PRINCIPALS' PERCEPTIONS ON ICT IMPLEMENTATION IN SECONDARY SCHOOLS IN THE KHOMAS EDUCATION REGION, NAMIBIA.

A THESIS SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF EDUCATION OF THE UNIVERSITY OF NAMIBIA

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ABSTRACT

The implementation of Information and Communication Technologies (ICT) has been an integral part of education in most developed countries. As a result, there is enormous pressure on education institutions around the world to keep up with the pace of technological development. In Namibia, the implementation of ICT curriculum aimed at assisting learners and teachers to look for information, manage information and present information through ICT. Given these contributions, principals need to have sufficient knowledge of the use of ICT in order to support and implement the new technologies into school activities. The purpose of the study was to investigate the perceptions of principals on implementing ICT into school activities in the Khomas Education Region.

This study adopted a qualitative case study design to investigate the principals' perceptions. Three secondary school principals whose secondary schools met the criteria of purposive sampling were selected to participate in the study. Research instrument that was found appropriate for this study was semi- structured interview. The data were analyzed by providing detailed descriptions of the setting, participants, and activities and categorization of coded pieces of data and grouping them into themes.

The findings of this study indicated that principals in the Khomas Education Region have positive attitude towards ICT irrespective of challengers they face in managing the implementation ICT in school environment. The study found the principals were either computer illiterate or computer semi-literate. They were unable to act as instructional leaders in the implementation of ICT in teaching and learning. The study recommends, among others, that principals should undergo through ICT professional development

programmes, not only to make them computer literate but also to enable them to manage effectively and confidently implementation of ICT in schools.

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DEDICATIONS

This thesis is dedicated to my two children Rewaldo Quest and Beaucherine Quest.

DECLARATIONS

I Rejoice Quest, declare hereby that this study is a true reflection of my own research, and that this work, or part thereof has not been submitted for a degree in any of higher education.

Signature _____ Date_____

(Rejoice Quest)

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LIST OF ACRONYMS AND ABBREVIATIONS

ACTET	Advisory Council on Teachers Education and Training
AECT	Association for Educational Communications and Technology
AISI	African Information Society Initiative
AVU	African Virtual University
Bed	Bachelor of Education
CD	Compact Disc
CECS	Community Education Computer Centre
DFID	Department for International Development
DSTV	Digital Versatile Television
DVD	Digital Versatile Disc
Email	Electronic mail
EMIS	Education Management Information System
ETSIP	Education and Training Sector Improvement Programme
GeSCI	Global eSchool and Community Initiative
ICDL	International Computer Drivers Licence
ICTs	Information Communication and Technologies
IDRC	International Development Research Centre
ISP	Internet Service Provider
IT	Information Technology

MBESC	Ministry of Basic Education, Sports and Culture
MP3	Music Player 3
MS Excel	Microsoft Excel
MS Word	Microsoft Word
MoE	Ministry of Education
NETA	Namibian Education Technology Alliance
NETSSC	National Education Technology Service and Support Centre
NIED	National Institute for Educational Development
NPC	National Planning Commission
PICTA	Partnerships in ICTs in Africa
SADC	Southern African Development Community
Sida	Swedish International Agency
SITES	Second Information Technology Education Study
TPD	Teacher Professional Development
TRC	Teacher Resource Centre
TTISSA	Teacher Training Initiative for Sub-Saharan Africa
TV	Television
UNAM	University of Namibia
UNDP	United Nations Development Programme

UNESCO	United Nations Educational, Scientific and Cultural Organization
USAID	United States Agency for International Development
VCRs	Videocassette recorders

CHAPTER ONE

INTRODUCTION

1.1 Introduction

The study investigated secondary school principals' perceptions on implementing Information and Communication Technologies (ICT) into the teaching and learning environment in the Khomas Education Region of Namibia. In this chapter, the researcher presents the background of the study, the statement of the problem, the research questions, the significance and limitation of the study.

1.2 Background of the study

Since the 1980s, ICT has become an integral part of the education system (Zhang & Aikman, 2007). According to Clegg, Hudson and Steel (2003), there is an enormous pressure on educational institutions around the world to keep up with the pace of technology. For example, tension about where and how to access ICT with its many expectations in education has been a challenge.

However, Akbaba-Altun (2006) asserts that parents, learners and the schools at large are worried, in particular, about lagging behind with computers application in the educational system. Akbaba-Altun further notes that most school principals are worried since ICT are considered to be a powerful tool for education. As a result, education demands change and most teachers have

developed new ways of teaching and learning. New ways of designing learning tasks and different ways of teaching and learning have been developed by ICT experts. The challenge is not simply a case of technology adoption, but rather a process of innovation, which requires both financial and training support for schools, as well as cooperation between school principals and teachers to ensure success.

Since 1996, the United Nations Economic Commission for Africa (UNECA), through its establishment of Partnerships in ICT in Africa (PICTA) supported ICT for African countries (Farrell & Isaacs, 2007). The Swedish International Agency (SIDA), United States Agency for International Development (USAID) and the Department for International Development (DFID) were particular in their promotion of ICT access and use for school principals in some African countries such as Tanzania, Namibia and Ghana (Farrell & Isaacs, 2007).

Furthermore, the World Bank, United Nations Educational, Scientific and Cultural Organization (UNESCO)'s Teacher Training Initiative for Sub-Saharan Africa (TTISSA) and the African Virtual University (AVU) Teacher Education Project promoted teacher professional development for school principals and ICT implementation in schools (Farrell & Isaacs, 2007). TTISSA is a high priority programme on teacher professional development in Africa scheduled for 2006-2015 with a focus on supporting the 46 sub-Saharan countries on restructuring national teacher policies and teacher education. TTISSA's main aim is to increase the number of teachers in order to improve the quality of teaching in Africa; it also considers the use of ICT as a strong component of the programme.

A comprehensive study of teaching, learning and computing concluded that school principals' and teachers philosophies and practices impacted their use of the ICT in schools (Becker & Riel, 2001). Farrell & Isaacs (2007) maintain that the process of adoption and diffusion of ICT in education in Africa is in a transition form. The focus of their study was mainly on the effective and appropriate use of ICT necessary for the ICT implementation process to be successful in the African countries. One of the primary features of this new phase is the priority that governments were given. Governments were urged to develop clear policies on staff development in ICT in education. In line with this priority, UNESCO provided some guidelines to be implemented for teachers in their professional development (UNESCO, 2008b). Within the educational setting, teachers should:

- use ICT access and share resources to support their own professional development;
- use ICT to access outside experts and learning communities to support their activities and their professional development; and
- use ICT to search for manage, analyse, integrate and evaluate information that can be used to support their professional development.

In this sense, like teachers, the school principals' roles within the ICT policy structure are crucial and thus need to be addressed separately in order to determine how technology can be embedded into school practices. In addition, the Vision *2030* and the Education and Training Sector Improvement Programme (ETSIP 2004: 10) developed an ICT policy for education in Namibia. The ICT policy objectives are to:

- Produce ICT literate citizens;

- Produce people capable of working and participating in the new information and knowledge-based economy and society;
- Leverage ICT to assist and facilitate learning for the benefit of all learners and teachers across the curriculum;
- Improve the efficiency of educational administration and management at every level from the classroom, school library, through the school, and on the sector as a whole;
- Broaden access to quality educational services for learners at all of the education system and set specific criteria and targets to help classify and categorise the different development levels of using ICT in education.

School principals, as strategic managers of schools, need to explain the ICT education objectives to teachers in order to create a general agreement by sharing information. In order to do so, school principals needed to stimulate creativity and set directions for the teachers in order to implement ICT at their schools. Hence, school principals are crucial in this study. In the next session, the meaning of ICT is discussed by various authors for clarification of further explanations.

1.3 What is the meaning of ICT?

It is difficult to find a clear definition of the term ICT. However, there seems to be a misconception where many educators think that ICT generally refers to the use of computers and computing related activities (Olakulehin, 2007). However, UNESCO (2008a, p.4) defines ICT as,

> .. the tools and the process to access, retrieve, store, organise, manipulate, produce, present and exchange information by electronic and other automated means. These include hardware, software and telecommunications in the forms of personal computers, scanners, digital cameras, phones, faxes, modems, CD and DVD players and recorders,

> digitised video, radio and TV programmes, database programmes and multimedia programmes.

Another useful definition of ICT is that it:

> … generally relates to those technologies that are used for accessing, gathering, manipulating and presenting or communicating information. The technologies could include hardware (e.g. computers and other devices); software applications; and connectivity (e.g. access to the Internet, local networking infrastructure, and videoconferencing). What are most significant about ICT are the increasing convergence of computer-based, multimedia and communications technologies and the rapid rate of change that characterises both the technologies and their use." (Toomey, 2001, p. 4).

The Namibia ICT policy for Education (Ministry of Education (MoE), 2005, p. 4) further defines ICT as:

> ICT covers all the technologies used for the handling and communication of information and their use specifically in education. These include computers, audio visual systems, broadcast receiving systems and telecommunication systems, media such as compact discs and videodiscs, microcomputer-based laboratories, the Internet, virtual learning centres, local and wide area network (wired and wireless), instructional software, printed media, educational television, voice mail, e-mail, satellites communication, VCRs, cable TV, conventional and interactive radio.

Within this context, the present study took cognisance of the above mentioned definitions by Olakulehin (2007) and the Namibia ICT policy for Education (MoE, 2005). Onward discussions on ICT in this study centred on these definitions as tools to be used in the schools. ICT tools are considered to be additional tools to the teaching and learning environment and thus, are teaching and learning resources in the education environment (Anderson, 2002). Moreover, ICT is also regarded as a tool, integral to the education system which is used by teachers and school principals in their working environment. ICT has also brought innovations in education such as some new additional teaching and learning strategies through which educational services are

delivered. Thus, there is no more doubt to the significance of ICT in the education system (Kozma, 2008). ICT are therefore, vital tools that could be used to transform the education system not only for school principals but also, to change the whole spectrum of schools.

ICT has made pervasive impacts both on society and daily lives, becoming versatile tools that are relevant for teaching and learning process in various countries. Throughout the history of African countries, ICT has started to build excellence in its manufacturing and demand for economic development. International donors and development agencies like the International Development Research Centre (IDR), UNESCO, United Nations Development Programme (UNDP), USAID and Leland Initiative have realized the strength of ICT in education as well as how ICT tools are needed in the competitive, increasing global electronic. For example ICT offer quick responses needed for innovations, deliverance of information, communication and services in schools. Akbaba-Altun (2006) says that living in a technologically fast-changing world some school have already witnessed some significant social and economic changes and its impact in schools is noticeable. Consequently, efforts are made to accelerate the application of ICT tools in schools. The next discussion focuses on the school principals' roles in implementing ICT in schools.

1.4 ICT implementation in schools

In Namibia, the ICT Policy for Education calls for constructive global partnerships on common interest, obligation, commitment and equality as promised by good governance, democracy and human rights (MoE, 2004). The policy emphasise that every academic institution, school and local community must be encouraged to develop, implement ICT.

An Education Steering Committee consisting of Ministry of Education officials, ICT project managers and NGO leaders was formed in 2005 to share experiences and coordinate ICT in the education sector. In Namibia Steering Committee leads the policy development process in order to integrate ICT in teacher training programmes, learning processes as well as educational management programmes. The Steering Committee also developed an ICT implementation framework that was used as a plan for the implementation process.

By June 2005, a guide for ICT implementation in the Education was developed in order to operate as a cohesive network of partners. Guidelines are elaborated in the literature review. The Ministry of Education (Farrell & Isaacs, 2007: 27) has achieved the following during the implementation process:

a) In partnership with Microsoft, 4,000 computers were deployed to some schools.
b) The government has also entered into agreement with *Xnet* and Internet Service Provider (ISP) to provide Internet services to schools for N$300 per month.
c) The Global E-Schools and Committee Initiative (GeSCI) placed a Country Programme Facilitator in the Ministry to assist with further development and implementation of the ICT Policy and to help with the establishment of local and international partnerships to support ICY in education initiatives.
d) The then Ministry of Basic Education, Sport and Culture (MBESC) set up a local level support centre, the Teacher Resource Centre (TRC), to assist teachers with technology use and improving overall teaching skills.
e) In addition, the Ministry of Education has equipped some classrooms with computers and projectors in order to increase the use of ICT in teaching and learning.
f) SchoolNet Namibia has provided computer training to 300 schools as part of their Teacher Professional Development (TPD) project.

