
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3. Where is/are your computer(s) located?
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4. Who has access to the computer/s?

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5. If learners have access to computers, which group / grades?

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6. If learners have access to computers, are there enough to allow each learner to have his/her own computer?

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7. What are the computers used for?

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8. If for learners, what are they using them for?

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9. Do you have a budget for ICT? Is it enough?

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10. How do you service your computers?

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11. Do you have Internet? How did you acquire it?

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12. Which Operation System do your computers run on?

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13. What application software does your school use?

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14. How did you acquire those software tools (operating system and application software)?

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15. How many educators /teachers are computer-literate in your school?

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16. Are the educators offering / teaching ICT? If yes, How many?

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17. Do you have a plan to capacitate educators who are not computer literate? If yes, what is the plan and is it recognized by SAQA? If no, why?

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18. Do you have ICT policies in place? If no, why?

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PART 7: BARRIERS HINDERING THE SUCCESSFUL INTEGRATION OF ICT IN SCHOOLS

Kindly make use of ratings below for your response on each statement:						
1 = Strongly agree 2=Agree 3= Not sure 4=Disagree 5= Strongly disagree						
14.	Crowded classrooms	1	2	3	4	5
15.	Inadequate number of ICT-related courses	1	2	3	4	5
16.	Lack of computers and other presentation equipment in classrooms	1	2	3	4	5
17.	Lack of computer laboratories for use during free periods	1	2	3	4	5
18.	Lack of ICT planning	1	2	3	4	5
19.	Lack of support from the department	1	2	3	4	5
20.	Lack of motivation of the educators concerning the use of ICT in classroom	1	2	3	4	5
21.	Lack of good role models for prospective educators	1	2	3	4	5
22.	Lack of successful institutional model	1	2	3	4	5

23.	Educators do not integrate ICTs into their classrooms due to lack of interest caused by lack of expertise and skill in the field.	1	2	3	4	5
24.	Overwhelming course load on educators (which results in less time for research and personal development).	1	2	3	4	5
25.	Lack of time causes educators not to explore ICTs, and to fail to fulfil their personal developments in this field.	1	2	3	4	5
26.	Does ICT reflect on the school budget?	1	2	3	4	5
27.	Does the school management team supports ICT	1	2	3	4	5

PART 8: RESPONDENTS' VIEW:

Reflect your experience in using ICT devices / computers.

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In your own view, what are the factors hindering the success of integrating ICT in schools?

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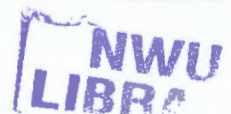
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Thank you very much for your response and time



ANNEXURE F: QUESTIONNAIRE FOR DEPARTMENTAL OFFICIALS

You are being requested to participate as a volunteer in a research study conducted by Mr Thabang Maruping, a Master's student in Computer Science and Information Systems at North-West University. This study is designed to gather information about factors hindering successful integration of ICT in rural schools.

Kindly note that;

- Your participation is on a voluntary basis, no remuneration or allowance will be paid for the participation.
- The questionnaire will take approximately 10 minutes to complete
- Your responses will be used only for this study and will be kept confidential.
- Your personal data will not be used in this study and will not be shared with any other party.
- By completing and submitting this questionnaire, you are indicating that you understand the above statements, and consent to participant in this study.

How to complete the Questionnaire

Participants are urged to read the questions and answer them as honest as possible. You are advised to mark each response by making a cross (X), or encircling each appropriate response with a blue or black PEN (not a pencil).

PART 1: PERSONAL INFORMATION

Gender	Male	1	Female	2
--------	------	---	--------	---

Age	18-35	1	36-53	2	53 and above	3
-----	-------	---	-------	---	--------------	---

Race	Black	1	White	2	Indian	3	Coloured	4
------	-------	---	-------	---	--------	---	----------	---

Designation	SES	1	Circuit Manager	2	AO Manager	3	Other	4
-------------	-----	---	-----------------	---	------------	---	-------	---

Highest Qualifications	Certificate	1	Diploma	2	Degree	3
	Honours	4	Master's	5	PhD	6

PART 2: AWARENESS AND READINESS

Kindly make use of ratings below for your response on each statement:						
1 = Strongly agree 2=Agree 3= Not sure 4=Disagree 5= Strongly disagree						
55.	Are you aware of the government's initiative to integrate ICT in teaching and learning?	1	2	3	4	5
56.	Do you support the government's initiative?	1	2	3	4	5
57.	Are you doing something to embrace this government initiative?	1	2	3	4	5
58.	Do you think integrating ICT in teaching and learning can help you in school	1	2	3	4	5
59.	If you agree, how will it help?					
60.	If you disagree / not sure with No.4, what do you think could be the problem?					

