CHAPTER 1

INTRODUCTION

This chapter introduces the study on the evaluation of the implementation of the ICT Policy for Education in Namibian rural junior secondary schools. In Section 1.1 of this chapter, the research problem is introduced. Section 1.2 elaborates on the research problem and aims of the study, culminating in the main research question. Section 1.3 presents the research approach, further presented in a schematic form illustrating how the research questions will be answered. The significance of the research is presented in Section 1.4 and conclusions drawn in Section 1.5.

1.1 Introduction

This section explains why it is important to evaluate the extent to which the intended ICT policy of Namibia has been implemented in the junior secondary schools in rural areas. A brief background of the history of education in Namibia is presented, leading to the rationale for introducing the national ICT Policy for education.

Access to formal schooling was severely limited in Namibia before independence as under colonial rule education had been developed and modelled in a way that Africans were trained for specific functions, especially to make them submissive to the established order and prepare them for semi-skilled and unskilled labour (Cohen, 1994). Since 1990, when Namibia attained its independence from South Africa, education has been perceived as potentially important for obtaining national, social, political and economic objectives (Amukugo, 1992). The Namibian Government has thus embraced education as one of the pillars for the national development strategy in the hope of using it as a transformative institution (Burns, 2001). The disparity has necessitated the development of policies that would

narrow the gap between the previously advantaged white communities and disadvantaged black majority (MEC, 1993).

In 1993, the Ministry of Education (MoE) produced an educational brief "*Towards Education for All*" to guide educational development in the country, in which three important goals were emphasised: access, equity and equality. Achieving these in education has been a challenge for the Government, as they required all schools to have the same resources, including well-qualified teachers and well-equipped laboratories by 2010 (MEC, 1993). However, rural schools do not have the necessary infrastructure and modern equipment, for various reasons (Clegg, 2004; Hamunyela, 2008; Matengu, 2006) and few learners from rural secondary schools enter higher education in the country or abroad.

With about 60% of the population living in regions along the northern frontier of the country (Caprivi, Okavango, Ohangwena, Oshikoto, Oshana, Omusati and Kunene), the North Central region consists of four political regions, Ohangwena, Omusati, Oshana and Oshikoto. These are home to about half of the population of 1.8 million people and are amongst the most disadvantaged of the thirteen administrative regions, in terms of such indices as per capita income, mortality rates, life expectancy and food security (UNDP Human Resource Development Report, 2000). These regions were heavily militarized during the 1970s and 1980s, when they were the focus of the liberation war fought between the South African apartheid regime and the South West African People's Organization (SWAPO). In addition, they were deliberately undeveloped, so that they could be used as a reservoir of migrant labour for the rest of the country.

In order to redress the challenges of inequity, the Government of the Republic of Namibia introduced Information Communication and Technology (ICT) to the education system in 1999, the primary objective being to enhance the teaching and learning of Mathematics, Science and English as critical subjects and so redress equity and quality issues inherited from the colonial past. A review of the National ICT Policy (1999) took place and the new national policy was adopted in

2005. The Permanent Secretary of the Ministry of Education appointed the National ICT Steering Committee, comprising educational stakeholders, to advise the Ministry of Education on the best practices of ICT provision and pedagogical usage. The ICT Policy for Education was developed to enhance the use and development of ICT in the delivery of education and training in the five distinct areas: investigation and development of appropriate pedagogical ICT solutions, i.e., deployment, maintenance and support, literacy, and integration into subject areas of which the latter is elaborated in Chapter 2 (National ICT Policy for Education, 2005). The document also stipulates pre-service and in-service teacher education institutions as priority areas for ICT deployment, followed by schools with secondary grades (Ministry of Education, 2005).