Despite all the efforts carried out by the Ministry of Education, there are still some challenges among others:

- Technical – There is a necessity for a programme to train technical support personnel;
- Skills training – The ICT approach was on ICT integration first instead of training the skill;
- Technology training approach- Some training courses have been one-time workshops;
- Lack of evaluation and follow up- It appears that no evaluation data on the impact of ICT and TPD projects are available;
- Sustainability- There is a lack of capacity to make systemic and nationwide changes in donor funded projects (MoE, 2005, p. 10).

The ETSIP was established with the purpose of improving the quality of the education sector not only with relation ICT but also in order to mobilize private sectors, public and non-governmental organisations to assist with the implementation process of ICTs in schools (Ministry of Education, 2005). One of its aims that focus on ICT is as follows:

> Improving access to ICT to enhance learning and administration including making ICT a subject and a cross-curricular tool, staff training in ICTs, and developing support services and structures for deployment and maintenance (MoE, 2005, p.15);

The foregoing aim is important as it provide a backlog for the current study. It became important for the researcher to find out the extent to which the ICT implementation process has progressed in schools.

1.5 Statement of the problem

Despite the fact that the ICT Policy for the Education sector and ICTs implementation plans are in place in Namibia, there is not enough evidence supporting principals' views concerning the

integration of ICT in teaching activities at their schools(NETA, 2005; Tech/ NA!, 2006). It is also unclear as to whether or not principals are able to manage and implement the ICT policy for Education properly with limited ICT facilities and equipment (NETA, 2005).

In addition, there are no studies conducted in Namibia that specifically looked at views of school principals in relation to the implementation of ICT in learning and teaching activities. Studies conducted in Namibia only investigated the teachers and learners' perceptions and challenges that contributed to the implementation of Computer Practice in schools (Kamerika, 2006), integration of ICT in the preparation of teachers at the Colleges of Education in Namibia (Ipinge, 2010), an understanding of factors involved in the adoption of ICT into schools in Namibia, particularly in Windhoek and Katima Mulilo (Matengu, 2006), the role of school principals in promoting and managing computer usage in selected schools in the Caprivi Region (Katulo, 2010) and the implementation of the National ICT Policy for Education in Namibia rural junior secondary schools, especially in science classrooms (Ngololo, 2010). Thus, this study envisaged to investigate the perceptions of secondary school principals on implementing ICT into schools in the Khomas Education Region in Namibia.

1.6 Objectives of the study

The major aim of this study is to investigate the perceptions of school principals on the implementation of ICT in schools. The specific objectives are to:

1. identify what type of information and communication technology tools or equipment schools have;
2. identify the school principals' perceptions about ICT implementation in schools;
3. investigate school principals' perceived skills to support teachers in implementing ICT in schools;
4. identify the perceived challenges school principals face during the implementation of ICT in schools.

These areas of concern gave rise to the research questions below that guided this study.

1.7 Research questions

The study investigates the principals' perceptions on implementing ICT in schools. In order to provide answers to the main research objective, the following sub-research questions were asked:

1. What type of information and communication technology tools or equipment do schools have?
2. What are the school principals' perceptions about ICT implementation in schools?
3. What perceived skills do school principals have to support teachers in ICT implementation?
4. What perceived challenges do school principals face during the implementation of ICT in schools?

1.8 Significance of the study

School principals play an important role in supporting teachers in schools. The findings on the principals' perceptions may, therefore, assist the Ministry of Education (MoE) with the implementation of ICT Policy for the Education Sector in schools. Furthermore, the findings of the study could provide the MoE with possible solutions to challenges faced by school principals when managing the implementation of ICT in schools.

1.9 Limitations of the study

The present study is a case study carried out only in the Khomas Education Region. Since a small sample of three school principals in the Khomas Region was chosen, the findings of the study should not be generalised to other regions.

1.10 Definition of concepts and terms

Diffusion: It is the process by which an innovation is communicated through channels over time among the member of social system (Rogers, 1995).

Innovation: Innovation refers to an idea, practice or object that is perceived as new by an individual or a unit of adoption (Rogers, 2003). Innovation is the intended to be useful. To implement a product innovation requires a paradigm shift while process innovation involves of existing processes (Whitehurst, 2009).

Internet: It refers to an effective mechanism to communicate by using applications such as electronic mail (e-mail) as a supplement to teaching in the classroom (Hassini, 2004).

Perception: It refers to the acceptance of sensory stimuli by the teacher or learner, given meaning based primarily on past experience (Plante & Beattie, 2004).

1.11 Structure of the thesis

The thesis is structured in chapters under general headings.

Chapter 1 This chapter explains the orientation of the proposed study, statement of the problem, research questions, significance and limitation of the study as well as the definitions of terms.

Chapter 2 It looks at the literature review in relation to the area of ICT implementation in schools in particular as well as describing the theoretical framework of the study.

Chapter 3 Chapter three outlines the methodologies employed in conducting the research project. It describes the setting and the procedure used in data collection and data analysis. It also discusses the ethical issues.

Chapter 4 This chapter focus on data presentations, analysis and discussions of the results.

Chapter 5 Chapter five presents the summaries, conclusions and recommendations of the study.

1.12 Summary

This chapter has provided the background and orientation of the study. The background has been described from the understanding of context from the secondary school principals' perceptions on the implementation of ICT in schools. The main research participants in this study are school principals of secondary schools in the Khomas Education Region. In the next chapter the literature review is discussed.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter starts with the theoretical framework of the study based on Diffusion of Innovation Model and then, review the extant literature on studies conducted about ICT implementation; perception about ICT and challenges about the implementing of ICT in schools are reviewed.

2.2 Theoretical framework of this study

The theoretical framework is based on the Diffusion of Innovation Model by Rogers (1995) that provides understanding of the implementation of ICT into teaching and learning. The Diffusion Innovation Model was developed in order to seek an understanding of how individuals change (Newhouse, 2002; Albirini, 2006). The Diffusion of Innovation Model is based on the Individual Innovativeness Theory which describes the process of adoption of new technologies when implementing ICT in new environments.

2.2.1 The Diffusion of Innovation Model

This Diffusion Innovation model was used as a guide to provide information about how school principals could implement ICT in schools. The Innovation Model defines innovation as "an idea, practice or object that is perceived as new by an individual or unit of adoption" (Rogers 1995, p.11). The model is based on four theories of adoption*: Innovation Decision Process; Individual Innovativeness; Rate of Adoption and Perceived Attributes.*

The Innovative Decision Process Theory defines "diffusion as a process through which an innovation is communicated through certain channels over time among the members of a social system" (Rogers, 1995, p11). *Individual Innovativeness Theory* focuses on an individuals' ability to adopt an innovation in the social system. In this Diffusion model, innovation is defined as "an idea, practice or object that is perceived as new by an individual or unit of adoption" (Rogers 1995, p.11). The *Rate of Adoption Theory* refers to the rate of adoption process which takes place over time, for example some school principals are slow in adopting ICT in their schoolsand the others are early adopters. *Perceived Attributes Theory* focuses on five attributes which influence an individual to take decisions about whether to adopt or reject an innovation. These attributes are: relative advantage, compatibility, complexity, triability and observability. For example, some school principals take their time to understand what is the ICT all about and others not.

The ‘idea’ or “new practice” in the present study is considered as the implementation of ICT in the teaching and learning environment. The next subsections describe the diffusion innovation model in detail.

2.2.1.1 Innovation Decision Process

This is the first theory of the diffusion Innovation Model. Rogers (2003) described the innovation-decision process as “an information-seeking and information-processing activity, where an individual is motivated to reduce uncertainty about the advantages and disadvantages of an innovation” (p. 172). According to Rogers (2003), the innovation-decision process involves five steps: (1) knowledge, (2) persuasion, (3) decision, (4) implementation, and (5) confirmation.

- ***Knowledge***. Knowledge about innovation might come through different communication channels and sources. The type of knowledge Rogers (2003) is referring to is the awareness-knowledge, the how-to knowledge and the principles-knowledge. For example the awareness-knowledge represents the knowledge of the innovation’s existence. Some school principals can be motivated to learn more about the innovation and eventually, to adopt it. The how-to-knowledge contains information about how to use an innovation correctly. For example some school principals need to help teachers to use the technology effectively. The principles-knowledge is the last knowledge type. It includes the functioning principles how and why an innovation works. For example some school principals adopt the innovation without knowledge and the misuse of the innovation can cause its discontinuance. Thus, the attitude of the school principal can shape or reject the adoption of the innovation.
- ***Persuasion***. The main activity in this stage is affected by feelings which can be a negative or positive attitude towards innovation. The decision-making unit would actively seek information about the innovation of concern before developing an opinion. In this case for example, school principals’ opinions or beliefs can be influenced by colleagues or peers and can cause a degree of uncertainty or an innovation can be affected.

- ***Decision***. In this stage the decision to adopt or reject an innovation would be made based on a trial period. This means that some innovations are adopted quickly from individuals who want to try the innovation in their own basis and then come to an adoption decision. Adoption refers to a "full use of an innovation as the best course of action available," while rejection means "not to adopt an innovation" (Rogers, 2003, p. 177). There are two types of rejection according to Rogers: active rejection and passive rejection. In active rejection, we find that some school principals for example tries an innovation and thinks about it but later they decide not to adopt the innovation. On the contrary, in passive rejection, some school principals for example do not think about adopting the innovation at all.
- ***Implementation***. This is where the activities shift to real action. An innovation brings the newness in which "some degree of uncertainty is involved in diffusion" (Rogers, 2003, p. 6). It also involves behaviour change due to the implementation. Reinvention also happens at the implementation stage. Reinvention is "the degree to which an innovation is changed or modified by a user in the process of its adoption and implementation" (Rogers, 2003, p. 180). Rogers further discussed that the more reinvention takes place, the more rapidly an innovation is adopted and becomes institutionalized. For example as innovations, computers are the tools that consist of many possible opportunities and applications, thus computer technologies are more open to reinvention.
- **C*onfirmation.*** The decision to reject or adopt the innovation is confirmed at this stage. In this stage the individual looks for support for his or her decision. According to Rogers (2003), this decision can be reversed if the individual is "exposed to conflicting messages about the innovation" (p. 189). However, the individual tends to stay away from these messages and seeks supportive messages that confirm his or her decision. Thus, for example some school principals' attitudes become more crucial at the confirmation stage. Supporting an innovation and the attitude of the individual can later cause an adoption or discontinuance. Discontinuance may occur during this stage in two ways. First, the individual rejects the innovation to adopt a better innovation replacing it. This type of discontinuance decision is called *replacement continuance*. The other type of discontinuance decision is *disenchantment discontinuance.* In the latter, the individual rejects the innovation because he or she is not satisfied with its performance. For example some school principals do not meet the needs of the individual. Because of the way it is presented, it does not provide a perceived relative advantage and its attribute of innovations affect the rate of adoption.

2.2.1.2 The Individual Innovativeness Theory

The Individual Innovativeness Theory focuses on the personality of the individual who is initiating a certain activity. The Individual Innovativeness Theory classifies innovators into five categories: innovators, early adopters, early majority, late majority and laggards.

According to Roger (1995) innovators are individuals who take risks and are willing to take initiative and their time to try something new most of the time. For example, there are some school principals who seek out opportunities for change and try out new ways of doing things. While early adopters are those individuals who manage to adapt and adopt changes in ICT at an early stage. For example, some school principals can cope adequately with changes; some even welcome them as leaders. The ICT policy objectives require some changes to be made and this entirely depends on the school principals to adopt those changes in their schools.

On the other hand, early majority are considered to be those individuals who are careful, like to be in a safe environment, deliberately unwilling individual who are unwilling to risk time for new innovations (Roger, 1995). For example, school principals who are afraid of using the new equipment or who doubt their ability to learn and use computers such school principals might be reluctant to accept the new innovations.

