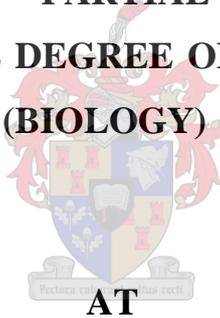


**BIOLOGY TEACHERS' LIVED EXPERIENCES OF THE NAMIBIAN
SENIOR SECONDARY CERTIFICATE (NSSC) CURRICULUM**

BY

ALOOVI ONESMUS ALOOVI

**THESIS PRESENTED IN PARTIAL FULFILMENT OF THE
REQUIREMENTS FOR THE DEGREE OF MASTER OF EDUCATION
IN CURRICULUM STUDIES (BIOLOGY)**



AT

STELLENBOSCH UNIVERSITY

SUPERVISOR: PROF. LESLEY LE GRANGE

DECEMBER 2016

DECLARATION

By submitting this thesis electronically, I declare that the entirety of the work contained therein is my own, original work, that I am the sole author thereof (unless to the extent explicitly otherwise stated), that production and publication thereof by Stellenbosch University will not infringe any third party rights and that I have not previously in its entirety or in part submitted it for obtaining any qualification.

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ABSTRACT

This study was conducted in order to explore the lived experiences of Grade 11 and 12 Biology teachers on the implementation of Namibian Senior Secondary Certificate (NSSC) Biology curriculum. The research design of this study is characterised by its qualitative, exploratory, contextual and descriptive nature. A qualitative method was adopted for this study because it helped the researcher to create a holistic picture of the phenomenon within the context in which it occurs. Since this study seeks to understand the lived experience of teachers, an interpretive paradigm was adopted. The study employs a phenomenological epistemology according to which the researcher examined records and interpreted lived experiences through clear and detailed descriptions. Semi-structured interviews were used to collect qualitative data from five NSSC Biology teachers from three high schools in the Erongo region of Namibia. Data constructed through semi-structured interviews were analysed by means of thematic analysis.

The research findings revealed that the implementation of the NSSC Biology curriculum is influenced by social and contextual factors. It was noted during the study that education-related decisions by officials at all levels of government were being influenced by a variety of factors. For example, the pressure created by global competitiveness heightened the public's economic concerns and in particular those of business leaders. Hence, influential leaders who view education as the key to a stronger economic future have promoted new accountability initiatives and provided incentives to stimulate improvements in schools. Similarly, corporations and their representatives have become involved in influencing education policy at local, state and federal levels in their pursuit of employees who possess skills and knowledge needed by a productive workforce. Furthermore, education-related decisions of officeholders and other policy makers are also influenced by media that convey information and shape public perceptions. The latest news stories and editorials focusing on the lack of textbooks and laboratory facilities in rural and township Namibian schools may heighten public awareness of inequities in the country's education system. Similarly, media coverage of learners' achievement scores informs and influences communities' views on the quality of education in the country.

The study further revealed that lack of training and support, poor assessment policy guidelines, language policy, workload and frequent curriculum changes are some of the challenges teachers are experiencing in the implementation of NSSC Biology curriculum. The research findings revealed that teachers in the Erongo region of Namibia received little or no training at all after the implementation of NSSC Biology curriculum in 2006. Those who

attended the training sessions argued that the training was inadequate and could not prepare them to implement the NSSC Biology curriculum effectively. The research findings revealed the need for aligning both teachers' pre-service and in-service training programmes with national curriculum policies to enable better alignment between the current educational programmes for teachers and the focused training required for successful curriculum implementation.

Furthermore, the research findings revealed that lack of support from subject advisors and heads of departments caused confusion among teachers on how to implement the NSSC Biology curriculum effectively. The study revealed that the only support Biology teachers get from the subject advisors and heads of departments are the provision of curriculum documents such as the syllabi and scheme of work. It was also noted that the support Biology teachers get from the regional office is limited to mini-workshops and subject meetings.

Data constructed in this study further revealed that NSSC Biology teachers in the Erongo region of Namibia are over-burdened. Participants expressed their stress as a result of the workload associated with the NSSC Biology curriculum. The research finding revealed that, unlike with International General Certificate of Secondary Education (IGCSE) and its variant the Higher International General Certificate (HIGCSE) curriculum, teachers using NSSC curriculum are expected to do planning and marking, create teaching aids, evaluate lessons, attend to extramural activities and offer counselling to learners with social problems, although they are not professional counsellors. Finally, the research findings revealed that teachers in the Erongo region experience a lack of teaching resources because of the uneven distribution of resources among high schools in region.

Keywords: Biology teachers, curriculum implementation, Grades 11 and 12, lived experiences, Namibian Senior Secondary Certificate (NSSC).

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DEDICATION

This study is dedicated to my daughter, Grace Atti Aloovi, for her love and respect. It is also dedicated to my wife, Teresia Ndahafa Aloovi, for her love, support, understanding and encouragement during my study. Lastly, this study also dedicated to all Biology teachers who work tirelessly to bring enlightenment to their learners and the promise of hope to the world.

LIST OF ACRONYMS USED

AIDS	Acquired Immune Deficiency Syndrome
BETD	Basic Education Teachers' Diploma
BEdHons	Bachelor of Education Honours
CAPS	Curriculum Assessment Policy Statements
CEPD	Centre for Educational Policy Development
CDs	Compact Discs
DNA	Deoxyribonucleic acid
DoE	Department of Education
EMDCs	Education Management and Development Centres
EMIS	Educational Management Information System
EU	European Union
HED	Higher Education Diploma
HIGCSE	High International General Certificate of Secondary Education
HIV	Human Immunodeficiency Virus
ICT	Information and Communication Technologies
IGCSE	International General Certificate of Secondary Education
ILO	International Labour Organisation
INSTANT	In-Service Training and Assistance for Namibian Teachers
MBESC	Ministry of Basic Education Sport and Culture
MEC	Ministry of Education and Culture
NIED	National Institute of Education Development
NSSC	Namibia Senior Secondary Certificate
OECD	Organisation for Economic Cooperation and Development

PCK	Pedagogical Content Knowledge
STS	Science Technology Society
SWAPO	South West Africa Peoples' Organisation
UK	United Kingdom
UNAM	University of Namibia
UNESCO	United Nations Educational, Science and Cultural Organisation
USA	United State of America
VCRs	Video Cassette Recorders
VUA	Vrije Universiteit Amsterdam

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CHAPTER 1

OVERVIEW OF THE STUDY

1.1 INTRODUCTION

This chapter presents a brief overview of the study. The first part presents the aim of the study, objectives of the study, a brief motivation, the significance and the background of the study. The second section of this chapter presents the problem statement and the research question guiding this study. The third section provides the overview of the research design and methodology. The chapter also describes the instruments for data construction, data analysis, the site selection, sampling method and ethical procedures that are employed to address the aim of this study. Moreover, issues regarding validity and reliability of the study are discussed in the chapter. Finally, the chapter presents a brief overview of the thesis.

1.2 AIM OF THE STUDY

The aim of this study is to explore how Grade 11 and 12 Biology teachers experience the implementation of the Namibia Senior Secondary Certificate (NSSC) curriculum.

1.3 OBJECTIVES OF THE STUDY

The objectives of this study are as follow:

- To determine factors that contribute to poor performance in NSSC Biology national examination
- To determine the implementation challenges associated with NSSC Biology curriculum
- To determine the perception of biology teachers about curriculum changing in general

1.4 MOTIVATION FOR THE STUDY

Firstly, the study is motivated by the researcher's personal experience as a Biology teacher for the past five years. As a Biology teacher in Namibia, the researcher observed the poor performance of learners in the Erongo region in the Biology national examination with a less than 66% pass rate every year (see Appendix K). Furthermore, the annual regional educational statistics of 2007 to 2015 indicate that little has been achieved in the Biology national examinations since the implementation of the NSSC Biology curriculum in 2006 in comparison to other subjects offered in the NSSC curriculum (see Appendix L). In addition, the regional statistics shows that between 2010 and 2012 the regional pass rate in NSSC Biology was less than 64%. In 2013 the pass rate dropped to 57% and in 2014 it rose to 63%. The highest pass rate in NSSC Biology of 65% was recorded in the region in 2015. As a

Biology teacher in the Erongo region for the past five years, the researcher noted that over the years the regional NSSC Biology national examination results have remained below 66% regardless of the efforts of teachers to ensure that learners are well prepared for the national examination. Biology teachers in the region offer afternoon classes, as well as winter and spring schools, yet there has not been a significant improvement in the regional results and inconsistent pass percentages have been typical over the years. The researcher contends that investigating teachers' lived experience of the implementation of NSSC Biology curriculum might reveal factors which have contributed to the low performance of learners in the NSSC Biology examination compared to other subjects offered in same curriculum in the region. Furthermore, the researcher argues that investigating teachers' lived experience might reveal reasons why afternoon classes, winter and spring schools failed to yield significantly better results. Secondly, the study is motivated by a perceived need for such an inquiry, given that no research has been conducted in Namibia on the lived experiences of Grade 11 and 12 Biology teachers with respect to the implementation of the NSSC curriculum. Many studies that have been conducted in Namibia so far focus mainly on the knowledge part of the Biology curriculum but none of them devote attention to the lived experience of Biology teachers on the implementation of the Biology curriculum. It is against this background that this study aims to explore the Grade 11 and 12 Biology teachers' lived experiences of the implementation of the NSSC Biology curriculum in the Erongo region of Namibia.

1.5 SIGNIFICANCE OF THE STUDY

According to McMillan and Schumacher (2006:99), the stated importance of a study tells the reader why the study is essential and indicates the reasons for the researcher's choice of a particular study or problem. The literature reviewed reveals that so far no study has been conducted in Namibia concerning Grade 11 and 12 Biology teachers' lived experiences of the implementation of NSSC curriculum. It also reveals that little has been done elsewhere on the lived experiences of Biology teachers. Therefore, the findings of this study aim to:

- Provide insights into Biology teachers' lived experiences of curriculum change;
- Provide much needed baseline data for future studies in this area;
- Open up dialogue on the Grade 11 and 12 Biology teachers' lived experiences of the NSSC curriculum in Namibia;
- Possibly provide insight into what contributes to poor performance in the NSSC Biology examination; and
- Make recommendations for future national curriculum frameworks that might be implemented.

1.6 BACKGROUND OF THE STUDY

Like many other African countries, after independence Namibia embarked on several reforms in various spheres of life including education (Ministry of Education and Culture [MEC], 1993:74). The country geared itself towards achieving four major goals in education, namely access, equity, quality and democracy. The realisation of the country's educational philosophy "Toward Education for All" was dependent on introducing reforms in a number of areas, including curriculum and assessment (MEC, 1993: 74). Educational goals in post-independent Namibia were formulated as a response to dissatisfaction concerning the lack of relevance in both the content of the school curriculum and the assessment systems of the former Cape Education Department¹ in Namibia. According to Njabili (2004:31), during the apartheid era schools and the curriculum in Namibia were organised and run on a racial basis. The curriculum materials were mainly examination syllabi prepared by the ruling country (South Africa). Thus teaching and teaching materials were determined by the requirements of foreign examination syllabi regardless of their relevance to Namibia.

In an effort to abolish the apartheid educational system, several strategic initiatives were launched. Among others, a new Senior Secondary School programme leading to the establishment of a new curriculum called the International General Certificate of Secondary Education (IGCSE) and its variant the (HIGCSE) were introduced in 1994 in order to replace the South African system. The new curriculum H/IGCSE was launched to prepare students for entry to the University of Namibia and other higher education institutions in the world.

It is against this historical educational background that the system based on that of the former Cape Education Department was abolished in a post-independent Namibia and replaced by the H/IGCSE curriculum in 1994 (MEC, 1993). Swarts (1995:6) argues that the H/IGCSE curriculum was found to be "pedagogically appropriate as a starting point to develop the Namibian Senior Secondary Certificate." Similarly, Howarth (1995:41) states that the H/IGCSE curriculum was founded on the ideal that "teaching and assessments should be integrated and not divorced from each other as was the case with the system of the Cape Education Department. In addition, Howarth (1995:41) argues that the H/IGCSE curriculum aimed at supporting modern curriculum development, promoting international understanding, encouraging good teaching practice as well as implementing a set of widely recognised standards.

¹The education system adopted in Namibia during the apartheid period created educational inequalities through overt racist policies.

Although the H/IGCSE curriculum was introduced to improve learners' performance, little has been achieved since its implementation in 1994. The curriculum has several shortcomings as well as implementation problems. For example, with the H/IGCSE curriculum a learner could choose to sit for either a core paper (with grades C-G²) or an extended paper (with grade A⁺ to E³). No conversion from the extended grade to core grades was possible. This means that a fail in an extended grade would not be automatically converted to a pass on the core grade. The learner was either graded or ungraded for the specific paper enrolled for. This setback posed challenges for some teachers in terms of adapting to the new system of grading, as they were used to the system of the Cape Education Department with its flexibility, whereby a subject could be taken either on the higher grade or standard grade, and a fail on the higher grade would automatically be converted to a pass on the standard grade if such conversion was warranted (MEC, 1993:124). According to the MEC (2010), educators perceived the H/IGCSE approach to education as so problematic that it had to be scrapped and be replaced by the NSSC in 2006.

1.7 PROBLEM STATEMENT

Since independence in 1990, the Department of Education in Namibia experienced rapid curriculum transformation. This transformation in Namibia happened for a number of reasons which included political, social and economic changes influenced by the rapid increase in global knowledge, technology and skills (MEC, 1993). According to the MEC (1993), curriculum transformation was necessary in Namibia to align the curriculum goals with those of international standards. According to Flores (2005:401), as societal expectations and political and social priorities change, they place new demands on schools and teachers. Similarly, Amimo (2009:2) argues that there will never be a perfect curriculum for all ages as the environment keeps changing and creates new needs in the society. Therefore, the curriculum has to be transformed continuously in order to address societal needs. However, Evans (2000:173) argues that often policy makers introduce curriculum policy changes with little or no consultation with teachers. Similarly, Fullan and Hargreaves (1992:44) stated that for the teachers, curriculum transformation is not simply something that happens on paper or in an elegant flow chart. It must be implemented in the busy and complicated world of their classrooms. Fullan and Hargreaves (1992:44) argued that when teachers are faced with a

² The grading system used in the IGCSE curriculum to grade learners who wrote a certain examination at core/low level. The scores ranged from 6 points to 1 point.

³ The grading system used in IGCSE to grade learners who wrote a certain examination at high level. The symbols range from A⁺ being the highest, valued 8 points, and the E symbol being the lowest, valued at 3 points.

paradigm shift, they filter off their own experiences, beliefs, theories and ideology. This results in teachers responding differently and quite uniquely to educational policy.

Political, social and economic changes in Namibia resulted in the abolishing of the Cape Educational Department curriculum in 1994 to be replaced by the H/IGCSE curriculum. Although the H/IGCSE curriculum was introduced to improve teaching and learning, it created more implementation problems and as a result it was replaced by the NSSC curriculum in 2006. The NSSC curriculum was meant to build on the previous curriculum (H/IGCSE), but was amended to provide clear specifications on what needed to be taught and learned. Like any other new curriculum, the implementation of NSSC curriculum raised fears, doubts and questions on the part of many of the teachers on how they would best provide effective instruction to the learners. In addition, the NSSC curriculum imposed many challenges on Namibian educators as to how to re-think education and implement a curriculum to realise the broader goals of access, equity, quality, democracy, efficiency and life-long learning as stipulated in the national document guide “Towards Education for All” (MEC, 1993:13).

The failure of the NSSC Biology curriculum to yield better results over the years in national examinations raised critical questions among stakeholders. A lot of the blame for the current state of affairs in the NSSC Biology curriculum is placed on the country’s former apartheid system in which most teachers were not well trained to implement the national curriculum. Some critics assert that the NSSC Biology curriculum is overloaded with subject content, which learners fail to master over a given time. Policy makers placed the blame on teaching methods; they argued that most teaching methods used in the implementation of NSSC Biology curriculum were outdated (Africa Review, Wednesday, May 11, 2011). On the other hand, the Organisation for Economic Cooperation and Development (OECD, 2008:24) reported that the poor results stemming from the NSSC Biology curriculum were due to lack of teachers’ motivation, their incompetence, lack of interest and negligence to the plight of learners. Teachers, on the other hand, blamed the failure of the NSSC Biology curriculum on learners, whom they regard as incapable because of bad behaviour (OECD, 2008:84). Furthermore, teachers argued that they are subjected to serious stress by the behaviour of learners, their parents and society as a whole (OECD, 2008:84). Nevertheless, learners see things differently. Many of them argued that teachers are at fault as they do not help them to study or to develop as individuals (OECD, 2008:84). Given the level of criticism, the confusion among policy makers, teachers as well as learners, and the lack of clarity about factors which hinder effective implementation of the NSSC Biology curriculum, the

researcher found it necessary to conduct a study on the lived experience of Grade 11 and 12 Biology teachers of the implementation of the NSSC curriculum so that more in-depth qualitative data could be provided from which insights could be derived.

The problem statement of this study reads as follows: Within a period of less than 16 years the Department of Education in Namibia implemented three different curricula. According to the literature reviewed, all three curricula failed to yield better results (MEC, 2010). The literature revealed that in an attempt to find out why the Biology results remain low in comparison to other subjects offered in the NSSC curriculum (see Appendix L), many studies focused mainly on the knowledge component of the Biology curriculum in Namibia (MEC, 2010). Furthermore, the literature revealed that although many teachers were exposed to different curricula over the years, none of the studies in Namibia focused on the lived experience of Biology teachers of the implementation of the Biology curriculum (Tubaundule, 2014; MEC, 2010). It is against this background that this study aims to explore the lived experiences of selected Grade 11 and 12 Biology teachers of the implementation of the NSSC Biology curriculum in the Erongo region of Namibia.

The researcher contends that the study on lived experiences of teachers might give an insight into why the different Biology curricula in Namibia have not produced the desired results since independence. An investigation of the lived experiences of teachers is crucial for any curriculum development, since teachers are the implementers of the curriculum and engage with it for much longer than policy makers. Teachers have direct contact with learners and are intimately aware of the learners' needs. Investigating teachers' lived experiences might give an insight into why learners perform poorly in the NSSC Biology examination as per the researcher's experience of the past five years. The researcher argues that studying the learners' lived experiences of a curriculum might not be as productive, given their short engagement with it.

1.8 RESEARCH QUESTION

How do Grade 11 and 12 Biology teachers in the Erongo region of Namibia experience the implementation of NSSC curriculum?

1.9 RESEARCH METHODOLOGY

1.9.1 RESEARCH PARADIGM

The study adopts an interpretive paradigm as the orientation most appropriate for the intended research. According to Cohen, Manion and Morrison (2000:111), the interpretive approach has the intention of understanding the world of human experience. Consequently, the specific

research approach that is adopted in this study is phenomenology. According to Zucker (2009:1), phenomenology is a systematic inquiry into an event or occurrence which aims to describe the phenomenon of interest. Therefore, phenomenology entails the analysis of consciousness, the nature of essence as perceived by the inner consciousness of individual participants (Pence, 2000:42). To explore the lived experiences of the Grade 11 and 12 NSSC Biology teachers, the study employs a phenomenological approach where the researcher records and interprets “lived experiences” through clear and detailed descriptions (Magrini, 2012:1). Phenomenology is discussed in more details in Chapters 2 and 3.

1.9.2 SITE SELECTION AND SAMPLING

According to McMillan and Schumacher (2006:319), site selection is aimed at pinpointing people taking part in a particular study, and is preferred when the research focus is on complex micro processes. McMillan and Schumacher (2006:319) contend that a clear description of the criteria for site selection is important and that it should be linked to the research problem identified. Moodley (2013:9) defines sampling as a smaller selection of subjects who represent the bigger population and from which the researcher collects information. For the purpose of this study, the units of analysis are five Grade 11 and 12 NSSC Biology teachers from three high schools in the Swakopmund circuit. The three high schools from which the five NSSC Biology teachers were selected are the former German-speaking school, the former English-speaking white school and the former Afrikaans-speaking black school. Teachers from the Swakopmund circuit were selected because they were accessible to the researcher since he resides in this circuit, which made this study economically viable.

Teachers were selected using purposive sampling. Participants were selected based on the idea that each teacher selected comes from a different school type with a different background, and that further differentiating factors would be evident in teachers’ biographical profile, qualifications and years of experience of teaching Grade 11 and 12 NSSC Biology. This type of sampling is supported by Hycner (1999 cited by Groenewald, 2004:8), who explains that the phenomenon being researched dictates the type of research participants used.

1.9.3 DATA-CONSTRUCTION INSTRUMENT

In this study data were primarily produced through the use of interviews. Polkinghorne (2005:139) describes interviews as the most widely used approach for the production of qualitative data. According to Le Grange (2000:5), interviews allow the researchers to get inside the minds of people in order to understand and interpret their views on different matters. Furthermore, Le Grange (2000:5) argues that most researchers use interviews as a

magnifying glass to enter into the respondents' experiences. Le Grange (2000:5) further stresses that interviews allow researchers to make direct contact with their research participants. In this study semi-structured interviews were used as the best tool for data construction so as to answer the research question: How do Grade 11 and 12 Biology teachers in the Erongo region of Namibia experience the implementation of the NSSC curriculum?

Cohen et al. (2000:305) described interviews as data-construction tools which enable the researchers to enter and understand the situation being investigated. In this study, during the interviews the researcher concentrated on and transcribed what emerged from the participants' responses without any preconceived notions, since this is an open-ended study. The data-construction process is discussed in more detail in Chapter 3.

1.9.4 RESEARCH METHOD

The research design of this study is characterised by its qualitative, exploratory, contextual and descriptive nature. A qualitative approach is used in order to create a holistic picture of the phenomenon within the context in which it occurred (Matthew, Miles & Michael, 1994:6). Similarly, Merriam (1998:5) explains that qualitative research seeks to explain social phenomena within their natural setting. This study attempts to construct empirical evidence to gain an understanding of the lived experiences of Grade 11 and 12 Biology teachers on the implementation of the NSSC curriculum at three high schools in the Erongo region of Namibia. Qualitative research seeks to understand and interpret the meaning of circumstances or events from the perspectives of the people taking part and how it is understood by them. The qualitative approach is therefore selected in order to obtain comprehensive in-depth knowledge and understanding of how Grade 11 and 12 Biology teachers experience the implementation of the NSSC Biology curriculum.

1.10 DATA ANALYSIS

Data analysis concerns the examination and interpretation of data. McMillan and Schumacher (2006:364) argue that qualitative data analysis is an on-going process that is incorporated into all stages of qualitative research. Data analysis is a systematic procedure of probing, classifying, comparing, synthesising and interpreting data to tackle the initial propositions of the study (Yin, 2003:109; White, 2002:82). This suggests that data analysis does not only happen at the end of the study, but is in fact done continuously as data are gathered. This study adopts a thematic approach to data analysis. According to Braun and Clarke (2006:6), thematic analysis is a method of analysing qualitative data by "identifying, analysing and reporting patterns (themes) within data." Similarly, Fereday and Muir-Cochrane (2008:82)

describe thematic analysis as an approach to data analysis which seeks to unearth salient themes that emerge as being important to the description of the phenomenon.

1.11 ETHICAL CONSIDERATIONS

According to Van den Assem (2011:1), ethics deals with issues of human behaviour related to a sense of what is right and what is wrong, and thus it may be viewed as society's code of moral conduct. Ethical issues arise in all aspects of research and the research methods proposed in this study also have potential ethical risks. Therefore, an application for permission to conduct the research study in the Erongo region was lodged with the Directorate of Education in Namibia, since the study involves Grade 11 and 12 Biology teachers (see Appendix B). Furthermore, the principals of the three high schools from which the five Biology teachers were selected were also informed in writing about the study which would take place at their respective schools (see Appendix C). Interviews were conducted only once informed consent was given by interviewees (see Appendix I). Moreover, anonymity of data and confidentiality were assured and participants were informed of their rights to take part in the study, as well as their rights to withdraw from the research at any stage should they feel uncomfortable. In addition, the researcher submitted an application for ethical clearance to the Research Ethical Committee of Stellenbosch University (see Appendix H). The researcher ensured that the research study was carried out with due consideration of the ethical procedures of Stellenbosch University as well as of the Ministry of Education in Namibia.

1.12 VALIDITY AND RELIABILITY

Validity refers to the degree of congruence between the explanations of the phenomena, meaning that the realities of the world rest on data collection and analysis (McMillan & Schumacher, 2006:324). For all kinds of research, including this research, the key quality-control issue is related to the validity of a study and its findings. A valid study is one that has appropriately collected and interpreted data, so that the conclusions accurately reflect and represent the real world (or laboratory) that was studied (Yin, 2011:78). Similarly, Le Grange (2014:65) argues that validity is an instrument used to judge whether the research accurately describes the phenomenon which it is intended to describe. Therefore, the research design, the methodology and the conclusions of the research all need to have taken issues of validity into account.

According to Le Grange (2014:60), reliability is the probability that repeating a research procedure or method would produce identical or similar results. It represents the degree of confidence that replicating the process would ensure consistency. On the other hand, Sapsford

and Evans (1984 cited in Le Grange,2014:60) emphasises that reliability applies to people involved in research as well as the instruments used for data construction.

The validity and reliability of this study were enhanced by employing member checking and thick description of the primary data. The formulation of interview questions and the interviews were monitored through detailed and informed discussions between the researcher and his supervisor. The credibility of the study is increased by creating contextually rich data as a basis for checking, questioning and theorising. Issues of validity and reliability are discussed in more detail in Chapter 3. In the next section the researcher discusses the delimitation and limitation of the study.

1.13 DELIMITATION OF THE STUDY

This phenomenological study is limited in scope to addressing the lived experiences of its participants. The study is delimited to the exploring the experience of five Biology teachers from three high schools of the Swakopmund Circuit in the Erongo region of Namibia. The focus is on the teachers' narrative of their lived experiences of the implementation of the NSSC Biology curriculum. Therefore, the understandings that developed from this study cannot be generalised to all Biology teachers in the region or the country. Interviews were selected as the only data-construction tool in this study. The lived experiences of Grade 11 and 12 Biology teachers on the implementation of the NSSC curriculum were explored based on their narratives. The selection of interviews as the only instrument for data construction in this study is based on the understanding that lived experiences are reflected in the self-reporting of participants. Methodological procedures such as document analysis and observation were not used, since the researcher's interest lies in the participants' lived experience of the implementation of the NSSC Biology curriculum.

This study provides an insight into the lived experiences of Grade 11 and 12 Biology teachers on the implementation of the NSSC curriculum. Furthermore, the study provides insights into the participants' views on the implications associated with the implementation of the NSSC Biology curriculum.

1.14 LIMITATION OF THE STUDY

As noted the aim of this study was to explore the lived experiences of Grade 11 and 12 Biology teachers on the implementation of the NSSC curriculum in the Erongo region of Namibia. However, because of the vastness of the region, lack of time and funds, and other resource constraints, the study had to be confined to one circuit (the Swakopmund circuit) out of three circuits in the region. Within the Swakopmund circuit, only five NSSC Biology

teachers from three high schools part take in the study. Since taking part in the study was voluntary, during the negotiation to get access to the research site, one high school withdrew from the study. This reduced the number of participants from eight to five teachers. All interviews were conducted in the second language (English) of the participants; some participants could not express themselves in the way they wished to do because English was not their first language. The study is not representative of high schools in all 14 regions, not of the lived experiences of all teachers in the Erongo region. Since there are no studies that have been conducted in Namibia on the lived experiences of teachers on the implementation of the Biology curriculum, there was a paucity of literature to draw on. Furthermore, the study is limited to the lived experiences of the NSSC Biology teachers who participated in this study. Phenomenological studies are restricted to the experiences of those who participate in the study. Even though it is likely for the readers to transfer those descriptions to other settings because of a shared or similar situational personality (Creswell, 1998); the findings of this study cannot be generalised to other high schools in other regions. Important lessons could, however, be learned from such studies.

1.15 ORGANISATION OF THE THESIS

Chapter 1: This chapter provides an overview of the study. It presents the aim, motivation, background to the study and the problem statement. The research question, research methodology, ethical considerations, validity and reliability, the significance of the study and the outlines of the subsequent chapters are presented.

Chapter 2: This chapter presents the survey of the literature that related to this particular study. Phenomenology, lived experience, the curriculum, colonial education in Namibia, history of school Biology, the need for curriculum transformation and the impact of curriculum change on teachers are also dealt with in this chapter.

Chapter 3: This chapter focuses on the research design and research methodology used to obtain data in this study. The chapter further discusses the research question and the paradigm adopted to guide the study. Details of sampling, the data-collection instrument, ethical and other issues concerning validity and reliability will be provided in this chapter.

Chapter 4: This chapter presents the research findings, analysis, description and interpretation of the data collected during the study.

Chapter 5: This chapter outlines the findings of the preceding chapters. Furthermore, the chapter provides the conclusion on the research findings and presents a number of

recommendations. The significance of the research findings is highlighted and opportunities for further research are opened up.

1.16 CONCLUSION

Chapter 1 served to briefly introduce the readers to the “what” and “why” of the study. It provides the aim, objectives, the motivation as well as the significance of the study. The chapter continued by highlighting the background of the study and the problem statement to set the context of the study. The research question guiding this study, the research method and the research paradigm appropriate for the study were also discussed. Furthermore, the chapter describes the sampling method, the instrument suitable for data construction and the process of data analysis. The credibility and transferability issues as well as the ethical considerations involved in the study were discussed in this chapter. The chapter concluded by highlighting the delimitation and limitation of the study as well as the organisation of the thesis. Chapter 2 focuses on a review of the existing literature on teachers’ lived experiences.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

Chapter 1 provided an overview of the research study. This chapter focuses on a review of existing literature on teachers' lived experiences. The literature review focuses on exploring various theories and what previous findings reveal with regard to teachers' lived experiences on the implementation of any new curriculum. The term 'literature review' refers to the process that aims at critically analysing a segment of published themes (Briggs and Coleman, 2007:62). Briggs and Coleman (2007:62) states that the reason for conducting a literature review is to help clarify what is already known as well as what has been done to avoid duplication. To answer the research question for this study, the researcher will critically analyse and review both the national and international literature.

This study specifically explores the lived experiences of Grade 11 and 12 Biology teachers of the implementation of NSSC Biology curriculum in three high schools in the Erongo region of Namibia. The literature review will therefore engage with the following key focus areas: phenomenology, lived experience, curriculum, history of Biology as a school subject, colonial education in Namibia, curriculum transformation and other components that are required for effective implementation of any curriculum. Phenomenology is at the heart of research on lived experiences. Therefore the literature on phenomenology is reviewed first.