The adoption of the National ICT Policy was followed by that of the National ICT Implementation Plan (2006). In order to ensure that the implementation plan would be effected, the Ministry of Education created a National Budget from 2006/2007 onwards. In addition, stakeholders such as the Global e-School Initiative (GeSCI), SchoolNet Namibia, Namibia Education Training Academy (NETA) and Computer Education Community Service (CECS) have been supporting this activity by donating ICT resources to schools mostly located in the rural areas. These non-governmental organisations (NGOs) also provide teacher training, and receipt of ICT supplies at schools is encouraged by the Government (MoE, 2005).

The National Education Technology Service and Support Centre (NETSS) in Windhoek, a refurbishment centre was established to assemble and deploy ICT in schools in 2006. Since 2005, approximately 345 schools (including primary, combined, and secondary schools) have received several types of ICT through donor agencies. These varied from up-to-date computer laboratories with 10 to 20 networked PCs, laser printers and connectivity, to out-dated, redundant equipment in need of replacement by donor agencies or NGOs. To enhance efficiency, the XNET Development Trust was formed in 2003 to address issues of providing reliable and cost-effective Internet connectivity. Thus far, XNET has provided affordable connectivity to over 250 schools throughout the country at a flat rate of

N$ 3.00 per month per school. In the same light, the technical support system to schools is also centralised from the NETSS Support Centre in Windhoek. The first level of support is resolved electronically or by telephone, where the request is rooted through the help desk to the relevant support capability (MoE, 2006). However, the long distances between the capital Windhoek and the northern regions remain an obstacle for proper communication with schools and regional centres, and for organisation of teachers' support structures (Clegg, 2004; Hamunyela, 2008; Matengu, 2006; Ottevanger, 2001). This study found that the situation for rural areas had not changed by the time of conducting this research.

The major problem is that the effects of services related to ICT implementation in the Namibian education system are unknown. A few studies conducted in Namibia have focused on ICT deployment and technical maintenance (Clicherty and Tjivikua, 2005; Matengu, 2006). However, ICT deployment does not guarantee use and integration in the school curriculum. There is a need to evaluate the implementation of the ICT at national and school level for purposes of accountability and transparency to educational stakeholders, in this case teachers, principals, curriculum developers, school boards, and educational planners.

It is important to address this problem in order to ensure that the ICT policy does not become neglected but rather should be used to advance the delivery of equitable quality education, and thereby provide an opportunity to improve the livelihoods of the people. Specifically, it is important to evaluate the extent to which the educational goals have been achieved by the year 2010, especially in the rural areas where a shortage of qualified teachers has been detected and schools are isolated, lacking access to communication and generally not as well-equipped as their counterparts in urban areas (Clegg, 2004; Matengu, 2006; Ottevanger, 2001; Worldbank, 2000).

Evaluation of the ICT implementation plan may lead to taking informed decisions by the various stakeholders. Also, the findings from this study will add to the scientific body of knowledge of ICT implementation in rural schools, with particular

reference to the description of ICT and factors influencing the implementation of ICT in rural schools. However, this study had to overcome some challenges both in the search for literature and the method adopted to find answers to the research questions posed below. For example, finding literature on ICT implementation in the developing world is a challenge, and conducting evaluation studies through survey methods in such a vast country requires financial and human resources. Another challenge was determining ICT deployment in schools as the Educational Management Information System (MIS) of the Ministry of Education gives inconsistent information due to the incompleteness of its database on ICT information.

1.2 The research problem and questions

Governments around the world are recognizing the critical importance of education for economic development and the high quality of life of all citizens. In Namibia, however, achieving these goals is faced with obstacles, as pre-independence problems continue to hamper teaching. The number of qualified science teacher has increased but a poor school infrastructure and lack of basic equipment remain problematic, especially at junior secondary schools and in the domain of teaching science (Clegg, 2004). Teachers use traditional approaches to teach science (Kapenda, 2008), and as a result, the government faces challenges about whether and how to integrate ICT into teaching and learning. These choices are complex, technically demanding, and the effects not always known (Anderson & Plomp, 2009). In order to realise these demands, teachers are required to have a deep knowledge of national policies and social priorities, and be able to design, modify, and implement classroom practices that support them (UNESCO, 2008b).