This category comprises of individuals who are resistant to change and are referred to as late majority individuals Roger, 1995). In other words, these types of school principals are difficult and seem to refuse to take chances in order to bring change. School principals who are in this category tend to reject or resist change in whatever form it may arrive.

The laggards are those who are consistent or even adamant in resisting change and mostly, pressure is required to force them in order to bring change in their environment. For example, school principals who are unwilling to try new innovation. School principals might be stuck in their past and the school seem to be left behind when comparing to other schools.

The main idea that can be drawn from the model is that any innovation-decision process at an individual level could be influenced by perceptions and attitudes of the person who is responsible for the innovation process.

2.2.1.3 Rate of Adoption theory

The third theory in the Innovation Model is the Rate of Adoption Theory. It focuses on the rate of adoption process for an individual. Rogers (2003) defined the *rate of adoption* as "the relative speed with which an innovation is adopted by members of a social system" (p. 221). For example some school principals who adopted the innovation for a period of time can be measured against

the rate of adoption of the innovation. Rogers (2003) outlines several strategies to help an innovation reach this stage:

1. Have an innovation adopted by a highly respected individual within a social network, creating an instinctive desire for a specific innovation.

2. Inject an innovation into a group of individuals who would readily use an innovation.

3. Provide positive reactions and benefits for early adopters of an innovation.

Thus, the adoption process is spread over time amongst teachers, monitored by principals, to be implemented successfully in schools.

2.2.1.4 Perceived Attributes Theory

The Perceived Attributes Theory identifies the following five characteristics of innovations: relative advantage, compatibility, complexity, triability and observability. An attribute is a quality or characteristic given to a person, group, or some other thing and in this instance the researcher looked at the attributes of ICT. The theory of perceived attributes is based on the decision that individuals will make either to adopt an innovation or reject the innovation. First, the innovation must have some relative advantage over an existing innovation or the status quo. Second, it is important the innovation be compatible with existing values and practices. Third, the innovation is not too complex. Fourth, the innovation must have triability. This means the innovation can be tested for a limited time without adoption. Fifth, the innovation must offer observable results (Rogers, 1995).

Relative Advantage

Rogers (2003) defined relative advantage as "the degree to which an innovation is perceived as being better than the idea it supersedes" (p. 229). For example school principals who are innovators, early adopters and early majority are more status-motivated for adopting innovations, the late majority and laggards perceive status as less significant. Rogers also categorized innovations into two types: preventive and incremental (non-preventive) innovations. "A preventive innovation is a new idea that an individual adopts now in order to lower the probability of some unwanted future event" (Rogers, 2003, p. 233). Preventive innovations usually have a slow rate of adoption so their relative advantage is highly uncertain. However, incremental innovations provide beneficial outcomes in a short period. For example if some school principals see that technology has value in their instruction, then they will provide help for themselves and their staff through experience.

Compatibility

Another perceived attribute in the diffusion process is the compatibility attribute. According to Rogers (2003) "compatibility is the degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of potential adopters" (p. 15). A lack of compatibility in Information Telecommunication (IT) with individual needs may negatively affect the individual's IT use (McKenzie, 2001; Sherry, 1997). For example school principals' innovation influences teachers' opinions, beliefs, values, and views about ICT teaching. If an innovation is compatible with an individual's needs, then uncertainty will decrease and the rate of adoption of the innovation will increase. Thus, school principals should be clear on the meaning of the innovation and the use of it.

Complexity

Rogers (2003) defined complexity as "the degree to which an innovation is perceived as relatively difficult to understand and use" (p. 15). Therefore, excessive complexity of an innovation is an important obstacle in its adoption. A technological innovation might confront faculty members with the challenge of changing their teaching methodology to implement the technological innovation into their instruction (Parisot, 1995), so it might have different levels of complexity as well. For example if school principals are familiar with hardware and software then they might be adopted successfully for the delivery of course materials (Martin, 2003).

Trialability

According to Rogers (2003), "*trialability* is the degree to which an innovation may be experimented with on a limited basis" (p. 16). Trialability is positively correlated with the rate of adoption. The more an innovation is tried, the faster its adoption is. For example some school principals in the adoption of an innovation might wait for have trial period, which is especially helpful for later adopters. However, Rogers stated that earlier adopters see the trialability attribute of innovations as more important than later adopters.

Observability

The last perceived attribute is observability. Rogers (2003) defined *observability as* "the degree to which the results of an innovation are visible to others" (p. 16). Rogers (2003) argued that innovations offering more relative advantage, compatibility, simplicity, trialability, and

observability will be adopted faster than other innovations. Rogers (2003) does caution, "getting a new idea adopted, even when is has obvious advantages, is difficult" (p. 1), so the availability of all of these variables of innovations speed up the innovation-diffusion process. For example some school principals with *observability* attribute show faster progress of adopting a new technology in their teaching and learning at schools.

2.3 Review the extant literature on studies conducted about ICT implementation

2.3.1 Studies conducted on setting appropriate ICT educational objectives

Within the schools, school principals undertook various leadership roles to inspire the teachers and learners and the entire community (Leithwood, Day, Sammons, Harris, & Hopkins, 2006). They practice to set direction to provide a clear objective, image for the future and the movements afterwards. Otto and Albion (2002) conducted a study on the role of the school principals in realising the potential of understanding ICT policy in schools and they concluded that the ability of school principals to develop and articulate objectives for ICT is critical. It is critical since the principals are the decision makers in the schools as far as purchasing and implementation of ICT is concerned. Once they are not keen on ICT then it means their implementation will be very difficult in schools.

Crowther, Hann and Andrews (2002) also argued that the creation of a shared objective in ICT policy was necessary as such objectives tend to drive the school to adhere to their decisions in times of rapid change.

2.3.2 Studies conducted on leadership and management for the application of ICT

Leadership and management play an important role in school reform, innovations and implementation. Clarke (2007, pp. 1-3) said that leadership is concerned with establishing a vision and directing teachers to reach their predetermined objectives. Thus, the leadership within the school setup need to focus on ensuring efficient and operating circumstances in order to maintain direction as explained in the set of objectives.

A study done by Fullan (2007) about leadership and management in the USA presented guidelines for resisting, coping or leading change in workplaces. The guidelines clearly indicate an inter relationship between school principals' involvement in innovations and how effective such innovation will be implemented in schools, and idea which was supported by other researchers (Baylor & Rithcie, 2002; Soule, 2003; Dragon-Severson, 2004; Johnson, 2004).

For example, school principals as leaders are in the position and have the authority to create conditions for innovations in ICT implementation in schools and their influences will be stronger if they become more proactive during innovations. There is no doubt that good leadership can bring about change or that the school principals' decision can influence the ICT implementation processes at schools (Dawson & Rakes, 2003; Young, 2004; Anderson & Dexter, 2005; Becta, 2005; Vallance, 2008).

It should be noted that the school principal might assist or hinder technology use in their decision to implement ICT into schools (Thomas, 2001; Flanagan & Jacobsen, 2003). It is, therefore, viewed by the researcher that the school principals' understanding of their actions and strategies should be taken seriously as these may influence the use of technology in school. One of the best styles of leadership that can bring about change and transform individuals is transformational leadership (Northouse, 2001). Transformational leadership

> ... facilitates a redefinition of people's mission and vision, a renewal of their commitment and restructuring of their systems for goal accomplishment. It is a relationship of mutual stimulation and elevation that converts followers into leaders and may convert leaders into moral agents".(Leithwood, 2002. p. 5).

Transformational leadership occurs when one or more individuals are engaged with one another in such a way that leaders and followers raise one another to higher levels of motivation and morality (Bass & Riggio, 2006). Foskett and Lumby (2003), who promoted a range of partnerships in education in England and Wales, advocate for the transformational leadership style, which they believe empower school principals' organisational innovation. Transformation leaders promote learning through:

- a shared vision and mission;
- fostering a collaborate climate of accepted group goals;
- conveying performance expectations;
- providing appropriate models and individual support and intellectual stimulation;
- enhancing participation in school decisions; and
- building a productive school culture and also ensure opportunity for teacher professional development (van Niekerk, 2009, p. 15).

All in all, from transformational leadership viewpoints, school principals need to set direction, influence school activities, inspire their staff members, support teachers and learners through innovations in order to improve school activities (Bush, 2003; Clarke, 2007; Davies & Davies, 2005). Therefore, school principals, as managers of schools, are key persons that need to use their powers to change school conditions as well as influence teachers to partake in new innovations such as ICT and high technological developments (Fullan, 2001; Rogers, 2003).

2.3.3 Studies conducted on appropriate ICT infrastructure and platform deployment

The infrastructure involves the identification of baseline needs for buildings as well as software and hardware for the ICT implementation process (Han, 2002; Becta ICT Research, 2004b; Seyoum, 2004; Cowie & Jones, 2005; Afshari,Bakar, Su Luan, Samah, & Fooi, 2009). According to Cuban (2001) the infrastructure should be considered to be more than a question of availability, access, location and organisation. Leaders and managers must know the school infrastructure in order to allow them to make decisions as to whether or not to implement new innovations (Rogers, 1995). Kovalchik and Dawson (2004) identified and described different stages that school principals go through in order to avail the infrastructure of a school for new implementation process. These stages were identified as follows: entry, adoption, adaption, appropriateness and invention.

- The **entry stage** is characterised by having little or no experience in the use of ICT and shows little inclination to change;
- During **adoptionstage**, more interest develops in order to implement ICT, but having insufficient experience might lead to replicate the traditional strategies;
- The **appropriate stage** is the turning point where there is a change in attitude and value of ICT is understood, and integration becomes effective;
- The **invention stage**, is a stage where an individual's start to experiment with new teaching and ICT implementation becomes effective and sustainable (Kovalchik& Dawson, 2004, p. 12).

For ICT implementation to take place, school principals need to make efforts to change. They should reach out for inventions by using a three way relationship of pressure, support and negotiations in order to make changes. It is of the researcher's opinion that school principals should take risks to adopt new strategies to support infrastructures at their schools in order to implement ICT at their schools.

2.3.4 Studies conducted on curriculum development and content availability for ICT

Gulbahar and Guven (2008, p. 45) state that "the key to successful ICT implementation is identifying what you are trying to accomplish within your curriculum." Curriculum can be described as an interrelated set of plans and experiences that learners accomplish under the guidance of a learning institution (Diaz-Maggioli, 2004). It is also the school principal's responsibility to make sure that the curriculum content is current, updated and available. Thus, school principals should be supportive, have insights in the curriculum development and influence curriculum implementation at their schools.

2.3.5 Studies conducted on ICT training and usage support

Kischner (2003) conducted a study on teachers' preparation in deploying ICT. Although Kischner (2003) found out that preparation of teachers is also essential when introducing ICT innovations at a school, school principals have been identified as having major influence in the training and support of the staff during ICT implementation (Owston, 2006). School principals also need appropriate knowledge and skills in order to be able to implement ICT in school activities. It is expected from to keep track of the latest developments in curriculums in order to maintain high educational standards (Newhouse, 2002). Furthermore, Newhouse (2002) said that training for school principals is important in order to develop appropriate skills and knowledge regarding effective use of computers to support teachers and learners in their schools.

Afshari et al. (2009) described the learning style of school principals as a factor for ICT implementation. The implication here is that the personal characteristics of school principals may have an influence on how easily they take up new innovations. Roger's (1995) concluded that school principals, as later adopters, tend to show greater empathy, a greater ability to deal with obstructions than those with low inspiration for the innovation. This view was also supported by Afshari, et al., (2009) that describes late adopters as more realistic, steadier in their judgments, have a concrete grip on problems, dislike fads, are less willing to take unnecessary changes, prefer to be guided by experience and have a more realistic appreciation of possibilities than early adopters.

Furthermore, the school principals' behaviours seem to have an influence on his or her administrative tasks, particularly during the time of change when tension, anxiety, uncertainty and struggle can occur (Rogers, 2003; Lewis & Richie, 2006; Fullan, 2007). In other words, individual differences and contributions from school principals in understanding their administrative tasks can strengthen or weaken the process of ICT implementation.