2.2 PHENOMENOLOGY

The term 'phenomenology' means different things to different people. According to Woodruff (2013:1), phenomenology refers to the study of structures of consciousness as experienced from the first person point of view. It focuses on descriptions of what people experience and how it is that they are experiencing a particular phenomenon. The experience is directed toward an object by virtue of its content. On the other hand, Merleau-Ponty (1964 cited by Stoller, 2009:709) describes phenomenology as a philosophical method of observing, recording and interpreting lived experience through vivid and detailed descriptions. In addition, Merleau-Ponty (ibid.) argues that the practice of phenomenology seeks to expose, uncover or reveal elements of human existence that structure our practical, particularly empirical, situations. According to Merleau-Ponty (ibid.), phenomenology can also refer to active participation in events or activities leading to accumulation of knowledge.

Merleau-Ponty (1964 cited by Stoller, 2009:709) emphasises that lived experience is the most immediate source and last measuring stick of all experiences. On the other hand, Stoller

(2009:709) argues that phenomenology is not a science based on experience but rather a science derived from experience. Phenomenologists view experience as an object of phenomenological investigation. Therefore, the structure of experience is of importance to the phenomenologist, so that the flow of the experience can be described as given (Stoller, 2009:709). Phenomenological investigation demonstrates that the flow of experience is positioned within a historicity of experience. In addition, Stoller (2009:10) argues that the root of the phenomenological theory of perception centres on an object being perceived in relation to the horizons in which it is found and from which it stands out. In this case 'horizons' refers to the unperceived aspects of an image (Stoller, 2009:10). He further argues that experience encompasses not only what is experienced at a given time but also that which will be potentially experienced.

Merleau-Ponty (1964:4) elucidates that one might characterise phenomenology as philosophy that investigates experience from a first-person point of view as it is presented to the subject. Merleau-Ponty (ibid.) further argues that phenomenology is a philosophical method as opposed to a scientific investigation in that it seeks to avoid the Cartesian mind-body or mind-matter dualism (Kockelmans, 1994; Romdenh-Romluc, 2011; Sokolowski, 2000; Stewart & Mickunas, 1990) inherent in empiricist scientific investigations. When Descartes asserted "I think therefore I am", he inscribed the segregation of the mind from the body and as such he proffered the possibility of a purely rational and objective approach to studying and understanding the world, inclusive of a physical relationship between the observer and that which is being observed (Stewart & Mickunas, 1990). That is to say, Descartes' position advanced the theory that the manner in which individuals come to know something resides outside them. This philosophical orientation is grounded in the teaching of Plato, who embraced the dualism of the soul as separate from the body (Romdenh-Romluc, 2011:19). The researcher agrees with Romdenh-Romluc (ibid.) that the phenomenological approach offers holistic insight into that which we observe or experience and that phenomenology acknowledges and embraces the idea that peoples' minds and bodies are not separate entities. Although humans have the faculty of reason, reasoning is never completely separate from their feelings and attitudes (ibid.). This is because if people accept reality as an object that they see and see themselves as an object within the same reality, then it is not possible for them to be in the world and to be of the world simultaneously without an intimate connection between their minds and bodies. Romdenh-Romluc (2011:19) claims that phenomenology does not attempt to force a sterile objectivity over that which it studies as though there is no connection between the one who is studying and the object being studied. From a

phenomenological perspective, meaning and understanding are subjective in nature and as such, meaning cannot exist outside of one's consciousness (Romdenh-Romluc, 2011:19).

Furthermore, there is a connection that phenomenologists refer to as intentionality wherein people recognise the conscious relationship that they have with an object (Sokolowski, 2000:8). It should be understood that when phenomenologists speak of intention, the application is not in the practical sense of an action but rather in the knowing or cognitive sense of an object (ibid.). Phenomenology offers diverse ways in which one can understand phenomena. As people's understanding of phenomena changes in accordance with their intentionality, they can begin to understand the diversity regarding the ways in which humans come to know and how they share reality with others and the world (ibid.). Once they find out that all consciousness has intentionality or a way of knowing, this way of knowing can be studied as a phenomenon.

Husserl's term *Lebenswelt* defines the phenomenological sphere of lived experience or life world – the world of everyday experience. Husserl is referred to as the father or founder of phenomenology (Stewart & Mickunas, 1990; Romdenh-Romluc, 2011). Phenomenology provides the contextual space of our daily lives and the space we inhabit along with the subjects that we study. Again, distinguishing itself from the Cartesian orientation to the world where the mind exists separately from body, phenomenology can study all aspects of the *Lebenswelt* and uncover its essential structures (Romdenh-Romluc, 2011:13).

Sokolowski (2000:49) emphasises that using a phenomenological lens to understand the world also requires that individual everyday understandings or intentionalities be set aside. That is to say, every person in the state of being conscious has a customary standpoint or natural perspective on the world of ordinary experience. Husserl (1970 cited in Stewart & Mickunas, 1990:26) describes this as peoples' natural attitude (Sokolowski, 2000:49; Mickunas, 1990:24). In this natural attitude, people unquestioningly accept that the world exists and they identify items that exist in the world, both animate and inanimate, along with values, judgments and feelings (Sokolowski, 2000:49). However, one should understand that from a philosophical vantage point, the natural attitude does not provide for a sense of wonder; the natural attitude does not question how individuals' understandings or intentionality of everyday experiences come to be (Sokolowski, 2000:49). The goal of the phenomenologist is to flesh out the essence of a lived experience and requires that the researcher suspends his/her natural attitude in exchange for a philosophical attitude, as a demand to know the rational foundations of the world or, as Aristotle put it, to know the

reason why (Stewart & Mickunas, 1990:26). Husserl (1970 cited in Stewart & Mickunas, 1990:26) describes the exchange of a natural attitude for a philosophical one as a phenomenological reduction. This concept of phenomenological reduction will be discussed next.

2.2.1 PHENOMENOLOGICAL REDUCTION

Sokolowski (2000:51) defines phenomenological reduction as the move from the natural attitude to the phenomenological; it is the restriction of our intentionality from its expansive natural attitude which targets any and all things in the world to the apparently more confined phenomenological attitude. It targets individual intentional life with its correlated objects and the world. Phenomenological reduction, then, is the process by which one self-consciously examines his/her understanding or their intentionality to the point of transcendence in that thematic implications rise up or become conscious to people based on their using themselves as the instrument of truth (Sokolowski, 2000:51).

Stewart and Mickunas (1990:26) argue that in order to achieve phenomenological reduction and the associated phenomenological attitude, understanding or truth resulting from one's natural attitude must be recognised and acknowledged as superfluous or accidental. Stewart and Mickunas (*ibid.*) contend that the effect of such recognition and acknowledgement establishes an opportunity for the offsetting of commonly held beliefs and allows for the questioning of judgments that result from an individual's natural attitude to the world. In the acknowledgement of predispositions and prejudices, suspension of perceptions is realised. Husserl (1970) states that suspension serves to neutralise the intentions of natural attitude, making possible the emergence of layers of understanding as perceived from the philosophical and phenomenological attitude. Husserl (1970) argues that when someone experiences suspension, he or she can bracket or set aside those extracted prejudgments. Significantly, as a result of phenomenological bracketing, consciousness is purified and only phenomena remain.

Phenomenology is the appropriate philosophical framework for this study, since it seeks an understanding of the essential structures of teaching within the lived experience of teachers (Stewart & Mickunas, 1990:36). Moreover, the philosophical orientation of phenomenology acknowledges and accepts the influence of perceptions, where reality may be revealed to us from different angles and in various stages (Romdenh-Romluc, 2011:19). These levels of awareness or changes in the perceptual process allow for plural descriptions of the world and confirm the problems with the Cartesian mind-body dualism (Romdenh-Romluc, 2011:19). Merleau-Ponty (1964 cited in Romdenh-Romluc, 2011:19) states that "I cannot view the world

from nowhere; I always perceive the world from somewhere; that is to say perceive the world from my own particular perspective.”

According to Grumet (1976a:38), one form of curriculum research that incorporates the phenomenological critique of mainstream social science is *currere*, a phenomenological form of autobiographical curriculum theory. Therefore, it is necessary that the phenomenological foundations of *currere* be discussed briefly in the next section.

2.2.2 PHENOMENOLOGICAL FOUNDATION OF CURRERE

Currere was first described by William Pinar in 1975. According to Pinar (1975:19), *currere* encourages teachers to undertake an autobiographical examination of themselves. In relation to curriculum, Pinar (1975:19) has the following to say: “The method of *currere* reconceptualised curriculum from course objectives to complicated conversation with oneself (as a ‘private’ intellectual), an ongoing project of self-understanding in which one becomes mobilised for engaged pedagogical action as a private-and-public intellectual – with others in the social reconstruction of the public sphere.”

Furthermore, Pinar (ibid.) proposes a framework for the method of *currere*, requiring those involved in education to reflect upon their life experiences thus far. The framework includes four steps or benchmarks: the regressive, the progressive, the analytical and the synthetic (Pinar, 1975:19). The regressive step motivates teachers to bear in mind particular educational experiences and how those experiences have directed them in the development of their own personal approach or beliefs about education. The regressive step allows teachers to recognise how the past has not only affected them, but also the people around them. The progressive step presents an opportunity for teachers to think about the future. The analytical step has to do with analysing the here and now, and generate a subjective space of freedom from the present. The synthetic step involves analysing the present in the light of the knowledge and understanding achieved from the regressive, progressive and analytical steps. Pinar uses the four steps as a framework to reflect on curriculum theory and public education.

Similarly, Grumet (1976a:38) cited *currere* as a method and theory of curriculum which escapes the epistemological traps of mainstream social science and educational research. According to Grumet (ibid.) *currere* focuses on the educational experience of the individual as reported by the individual. Harre and Secord (cited in Grumet, 1976a:38) suggested that the “most profound discoveries of social psychology will be made by those who, while playing a part, filling a role and so on, can be their own audience.” Husserlian phenomenology undergirds the method of *currere*, particularly the emphasis on the reciprocity between

subjectivity and objectivity in the constitution of experience and meanings (Grumet, 1976a:38). The method of *currere* is related to this study because it shares phenomenology's interest in describing immediate, pre-conceptual experience and ensure that the phenomenological process of "distancing" and "bracketing" required doing so. The notion of constitution central to both *currere* and Husserlian phenomenology is founded on Brentano's formulation of intentionality as a fundamental structure of consciousness (Grumet, 1976a:38). Intentionality specifies that all consciousness is consciousness of something and so the subject is accessible to oneself via the object intended (ibid.).

Grumet (ibid.) states that objective constitution is the life of the subject; knowledge of self becomes knowledge of self as knower of the world, not just as a passive recipient of stimuli from the objective world, not as an expression of latent subjectivity but as a bridge between these two domains, a mediator. The homunculus of educational experience resides in cogitation. Husserl (1964 cited in Grumet, 1976a:39) rejects the determinism which undergirds so-called empiricism, which portrays consciousness as the passive recipient of sense impressions. Husserl (1964) also rejects philosophical idealism which, while denying knowledge of the world to human beings, consoled them with the definitiveness of the constructions of their own minds.

Currere draws support for its focus upon lived experience from Husserl's conviction that only in the immediacy and intensity of encounter can certainty reside. To that end Husserl formulated a system of disciplined reflection to assess the adequacy and fullness of this certainty, a system designed to produce knowledge grounded in the lived experience of the subject. With this in mind, the nature of lived experience is discussed next.

2.3 LIVED EXPERIENCE

What is "lived experience?" This is an important question because phenomenological human science begins in lived experience and eventually turns back to it (Van Manen, 1990:35). Dilthey (1985 cited in Van Manen, 1990:35) suggests that in its most basic form lived experience involves our immediate, pre-reflective consciousness of life: a reflexive or self-given awareness which is, as awareness, unaware of itself. Dilthey (1985 cited in Van Manen, 1990:35) further states that "a lived experience does not confront a person as something perceived or represented; it is not given to the person but the reality of lived experience is there-for-that person because he/she has a reflexive awareness of it, because he/she possesses it immediately as belonging to him/her in some sense. Only in thought does it become objective."

An analogy may be helpful here. A new teacher stands in front of a class for the very first time and may be conscious that all learners are looking at him/her. Some teachers have this experience every year when they begin the year with a new class or classes (Van Manen, 1990:36). This “looked at” feeling may make it difficult to behave naturally and to speak freely. The same is true when one is being interviewed on television or when a person participates in a panel discussion (ibid.). Having all the eyes on one removes one’s taken-for-granted relation to one’s voice and his body. The presence of the audience force one to be aware of one’s experience while experiencing it (ibid.). This could result is awkwardness. However, as soon as one gets involved in the debate and “forgets” the presence of the audience, one engages ‘naturally’ in the activity. Only by later reflecting on the discussion, can one try to apprehend what the discussion was like.

Van Manen (1990:36) explains that various thinkers have noted that lived experience first of all has a temporal structure: it can never be grasped in its immediate manifestation but only reflectively as past-present. Moreover, our appropriation of the meaning of lived experience is always of something past that can never be grasped in its full richness and depth, since lived experience implicates the totality of life (Van Manen, 1990). The interpretive examination of lived experience has this methodical feature of relating the particular to the universal, part to whole and episode to totality. Merleau-Ponty (1968 cited in Van Manen, 1990:36) has given a more ontological expression to the notion of lived experience as immediate awareness, which he calls sensibility.

A study by Merleau-Ponty (1964 cited in Sadala & Adorno, 2003:2) highlighted that lived experience is situational. It happens in a particular space and time. The situation or action speaks for itself and cannot be assumed or viewed through the eyes of the researcher (Sadala & Adorno, 2003:2). This means that experience is a text whereby the reader expands the borders of understanding instead of understanding the borders. The aim of any phenomenologist is to describe the phenomena as accurately as possible, refraining from imposing preconceived notions (Groenewald, 2004:4). Furthermore, Groenewald (2004:4) points out the phenomenologist’s concern as that of understanding social and psychological phenomena from the perspective of the people involved.

It is very important for one to understand that lived experience is the beginning point and last point of phenomenological research. The aim of phenomenology is to transform lived experience into a textual expression of its essence in such a manner that the effect of the text is at once a reflexive re-living and a reflective appropriation of something meaningful: a

notion by which a reader is powerfully animated in his or her own lived experience (Van Manen, 1990:36). Dilthey (1985:59) suggests that lived experience is to the soul what breath is to the body: “just as our body needs to breathe, our soul requires the fulfilment and expansion of its existence in the reverberations of emotional life.” Lived experience is the breathing of meaning (ibid.). In the flow of life, consciousness breathes meaning in a to-and-fro movement: a constant heaving between the inner and the outer made concrete, for example, in the person’s reflexive consciousness of hope for a child and the child as the object of hope (ibid.). There is a determinate reality-appreciation in the flow of living and experiencing life’s breath. Thus, a lived experience has a certain essence, a “quality” that people recognise in retrospect (ibid.).

On the other hand, Gadamer (1975 cited by Van Manen, 1990:36) observes that the word “experience” has a condensing and intensifying meaning. If something is called or considered an experience, its meaning rounds it into the unity of a significant whole. Van Manen (ibid.) further argues that what makes the experience unique is that someone can reflect and talk about it as a particular structural nexus and the motif then gives quality to the particular experience. That shows that lived experiences are related to each other like motifs in a symphony (ibid.). According to Van Manen (ibid.), this means that lived experiences gather hermeneutic significance as we gather them by giving memory to them. Through mediations, conversations, day dreams, inspirations and other interpretive acts we assign meaning to the phenomena of lived life (ibid.). Since the study investigates the lived experiences of teachers of the implementation of the NSSC Biology curriculum, it is necessary for the researcher to discuss what the concept of ‘curriculum’ entails.

2.4 CURRICULUM

Although the concept of ‘curriculum’ was highlighted earlier in the discussion on the phenomenological foundation of *currere*, the concept will be further considered in detail in this section. The section will begin by discussing what the term ‘curriculum’ entails. The concepts of ‘curriculum as planned’ and ‘curriculum as lived experience’ will also be discussed.

According to Connelly and Lantz (1991:15) and Egan (2003:10), one of the biggest challenges in curriculum studies is how to define the concept of ‘curriculum’. According to Egan (2003:10), the origin of the word ‘curriculum’ can be traced to its Latin root. Its first meaning referred to “running,” “a race,” or “a course,” and its secondary meanings were “a race-course” or “a career” (Connelly & Lantz, 1991:15; Egan, 2003:10). The *Oxford Advanced Learners’ Dictionary* (Hornby, 2010:359) defines curriculum as “a course; a

regular course of study or training, as at a school or university”, or as “a course, especially, a specific fixed course of study, as in a school or college, as one leading to a degree.

McKernan (2008 cited by Carl, 2012:28) argues that curriculum is not the final blueprint, as it is nothing more than an idea and ideal in the form of a proposal that it represents some worthwhile plan for leading us out of ignorance and thereby resulting in further growth through education. It refers to the means and materials with which teachers interact for the purpose of achieving identified educational outcomes (Carl, 2012:28). A curriculum consists of all the planned and unplanned experiences that the school offers as part of its educational responsibility (ibid.). It is the way the content is designed and derived. This includes the structure, organisation, balance and presentation of the content in the class (ibid.).

On the other hand, Marks, Stoops and King-Stoops (1978:457) define curriculum as the sum total of the means by which a teacher is guided in attaining the intellectual and moral discipline requisite for the role of an intelligent citizen in a free society. It is not merely a course of study, nor is it a listing of goals or objectives; rather it encompasses all the learning experiences that learners have under the direction of the teacher (Marks et al., 1978:457). However, Kelly (2005:6) asserted that “there is a need for a definition which embraces at least four major dimensions of educational planning and practice, which describes the intentions of the planners, the procedures adopted for the implementation of those intentions, the actual experiences of the learners resulting from the teachers’ direct attempts to carry out the planners’ intentions, and the ‘hidden’ learning that occurs as a by-product of the organisation of the curriculum, and indeed the school.” Kelly (ibid.) highlighted two concepts: curriculum as planned and curriculum as lived experience. Therefore, in the next section, the researcher will elucidate the differences between the curriculum as planned and the curriculum as lived experience.

2.4.1 CURRICULUM AS PLANNED AND CURRICULUM AS LIVED EXPERIENCE

In his lecture “Legitimizing Lived Curriculum: Toward a Curricular Landscape of Multiplicity” Aoki (2005) described the complex relation between curriculum as planned and curriculum as lived. According to Aoki (2005), curriculum as planned is best described as the work of the curriculum planners, usually written outside the classroom. Curriculum as planned entails formulating statements of what teachers should do in the classroom, and recommending resources as well as providing information regarding evaluation (Aoki, 2005). However, he argues that curriculum does not detail what happens in the classroom. Meaning that curriculum as planned can be interpreted and experienced in different ways by different teachers.

On the other hand, Aoki (2005) describes the curriculum as lived as referring to a multiplicity of curriculums that a teacher experiences. He argues that there are different lived curriculums in different classrooms. However, he acknowledges that it is difficult for a teacher to plan a lesson without knowing the dynamics of the classroom; a lesson can easily change if one has a large number of learners with learning difficulties, or if many of the learners display gifted qualities (Aoki, 2005).

Aoki (2005) states that curriculum and instrumentalism are very predominant in the fabric of curriculum work. He argues that curriculum as planned and curriculum as lived are essential for the implementation of any curriculum. Aoki (2005) writes about a teacher's place in the midst of the multiplicity of curriculum, between both the lived and the planned. Aoki (2005:213) argues that during the lesson teachers should "allow space for stories, anecdotes and narratives that embody the lived dimension of curriculum life." To ensure that the curriculum is experienced by both the learners and teachers during the lesson, there is a need for educators to bring the curriculum to life and engage the classroom. It is important for teachers to understand that a lived curriculum acknowledges the individual differences of those who are learning and accommodates lived meanings. It is with this understanding in mind that this study wishes to investigate teachers' lived experiences of a Namibian Biology (Life Sciences) curriculum, because this is a neglected area and not captured in research on curriculum implementation. To have a clear understanding of the Namibian education system, one should understand the history of education in Namibia. Therefore, the discussion in the next section focuses on colonial education in Namibia.

2.5 COLONIAL EDUCATION IN NAMIBIA

As inhabitants of a former German and South African colony, Namibians endured all kinds of discrimination for more than a century (Tjitendero, 1984:7). According to Tjitendero (ibid.), formal education in Namibia was introduced by various missionary societies whose education was aimed at 'civilising the natives' rather than educating them for self-reliance. It was meant to teach black Namibians how to read the Bible and other evangelical literature to enable them to facilitate the spreading of the gospel (South West Africa Survey, 1967:2; Geingob, 1968:219). This religious education was later utilised by the German colonisers who conquered the territory in 1884 as a means of entrenching colonisation and racial segregation.

In the German colonial education system indigenous people were provided with well-calculated limited skills to ensure that they remain manual workers who would provide cheap labour to the Germans (Tjitendero, 1984:3). Geingob (1968:213) points out that reserve (black 'states'/homelands) were created for the indigenous people and that the German colonial

government paid no attention to the establishment of adequate schools for the black population. Missionary and German schools were established with the aim of enabling blacks to study the Bible as well as to enable them to write their names (South West African Survey, 1967:109). It was simply an education for basic communication purposes.

The process of colonisation in Namibia intensified when white South Africa seized power from the Germans in 1915. More reserves (Bantustans or homelands) were created (Tjitendero, 1984:7). This further promoted disparity between the colonisers and the colonised. The South African government promoted the policy of segregation and later apartheid that was intended to minimise threats to white supremacy both in South Africa and Namibia (Tjitendero, 1984:7). During the apartheid years the South African government endorsed the general principle of territorial segregation between blacks and whites. Tjitendero (1984:7) further argues that Bantu Education was a component part of the apartheid policy that was designed to foster and to inculcate a passive acceptance of racial inferiority among black people, while accommodating the myth of white superiority. Apartheid was the ideological and legal basis for the inequalities in access to education and to culture, and interfered with scientific development and freedom of information (United Nations Educational, Science and Cultural Organisation [UNESCO], 1968: 15).

The country's education system was designed to reinforce apartheid rather than provide the necessary human resource base to promote equitable social and economic development (Tjitendero, 1984:8). Tjitendero (ibid.) further claims that colonial education was fragmented along racial and ethnic lines, with vast disparities in both the allocation of resources and the quality of education offered. Black education was based on the principles of trusteeship, inequality and segregation. It aimed at inculcating the white man's view of life. According to Tjitendero (1984:7), apartheid education was designed, firstly, to reproduce the privileges of the ruling class; secondly, to reproduce skills and attitudes required for maintaining a colonial society; and finally, to serve as an instrument of oppression. As Tjitendero (ibid.) states:

Bantu education was broadly conceived and organized in such a way as to provide schools with a definite Christian character. It was based on the three principles of guardianship, no levelling and segregation, as defined in the policy statement of the Institute of Christian National Education. Black schools were still in the hands of the Missionaries and Afrikaans was the medium of instruction. The Commission recommended mission schools to be replaced by the communities and Bantu education syllabi to be

introduced. The education of the Whites should continue to be the responsibility of the South West African administration.

Tjitendero (*ibid.*) argues that the colonial state in Namibia dictated the purpose of the education system in the country. Democracy was non-existent and the colonial government legislated greater inequalities between race and ethnic groups. Not only were racially segregated schools established, but education was further fragmented into tribal schools all over the country (*ibid.*). According to Amukugo (1993:45), during apartheid different education systems and administrations were developed based on race; whites, blacks and coloureds all had different schools that were administered by racially based education departments. Amukugo (*ibid.*) further argues that school attendance for all white children was made compulsory. Whites received superior schooling while blacks received an inferior schooling. The coloured schooling system was better than that of blacks but inferior to that of the whites (*ibid.*).

According to Amukugo (*ibid.*), Bantu education served the interests of white supremacy. It denied black people access to the same educational opportunities and resources that were enjoyed by white Namibians. It denigrated black peoples' history, culture and identity. Amukugo (*ibid.*) further argues that Bantu education promoted racial myths and stereotypes in its curricula and textbooks. In addition, Bantu education treated black Namibians as perpetual children in need of parental supervision by whites, which greatly limited students' vision of their place in broader Namibian society.

Amukugo (1993:234) argues that Bantu education was meant to equip blacks with basic literacy and numeracy skills to prepare a few, especially males, for clerical jobs in the colonial government. The Bantu education system was unfair, discriminatory and fragmented. It was used as a tool to further the interests of the colonial power in providing a semi-literate black workforce for the labour market (Kasanda & Shaimemanya, 1998). Black education was underfunded and characterised by a high number of learners dropping out of school. Very few black learners, boys and girls, were encouraged to enrol for Mathematics and Science subjects, because the colonial government regarded them as inherently incapable of mastering those subjects (Kasanda & Shaimemanya, 1998). This idea was supported by the South African Prime Minister, H.F. Verwoerd, who said "What is the use of teaching a Bantu child mathematics and science while he/she cannot use it in practice? Education must train and teach people in accordance with their opportunities in life. It is therefore necessary that native

education should be controlled in such a way that it should be in accordance with the policy of the state” (Ramananandan, 1995:370).

During the apartheid period the white ruling class worked to preserve their privileges and to transmit those skills and attitudes required for maintaining their status quo (Amukugo, 1993: 234). To further strengthen the apartheid state machinery, only a few ill-equipped, poorly staffed and underfunded schools were made available for blacks. Insufficient school facilities meant that the majority of the black population had to stay out of school or compete for the few places in their designated schools (Kasanda & Shaimemanya, 1998). It also meant that only a negligible number of non-whites would proceed to secondary and tertiary education levels. These deliberately engineered mechanisms enabled the colonisers to rationalise separate and unequal education systems which the oppressed were coerced into submitting to (Tjitendero, 1984:70). The nature of the apartheid education systems did not allow the majority of black people access to cultural capital, nor did it enable them to get a place in the structures for distributing it (Kasanda & Shaimemanya, 1998). Those who had the cultural capital had the power to make rules and to appropriate cultural capital. This historical account is important background to understanding the different schools in which the teachers selected for this study worked. The next section will discuss the teaching and learning methods used in Namibian schools during the apartheid period.

2.6 TEACHING AND LEARNING DURING APARTHEID IN NAMIBIA

Teaching and learning in Namibia during apartheid will be discussed under the following themes: curriculum, medium of instruction, teacher/learner ratio, and teachers’ training.

2.6.1 CURRICULUM

During the apartheid administration in Namibia, teachers were the custodians of knowledge while the learners were passive; they could not contribute to their own learning (MEC, 1993:120). The teaching method used was teacher-centred. Teachers were responsible for the learners’ learning (MEC, 1993:120). Similarly, Christie’s (2009:168) study on classroom teacher-learner discourses found that teachers usually stood up front, while learners sat passively at their desks. The learners’ role was to listen to and memorise what the teacher said. In other words, learners were not active and for this reason they simply ‘received’ the knowledge which teachers ‘deposited’ in their minds. This implies that teachers exercised unquestioned authority in their classrooms. Teachers were not only initiating activities to be pursued by learners, but also controlling communication channels within the group (Beets, Bitzer and Carl, 2014:161).

The curriculum was content-based and broken down into subjects (Beets et al., 2014:161). Moreover, the curriculum was very narrow in its scope (MEC, 1993: 120). This implies that the curriculum was designed in such way that it was concerned with describing, labelling and categorising. Learners spent time memorising what they were taught during lessons and how learning material was represented in textbooks (Kandumbu, 2005:13). It was not surprising to find people in Namibia during the apartheid years, who claimed to be educated, but lacked critical skills and knowledge (Kandumbu, 2005:13). Learners mastered the knowledge only for examination purposes, which was the only form of assessment that was meant for achieving objectives (Avenstrup, 1998:11; MEC, 1993:121). In addition, Beets et al. (2014:61) argue that in the examination learners were required to reproduce what they had been taught in classrooms. The Secretary for Bantu Education at the time stated that the Bantu education curriculum was geared towards achieving the following objectives: Standard Two (Grade 4) for literacy, Standard Six (Grade 8) ‘for a better class of labourer’, Standard Eight (Grade 10) for training teachers, nurses and police; and Standard Ten (Grade 12) for those who are to proceed to university for further education (Tjitendero, 1984: 14).

Tjitendero (ibid.) argues that teaching methods used in black schools were different from those used in White schools. Furthermore, Tjitendero (1984:26) states that the lecture method and the textbook method were regarded as the only teaching methods to be used in black schools during apartheid. The discussion above serves as the basis for understanding the need to transform education in post-independence Namibia and why there was a perceived need for a national curriculum. The different teaching methods used in black schools during apartheid will be discussed next.

2.6.1.1 The lecture method

According to Chaka (1997:34), teachers’ training in Namibia during apartheid was rigid because it was very authoritarian. Teachers were given too much power and as a result they did not encourage learners to reflect on their learning. Similarly, Rowell (1995:3) points out that “the authoritarian system of instruction fostered memorisation, rote learning, inhibited independent thinking and the development of problem-solving strategies.” Learners were treated as empty vessels that had to be filled with knowledge by teachers; teachers were in charge of the learners’ learning process (Rowell, 1995:3). The literature reviewed above demonstrates that during the apartheid period in Namibia teachers used the lecture method in the delivery of the curriculum.

The lecture method is the teaching method where the teacher talks, explains, illustrates and defines, while the learners listen passively (Chacko, 1993:47). It is often used to present

content to large classes (Chacko, 1993:47). Most teachers find it extremely difficult to perform individual work with large numbers of learners within a specific time frame. Individual work demands sufficient apparatus, time and equipment, and a lack of these resources might cause Biology teachers to refrain from using the individual method of interacting and rather to adhere to the lecture method (Chacko, 1993:47; Van Aswegen, Fraser, Nortje, Slabbert & Kaske, 1993:76). Isaac (1990:66) states that the lecture method is used more frequently by the majority of teachers because of time constraints and the cost in terms of equipment, space and supervision required by practical or investigative methods.

In spite of the advantages to the lecture method stated earlier, many scholars criticised the method. Huang (1991:26); Isaac (1990:66) as well as Yager and Huang (1994:99) maintain that it is doubtful whether the lecture method alone is sufficient for the development of skills that learners need to learn for life. Yager and Huang (1994:99) describe the lecture method as a 'sterile' learning method which prevents learners from exploring and thinking. Learners are sometimes taught as though they are passive and non-curious receivers of knowledge (Tobin, Tippins and Gallard, 1994:50). Learners are not always given the opportunity to develop the skills they need to acquire and apply the knowledge they have gained (Tobin et al., 1994:50). Due to poor teaching method used learners are not always actively involved in the learning activities, lessons can easily become boring (i.e. counter-productive) and learners may find it difficult to remember data.

Therefore, the researcher argues that if schools were to educate for democracy in terms of peaceful debate, mutual respect and the protection of human rights, and the repudiation of ethnic prejudice and intolerance, then the organisation of both classrooms and schools should be more consistent with these aims. In terms of classroom activities, this means that teaching methods across the curriculum will need to become more active, participative, cooperative, investigative and critical in order to develop democratic citizens. The curriculum will also need to allow time for a direct and explicit examination of political issues and structures. This is necessary because democratic education is based on a notion of choice, but choice based on political ignorance is no choice at all.