The successful implementation of ICT into a classroom will depend on the abilities of the teachers to structure the learning environment in innovative ways, to merge new technologies with new pedagogies, to develop socially active classrooms, and encourage cooperative interaction, collaborative learning and group work. Such an innovation requires a new set of classroom management skills to be developed (UNESCO, 2008a). In other words, new technologies require teachers'

roles to change and to include new pedagogies and new teacher training. Ainley, Enger, Searle (2008), Boateng (2007) and Gaible (2008) note that there is currently little understanding of the way in which ICT is used in schools and classroom around the world. It is important for the national policy to state what ICT should be used in schools and at classroom level.

To date, no study has been conducted in Namibia aimed at evaluating how ICTs have been used by the teachers since the introduction of ICT Policy (2005) in schools. What schools are doing with ICT in accordance with the policy requirements have not been investigated (Matengu, 2006). What little literature exists on ICT implementation in Namibia focuses on infrastructure and assessment and how it can benefit schools (Hesselmark & Miller, 2004; Matengu, 2006). In addition, the country lacks large-scale data sets to illustrate how ICT is being used in schools in both urban and rural areas.

In the National ICT Policy for Education, the monitoring and evaluation component is listed as part of the ICT Implementation Process, but neither has been conducted since 2005. Deferring evaluation as an important integral part of the programme, when designing and implementing a national programme like the National ICT Policy implementation, may result in difficulties of reaching sound and reliable decisions about effective implementation (Rossi, Lipsey & Freeman, 2004;). Currently in Namibia, there is insufficient evidence based on information about how ICT is being implemented in schools, more so in rural areas, nor are the factors that affect the implementation of ICT known. Given these reasons, it is worthwhile to conduct an evaluation in rural schools, especially at junior secondary school level. Upon completion of this school level, many learners end their school career or advance their education further. According to the ICT policy, this school level is a top priority in terms of ICT deployment and it should be used for advancing the teaching of mathematics, science and the English language. In addition, the decision to focus on the teaching of science is based on the National ICT Policy's (2005) emphasis on enhancing the teaching of science for purposes of economic development, as well as the researcher's experience in the area of

science teaching. Consequently, this study evaluates the implementation of ICT Policy for Education in rural junior secondary schools and focuses on the teaching of the sciences. The main research question has been formulated as follows:

How and to what extent is the intended ICT Policy implemented in the junior secondary schools in Namibian rural areas?

This question aims to determine how the ICT Policy for Education is being implemented, as this is essential in order to evaluate and understand the current status of ICT implementation in rural areas. To be able to address the main research question, there is a need to understand the context of the policy interpretation and also to obtain a description of the situation in the rural schools, before digging deeper into the factors that contribute to the current situation. In this context the following specific questions are phrased to address the general research question stated above:

1. *What is the national context with regard to the implementation of the ICT Policy for Education in rural junior secondary schools?*

Research Question 1 aims to investigate the context and understand the intentions of ICT Policy implementation.

2. *How has the national ICT policy been implemented in the science classrooms?*

Research Question 2 aims to ascertain the extent to which the ICT Policy has been implemented in the rural areas of Northern Namibia. Reasons for choosing to focus on science classrooms have been described above.

3. *What factors affect ICT Policy implementation in rural schools?*

Research Question 3 aims to identify the factors that affect the policy implementation process in an attempt to improve the rural situation.

Research questions provide guidance in terms of research methodology and control the direction of this study. They also indicate the type of data and information to be generated.

1.3 The research aims and objectives

In line with the research questions presented above, the aims and specific objectives of this study are:

1. To evaluate the implementation of the ICT Policy for Education in rural schools.
   - To obtain a descriptive context of ICT Policy implementation in rural schools.
   - To ascertain the infrastructure available in rural schools.
   - To ascertain the extent of ICT use in general and for pedagogical use of ICT.
   - To ascertain the leadership styles applied in rural schools.
   - To ascertain the extent to which the National ICT Policy objectives have been attained in rural schools.
   - To determine the collaboration and general support offered to rural schools.
   - To determine the level of professional development and expertise available in rural schools.
2. To explore how science teachers integrate ICT in science classrooms in Namibian rural schools.
   - To identify innovative practices followed in the science classrooms.
3. To identify factors that affect ICT implementation in Namibian rural schools

- To obtain an in-depth analysis and exploration of factors affecting the implementation process.