2.3.6 Studies conducted on the maintenance and technical support of ICT

MoE (2005, p.10) defines maintenance as "actions that are taken on equipment and systems (e.g. repair, upgrading, and can be diagnostic or preventive)". On the other hand, technical support involves actions taken as a result of contact initiated by users to assist them to get more out of the ICT systems, for example, help desk, initial technical training and provision of after sales service. ICT implementation requires maintenance services such as lubricating, adjusting and replacing minor parts to be done regularly. In Namibia, the MoE established the National Education Technology Service and Support Centre (NETSSC) in order to ensure access to technology for all education institutions by overseeing the sourcing, refurbishment, installation and support of ICT in schools (MoE, 2007; Katulo, 2010).

2.3.7 Studies conducted on monitoring and evaluation the ITC implementation process

Monitoring and evaluation (M&E) provides feedback regarding what is working and what needs to be changed during the implementation process. School principals need to gain or foster an agreement with their immediate authorities to monitor and evaluate ICT implementation in schools. According to Leitwood et al. (2006) and Leitwood (2002), such agreements are

essential for driving whole schools towards achieving mutual goals. Rogers' (2003) theory of Innovation Diffusion argued that school principals should be given opportunities to explore changes of their new innovations. School principals should be knowledgeable in timeframe of ICT implementation process and should assist in the change vision for monitoring and evaluation process at schools.

According to TechNa! (2006) M&E is necessary from a number of perspectives. Regular, appropriate M&E provides implementers with feedback regarding what is working and what needs to be changed. Senior policy makers and administrators can see the impact which funding provides. Donor partners can assess their contributions effectively. Ultimately, high quality M&E plans can ensure that interventions achieve their intended long-term goals.

2.4 ICT implementation process

Globally teachers and school principals need to be prepared for the 21stcentury.They need to have appropriate knowledge and skills in using ICT. Currently, developing countries are revising their policy statements that emphasise 21st century knowledge and skills for lifelong learners (NCREL, 2000a), technology knowledge and skills, high-order thinking skills, authentic problem solving, communication and collaboration and most importantly, creating new knowledge. For example, in Ghana a long-term strategic direction provided a framework for specific priorities and actions to be implemented over a period of time. The ministry of Ghana describes its ICT policy in Education as follows: "every learner in general and tertiary education and training bands will be ICT capable by 2015". They stated the following goals:

(1) Enhance a system-wide and institutional readiness to use ICT for teaching, learning and administration.

(2) Ensure system wide integration of ICT into teaching and learning.

(3) Encourage communities to support ICT facilities in educational institutions PHASE III.

(4) ICT integrated at all levels of the education system – management, teaching, learning and administration (Ghana Ministry of Education, 2006, p. 26).

The implementation phases shows the shift in emphasis in order to include the "21st century knowledge and skills for lifelong principals in order to focus on global developments and that will mean that school principals and teachers need to change their role in the teaching and learning environment towards the implementation of ICT in education.

The Zambian government has drawn up a long-term plan called The National Vision 2030. The Ministry of Education of Zambia draft ICT Policy and a draft National Implementation Framework for ICT (2007 – 2010). The Ministry's overarching goal of the ICT Plan is to:

- Enhance the access to quality teaching and learning at all educational levels;
- Become more efficient, effective and transparent in management and administration of the education system.

The Namibian National Policy for ICT in education is derived from *Vision 2030*. The policy has a set of specific educational goals such as:

- To produce ICT literate Namibian citizens;
- To produce 21st century citizens with capabilities of working that from ICT and other related developments;
- To leverage ICT to assist and facilitate learning for the benefit of all learners and teachers across the curriculum;
- To improve the efficiency of educational administration and management from classroom to school level;
- To broaden access to quality educational services for learners at all levels of the education system; and
- To set specific criteria and target to help classify and help categories the different development levels of using ICT in education (Namibian MoE, 2005, p. 5)

Reviewing ICT policy in Ghana, Zambia and Namibia in education, the researcher found out that the focus in all three countries has been not only on particular technologies in teaching and learning but on technology implemented in education settings as well (Honey, Culp, & Carrigg, 2000). While such progression indicates an increased awareness of viewing the use of ICT in context, conceptualization of ICT implementation is still inadequate, in a sense that there is a lack of a holistic conceptualization of ICT implementation that links the use of ICT to educational change. Furthermore, Honey, Culp, and Carrigg (2000) suggest that answering these questions requires the re-conceptualization of a range of concepts relevant to educational change: (1) effective use of ICT cannot be accomplished by technological fixes alone, instead it is embedded in the larger process of educational change; (2) effective use of ICT requires pedagogical intervention from school principals and teachers; (3) effective use of ICT requires organizational intervention, which involves a conceptual change of leadership school principals instructional leadership to transformational leadership, and a conceptual change of professionalization from teacher training to human and social capital development of school principals and teachers. The current study attempted to explore Namibian school principals' conceptualization of ICT implementation ideas and challenges.

2.5 Studies conducted about the perceptions on ICT implementation

Perceptions about ICT schools reflect on many things. Perception is defined as a "belief or option, often held by many people and based on appearance" (Plante & Beattie, 2004, p. 24). However, this researcher view perceptions as referring to school principals' beliefs, emotions, attitudes and opinions towards ICT implementation in teaching and learning activities. For example, school principals' perceptions are essential in the ICT implementation of teaching and learning activities in schools. From the definition, we can note the value of perception as it creates a connection from information to knowledge from one's individual perspective using emotions and opinions in a teaching and learning environment. Perception is crucial for determining an individual's knowledge of the subject at hand. It is in agreement with Plante and Beattie (2004) who further argued that perception allows for various interpretations of information.

Another important factor about perception is that school principals' attitudes can affect the ICT implementation of teaching and learning environment. Han (2002, pp.163–164) has observed that, "it is important to realize that the school principals' existing attitudes, skills and working habits will have a great influence on their acceptance, style of implementation and outcome regarding educational computing". School principals' attitudes towards teachers and ICT integration differ. Literature indicates that school principals have the capacity to influence, motivate and encourage teachers in the use of ICT in schools (Han, 2002). The researcher is in agreement with Davies (2005) who studied how short-term improvement can become strategically sustainable, and pointed out those school principals should show interest in ICT and

be enthusiastic about it. In support of this argument, findings of studies (Foskett & Lumby, 2003; Everard, Morris & Wilson, 2004; van Niekerk, 2009) confirmed that it was important for school principals to continuously motivate teachers towards ICT implementation.

On the contrary, negative comments and opinions of school principals, as well as limited knowledge, could lead to teachers' low motivation. This coincides with the opinions of Foskett and Lumby (2003) and Steyn and van Niekerk (2009) that low motivation may demote and hamper the functioning of a school as well as the attainment of ICT objectives and opportunities for development. However, it is indicated that school principals who seem to have negative attitudes could ICT implementation process (Foskett & Lumby, 2003).

Research shows that school principals who are knowledgeable about ICT and have the positive attitude seem to right perception that could lead school principals to create appropriate opportunities for ICT implementation (Akbaba-Altun, 2006; Kalake, 2007). Therefore, it is imperative for school principals to have the right combination of knowledge and attitude to make their beliefs a reality to effectively implement ICT in schools.

2.6 Studies conducted on the challenges on ICT implementation

Implementation of ICT in schools is a complex process and school principals may encounter a number of barriers (Mumtaz, 2000; Schoepp, 2005). There are barriers or factors that can be manipulated and those that cannot be manipulated. On the other hand, non-manipulative factors

are factors that cannot be influenced directly such as age, teaching experience, computer experience of the teachers or government policy and the availability of external support for the school (Afshari, Bakar, Luan, Samah & Foo, 2008).

On the other hand, manipulative factors refer to attitudes of school principals and teachers towards teaching and ICT, school principals and teachers' ICT knowledge and skills, commitment of the school towards the ICT implementation process (Afshari et al., 2008). Lack of time, lack of ICT competencies, lack of school principals' confidence and lack of positive attitudes are the manipulative and they are only barriers which are discussed next in this study.

One of the most influential barriers to ICT implementation is time. A significant number of studies (Beggs, 2000; Becta, 2004; Al-Alwani, 2005; Schoepp, 2005; Sicilia, 2005) identified time and the difficulty in scheduling enough computer time for classes as a barrier to implementing ICT in the teaching and learning environment. According to Beta (2004) lack of time is a major problem for school principals to perform their work effectively. This can be explained in relation to the overload curricula, the evaluation and lack of resources which necessitates time-consuming preparation for administration. School principals require time to learn new technologies and integrate their newly acquired skills in their teaching and learning practices (Carlson & Gadio, 2002; Day & Sachs, 2004; Theroux, 2004; Woodbridge, 2004; Buckenmeyer, 2005).

Competencies contribute in one way or another to the support of ICT implementation in the teaching and learning environment. Without knowledge and skill of computer technology, school principals might have a high level of uncertainty that might influence their opinions and beliefs about the ICT innovations (Rogers, 2003). Gibson (2002) and Han (2002) further point out that due to continuous change in education, it is essential for school principals to regularly update their own ICT knowledge and skills to ensure that appropriate changes are implemented.

School principals who seem to be knowledgeable about ICT but who lack practical experience of ICT tend to be less effective and to have low competence (Kirkwood, 2000; Afshari, Bakar, Wong & Afshari, 2010). In this regard, school principals should be knowledgeable about organisational strategies, planning and development processes, curriculum, instruction, assessment and teacher professional development to be able to guide teachers to bring about real change (Arnold, Perry, Watson, Minatra & Schwartz, 2006; Busher, 2006; Drago-Severson, 2004; Kalake, 2007). Therefore, it is a necessity for school principals to influence teachers in the sustainability and effectiveness of ICT implementation.

A survey conducted by Earl (2002) shows that lack of confidence was one of the main areas that were highlighted by most of the school principals and they also considered themselves not to be skilful in using ICT. The school principals also mentioned that they were not anxious to use ICT in their instructions in front of learners who perhaps could be more skilful than they were Beggs (2000) also asserts that school principals "fear of failure" could cause lack of confidence. In addition, Balanskat, Blamire and Kefala (2006) found that limitations in ICT knowledge makes

school principals feel anxious about using ICT in their offices. It is therefore, important for school principals to practice ICT in to gain confidence to assist teachers and learners in using ICT in teaching and learning activities.

As technology continues to develop, it also brings change. School principals can be either stimulated or limited by the new innovations in the use of ICT. In other words, teachers may develop a negative or positive attitude towards the use of ICT in the teaching and learning activities because of their belief. If, for example, school principals are triggered by the use of new technology in the teaching and learning situations, they might be capable of influencing the teaching activities at large at their schools by adopting the use of ICT in the classroom or for personal uses or vice-versa. Positive attitudes towards ICT on teaching and learning will not automatically lead to the uptake of ICT or innovative teaching practice. Judson (2006) suggests that there may be a little correlation between stated belief and actual practice.

Some studies (Earle, 2002; Becta, 2004; Gomes, 2005; Schoepp, 2005) argue that school principals' attitudes and inherent resistance to change are significant barriers to the implementation of ICT in the schools. In addition, Beggs (2000) reports that "there can be no change in education without a change in the attitude of teachers" while Becta (2004) argues that resistance to change is an important barrier to school principals' use of new technologies in education.

Gomes (2005) also added that school principals need to see examples of improvement and effective integration and "experience positive events" in order to use ICT. School principals need to be motivated to change their traditional teaching methods to the current practice. Therefore, the notion here is that school principals should be motivated to develop positive attitudes to the use of ICT in education and the implementation process should be done professionally as well as on a gradually basis in order to adopt the innovation of ICT in education system.

2.7 Summary

The literature review presented the theoretical framework of the study grounded in Roger's Diffusion of Innovation Model in order to understand the perception of school principals in ICT implementation. The researcher has focused on school principals' perceptions on ICT which are the main focus of the investigation and useful information was revealed about ICT implementation. The researcher has also identified numerous factors regarding the school principals' perceptions on ICT implementation and it has been revealed that

a) school principals commonly lack the "big picture" of ICT implementation in teaching and learning environment;

b) school principals do not have the ability to analyse and react to ICT issues; and

c) school principals might not know how to support their teachers when it comes to integrating ICT into specific subject content areas during the implementation process. This being the situation, the implementation of ICT into teaching and learning

environment is therefore a great concern because principals as leaders may not be able to guide their teachers and learners in schools.