2.6.1.2 Textbook method

Harper (1997:17) and Mhlongo (1997:3) indicate that the teaching and learning during apartheid was plagued by teacher-dominated and textbook-bound methods. The researcher argues that although textbooks are good sources of information, they are mostly abused by teachers. Most teachers use textbooks as the only source of information (Slabbert, 1992:35).

Thus the learners might be separated from the concrete sources of knowledge, such as the materials from the environment where relevant information can be gained.

Although textbooks are widely used in Namibian schools, the researcher avers that much of the textbooks' content has become outdated or incomplete because of the rapid changes in developments in the field of Biology that happens every day. Content knowledge is thus tentative and provisional, as technological and scientific developments necessitate that the facts in textbooks be reviewed regularly (Chacko, 1993:47). Chacko (ibid.) further argues that most textbooks that are used in Namibian schools lack open-ended problems which learners can investigate and find solutions to as part of developing skills for life-long learning. Chacko (1993:47) argues that teaching methods in secondary schools should move away from a textbook-centred approach, where only the subject content is considered and not the skills necessary to apply this knowledge. Therefore, the researcher argues that all Biology teachers in the country and elsewhere need to employ different teaching approaches that will enable learners to develop learning skills which they can use in their real-life contexts and which they can integrate into other subjects.

One of the important factors which influence the implementation of any curriculum is the language of instruction. The language of instruction helps effective delivery of the subject content. Since the language of instruction plays a major role in the implementation of any curriculum, it's very important that the researcher highlights the language of instruction used in Namibian schools during the apartheid system.

2.6.2 MEDIUM OF INSTRUCTION

Regarding the language policy, Afrikaans was the effective lingua franca in Namibia. Afrikaans was introduced as the medium of instruction in all secondary schools in the country except Eastern Caprivi, where English was used as medium of instruction (Kandumbu, 2005:13). The emphasis was placed on teaching Afrikaans at the expense of indigenous languages for both political and administrative reasons (ibid.). According to Kandumbu (ibid.), the South African apartheid administration argued that the quality of teaching Afrikaans was better than providing instruction in the indigenous languages or English, and the learning of Afrikaans had a higher priority than the learning of local languages (ibid.). As a result, most Namibians considered Afrikaans as the language for the elite (Chamberlain, Diallo & John, 1981:8; Tjitendero, 1984:16). The content of education was also seriously affected as a result of the fact that course readers and textbooks were not always available in indigenous languages (Tjitendero, 1984:15).

2.6.3 TEACHER / LEARNERS RATIO

Regarding the policy on teacher/learner ratio, according to the study conducted by the United Nations Institute for Namibia, the teacher/learner ratio in black schools was higher than that of the white schools (Kandumbo, 2005:14). Geingob (1968: 219) states that the official policy governing the teacher/learner ratio in white schools was that a teacher should not under any circumstances have more than 25 learners in his/her class. This policy was introduced to enable teachers to give greater individual attention to their learners and also to pay attention to problematic learners as well as those who experience barriers to learning (Kandumbo, 2005:14). In contrast, there was no limitation on the number of learners in black classrooms (Geingob, 1968:219). According to Geingob (ibid.), in many cases in black schools a teacher had 50 to 60 learners in the class. As a result, black teachers experienced difficulties in rendering effective quality teaching, and it was also difficult for them to pay attention to those learners who faced barriers to learning (Geingob, 1968: 219).

2.6.4 TEACHERS' TRAINING

Teachers' training to teach in black schools was ineffective. The training which was offered had no link to specific subject areas within the country (Kandumbo, 2005:14). Therefore, the standard of teaching in black schools was inadequate. Another contentious issue was that legislation did not allow white teachers to teach in black schools (Geingob, 1968:219). According to Geingob (ibid.), the majority of black teachers were only qualified to teach at primary schools. Due to the low level of language proficiency among black teachers, a law was passed that prohibited black teachers from teaching in the white schools (Geingob, 1968:219). Lack of qualified black teachers at secondary level have disadvantaged black learners in such a way that they could not enrol for secondary education. Since Namibia gained its independence in 1990, legally schools have been desegregated in all respects. However, due to the legacy of apartheid most black and white teachers continue to teach in schools designated for their particular 'race' during apartheid.

Much has been written about the history of education in Namibia during the apartheid era. However, it is important for one to know that the apartheid curriculum was based on observation and conceptual development (Cross & Chisholm, 1990:45). That is to say black learners were not provided with opportunities to engage with the curriculum in depth in order to discuss their understanding on a given concept and to apply their knowledge in a range of contexts. Similarly, Kandumbu (2005:14) argues that schooling for black communities was by no means easy, particularly when one reflects on the political situation at that time. The content was prescriptive, authoritarian, sexist and context blind. Nevertheless, the year 1990

marked a significant change in the history of Namibia as the country embarked on several reforms in various spheres of life, including education, so as to redress the injustices in schooling during colonialism and apartheid. Curriculum transformation was among the areas in education that the South West Africa Peoples' Organisation (SWAPO) government embarked on. The next section will discuss the process of curriculum transformation in Namibia as well as provide a brief history of Biology as a school subject.

2.7 CURRICULUM TRANSFORMATION IN NAMIBIA

Before the researcher analyses the process of curriculum transformation in Namibia, the researcher would first like to elaborate on the concept of transformation. According to the higher education summit held in South Africa on 29-30 July 1996, transformation would entail the democratisation of governance structures and policy formation. It has to do with equality of access to education in line with the reconstruction and development of principles that guide lifelong learning, human resources development and the formation of a curriculum that is relevant to the needs of society (High Education Summit in South Africa, 1996). Transformation entails a democratic and peaceful process whereby all the relevant stakeholders contribute meaningfully to the creation of a teaching environment conducive to learning (Waghid, 2003:8). Such a conducive teaching environment is crucial in education since it helps teachers and other stakeholders to reach their goals.

Waghid (2003:8) argues that curriculum transformation can mean different things to different people, depending on how they perceive the concept. The *Oxford English Dictionary* defines transformation as the action of changing the form, shape or appearance of a given substance. It can also mean a complete change in the character, condition and nature of a substance. Based on Waghid (ibid.) and the *Oxford English Dictionary* definition of transformation, it could be inferred that in the context of this study transformation implies a complete change from one curriculum to another. The Ministry of Education and Culture (MEC) (1993:2) states that educational transformation refers to “education for all”, meaning that there is a shift from education for just the elite to education for all. According to Harvey and Knight (1996:10), transformation means “a form of change from one system to another.” This means that curriculum transformation has to do with the changes in the knowledge and abilities of learners as well as the development of domain expertise. However, it can also mean the process of getting to understand something better. Curriculum transformation concerns the extent to which the education system transforms the conceptual ability and self-awareness of learners (Harvey & Knight, 1996:11).

In 1990, when Namibia emerged as an independent nation, curriculum transformation was a priority as stated by the first president Dr Sam Nujoma. Dr Nujoma argued that the only way to rectify the apartheid legacy was by a massive new education and training programme for the people of Namibia (MEC, 1993:73). The primary goals for curriculum transformation were outlined as access, equity, quality and democracy in education. The MEC was established immediately after independence to facilitate the process of curriculum transformation. Angula and Lewis (1997:237) note that the MEC was faced with a daunting task, as the undoing of the apartheid legacy required changing the purpose of schooling from that of selection and an education for the elite to that of education for all.

The Namibian curriculum transformation was guided by the policy statement “Toward Education for All” (MEC, 1993:74). According to the policy statement, apartheid education was about educating elite in a positivistic system that was based on race. Similarly, Jansen (1995:249) states that Namibian curriculum policy immediately prior to independence mirrored the Bantu Education curriculum in South Africa. The curriculum was premised on notions of white supremacy, and racial and ethnic separation (Jansen, 1995:249). The curriculum of the time was characterised by a highly unequal provision of basic curriculum resources (Jansen, 1995:249). Since then Namibia has experienced unprecedented curriculum reforms in its classroom theory and practice. First and foremost, curriculum reformers refocused curriculum change on the role of the learner in the teaching and learning process (Tubaundule, 2014:86). This meant the introduction of a learner-centred pedagogy, which was regarded by many as an “effective antidote to the prevalence of teacher-centred didactic classroom practices” (O’Sullivan, 2004:585). The new curriculum transformation, as described by the document “Toward Education for All”, is built on learner-centred education and aimed at harnessing curiosity, excitement, the promotion of democracy and responsibility in lifelong learning (MEC, 1993). It was designed to employ a holistic view of teaching, valuing life experiences as well as to assist learners in integrating school and life outside school (MEC, 1993:7). The new curriculum reform defined learning as an active process with participation from the learners in developing, organising, implementing and managing learning.

The Namibian educational transformation involved both change in curriculum development processes as well as the product. It also involved a transition from one education system to another (MEC, 1993:7). The researcher contends that changing from one educational system to another is not an easy task, and reform and change are not necessarily synonymous. According Popkewitz (1988:92), change and transformation are never simple. Popkewitz

(1988:92) argues that “we know very little about change. Despite all well-intentioned efforts to improve our social world, there are no examples where the efforts of men and women have not been transformed as our ideas are moved into everyday politics.” Popkewitz (1988:92) states that in order to reform and change, we must question our underlying assumptions about society, culture, history, economics and politics. Failure to do so will result in window dressing. At worst rhetoric and rituals around reform, without questioning our underlying assumptions, will serve to perpetuate our general myths of schooling as the major system by which to improve society and sustain the illusion we hold about reform as a way of progressing (ibid.).

Popkewitz (1988:92) emphasises that schools as the major institutions by which to improve society are viewed as a myth, because although schools at certain periods help to produce conditions that have the potential for social transformation, they also serve to reproduce existing relations in society. They do this partly by the selection, organisation and evaluation of knowledge, which gives value only to certain types of knowledge (Popkewitz, 1988:93). The researcher goes along with Popkewitz’s (1988:93) argument, because knowledge taught in schools is always bound to interests in society. Those who have power in the society do not provide all people with the same access to knowledge or power.

Allen and Tanner (2005 cited in Le Grange, 2008:101) suggest that curriculum change requires active participation by learners and discovery-based laboratory tasks. Similarly, Thornton and Sokoloff (1998) point out that student learning and knowledge acquisition are enhanced with an interactive approach to teaching. Therefore, the challenge in curriculum reform is ascertaining how best to provide teachers with the required support and education so that they can effectively facilitate learning to the extent that learners can take responsibility for their own learning (Le Grange, 2008:102).

The process of curriculum transformation after independence was not unique to Namibia but also experienced in neighbouring South Africa after 1994. According to Chishole (2003 cited by De Villiers (2011:537), curriculum transformation in South Africa was undertaken in three main stages: firstly, the cleansing of the curriculum of its racist and sexist elements and the purging of the most controversial and outdated content. This was followed by the implementation of outcome-based education, and the review and revision of Curriculum 2005.

In Namibia, as in many other African countries, education reforms were necessary in order to align the new curriculum goals with those of the new government and international standards (MEC, 1993:129). The apartheid education system and assessment practices were no longer appropriate to the country's demand for providing universal basic education to all citizens. The objectives of curriculum reform are to have as many learners progressing through the educational system to create a critical mass of an educated and skilled citizenry for a knowledge-based society (National Planning Commission, 2004:31). The MEC (1993:129) emphasises that an effective learner-centred education system should be able to accommodate low achievers and late developers as well as average and gifted learners. Curriculum reforms and assessment initiatives were the government's attempt to move away from an education system that emphasises success versus failure toward an orientation that focuses on encouraging performance and recording the achievement (MEC, 1993:124).

Many reasons necessitated curriculum reform in independent Namibia. According to the MEC (1993:7), the Cape Education Department had a number of deficiencies. Firstly, it was inefficient in that it manifested low progression and achievement rates. Examinations were typically discriminatory, i.e. norm referenced rather than criterion referenced. Secondly, it was found to be irrelevant to the needs of the Namibians. It was fragmented and segregated on the basis of racial and ethnic backgrounds. Thirdly, it was characterised by unequal access to education and training at all levels of the education system. Lastly, it was teacher-centred and was characterised by poor classroom practice, slow learner participation and poor learner performance that could not be relied upon to promote quality education, because it was based on rote learning and memorisation rather than on understanding the concept covered. In the Cape Education Department approach, teaching practice was informed by the view that learners were empty vessels that needed to be filled by the teachers (MEC, 1993:74). Learners were viewed as passive recipients of knowledge, while teachers were regarded as the centre and source of knowledge.

It is against this historical educational background that the system based on that of the Cape Education Department was abolished in post-independent Namibia and replaced by the Higher/International General Certificate of Secondary Education (H/IGCSE) curriculum in 1994. According to Swarts (1995:6), the H/IGCSE curriculum was found to be pedagogically appropriate as a starting point to develop the Namibian Senior Secondary Curriculum. Similarly, Howarth (1995:4) states that the H/IGCSE curriculum was founded on the ideal that learning and assessment should be integrated and not divorced from each other, as was the case with the system of the Cape Education Department. Furthermore, in this model

learners are provided with opportunities for their work to be assessed both at the school and external level. According to the MEC (1993:124), this would allow teaching and assessment to move away from a culture of failure to an education that requires educators to rethink the philosophy that guides the curriculum. This means that the education system is moving from an approach that emphasises success versus failure and towards an orientation that focuses on encouraging achievement among learners. The MEC (1993:124) emphasised that another advantage of the H/IGCSE curriculum over Cape Education Department approach is that the H/IGCSE curriculum was designed to cater for a wide range of abilities of learners.

Although the H/IGCSE curriculum was introduced to improve learners' performance, little has been achieved since its implementation in 1994. There were various shortcoming and implementation problems (MEC, 2010). The H/IGCSE curriculum posed challenges to some teachers regarding the grading system, as they were used to the Cape Education Department's system with its flexibility in grading of learners. The problems experienced with the implementation of the H/IGCSE ranged from lack of appropriate human capacity, technical and financial resources as well as appropriate indicators to monitor the successes and challenges of the curriculum. This was evident by the fact that most teachers were still unsure of what was expected of them in terms of the curriculum change as a result of lack of in-depth training (Taal, 1996:7). Taal (ibid.) further argues that often innovations and reforms were introduced into the education system without ensuring that human and material resources were in place. Erden (2010:3) points out that if teachers do not comprehend what the theoretical frameworks of the curriculum are all about, they will fail to implement the curriculum successfully. Educators perceived the H/IGCSE curriculum approach to education as so problematic that it was abolished in 2006 and replaced by the Namibia Senior Secondary Certificate (NSSC) Curriculum in 2006. Reasons for curriculum transformation in Namibia will be discussed in detail in the next section.

2.8. REASONS FOR CURRICULUM TRANSFORMATION IN NAMIBIA

Education policy and curriculum change in Namibia took place for a number of reasons which include the political, social and economic changes influenced by the rapid increase in global knowledge, technology and skills (MEC, 1993). According to the MEC (1993), curriculum transformation was necessary in Namibia to align the curriculum goals with international standards. According to Flores (2005:401), as societal expectations and political and social priorities change, they place new demands on schools and teachers. Similarly, Amimo (2009:2) argues that there will never be a perfect curriculum for all ages as the environment

keeps changing and that creates new needs in the society. Therefore, the curriculum has to change continuously in order to address emerging societal needs.

According to the MEC (1993:4), curriculum transformation requires a fundamental shift in attitudes, the way citizens relate to each other and the way resources are deployed to achieve national goals. The researcher argues that the Namibian educational system requires transformation to meet citizens' needs, address their challenges as well as to reflect the new philosophy and approaches to education. According to the MEC (ibid.), the primary goal of curriculum transformation is to prepare learners for survival in a continuously and rapidly changing society where the ability to think and act independently had never been important. The MEC (1993:119) further states that if a democratic system of education is to achieve its goals, a radical change in the curriculum and in teachers' training and teaching practices needs to take place. This means that curriculum frameworks should be reformed in order to promote democracy in education. The reasons for curriculum transformation in Namibia will be discussed under the following themes: political reasons, philosophical reasons, cultural reasons, economical reasons, technological reasons and social reasons.

2.8.1 POLITICAL REASONS

According to Hoadley and Jansen (2009:207), curriculum change often follows a change in government. This is particularly true in oppressive countries in which an existing curriculum is regarded as representing a small minority of the population and an illegitimate ideology (Tubaundule, 2014:69). When apartheid in Namibia was replaced by a democratic system, the majority of Namibians expected the new government to change the curriculum to one that reflected the values and beliefs of a non-racial democracy (MEC, 1993:119). Therefore, citizens who were denied educational opportunities expected the new government to develop a system that provided them with quality education.

After independence in 1990, the country's administration at the time argued that the "best way a democratically inclined State could overcome gross disparities rooted in the past prejudices and socioeconomic injustices was by introducing a massive expansion of education" (Tubaundule, 2014:69). In programmatic terms, this meant the expansion of universal primary education for children, increased *access* to and equity of opportunity for all young people to secondary and higher education (Coombs, 1985:66; MEC, 1993:41-42).

2.8.2 PHILOSOPHICAL REASONS

Tubaundule (2014:70) argues that although the primary responsibility for the secondary school curriculum in Namibia is determined by the state, philosophical changes have always had an impact on the prescribed curriculum. Beane, Toepfer and Alessi (1986:89) note that different educational philosophies can provide important tools in curriculum change.

A philosophy of education serves numerous functions in curriculum transformation. In the context of Namibia it served as a foundation in formulating educational objectives and gave direction about what values and knowledge to include in the curriculum (Beane et al., 1986:89). In addition, a philosophy of education outlines the assumptions about teachers' teaching techniques, including proposals about learner assessment (Beane et al., 1986:89; Postlethwaite, 1973). According to Taba (1962 cited in Ornstein and Hunkins, 2004:308, 328), every change in a curriculum is value-laden in accordance with the educational philosophy of those directly involved in the process of curriculum transformation.

According to Ornstein and Hunkins (2004:35), there are three distinct thought which represent different value-laden philosophical positions: transmission, transformation and individual. These paradigms with their mutually exclusive goals have influenced changes in school curricula overtime (Ornstein & Hunkins, 2004:35). For example, the transmission model, rooted in perennialist and essentialist philosophies, remained the most common and pervasive force in curriculum thinking during Namibia's colonial era (Tubaundule, 2014:71). Its resistance to social change and its promotion of teacher-directedness and content-centred curriculum (Armstrong, Henson & Salvage, 1981:219) attracted much criticism from progressive curricula planners in the past century worldwide, including in colonial Namibia.

Given the criticisms of the transmission model, curriculum developers in an independent Namibia promoted a transformative curriculum (Tubaundule, 2014:71). Therefore, the Namibian curriculum is associated with the philosophy of pragmatism. In his book *Curriculum – From Theory to Practice* Null (2011:117), influenced by Dewey (1931), noted that pragmatists view the curriculum as a process of fixing problems through empirical means and therefore believe that the curriculum should be solution-oriented and that it must help students figure out what works within a given context (Tubaundule, 2014:71).

For philosophical reasons the Namibian secondary school curriculum aims at fostering individual teachers' personal fulfilment and critical thinking. Furthermore, the curriculum aims at preparing teachers to adapt to the ever-changing world driven by technology and the

acquisition of values of cooperation, which are consistent with the surrounding society (MEC, 2010:5).

2.8.3 PSYCHOLOGICAL REASONS

According to Barker (2001:28), over the centuries theories of educational psychology have attempted to describe how people behave in satisfying their physical and psychological needs. Similarly, for decades educational psychologists have been pre-occupied with issues of how people learn and how they could be taught in order to achieve effective learning (Ibid.).

Educational literature abounds with learning theories, including the constructivist learning theory (Tubaundule, 2014:72). According to Tubaundule (2014:72) the constructivist learning theory was established by, among others, famous educators, philosophers, psychologists, and sociologists such as Lev Vygotsky, Jean Piaget, David Ausubel, Jerome Bruner as well as Lave and Wenger, and has had a major influence on the 20th-century curricular systems worldwide (Barker, 2001:28).

Vygotsky introduced the social aspect of learning into constructivism. Vygotsky (1978) argues that students can solve problems beyond their actual developmental level or “zone of proximal development,” provided that they are guided by an adult or accompanied by a competent peer (Barker, 2001:28). In 1959 Piaget and Inhelder published the ‘stage theory’ in which they argued that every human being’s cognitive development passes through the construction of one logical structure after another (Tubaundule, 2014:73). Piaget and Inhelder (1958) concluded that the logic of learners and their modes of thinking are initially entirely different from those of adults.

According to Tubaundule (2014), the implications of Piaget and Inhelder’s theory provided the foundation for constructivist education since its publication in 1958. In the Namibian context, the idea of ‘levels’, which is defined in Namibia’s Curriculum for Basic Education, clearly has its origin in the general stages of cognitive development as indicated by Piaget and Inhelder’s stage theory of 1958 (Barker, 2001:28).

However, at different periods of their work Ausubel, Bruner, and Inhelder as well as Vygotsky contributed immensely to the alternative conceptions of constructivism and social constructivism (Tubaundule, 2014:74). As a result, social constructivism is publicly influential around the world (Barker, 2001:28). In Namibia, for instance, the 2006 NSSC curriculum for Basic Education is closely aligned to the social constructivist theory of learning, which proposes that because knowledge is socially constructed, teachers must allow

learners to construct their own understanding and knowledge through experiencing things and reflecting on these experiences (MEC, May 2013:5).

2.8.4 CULTURAL REASONS

Tubaundule (2014:74) argues that the culture of any society includes the features that account for its distinctive identity, cohesiveness and continuity. Culture includes the society's system of values, ideology and social codes of behaviour. It can also include its dynamic technologies and modes of consumption as well as its political system and decision-making processes (Tubaundule, 2014:74). "A society's culture is expressed in many forms: in its literature, art, architecture, dress, food, and modes of entertainment" (Coombs, 1985:244).

According to Coombs (*ibid.*), education is central to the identity and survival of a culture. Historically, education and schools in particular in all societies were primarily responsible for the conservation and protection of culture and transmitted it intact from generation to generation (*ibid.*). Today, few cultures, if any, can remain static for any length of time (*ibid.*); and Namibia is no exception.

According to the 2011 national census, Namibia has eleven ethnic groups, each with its distinct cultural practices. This reflects that Namibia does not have a common culture. Therefore, in an attempt to foster cohesion and nationhood in diversity, the school curriculum has been transformed to accommodate the country's heterogeneous cultural values (Tubaundule, 2014:74). For this reason, the national school curriculum was transformed to promote progressive values and mores of gender equality, democracy, self-fulfilment and personal meaning relevant to one's individual lifestyle (Ministry of Basic Education, Sport and Culture [MBESC], 2004:12).

Moreover, the national curriculum statement supports bilingual education throughout the school system (MBESC, 2004:12). The national curriculum statement emphasises that learners should become proficient in their mother tongue or predominant local language, and that English shall be an official language (MBESC, 2004:12). Based on the literature reviewed, one can see how culture influenced curriculum transformation in Namibia.

2.8.5 ECONOMIC REASONS

As Namibia moves from being an agricultural society to becoming an industrial/commercial economy, there is a need for curriculum transformation to reflect and meet industry's needs. For instance, during the past twenty-six years since independence numerous combinations of business management and commercial subjects have been introduced and experimented within Namibia's secondary school curriculum (Tubaundule, 2014:75). Such experiments

have been conducted against the backdrop that business skills are pillars of economic growth and development of any modern society. Recently, entrepreneurship education was integrated into Namibia's secondary school curriculum (Ministry of Basic Education Sport and Culture [MBESC], 2004). The introduction of Entrepreneurship Education in Namibian secondary school curriculum is motivated by the high rate of unemployment among youths. Through Entrepreneurship teachers empower learners with functional and financial literacy skills required in the business world (International Labour Organisation/ILO, 2010).

Furthermore, as Namibia moves into the information age, in which employees' roles in the workplace require different sorts of skills and attitudes, curriculum transformation is inevitable (Hoadley and Jansen, 2009:208). Anecdotal evidence shows that employers have strong opinions about the curriculum and are calling for a curriculum that emphasises transferable skills such as communication, social, analytical and critical thinking skills in graduates (Tubaundule, 2014:75).

2.8.6 TECHNOLOGICAL REASONS

Over the past few years the world has experienced remarkable developments in information and communication technologies [ICTs] (Hoadley and Jansen, 2009:208). According to Hoadley and Jansen (1995:249), growth in the areas of microelectronics, computers and telecommunications has made ICTs attractive in different spheres of human life. Despite the massive contributions that ICTs have made in both the social and economic sectors, the Information Age has put educational institutions across the world under tremendous pressure (MBESC, 2001:2). Therefore, apart from ensuring that every educational institution and perhaps every teacher is provided with information and communication technologies, namely computers, their accessories and connectivity to the Internet, ICT for education has been recognised as means of stimulating creative thinking and knowledge among teachers (ibid.).

According to Hoadley and Jansen (2009:208), economic and technological changes do influence the secondary school curriculum. This means that the secondary school curriculum needs to be reviewed regularly so that it meets the challenges thrown up by economic and technological changes. Therefore, when computers first came widespread in modern societies, many countries including Namibia introduced ICT education into their curricula (Tubaundule, 2014:75). Since ICT is viewed by many as a promoter of innovation and technological advancement, Namibia adopted an ICT Policy for Education in 2001. The ICT policy in education aimed at promoting ICT skills and knowledge in the curriculum, ICT as a secondary school subject and the use of ICT in subjects other than ICT (MBESC, 2001:14).

However, change has not only been confined to the content of the curriculum (Hoadley and Jansen, 2009:208), but pedagogy has also begun to change in that audio-visual technologies have become part of the teaching and learning process (Hoadley and Jansen, 2009:208).

2.8.7 SOCIAL REASONS

Tubaundule (2014:76) argues that the modern world system, national educational systems and school curricula are likely to be influenced by the social dynamics in the wider environment. Curriculum transformation in Namibia was a response to social challenges such as HIV/AIDS, global warming, poverty and unemployment. The current health risks caused by HIV/AIDS influenced the ministry of education in Namibia to introduce HIV/AIDS education, sexuality education and Life Skills into the secondary school curriculum. Similarly, the increasing recognition of racism as a major social problem has often led to the introduction of multicultural and anti-racist education in the secondary school system (Jansen, 1995:254). However, adding more subjects/topics to a crowded curriculum presents challenges to teachers. According to Kelly (2005), most teachers are struggling with an overcrowded school curriculum, since there is a shortage of groups continually promoting the need for additional specialized courses.

Furthermore, since the 2002 World Summit on Sustainable Development held in Johannesburg, environmental education has been strengthened in the Namibian school curriculum (Tubaundule, 2014:76). The subject aims at promoting environmental awareness among teachers and learners as well as the protection of nature for sustainable development. So it is evident from the discussion above that several social factors influenced the development of national curriculum frameworks in post-independent Namibia. In the next section the researcher will discuss the history of Biology as a school subject in Namibia.

2.9 HISTORY OF BIOLOGY AS A SCHOOL SUBJECT

Biology is one of the optional subjects in the key Learning Area of Science Education. It provides a choice of balanced learning experiences through which students develop the necessary scientific knowledge, understanding and attitudes essential for personal development as well as for contributing towards a scientific and technological world. It prepares students for higher education courses such as medicine as well as for a workforce in various fields of the life sciences.

Biology as a school subject has a long history both in Namibia and the world at large. According to Le Grange (2008:89), Biology emerged as a school subject in Britain in the 19th century following the introduction of scientific subjects into secondary school curricula.

During that time Physics and Chemistry were the leading subjects, followed by Botany and Zoology. Goodson (1983:43) noted that Biology hardly existed as an identifiable discipline at the time. Goodson (ibid.) argues that Biology only began to emerge in the curricula of some schools after Botany enrolments starting declining. According to Goodson (ibid.), the growth of Biology in schools was slow because the utilitarian and applied aspects of Biology remained substantially underdeveloped. It was also slow because Biological science was still immature in the 19th century (ibid.).

In the United States of America (USA) Biology emerged as a school subject as a result of a combination of historical, intellectual and social developments in the late 19th century (Rosenthal and Bybee, 1984:140). The main historical event was the industrial revolution and its associated effects on population growth in secondary schools. Le Grange (2008:91) emphasises that the emergence and growth of Biology as a school subject in Britain and USA were influenced by the knowledge aim of the subject (Biology as a science of life) and the personal/social aim of the subject (Biology as a science of living). Bybee (1977 cited in Le Grange, 2008:91) argues that the history of Biology education has been characterised by a changing emphasis on three primary aims: the knowledge aim, the method aim and the personal/social aim. Biology as a science of life entails the theoretical, conceptual and procedural understanding of life, whereas Biology as a science of living would have a stronger human-centred approach focusing on how biological issues impact on human life (Le Grange, 2008:91). Also evident in the cases of both Britain and USA is the fact that the utilitarian value/potential of the subject played a prominent role in its birth and growth, (Le Grange, 2008:91).

Le Grange (2008:91) states that the history of Biology in Britain and USA had an influence on the development of Biology education in Africa. This reminds us that the science of life and science of living issue is not new, but a perennial one that has characterised school Biology since its inception. Furthermore, the history of Biology helps one to appreciate that Biology as a school subject has been and will continue to be shaped by socio-historical factors and not only by developments in the field of science. Lastly, Le Grange (2008:91) emphasises that tracing the history of Biology as a school subject helps us to understand and interpret present developments in Biology as a school subject.

The study conducted by Preller (1953 cited in Le Grange, 2008:92) provides evidence that Biology existed as a school subject in the former Cape Province prior to 1935, but was introduced into former Transvaal province for the first time in 1935. Prior to the introduction

of Biology, Botany seemed to be the biology-related subject taught by most schools (Preller, 1953 cited in Le Grange, 2008:92). The study conducted by Preller (1953) indicates that although Biology replaced Botany as a school subject in the Transvaal province in 1953, the subject retained strong components of Botany (plant morphology, plant systematic and plant physiology). Over time the study of animal physiology and classification was also included. Human physiology and hygiene were offered as a separate subject at the time (Le Grange, 2008:92). Le Grange (ibid.) further states that from the time the subject Biology was first introduced into South Africa it focused mainly on the study of plant and animal life. Matters relating to living were addressed chiefly in the fields of physiology and hygiene, which focused narrowly on personal hygiene.

The subject of Biology expanded to include molecular Biology (after the work of Crick and Watson in the 1950s), Ecology and Genetics (Le Grange, 2008:92). According to Le Grange (ibid.), Biology became the largest subject offered (besides English) in South Africa, i.e. taken by more matriculation candidates than any other subject. During the apartheid era the academic orientation to Biology became further entrenched and largely epitomised what could be described as an extreme end of the pendulum – Biology as purely a *science of life* (Le Grange, 2008:93). This academic orientation to the subject was not unique to South Africa, but also found in Namibia and elsewhere in the world. The USA may be an exception here. From the time that the Russians launched Sputnik in 1957 great emphasis was placed on the utility of school science in the USA. Most notable was the introduction of the Science-Technology-Society (STS) approach. As recently as two decades ago, Lock (1996:3) still expressed concern about the strong emphasis on the knowledge aim of Biology in Britain, what he describes as a content-dominated curriculum that lacks relevance to learners' lives.