PART 3: RESOURCES, SUPPORT AND MAINTANANCE

Kindly make use of ratings below for your response on each statement:						
1 = Strongly agree 2=Agree 3= Not sure 4=Disagree 5= Strongly disagree						
28.	Are there measures in place to ensure the successful implementation of government's e-learning plan?	1	2	3	4	5
29.	Does the Department of Education have ICT policy for rural school?	1	2	3	4	5
30.	Does the Department of Education have plans going on to rope in rural schools that do not meet these requirements?	1	2	3	4	5
31.	Is there a professional development plans in place for educators and administrative staff to be involved in ICT?	1	2	3	4	5
32.	Does the Department of Education have plans to recruit and keep qualified ICT personnel in the rural areas?	1	2	3	4	5
33.	Does the Department of Education have a policy to study the impact of ICTs on learning outcomes of the students and motivation of the teachers?	1	2	3	4	5
61.	The Department of Education has supplied every school with standard package (hardware, software, training, etc.)?	1	2	3	4	5
62.	Are there companies involved in implementing the school networks and providing the necessary equipment, training etc.?	1	2	3	4	5

Kindly make use of options below for your response on each statement Choose the correct number of the correct answer (1-5) or if other, specify										
63.	How many rural schools have benefited so far?									
	Less than 5	1	6 -10	2	11 - 20	3	21 and 30	4	More than 30	5
64.	What do these schools have?									

Computer (Desktop)	1	Laptop	2	Projector	3	Interactive white board	4	Internet Connection	5
Other (Specify).....									

Kindly make use of ratings below for your response on each statement: 1 = Strongly agree 2=Agree 3= Not sure 4=Disagree 5= Strongly disagree						
65.	There are minimum requirements required for a school to be considered for departmental assistance in integrating ICT.	1	2	3	4	5
66.	If you the response in Question 11 is agree, what are they?					
67.	Does the Department of Education offer rural schools some kind of ICT technical support?	1	2	3	4	5
68.	Does the Department of Education provide schools with security systems for abuse of the Internet and confidentiality are concerned?	1	2	3	4	5
69.	70. Does the Department of Education have allocated extra funds for schools using ICT?	1	2	3	4	5
71.	What can the department do to save schools from becoming dumping grounds for old computers?	1	2	3	4	5
72.	Is there a special attention reserved for schools in very remote rural areas that have not got the resources to go the ICT way?	1	2	3	4	5

PART 4: BARRIERS HINDERING SUCCESS OF INTEGRATING ICT IN SCHOOLS

Kindly make use of ratings below for your response on each statement: 1 = Strongly agree 2=Agree 3= Not sure 4=Disagree 5= Strongly disagree						
34.	Crowded classrooms	1	2	3	4	5
35.	Inadequate number of ICT-related courses	1	2	3	4	5
36.	Lack of computers and other presentation equipment in classrooms	1	2	3	4	5
37.	Lack of computer laboratories for use in free time	1	2	3	4	5
38.	Lack of a technology plan	1	2	3	4	5
39.	Lack of support from the department	1	2	3	4	5
40.	Lack of motivation of the teachers/educators concerning the use of ICT in their classrooms	1	2	3	4	5
41.	Lack of good role models for prospective educators	1	2	3	4	5
42.	Lack of successful institutional models	1	2	3	4	5
43.	Educators do not integrate ICTs into their classrooms due to dis interestedness which is caused by their inadequate ability and knowledge in	1	2	3	4	5

	the field.					
44.	Overwhelming course load on teachers/educators (that causes less time for research and personal development).	1	2	3	4	5
45.	Lack of time makes educators stay away from ICTs, and they cannot fulfil their personal developments in this field.	1	2	3	4	5
46.	Allocation of budget	1	2	3	4	5
47.	Support from top management	1	2	3	4	5

PART 5: RESPONDENTS' VIEW:

3. How can the department ensure that this initiative is sustainable?

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4. In your own view, what are the factors hindering the success of integrating ICT in schools?

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Thank you very much for your response and time

ANNEXURE G: RESPONDENT'S DEMOGRAPHIC INFORMATION

1. Demographics

This section is depicting the personal data of the respondents' questionnaire from all targeted groups (learners, teachers, Principals and Departmental officials).

2. Response rate

The total number of questionnaires distributed to respondents was 100. Only 66 were returned which gives 66%

3. Biographic analysis

This section is depicting the personal data of the respondents.

4. Responses from learners

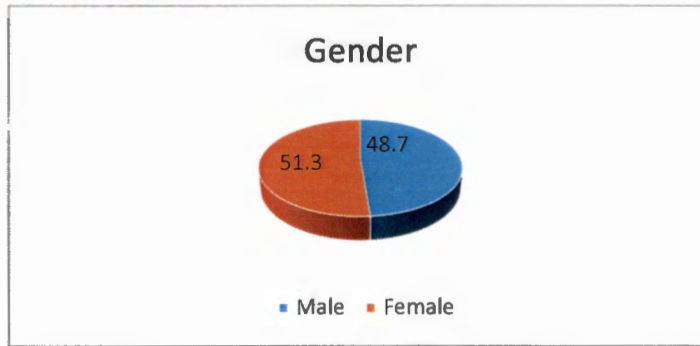


Figure 4.1 Gender

Figure 4.1 Shows a 100% respondents 51.3% were female and 48.7% were male.