ICT implementation concept emphasizes the importance of school principals' role in ICT implementation in countries like Ghana, Zambia and Namibia. Moreover, school principals' perceptions and knowledge also provided needed ideas for successful ICT implementation process.

Finally, the literature review presented a discussion about challenges which school principals face while implementing ICT in schools. The challenges include of time, lack of confidence, lack of competency and lack of positive attitudes for the implementation of ICT in teaching and learning. The opinions, perceptions and attitudes of principals towards ICT were found to have either a negative or positive impact on the implementation process. The next chapter outlines the methodology used in the study.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

The chapter focuses on the research design, research methods and research instruments used in the study in order to collect data from the participants. Further discussions include the population, sample and sampling procedures, data collection procedures, data analysis validity and ethical considerations.

3.2 Research Design

The research design is a plan of enquiry (Bogdan & Knopp, 2006; McMillan & Schumacher, 2001) that puts design into motion (Denzin & Lincoln, 2000) on how to proceed in gaining an understanding of a phenomenon in its natural setting (Ary, Jacobs & Razavieh, 2002). The study was an attempt to understand perceptions of school principals on the implementation of ICT in teaching and learning activities in the Khomas Education Region. The design provides logical steps followed to collect and analyse data (Denzin & Lincoln, 2000; Mason, 2002).

A qualitative research design was used in order to understand social phenomena of multiple realities for the school principals' perceptions. A qualitative research method offered a perspective that enabled the researcher to collect enough descriptive data for analysis. The benefit of a qualitative approach to this study is that the research focuses on school principals'

experiences and the meaning attach to events, processes and structures in their schools as social settings (Berg, 2007; Skinner, Tagg & Halloway, 2000). The qualitative research design offers a way of thinking about studying social reality and their natural settings and no attempt was made to manipulate the respondents' behaviour.

Qualitative case studies have been chosen for this study. Qualitative case studies are appropriate for naturalistic, context-specific settings (Patton, 2002) in which the researcher is involved and immersed (Golafshani, 2003) and becomes an instrument through which the experiences of the participants may be interpreted. This study is in a form of descriptive, narrative and non-numerical data aimed to gain insights into the phenomenon under investigation (Gay, Mills & Airasian, 2009). The notion is supported by Denzin and Lincoln (2003) that a strategy of inquiry depicts the skills, assumptions and material practices that researchers-as-methodological developers use when they transfer from a paradigm to the gathering of empirical materials. Silverman (2006) says the significance of a case study method lies in its ability to open the way for discovery in that it creates a platform for further inquiry that may be pursued in subsequent studies.

Gay, Mills and Airasian (2009) define a case study as the in-depth investigation of one unit (an individual, group, institution, organization, program, or document). Moreover, the case study is qualitative and descriptive in nature; it employs methods that provide various views from the participants. The study also investigates practices, beliefs and attitudes that prevail on the use of ICT in teaching and learning environment (Cohen, Mannion and Morrison, 2000). In addition,

the case study is appropriate because in this study it focuses on human experience within the complexities of contexts (Rossman & Rallis, 2003). Thus, the approach is believed to provide in-depth data in order to enhance the understanding of the school principals' perceptions in ICT implementation in schools.

3.3 Population and Sample

The population for this study comprise of all 27 secondary school in the Khomas Education Region. However, a sample of three secondary school principals was drawn from 27 secondary schools (who met the criteria explained in section 3.4). The following three suburbs in the Khomas Education Region were chosen: Katutura, Khomasdal, and Windhoek Central. Members of a sample were chosen with a purpose to present a suburb in relation to a key criterion and have a principle aim to ensure that within each of the key criteria (Ritchie & Lewis, 2003). In addition, in order to achieve significant understanding of the school principals, the researcher generated meaningful and relevant data that enabled her to address the research questions and form arguments to support the findings (Mason, 2002).

3.4 Sampling procedures

A purposive sampling procedure was used in order to select the school principals. It is a process of selecting a sample from a given population that serves a specific purpose (Gay, Mills & Airasian, 2009). The researcher purposefully selected three school principals using the following criteria (Glesne, 2006; Berg, 2007).

- The school should be in existence for at least six years because six years has now passed since the launch of local ICT policy;
- The school should have a computer laboratory or dedicated room for ICT;
- The school should be a secondary school; and
- The school should have implemented ITC in teaching and learning activities.
- The school principal should have at least consecutive three years of experience at the same school;
- The school principal must voluntarily participate in the study.

3.5 Research instruments

Data were collected by using a semi-structured interview guide, documentation and observation checklist were also used in this study (see Appendix E and F) to collect personal data from the school principals at the selected schools.

3.5.1 Documents for data collection

In the document analysis, the researcher gathered and studied documents at the selected schools. These documents included the school IT (Information Technology) plans and minutes of meetings about IT at schools, ICT policy, the Tech/NA! ICT implementation guide, leaflets and circular memorandums from the Ministry of Education were used to supplement the information and uncover information that would describe the school's ICT implementation history.

3.5.2 Interviews

Interviews are one of the most common forms of qualitative research methods (Ary, Jacobs & Razavieh, 2002; Mason, 2002; Ritchie & Lewis, 2003; von Kardorff & Steinke, 2004; Silverman, 2004). The researcher adopted the semi-structured interview method and developed an interview guide in order to get descriptive information from the participants. According to Denzin and Lincoln (2000) interviews provoke thought and allow participants to express themselves in greater detail, thereby revealing more information that the researcher may not be aware of. Another advantage of interviews is that they yield more elaborate and clearer answers that result from probing responses for clarity and expansion (Gall, Gall & Borg, 2007) when compared to questionnaires. The semi-structured interviews with open-ended questions are also believed to allow ideas to come to mind in relation to innovation, implementation, and the role of school principals in the implementation process. An interview guide, consisting of semi-structured questions, provided a high degree of objectivity and uniformity and allowed the researcher to probe further for clarification (McMillan & Schumacher, 2001).

The interview schedule comprised of seven open-ended questions focusing on the general perceptions of school principals in implementing ICT in schools and the challenges school principals were faced with during the ICT implementation process. All the interviews were recorded on tape. School principals were interviewed individually during their free time. Each interview took approximately 30 minutes.

3.5.3 Observations

Observation involves the watching of participants in order to understand their interactions and behaviour in a natural phenomenon (Gay, et al., 2009). It is purposeful, systematic and selective (Kumar, 2005) method of gathering information in a natural setting (Creswell, 2009, p. 221). Further, observation is appropriate for this case study for monitoring school principals' behaviour and practices in schools. The researcher observed and took written notes at the school sites about various places on the school ground such as school principals' office, staff rooms, classrooms and the computer room or IT laboratories in order to have better understanding of the school setting. The researcher was permitted to visit the school principals once during the course of the study, stay in the computer room or laboratories and to observe the uses of ICT by teachers, secretaries, students as well as by the school principals. Pictures were also taken with the permission of the respondents.

3.5.4 Pilot testing

All the research instruments were pilot-tested in three of the selected secondary schools in the Khomas Education Region. The primary importance of a pilot study is that it may assist in the development and testing of research instruments and collection of preliminary data (Teijlingen & Hundley, 2001). The pilot study case schools met the same criteria as outlined and did not form part of the actual study. The reason for conducting a pilot study was to find out whether instruments were measuring what they were supposed to measure (Berg, 2007). Working from the findings of the pilot study, some corrections were made such as reduction of the number of question items.

Before interviews were carried out during the pilot study, the purpose of the study was explained to all the respondents and verbal informed consent was obtained from the respondents to tape record the pilot interviews. Three questions were asked from the interview guide and the participants were asked to identify questions they had difficulties to understand. It lines up with Kvale (2005, p. 155) who suggests that the wording of a question "inadvertently shapes the content of an answer".

The recorder responses were checked for unexpected answers that may have occurred as result of possible misinterpretations of interview questions. The pilot results indicated that the research instruments brought out most of the anticipated responses. The findings of the pilot study shows that participants had some difficulties in understanding the abbreviation and the meaning of the term ICT? They did not know that ICT involves different tools such as DVDs, televisions, MP3s, digital cameras and other equipment. Therefore, the researcher has changed ICT to "Information Communication Technology equipment or tools". The second question was on "What type of ICT do you have at your school?" It was changed to "What type of Information Communication and Technology equipment or tools do you have at your school"? Question three has been changed to: "What training can teachers receive to implement ICT into teaching and learning activities?" Instead the following question was posed: "How do you support your teachers to implement ICT into teaching and learning activities? The information in the observation schedule was not changed because it was found appropriate for the study.

3.6 Data collection procedures

The following procedures were used to collect data. First, the researcher obtained permission from the MoE and school principals to conduct the study at selected case secondary schools (see Appendix A, B, C and D). Secondly, the researcher explained the purpose of the study to the participants and discussed the ethical issues with the participants. A suitable time table was set with the principals. Seven open-ended questions were asked by the researcher during the interview. Each school principal was interviewed once and each interview lasted for approximately 30 minutes. All interviews were audio taped after obtaining informed consent from the participants. All the recorded interviews were transcribed verbatim. Finally, the researcher obtained permission to observe the school's activities over a period of three months for approximately an hour for an observation per school. In-depth notes were kept about the practices of the school in ICT implementation process. These notes assisted the researcher in order to get better understanding of the responsibilities of the school principals in analyzing documents.

3.7 Data analysis

The documents related to the implementation of ICT include minutes of meetings, school schedules, school agendas, ICT implementation guide and ICT policy. These documents together with the interview guide, observation check list and the in-depth notes were analyzed. The researcher conducted observation, before and after the interview for a period of one week starting the day the researcher entered the research site. Observation notes were taken immediately after every activity was observed. The field notes from the observation schedule

were presented in reported form. The data from the field notes were categorised in themes such as ICT tools, ICT perceptions, ICT skills and infrastructures. The data collected through observation was analysed using interpretations that relied on the researcher's own insight as presented in the school portfolios.

Secondly, the data obtained through interview were presented and analysed as follows: First, the researcher listened to the interviews from the tapes and transcribed them one by one. The transcribed data were re-read several times. The responses per question were presented in a report form and in some cases directed quotes were recorded. The still-pictures were also used to support some responses. A summary of the interpreting items that appeared more in the responses was written. Responses for interview questions were analysed using narrative analysis. Gay, Mills and Airasian, (2009, p. 385) defines narrative analysis "as a process where the researcher collects descriptions of events through interviews and observations and synthesises them into narratives or stories, similar to the process of restoring.

3.8 School Portfolios

The following schools were observed during the research and several findings were noted.

School A case study

School site

School A was the first school site where the researcher collected data. In this school Frank is the school principal. The secondary school is in Windhoek Central suburb offering Grade 8-12. The school has a total of 34 teaching staff members and two secretaries. The school is managed by a school principal and four Heads of Department (HODs). The school has a total number of 1000 learners. The learners came from middle class to upper class socio-economic group. Some had their own computers with or without Internet connections. Almost all the students were computer literate.

ICT tools

They have ICT tools such as three TVs, three digital cameras, DSTV, an overhead projector, internet, computers and laptops. The staff members also have a privilege to teach on whiteboards. The school had 80 computers under the Sanlam project. They had three serves to link all the computers to Internet connection and LAN. With the schools existing computers, there were a total of 120 computers in this school. Computers were placed in fifteen classrooms and science labs, the resource centre, staff room, the serve room and the office block for the school principal and the secretaries.

However, the researcher observed that the computers in the classrooms had been relocated to the four computer labs. There were no computers in all classrooms. At the time this study was carried out, the computer system at one of the buildings was down due to faulty router. The router had a technical problem about two months before the researcher's fieldwork. Teachers and students could not access the Internet.

Infrastructure

The school also has two computer labs. This school had more technology infrastructure compared to School B and C. The hardware in these schools was located at the classroom, science lab, teacher's computer room, computer lab, resource centre and office. Each computer lab consisted of 30 computers, and LCD and one laser printer.