Le Grange (2008:93) argues that there are several factors that gave rise to the more academic orientation to Biology. Firstly, Le Grange (2008:93) argues that Biology had matured as a school science subject in the second half of the 20th century. Secondly, there were significant scientific discoveries in Biology, most notably the deoxyribonucleic acid (DNA) helix. Lastly, Le Grange (2008:93) avers that the legacy of positivism, which had reached its pinnacle in the 1930s/1940s, significantly influenced school science. Robottom (1983) cited by Le Grange (2008:93), writing in Australia in the 1980s, raises a concern about the neglect of the qualitative dimensions in school science curricula because of the artificial separation of fact and value, leading to the privileging of factual knowledge over values under the influence of positivism. The logic of experimentation and value neutrality of positivism resulted in greater

emphasis being placed on laboratory work in school Biology and an exercising of matters of personal and social relevance (Le Grange, 2008:93). However, Le Grange (ibid.) emphasises that there were factors endemic to Africa that contributed to the science of life approach becoming dominant in school Biology in Africa over the last 50 years.

As in South Africa, not much has been written about the history of Biology as a school subject in Namibia. However, it is very important for one to know that during apartheid Namibia and South Africa shared a common curriculum. This means that Biology as a school subject in Namibia was introduced at the same time as in South Africa. Developments in Britain and the USA influenced the introduction of Biology as a school subject in both Namibia and South Africa in the 20th century. Since Biology was established in Europe and USA, textbooks and teaching aids were acquired from these countries and from countries such as the Netherlands. This shows the extent at which the Namibian and South African educational system were influenced by developments in Britain and the USA during apartheid. Next the relationship between the educators and curriculum reform is discussed.

2.10 EDUCATORS AND CURRICULUM REFORM

According to Carl (2005:223), the process of curriculum reform, which became a major feature of education in Africa, involved various role players and interested parties, with teachers being effectively the principal role players. Spillane and Zeuli (cited by Stoffels, 2004:1) believe that large-scale curriculum reforms aimed at altering teachers' pedagogical assumptions, teaching methods, classroom organisation and assessment strategies are extremely difficult to achieve. The literature reviewed showed that teachers in all contexts struggle to implement progressive curriculum change, from post-colonial countries such as Namibia and Botswana (Ochurub and Tabuluwa cited by Stoffels, 2004) to well-resourced, developed countries (Spillane, Zeuli and Cohen cited by Stoffels, 2004).

After independence in 1990 the Ministry of Education and Culture in Namibia embarked on a major programme of curriculum reform. Educational development was based on the philosophy of Education for All, its goals being reflected in the keywords: access, equity, quality and democracy (MEC, 1993: 75). These goals necessitated a paradigm shift from a content-based education system for a few to a learner-centred approach for all, which required fundamental changes in teachers' attitudes and competence (MEC, 1993:75). This in return required fundamental changes in the content and process of teacher education. The researcher contends that change in teacher education was regarded as a matter of urgency during the

educational transformation process in Namibia. This was necessary in order to address the problem of unqualified and under-qualified teachers.

Toward the end of 1990 new subject syllabi were hastily developed for all subjects on the junior level (Grades 8-10) and the senior level (Grades 11-12) (MEC, 1993). According to Jansen (1995:251), by the year 1992 curriculum development in Namibia became much more structured, which led to the establishment of a National Institute of Educational Development (NIED). Through curriculum reform teachers' education was reformed, with the development of the Basic Education Teachers' Diploma programme/BETD (MEC, 1993) catering for Grades 1-7 (primary education) and Grades 8-10 (junior secondary education). To ensure that secondary education (Grades 11-12) was also addressed in the new curriculum reform, the University of Namibia introduced a Higher Education Diploma (HED) in secondary education. This programme was meant to train Grade 11 and 12 teachers. According to Jansen (1995:251), the development of NIED and different teachers' training programmes demonstrated the high aspirations of the Namibian curriculum reforms. Teachers were trained on how to employ a learner-centred teaching approach in their classes and that subject content had to be presented in a way that related to the learners' daily life experience, with group work and practical activities advocated as a normal part of the classroom activities (MEC, 1993). Assessment would be based partly on course work, with learners taking greater responsibility for their own learning (MEC, 1993). Even though the curriculum goals were in line with the international standard in education at the time, the researcher contends that they seemed to be far removed from the curriculum that most Namibian teachers were used to as well as from what was happening in most classrooms.

Generally, teachers in Namibia had warmly welcomed the different curriculum changes that took place since independence in 1990. They regarded the reforms as a much desired break in the post-independent educational system. However, the translation of the curriculum goals and objectives into classroom activities left much to be desired (Van den Akker, Ottevanger & Plomp, 1994). Furthermore, Van den Akker et al. (1994) argued that teachers' qualification and experience, poor school infrastructure, lack of equipment for practical activities, large classes and overloaded timetables are some of the factors that hinder effective implementation of the curriculum in Namibia. Because of these challenges that might still be there, researching teachers' lived experiences is important. Moreover, over the years, teachers in rural schools were operating in isolation because of the long distances between their schools and the regional teachers' resource centres. Lack of communication infrastructures in most schools makes it difficult for teachers in rural schools to communicate with their peers in

urban schools. Lack of workshops and training in which teachers can deliberate on problems regarding the implementation of the new curriculum also contributed to the very limited success of curriculum implementation in Namibia over the years (MBESC, 2001). Therefore, exploring the lived experience of teachers can reveal whether these challenges still exist.

Challenges in the implementation of the new curriculum resulted in the introduction of large-scale professional development projects focusing on junior and senior secondary school teachers. One such project was the In-Service Training and Assistance for Namibian Teachers (INSTANT). INSTANT was an EU-funded project and was administered first by the Vrije Universiteit Amsterdam (VUA) and later by VUA in cooperation with the British Council (INSTANT, 1991). The project was responsible for providing teachers with new skills on how to implement the new curriculum. According to Ottevanger and Benschop (1995), INSTANT activities were divided into three categories:

- In-service training activities (in form of workshops and cluster meetings);
- Building infrastructure for sustainable professional development; and
- Materials development.

The project's goals were initially directed toward teachers. The emphasis was to raise awareness of the new curriculum, its goals and manifestation in the classroom (Ottevanger & Benschop, 1995). In addition, the project provided training on the teaching methods that promote active learning. However, over the years the emphasis was shifted to the development of a sustainable regional infrastructure for supporting teachers. Teachers were trained as professional developers.

Earl (2003:1) argues that educational reform in the past decade has felt like a roller coaster ride for most teachers and schools. Earl (ibid.) further argues that schools reflect the changes that are occurring more broadly in society, and there seems to be no end to the changes (economic, cultural, political and socioeconomic) that schools are expected to keep up with, or even lead. According to Earl (ibid.), the proposed strategies to transform teachers' instructional practices from a traditional teacher-centred to a more learner-centred approach proved to be problematic. Curriculum renewal tended to be imposed on teachers from the top such by the Education Department (ibid.). Earl (ibid.) indicates that teachers are rarely involved in the planning and decision-making on curriculum development. Earl's (ibid.) argument can be substantiated by the lack of ownership that teachers feel in the curriculum renewal process, among many other reasons why the curriculum initiatives were found to be ineffective, as well as by the mismatches between the intended and implemented curriculum.

Therefore, the researcher tends to agree with Smith (2001: 67) that policy-makers at national levels usually produce policy and teachers remain in the background. Although teacher unions may represent educators at policy level, their voices are seldom heard (Carl, 2005).

Another factor that influences curriculum change is the preparedness of educators to implement the changes. The researcher argues that consultation with teachers and the proper training of teachers on how to implement relevant teaching approaches are important factors to take into account for the successful implementation of any curriculum. Flores (2005:403) points out that although teachers are seen as curriculum developers who are dealing with greater responsibilities and demands, the training and support provided to them are not adequately addressing their needs. Most teachers are not empowered to handle the new curriculum effectively. Lagana (1989 cited in Beets et al., 2014:9) regards empowerment as the process of providing teachers with the opportunity and necessary resources to enable them to believe and feel that they understand their world and have the power to change it; for example, they should have greater autonomy and independence in decision making. Empowerment in this case refers to the ability of school management to loosen control over what the teachers are doing but gain a wider span of control over information and outcomes.

The researcher argues that the implementation of the H/IGCSE curriculum in Namibian schools immediately after independence led to a complex curriculum reform process with inadequate preparation and support for already insecure teachers, who were expected to play a central role in its implementation. Stoffels (2004:13) examines why classroom practices are hard to change. Against the background of the implementation of the post-apartheid curriculum reforms, Stoffels (ibid.) critiques scholars who explain that policy failure occurs as a result of teachers' resistance or lack of resources. Central to this, Stoffels (ibid) argues that policy failures occur because of disconnect between the intended curriculum and the cultural values of teachers. In educational change a teacher's role is central and change theories which ignore the personal domain are bound to miss its objectives. Smith (2001:68) states that "the role of teachers can no longer be overlooked; policy changes will not have the desired effect if they are not accompanied by a supportive process intended to strengthen the role of teachers."

Fullan and Pomfret (1977:391) pointed out that the effective implementation of social innovations requires time, personal interaction and contacts, in-service training, and other forms of people-based support. This shows how teachers play crucial role in the implementation of new policies to reform, restructure and transform schools. They are often

seen as either impervious to, unaffected by or resistant to the education policy change (Smith, 2001:68). According to Mata (2012:512), the knowledge and attitudes of teachers regarding curriculum innovation needs to be reported by curriculum designers, education policy makers as well as the teaching community. Mata (ibid) states that change in educators is important because the main barriers to curriculum innovation are teachers' resistance to change. The next section will look at Biology as a school subject in an independent Namibia.

2.11 BIOLOGY AS A SCHOOL SUBJECT IN AN INDEPENDENT NAMIBIA

After independence in 1990 curriculum reform took place in all subjects, including Biology. This resulted in the abolishment of the Cape Education Department curriculum, which was replaced with the H/IGCSE curriculum in 1994 (MBESC, 2001). Although the curriculum was changed from Cape Educational Department to H/IGCSE, there were no major changes in the content knowledge of school subjects. The main change that was made in the new curriculum (H/IGCSE) was the translation of all teaching materials from Afrikaans into English. In addition, study materials were reviewed to remove all racist remarks. This was not only unique to the Namibian education system, but also to South Africa, which had been subjected to an apartheid system. This was revealed by Le Grange (2008:95), who argues that although subject syllabi were reviewed in South Africa immediately after the demise of legal apartheid, the changes were merely cut and paste ones based on the assumption that what went before remained suitable for the new education system. This shows that curriculum change in Biology was not necessarily substantive in the early years after independence in Namibia and after apartheid in South Africa. Similarly, Jansen (1999:57) argues that the syllabi alterations that took place immediately after apartheid had very little to do with the school curriculum (Biology) and were more concerned with an uncertain state seeking legitimacy after the first national democratic elections. Jansen (1999:57) further argues that the main curriculum revisions involved exorcising of racial content as well as outdated and inaccurate subject matter from school syllabi.

Historically, over the last century many problems were encountered with the development of Biology as a school subject in most countries in southern Africa, including Namibia. The problems experienced in the implementation of the Biology curriculum range from overcrowded classrooms, old and insufficient laboratory equipment, lack of qualified teachers, and inadequate physical conditions in laboratories, just to mention a few. What follows is a discussion of the challenges faced by teachers of Biology as a school subject in Namibia.

2.12 CHALLENGES IN TEACHING BIOLOGY

Coupled with the visibility and centrality of Biology is the rapid generation of new knowledge in the field. Biology teachers confront a swiftly evolving discipline that presents both an exhilarating opportunity and a sometimes overwhelming flow of new information, techniques and applications (National Research Council, 1990; Raizen, 1991). According to Tobias (1992), crucial topics such as genetic engineering, molecular forensics, biodiversity and infectious diseases were introduced in Biology education over the years. Most Biology teachers have scrambled to incorporate new topics and illustrations into their courses to keep them current and lively (Shalala, 1995). The literature above demonstrated the challenges in teaching Biology at secondary level.

The challenges of teaching Biology will be discussed under the following themes: language/medium of instruction, lack of qualified teachers, teachers' pedagogical content knowledge, overcrowded classrooms, support and availability of resources, and professional development.

2.12.1 LANGUAGE OF INSTRUCTION

Language of instruction is crucial in education. It is the medium of communication between teachers and learners. The language of instruction plays a major role in the delivery of quality education, because it enables teachers to convey subject knowledge to learners (Centre for Educational Policy Development [CEPD], 2011:48). Similarly, Ludi (1980 cited in CEPD, 2011:48) argues that someone's first language is crucial in setting up the basis for lifelong learning. However, the practice of using someone's first language as the medium of instruction is not adhered to in most countries, including Namibia. Most countries prefer using foreign languages as medium of instruction in schools, especially those of their colonial masters (CEPD, 2011:48). In Namibia the apartheid legacy was demonstrated through the use of Afrikaans as the language of instruction in most schools (Jansen, 1995:253). However, after independence in 1990 the Ministry of Education and Culture devoted considerable policy and political resources to unifying the language policy in the country (ibid.). According to the Namibian Constitution article 3, English shall be the official language of instruction in all public schools and government offices. However, the Constitution does not prohibit the use of any other languages as medium of instruction in private schools (ibid.). English as the language of instruction in public schools is stipulated in the language policy document of 1992-1996 (Jansen, 1995:249). The Namibian language policy for schools is based on the following guidelines:

- Grades 1-3: learners use their mother tongue as the language of instruction in schools (Curriculum Guide for Formal Basic Education, October 1992);
- Grades 4-7: English is stressed as primary medium of instruction for promotional subjects with code-switching;
- Grades 8-12: English is used as the medium of instruction without code-switching.

According to the Policy Dialogue Report (1993 cited by Jansen, 1995:250), the introduction of English as the language of instruction in Namibia was meant to break with apartheid and its manifestations such as the use of Afrikaans as a language of instruction in most schools. However, Jansen (1995:255) argues that the sudden shift from Afrikaans to English as the medium of instruction in schools was too risky. Firstly, most textbooks, syllabi and schemes of work that were available in schools were written in Afrikaans. Secondly, the use of English in schools acted as a barrier to effective teaching, because the English proficiency of most teachers was poor. Lastly, the use of English in schools implied that teachers had to translate all teaching materials written in local languages into English. Jansen's (1995:255) arguments show how the use of English in Namibian schools affected the implementation of the curriculum.

Similarly, De Beer (1993:3) argues that there are a number of factors that sometimes lead to the non-realisation of outcomes. According to De Beer (*ibid.*), language is one of them. De Beer (1993) gave the example of South Africa, which has eleven official languages, while English – which is the language of instruction – is the second or third language of the majority of learners. De Beer (1993) argues that in this case English is the major obstacles in effective learning in the science classroom. In addition, Luthuli (1981 cited in De Beer (1993:3) argues that the mother tongue is the most appropriate communication medium for effective learning, as it is an enormous challenge for learners to discover the scientific and often abstract world through a second or third language.

Obanya (2004:10) claims that teaching learners in a foreign language is both mentally and physically taxing. Similarly, Benson (2005:2) states that teaching in a language which is unfamiliar to learners may result in the teachers being compelled to code switch to help learners to understand the concepts covered. Code-switching may result in ineffective teaching, since learners may sit quietly because of language barriers. Benson (2005:2) further argues that the use of a foreign language in teaching may result in frustration leading to failure and high drop-out rates among learners. In Namibia the use of English in teaching Biology is aggravated by poor English proficiency among teachers as well as by poorly

designed curricula. A study conducted by Harris (2011:41) among Namibian teachers in rural schools revealed that 61% of teachers do experience problems with the use of English as medium of instruction. Similarly, the results of an English proficiency test written by all Namibian teachers in 2011 revealed that over 98% of teachers have poor English communication skills (Kisting, 2011:1). Bokamba (2007) indicates that the use of English in schools obstructs quality teaching.

2.12.2 LACK OF QUALIFIED TEACHERS

The level of teachers' qualifications is regarded as a critical problem in Biology education. Inadequate teachers' training is not only the cause of lack of interest in Biology as a school subject, but can also influence the success of teachers (Fraser, 1996:2). Furthermore, problems such as the decrease in the number of qualified and competent Biology teachers lead to poor implementation of the curriculum. According to the statistics from the Educational Management Information System [EMIS] (2012 cited by Tubaundule, 2014:70), Namibia has over 24660 teachers, of whom 1208 are without teaching qualifications and 3000 are under-qualified. Among the fourteen regions of the country, Kavango West and East regions are the most affected. The two regions have a combined number of 2876 teachers, of whom 210 teachers are unqualified and 104 under-qualified.

A study conducted by the United National Scientific Education and Cultural Organisation/UNESCO (2013) found that the Ministry of Education needs to employ over 4,000 teachers by the year 2015 to reach the goal of universal education. This is about 30% of the total number of teachers in the country in 2010. The high demand for qualified teachers in the country provides evidence of that the ministry of education is experiencing challenges with the implementation of the curriculum because of a lack of qualified teachers. The report by UNESCO (2013) states that addressing the shortage of qualified teachers in the country requires a multi-pronged approach whereby institutions of higher learning could play a critical role in the training of teachers through pre-service and in-service training.

The Dean of Education at the University of Namibia argued in 2013 that the lack of qualified teachers in most schools compromises the implementation of the NSSC curriculum. Similarly, Fraser (1996:2) argued that the success of any curriculum depends on the availability of qualified and competent teachers. The Dean of Education at the University of Namibia expressed concern that if nothing was done to improve the shortage of teachers in the country, the NSSC curriculum will be implemented by mainly unqualified teachers. According to the Dean of education at the University of Namibia, the shortage of qualified teachers in the country is the result of high resignation rates among teachers to further their studies in search

of better employment. Furthermore, the Dean argues that the situation has been worsened by the high number of student teachers who left teaching education programmes because of lack of funds. According to the University of Namibia's (UNAM) statistics of 2014, the University lost 40 first-year student teachers out of a total of 450 students as a result of a lack of funds to pay for their studies.

The most affected schools in Namibia when it comes to the shortage of qualified teachers are rural and township schools. Over the years, teachers in Namibia focused their attention on urban schools because of the better working environment there and the availability of teaching resources. This resulted in rural and township schools employing under-qualified teachers to fill the gap left by qualified teachers. Mulkeen (2006) argues that the shortage of teachers in rural and township schools cannot be solved by training more teachers. Mulkeen (2006) argues that improvement in the educational infrastructure and the provision of teaching resources could be a solution to the problem. Telecommunication and road infrastructure should be made available if qualified teachers are to teach in rural and township schools. Similarly, Castle (1995) argues that a lack of access to professional opportunities and the responsibilities to take on multiple duties are some of the reasons why qualified teachers prefer to teach in urban schools.

2.12.3 TEACHERS' PEDAGOGICAL CONTENT KNOWLEDGE IN TEACHING

In order to improve Biology education, it is vital for teachers to understand the link between content knowledge and Pedagogical Content Knowledge (PCK). According to Shulman (1986:9), content knowledge refers to the amount and organization of knowledge in the mind of the teachers. Shulman (ibid.) argues that to think properly about content knowledge, requires going beyond knowledge of the facts or concepts of a domain. It requires understanding the structures of the subject matter in the manner defined by such scholars as Joseph Schwab (Shulman, 1986:9). Schwab (1978 cited by Shulman, 1986:9), states that the structures of a subject include both the substantive and the syntactic structures. The substantive structures are the variety of ways in which the basic concepts and principles of the discipline are organized to incorporate its facts (Shulman, 1986:9). According to Schwab (1978 cited by Shulman, 1986:9) syntactic structure of a discipline is the set of ways in which truth or falsehood, validity or invalidity are established. When there exist competing claims regarding a given phenomenon, the syntax of a discipline provides the rules of determining which claim has greater warrant. A syntax is like a grammar. It is the set of rules for determining what is legitimate to say in a disciplinary domain and what breaks the rules (Shulman, 1986:9). Shulman (ibid.) argues that teachers must not only be capable of defining

accepted truth but also “able to explain why a particular proposition is deemed warranted, why it is worth knowing how it relates to other propositions both within the discipline and without, both in theory and in practice”. Thus biology teachers must understand that there are a variety of ways of organizing the discipline.

PCK is a second kind of knowledge that biology teachers should acquire in order to implement any curriculum effectively. The notion of PCK was first introduced by Shulman (1986). It is a form of knowledge that connects teachers’ cognitive understanding of subject matter content, the relationships between such understanding and the instruction teachers provide for learners (Mthethwa-Kunene, Onwu and De Villiers, 2015:1141). Shulman (1986:9) argues that PCK goes beyond knowledge of subject matter per se to the dimension of subject matter knowledge for teaching. It is a form of content knowledge that embodies the aspects of content most germane to be taught. According to Shulman (ibid.), PCK also includes an understanding of what makes the learning of specific topic easy or difficult: the conceptions and preconceptions that students of different ages and cultural backgrounds bring with them to the learning of those most frequently taught topics and lessons. Shulman (ibid.) further argued that if those preconceptions are misconceptions, teachers need to possess knowledge of the strategies most likely to be fruitful in reorganizing the understanding of learners, as they are unlikely to appear before them as blank slates.

2.12.4 OVERCROWDED CLASSROOMS

In this study the term ‘overcrowding’ refers to the excessive number of learners per classroom compared to the carrying capacity of that class. According to Amukugo (1993), learner-teacher ratios in most previously disadvantaged schools are still characterised by higher number of learners per teacher. Overcrowded classrooms make it difficult for the teacher to provide quality education to all learners. Teachers teaching in overcrowded classrooms hardly have one-on-one contact with their learners. As a result, the quality of teaching is compromised. Similarly, Uugwanga (1998:53) argues that large classes do impede the quality of teaching in most Namibian schools.

In Namibia overcrowded classrooms are the result of urbanisation. Most people move to towns and cities in search of employment and better living standards. Once they get employment, they move to the cities with their whole families, including school-going children. This is the main problem in the Erongo region of Namibia. According to the Namibian newspaper (16/01/2013), regardless of the new classrooms that were built in the region and the opening of the new school in Walvis Bay, Grade 8 and 11 learners in the Erongo region are still struggling for space. According to the directorate of education in the

Erongo region, overcrowded classrooms in the region are attributed to many parents who move to coastal towns in search of employment in the mining and fishing sectors. Overcrowded classrooms are difficult to teach, since there is not enough space for the teacher to move around to monitor teaching and learning. Because of the overcrowded classrooms, teachers hardly attend to learners with physical disabilities or with barriers to learning. Most teaching time is lost in overcrowded classrooms because learners are often noisy. Overcrowded classrooms do not only make it difficult for the learners to concentrate on their given tasks, but also hinders teachers from using different teaching approaches such as cooperative learning and group work.

2.12.5 SUPPORT AND AVAILABILITY OF RESOURCES

Fullan (2007:65) maintains that change can have a positive impact on educational organisation only if there is a continuous maintenance of the change process. Change is meaningless to an organisation if shortly after its implementation maintenance of the change process is not addressed (Fullan, 2007:65). Furthermore, Fullan (ibid.) argues that continuous maintenance of the process of change needs to focus on the roles and strategies of various types of change agents. According to Fullan (1991:30), continuation of a change process is a decision about the institutionalisation of an innovation based on the reaction to either a negative or positive change. The literature indicates that continuity of a change process depends on whether or not the change is embedded or built into the structure through policy, budget or timetable. Continuation depends on whether the change process has generated a critical mass of administrators or teachers who are skilled and committed (Tubaundule, 2014:139).

According to Berman and McLaughlin (1977), financial and structural supports are required to continue a positive level of change. Similarly, Carl (2009:143) contends that the implemented curriculum may be enhanced or inhibited by the availability or scarcity of resources such as study materials, infrastructural and learning aids, equipment, physical accommodation and other facilities. Carl (ibid.) further argues that inadequate resources and conditions can limit the performance of the best teachers as well as undermine learners' efforts to focus on learning. However, Fullan (1991:30) argues that the availability of resources alone cannot improve the implementation of the curriculum. Teachers as curriculum agents need to identify and counter the passive characteristics of the curriculum material to ensure that the curriculum is fully and actively implemented. While resources such as textbooks, communication technologies, photocopy machines and infrastructures help

teachers to bring about changes, it is rather the teachers' belief and actions that are critical factors in the way that the curriculum is put to good use (Fullan, 1991:30).

According to Ndjabili (2004:11), teaching resources can be categorised into two groups: material resources and human resources. Material resources include fixed assets such as buildings, and movable assets such as the teaching equipment found in the libraries and laboratories. Human resources include the provision of assistant teachers to help qualified teachers to implement the curriculum successfully as well the provision of training to equip teachers with relevant subject knowledge and teaching skills (Ndjabili, 2004:11).

According to the MEC (1993), sanitary facilities such as water and toilets as well as telephones and electricity are some of the factors that affect the implementation of the curriculum in Namibia. Most schools in Namibia are poorly equipped with basic facilities that teachers require for effective implementation of the curriculum. According to the report by Education Management Information System/EMIS (2013), only 55% of the Namibian schools have toilets, 47% have clean water and 57% have electricity. These statistics shows how seriously teachers are affected when it comes to basic facilities in the country. Without water, electricity and laboratory equipment teachers can hardly conduct practical activities.

School infrastructure covers the basic elements necessary to ensure access to education (Uugwanga, 1998). Classrooms are regarded as common places in which structured teaching takes place with groups of learners. While teaching also takes place in a variety of different types of spaces, families and communities expect formal teaching to take place in a classroom that has been designed for safety and comfort. According to Uugwanga (1998), most schools in Namibia do not have enough classrooms and amenities. For many schools in Namibia teachers are still conducting their classes in temporary shelters, places of worship and makeshift classrooms built out of thatched grass and mud. These types of infrastructures expose teachers and learners to harsh condition such as rain, wind and heat. Lack of science laboratories in most Namibian schools is another challenge in the implementation of the NSSC Biology curriculum. Cohen (1990) revealed that schools in rural areas are often isolated and lack access to modern means of communication such as a telephone and fax machine. In addition, Cohen (1990) emphasized that the long distances between rural schools and regional teacher resource centres seriously hampers the implementation of the curriculum.

2.12.6 PROFESSIONAL DEVELOPMENT

According to Knoff and Batsche (1995), continuous professional development is critical to the success of any curriculum. Staff development training can be divided into two distinct

groups, namely pre-service training and in-service training. Short and Rinehart (1992) and Carl (2009:3) argue that continuous professional development enhances teacher empowerment and a self of self-efficacy. This indicates that empowered teachers are able to assume responsibility for their growth and able to make decisions about their work and practice. Moreover, empowerment provides teachers with the opportunity for autonomous professional behaviour (Bredeson, 1994), cultivates a spirit of a shared vision among teachers (Van Slyke, 1998) and thus can influence the implementation of the curriculum policy with lasting effects (Little, 1982). That is the reason why teachers require adequate professional development in order to equip them with the necessary skills to implement the desired change.

Knoff and Batsch (1995) are of the opinion that professional development initiatives should have a lasting effect on the implementation process. The process should have clear goals and embrace a multiyear perspective and skill-based orientation. A study conducted by Huberman and Miles (1984:273) reveals that the role of professional development and ongoing technical assistance in enhancing implementation is dependent on the quantity and quality of the assistance that teachers receive. Teachers discovered the benefit of accessing on-going opportunities such as external conferences, in-service training, team meetings, materials, peer consultation and access to central office personnel (Huberman & Miles, 1984:273).

Carl (2009:215) argues that in-service training can help teachers to be effective if it is planned as an integral part of the schools' instructional development programme. This can take place in the form of subject meetings or workshops. Carl (2009:215) adds that by strengthening a subject group approach by means of class visits and subject group meetings, schools can create valuable in-service opportunities as subject groups link up with inspectors and subject advisors to influence the process of training. McGee (1997:294) states that in-service training for teachers should aim at changing their classroom behaviour in order to achieve more effective curriculum implementation. McGee (ibid.) noted that most in-service educational programmes that were developed to enhance curriculum implementation are one-off in-service courses and sessions, lack follow-up activities and specificity to classroom teaching behaviour, and are mostly imposed upon teachers. Therefore, McGee (1997) suggests that for a teacher development model to be effective, it should incorporate three connected aspects. Firstly, every teacher development initiative should include professional aspects which should be related to teachers' classroom practice. Secondly, the model should include personal aspects which are related to how teachers will cope with their own views about changing themselves. Lastly, inclusion of social aspects will help teachers to understand how they

should work with other teachers. These aspects lead to collaborative ways of working, the development of alternative classroom practices and a sense of empowerment in teaching (Bell, 1993).

In an attempt to address the shortage of qualified teachers in the country the Ministry of Education and Culture in Namibia prioritised teachers' training programmes, both pre-service and in-service training (MEC, 1993b; Swarts, 1995). In the five-year development plan on in-service teacher training, the Ministry of Education outlined a multi-pronged approach to the improvement of teaching in Namibia (MEC, 1991). A pivotal role was designed for teachers' support through the establishment of regional teachers' resource centres and the training of facilitators (Ottevanger, 2001:20). Teachers' resource centres in all 14 regions of the country were tasked with performing multiple functions, which included the facilitation of in-service training for teachers at all levels and the provision of basic facilities such as libraries to all schools in the region.

2.13 IMPACT OF CURRICULUM CHANGE ON TEACHERS

Evans (2000: 173) contends that policy makers produce curriculum policy changes with little or no consultation with teachers. Fullan and Hargreaves (1992:44) claimed that for teachers, curriculum change is not simply a plan on paper or an elegant flow chart. It must be implemented in the busy and complicated world of their classrooms. A support teacher or a teacher educator can do a superb lead lesson, but it is the teacher who has to emulate that lesson hour after hour, day after day, week after week (ibid.). Fullan and Hargreaves (ibid.) argues that when teachers are faced with a paradigm shift, they interpret and enact it through the filters of their own experiences, beliefs, theories and ideology. This results in teachers responding differently and quite uniquely to educational policy. Fullan and Hargreaves (ibid.) argues that a group working with computers can demonstrate excellence in teaching strategies, but it is the teacher who must somehow carry out that group activity alongside all the other pressing demands of other pupils in his or her classroom. Based on Fullan and Hargreaves (ibid.) argument, one can realise that change is too often idealised, thought of in self-contained systems and packaged too neatly. This means that change in any curriculum should be dealt with in ways that are much more sensitive to the real-world demands of the context of teaching.