4. To contribute to the knowledge about the implementation of ICT in rural schools in developing countries.

- To legitimate the findings before conclusions are finalised.
- To make recommendations for consideration by policymakers.

The study is designed to provide useful data for the Namibian policymakers to evaluate the current status of ICT implementation in rural areas, providing descriptive and exploratory information and the relationships that exist between the variables, as well as other background information. The data will also yield useful information towards ICT implementation and integration in rural science classrooms.

1.4 An overview of the research design

This section presents a brief description of the research, including SITES and the rationale for adopting the SITES 2006 as an inspirational model for this study approach. The research approach is presented in a diagrammatical format, illustrating the research methods adopted for each sub-research question. This study adopted a pragmatic evaluation research approach.

For research question 1, document analysis and interviews with the National ICT Coordinator have been used and the results presented in Chapter 2.

Research question 2 is inspired by the Second Information Technology in Education Studies (SITES 2006), an international comparative study conducted under the auspices of the International Association for the Evaluation of Education Achievement (IEA). The SITES were intended to serve as a basis for participating countries to compare developments in ICT in education and to provide benchmarks (Howie, Muller & Paterson, 2005), and they consist of three modules: SITES Module 1 (M1), SITES Module 2 (M2) and SITES 2006. SITES M1 aimed

to provide an overview of ICT in education in primary and secondary in 26 countries and used a survey method. SITES M2 was an in-depth case study of ICT in selected schools that had implemented ICT-based curriculum innovation in the participating countries. SITES 2006 focused on evaluation of educational opportunities offered by teachers and schools in ICT in education (Plomp, Anderson, Law & Quale, 2009). The details of the series of SITES studies are presented in Chapter 3 (Sections 3.5).

Plomp, Pelgrum and Law (2008) explained the major aims of SITES 2006 as being to provide international benchmarks of (i) how in the information society pedagogical practices are changing; (ii) the extent to which ICT is used in education; and (iii) how the use of ICT is associated with (changing) pedagogical practices. The SITES 2006 followed a survey approach in order to build upon the large number of case studies of innovative pedagogical practices supported by ICT studied in SITES M2, and to investigate the factors associated with the use of ICT in schools and among teachers. The outcomes of the SITES 2006 are used to inform policymakers in the participating countries to make informed judgments about developments in their national education systems, as compared to other countries.

The inspiration for choosing the SITES 2006 research design as the example was the need to conduct large scale studies in Namibia's rural secondary schools. It is noted that the SITES 2006 focuses on both mathematics and science, however, for reasons presented in Section 1.2, the focus has narrowed down to science classrooms. In addition, the aims of the SITES 2006 study are similar to those of this study, i.e. describing the context of the Namibian educational system, to ascertain the availability of infrastructure; to ascertain the extent of ICT use and pedagogical use; to ascertain the extent of implementation of policy objectives and identify innovative practices related to ICT. The research will examine problems encountered and identify future expectations.

Research question 3 employed exploratory case studies to identify the factors that affect ICT implementation in rural schools. The research approach used in this study is aligned to the specific research questions of this study as outlined in Figure 1.1 (below):