The processing of information that is afforded by technological advances changes the very layout of the classroom. No longer are desks arranged in rows with the teacher positioned at the front of the computer lab from where the teachers can teach. Many schools are beginning to replace desks with tables so that students can interact with one another. Traditional desks have been replaced by tables and modern furniture. The researcher observed that the lighting, power supply and computer lab size was sufficient. The increase of electronic media such as computer monitors, LCD projectors, digital whiteboards and file servers have greatly increased the burden placed upon the power infrastructure of school buildings.

School B case study

School site

The next school for the researcher to collect data was School B. Abel is the school principal at this school. This secondary school is in Katutura suburb; it offers Grade 8-12. The school has a total of 32 teaching staff members and 2 secretaries. The school is managed by one school

principal and four Heads of Department (HODs). The school also has two secretaries. In terms of learners, the school has a total number of 888 learners.

ICT tools

School B has equipment such as a digital camera, voice recorder, DSTV and an overhead projector as well as a television set for classes. Unlike School A this school has not as many computers. Eight computers were put in a classroom for teachers use only.

Infrastructure

The school also has no computer lab similar to School A and School C. School B only has a classroom for 8 computers and other ITC tools at the school. The researcher observed that the classroom was in a poor condition. There was not enough ventilation and that can cause the computers to overheat. The lightning was also poor and most of the time the computer teacher relied on natural sun light due to interruptions of power failure at times. The power was also off during the observation and the researcher could experience the struggle of the school principal who tried to explain the challenge of electricity when the school principal was asked for the condition of the classroom. In addition dust could also be observed on the other ICT tools such as the digital cameras and the overhead projector. It indicated to the researcher that the computer room was not properly structured for ICT use.

School C case study

School site

The next school where the researcher collected data was School C. Jack is the school principal. This school is in Khomasdal suburb and has Grade 8 to Grade 12 classes. The school has 38 teaching staff members and a secretary. The school is managed by a school principal and four Heads of Department (HODs). In terms of learners, the school has a total number of 1050 learners.

ICT tools

Ten computers were placed in the resource centre, 10 computers in the computer lab and five computers in the staff room. The entire computers were not connected to a server in a LAN environment with Internet connection using the lease line connection. There was also one laptop for all the classes.

Infrastructure

The school also has one computer lab with computers for the Information and Technology (IT) subject. The school also had one new building specially built as a computer lab, however, the building was empty as they were short of cash to buy the hardware at the time of the researcher's fieldwork. Besides, the researcher questioned the building and did not add it to the total number of computer labs since it might be used for something else in completion. The computer lab had a trolley with a plug for laptop and computer connection was placed for classroom use. If a

teacher wants to use the laptop, he or she had to push the trolley to the front and fixed the equipment.

3.9 Validity

Validity is a test of whether the collected data accurately gauge what is measured (Cohen & Morrison, 2000; Babbie & Mouton, 2001; Denzin & Lincoln, 2003; Mason, 2002; Mills, 2003). Furthermore, validation is related to the authentic context of the sub-studies and issues around the observed setting. In this study validity was ensured through judgement of the researcher's supervisor, teaching, learning and research techniques. Generally the validity was done by asking a series of questions and the answers in the research of others.

3.10 Reliability

The term reliability is defined as

> the extent to which results are consistent over time and an accurate representation of the total population under study is referred to as reliability and if the results of a study can be produced under a similar methodology, then the research instrument is considered to be reliable (Joppe, 2000, p. 1).

Similarly, de Vos (2002) explain that reliability may be assured by the researcher by using similar instruments at different times or administering the instruments to different subjects of the same population and yet get similar results. For example, test and re-test method was used during pilot study to establish reliability of the instruments.

3. 11 Ethical considerations

Ethical issues were considered at all times in order to keep the participants and the researcher in accordance with the best practice (Cohen, Mannion & Morrison, 2000). The participants were assured that the information obtained from the interviews, questionnaires would be treated confidentially and that it would only be used for the purpose of the study (Denzin & Lincoln, 2000; Seale, Gobo, Gubrium, & Silverman, 2004). Secondly, permission to tape record the interviews was also sought from the participants. Thirdly, participants received an informed consent sheet to sign that clearly stated that their participation in the study was voluntary (Ary, Jacobs, & Razavieh, 2002; Denzin & Lincoln 2002; Ritchie & Lewis, 2003; Seal et al., 2004). Finally, the real names of the participants and schools were not used but fictitious names given to principals and schools in the study. Participants were given fictitious names and schools were assigned with letters of the alphabet (Denzin & Lincoln, 2000; McMillan & Schumacher, 2001; Richie & Lewis, 2003).

3.12 Summary

The chapter described the design that was used to collect descriptive data. The population, sample, sampling procedures, research instruments, data collection procedures and data analysis procedures were described. The instruments used to in data collection were discussed. An account of how the instruments were piloted and how amendments were made to refine the last version of the research instruments was explained. In addition, three schools and three school principals' portfolios were also presented. Ethical issues were described. The next chapter deals with presentations of results, discussions and findings of the study.

CHAPTER FOUR

DATA PRESENTATION ANALYSIS AND DISCUSSION OF RESULTS

4.1 Introduction

In this chapter the researcher presents the results of the Study. The main research sub-questions are as follows:

1. What type of information and communication technology tools or equipment do schools have?
2. What are the school principals' perceptions about ICT implementation in schools?
3. What perceived skills do school principals have to support teachers in ICT implementation?
4. What perceived challenges do school principals face during the implementation of ICT in schools?

For the ease of reference, the chapter revolves around four research questions that have been used as spring boards for the presentation. The analysis of data is starting with the data from the first research question.

4.2. Research Question One: What type of Information and Communication Technology tools or equipment schools have?

In this section, the researcher presents responses of respondents to the question and above, followed by the analysis of responses.

4.2.1 Interviews

Frank: *We have two computer labs. The one computer lab has fifteen serviceable computers with internet and the other computer lab has twenty computers, only for word processing. The school also has three television sets in language classes, three MP3 for oral tests and examinations, an overhead projector and three digital cameras for excursions and whiteboards in classes for teaching. The teachers can also make use of the five laptops of the school for administrative work. Our internet is linked with the school inspectors so as to monitor the progress of the learners.*

Abel: *We have a digital camera, voice recorder, television with DSTV in our computer room and teachers are allowed to borrow these equipments for their lesson presentations. All electronic equipments are stored in the computer classroom. Our computer classroom has eight computers mainly for teachers to do their administrative work. A television set is also available to show some programmes of case studies.*

Jack: *The school has one computer lab and no other ICT tools to assist with teaching in classes. I would like to buy some more ICT equipment but money is the problem.*

4.2.2 Discussion

The respondents were asked to mention ICT tools available at their schools. Findings revealed that during the distribution of these ICT tools resources there were imbalances between rural and urban schools.

As illustrated in the above responses, all school principals provided a list of ICT tools that are available at their schools. Altogether, the schools had the following ICT tools available:

- Computers (ranging from 0 to 30 computers per school)
- Televisions (3), some with DSTV connections
- MP3
- Laptops
- Digital camera, Voice recorder
- Overhead projectors
- Whiteboards

For the summary of the available ICT tools at schools, refer to chapter 3 under school portfolios. The equitability of schools with ICT tools could be related to different issues such as school context; financial support; lack of interest from principals' side; lack of skills or simply just ignorance of the willingness of the principals. For example, Silverman (2004) and Yin (2003) also observed that the events leading to the choice made for the type of ICT tools to be used could better be understood in the context within which implementation of ICT occurs.

Furthermore, the availability of ICT alone was not sufficient since technical as well as pedagogical support on how to use ICT equipment should be established (Nachmis & Forkosh-Baruch, 2008). Aryatuha (2007) also noted that the availability of computers and other ICT tools should be accompanied by training of the users and constant technical support. Thus, high quality of ICT tools could be available at schools but they could be wasted if they remain underutilized. In addition, school principals who buy equipment for their schools need to have knowledge about the latest ICT tools so that these could last for few years and not just collapse in short periods of time after spending a lot of money on these.

4.3 Research Question Two: What are the school principals' perceptions about ICT implementation in schools?

In this question the researcher was concern about school principals' perceptions about ICT implementation in schools as it was obvious that their perceptions could have had an impact on ICT implementation in their schools.

4.3.1 Interviews

One interview item provided the answers to research question two above. The item was:

- What are your general perceptions on the implementation of Information and Communication Technology?

When the question was posed, the school principals expressed their views as follows:

Frank: *My general perception on the implementation of Information and Communication Technology is that it is very important in the world like ours and in today's world. Everybody should be computer literate. It is important for learners and teachers to know computers. Computers will also be useful for teachers and learners. We can only benefit from having computers in our school.*

Abel: *I am generally very supportive to ICT in schools. We live in a global village. We cannot run away from computers. We need to be internationally updated with technology…. ICT is making education much more interesting. The school is the only place or platform to learn ICT skills. The ICT implementation guide was established in 2006.*

Jack: *Well, firstly, the implementation of ICT in our schools is long overdue. Different phases were supposed to start in the schools. This is something that should have been done long ago. We live in an era where we know information technology and communication is so crucial that you cannot lag behind because we need to be abreast with media. ICT is nowadays not optional at schools.*

In addition, the following question was asked regarding the necessity of the government to implement ICT: Do you think it is necessary for the government to implement ICT in education?

Frank: *I don't have a problem with the government. When I handed in my proposal to the government to receive some computers for my school they assisted me. They also gave me some contacts for computer services supporting the government schools. The government officials do assist when I call them. Our school also received an overhead projector and a digital camera from the government.*

Abel: *I tried several times to contact the government but people don't help at those offices. However, the school received eight computers from a private company and that is what we are currently working on.*

Jack: *The government only helped me once with computers for my school and never communicated to me when I wanted some information regarding the computers at school.*

The researcher felt that it was necessary to pose another question to school principals about whether they received enough support from the Ministry of Education to implement ICT in schools. The question read as follows: Do you think school principals receive enough support on ICT implementation in schools? What type of support to you need?

Frank: *I receive support from the government, learners' parents and private companies. There were also some teachers at the school who offered their services in the ICT laboratories in case of emergencies.*

Abel: *The government only supported my school once. There are also some parents who volunteered to look for funds for ICT equipment.*

Jack: *I don't receive any support for ICT at my school.*

4.3.2 Discussion

The respondents were asked to give their personal perceptions on ICT implementation in schools. Their responses gathered the following results:

Comment*: Frank views ICT to be important in today's world. His view is for everyone to know computers. However, Frank did not elaborate about what should be taught in order to be computer literate and in what ways teacher and learners could use computers for. For a person who school is well equipped with ICT tools, he could have taken a lead about how ICT could be used to enhance teaching and learning at the school.*

Comment: Abel seems to have welcomed the implementation of ICT at his school (B). He highlighted some interesting views about why the school needed to have ICT tools. His perceptions as to why ICT tools were important were linked to its global usage. According to Abel, communicating internationally seems to be of importance. However, Abel said very little as to how ICT could make education interesting and how he wanted to provide opportunities to teachers and learners in order to learn ICT skills.

Comment: Jack seemed to be more concerned with long overdue implementation of ICT at his school. He seems to be frustrated with the ICT implementation process. According to him the ICT implementation process was supposed to have been completed long time ago. From the look of things, he seems to be complaining about the slow progress of the implementation process. According to him, ICT at schools should not be considered as an optional thing since all the schools need support in one way or the other.

***Comment**:* With the exception of Jack, other school principals seem to have received assistance from the Government. Frank and Abel also indicated that they received support from teachers as well as parents who volunteered to look for funds for ICT equipment while Frank seemed to have hardworking teachers who offered their services free of charge. Jack seemed to be frustrated and his answer is very short and one cannot really make up whether he had no interest or may be frustrated by lack of support. It is, however, interesting to know how Jack has managed to have a computer laboratory if he did not receive any support at all.