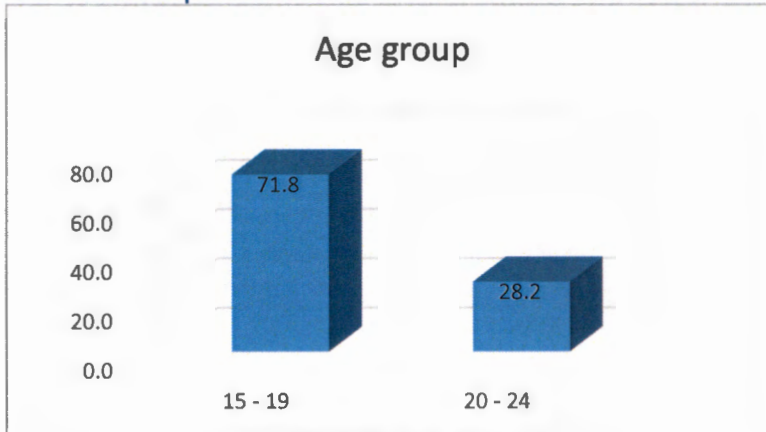


Figure 4.2 Age group

Figure 4.2: The learners' ages ranged from 15 to 19, with the majority being 71.8%, and minority are employees ranging between 20- 24 years with 28.9%.

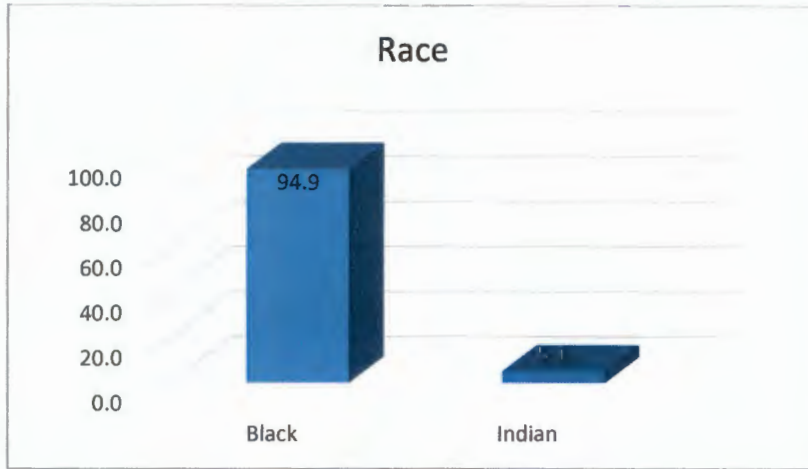


Figure 4.1.3 Race

Figure 4.3 above depicts that the majority (94.9%) of the respondents were black, and the lowest was white respondents with 5.1%.

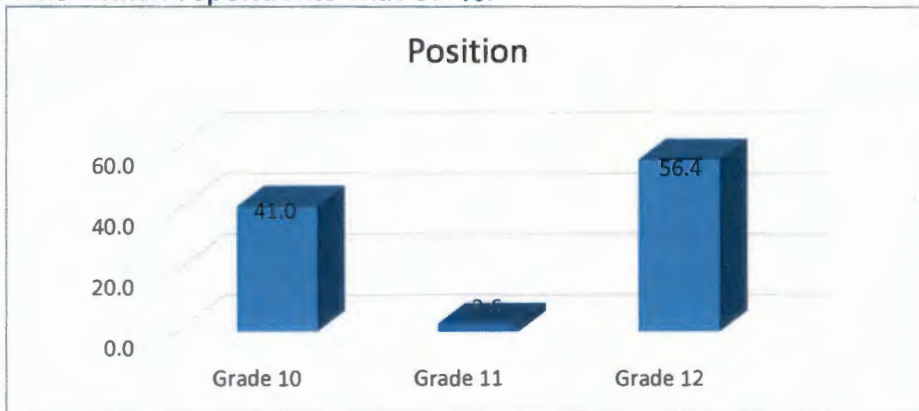


Figure 4.1.4 Grade

Figure 4.6 Reflects grade category. It was found that 56.4% were in Grade 12, followed by Grade 10 with 41%, and lastly 2.6% were Grade 9 students. The largest number of students were in Grade 12.