According to Fullan and Hargreaves (ibid.), for one to understand a teachers' task of teaching, it is important to understand their circumstances and the context in which they work. We need to know how the teachers' classroom environment influences their teaching. We need an

ecological understanding of teaching and how teaching develops to suit the classroom environment and in what ways we can and should change the classroom environment if we want to change what goes on there.

Scholars such as Ogunniyi (1986:71) argue that no educational system is more important than its teachers. Teachers are the implementers, interpreters and analysers of the curriculum. Therefore, teaching and learning of Biology in secondary schools will be ineffective if Biology teachers do not engage the NSSC curriculum meaningfully. What an educator thinks does or feels about the new curriculum will have a positive or negative impact on the implementation process. According to Fullan and Hargreaves (1992:44), an understanding of the subjective world of teachers is a necessary precondition for effective curriculum implementation. The subjective ways in which teachers mediate meaning through assumptions and perceptions do have an impact on the realisation of educational ideals. Therefore, teachers must be acknowledged and the curriculum construction process has to be negotiated instead of being imposed on teachers by policy makers. It is therefore apposite to research the lived experiences of teachers in relation to curriculum implementation.

The implementation of any new curriculum does not only increase teachers' workloads, but also intensifies it. Gitlin (2001:3) argues that the intensification of teachers' work might lead to self-regulating tendencies among teachers. His findings suggest that, because of the intensity of teachers' work, teachers adopt mechanisms to alter the effect of these forces. For instance, some teachers would simplify tasks, while some may follow the recommended tasks and textbooks. In an effort to reduce the workload, some teachers may set menial tasks for learners to enable them to get their own administrative work done. The researcher argues that because of the legality and the functional significance of any curriculum, it is important to understand how teachers experience curriculum implementation. The lived experiences of Grade 11 and 12 Biology teachers of the implementation of the NSSC curriculum will be explored via the components that are required for effective curriculum implementation; these include training, curriculum principles, instructional planning, teaching/learning and assessment.

2.13.1 TRAINING TEACHERS FOR CURRICULUM IMPLEMENTATION

Teachers require training in order to implement a curriculum effectively. Recent investigations of curriculum implementation in Namibia revealed that teachers do experience numerous challenges in the implementation of the NSSC curriculum. According to Mulkeen (2010:174), teacher training in Namibia is not aligned with the needs of the classroom. Firstly, training in pedagogical methods is often theoretical, making it less likely to have an

impact on classroom practices. Secondly, the teaching of the content knowledge is often not closely aligned to the school curriculum (Mulkeen, 2010:174). Inadequate training of teachers may result in poor performance of learners both nationally and internationally. Similarly, Moalosi and Molwane (2010:29) argue that the challenges experienced by most South African teachers on the implementation of the Curriculum Assessment Policy Statements (CAPS) emanate from poor teacher training. Therefore, Mulkeen (2010:174) argues that to ensure effective implementation of the curriculum, teachers need to be well trained, highly motivated, dedicated and professionally competent.

In order to explore the nature of teachers' knowledge and understanding of the curriculum, it is necessary to evaluate the training programme teachers went through in order to implement the curriculum successfully; this can be done in the form of workshops (Ngware & Oketch, 2010:22). These authors emphasise the success of in-service training in Malawi and Madagascar. Moreover, they argue that good performance depends on carefully planned programmes. Similarly, Bennel (2010:18) highlights the positive outcomes of planned in-service training programmes and acknowledges that teachers in Malawi and Madagascar receive appropriate curriculum training. The findings of Bennel's (2010:16) research highlight that teaching and learning had improved in Malawi and Madagascar, implying that well-planned curriculum guidance and support have a positive influence on teachers' knowledge and experience in teaching practices.

In contrast, research by Moalosi and Molwane (2010:33) into the challenges facing teachers in the teaching of design and technology in schools in Botswana revealed that teachers received little training when the new curriculum was introduced. Teachers lacked in-service training to empower them for curriculum implementation and this led them to teach only components of the curriculum which they felt comfortable with (Moalosi and Molwane, 2010:33). This shows that teachers' understanding and experiences have a significant influence on teaching practice. The literature in South Africa reveals that poorly planned workshops leave teachers confused as to where, what and how to start teaching the curriculum (Lombard and Wolhutter, 2010:165). The study by Lombard and Wolhutter (2010:165) in South Africa reveals that the training teachers received on the implementation of CAPS was initial training and merely provided background information and guidelines on lesson preparation. In a study conducted on organising knowledge for the classroom by Jansen (2009:100), it was revealed that teachers lacked content knowledge to teach the new Namibian curriculum. Therefore, Mulkeen (2010) emphasises the need to pay attention to

teachers' capacities that influence quality education in schools as well as to engage teachers in the way in which they understand their working conditions and circumstances.

2.13.2 KNOWLEDGE AND UNDERSTANDING OF CURRICULUM IMPLEMENTATION

The principles guiding the implementation of the curriculum are important for teachers to know and understand for effective teaching and learning (Oliver, 2009:22). Oliver (ibid.) defines principles as guidelines that promote the aims and objectives of the official curriculum. According to Lombard and Wolhutter (2010:5) and Mbingo (2006:15), the following are some of the guiding principles adopted by the Department of Education in South Africa that teachers have to take into account when planning teaching and learning. These are social justice, health of environment, human rights and inclusivity, higher level of skills and so on. Mbingo (2006:272) maintains that teachers lack clarity on how these principles manifest in teaching and learning.

Brown and Gordon (2009:26) describe planning as an important guide to daily activities and commitment to help teachers in choosing goals for the subject area and objectives to be achieved, as well as skills to be developed. In a study on the National Curriculum Review conducted in South Africa, teachers highlighted that planning requirements had become complicated and appeared to make little contribution towards improving teaching (Department of Education / DoE, 2009:25). A study conducted by Nsamba (2009:35) on effective teaching found lack of proper planning for lessons and, although teachers knew the stages of planning, they found planning to be a difficult task.

2.13.3 TEACHING AND LEARNING

Sigthorsson (2008:52) highlights the importance of teachers' experience in curriculum practice. This refers to teaching and learning of the subject content, language of instruction and the resources in the classroom environment. Sargent (2010:26) also investigated whether there was evidence of a relationship between national curriculum reform and patterns of social classroom interaction in rural primary schools in Northwest China. The findings indicated that teachers who used new curriculum materials taught less, praised more and emphasised the development of learners' self-expression and thinking abilities (Sargent 2010:26). In his view, knowledge can be acquired through practice. On the other hand, Mohd Meerah, Halim, Rahman, Abdullah, Hassan and Ismail (2010:28) explored teachers' experiences in teaching marginalised children in Malaysia and provided evidence that teachers in schools serving socially disadvantaged rural children reported lower levels of pupil motivation. Teachers

preferred to explain to their learners the concepts and phenomena from the textbooks rather than asking them to explore the issues on their own.

2.13.4 ASSESSMENT

The term ‘assessment’ can be interpreted differently by different people depending on how they perceive it. Some people view assessment as a pen-and-paper approach, while others see it as an on-going process of supporting learners to achieve educational goals. According to Lorna (2003:3), the term ‘assessment’ is derived from the Latin word *assidere*, meaning “to sit beside or with.” This implies that it serves as a tool of communication between teachers and learners. Beets, Bitzer and Carl (2014:160) emphasise that assessment is one of the key components of curriculum development and implementation which impacts on different levels of the education system. It is most often narrowly regarded as meaning tests and examinations (Beets et al., 2014:61). The researcher argues that assessment is the process of gathering and interpreting evidence to make judgements about learners’ learning. It is a crucial link between learning outcomes, content and teaching and learning activities. Similarly, Copple and Bredekamp (2009:22) define assessment as a tool for monitoring children’s academic progress toward achieving desired goals. Assessment is not only central to teaching and learning in classrooms, but is an integral necessity for the optimal functioning of the whole education system (Beets et al., 2014:161).

2.13.4.1 Types of assessment

Two types of assessment approaches have been practised in Namibian schools since the implementation of the NSSC curriculum in 2006. These are formative and summative forms of assessment. Formative assessments are in-process evaluations of learners’ learning that are typically administered multiple times during a unit, course or academic programmer. They aim at giving educators feedback about the success or failure of the learning process so that instructional approaches, teaching materials and academic support can be modified accordingly. The information you gain from formative assessment may make you re-think your teaching plans for your group and changes can be made to improve learning before it is too late (Lamprianou and Anthanasou, (2009:29). Similarly, Mansell, James and Assessment Reform Group (2009:9) argue that formative assessment is the use of day-to-day, often informal assessment to explore pupils’ understanding so that the teacher can decide how to help them develop their understanding. Dunn, Methrotra and Halonen (2004:127) suggest that formative assessment is an integral aspect of classroom work and that there is ample evidence that developing appropriate assessment methods can raise achievement standards. They elaborate on the importance of formative assessment by stating that it empowers students to

take appropriate action, allow instructors to adjust what they are doing in a timely fashion, helps students to discover what they do and do not know, and keep differences in faculty and student perceptions of learning from interfering with learning. On the other hand, Pellegrino, Chudowsky and Glaser (2001:38) maintain that formative assessment provides specific information about the learners' strengths and difficulties with learning. Teachers can use information from this kind of assessment to adapt their instruction to meet students' needs, which may vary from one student to another, and students can use this information to determine which skills they need to study further. This type of assessment is usually not graded and is conducted in different forms, ranging from formal quizzes and assignments to informal questioning techniques and discussions with learners.

Unlike formative assessment, summative assessments is a more formal summing up of learners' progress that can be used for purposes ranging from providing information to parents to certification as part of a formal examination course (Lamprianou and Anthanasou, 2009:29). In addition, summative assessments are used to evaluate learners' learning at the end of a unit, course, semester or school year. Summative assessments are graded tests, assignments or projects that are used to determine whether students have learned what they were expected to learn during the defined instructional period.

2.13.4.2 Purpose of assessment

The primary goal of assessment is to improve learning, inform teaching and help learners to achieve the highest standards they can as well as to provide meaningful reports on learners' achievement. Tanner and Jones (2003 cited by Beets et al., 2014:161) outline three reasons for conducting assessment in schools: to satisfy managerial aims, communicative aims and pedagogical aims.

(a) *Managerial aims include*

- Demonstrating the effectiveness of government policy;
- Holding schools and Education Management and Development Centres (EMDCs) or teaching districts accountable for learners' progress; and
- Controlling the curriculum by emphasising particular forms of knowledge.

(b) *Communicative aims include*

- Providing information to parents about their children's progress against the learning outcomes;
- Providing information to other teachers, educational institutions or employers about individual learners' knowledge and skills;

- Providing guidance to parents in order to make informed choices about the correct placement of the learners for continued education and training; and
- Informing teachers and learners about which part of the curriculum are considered important

(c) Pedagogical aims include

- Evaluating the success of the teachers' teaching;
- Analysing learners' learning and identifying misconceptions;
- Supporting the teaching process by providing feedback to inform future planning;
- Giving learners an appreciation of their achievements and encouraging success;
- Motivating learners and holding them accountable;
- Supporting the learning process by identifying precisely what individual learners need to do to improve; and
- Encouraging learners to develop skills of self-assessment and self-regulated learning.

The researcher notes that since the adoption and implementation of the H/IGCSE curriculum in Namibia, teachers have been experiencing challenges with classroom assessment. Kanjee and Claasen (2009:269) conducted a similar study on teacher assessment practice in South African schools which was exploratory in nature and involved the use of classroom observations and interviews. The study revealed that teachers' knowledge and awareness of assessment practices were limited. It also revealed that there was a gap between teaching practices and the application of the assessment policy which was created by the absence of orientation programmes (Kanjee & Claasen, 2009:69).

Njabili (2004: 38) argues that "It should be noted that the most sensitive part of curriculum change is change in the assessment and examination system. Poor performance in public examinations is an indicator of poor teaching and learning." Njabili (ibid.) further argues that curricular objectives can best be achieved if examinations and assessment serve the curriculum. Frequently the curriculum has been the servant of examinations. As Njabili (2004: 37) writes, "In such a situation, the content of the curriculum and emphasis in teaching is determined by examination demands."

2.14 SUMMARY

The purpose of this chapter has been to review literature relevant to answering the research question: How do Grade 11 and 12 Biology teachers in the Erongo region of Namibia experience the implementation of the NSSC curriculum? First, the chapter introduced the concept of phenomenology, because it is central to this study. The literature reviewed revealed that phenomenology is concerned with the temporal flux of what is lived – which Husserl regarded as the ultimate source of truth. The chapter then discussed the concept of lived experience. This concept is crucial in this study because phenomenological human science begins with lived experience. Since the study explores the lived experiences of teachers of the implementation of the NSSC Biology curriculum, the concept of curriculum was discussed in detail. The difference between curriculum as planned and curriculum as lived was discussed. Secondly, the chapter provided the historical background on curriculum change in Namibia and its implications for the educators as well as its impacts on the current curriculum. The literature on curriculum change reveals that its purpose is to generate social and economic change in Namibia. The literature further reveals that policies associated with curriculum change in Namibia place the focus on the eradication of racial discrimination and the promotion of four major goals: access, equity, quality and democracy. In addition, the literature reveals that curriculum change implies changes to teaching practice, teachers' training and the use of support materials. The chapter highlights the need for curriculum transformation in Namibia and what the purpose of educational change is. Lastly, the chapter discussed the history of Biology as a school subject in Namibia and South Africa. The chapter also highlighted some challenges experienced in the teaching of Biology at secondary schools. Chapter 3 will discuss the research methodology of the study.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 INTRODUCTION

In the previous chapter the literature relevant to this study was reviewed. Arguments for curriculum change as well as the challenges associated with Biology education were presented. Chapter 3 provides insights into the research design and the research methodology used in gathering and analysing the data to answer the research question: How do Grade 11 and 12 Biology teachers in the Erongo region of Namibia experience the implementation of the NSSC Biology curriculum? The chapter proceeds by identifying and briefly discussing different types of research paradigms used in social science. The chapter also discusses the context of the study, the participants, the sampling method, the data-construction method and the research site selection as well as negotiation for access to the research site. The chapter concludes by discussing the process of data processing and analysis, the validity and reliability of the study and the ethical procedures taken into account during the study.

3.2 RESEARCH DESIGN

The research design is regarded as a plan of action that links the philosophical assumptions of the framework of the study to specific methods that will be used to conduct the study (Creswell & Clark, 2007:4). The research design plays an essential role in an investigative study, because it provides an outline of the route that will be followed in order to conduct the study (Creswell & Clark, 2007:4). Research design plays a major role in ensuring that the evidence obtained enables the researcher to answer the research question as unambiguously as possible (De Vaus, 2001:9).

The research design for this study is characterised by its qualitative, exploratory, contextual and descriptive nature. A qualitative approach is used to create a holistic picture of the phenomenon within the context in which it occurs (Huberman & Miles, 1994:6). Similarly, Merriam (1998:5) argues that qualitative research seeks to explain and understand social phenomena within their natural setting. This study attempts to construct empirical evidence to gain an understanding of the lived experiences of the Grade 11 and 12 Biology teachers of the implementation of the NSSC curriculum at three high schools in the Erongo region of Namibia. In the selection of the research design to answer the research question, the worldviews and assumptions that the researcher brings to the study, procedures of inquiry and specific methods of data collection, analysis and interpretation are taken into consideration (Creswell, 2009:3).

3.3 RESEARCH METHODOLOGY

Research methodology refers to the methods, techniques and procedures that are employed in the process of implementing the research design or plan (Babbie and Mouton, 2001:74). In other words, methodology is a set of all strategies and specific methods that could be chosen to deal with specific issues in the research (Babbie & Mouton, 2001:74; Mouton, 2001:55). The research method involves the research process, the type of tools and procedures to be used in research activities such as the form of sampling, data-collection methods and procedures, data-analysis methods and the sequence in which they are employed based on the research questions (Babbie and Mouton, 2001:74).

This study employed a phenomenological epistemology, according to which the researcher observes records and interprets “lived experiences” through clear and detailed descriptions (Magrini, 2012:1). Vandenberg (1997:10) explains phenomenology as a way of describing phenomena in the lived world, or as an explanation of the movements of consciousness that enable one to become aware of phenomena, or both of these together. As a branch of philosophy, however, it describes how adults are aware of things. In this case, this study aims to explore the lived experiences of Grade 11 and 12 Biology teachers of the implementation of the NSSC Biology curriculum in the Erongo region of Namibia. Phenomenology as a branch of philosophy describes how participants experience the situation in which they live.

According to Zucker (2009:1), phenomenology is a systematic inquiry into an event or occurrence that aims to describe and explain the phenomenon of interest. Phenomenology is the analysis of consciousness, the nature of essence as perceived in consciousness (Pence, 2000:42). Waghid (2013:7) explains phenomenology as a paradigm that deals with life experienced internally in our consciousness, that is, the study of phenomena. In addition, phenomenology is concerned mainly with consciousness. This means that the participants are fully aware of the phenomenon. Waghid (2010:6) explains that phenomenology deals with an attempt to set aside what people already know about something and describes how they can come to know it – a matter of tracing the processes by means of which people give meaning to the world.

Magrini (2012:1) argues that a phenomenological study is determined by questioning the essential nature of lived experiences. In this context, the study investigated the lived experiences of teachers. De Vos, Strydom, Schulze and Patel (2011:8) stated that this approach is called a phenomenological approach, because it aims to understand people from their own perspective and maintains that all human beings are engaged in the process of

making sense of their worlds and continuously interpret, create, give meaning to, define, justify and rationalise their daily actions.

3. 4 RESEARCH PARADIGMS

The concept of a paradigm was introduced in 1962 by Thomas Kuhn to mean a particular stance which governs the way that people view a phenomenon and guides their approach to research. Mertens (1998) and Guba and Lincoln (1994) define paradigms as philosophical frameworks that guide social science research. Mertens (1998:6) describes a paradigm as a set of philosophical assumptions that guide and direct thought and action. Le Grange (2014:2) states that paradigms are frameworks that serve as maps or guides for scientific/research communities, determining important problems and issues for their members to address and determining acceptable theories and methods to solve identified problems.

According to Lather (1991 cited by Le Grange, 2014:2) there are four paradigms that are mostly used in social science: the positivist, post-structural, interpretivist and critical paradigms. Maxwell (2004:37) argues that the four paradigms adopt distinctively different positions about the nature of reality (ontology) as well as how we come know it (epistemology). Maxwell (2004:37) further explains that the different positions are mostly based on the theoretical foundations, assumptions and purposes of each research paradigm and they can produce competing or complementary modes of inquiry. Maxwell (2004:37) emphasises the importance of selecting a research paradigm and argues that the selection of a paradigm involves assessing the best paradigm which fits the assumptions and methodological preferences of the researcher. Before the researcher identifies the paradigm which best fits his study, he will first briefly discuss the four different types of research paradigms used in social science as identified by Lather (1991) and supported by Le Grange (2014).

Lather (1991) identifies the four paradigms used in social science as the positivist, post-structural, critical and interpretivist paradigms. According to Lather (1991), positivistic and post-positivist paradigms are based on a similar ontological assumption that there is a single reality about the world. The positivism paradigm is based on the assumption that there are basic laws which govern all phenomena and social reality exists independently of people. Factors within these phenomena can be objectively investigated, separated and quantified for statistical analyses by employing valid and reliable measurements. In addition, Lather (1991) describes the critical paradigm as another approach linked to educational research. According to Lather (1991), the critical paradigm aims at promoting democracy by influencing changes in different social, political, cultural and economic systems. On the other hand, Lather (1991)

describes post-structuralism as a paradigm that offers a way of studying how knowledge is produced and critiques structuralism's premises. It argues that because history and culture condition the study of underlying structures, both are subject to biases and misinterpretations. A post-structuralist approach argues that to understand an object (e.g. a text); it is necessary to study both the object itself and the systems of knowledge that produced the object (Lather, 1991). Finally, Lather (1991) describes the interpretivist paradigm as the paradigm which seeks to extend human understanding. Lather (1991) further states that the purpose of research within the interpretive paradigm is to understand a specific context as it is. The interpretive paradigm is adopted in this study because it helps the researcher to explore the lived experiences of Grade 11 and 12 Biology teachers of the implementation of the NSSC curriculum. The interpretive paradigm, which is the orientation most appropriate for this study, will be discussed in detail in the next section.

3.4.1 INTERPRETIVE PARADIGM

The interpretive paradigm is a theoretical perspective based on the idea that a sociological understanding of actions must include the meaning that social actors give to what they and others do (Mackenzie & Knipe, 2006:3). When people interact, they interpret what is going on and this is what gives social life its patterned quality. The researcher adopts an interpretive paradigm as the orientation most appropriate for this study. This is because the study seeks to understand the lived experiences of Grade 11 and 12 Biology teachers of the implementation of the NSSC curriculum, including the meanings they give to what they do.

According to Mackenzie and Knipe (2006:3), the interpretive approach to this study has the intention of understanding the world of human experience. Le Grange (2014:2) argues that the interpretive paradigm allows the researcher to understand the situation and make sense of the phenomenon within its social and cultural context. Taylor and Medina (2013:12) state that "the interpretive research paradigm foregrounds the researcher's cultural situation and its role in shaping his/her relationship." The interpretive paradigm is concerned mostly with generating contextually based understandings of human experiences (Cohen, Manion and Morrison, 2007:17). Creswell and Clark (2007) argued that the interpretive paradigm also refers to a constructivist approach to research, because it emphasises the ability of the individual to construct meaning regarding the fundamental nature of the social world. Creswell and Clark (2007) points out that an interpretive approach relies heavily on naturalistic methods including interviews, observations and analysis of existing texts. The interpretive paradigm ensures an adequate dialogue between researchers and those with whom they interact in order to collaboratively construct a meaningful reality. Hermeneutics and

phenomenology are some of the approaches rooted in interpretive paradigm. A brief discussion of each approach follows.

3.4.1.1 Hermeneutic approach

According to Danner (1995:223), the concept of hermeneutics stems from the Greek verb *hermeneuin*, which has three meanings: to make something explicit (to express), to disclose something (to explain) and to translate (to interpret). Similarly, Jacobs (2012:18) describes hermeneutics as having to do with textual interpretation or finding the meaning in the hidden word. It involves the art of reading texts or experiences in such a way that the intention and meaning behind the appearance of such a text or expression are understood (Jacobs, 2012:18). According to Danner (1995:223), hermeneutics focuses on the subjective experience of individuals and groups. It is an attempt to uncover the world as experienced by the subject through their life world stories. The hermeneutic school believes that interpretations are all we have and description itself is an interpretation of the phenomenon (Lavery, 2003). The hermeneutic cycle is a method of analysing data through reading, reflective writing and interpretation in a rigorous fashion (Lavery, 2003).

Hermeneutic phenomenology is an interdisciplinary approach that draws from many disciplines and has a very convincing yet distinct set of principles that are essentially targeted at arriving at a better understanding of a phenomenon (Jacobs, 2012:18). It shares many similarities with other research designs, yet it has its own specific basic principles.

3.4.1.2 Phenomenological approach

Phenomenology is a philosophical approach to scientific investigation that seeks to avoid the Cartesian mind-body or mind-matter dualism (Kockelmans, 1994; Romdenh-Romluc, 2011; Sokolowski, 2000; Stewart & Mickunas, 1990) inherent in empirical scientific investigation. Zucker (2009:1) describes phenomenology as a systemic inquiry into an event or occurrence which aims to describe and explain the phenomenon of interest. Therefore, phenomenology is the analysis of consciousness, the nature of essence as perceived in consciousness (Pence, 2000:42). Similarly, Waghid (2013:7) defines phenomenology as a paradigm that deals with life experienced internally in our consciousness. This shows that phenomenology is concerned mainly with inner consciousness. Waghid (2010:6) explains that phenomenology deals with an attempt to set aside what people already know about something and describes how they come to know it – a matter of tracing the processes by means of which we give meaning to the world. Van Manen (1990:10) describes phenomenology as a systematic attempt to uncover and describe the internal structures of lived experience.

In this study the phenomenological approach was selected over the hermeneutic approach. This is because the hermeneutic approach is often limited to the interpretation of texts. Consequently, the phenomenological approach was adopted for this study since the study is aimed at exploring the lived experiences of Grade 11 and 12 Biology teachers of the implementation of the NSSC curriculum. The study employs a phenomenological approach where the researcher records and interprets “lived experiences” through clear and detailed description (Magrini, 2012:1). Phenomenological research is used to determine and describe what an experience means for those who have lived it (Creswell, 1998:54). Van Manen (1990:54) states that phenomenological research seeks to describe basic lived experience and the meaning of the experience specifically from the perspective of those who experience it without offering causal explanations or interpretive generalisations. Van Manen (1990:54) further states that phenomenological studies attempt to search for the central or essential meaning of an experience specifically from the perspective of those who experience it.

Creswell (1998:54) states that the “structure of the experience” refers to the notion that all experiences have an underlying structure; for example, grief is the same, though not necessarily in degree, whether it stems from the death of a loved one or the death of a pet. Studying the lived experiences of Grade 11 and 12 Biology teachers of the implementation of the NSSC curriculum through a phenomenological design helps the researcher to describe the lived experiences of teachers. A phenomenological approach is adopted in this study because it is geared to give the voice to those whose experience is being described (Van Manen, 1990). The purpose of this study, as the essence of any phenomenological research study, is to transform the lived experiences of the participants into textual expressions that not only describe the experience, but also the meaning derived by the participants from the experience (Van Manen, 1990). Next the context and sampling method used in this study will be discussed.

3.5 CONTEXT AND SAMPLING

3.5.1 DESCRIPTION OF THE ERONGO REGION

The study was conducted at three high schools in the Erongo region of Namibia. Erongo is one of the 14 regions of Namibia; its capital is Swakopmund. The region comprises the Swakopmund magisterial district up to the Uisab River. It also includes the Walvis Bay, Omaruru and Karibib magisterial districts. The region is named after the mountain, Erongo, found in that area.

All the main centres in the region are connected by paved roads. In the west, Erongo has a shoreline on the Atlantic Ocean. On land, it borders on Kunene in the north, Otjozondjupa in the east, Khomas in the south-east and the Hardap region to the south. Figure 1 shows where the Erongo region is situated in Namibia and Figure 2 is a map of the Erongo region.

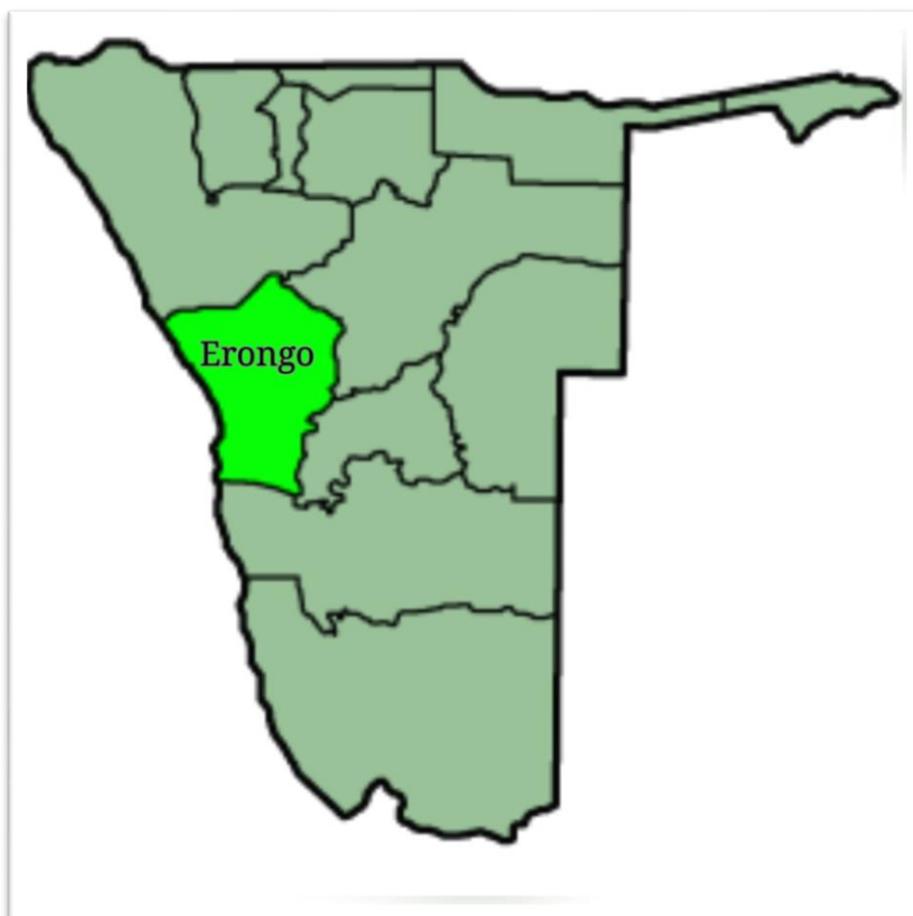


Figure 1 Map of Namibia showing the Erongo region

Source: <http://en.wikipedia.org/wiki/erongo-region>



Figure 2 The map of the Erongo region

Source: <http://www.erc.com.na/maps/erongo-region>

According to the Namibian Population and Housing Census (2011), Erongo has a population of 107,771 (50,040 females and 57,616 males, or 115 males for every 100 females), growing at an annual rate of 1.3%. The fertility rate is 3.2 children per woman. Eighty percent (80%) of the population live in urban areas, while 20% live in rural areas. With an area of 63,579 km², the population density is 1.7 persons per km². By age, 11% of the population is under 5 years old, 18% are between 5–14 years, 65% between 15–59 years, and 6% are 60 years and older. The population is divided into 27,496 households, with an average size of 3.8 persons. Thirty-five percent (35%) of households have the female heads, while 65% have the male

heads. For those who are 15 years and older, 57% had never married, 26% are married with a civil marriage certificate, 3% are married traditionally, 10% are married consensually, 2% are divorced or separated, and 3% are widowed.

The most commonly spoken languages at home are Oshiwambo (37% of households), Afrikaans (22%), Damara/Nama (21%) and Otjiherero (20%). For those who are 15 years and older, the literacy rate is 92%. In terms of education, 89% of girls and 86% of boys between the ages of 6-15 are attending school, and of those older than 15, 79% have left school, 9% are currently at school, and 8% had never attended school.

According to the Namibian Population and Housing Census (2011), Erongo is relatively prosperous region in Namibia, with the second highest per capita income derived mostly from mining, fishing and tourism. The fishing and mining industries are the major employers, but industrial activity is limited and based mainly on the fishing industry (Duddy, 2013:1). The commercial fishing industry is the largest employer in the region, accounting for 39% of the economically active population. According to the Namibian Labour Force Survey (2012), the unemployment rate in the Erongo region stood at 25.5%. However, the report released by the Namibia's Population by Region (2013:3) indicated that unemployment in the region rose to 34%. The increase in unemployment rate in the region was the result of recent declines in fish stocks, which led to fishing companies being granted smaller quotas, forcing some fish-processing factories to close, resulting in loss of jobs. Various mining operations within the region at places such as Navachab and the desert area also create employment for the inhabitants of the Erongo region. Figure 3 shows the mining activities taking place in the region.