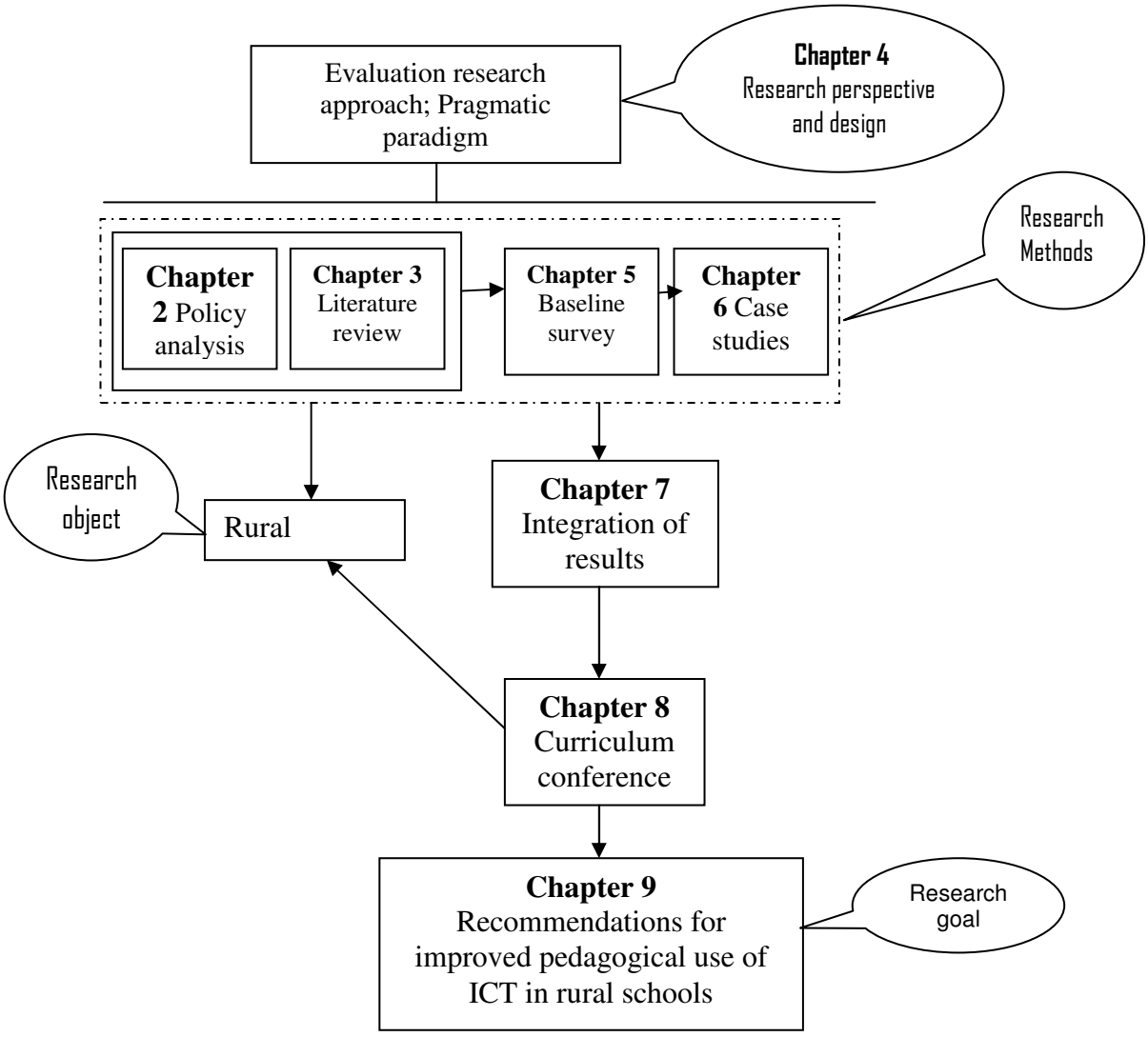

Figure 1.1: The Research Model for this study

Figure 1.1 (above) presents the chapters in this study and characteristics of their content. The chapters are arranged in the sequence of how the research questions are addressed. In order to understand how this study is structured, the research model offers a diagrammatical representation of the events as they

follow one another and also the research questions they address. The operational research questions are therefore addressed as follows:

Research question 1: What is the national context with regard to the implementation of the ICT Policy for Education in rural junior secondary schools?

The research approach adopts descriptive, analytical and exploratory components to answer all three research questions in the following way.