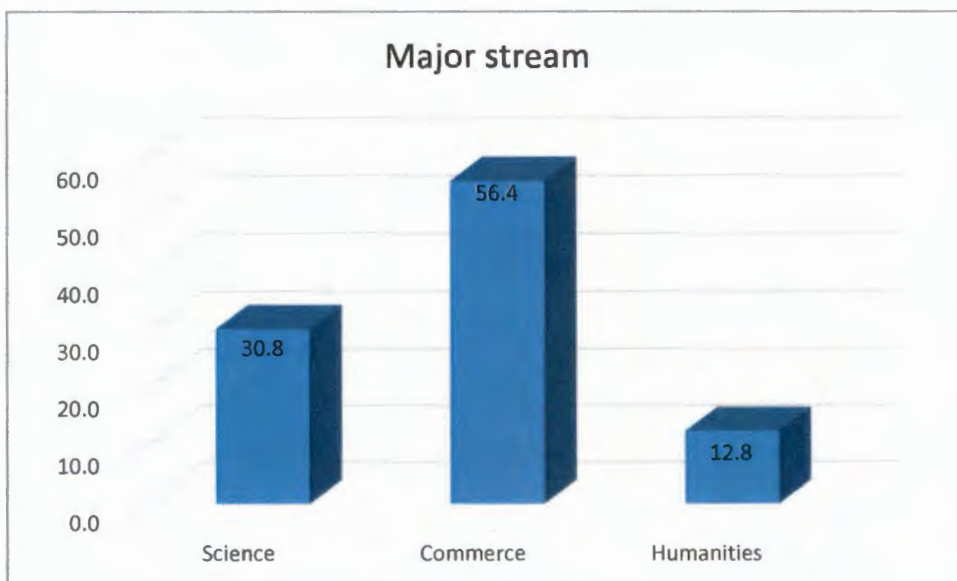


Figure 4.1.5 Major stream

Figure 4.1.5 Reflects the major stream - it was found that 56.4% were in Commerce, followed by Science with 30.8%, and lastly 12.8% were Humanities. The largest number of respondents were in Commerce.

4.2 Responses from teachers

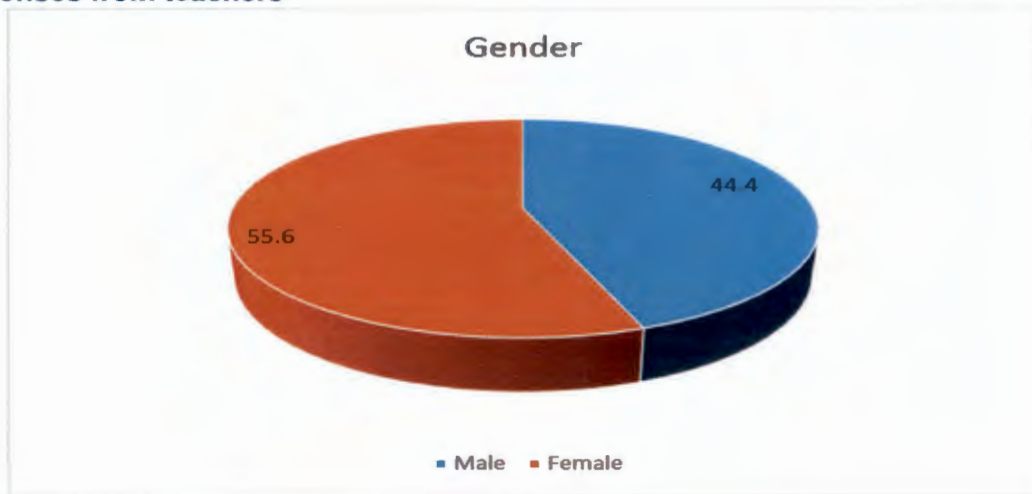


Figure 4.2.1: Gender

Figure 4.2.1 Participants were asked to indicate their gender by placing a tick next to the relevant option provided (male or female). All 18 participants (100%) responded. Of the 100% respondents 55.6% were female and 44.4% were male.

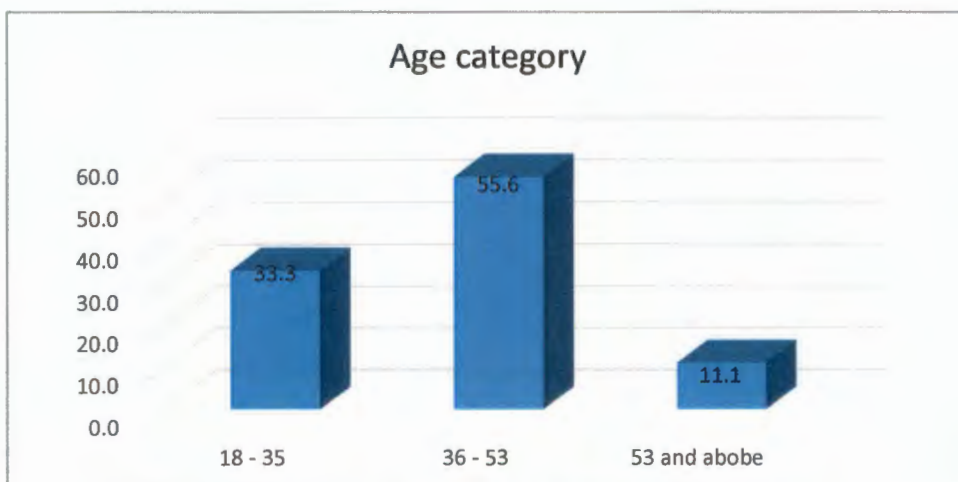


Figure 4.2.2 Age

Figure 4.2.2 The employees' ages ranged from 36 to 53, with the majority being 55.6%, followed by ages ranging between 40- 49 with 33.3% and the minority are employees ranging 53 and above with 11.1%.