An interesting finding from this study was the difference in perceptions of what school principals had in their definitions of ICT implementation. Change also goes along with the right attitude. Han (2002) says that the able school principal has the capacity to influence and leadership role to encourage innovative changes in teaching and learning. Even though the three school principals gave their own perspectives of ICT implementation, they were positive and eager to see ICT implementation in schools. In this research, it was evident from the findings that, even where the school principal did not receive the expected government support from government, they went ahead and sourced external support to achieve their objectives for ICT implementation in their schools. The importance of a positive and proactive approach to external links and influences such as ICT in schools has been noted in previous research (Tearle, 2003). Therefore, in order to adopt change, school principals should have a positive attitude in their role as ICT implementers at their schools.

Furthermore, it could be seen by the responses of the school principals that the government is supporting ICT implementation in schools as could be deduced from interviews where the majority of principals indicated not to have problems with the support they received from the government (two school principals out of three). The government's cooperation is necessary for ICT implementation and has a substantial impact on the availability of ICT equipments at the schools. There is, however, a need for the government to re-evaluate the ICT delivery tools to schools by considering the social context of the school. Moreover, the realities of school principals' needs and interests in the different schools should be considered in order to speed up the implementation of ICT in schools.

4.4 Research Question Three: What perceived skills do school principals have to support teachers in ICT implementation?

The researcher used both interviews and observation methods to collect data to the above research question.

4.4.1 Interviews

In order to provide answers to the above research question in the interviews were used. Three of the interview items provided answers to research question three. The five items were as follows:

- How do school principals receive their ICT skills?
- How important are these ICT skills for school principals?
- How well are you prepared to use ICT in your school?
- What type of ICT training did you receive?

- How do you implement ICT in school administration?
- How school principals supported teachers to implement ICT in school activities?

School principals were asked what ICT skills they needed in order to support their teachers. The school principals expressed themselves as follows:

Frank: *I know at least how to switch on a computer and to switch it off. Most of my documents are also saved for later use. In case I need to work on the documents, I know how to navigate in my folders, rename a document, copy and paste information and to print if I need hard copies. With regards to internet, I logon and off the network to check for information such as ..... I like for example to read my newspapers from the websites. Normally, I check my mails before I start working on my laptop.*

Abel: *I know at least how to switch on a computer and to write my documents for staff members and learners.*

Jack: *I don't know how computers work. I want to know.*

Furthermore, the importance of these skills for ICT implementation was asked. The majority of the school principals stated that due to a lack of knowledge on ICT they did not know that to enhance skills was important. The following quotations illustrate views on the school principals:

Frank: *I know how to work on the computer but some of the applications are still a challenge for me. I still need to learn how to do some presentations from the PowerPoint and work on communication, for example wikis and discussion forums for ideas from people in other countries.*

Abel: *I just know how to work on Ms Word to write my documents for staff members and learners.*

Jack: *I don't know how to work on the computer.*

In response to the third question, the school principals how well they are prepared to use ICT in schools and this is what they said:

Frank: *I can work on some ICT equipment but I need confidence to do it in front of my staff members and the other people.*

Abel: *I am not ready to show any ICT skills. There is a lot to be done to update my skills.*

Jack: *I am not ready. I have to learn many things in ICT.*

The researcher also posed the question on training they received and they answered as:

Frank: *I have the basic training in computers. I completed the ICDL course and I think it will be wise to learn about Office Administration.*

Abel: *Well, I did ICDL and I know how to use the internet. I also received IT training at FNB when I worked there as a manager.*

Jack: *I would like to do office administration which l am more interested to be trained in. No, I did not receive any training. In the near future I want to use Edupack which is offered by the Ministry.*

The researcher also asked the question on how school principals implement ICT in school administration and the following were their responses:

Frank: *My secretaries do most of the administration work at my school. I don't need to know. I sometimes go on the computer programs if I need records for my staff members or learners. Oh, yes..... I would like to attend a course in ICT administration for schools to know more on how programmes operate in schools.*

Abel: *My two secretaries are doing most of the school's administrative tasks. I can do some of it but I just don't have time to work on it. There are too many other activities which need my undivided attention at school.*

Jack: *The administrative work for the school is done by my secretary. She used to give me information when I need it for the staff members, parents or learners at school.*

Finally, when the researcher posed a question about how school principals supported teachers to implement ICT in school activities; the school principals have the following to say:

Frank: *All my staff members are encouraged to attend ICT workshops. I support teachers by giving them access to the computer room anytime of the school periods. They can make use of the school laptops for projects in their non-teaching periods to prepare some information for their lesson presentations. Teachers only have to submit typed question papers. In order for teachers to accomplish what they intend to do, we appointed a computer teacher to help them with projects. Teachers are also encouraged to give presentations after they have attended ICT workshops in order to motivate their colleagues to do the same.*

A further strategy of supporting teachers must be to establish a timetable to force teachers to make use of a computer at least once in a cycle of seven days. Teachers have to sign in and out for borrowing ICT equipment in their classes. In the process I will be able to monitor teachers who are active in the ICT at our school to assist those who are a bit slow. As a follow up, a report for the teachers' progress will be available to involve them in the use of ICT.

Abel: *My 28 staff members are exposed to workshops according to their interests in ICT. However, that is a challenging part because some teachers struggle with basic functions of cell phones. Some teachers do some administrative work on the computer room during their free periods.*

Jack*:* *Those teachers who are interested in ICT must look for opportunities to attend workshops themselves. There are too many teaching activities to be done for learners.*

4.4.2 Discussion

The question was asked whether school principals had received training and their responses were the following:

Comment: Frank seems to have basic computer skills and seems to have knowledge about using Microsoft word (Ms-word) since he know how to navigate between folders. With regards to using Internet, Frank indicated that he is able to read newspapers and his email communications.

Comment: On the other hand Abel seems also to have the basic computer skills, opening and switching it off as well as to use Ms-word for record keeping. It could be regarded that Abel, perform at least one ICT-related function which can be improved with further training.

Comment: Jack seems to indicate that he knows nothing about ICT. This seems to be funny not to have any ICT skills since everyone, nowadays, have a cell-phone and they supposed to know how to use them. Therefore, it seems like Jack had comfortable with prepared documents by his secretary.

Findings in this study indicated that only two school principals (School A and School B) were able to use computers in their offices while the other school principal still used the traditional

way of by making use of printed material which was prepared by the secretaries. In addition to computers only some ICT tools were observed in some of the school principals' offices of this study. This study showed that despite school principals' ICT training, school principal Jack was unable to use the computer in the office. As it could be seen from the school principals' responses, they all wanted training for them to proficiently make use of the computers.

Only one out of three school principals (Frank) had access to the Internet and one school principal indicated that he is also working on the School Write Computer program (a programme which keeps records for learners at schools). In addition, due to the lack of ICT experience, all the school principals of this study confirmed that secretaries did most of the administrative duties. Collected data indicated that only one school principals mentioned about the Internet use. The Internet helped school principals to find information regarding their profession and educational subjects in order to develop processes for effective decision-making and problem solving which results in better accountability (Felton, 2006). Therefore, it was vital for school principals to have access to the Internet as well.

4.5 Research Question Four: What perceived challenges do school principals face during the implementation of ICT into schools?

4.5.1 Interviews

The interview guide had four items of which one provided answers to research question four. The following interview question was posed to school principals:

- What challenges do you experience with regards to ICT implementation at your school?

The school principals answered interview item one as follows:

Frank: *The challenges we currently experience is that we don't have enough computers. Lack of money to buy and maintain the computers are the biggest needs. We are in the process to ask an extra N$50 from parents to appoint an instructor for computer classes. At times I experience ineffective Internet network.*

Abel: *The first one is lack of ICT resources such as computers, printers and over head projectors. We need more computers at our school. Secondly, more television sets are needed for my staff members and the learners. The televisions can be used to watch educational programs by learners and teachers can use them to update their lesson information. I need at least a computer lab for learners instead of a computer room which is only used by teachers. Proper power supply is also needed for my smooth running of my ICT activities at school.*

Jack: *The ministry must please provide another computer lab with more computers because the learners are too many. We need a willing teacher and an enthusiastic facilitator who could inspire the teachers to use ICT at our school. Another headache is money for ICT tools. ICT tools are very expensive and I plan to seek assistance also from the parents and private businesses.*

4.5.2 Discussion

The researcher asked the respondents what challenges they faced with ICT implementation in their schools. Their responses were as follow:

Frank *:* *He seems to contradict himself here. See Research question one. Frank's school has two computer laboratories. Maybe he wanted some more computer laboratories. He also mentioned inadequate funds to improve most probably on his ICT in his school.*

Abel*:* *He also seems to have different conception of what ICT is all about. Eight computers, digital camera, voice recorder, television with DSTV in computer room, is that not a lot, only for teachers? However he asked for more ICT tools and computer labs despite the fact that he had problems with power supply.*

Jack*:* *It seems to be a communication break down between the governments and school principal Jack with regards to the supply of ICT tools. Thus, maybe he needs to explore how best to communicate with the government in order to secure sustainability of ICT implementation programme at his school.*

School principals seem to face many challenges in ICT implementation face many challenges in ICT implementation in Namibia. The challenges include: lack of electricity, lack of knowledge of skills, lack of Internet, inadequate finances and lack of technical support in ICT implementation into teaching and learning.

Another basic requirement was the availability of electricity at Jack's school (School C). This affects the functioning of any ICT initiative. Power cuts with different power cut schedules each week create havoc with the timetables. Power outages and fluctuations add to the high maintenance costs of computer hardware. Thus, alternative power supply needs to be available at schools.

The lack of knowledge and skills for implementing ICT in their teaching and learning was attributed to the lack of courses in ICT training. Pelgrum (2001) addressed a self-assessment of knowledge and ICT skills and found a correlation between low level of knowledge and internal information exchange (exchange of information about ICT on courses, staff meetings and inside ICT working groups). For example, Frank said: *"I have the basic training in computers. I completed the ICDL course and I think it will be wise to learn about Office Administration ".* Similarly, Jack also said: *"I would like to do office administration which l am more interested to be trained in. I did not receive any training. In the near future I want to use Edupack which is offered by the Ministry".* These findings suggested that school principals would love to receive more training in specified areas of ICT in order to apply acquired skills in their working environment. Moreover, Scrimshaw (2004) believed that adequate training is crucial for building confidence and the feeling of competency among teachers. Similar results to those in this study were presented by Vuković and Dumančić (2011) who showed that more ICT courses for school principals created more positive attitudes towards ICT among school principals, who then felt more ready to apply their knowledge and skills. Thus, ICT knowledge and skills was a need for successful ICT implementation in schools.

While the Internet contained tremendous potential for school principals, it also has its own pitfalls. For one, providing all schools with Internet access was a very expensive proposition for most government schools. This was more so in the case of rural centers and remote areas, where Internet connections are bound to be erratic, if available at all. A different challenge altogether when it came to Internet usage is the effort involved in monitoring the teachers and learners'

usage of the Internet to ensure that they did not visit educationally irrelevant and socially undesirable sites, thus detracting them from the intended objective.

A number of other international studies also confirmed that the availability of financial resources was crucial for ICT implementation processes (OECD, 2010; Stensaker, Maassen, Borgan, Oftebro, & Karseth, 2007; Tearle, 2004; UNESCO 2011). Out of the external factors discussed so far, 'financing' stood out as having the biggest influence on other factors. Thus, the participants held the insufficient financial resources responsible for the lack of or inappropriate hardware, software, technical support and professional development both at faculties and in the schools. Pelgrum (2001) identified the same external factors and called them material conditions which presented obstacles to the implementation of ICT into schools, with an exception that he included lack of technical staff into non-material conditions.

The researcher also reported that technical support was a challenge for school principals. In the same way Scrimshaw (2004) and Stensaker, et al., (2007) listed 'technical support' as an important ICT enabler while Pelgrum (2001) noticed that 'lack of technical assistance' and 'lack of technical support' had a great negative impact on ICT implementation. However, the problems around the lack of technical support were not specifically mentioned in this study, the school principals still need to work out strategies in order to ensure the smooth running of ICT in schools.