According to the Namibia's Population by Region (2013:3), among households, 96% have safe water, 12% have no toilet facility, 73% have electricity for lighting, 89% have access to radio, and 20% have wood or charcoal for cooking. In terms of households' main sources of income, 4% is derived from farming, 67% from wages and salaries, 8% from cash remittances, 8% from business or non-farming activities, and 10% from pensions (Namibia's Population by Region, 2013:3).



Figure 3 Mining activities in the Erongo region

Source: <http://www.erc.com.na>

The region is linked to the coast of Namibia and is well developed. Facilities such as schools, hospitals and clinics, the supply of electricity and telecommunication services are, with a few exceptions, well established. The region has 66 schools with a total of 32,114 learners. The region is divided into three educational circuit offices: Omaruru, Walvis Bay and Swakopmund. This study was conducted in the Swakopmund circuit. It was chosen because the researcher had easy access to the schools and teachers. In addition, the researcher resides in the same town, which makes the study economically viable. Figure 4 below shows some of the infrastructure of the Erongo region.



Figure 4 Infrastructure of the Erongo region

Source: <http://www.google.com/url>

3.5.2 PARTICIPANTS

The participants for this study were selected using purposeful sampling. The target population (unit of analysis) in this study are five grade 11 and 12 NSSC Biology teachers from three high schools in Swakopmund circuit. The three high schools from which the five Biology teachers were selected are the former Germany-speaking school, the former English-speaking white school and the former Afrikaans-speaking black school. Participants were selected using purposeful (deliberate) sampling. They were selected based on the type of school they were teaching in. Other reasons informing the selection were that teachers came from different backgrounds, and had different biographical profiles, qualifications and years of experience in teaching Grade 11 and 12 Biology. This sampling method is supported by Groenewald (2004:8), who states that the phenomenon being researched dictates the type of research participants. Since this study focuses on the depth and richness of the data, only a small number of participants were selected. Rich data are those from which the researcher can draw information about issues of central importance to the purpose of the research. Groenewald (2004:11) suggests that in a phenomenological approach, two to ten participants

are sufficient for the study to reach saturation point. It is against this guideline that the researcher selected only five Grade 11 and 12 NSSC Biology teachers for this study. The next section discusses the sampling method employed in this study.

3.5.3 SAMPLING

Sampling is the act, process or technique of selecting a suitable sample or a representative part of a population for the purpose of determining the parameters or characteristics of the whole population (Webster, 1985). Oliver (2009:37) defines sampling as a smaller selection of subjects who represent the larger population and from which the researcher collects information. This means that sampling is the process of selecting units (e.g. people, organisations) from a population of interest, so that by studying the sample one may fairly generalise results back to the population from which they were chosen (Oliver, 2009:37).

As in any research project, choosing the research sample for this study was a crucial step, since it is practically impossible to study the whole population (Marshall, 1996:522). According to Hardon, Hodgkin and Fresle (2004:57), in qualitative studies researchers aim to identify information-rich cases or informants. Information-rich cases are those from which one can draw the most information about issues of central importance to the purpose of the research (Hardon et al., 2004:57). Hence the concept of purposeful sampling is used when such participants are selected. Marshall (1996:522) argues that although random sampling is “well defined and rigorous and provides the best opportunities to generalise the results to the population, it is not suitable for qualitative research studies because it is not the most effective way of developing an understanding of complex issues relating to human actions because it does not collect rich and in-depth data”. Consequently, this study employs purposeful sampling or “selecting information-rich cases for study in depth” (Patton, 2002: 46).

Patton (2002: 244) argues that “sample size depends on what one wants to know, the purpose of the inquiry, what’s at stake, what will be useful, what will have credibility, and what can be done with available time and resources....In-depth information from a small number of people can be very valuable, especially if the cases are information rich... purposeful samples should be judged on the basis of the purpose of the study”. However, Creswell and Clark (2007) suggested a maximum of 10 participants in a qualitative study. The use of few participants in the study allows the researcher to collect rich and in-depth data. It is against this background that this study includes only the five NSSC Biology teachers who were purposively selected. Teachers were selected based on the idea that each teacher selected comes from a different school type with a different background, and that further differentiating factors would be evident in teachers’ biographical profile, qualifications and

years of experience of teaching Grade 11 and 12 NSSC Biology. This type of sampling is supported by Hycner (1999 cited by Groenewald, 2004:8), who explains that the phenomenon being researched dictates the type of research participants used.

3.5.4 SITE SELECTION OF THE STUDY

According to McMillan and Schumacher (2006:319), site selection is the process of locating the area from which a particular study will be conducted; it is preferred when the research focus is on complex micro processes. McMillan and Schumacher (ibid.) believe that a clear definition of the criteria for site selection is essential and that it should be related to an appropriate for the research problem selected. It is against this belief that the researcher actively selected the most productive sample to answer the research question as opposed to adopting random sampling. In this regard, three high schools in the Swakopmund circuit of Erongo region were purposefully selected as the research sites for this study. The three schools were selected based on their geographical area, historical background and administration style. They were also selected because of their easy accessibility to the researcher, which made the study economically viable and suited the purposes of a Master's study.

3.5.5 NEGOTIATING ACCESS TO THE RESEARCH SETTING

According to Koopman (2013:92), the data-construction process is one of the key challenges facing most social science researchers. It is time consuming and in most cases it is very difficult to gain access to the participants, given the heavy workloads and the tight time frames within which they live and work (Koopman, 2013:92). The process of gaining access to the research site is critical, because it can delay the study for some weeks, months or even years depending on the type of study the researcher has embarked upon. Scourfield (2011:2) cautions researchers about access to the research site by pointing out that social science textbooks vary in opinion about how much time is devoted to or lost in the process of gaining access to the research setting. Similarly, Scatzman and Strauss (1973) argue that it is not the construction and analysis of the data processes that researchers should worry about, but the preliminary problems associated with gaining entry into the setting.

After obtaining permission from the Directorate of Education in the Erongo region of Namibia to conduct the research in schools located, and ethical clearance from Stellenbosch University, letters were drafted to principals of the four high schools that were selected to participate in this study (see Appendix C). In the letters the researcher highlighted the purpose of the study, procedures to be followed during data construction, and participants' rights when participating in the study, including their right to withdraw from the study at any point. This

process took about two and a half months before the researcher received answers from all principals (see Appendices E, F and G). In the process of negotiation to gain access to the research site, one of the four schools selected decided to withdraw from the study. This reduced the number of schools from four to three and the number of participants from eight (8) to five (5). Other than the withdrawal of one school and the lengthy wait for feedback from the schools, negotiating access to the teachers was relatively smooth. In the next section the researcher will give a brief description of the participants and the conditions under which they work.

3.6 DATA-CONSTRUCTION INSTRUMENTS

Data construction methods refer to the various ways in which data are constructed and analysed. According to Murray and Hughes (2008:148), in a phenomenological study data are constructed on a face-to-face basis through interviews, field notes or rich descriptive essays. This approach has various benefits, for example, the richness and depth of data to be constructed. On the other hand, Creswell (1998:64) argues that phenomenological studies use “only interviews” to capture the experiences and perceptions of those participating in the study. This qualitative study uses phenomenological inquiry through in-depth semi-structured interviews to explore the lived experiences of Grade 11 and 12 Biology teachers of the implementation of the NSSC curriculum.

3.6.1 INTERVIEWS

Interviews are the most widely used approach for the production of qualitative data (Polkinghorne, 2005:139). According to Le Grange (2000:5), interviews (structured or unstructured) allow the researcher to get into the minds of people in order to understand and interpret their views on different matters. Le Grange (2000:5) states that most researchers use this tool as a magnifying glass to enter the respondent’s experience. He further notes that interviews allow the researchers to make direct contact with their research participants. Potter (1996 cited in Polkinghorne, 2005:142) emphasises that the advantage of interviews is that participants usually respond when confronted in person, which allows the researcher to note specific reactions and eliminate misunderstanding or ambiguity about some questions (Polkinghorne, 2005:142). Any movements, facial expressions, the length of pauses in between answers or any non-verbal cues from the interviewees during the interview can turn accounts of interviews into vivid descriptions. During interviews the research participants are free to expand on the topic when they feel the need.

In this study semi-structured interviews were conducted with all participants (see Appendix J). All participants were asked the same questions in the same sequence. This questioning

technique enabled the participants to express their views on specific phenomena. Good relationships with participants were developed to give the participants the opportunity to express their view without hesitation. This was achieved through showing empathy, sensitivity and interest in the participants' responses. Interviews were conducted in conditions in which interviewees felt comfortable as well as relaxed in order to share their lived experiences. All interview sessions were tape-recorded to allow the researcher to keep all valuable information. During the process of data construction process the researcher kept his thoughts, opinions, assumptions and feelings separate from the respondents' comments. Instead, the researcher transcribes what transpired in the participants' responses without holding any preconceived notions about them, since this is an open ended study.

Semi-structured interviews were designed around the primary research question. Secondary follow-up questions were used to probe for further information about the participants' attitudes, beliefs, opinions and experiences of the NSSC Biology curriculum. Creswell (2002:398) explains that "attitudes, beliefs and opinions are ways that individuals think about issues, whereas practices are their actual behaviours." The participants' attitudes and practices in this study were identified through the use of the open-ended interview protocol. Creswell (1998:126) recommended that during an open-ended interview protocol the interviewer should:

- Use a header to record essential information about the project and as a reminder to go over the purpose of the study with the interviewee;
- Place space between the questions;
- Memorise the questions and their order to minimise losing eye contact with the interviewee;
- Write out the closing comments that thank the participants for the interview and request follow-up information, if needed.

The interview protocol in this study adopted Creswell's recommendation by including the title of the study, the study's guiding research question and other follow-up questions on a sample questions document that was provided to the interviewees during the interview (see Appendix J). Additional information essential to the study was contained in the information consent form (see Appendix I) which was reviewed, read and signed by both the interviewees and the interviewer prior to the beginning of an interview. Interview questions were memorised by the interviewer to ensure that the interviews flow smoothly as well as to avoid losing eye contact with the interviewees. Follow-up questions were posed to allow the interviewees to clarify

some issues as well as for them to give more information. Common themes that emerged from the interviews were identified, analysed and discussed. The next section discusses the data processing and analysis.

3.7 DATA PROCESSING AND ANALYSIS

The previous section explained where and how data were collected using semi-structured interviews. However, once the data has been collected it has to be analysed. However, separating data collection from data analysis is problematic because it suggests that these two processes work in a linear way, but they do not (Merriam, 1991:123). According to Merriam (1991:123), “the process of data collection and analysis is recursive and dynamic”. Like the rest of the research design, data analysis is an iterative process that continues throughout the research. It occurs simultaneously (Merriam, 1991:123) and concurrently with the research question, theoretical assumptions of the researcher, methodological approach and data construction methods. But the assumption here is that once data construction is finalised, data analysis is more intensive. Therefore, it is imperative for the researcher to consider the method or methods to be used to analyse the final product of data construction (Merriam, 1991:123)

The aim of data processing and analysis is to transform information or data into an answer to the research question. Ary, Jacobs and Razavieh (2006:490) assert that qualitative data analysis involves an attempt to comprehend the phenomenon under study, synthesise information and explain the relationship and the theories about how and why the relationships appear as they do, and reconnect the new knowledge with what is already known. The analysis process involves interpreting the participants’ responses to the interview questions using an inductive approach (Thomas, 2003:3). According to Thomas (2003:3), the inductive approach aids in developing an understanding of meaning in complex data through the development of summary themes or categories from the raw data. Thomas (2003:3) argues that the categories developed from the raw data capture key themes that the researcher considers to be important. Data obtained through the interviews should be transcribed and coded by grouping the responses of the participants into common themes or similar ideas that emerged.

Yin (2009:126) states that most researchers embark on the research without having precise ideas of how data will be analysed. Moreover, analysing research data is one of the least developed strategies (Yin 2009:126). Yet a research study requires a clear plan on how data are to be processed and analysed, and how inferences are derived from the story presented

(Gerring, 2007:6). This study adopts a thematic approach to data analysis. The next section discusses the thematic approach to data analysis which is adopted in this study.

3.7.1 THEMATIC ANALYSIS

Thematic analysis has been identified as an appropriate method to analyse the transcribed texts of the interviews conducted in this study. Thematic analysis is a method of analysing qualitative data by “identifying, analyzing and reporting patterns (themes) within data” (Braun & Clarke, 2006:6). Fereday and Muir-Cochrane (2008:82) echo similar sentiments by stating that thematic analysis seeks to unearth salient themes that emerge as being important to the description of the phenomenon. Such analysis moves beyond counting explicit words or phrases and focuses on identifying and describing both implicit and explicit ideas within the data, that is, themes (Alhojailan, 2012:39). A theme “captures something important about the data in relation to the research question and represents some level of patterned response or meaning within the data set” (Braun & Clarke 2006:82).

Braun and Clarke (2006:81) explain that thematic analysis can be an essentialist or realist method which reports experiences, meanings and the reality of participants. The final step is consistent with the interpretive assumption informing this study, which is not geared to identifying causes but provides a different way to explain social phenomena. Therefore, the intuition is that thematic analysis entails close attention to individuals’ experiences and by this way it provides insight into the lived experiences of Grade 11 and 12 Biology teachers of the implementation of the NSSC curriculum. Moreover, locating themes would most readily honour the concept of letting the participants’ words and intentions emerge as intact as possible (Braun & Clarke, 2006).

In the context of this study, Braun and Clarke’s (2006) step-by-step guide to conducting thematic analysis is used. The initial step involves familiarising oneself with the data through transcribing, reading and rereading the transcriptions, and segmenting the data into manageable units for analysis. Where interviews are in a language other than English, the original dialogue is translated into English. The second step involves generating initial codes from the data. The purpose of coding in this study is to make connections between different parts of the data as derived from the participants’ responses (Alhojailan, 2012:12). The generating and categorising codes utilise both inductive (data driven) and deductive (informed by interpretive theory and prior research findings) approaches.

The third step is searching for themes and this involves sorting the different codes into potential themes. The fourth step involves reviewing and refining the candidate themes. At

this stage the validity of individual themes in relation to data should be set. The fifth step can only be done once a satisfactory thematic map of the data has been created. It consists of defining and naming themes that will be presented and it analyses the data within them (Braun and Clarke, 2006). The final step is producing the report accompanied by enough data extracted which captures the essence of the main points.

3.8 VALIDITY AND RELIABILITY OF THE STUDY

Validity and reliability are ways of indicating and communicating the rigidity of research processes and the trustworthiness of the research findings. According to Le Grange (2014:65), validity is an instrument used to judge whether the research accurately describes the phenomenon which it intended to describe. This means that the research design, the methodology and the conclusions of the research all need to have regard to the validity of the process. Similarly, Bell (1993:51) argues that validity tells us whether an item measures or describes what it is supposed to measure or describe.

Validity is a component of the research design that consists of the strategies used to identify and attempt to rule out alternative explanations, such as validity threats (Maxwell, 2005:9). It is therefore important to think of specific validity threats and to try to ascertain which strategies are best to deal with these (Maxwell, 2005:9). According to Moodley (2013:59), in a qualitative research design validity is concerned about the following questions: Do the researchers actually observe what they think they have observed? Do the researchers actually hear the meanings that they think they have heard? The internal validity of qualitative research is the degree to which the interpretations and concepts have shared meanings between the participants and the researcher (McMillan & Schumacher, 2006:324). Researchers are conflicted about the use of the terms validity and reliability in qualitative research (Agar, 1986 cited in Krefting, 1991:3). (Agar, 1986 cited in Krefting, 1991:3) further argues that the concept of reliability is even misleading in quantitative research. On the other hand, Neuman (2003:184) asserts that most qualitative researchers accept principles of reliability and validity, but use the terms infrequently because of their close association with quantitative measurement. Guba and Lincoln (1994) propose two key criteria for assessing validity in qualitative study: credibility, whether the findings are believable, and transferability, whether the findings apply to other contexts.

In this study the researcher opts to use Guba and Lincoln's (1994) constructs of credibility (in preference to internal validity) and transferability (in preference to external validity/generalisation) to address the issues of reliability and validity, since the intention is not to generalise the results to a large population (although the findings can be applicable to

another context), but attempt to determine the degree to which the findings of this inquiry can apply or transfer beyond the bounds of this project and to ensure that the research findings represent a credible conceptual interpretation of the data drawn from the participants' original data (Guba & Lincoln, 1994:296). The key criteria for assessing validity in this qualitative study are discussed below.

3.8.1 CREDIBILITY

Credibility involves establishing that the results of qualitative research are credible or believable from the perspective of the participants in the research (Moodley, 2013:60). From this perspective, the purpose of qualitative research is to describe the phenomena of interest from the participants' point of view. The participants are the sole judges about the legitimacy and credibility of the results. Therefore, it is necessary for the researcher to request the participants to read the transcripts and comment on the interpretation of their views on the research question (Moodley, 2013:60). In order to ensure the credibility of this study, the researcher will ensure that the multiple realities revealed by informants are represented as adequately as possible. In this study the researcher used the following strategies to enhance credibility:

- Participants' verbatim language: participants' words were transcribed as they were spoken;
- Feedback from participants: at the end of each interview the researcher played the recorded clip in the presence of the interviewee for verification and justification. This gave the interviewee an opportunity to confirm or insert omitted information.

3.8.2 TRANSFERABILITY

Shenton (2004:69) states that external validity is concerned with the extent to which the findings of one study can be applied to other situations. Transferability refers to the degree to which the result of qualitative research can be generalised, transferred to other contexts or settings (Moodley, 2013:61). From a qualitative perspective, transferability is primarily the responsibility of individual doing the generalising. On the other hand, Krefting (1991:216) argues that transferability is more than the responsibility of the individual desiring to transfer the findings to another situation or population than that of the researcher of the original study. The argument is that as long as the original researcher presents sufficient descriptive data to allow comparison, he/she has addressed the problem of applicability (Moodley, 2013:61). According to Trochim (2006:3), qualitative researchers can enhance transferability by thoroughly describing the research context and the assumptions that are central to the

research. The person who wishes to transfer the result to a different context is then responsible for judging the sensibility of the transfer (Moodley, 2013:61).

3.9 ETHICAL ISSUES

According to Chilisa (2012:86), ethics deals with issues of human conduct allied to a sense of what is right and what is wrong, and thus it may be viewed as society's code of moral conduct. It includes all codes of conduct that are concerned with the protection of the research participants from physical, mental and psychological harm (Chilisa, 2012:86). Ethical issues arise in all aspects of research, and the research method for this study also requires ethical consideration. Therefore, an application for permission to conduct the research study in Erongo region was sought from the Directorate of Education in Namibia, since the study involved Grade 11 and 12 Biology teachers in Namibia (see Appendix B). Permission from the Directorate of Education was granted in writing (see Appendix D). In addition, the research proposal for this study was submitted to the University of Stellenbosch's ethical committee for ethical clearance (see Appendix H). Therefore, it is very important for the researcher to take note that harm in any research can be prevented or reduced through the application of the appropriate ethical principles. For this study two ethical principles were adopted: informed consent and privacy/confidentiality. Each principle is discussed below.

3.9.1 INFORMED CONSENT

According to Mack, Woodsong, MacQueen, Guest and Namey (2005:9), informed consent is a mechanism for ensuring that people understand what it means to participate in a particular research study so they can decide in a conscious, deliberate way whether they want to participate. In this study all participants were informed in writing about the purpose of the research (see Appendix I) and their consent was obtained in writing in order to carry out the interviews.

Flick (2009:41) states that if the principle of informed consent is used as a precondition for participation, then the following criteria must be taken into consideration:

- Consent should be given by someone competent to do so;
- The person giving the consent should be adequately informed;
- The consent is given voluntarily.

3.9.2 PRIVACY

Privacy in this study refers to the confidentiality afforded to participants in the research. According to Flick (2009:42), issues of confidentiality become problematic when research is done with several members at the same setting. Flick (2009:42) points out that the readers of the report should not be able to identify people who took part in the study. In this study the participants were guaranteed that their identities would not be revealed when reporting on the study to ensure privacy and confidentiality. Participants' really names are not used in the study, instead pseudonyms are used. The names of the schools are not revealed. Schools are referred to A, B and C. Tapes and transcripts are stored in a safe place to protect the identity and views of the participants.

3.10 CONCLUSION

This chapter provides a detailed description of the research methodology. The chapter began by introducing the research design, methodology and brief description of the four research paradigms used in social science as identified by Lather (1991): the positivist, post-structural, critical and interpretivist paradigms. Because of the exploratory nature of this study, the interpretive paradigm was adopted as the orientation most appropriate for this study. The interpretive paradigm was adopted because it focuses on the understanding of lived experiences. In addition, the interpretive paradigm allows the researcher to understand the situation and make sense of the phenomenon within its social and cultural context (Le Grange, 2014:2). Although there are many different approaches rooted in the interpretive paradigm, this study adopts the phenomenological approach, which explores the lived experiences of Grade 11 and 12 Biology teachers of the implementation of the NSSC Biology curriculum. Both the research site and the participants were purposefully selected. The research participants were five Grade 11 and 12 Biology teachers from three high schools in the Swakopmund circuit in the Erongo region of Namibia. Teachers were selected based on the type of school they were teaching in. Other reasons informing the selection were that teachers came from different backgrounds, and had different biographical profiles, qualifications and years of experience of teaching Grade 11 and 12 Biology. The data-construction method in this study is primarily semi-structured interviews with open-ended questions to allow the participants to express their lived experiences of the implementation of the NSSC Biology curriculum. The transcribed text of interviews were analysed thematically. Thematic analysis is a method of analysing qualitative data by “identifying, analyzing and reporting patterns (themes) within data” (Braun & Clarke, 2006:6). The chapter introduces the reader to various means that are employed to establish the validity and reliability of the study. Lastly, the chapter highlights ethical issues that were taken into consideration during the research process. Chapter 4 presents the findings and analysis of the data obtained during the process of data construction.

CHAPTER 4

DATA PRESENTATION AND ANALYSIS OF FINDINGS

4.1 INTRODUCTION

Chapter 3 focused on the description of and rationale for the selection of the research design and the methodology used to gather data. Chapter 4 presents the data, analysis and interpretation of data collected by means of semi-structured interviews. The data were presented and analysed in response to the problems posed in Chapter 1. The main research question that guides this study is: How do Grade 11 and 12 Biology teachers in the Erongo region of Namibia experience the implementation of the NSSC curriculum? It is through the collection, analysis and interpretation of data that the researcher attempts to develop knowledge on teachers' lived experience of the implementation of the NSSC Biology curriculum. An inductive approach is used to interpret data collected during semi-structured interviews.

Chapter 4 begins by shedding light on the following aspects: firstly, a description of each participant, followed by the geographical location of the study. Secondly, the process used familiarise tour to the research site before embarked on the study; thirdly, the interview process, including the time and the venue for the interviews. Fourthly, the chapter highlights the instrument used for data construction. The chapter concludes with the presentation and analysis of data gathered by means of semi-structured interviews as well the interpretation of the data.

4.2 DESCRIPTION OF THE PARTICIPANTS

To maintain confidentiality, participants' real names were not used in the study, but pseudonyms are used. Schools' names were not revealed to protect the identity of the participants. Schools were referred to school A, B and C. The study involves five (5) Biology teachers from three high schools in the Erongo region of Namibia. As stated in Chapter 3, the research participants were selected using purposive sampling. The school settings from which participants were selected represented diverse learners' demographics.

The sampling method used in this study is supported by Groenewald (2004:8), who states that the phenomenon being researched dictates the type of research participants to be included. Since this study focuses on the depth and richness of the data, only a small number of participants were selected. Groenewald (2004:11) argues that in a phenomenological approach, two to ten participants are sufficient for the study to reach saturation point. It is

against this background that eight participants were originally selected and that five (5) participants eventually became involved in this study. Table 1 below represents the participants' profiles, followed by an in-depth description of each participant.

Name	Ethnicity & Gender	Qualification	Years of teaching
Van Wyk	Coloured Male	Certificate in Environmental Science	2
Botha	White Female	Bachelor of Science in Education	6
Martha	Black Female	Basic Teachers' Diploma and specialised Diploma in Biology	18
Selma	Black Female	Bachelor Degree in Education	5
Saima	Black Female	Bachelor Degree in Education	9

Table 1 Participants' profiles

Van Wyk is a Grade 12 Biology teacher at high school A. Van Wyk was 25 years old at the time of the study. He is single and has no children. He has two years teaching experience. Van Wyk's home language is Afrikaans. He is teaching two Grade 11 high-level⁴ classes as well as two Grade 12 high-level classes. Both classes use English as the medium of instruction, because English is the official language in Namibia. In one class he has 45 learners (ordinary-level⁵ class) and in the other class he has 22 learners (high-level class). He completed Grade 12 five years prior to the commencement of the time of the study. After he matriculated in Belgium, he registered for a Certificate in Environmental Science at the University of Belgium and graduated in 2012. He does not have a teaching qualification, but is registered

⁴'High level' is the levels at which learners are tested on high-order questions, e.g. evaluation, synthesis and analysis, and their grading system range from grade 1 to 4.

⁵'Ordinary level' is the level at which learners are tested on low-order questions and their grading system ranges from A* to G.

for a Bachelor's Degree in Education at the University of South Africa. Van Wyk does not take part in any extramural activities at the school.

Botha is a Grade 11 and 12 Biology teacher at high school A. She was 36 years old at the time of the study. She is a single mother with a son. Unlike Van Wyk, Botha's home language is English. She has six years teaching experience – one year in the IGCSE curriculum and five years in NSSC curriculum. She is teaching three Grade 11 ordinary-level classes and one Grade 12 high-level class. Like Van Wyk, Botha uses English as medium of instruction. The number of learners in her classes varies from 38 to 45 learners. She completed Grade 12 thirteen years ago. She graduated with a Bachelor's Degree in Education from the University of Namibia. Apart from being a Biology teacher, she is also involved in extramural activities. She is responsible for volleyball and netball at the school. She also serves on the regional science fair committee.

Martha is responsible for Grade 11 and 12 Biology at high school B. She was the only Biology teacher at school B at the time of the study. Martha was 41 years old at the time of the study. She is married with four children. Oshiwambo is Martha's home language. She has eighteen years of teaching experience, four years with the Cape Educational Department, seven years with IGCSE curriculum and seven years in NSSC curriculum. She is teaching two Grade 11 ordinary classes and one Grade 11 high-level class. Apart from Grade 11 classes, she is also teaching two Grade 12 ordinary classes and one Grade 12 high-level class. The number of learners in her classes varies from 39 to 47 learners. Martha has a three-year teaching qualification obtained from Windhoek College of Education specialising in Life Science and Agricultural Science. She also holds a specialised Diploma in Biology obtained from the University of Namibia. At the time of the study Martha was busy studying for a BEdHons in Education with the University of Namibia. Apart from teaching, Martha is responsible for women's athletics at the school.

Selma is a Grade 11 Biology teacher at high school C. She was 35 years old at the time of the study. She is a single mother of two children. Oshiwambo is her home language. She has five years teaching experience, of which three years were spent teaching NSSC Biology at the high level. She is responsible for three Grade 11 classes, both ordinary and high-level. Apart from Biology;⁶ she is also responsible for Grade 8 and Grade 10 Life Sciences.⁷ She uses

⁶Biology is a study of life at Grade 11 and 12 level

⁷ Life Science is the study of life at Grade 8 to 10 level

English as a medium of instruction in all classes. The number of learners in her classes varies from 37 to 46. She graduated with a Bachelor's Degree in Education from the University of Namibia. Her major subjects were Biology and Physical science. Apart from teaching, she is responsible for netball and women's soccer at the school.

Saima is a Grade 12 Biology teacher at high school C. Saima was 38 years old at the time of the study. She is married with one child. Damara>Nama is Saima home language. She has nine years teaching experience, of which she taught IGCSE curriculum for two years and taught the NSSC curriculum for seven years. She is responsible for three Grade 12 high-level classes and two Grade 10 classes for Physical Science. She uses English as a medium of instruction. The number of learners in her classes ranges from 36 to 45. She holds a Bachelor's Degree in Education from the University of Namibia. Like some of the other teachers, Saima is responsible for the science fair at school and at a regional level. A discussion of the history and geographical location of the study follows.

4.3 THE HISTORY AND GEOGRAPHICAL LOCATION OF THE STUDY

Namibia is divided into fourteen regions with more than 2,000 high schools. Of the fourteen regions, the researcher opted to conduct this study in the Erongo region as stated in Chapter 3. Erongo is one of the fourteen regions situated along the coast of Namibia. The reasons for selecting the Erongo region as the research site is based on time and economic factors as well as the accessibility of the research participants. As noted earlier, participants in this study were purposively selected from three high schools in this region. A detailed description of the three high schools from which the participants were purposefully selected is provided below.

SCHOOL A

According to the school principal, school A opened its doors in 18 October 1913 with a total number of 126 learners. It was established by the community members, since there was no formal education available for the children of Swakopmund. It started as a primary school. In 1930 school A became a high school with more than 16 teachers and over 300 learners. The medium of instruction was German when the school was founded. In 1947 German was replaced by English, but the school still attracts a considerable number of German- and Afrikaans-speaking children from outside Swakopmund. It was unique in the then South West Africa (Namibia) in that English-, Afrikaans- and German-speaking children attended classes together, and it was renowned for its high standard of education. However, in 1976 as a result of the opening of the Rossing Uranium mine near Swakopmund a lot of developments took

place in Swakopmund and new schools were developed along cultural lines. This is the time when School A became a school exclusively for white children, and specifically became a German high school.

When Namibia became independent in 1990, the doors of the school A were opened to all Namibian citizens. The school changed its medium of instruction to English, with German as a compulsory subject. The school offers different fields of study ranging from science, commerce, art and design, and social science, to mention a few. The school has more than 800 learners and 20 teachers. According to the school principal, school A is a well-resourced high school with different sponsors both locally and internationally. The school has permanent structures which are well maintained; these include furnished classrooms, an office block, science laboratories, two hostels, a hall and a dining hall. It has clean water and electricity.

Van Wyk and Botha argued that although school A is among the best high schools in the country, which produces competitive high achievers every year, the Biology results at the school level are worrisome compared to other subjects offered in same curriculum (see Appendix N). Similarly, the school principal emphasised that although Biology results are not satisfactory every year, the school is known for its excellent Grade 12 results and most of its graduates further their studies at South African universities. According to the school principal, the success of the school is attributed to its strict rules. Learners are not allowed to engage in romantic relationships with one another and cell phones are forbidden on the school premises (see Appendix Q).