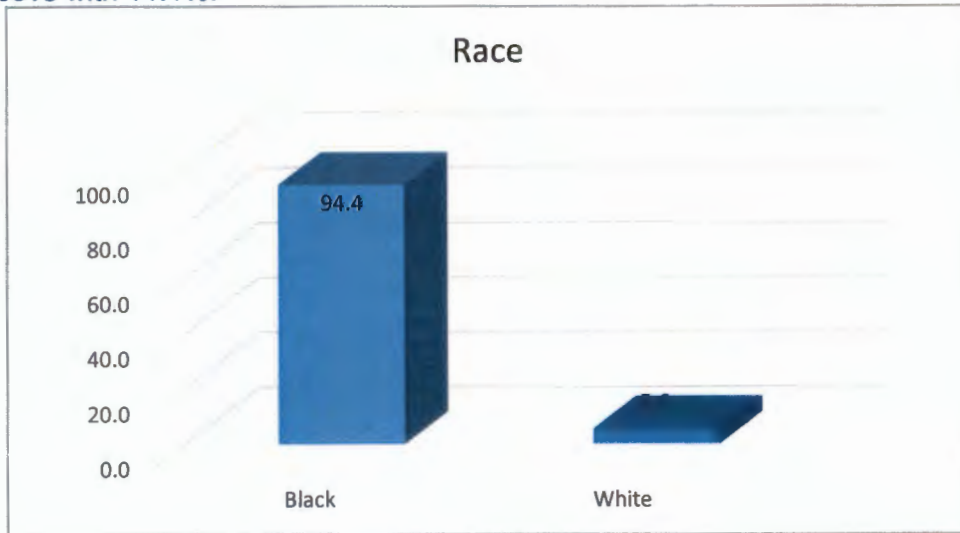


Figure 4.2.3 Race

Figure 4.2.3 above depicts that the majority (94.4%) of the respondents were black, and the lowest was white respondents with 5.6%.

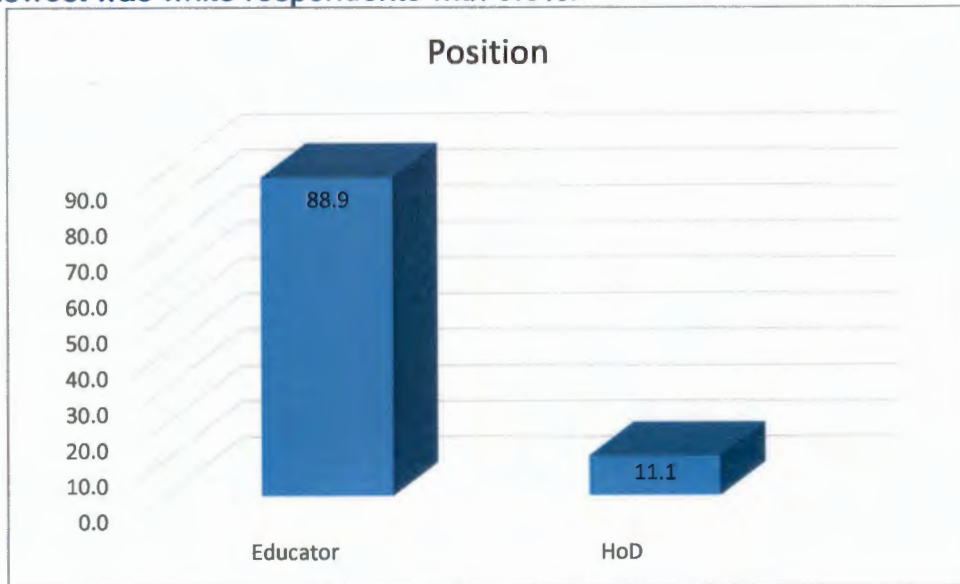


Figure 4.2.4 Position

Figure 4.2.4 reflects position categories; it was found that 88.9% were educators, and lastly HoDs with 11.1%. The largest number of employees were educators.



Figure 4.2.5 Highest Qualification

Figure 4.2.5 represents the highest level of school qualification that the employees had obtained. Of the respondents, 55.6% had degrees, followed by Honours with 27.8% and lastly a diploma with 16.7%.