4.6 Summary

Within the context of the study the analysis of the data was presented from the research questions in the interview guide. An analysis of the results led to the identification of the following challenges amongst others:

- lack of electricity;
- lack of knowledge of skills;
- lack of computers;
- lack of Internet
- inadequate financing in ICT; and
- lack of technical support in ICT implementation into teaching and learning.

The complexity lied in the school principals' perceptions with regard to knowledge and skills in ICT implementation. These factors enabled or constrained the development of ICT implementation in the teaching and learning environment. The next chapter presents summary of findings, conclusions and recommendations

CHAPTER FIVE

SUMMARIES, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

In this chapter the researcher presents summaries and conclusions of key findings of this study. The research questions are be used in order to present the findings of the study as well as writing recommendations.

In order to investigate principals' perceptions on ICT implementation in selected secondary schools in the Khomas Education Region. Four research questions were addressed and summaries, conclusions and recommendations are presented according to the main research questions of this study, starting with the first research question.

5.2 Summary of findings

5.2.2 Findings related to research questions

5.2.2.1 Research Question One: What type of information and communication technology tools or equipment do schools have?

The study revealed that during the distribution of ICT tools and equipment there were imbalances between schools in the different suburbs as per sample of the study (see page 40). Schools in typically high socio- economic suburbs were better equipped than those in typically low socio-economic suburbs.

The school principals who were engaged with ICT had more exposure on ICT tools than those who had little experience with ICT. Thus, it could be argued that the schools principals' character towards the new innovation had an impact on success or failure of ICT implementation. According to Rogers there are five crucial characteristics of a successful innovation. These five 'perceived characteristics of innovations', as Rogers calls them, are the aspects considered by potential adopters that affect how likely those potential adopters are to move from the first stage of awareness to the last stage of adoption. These five attributes were referred to as:

- *relative advantage*: the 'degree to which an innovation is perceived as being better than the idea it supersedes'
- *compatibility*: the degree to which an innovation is perceived to be consistent with the existing values, past experiences and needs of potential adopters
- *complexity*: the degree to which an innovation is perceived as difficult to use
- *trialability*: the opportunity to experiment with the innovation on a limited basis
- *observability*: the degree to which the results of an innovation are visible to others (Rogers 1995).

In line with the opinion from Rogers, the school principals must became aware of the ICT tools in their schools incorporate them in their schools and to make full use of them.

5.2.2.2 Research Question Two: What are the school principals' perceptions about ICT implementation in schools?

The data revealed that the understanding of the concept "ICT implementation" appeared to reflect that all the three school principals in this study had different views on ICT implementation at schools. Akbaba-Alun (2006, p. 186) points out that school principals' insufficient ICT-related knowledge leads to interpreting of regulations according to their own will. However, despite the fact that all three school principals were different in their views, they were very positive and eager to implement ICT in their schools.

When school principals were asked to explain about ICT implementation support from the government, two out of three school principals indicated that the government's engagement in ICT implementation at schools was not satisfactory except for School A where Frank is the school principal. Findings revealed that school that had sufficient government support had a higher success rate in ICT implementation. However it is worth mentioning that the school that had the least support from government (School C) still went ahead with ICT implementation. This implies that although government support was crucial for ICT implementation school that did not received government support were not deterred in ICT implementation.

ICT implementation had been advocated as a mode of transforming education setting to help and support new economy depends largely on interrelated productivity of education and technology (Becta, 2003). Thus, school principals' perceptions to encompass the new innovation and change depended largely on personal choice to adapt it or not for ICT implementation at schools.

5.2.2.3 Research Question Three: What perceived skills do school principals have to support teachers in ICT implementation?

All three school principals (A, B, C) perceived the lack of ICT-related skills and knowledge as a hampering factor in ICT implementation in their schools. According to Pelgrum (2002), lack of skills and knowledge were major obstacles to the realisation of ICT-related goals for schools. The findings of this research highlighted the kind of skills school principals may need when implementing ICT as a new one in the school environment for example using with MS Word to created documents or database to search for learners' records. However, identifying which competencies each school principal needs to acquire is far from simple, as this depends very much on the circumstances of their particular school.

All three school principals who participated in this study indicated need for training in specified areas of ICT such as Office Administration (School principals Frank) and Edupack (School principal Jack). Moreover, the school principals (A, B and C) indicated that they send their teachers for training. It was important for teachers to receive support from school principals during ICT implementation. The school principals supported their teachers by sending them for in-service training to improve their ICT skills. In this process, the school principals empowered their teachers by providing them opportunities and adequate time for training opportunities.

5.2.2.4 Research Question Four: What challenges do school principals' face while managing the implementation of ICT into teaching and learning activities at their schools?

Findings in this study indicated that school principals (A, B and C) were challenged by factors in ICT implementation in schools. The challenges included: lack of computers, inadequate electricity supply, lack of ICT knowledge and skills, training, lack of Internet connectivity, insufficient finance and lack of technical support in ICT implementation in schools. These common challenges to accesses ICT were caused by school principals' inadequate knowledge of ICT for example all the school principals delegated most of their ICT related functions to their secretaries in their schools.

5.3 Recommendations

From the findings, the researcher makes the following recommendations:

- School principals were not clear on the concept of ICT implementation in schools. For that reason, perceptions and understanding of ICT implementation at schools should be made clear since it impacts on the process of adoption of the innovation in school principals who have to take the lead.

- As indicated in the data analysis, the school principals need knowledge and skills. In order to adopt other strategies in ICT implementation in teaching and learning, school principals should include human resource management, financial management, monitoring and evaluation, the processing of learner and teacher records, communication

between government and schools, lesson planning, assessment and testing, financial management, and the maintenance of inventories. Staff development courses are also needed with emphasis on knowledge and skills.

- Support of school principals is critical if ICT implementation is to be used effectively. School principals would benefit from professional development workshops which would enhance their ICT knowledge and skills.

- In addition, school principals must be provided with proper infrastructures, adequate functioning computers and other ICT technologies. Sufficient and continuous technical support is also needed for optimal use of ICT implementation in the teaching and learning environment.

- Given the situation of power shortages in some schools and the effects of power shortages on the usage of computers and other technologies in schools, the government should actively promote the usage of alternate sources of power such as Solar systems.

- In order to mitigate the lack of financing and reduce the burden on government to provide ICT tools or equipment to schools, it is important to invest in public and private partnerships to co-finance ICT in schools.

5.4 Conclusions

ICT is becoming a part of everyday life for many school principals. However, the study revealed that ICT proficiency is an important factor affecting successful ICT implementation in the teaching and learning environment. Although some of the schools in this study benefitted

from ICT implementation from the government and other sources, this study demonstrated that school principals need knowledge in skills. The study concluded that ICT implementation can be successful if necessary support is given for school principals on proper infrastructure, staff development, ICT tools and facilities such as Internet connectivity, power supply and funds.

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APPENDIX A

PERMISSION LETTER FROM UNAM

UNIVERSITY OF NAMIBIA

Private Bag 13301, 340 Mandume Ndemufayo Avenue, Pioneerspark, Windhoek, Namibia

10 November 2010

To

The Permanent Secretary
Ministry of Education
P/Bag 13186
Windhoek

Dear Sir/Madam

RE: **Request for permission to conduct educational research study in the Khomas Education region**

This letter serves to inform your office that Ms. Rejoice Quest (Student No: 8911347), is a registered Masters student at the University of Namibia this year 2010. Part of the university requirement is that the student must do research in his/her area of interest. The topic for this study is "*An investigation on principals' perceptions on integrating Information and Communication Technologies (ICTs) into teaching activities in the Khomas Education region.* Ms. Quest needs your permission to interview school principals and simultaneously be an observer in their schools. In light of this, please grant her permission to collect the data as required.

Thank you very much for your co-operation in this regard.

Yours truly,

Dr HM Kapenda
Co-supervisor
Lecturer Faculty of Education, UNAM
Tel: 061-06 3642 Fax: 061- 206 3980 Email: hkapenda@unam.na

APPENDIX B

LETTER TO CONDUCT RESEARCH

P. O.Box 24851
Windhoek
Namibia 2010

01 November 2010

The Permanent Secretary
Ministry of Education
Windhoek
Namibia

Dear MrIIukena

My name is Rejoice Quest, a Masters student under the supervision of Dr H.U Kandjeo-Marenga and Dr J. Mushaandja in the Faculty of Education at the University of Namibia. I am conducting a research to investigate the principals' perceptions on implementing ICT into teaching and learning in the Khomas Education Region.

I am requesting your permission to interview principals in their schools. The results of the research study will be published but the name of the schools will not be published unless permission has been granted by the principals.

Although there may be direct benefit to your ministry of ICT awareness in education, the possible benefit of principals' participation is for me as the researcher to establish facts that will support my investigation on principals' perceptions on implementing Information and Communication Technologies (ICTs) into teaching and learning activities in the Khomas Education Region.

If you have any questions concerning the research study, please do not hesitate to call me.

Yours sincerely

(Researcher) Rejoice Quest

M.Ed student, faculty of Education

081 22 7869

APPENDIX C

PERMISSION LETTER FROM THE MINISTRY

REPUBLIC OF NAMIBIA

MINISTRY OF EDUCATION

PROGRAMMES AND QUALITY ASSURANCE

Tel: 264 61 2933200
Fax: 264 61 2933922
E-mail: mshimbo@mec.gov.na
Enquiries: MN Shimbopileni

Private Bag 13186
Windhoek
NAMIBIA

15 November 2010

File: 11/1/1

Ms Rejoice Quest
P. O. Box 24851
WINDHOEK
NAMIBIA

RE: REQUEST TO CONDUCT A RESEARCH AT SOME SCHOOLS IN KHOMAS REGION

Your letter, dated 1 November 2010, requesting permission to conduct a research at some schools in Khomas Region, has reference.

Kindly be informed that the Ministry of Education does not have any objection to your request to carry out research activities at some schools in the region referred to above.

Nevertheless, you are kindly advised to approach the Regional Council Office, Directorate of Education, for permission to go into the schools. It advisable to have the schools you intend to visit identified before you contact the Regional Office for them to be able to inform the schools in ample time.

It is important to ensure that participation in the research activity is on a voluntary basis.

Kindly take note also that the research activities should not disrupt the normal school programmes.

By copy of this letter the Regional Council Office, Directorate of Education, is made aware of your request.

Yours faithfully

MINISTRY OF EDUCATION
Office of the Permanent Secretary
16 NOV 2010
Private Bag 13186, Windhoek, Namibia

A Ilukena
PERMANENT SECRETARY

cc: **Director: Khomas Education Directorate**

APPENDIX D

LETTER TO PARTICIPANTS

01 December 2010

Dear Participant

You are invited to participate in a study project aimed at investigating on principals' perceptions on implementing Information and communication (ICTs) into teaching and learning in the Khomas Education Region.

This information will give better insight into the current state of ICT at schools. This study is being conducted under the supervision of Dr H.U. Kandjeo-Marenga and Dr J. Mushaandja in the Faculty of Education at the University of Namibia.

Your participation in this research project is voluntary and confidential. At no time will the name of any school or individual be identified. While results will be made available by school, you are guaranteed that neither your school nor your name will be identified in any report of the results of the study.

If you have any questions concerning the research study, please do not hesitate to call me at: 081 122 7869.

Yours sincerely,

Rejoice Quest

APPENDIX E

INTERVIEW GUIDE FOR SCHOOL PRINCIPALS

The following questions are used as guidelines for interviews Questions focused on principals' personal experiences, types of ICT implementation activities as well as challenges they faced in schools. Follow-up questions were asked in some instances to probe for more information.

The following questions will be asked:

(1) Type of ICT tools

What type of Information and Communication Technology tools do you have at your school?

(2) Perception on ICT implementation

What are your general perceptions on the implementation of Information and Communication Technology?

Do you think it is necessary for the government to implement ICT in schools?

Do you think school principals receive enough support from the government on ICT implementation in schools?

(3) ICT skills

How do you perceive ICT skills which school principals need?

How important are these ICT skills for school principals?

How well are you prepared to use ICT in your school?

What type of ICT training did you receive?

How do school principals support teachers to implement ICT in school activities?

(4) Challenges of ICT implementation

What challenges do you experience with regards to ICT implementation at your school?