Research question 1: *What is the national context with regard to the implementation of the ICT Policy for Education in rural junior secondary schools?* This was tackled through a literature review and document analysis. The literature review covered the most recent publications (1999-2010) from the developed countries and a few from developing countries, such as Chile and South Africa, Ghana and Namibia. Arguments that the two developing countries (Chile and South Africa) are not a true representation of most developing countries are noted with concern, but attempts to obtain relevant literature from more developing countries proved futile (see Chapter 3).

The document analysis approach was informed by the SITES 2006 National Context Questionnaire (NCQ) and provided a framework for developing the national context (Chapter 2). This approach was complemented by interviewing the National ICT Project Manager and the relevant people in areas of specialisation to enhance the data obtained through document analysis. Also, this approach provided a critique of important activities and policy statements articulated in the policy document, in order to give a better insight into the national context which was needed before the survey was conducted.

A survey approach was adopted to answer research question 2 of this study: *How has the national ICT policy been implemented in science classrooms?* In an effort to determine how ICT is being implemented in schools, three self-administered questionnaires were distributed to principals, science teachers and ICT

technicians in three educational regions located in rural areas. Three out of four North Central Educational regions (all rural) were selected as the sample for this study. The population of secondary schools is 247, of which the target sample in selected regions is 163, and of which 136 schools at least participated. The samples of schools per region were purposively selected to include those with electricity and functioning ICT. It is believed that the three regions are sufficient to give a representative view of the rural areas in Namibia. The selection criteria are explained in detail in Chapter 4. The findings of research question 2 sequentially lead to the research approach of research question 3.

Research question 3: *What factors affect ICT Policy implementation in rural schools?* is addressed through evaluative interviews and classroom observations in three purposively selected schools (Shaw, 1999). Semi-structured interviews and observation methods were used in the three schools to find answers to research question 3. The case studies analysis aims at generating suggestions and recommendations for improving the teachers' pedagogical practices using ICT, and to make recommendations to the government about improving implementation of the policy on ICT in education in rural areas. Three science teachers were observed using ICT in target classrooms. The selection for science teachers is based on the earlier argument for science education in Section 1.2. In addition, three principals and three laboratory technicians were interviewed to explain or verify some findings from the survey. Analysis of the outcomes of the case studies led to suggestions and recommendations for improvement of ICT pedagogical practices in rural schools.

In order to legitimate the findings of this research, a curriculum conference approach (Mulder, 1994) was employed for deliberative ICT decision-making, where the National ICT Coordinator and a number of principals, science teachers and ICT technicians were brought together as a consultation group to discuss issues on ICT implementation. In this forum, the consultation group analyses the findings from the research, takes their stance on proposed solutions, suggests

courses of action, argues for and against an opinion, and weighs these against their educational goals, values and standards (Mulder, 1994).

The research approach of this study employs a pragmatic viewpoint to interpret the ICT use in rural schools. As explained above (see also Figure 1.1, above) the model has four components, viz, policy analysis, literature review, baseline survey and case studies. Two of the components are independent, namely literature review and policy analysis, while the other two have dependent characteristics whereby (i) the literature review and the policy analysis influenced both the survey and the case studies, and (ii) the survey influenced the selection for case studies. Both the survey and case studies drew participants from the schools in the identified educational regions. It is assumed in this model that findings on all three components will contribute to improving pedagogical use of ICT in rural schools, which is the aim of this study.

The data analyses of the findings have been presented in Chapters 5 and 6 respectively. The analysis of the survey used a Statistical Package for Social Science (SPSS) to give a descriptive account of the data. Processing of data used frequencies; mean, maximum and minimum values, standard errors and also factor analysis for data reduction, Pearson's correlation analysis and regression analysis were conducted.

The qualitative data employed manual coding for analysis, with cases analysed individually then cross-analysed to obtain findings per constructs and a group of principals, science teachers and ICT technicians respectively. In order to determine a collective finding, the frequency count of emerging themes was considered.