Figure 5 Infrastructure of School A

SCHOOL B

School B is located in the township of Swakopmund. There are different accounts as to when the school was established. However, according to the school principal, school B opened its doors in 1965. According to the school principal; the school was established for black learners since the South African administration did not permit black learners to attend white schools which were situated in town. Instead, a place had to be found in the township, since white and black learners lived segregated lives. As a result, the black school was opened in the township. According to the school principal, the school's medium of instruction during the years of the South African occupation was Afrikaans, while other schools in the same circuit were taught either in German or English.

School B offers Grades 8 to 12, with different fields of studies in Grades 11 and 12. The school has about 30 teachers and over 1,200 learners. According to the researcher's observation, school B is in state of dilapidation; old facilities are on the verge of collapse and the sewage system is not functioning properly. According to the school principal, lack of accommodation for teachers, inadequate laboratory facilities and the lack of a proper school hall prove to be the major challenges at school B. The school principal informed the researcher that since the school had fallen into disrepair, in 2013 it launched a campaign to have its basic amenities repaired. However, by the middle of 2015 the school had not yet collected sufficient funds to start its first renovation since 1965.

According to the school principal, although the school's infrastructure is falling apart, the pass rate increases every year (see Appendices M and O). According to the school principal, slight improvements in the school's results every year were achieved because of the high professional ethics among teachers and parental involvement in different school activities. However, Martha argues that although the school's results improve gradually every year, Biology is among the subjects in which learners are obtaining low marks every year compared to other subject in the NSSC curriculum. Martha argues that the lack of laboratories, effective teaching aids, equipment and chemicals contributes to poor performance in the NSSC Biology national examination.



Figure 6 Infrastructure of School B

SCHOOL C

School C is another high school from which two participants were selected for this study. It is located north-east of Swakopmund. According to the school principal, high school C opened its doors in 1970. The school started with 153 learners who were taught by 10 teachers. The school was expected to provide education for white children who were judged to be highly intelligent, with the aim of providing a pool of youths to be educated as doctors, engineers and geologists. It was operated by the then colonial administration of Namibia. According to the school principal, in 1979 the school was converted into a high school, with 33 candidates completing the Matric Examinations (Cape Senior Certificate) in November of that year. At that time the school was under the jurisdiction of the Directorate of Education for the Administration of Whites. This directorate ensured that each learner had the opportunity to have a scholastic education in his/her home language, which was either Afrikaans or English. The white administration ensured that all instruction in all subjects until Grade 9 be offered in either Afrikaans or English.

In 1990, when the Republic of Namibia became independent, the school integrated its system into the Namibian system of education. As a result the final (Cape Senior) matric

examinations were written in 1993, which were then replaced by the Namibian and British Cambridge system. English became the language of instruction and all Namibian learners were allowed to enrol.

According to the school principal, the school is registered with the Ministry of Education as an educational facility for learners. The school follows the Namibian curriculum guidelines and covers the government syllabi in core subjects. It offers classes from Grade 8 to 12 with four classes per grade. The school offers different fields of studies in Grades 11 and 12. The school has approximately 900 learners with an average of 47 learners in a class. At the time of the study high school C had 33 teachers. The school has two hostels (male and female), a dining hall and a library. All infrastructures look new and are well maintained. According to Selma and Saima, the Biology results over the years have been declining regardless of extra afternoon, winter and spring classes offered at the school level. According to the regional statistics 2012 to 2014, the school is among the lowest performing schools in the Biology national examination in the region (see Appendices M and P).



Figure 7 Infrastructure of school C

4.4 FAMILIARISATION WITH THE RESEARCH SITE

Before the data-construction process, the researcher embarked on a familiarisation tour of all three high schools. The main reason for the tour was to meet the participants in person, fix interview schedules as well as to acquaint himself with the research site. During the visit the researcher had enough time to interact with the participants as well as with other teachers teaching different subjects in the NSSC curriculum. The researcher also made time to meet the school principals, who briefed the researcher about the history and challenges of their respective schools. The researcher also interacted with Grade 11 and 12 learners. The schools' respective infrastructures were also viewed during the familiarisation tour. During the visit the researchers had preliminary meet-and-greet appointments with each participant to facilitate the establishment of rapport. At the time of the familiarisation tour the researcher used the opportunity to emphasise the benefits of the research both to the participants, the region and the Ministry of Education. The researcher used the familiarisation tour to get more information about the three high schools.

During the familiarisation tour, participants were informed about the study details and were given assurances about ethical principles to be observed, such as anonymity and confidentiality. This gave the participants a sense as to what to expect from the interviews, which increased the likelihood of honesty, since it is a fundamental aspect of the informed consent process. It was during the familiarisation tour that all participants expressed eagerness and readiness to participate in the study. Since interviews were used to construct data for this study, the researcher deems it necessary to give a brief description of the interview process. The next section therefore focuses on the interview process of the study.

4.5 INTERVIEW PROCESS

As stated in Chapter 3, data were constructed through semi-structured interviews. Interview schedules were fixed during the familiarisation tour of the research sites. The reason for fixing interview schedules during the familiarisation tour was to fix the date and time of the interviews with participants, given their busy schedules. On the day of the interview the researcher arrived at the venue an hour before the scheduled time. This allowed the researcher to set up the equipment for the interview session. During the hour prior to the interviews the researcher collected all signed consent forms from the participants (see Appendix I). In addition, it also allowed the researcher to inspect the venue to ensure that there would be minimal noise, since a tape-recorder was used during the interview. During the process of data construction the researcher took into account Groenewald's (2004:15) guidelines on the use of technology during interviews. Groenewald (ibid.) argues that technological failure can

seriously derail any research undertaken. It is against this contention that the researcher arrived at the venue with a new tape-recorder fully loaded with new battery cells as well as spare battery cells to ensure that lack of power would not be an issue during the interviews. Furthermore, the researcher took along a cell phone to ensure that if the tape recorder failed, it could be substituted with a cell phone.

To enhance the quality of data constructed, face-to-face semi-structured in-depth phenomenological interviews were conducted to construct data. The in-depth phenomenological interviews allowed the interviewees to communicate freely as they shared their lived experiences on the implementation of the NSSC Biology curriculum. According to Koopman (2013:107), the benefits of the in-depth phenomenological approach are the richness and the depth of insight gained to answer the research question that is being investigated.

During the interview the researcher listened attentively to what was said so that interviewees were able to recount their experiences as fully as possible without unnecessary interruptions. The interviewer adopted an open neutral body language, nodding, smiling, looking interested and making encouraging noises (like Mmmm) during interviews. As stated by Koopman (2013:107) in this study at a time, the interviewer used silence as a strategic skill (listen more and less interferes) because this is highly effective at getting interviewees to contemplate their responses, talk more, elaborate and clarify particular issues. Reflecting on interviewees remarks was another technique used by the interviewer to develop the interview. Where appropriate, the interviewer sought clarification from interviewees when he was unclear as to what the interviewee meant. During interviews the interviewer ensured that leading or loaded questions that may unduly influence responses were avoided.

At the end of each interview the interviewer thanked the interviewees for their time and asked them if there is anything they would like to add or share with him regarding the study. According to the interviewer experiences, this gave the participants an opportunity to deal with issues that they might have thought important but might have not been asked by the interviewer. Doing so could lead to the discovery of new, unanticipated information. To enhance validity, at the end of each interview the researcher played the recorded clip in the presence of the interviewee for verification, justification and elaboration. This gave the interviewee an opportunity to confirm or insert omitted information. The researcher assured the participants that they would be provided with a copy of the study once it was finalised. In the next section the researcher discusses the venues and times of interviews.

4.5.1 VENUES OF INTERVIEWS

The term venue means different things to different people depending on the context in which it is used. In law a venue is a place where a trial will be held and the area from which the jury will be selected. It can also be defined as a place where an event or meeting is conducted. Therefore, it should be understood that a venue is a special kind of place where something happens, especially an organised event such as a court hearing, conference or any sport event. In this study the term venue refers to the place in which the organised interviews took place.

For this study all interviews were conducted in venues which were free from distractions as well as at the locations that were most suitable for participants. Participants were given the option to select the venue of their choice where they wish to be interviewed. All participants selected places that suited them; the criteria used in the selection of venues ranged from safety, accessibility, free of distractions and good ventilation. Van Wyk and Botha from school A opted for the staffroom as the venue for the interviews. The staffroom was chosen because of its safety and because it was free of distractions. The participants expressed that they felt safe to be interviewed in the staffroom rather than in their classes or a private place outside the school premises. It was quiet in the staffroom during all interviews. Staff members were informed in advance about the interview session that would be conducted in the staffroom and as a result they refrained from entering the staffroom. There were no distracting noises experienced during the interview sessions. Since the venue was conducive to conducting in-depth interviews, participants expressed themselves very well on the matters under discussion.

Martha from school B opted to use the head of department's office as the venue for her interview. The office was selected because it is far from the classrooms, which reduced the noise level, since the interview was conducted during school hours (during her free period). The head of department's office was selected as a suitable place because there was no intercom installed, which may have caused a noise when the bell rang at the end of each period. The office provided safety to the interviewer as well as the interviewee.

Selma and Saima from school C opted to use their classrooms as venues of their interviews. They argued that they were attached to their classrooms and regarded them as the safest places at school. They further stated that using their classrooms as places for the interviews allowed the researcher to experience first-hand the environment in which they are working. All classrooms had enough ventilation and were echo free. There was no noise experienced during the interviews, because all learners left immediately after school. The researcher was

satisfied with all venues used during interviews and thanked all participants for their invaluable contributions.

4.5.2 TIME OF INTERVIEWS

Generally speaking, time is a measure in which events can be ordered from the past through the present into the future. However, from a scientific point of view time is defined as a way of comparing and describing different kinds of motion such as speed of light, how fast the heart beats or how frequently the earth spins around its axis. However, in this study time is defined as the measure of the duration of events and the intervals between them. Time is vital for any study, including this research. If time is not managed appropriately, it may delay the whole process of data construction.

In this study interviewees were allowed to determine the time that was most convenient for them. Participants were asked to choose the time that would not require them to rush through the interview. For example, they were requested not to schedule an interview immediately before an important appointment or meeting. The researcher further advised the participants to schedule their interviews at an optimal time during the day. The researcher also advised the interviewees not to schedule their interviews very early or late in the day. Based on the researcher's experience as a teacher for the past 6 years, early or late hours of the day are not suitable for interviews because the interviewee might not give the interviewer his/her full attention. If it is early, interviewees might be thinking about everything they still need to do that day and if it's late in the day the interviewees might be exhausted. In addition, interviewees were further advised to choose any time of their choice between Tuesdays to Thursdays. Based on the researcher's experience as a teacher for the past 6 years, on Mondays teachers are preparing for the week and on Fridays they concentrate on making plans for the weekend, which may compromise the quality of the interview. Based on the researcher's experience, as from Tuesday teachers are always more settled into the week and they are able to focus on the interviews.

Van Wyk and Botha were interviewed the same day. Van Wyk and Botha used their administration periods for their interviews. Van Wyk was interviewed between 09:00 and 10:00. He had chosen this time since he had nothing to do then. The interview was completed within an hour. Botha was interviewed between 11:00 and 12:00. This was her best time since she had completed her daily activities. Like Van Wyk, the interview with Botha was completed within the scheduled time. Martha was interviewed between 14:00 and 15:00 a day after Van Wyk and Botha were interviewed. Selma and Saima were interviewed a day after Martha was interviewed. Selma and Saima were interviewed between 15:00 and 16:00, the

reason being that they wanted to have lunch before the interview, as they were very hungry. All interviews were completed within the scheduled time.

4.6 TOOL FOR DATA CONSTRUCTION

In this study data were constructed by means of semi-structured interviews. Semi-structured interviews were chosen as appropriate tools to construct data for this study because they allow for direct interaction between the researcher and the participants. According to Le Grange (2000:5), semi-structured interviews have the advantage of allowing the researcher to get into the participants' minds to interpret their views. Le Grange (*ibid.*) argues that semi-structured interviews are used as a magnifying glass to enter the respondent's experience. Le Grange (*ibid.*) adds that semi-structured interviews are qualitative methods by which researchers interactively question the participants in order to test theory-driven hypotheses. Interviews also allow the researcher to make direct contact with his/her participants.

Another advantage of a semi-structured interview as a tool for data construction is that participants usually respond when confronted in person, which allows the researcher to note specific reactions and eliminate misunderstandings or ambiguity about some questions. Any movement, facial expressions, the length of pauses between answers and verbal cues made by interviewees during interviews can turn accounts of interviews into vivid descriptions.

Hancock (1998:10) argues that semi-structured interviews tend to work well when the interviewer has pre-identified a number of aspects he/she wants to specifically address, but at the same time allows opportunities for interviewees to describe their experiences openly and freely. The interviewer can decide in advance what areas to cover, but should remain open and receptive to unexpected information from the interviewees. This can be particularly important if limited time is available for each interview and the interviewer needs to ensure that the 'key issues' are covered (Hancock, 1998:10).

Semi-structured interviews in this study contain a blend of open-ended questions in order to cover fairly specific topics or themes. Kielmann, Cataldo and Seeley (2011:28) suggest that in a semi-structured interview, the interviewer works with a topic guide that is loosely structured, or a checklist of topics he or she wants to cover. Kielmann et al. (2011:28) state that these guides could include some questions that are more structured. As a rule the latter tend to be followed up by less structured 'probes', which is a method of following up on a topic in order to generate more information. During the interviews all interviewees responded freely to questions posed to them. All questions were asked in the order given in the interview schedule (see Appendix J). Additional questions were introduced during interviews to get

more information on teachers' lived experiences of the implications of the NSSC Biology curriculum. All interview sessions lasted for about 50 minutes. Participants were asked the same questions in the same sequence. Data provided by five participants during semi-structured interviews are presented, analysed and interpreted in the next section.

4.7 DATA-ANALYSIS PROCESS

Yin (2009:126) defines data analysis as a process of examining, categorising, tabulating, testing or otherwise recommending evidence to draw an empirically based conclusion. This shows that data analysis is a process of breaking up data into manageable themes, patterns, trends and relationships (Mouton, 2001:108), so that the researcher and others can meaningfully understand various aspects of data. According to Merriam (1991:123), the process of data collection and analysis is recursive and dynamic. Like the rest of the research design, data analysis is an iterative process that continues throughout the research. Data analysis occurs simultaneously and concurrently with the formulation of the research question, methodological approach and data-collection methods (Merriam, 1991:123). Flick (2014: 370) defines qualitative data analysis as the interpretation and classification of linguistic materials with the following aims: firstly, to make statements about implicit and explicit dimensions and the structuring of meaning making in the material and what is presented in it; and secondly, to arrive at statements that can be generalised in one way or another by comparing various materials or various text or several cases.

Flick (2014:375) argues that interpretation is the core activity of qualitative data analysis that helps the researcher to understand or explain what is in the data constructed, whether explicitly mentioned or implicitly. According to Flick (2014:375), coding is a preparatory step for accessing the data and making it ready for interpretation. Interpretation means understanding the internal logic of an excerpt of the data or to put it into context: for example, what an interview statement about workload has to do with the fact that it comes from a female Biology teacher and not from a male teacher. Flick (2014: 375) argues that interpretation is the challenge at the heart of qualitative research. Without interpretation, we cannot make sense of our data. In this qualitative research study the researcher is aiming to find out more about teachers' lived experiences, their thoughts, feelings and social practices. To achieve this aim, the researcher asked questions that allowed the participants to express their lived experiences of the implementation of the NSSC Biology curriculum. The researcher will make connections between different components and aspects of the data in order to increase his understanding of the lived experiences of teachers of the implementation

of the NSSC Biology curriculum. Therefore, the researcher constructs meaning from the data through a process of interpretation.

The aim of data analysis in this study is to transpose data in such a way that it provides an answer to the research question: How do Grade 11 and 12 Biology teachers experience the implementation of the NSSC curriculum? According to Ary et al. (2006:490), qualitative data analysis involves an attempt to understand the phenomenon under study, produce information and explain relationships, theorise about how and why the relationships appear as they do, and reconnect the new knowledge with what is already known. According to Thomas (2003:3), the inductive approach (used in this study) is designed to support the understanding of meaning in complex data through the development of summary themes or categories from the raw data. To analyse data constructed through semi-structured interviews in this study, Braun and Clarke's (2006) step-by-step guide of conducting thematic analysis was used. The initial step involves familiarising oneself with the data through transcribing, reading and rereading the transcriptions, and then segmenting data into manageable units for analysis.

The second step involves generating initial codes from the data (see Appendix A). The reason for coding is to make connections between different parts of the data and the codes derived from participants' responses (Alhojailan, 2012:12). The generating and categorising of codes entails both inductive (data driven) and deductive (informed by interpretive theory and prior research findings) approaches.

The third step is searching for themes and this involves sorting the different codes into potential themes. The fourth step involves reviewing and refining the candidate themes. At this stage the validity of individual themes in relation to data should be set. The fifth step of thematic data analysis was only done after satisfactory thematic maps of the data were created. This step consists of defining and naming themes that will be presented and the analysis of the data within them (Braun and Clarke, 2006). The final step is producing the report accompanied by enough data extracted to capture the essence of main points. The themes that emerged during the process of data analysis are presented in Figure 8.

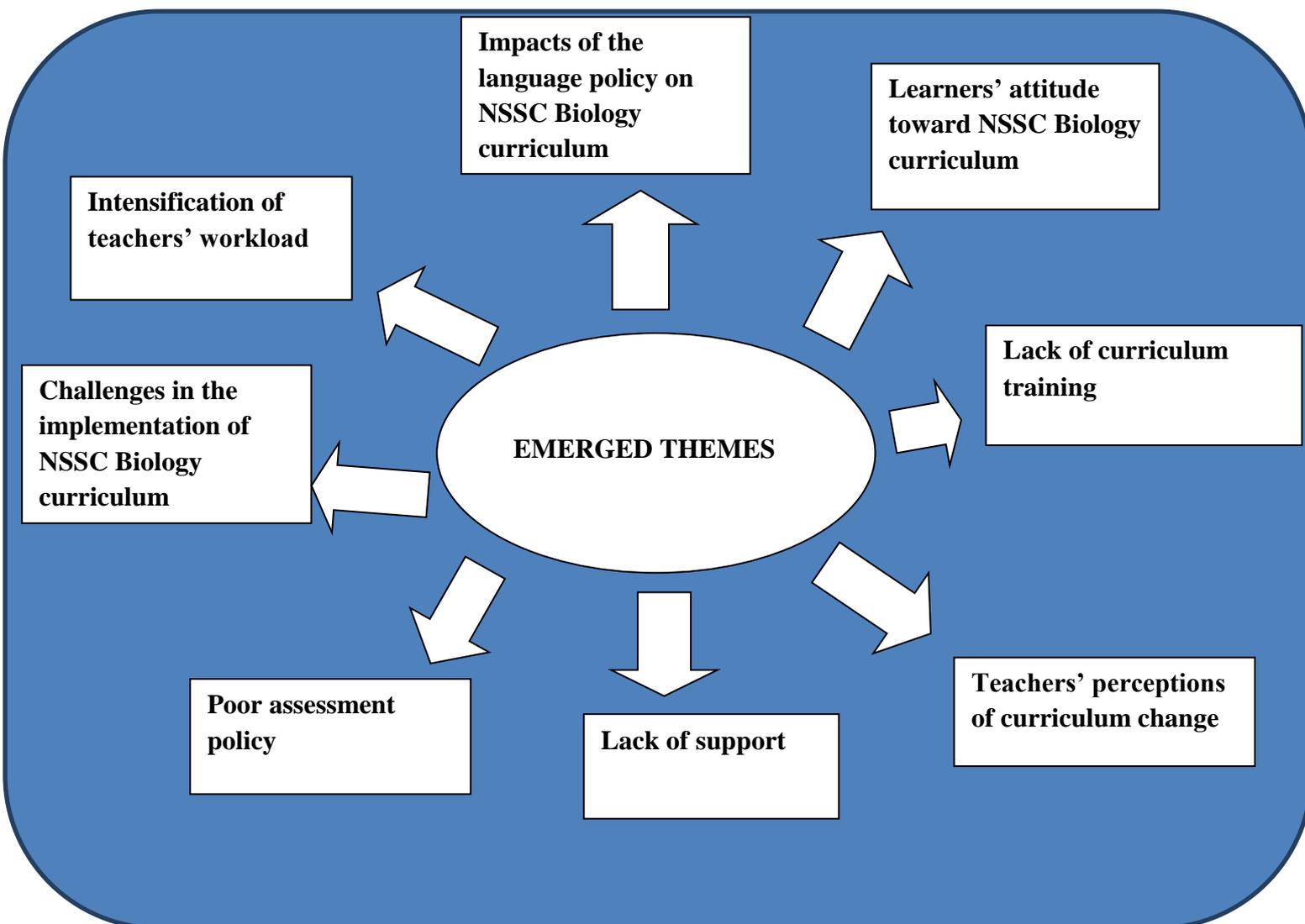


Figure 8 Themes emerged from interviews

4.8 DATA PRESENTATION AND DISCUSSIONS

Data constructed during in-depth semi-structured interviews are presented and discussed in this section. Before the researcher presents the research findings, it is important to reiterate that this study employed a phenomenological approach. A phenomenological approach offers an opportunity for individuals to describe their lived experiences in order to illuminate what might have been previously misunderstood or unknown/discounted (Bogdan & Biklen, 1993). The research findings are discussed under the themes presented in Figure 8.

4.8.1 LACK OF CURRICULUM TRAINING

During semi-structured interviews two participants revealed that they received training on the implementation of the NSSC Biology curriculum. However, participants claimed that the training was inadequate and did not prepare them to implement the NSSC Biology curriculum effectively. Teachers stated that the training they received was just the provision of basic knowledge and understanding of the amendments made to the H/IGCSE Biology curriculum. Furthermore, teachers who attended the training at the beginning of the implementation of the NSSC Biology curriculum felt that trainers could not deal with the curriculum content since they (trainers) believed that the NSSC Biology curriculum is built on the H/IGCSE curriculum. Therefore, trainers assumed that they did not have to go into any depth when training teachers because teachers already knew the H/IGCSE Biology content. On the other hand, three out of the five participants revealed that they did not receive training at all after the implementation of the NSSC Biology curriculum in 2006. When asked to share their experiences on curriculum training, participants made the following points:

Van Wyk: I never received any training with regard to the implementation of NSSC Biology curriculum since I joined teaching profession two years back. It seems subject advisors do not know their work. Everyone is doing his/her own things at the school level.

Botha: If they hardly offer a one-day workshop, how can they manage with the training? No training neither regular workshops taking place in this region regarding to the implementation of the NSSC Biology curriculum.

Martha: I only attended the training in the first year of the implementation of the NSSC Biology curriculum. However, I don't call it training but rather a workshop to familiarise teachers with the new changes that were made in the old curriculum (H/IGCSE). It was just an information-sharing session.

Selma: I attended two training [sessions] on the implementation of the NSSC Biology curriculum at my previous region. It helped me so much on how to approach the NSSC Biology curriculum. Since I moved to this region, I never attended any training. I am of the opinion that the Department of Education should make it compulsory for each region to offer regular training on the implementation of the NSSC curriculum in general.

Saima: I don't understand why the curriculum keeps on changing while we don't receive any training on how to implement it. We need training on how to use modern technology to present our lessons. Changing the curriculum without proper teachers' training is a waste of taxpayers' money.

During interviews all teachers expressed the view that, because of a lack of proper training on the implementation of the NSSC Biology curriculum, educators ‘scrabbled around in the dark’ relying on the school subject heads and their peers for guidance and support. According to the participants, this was a case of ‘the blind leading the blind’. As stated by Martha, the assumption of the subject advisors that teachers already have knowledge of the H/IGCSE Biology content was an inadequate response and would have disadvantaged those teachers like Van Wyk who had no knowledge of H/IGCSE curriculum content.

Martha, who taught all three curricula (Cape Education, H/IGCSE and NSSC), expressed disappointment with the quality of the training offered by the subject advisors on the implementation of the NSSC curriculum. Martha claims that, unlike in the H/IGCSE curriculum, subject advisors in the NSSC curriculum were not well prepared and they were not confident themselves about the subject content. Martha perceived that subject advisors had insufficient knowledge to respond to the questions posed to them. According to Martha, this could be because most subject advisors in the region are new university graduates with little knowledge of the three curricula and lack teaching experience. Martha, who attended the training and workshops on the implementation on the NSSC Biology curriculum, stated that during training teachers sought clarity and raised questions on issues that they needed more understanding on. However, when issues were raised on various points regarding the assessment aspects of the curriculum, subject advisors informed the participants that they were unable to deal with issues related to policies. Martha felt that they were not adequately trained to implement the NSSC Biology curriculum because subject advisors did not deal with classroom problems experienced in a practical manner.

Van Wyk, Botha and Saima, who never attended any training after the implementation of the NSSC Biology curriculum, expressed disappointment and had no confidence in the regional administration. This was captured well by Van Wyk, who said; *they failed us, how can we perform to our maximum if no training is offered to us?* Van Wyk, Botha and Saima felt betrayed by the regional senior educational officer and the subject advisors. Van Wyk, Botha and Saima argued that things must change in the regional administration if good results are to be achieved in the NSSC Biology examinations. On the other hand, Selma argues that policies in education should be fully implemented, including the training of teachers on the implementation of any new curriculum. Teachers questioned whether the lack of teachers’ training in the region is because of lack of resources (money) or just laziness on the part of those who are entrusted with the responsibility to do so (see Saima).

During the interview Martha, who had taught Biology for the past 18 years, highlighted the need for aligning teachers' pre-service and in-service training programmes with national curriculum policies to enable better alignment between the current teacher educational programmes and focused training required for successful curriculum implementation. Martha further expressed the need for the subject advisors, principals and heads of departments to undergo in-depth training themselves on the effective implementation of the NSSC curriculum, so that they are able to support teachers more effectively with the implementation of the curriculum.

The findings of this study corroborate some of the literature reviewed in Chapter 2. For example, Mulkeen (2010:174) found that in most cases teachers receive little training whenever a new curriculum is introduced. Furthermore, Mulkeen (*ibid.*) claims that in most cases teachers' training is not aligned with the needs of the classroom. Firstly, training in pedagogical methods was often theoretical, making it less likely to have an impact on classroom practices. Secondly, the teaching of content knowledge is often not closely aligned to the school curriculum (Mulkeen, 2010:174). Similarly, De Beer (1993) argues that as a result of lack of training most science teachers in South African schools often avoid using heuristic strategies in their classrooms and instead they use a more ostensive approach. An ostensive approach is a teaching approach in which learners learn through demonstration; they are not given opportunity to interact with the materials through practical activities. A study conducted by De Beer (1993) in South African schools revealed that science teachers were not properly trained on how to present practical activities to learners. The situation may be the same in Namibia, since Botha could not use the resources available to involve her learners in practical activities. De Beer (1993) argues that although the role of a heuristic, problem-centred approach to practical work is well recognised, research shows that such an approach is seldom followed in most schools. Instead, if practical work is done, it is often characterised by routine 'cookery-book' procedures in which learners carry out instructions from textbooks (De Beer, 1993:2). De Beer (1993:3) noted that most schools lack the necessary apparatus and equipment to do effective practical work. The situation in South Africa resembles what teachers experienced in this Namibian study.

Participants such as Saima pointed out that, unlike other subjects, the NSSC Biology curriculum requires teachers to use technological aids such as microscopes, water-testing kits and sequencing DNA kits. Saima argued that while these technologies are effective in the teaching of NSSC Biology, proper training and support are required to enhance proper use of such technology by all teachers. Van Wyk, who is from a well-resourced school, completed

his high school in Belgium and obtained his qualification from the University of Belgium; he revealed that the use of computers in Biology education improves learners' understanding and helps teachers to better explain the concepts under discussion. However, Botha who never attended any training after the implementation of the NSSC Biology curriculum, pointed out that the use of computers in Biology education requires proper training on how to use computers effectively.

Similarly, Saima argued that use of the term 'computer' produces anxiety in most teachers because of fear of the unknown. Therefore, Saima advocated for basic training on word-processing skills and computer proficiency. Saima felt that computer training would ease the fear of unknown among teachers. In the same vein, Van Wyk argued that there is a need for them to be trained on the effective use of the internet. Van Wyk emphasised that training in the use of internet enables teachers to access valuable teaching resources. However, Botha argued that the use of computers as teaching aids does have the harmful potential of emphasising only a limited set of information-retrieval skills. Therefore, Botha argued that Biology teachers should be trained to enable them to manipulate and challenge information that exists outside the format of the internet.

During the interview Saima, who had never attended training on the implementation of the NSSC curriculum, expressed concern about the curriculum that keeps on changing whilst no proper training on its implementation was provided. Saima felt that changing the curriculum without proper training of teachers is a waste of taxpayers' money. In addition, Saima perceived that subject advisors had a poor understanding of the NSSC Biology curriculum, because they often provided teachers with superficial information. Saima noted that subject advisors often contradict the subject policies, which leads to confusion and uncertainty among teachers.

Selma argued that it is still difficult for most subject advisors to demystify some of the aspects of the NSSC Biology curriculum, especially on the role of group work, the prevalence of a textbook-dependent syndrome as well as how to record learners' performance against all assessment standards. Selma further expressed the view that the predominance of the lecture method and teachers' textbook-dependent syndrome associated with H/IGCSE curriculum are still perpetuated in the NSSC Biology curriculum as a result of poor interpretations of the subject policy by subject advisors. According to Martha, the shortcomings of most subject advisors in the training of teachers raised the question of how the Directorate of Education in the Erongo region appoints and trains its personnel. Martha perceived incompetence among

some subject advisors as far as the implementation of the NSSC Biology curriculum is concerned. Saima perceived that some subject advisors in the region might not be fit for the positions they are occupying.

Botha connected the poor training of teachers in the implementation of the NSSC Biology curriculum to lack of supervision by the regional management team on how subject advisors should implement educational policies in the region. Botha argued that teachers' productivity is an important factor in educational development and also a vital factor in consolidating the Namibian Educational system. Therefore, she (Botha) felt that teachers should be prepared by the Department of Education to implement the NSSC Biology curriculum more effectively. Furthermore, Botha argued that the training and re-training of teachers determine the quality of education in the country as no nation can progress without the effective development and management of teachers.

With regard to the frequency of training in the implementation of the NSSC Biology curriculum, all participants were of the opinion that training courses should be conducted frequently, possibly twice a term, when teachers can meet their subject advisors to discuss critical issues that they encountered in their classes. Participants argued that it is the responsibility of the Department of Education to ensure that quality and adequate training is offered to all educators in the region. Furthermore, the participants perceived in-service teacher training as a solution to the ineffective implementation of the NSSC Biology curriculum.