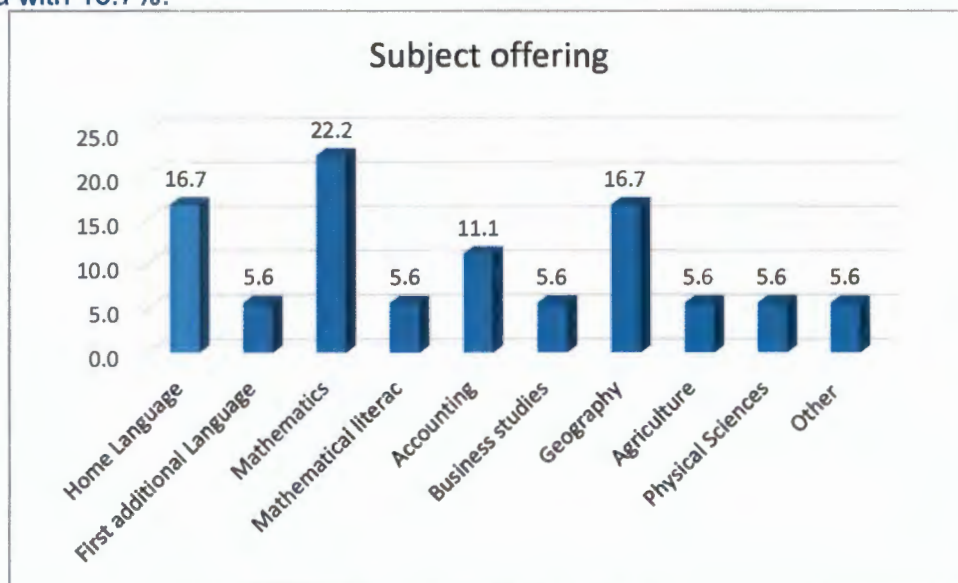


Figure 4.2.6 Subject Offering

Figure 4.2.6 above shows that the majority (22.2%) of the respondents offered mathematics, followed by respondents who offered home language and Geography with 16.7% and lastly respondents who offered additional language, Agriculture and others with 5.6%.

4.3 Responses from principal



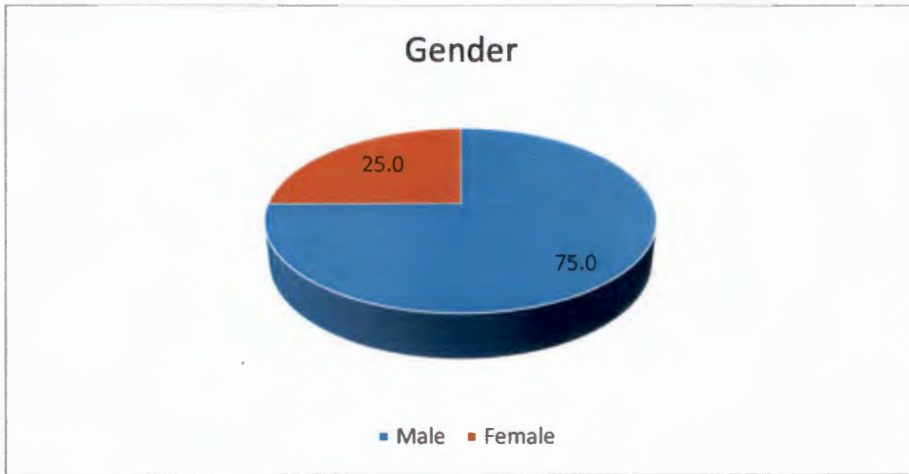


Figure 4.3.1: Gender

Figure 4.3.1 Participants were asked to indicate their gender by placing a tick next to the relevant option provided (male or female). Results revealed that 75% were male and 25% were female.

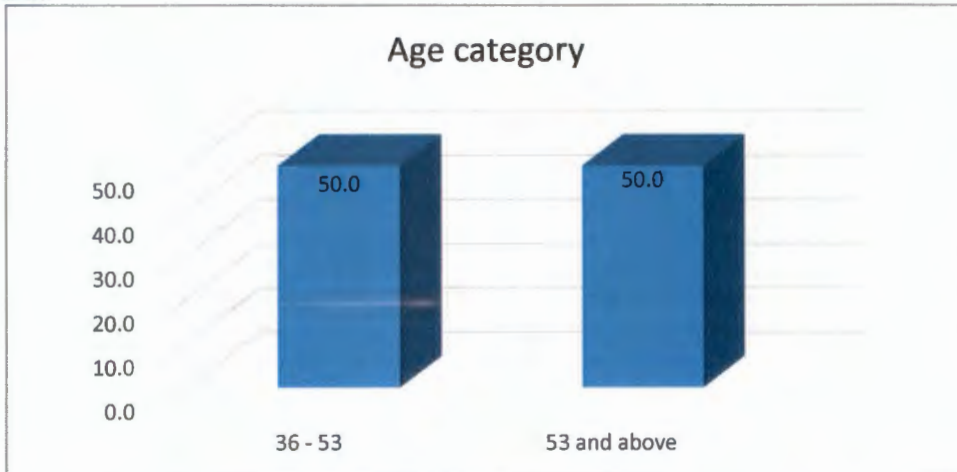


Figure 4.3.2: Age category

Figure 4.3.2 Participants were asked to indicate their age by placing a tick next to the relevant option provided. Results revealed that 50% of the principal were at age category of 36 to 53 and 53 and above each group.