The reliability of the questionnaire was found to be 0.943 for the principals' responses; 0.890 for the science teachers' responses; and 0.754 for the ICT technicians' responses. In order to test the data for the interviews, the researcher ensured credibility and transferability of the instruments.

1.5 Significance of the research

This study is significant for the Namibian context for several reasons. Firstly, it is the first study of its kind in Namibia to evaluate ICT implementation and integration in science classrooms that are rurally based. The findings should help to inform policy decision-making in ICT deployment and professional development. Secondly, few studies if any on ICT have focused on science classrooms in the rural areas located in the developing countries (Boateng, 2007; Brandt, Terzoli & Hodgkinson-Williams, 2006; Howie & Blignaut, 2009; Kozma, 2006). A number of studies on ICT implementation and integration placed their focus on towns (Ali, 2009; Cossa & Cronje, 2004, Ibrahim, 2009; Matengu, 2006) and on schools leadership (Katulo, 2010). Findings should provide policymakers, principals and science educators with information about the status of ICT implementation in rural areas and where to improve on professional development. This in turn should impact on science teachers' use of ICT.

Moreover, this will contribute to education research, particularly education evaluation research in Namibia, as this is the first study that ventured into evaluation research. The use of the SITES instrument makes it comparable to other studies conducted in the developing world, such as South Africa and Chile. The path followed to analyse the data marks another level of capacity-building in the Namibian education sector for large scale studies, which is relevant to national, regional and international studies.

In addition, the adoption of the curriculum conference approach used in the ICT conference is also unique to Namibia, and possibly also Southern Africa. It was necessary that the respondents verified, legitimised and negotiated the findings for this research before publication. The findings should influence ICT related decision-making.

1.6 Overview of the thesis

Chapter 1 has presented the research questions and background against which they are posed, as well as outlining the potential significance of the research to education in Namibia.

Chapter 2 presents the geographic, political and socio-economic status of Namibia in order to describe the context. The Namibian education system is described with a focus on realising the Namibian Vision 2030 through the Education and Training Sector Improvement Programme (ETSIP). A description of the Namibian ICT Policy for Education is presented and the contents thereof are summarised in the adapted typology of curriculum representation (Van den Akker, 2003). The research problem is conceptualised and related to the importance of the study to Namibia.

Chapter 3 is a review of the literature on ICT in education. In order for the reader to understand the formation of the conceptual framework, the definition of concepts and keywords are presented, followed by the rationale for ICT in education and possible ways of ICT use. Subsequently, consideration is given to ICT implementation at national systems and at school-level in the developed world and in the developing world respectively. In order to conceptualise the framework that guides the study, the relevant concepts are summarised and thereafter the factors that may affect ICT implementation at national and school levels are also discussed, before the chapter is concluded with the presentation of the conceptual framework for the study.

Chapter 4 presents the research design and procedures chosen for the survey, case studies, and the curriculum conference. Firstly, the research paradigm is presented, followed by the research design for the respective research questions in this study. Issues of validity and reliability are discussed before the conclusion.

Chapter 5 presents a description of ICT implementation in rural schools based on the findings of the baseline survey. The profiles of the participants and the participating schools are described before the findings of the baseline survey per construct. The conclusion is then drawn.

Chapter 6 presents the factors affecting ICT implementation in Namibian rural schools based on the quantitative findings and those from the case studies per construct. A summary of what the respondents present as factors affecting ICT implementation is presented before the conclusion.

Chapter 7 presents findings from the ICT use conference. The aims of the ICT use conference as well as the programme followed to generate data for the conference are presented, the results emanating from ICT Conference are discussed. A summary of negotiated findings for the study is presented.

Chapter 8 draws the conclusions and makes recommendations. An introduction to the chapter is presented, followed by a summary of the research project and subsequently the research findings. Reflections on methodology as well as on the conceptual framework are discussed. Finally, the implications for policymakers, education practitioners and researchers are discussed, before suggestions for improvement of ICT implementation in rural schools are presented.