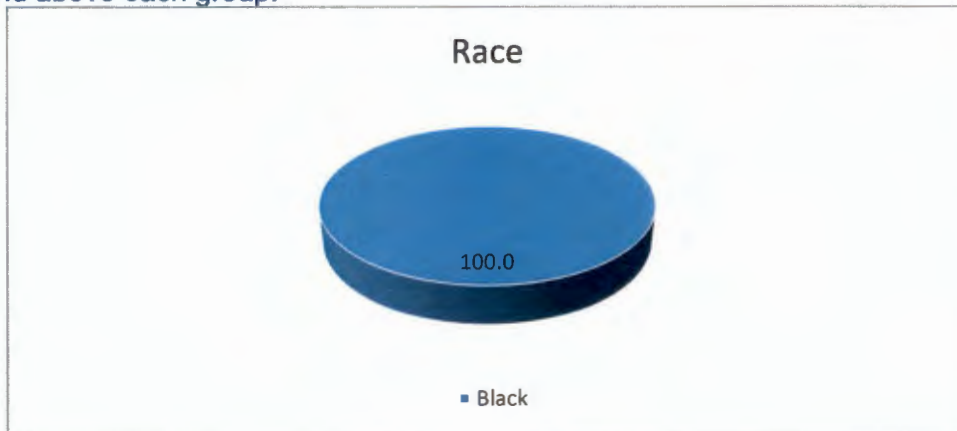


Figure 4.3.3: Race

Figure 4.3 above depicts that the majority (100%) of the respondents were Black Africans.



Figure 4.3.4: Highest Qualification

Figure 4.5 represents the highest level of school qualification that the employees had obtained. Of the respondents, 75% had Honours degrees, and the lowest was a junior degree with 25%.

4.4 Responses from departmental officials

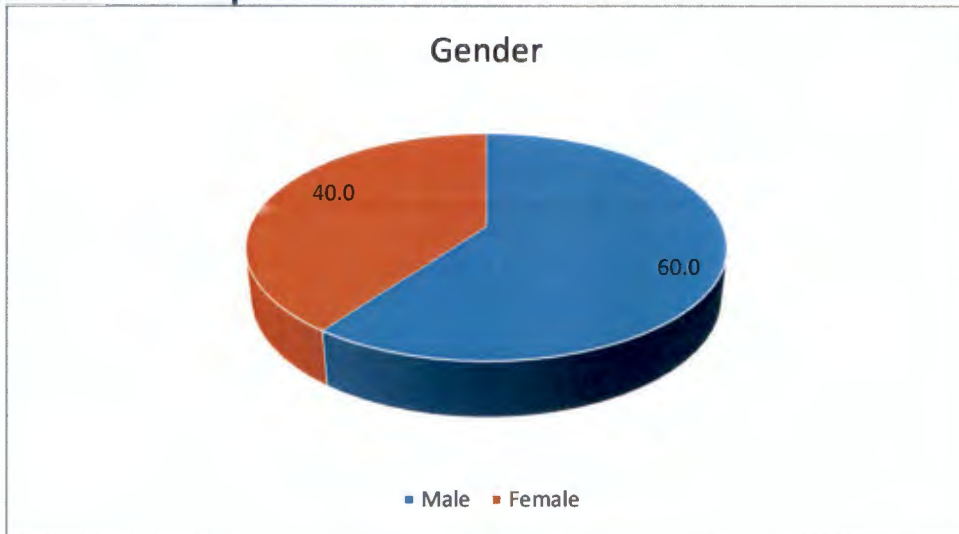


Figure 4.4.1 Gender

Figure 4.4.1 Participants were asked to indicate their gender by placing a tick next to the relevant option provided (male or female). Of the 100% respondents 60% were male and 40% were female.

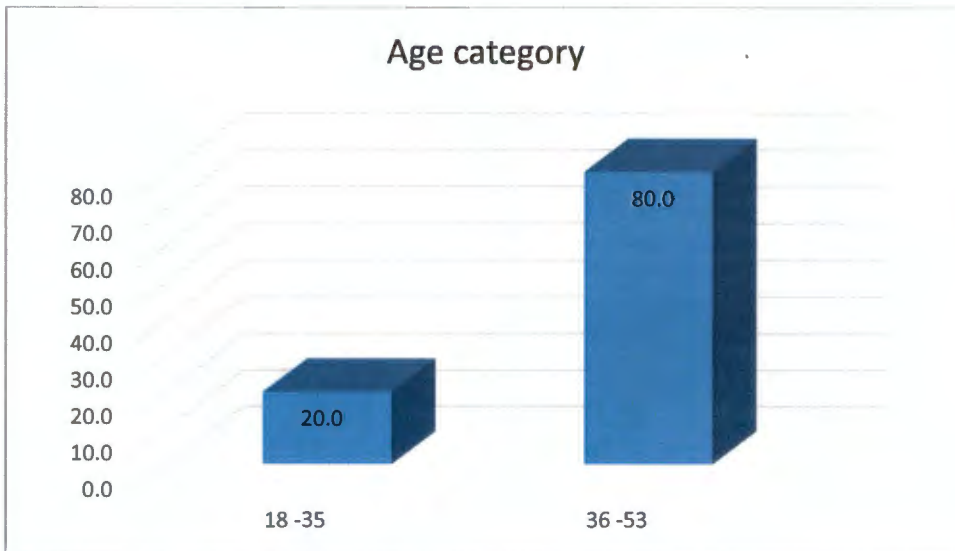


Figure 4.4.2 Age category

Figure 4.4.2 Participants were asked to indicate their age by placing a tick next to the relevant option provided.

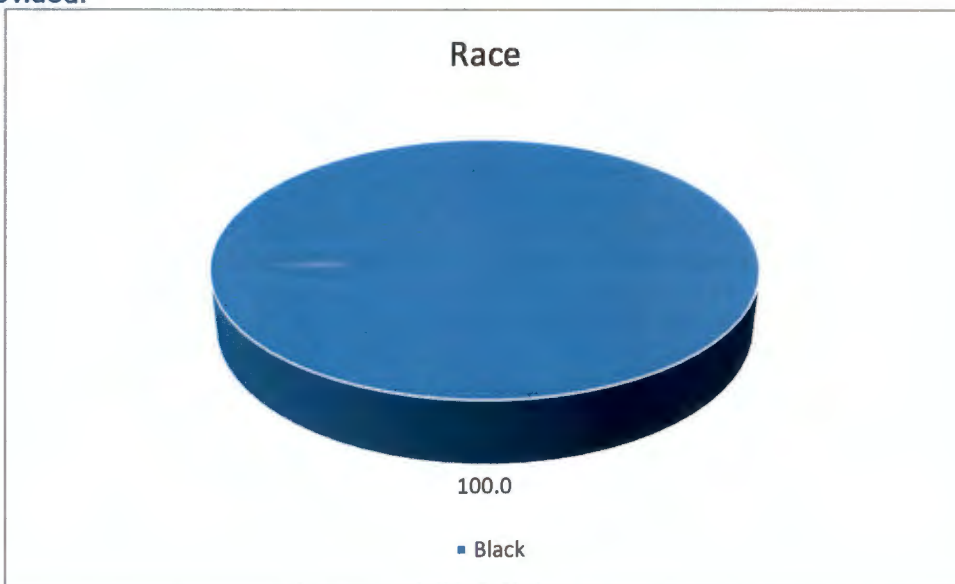


Figure 4.4.3 Race

Figure 4.3 above depicts that the majority (100%) of the respondents were Black Africans.

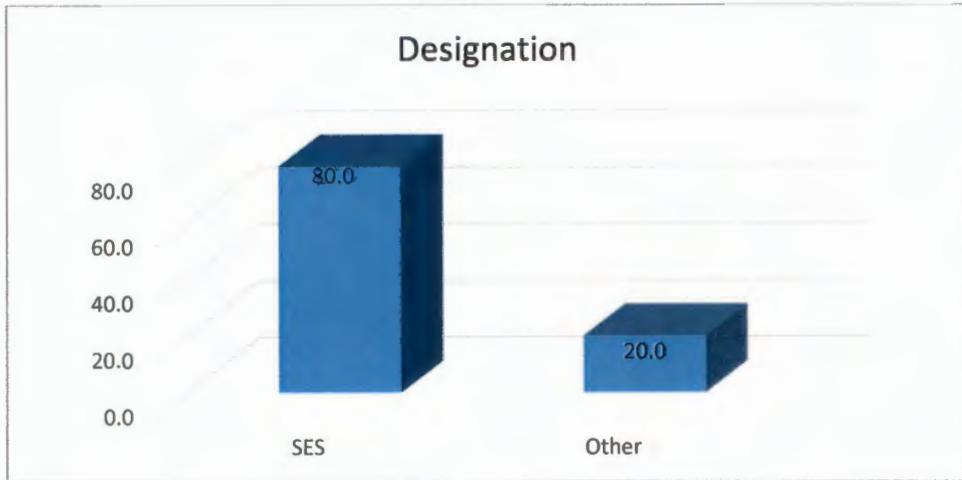


Figure 4.4.4 Designation

Figure 4.4.4 reflects designation category, the results revealed 80% of the respondents are SES, and lastly were others with 20%.



Figure 4.4.5 highest qualification

Figure 4.4.5 represents the highest level of school qualification that the employees had obtained. Of the respondents, 40% had honours and junior degrees, and the lowest was a diploma with 20%.