4.8.2 LACK OF SUPPORT

All five participants expressed the view that there was a lack of support from the subject advisors and the school management teams. The research findings revealed that the perceived lack of support from subject advisors and heads of departments caused confusion among teachers on how to implement the NSSC Biology curriculum effectively. All participants stated that in most cases they felt stressed, since there was no one to help them out when things became difficult. During the interviews all the participants singled out lack of support from subject advisors and heads of department as challenges they experienced in the implementation of the NSSC Biology curriculum. When participants were asked to highlight the kind of support they experienced in the implementation of the NSSC Biology curriculum, they had the following to say:

Van Wyk: Here I am on my own. The last time I met my subject advisor is when they were here with the regional team to inspect our administration files. She hardly visits our school. The head of department majored in Mathematics, she knows little about Biology.

Botha: The only support I received so far from my subject advisor is the provision of curriculum documents such as syllabi and schemes of work. No materials or financial support from the regional office. Little help from the head of department since she majored in Mathematics and Physical science.

Martha: Things had changed so much since independence. During the Cape Educational Department curriculum advisors were more visible. They usually help us with regard to lesson planning, lesson presentation as well as with the subject content. Now I am on my own, I only get help from my friends in other regions when things get tough. The head of department knows nothing about Biology, he specialised in Mathematics and Physical science. I feel like a lost bird as far as support is concern.

Selma: I rely heavily on my previous region for support. The last time I met the subject advisor was last year October 2014 when they came to inspect Grade 10 continuous assessment marks. The head of department help here and there; however, lack of necessary teaching resources hinders the implementation of the NSSC Biology curriculum.

Saima: So far I never experience support in term of resources. Our school is under-resourced. No proper equipment like microscope. The head of department is hardly a help since the departmental budget is not effective. . The only thing the head of department ask from me is my preparation file every Monday to put up her signature. Often I used my money to buy chemicals to conduct practical activities.

All participants revealed that there is little support and guidance for teachers on the implementation of the NSSC Biology curriculum in the three high schools in which this study was conducted. However, lack of support was expressed differently by teachers from different high schools. Van Wyk and Botha, who were from a well-resourced high school, stated that although they lacked subject advisor's support, they were well endowed with resources compared to other teachers from under-resourced high schools in the region. Van Wyk made reference to other schools where teachers use their own money to buy teaching resources.

Furthermore, the research findings show that there seems to be lack of clarity on the roles and responsibility of the regional management team in supporting the implementation of the NSSC Biology curriculum. Martha stated that it was not clear to what extent the Department

of Education in the region deployed subject advisors and what their roles were in the day-to-day implementation of the NSSC Biology curriculum. Moreover, the research showed that while heads of department in Namibia are in higher pay category, Saima claims that they are doing little or nothing to ensure that teachers get the necessary support to implement the curriculum effectively. Saima, who teaches at high school C where the head of department majored in Physical Science and Mathematics, stated that in most cases heads of department left all their administration work in the hands of subject heads,⁸ since they (heads of departments) have little knowledge of the subject matter. According to Saima, this creates conflict between the heads of departments⁹ and subject heads, since subject heads argue that they are not financially compensated for their additional administrative and supervisory roles.

During interviews all participants stated that all heads of departments in the three schools involved in this study had not specialised in Biology, which according to Martha raises the question as to what support these heads of department could offer to Biology teachers. Similarly, Saima perceived that some heads of department in the Erongo region had limited knowledge of the NSSC Biology curriculum, since they are not specialised in the subjects they are in charge of. As a result, they have little understanding of what is happening in Biology classrooms. According to Saima, since heads of departments have little knowledge about Biology education, they are only interested in seeing teachers attending to their classes; however, they don't go the extra mile to find out or address the challenges teachers are experiencing in delivery of the subject content.

During interviews all participants expressed the need for the regional administration team to ensure that heads of department are appointed based on their specialisation. Saima believes that heads of department who are subject specialists would be able to successfully guide teachers on how to implement the curriculum effectively since they have knowledge of the subject content.

Van Wyk indicated that because of lack of support from the subject advisors and head of department, they could not acquire the necessary skills to implement the curriculum effectively. Van Wyk further stated that lack of support in the implementation of the NSSC Biology curriculum left many teachers stranded. Teachers argued that they can read policies on their own, but application and interpretation are difficult when there no support. According

⁸The subject head is the person who coordinates activities in a specific subject within the department.

⁹The head of department is the person who is in charge of the department. He/she plans and manages departmental functions.

to the participants, lack of training and support demonstrates how difficult it is for the NSSC Biology teachers to translate curriculum policies into classroom practice.

During the interview Botha revealed that the only support teachers get from the subject advisors and head of departments is the provision of curriculum documents such as syllabi and schemes of work. Furthermore, Botha experienced that the support Biology teachers received from the regional administration is confined to workshops and subject meetings. However, Botha experienced that after a workshop or subject meeting nobody cared about what is going to happen in the classroom and what materials are needed to implement the changes that had been discussed in the workshop. According to Botha, there are no follow-up class visits in an attempt to ensure that teachers are implementing what they had been informed about in the workshops or meetings. Botha perceived these shortcomings as some of the factors that hinder effective implementation of the NSSC Biology curriculum.

Participants' demands for adequate support in the implementation of NSSC Biology curriculum are in line with the literature reviewed. In the literature reviewed, Rogoff (1990) and Vygotsky (1978 cited by Schartz and Sadler (2007:991) emphasised that teaching and learning require support and scaffolding to ensure that learners operate at their optimal skills levels. This means that teachers' differing teaching styles and needs must be given serious attention. This is because teachers' teaching styles enable them to internalise the use of various approaches and pedagogical knowledge in their teaching practice (Bantwini, 2009:179). Furthermore, Bantwini (2009:179) emphasises that good learning opportunities for teaching builds on the teachers' current science knowledge, skills and attitudes. However, Rogan and Grayson (2003:1176) and Lekgoathi (2010:109) caution against poor teachers' training and lack of pedagogical content knowledge as well as their deficiencies in the use of various instructional approaches and knowledge.

During the interview Saima emphasised that she does understand the changes that are taking place in the NSSC Biology curriculum; however, she argued that it is not easy to implement all the changes without the necessary support. Saima further pointed out that her school is under-resourced and as a result she often uses her own money to buy chemicals to conduct practical work. Martha, who is also from an impoverished school, expressed the view that lack of laboratories, ineffective teaching resources, and lack of support from the school management as well as shortage of necessary apparatus to conduct practical activities are some of the challenges she experiences in the implementation of the NSSC Biology curriculum. However, Martha revealed that she had managed to implement some of the

changes with the limited support and resources at her disposal. During the interview Martha revealed that although she does not conduct practical activities so often, as a result of the lack of necessary resources, she does use a variety of instructional strategies including peer teaching to make the concepts accessible and understandable to all learners in the classroom. The success of Martha in using a variety of instructional strategies in her class may be attributed to the fact that she taught all the different curricula (Cape Education Department, H/IGCSE and NSSC), and might have gained experience in this way. She also has more teaching experience, which has given her greater expertise in her area of specialisation.

Saima, who is from an under-resourced high school, emphasised that although teachers are working hard to implement the NSSC Biology curriculum, the teaching of Biology requires a lot of resources which are not at the disposal of most schools. Saima, who is from an impoverished high school, argued that even if the school management is willing to support the teachers on the implementation of NSSC Biology curriculum, the resource constraints are the main problem. On the same note, Selma argued that *although the school management worked so hard to support us psychologically, the problem remains with the lack of funds to buy necessary teaching materials*. The responses of Selma and Saima revealed that some schools in the region need financial resources for the acquisition of chemicals and instruments to conduct practical work as stipulated in the NSSC Biology curriculum policy guide (see Appendix R). However, the concern about the lack of funds was not shared by Van Wyke and Botha, since historically their high school has had sponsors both nationally and internationally.

During the interview Martha stated that the use of technology such as computers in Biology education is extremely effective. They enable teachers to engage learners' multiple intelligences and teach them word processing, graphing and internet research skills. Apart from the use of computers, Van Wyk, who matriculated in Belgium and teaches in a well-resourced school, emphasised the use of television in Biology education. Van Wyk argued that there are great films on biological topics available in local markets that other high school teachers can buy and use them in their classes if funds are made available. Furthermore, Van Wyk outlined the importance of documentaries from television as well as some programmes on public television that can be tape-recorded and used in the Biology classroom. Van Wyk and Martha argued that the advantages of using these technologies in the classroom are that learners are able to learn from someone other than their teacher. However, Selma, who is teaching in an under-resourced school, pointed out that the use of advanced technologies in Biology education is hindered by the lack of funds in most high schools in the Erongo region.

Selma emphasised the need for the Department of Education in the region to develop long-term plans to raise more funds to acquire technology, given its potential benefits. Selma also suggested that the Department of Education in the region should provide Biology teachers with computers, televisions, Video Cassette Recorders (VCRs) and overhead projectors as well as additional money for the schools to buy videos, Compact Discs (CDs) and laboratory equipment such as microscopes to ensure that quality education is taking place in all high schools in the region. During the interview Martha and Saima revealed that their schools lack the basic equipment for conducting Biology experiments. Among the equipment that is lacking are chemicals, test tubes, slides, Petri dishes, water- and Deoxyribonucleic acid (DNA)-testing kits, thermometers and filter papers, just to mention a few.

During interview Van Wyk highlighted the importance of practical activities in Biology education. According to Van Wyk, learners learn better when they experience the subject for themselves, not as abstract ideas for ‘rote learning’, but as real experiments to be designed, executed and evaluated. Van Wyk further emphasised that the slogan *Tell me and I shall forget, show me and I shall remember, involve me and I shall understand* holds true when it comes to the teaching and learning of Biology. The positive attitudes of Van Wyk toward practical activities might be attributed to the fact that he matriculated in Belgium and completed his university qualification in that country’s university. In other words, he might have been exposed to better teaching methods compared to other teachers who completed their studies in Namibia. Van Wyk’s arguments on the importance of practical activities are in line with Wellington’s (1998: 6) ideas. Wellington (ibid.) argues that appropriate practical work enhances pupils’ experience, understanding, skills and enjoyment of the subject. Wellington (ibid.) also states that practical work can improve pupils’ understanding of science and promote their conceptual development by allowing them to ‘visualise’ the laws and theories of science. In a similar vein, Martha emphasised that practical work motivates and stimulates – it generates interest and enthusiasm among learners. It helps learners to remember what they were taught. Saima also argues that during her secondary schooling she found that practical work develops not only manipulative or manual dexterity skills, but also promotes higher-level, transferable skills such as observation, measurement, prediction and inference.

4.8.3 POOR ASSESSMENT POLICY

The findings of this study revealed that all teachers who took part in this study acknowledge the importance of assessment for learners, teachers, parents and policy makers. Furthermore, participants demonstrated a clear understanding of what classroom assessments are all about. In addition, they highlighted the different types of assessments used in schools to assess learners' progress. However, they are concerned about not being adequately informed on how to handle assessments in large classes during their teacher training, a situation they described that robbed them their everyday success. When asked about how they experience the assessment policy guide of NSSC Biology, the teachers made the following comments:

Van Wyk: Since there is no proper assessment policy guide for Grade 11 and 12, different teachers assess learners using different tools. Due to time constraints, I spend more time on practical activities.

Botha: Lack of proper assessment policy guide for Grade 11 and 12 complicated the assessment process. Time constraints and overloaded subject content are the reasons why I only assess learners through test and examination. I hardly give exercise and project due to class size.

Martha: I use formative continuous assessment such as homework and class activities to evaluate my learners' performance. However, time and class size do compromise the quality of assessment given to learners. I hardly finish marking during the lesson. Learners are not taking assessment serious.

Selma: Although there is no proper assessment policy guide from the Department of Education, I did develop one at my school. I am of the opinion that assessment should be enforced among learners since [it] prepares learners for the final examination. However, overcrowding is another challenge facing teachers during assessment.

Saima: The process of assessment is complicated by the number of learners in our classes. How can you conduct practical activities with 46 learners in a class? To make matters worse there is no proper laboratory at our school. I have resorted to summative form of assessment.

Although all participants indicated that assessments are crucial in the learning process, this study revealed that three out of five teachers who took part in this study assessed learners for grading purposes and not to identify individual capabilities and weaknesses. This was revealed by Van Wyk, Botha and Saima as they stated that they resort to a summative form of assessment because of time constraints and class sizes. The responses from the three teachers

demonstrated how the context in which teachers taught influences the types of assessments they use in their classes. During interviews four of the teachers argued that although they are aware of the importance of formative forms of assessment, they could not implement this because of class sizes and time constraints. Selma noted that she resorts to summative assessment in order to complete her syllabus on time. Selma stated that if she fails to complete the syllabus on time she will be accused of misconduct by the school management. The responses from the four teachers demonstrate how teaching and learning are compromised in most schools, since the type of assessment used does not support learners to make progress in their learning area, but rather is used only for grading purposes –a situation Beets et al. (2014:169) describe as rote learning. However, during the interview Martha stated that although her class size is big, she does manage to assess learners through formative and summative forms of assessments. The success of Martha in practising both forms of assessment in overcrowded classes as well as through limited time might be attributed to the experience she gained from 18 years of teaching.

All five teachers who took part in this study experienced that the assessment standards in NSSC Biology curriculum are too generic and unclear in terms of what is to be assessed and how it should be assessed. According to Van Wyk, lack of clarity and a common understanding around assessment policy in NSSC Biology led to widespread misunderstandings among subject advisors and teachers. Because of a lack of clear guidelines on assessment policy, Botha and Selma revealed that they resorted to a checklist approach to assessments. However, Selma argued that the checklist approaches to assessment only indicates whether the assessments are done or not. In addition, Botha argued that the quality of the assessments given is not revealed in this approach. Botha stressed that the checklists approach to assessment does not reveal whether appropriate basic competencies were achieved. Botha and Selma described this approach to assessment as burdensome.

The study shows that teachers' attempts to implement assessment policy are impacted on negatively by various external and internal social and contextual school factors. Martha, Selma and Saima revealed that in-school factors that hinder effective implementation of assessment policy include overcrowded classrooms, lack of teaching support materials and learners' lack of interest in school work. Overcrowded classes are evident from the teacher-learners ratio of 1:45. According to the schools' statistics, in some schools this ratio is exceeded, making it difficult for the teachers to assess learners. The research findings further revealed that teachers seemed to experience challenges in assessing learners because of the class sizes and time constraints. This was revealed by Saima, who stated that *I cannot teach*

and assess learners at the same time as stipulated in the NSSC Biology curriculum because the classes are too big. Similarly, Botha argues that *Time constraints and overloaded subject contents are the reasons why I only assess learners through test and examination. I hardly give exercise and project due to class size.* The participants' responses show that teachers are not able to attend to individual learners differences because of large classes.

During the interview Saima stated that *distribution of exercise books, marking of exercise and correction of learners' work are problematic and time consuming.* Similarly, Martha experienced that more lesson time is wasted on the distribution of marked exercise books and the collection of the previous homework. Saima stated that 45 minutes per lesson is not enough for effective teaching and assessment.

During the interview Martha highlighted absenteeism among her learners, a situation she described as compromising the assessment policy in Biology. According to Martha, *most learners do not care about assessment since they are aware that it will not contribute to their final examination marks. Most learners do not show up whenever there is a test.* Martha, who is teaching at school B, which is located in the township, perceives that absenteeism is rooted in sociological contextual factors coupled with traditional beliefs and customs. Martha said that learners are constantly absent from school because they have to help their parents to work in order to supplement their families' income. Similarly, Selma experienced that during the cold and rainy season most learners do not attend school. As a result teachers could not attain their teaching objectives, because some learners are missing from classes. In addition, Selma experienced that poor school facilities also contribute to absenteeism among learners, especially during unfavourable weather conditions, since in some schools classes have leaking roofs and no windowpanes or doors. This might be the reason why Martha experiences high absenteeism since her school's infrastructures are in a dilapidated state.

All participants experienced that the current assessment and promotion policies adopted by the Ministry of Education in Namibia have negatively affected the implementation of the NSSC Biology curriculum at senior secondary level. Martha argued that the assessment and promotion strategies used in public schools in Namibia compromise the implementation of the NSSC Biology curriculum. This was revealed during the interview with Martha, who said *although we are trying our best to implement the curriculum, assessment and promotion policies associated with the NSSC curriculum make it difficult for us teachers to reach the goals and objectives of the NSSC curriculum.* When Martha was asked to describe her experience of the assessment and promotional strategies, she said she regarded them as

obstructing the effective implementation of the NSSC curriculum; Martha indicated that automatic promotion of learners at junior secondary level was the main problem in the way of learners' achievement of competencies at the senior secondary level. Martha argued that automatic promotion of learners at the junior secondary level means that most learners at this level carry on through the school system without having gained the necessary competencies. Martha experienced that automatic promotion is a challenge for teachers at senior secondary level, as they have to help learners who did not pass Grade 10 to attain the skills required in the NSSC Biology curriculum.

All participants stated that unlike Grades 8 to 10, Grades 11 and 12 do not have a proper assessment policy guide. All participants stated that they find it difficult to assess learners, since the assessment policy does not have clearly defined assessment criteria. However, Selma mentioned that through the experience she gained during her teaching career, she managed to develop her own assessment policy at her school and according to her it is really working well. During the interviews all participants agreed with Beets et al. (2014:169) and Boston (2002:2) that assessments play a crucial role in relation to curriculum implementation and to teaching practice. This was revealed by Selma, for example, who stated *firstly, school-based assessment allows teachers to measure learners' progress and to diagnose areas of lack of progress to enable remediation and focused teaching. Secondly, it provides crucial feedback to learners and parents about academic progress.*

4.8.4 CHALLENGES IN THE TEACHING OF NSSC BIOLOGY CURRICULUM

Interviews conducted with the five participants revealed that four teachers experienced problems with the implementation of the NSSC Biology curriculum. Participants perceived that these problems were the result of implementing the NSSC Biology curriculum without proper training of teachers. Participants stated that they did not receive adequate training that could have benefited them in the implementation of the NSSC Biology curriculum. On the question of how they experience the teaching of NSSC Biology curriculum, participants had the following to say:

Van Wyk: Teaching is going well since our school is among the well-resourced schools in the region. My learners enjoy the teaching of Biology since it involves hands-on minds-on. Practical activities are conducted twice a week. However, high number of learners per class and the workloads are some of the challenges in the teaching of NSSC Biology.

Botha: Lack of training complicated teaching in NSSC Biology curriculum. I am still teaching in the old style (lecture method). High number of learners per class complicated the process of assessment. The workload is too much, yet the time is too short.

Martha: Teaching NSSC Biology curriculum is complicated by the lack of necessary teaching resources. The curriculum encourages activities that promote higher-order thinking skills, yet there is no provision of teaching resources from the Department of Education.

Selma: Teaching NSSC Biology is very much stressful as there is a lot of work. Classes are overcrowded. I always feel as lacking the time and resources to make a difference in my teaching. I hardly give each learner a one-on-one attention as my classes are too big.

Saima: The use of English as the medium of instruction complicated the teaching process. Classes are too big. No resources to conduct practical activities. My work has been intensified.

During interviews only Van Wyk stated that all is going well with his teaching. Van Wyk pointed out that his school is well resourced and he managed to conduct practical activities twice a week, a situation that teachers from under-resourced high schools such as Martha, Selma and Saima could not enjoy because of a lack of the necessary teaching resources. However, during interviews the researcher noted that Botha, who teaches at the same school as Van Wyk (a well-resourced school), had different experiences. Botha revealed that she is still using the lecture method approach instead of the learner-centred approach. Furthermore, Botha revealed that she hardly conducts practical activities even though all resources are available. The researcher argues that the possible reason for the differences in the teaching approach between Van Wyk and Botha can be attributed to the fact that since Van Wyk matriculated in Europe (Belgium) as well as completed his university qualification in Belgium, and therefore might have been exposed to different teaching approaches which shaped his teaching style. Secondly, there is a possibility that Botha was never exposed to teaching approaches other than the lecture method which is commonly used in most Namibian schools, and as a result that is the teaching method she is likely to use irrespective of whether resources are available. Another possible reason for the difference in teaching approach between Van Wyk and Botha could be that since Van Wyk does not take part in extramural activities at school, is not married nor has a child, he might have more time to organise his school work compared to Botha, who took part in extramural activities at school and also has a child to take care of. Apart from differences in their teaching approaches, both teachers (Van Wyk and Botha) do share the negative impact of their class sizes on their teaching.

During interviews Martha, Selma and Saima argued that, as with the introduction of any new curriculum, the introduction of the NSSC Biology curriculum added extra administrative work for all stakeholders involved in the implementation of the NSSC Biology curriculum. Greater workload pressure was experienced especially by married and newly graduated teachers. The possible reasons for this workload pressure might be that married teachers do have many additional responsibilities including taking care of the family, while newly graduated teachers might lack expertise on how to plan and manage their work. Participants noted that initially there was added pressure associated with new work schedules, lesson preparations and assessment plans. According to the participants' experience, the workload associated with the NSSC Biology curriculum was among the factors which hampered the teaching of Biology. Furthermore, participants revealed that the teaching of Biology is complicated by the factor that teachers do not have all the necessary resources for effective implementation of the NSSC Biology curriculum. These findings are in line with the literature reviewed. Barab and Luehmann (2003:463) argued that while teachers are still adapting the curriculum to meet the local needs, they are doing so under more challenging constraints, for example, larger classes, difficult behaviour and higher profile accountability. This has resulted in local adaptation being less reform-oriented classroom instruction. This might be the cause of teachers' frustration and negative attitudes toward curriculum change (Barab & Luehmann, 2003:463).

Teachers experienced that with the introduction of the new curriculum, new textbooks have to be published, resulting in schools spending large amounts of money in the procurement of relevant textbooks. Of the five teachers involved in this study only Van Wyk and Botha who were not experiencing lack of teaching resources, since their school (school A) is well-resourced. During the interviews Selma and Saima, who are both from an under-resourced school (school C) said that although textbooks were published, not all learners could afford them. Selma and Saima argued that unlike in some other countries, learners in Namibia are expected to buy their own textbooks. Selma further argued that lack of textbooks among learners implied that teachers had to spend most of their time on the preparation of learners' worksheets. However, Saima argued that the process of preparing learners' worksheets was complicated by the lack of necessary facilities in under-resourced schools.

Lack of teaching resources was also experienced by Martha from impoverished school B, who said: *for me teaching of NSSC Biology is complicated by the lack of necessary teaching resources. The curriculum encourages activities that promote higher-order thinking skills, yet there is no provision of teaching aids from the directorate of education.* Teachers from under-

resourced schools felt that teaching in classes where there are inadequate teaching resources is frustrating and affects curriculum delivery negatively. Martha cited the unavailability of textbooks in NSSC Biology at higher level as one of the factors that hinder the implementation of NSSC Biology at high level. Similarly, Selma argues that it is not easy to teach NSSC Biology high level to learners who do not have textbooks to refer to for activities as well as for note taking. Selma further cited the typical situation of a teacher giving homework where he/she is expected to use the chalkboard on which to write the exercises, which is time consuming and frustrating for both learners and teachers.

The study revealed that teachers' Pedagogical Content Knowledge (PCK) plays a major role in the implementation of any curriculum. Martha, who taught Biology for 18 years, pointed out that most newly graduated teachers find it difficult to implement the Biology curriculum effectively because of a lack of PCK. During the interview Martha revealed that most teachers do not understand the link between Biology content knowledge and PCK. According to Martha, PCK is vital in the teaching of Biology because it is a process through which teachers accumulate common elements such as knowledge of subject matter, knowledge of learners and possible misconceptions, knowledge of curricula as well as knowledge of general pedagogy. Martha further argued that PCK is very important in teaching of any subject because it involves how to teach the subject using a reservoir of knowledge of good teaching practice and experience. Martha stated that through PCK teachers are able to connect their understanding of subject content with the instruction they provide to their learners to ensure that the subject content is mastered well.

This study further found that the physical structure and facilities at all three schools limited Biology teachers from carrying out the necessary teaching tasks in their classrooms. However, this problem was of greater concern at school B, where the school infrastructure is in a dilapidated state. During the interviews all five teachers revealed that the process of teaching NSSC Biology is somewhat limited because of insufficient physical infrastructure and facilities at schools. Martha noted that classrooms are overcrowded and conditions are inadequate for using the intended teaching methods, techniques and instructional materials. The same challenge was felt by Selma, who said: *teaching NSSC Biology is very much stressful. Classes are overcrowded. I always feel as lacking the time and resources to make a difference in my teaching. I hardly give each learner a one on one attention as he/she needs because my classes are too big.* Although there is an independent Biology laboratory in school A, Van Wyk and Botha reported lack of sufficient technical support, insufficient laboratory equipment and instructional materials in this school, since class size exceeded the

classes' carrying capacity. In school C, where the laboratory is shared with other science courses as well as used for other purposes, Selma and Saima also complained about the inadequate physical conditions and facilities. This finding goes hand in hand with the point made by Dindar (2001), who states that the implementation of the Science curriculum is hampered by lack of teaching resources.

All five participants expressed concerns over the time spent on assessing and marking learners' work. They feel that too much time is wasted on assessment activities, leaving little or no time for teaching. This problem might be attributed to overcrowded classrooms in all schools. Although participants expressed satisfaction with the sequence of the units and content in the curriculum, they would prefer the curriculum to be less prescriptive with reference to time-frames. In the interviews the participants stated that the pace of the Biology curriculum is too fast. Teachers argued that often they rush through the syllabi in order to complete the content and in so doing they do not spend much needed time with slower learners. According to Selma, this means that in most cases the syllabi are completed as per time schedule; however, the needs of all learners were not catered for. This challenge was noted by Botha, who said *the workload is too much, yet the given time is too short*. Botha and Martha perceive curriculum overloaded and time constraints as some of the factors responsible for the high failure rate among learners.

The findings of this study go are in line with those of Doidge (1995) and Papenfus (1995). Doidge (1995:31) and Papenfus (1995:60) claim that the Biology curriculum in secondary schools is overloaded with facts, which results in Biology teachers concentrating merely on the transmission of information while the development of skills such as observation, experimentation and problem-solving are neglected. The fact that teachers are faced with a vast amount of work to cover and require learners to memorise them for examinations might be the reason why most teachers neglect practical activities in Biology (Papenfus, 1995:60). While some teachers argued that they would prefer to use NSSC curriculum as a guideline and implement it to suit their teaching approach, Botha felt the need for more clear guidelines and structures for the implementation of the NSSC Biology curriculum.

The findings of this study are in line those of Tobin (1987). According to Tobin (1987) the relatively large amount of content teachers are obliged to cover is a constraint that prevents teachers from implementing the curriculum effectively so as to reach their objectives in the manner intended. Tobin (1987) further reports that most teachers found class time to be insufficient to provide learners with opportunities to discuss their understanding on a given

topic and apply their knowledge in a range of contexts. However, Tobin (1987) asked how teachers would change their teaching strategies if the amount of content were substantively reduced or the amount of instructional time increased. With reference to Tobin's (1987) question, in this study Martha said that reducing the amount of subject content or increasing time might not bring the necessary change because classroom management and lack of relevant resources also affect the teaching of NSSC Biology.

During the interview Martha emphasised that classroom management is a perennial concern for novice teachers, who have not developed a wide variety of instructional routines and schemes that allow them to feel comfortable with the instruction. Mitchener and Anderson (1989) highlight teachers' concerns regarding losing class control as a result of passive resistance to rule changes. For instance, during the interviews Botha stated that she feels uncomfortable with the facilitating role required in the NSSC Biology curriculum compared to the traditional lecturing expert role. Scott (1994) singles out time constraints, lack of resources, limited knowledge, the need to cover a variety of contexts and too much content as some of the factors that hinder effective teaching and learning in any curriculum.

Martha, Selma and Saima, who are all from impoverished schools, emphasised the need for Biology to be taught in science laboratories. They argued that Biology requires a considerable amount of technical support and equipment. However, they expressed concern about the class sizes. They argued that something should be done to reduce the number of learners per class to enable teachers to conduct practical activities. Although practical activities are crucial in teaching Biology, given the current number of learners in the classrooms, teachers felt that they could hardly conduct practical activities or implement learner-centred approaches in their classes. During the interview Van Wyk highlighted the importance of connecting the subject content to daily life. According to Van Wyk, this could be done through practical activities. Van Wyk argues that this allows learners to realise the importance of Biology in their everyday lives.

Van Wyk and Martha indicated the importance of active learner participation in the teaching of Biology. Van Wyk and Martha stated during interviews that learners should learn by living, seeing and doing. Therefore, Van Wyk and Martha felt that teachers should be competent and creative in teaching and facilitating the learning process. This finding goes hand in hand with that of Cho (2001). According to Cho (2001), teachers' teaching experiences affect their views on the value of the curriculum. Therefore, teachers demonstrate different meanings of fidelity of implementation in their everyday classroom situations.

All participants in this study expressed the view that language of instruction is a barrier to the effective teaching and learning of NSSC Biology. During the interviews participants stated that the language of science is unfamiliar to most learners and that the terminology encountered in Biology is difficult to master and to comprehend. Participants involved in this study stated that many concepts in Biology are abstract and difficult to explain to learners who are not fluent in the language of instruction (English). To make the matter worse, the study found that textbooks are not written in the learners' mother tongue. All participants in this study experienced that because of the language barrier learners sometimes missed out on the concepts because they did not understand the language used in the textbooks. Saima pointed out that because of the language problem; teachers are forced to explain some concepts through code switching. However, Botha and Selma argued that learners must know biological terminology irrespective of the language of instruction. Botha and Selma argued against the use of code switching by Saima, as it is against the language policy of the country in which English is chosen as the language of instruction in all public schools. On the use of English in teaching Biology, Selma felt that learners must be motivated to express themselves in the medium of instruction, which is English, because that is the language in which they are examined at the end of the year.

During the interviews participants were asked about the extent to which a learner-centred approach can address the language problem in classes. In response to this question the participants argued that a learner-centred approach has little impact on the language problem, because group work is not effective in overcrowded classrooms. Participants also stated that in all schools in the region English is a second language for all learners. Apart from the learners, language proficiency problems were also experienced by some teachers. Van Wyk and Saima stated that they found it difficult to explain some concepts in English, since English is their second language.

In line with the literature, the research findings on teaching of the NSSC Biology curriculum indicate that teachers play the key role during the process of curriculum implementation. According to Carl (2009:3), teachers interpret and implement curriculum intentions in their classroom practice. Carl (2009:3) argues that in addition to the teachers' own capabilities in teaching, their beliefs and perceptions of the curriculum, learners and effective Biology education determine how the curriculum is implemented in their classrooms. The results of this study show that teachers' characteristics such as their gender, teaching experience and attendance of professional teacher development activities, in-service training programmes, seminars and workshops all influence their teaching of NSSC Biology. However, Martha

expressed the view that learners' commitment, their classroom behaviour and interest in the subject matter also influence teachers' decisions and classroom behaviours.

4.8.5 LEARNERS' ATTITUDE TOWARD NSSC BIOLOGY CURRICULUM

All the participants in this study agreed that there are many factors that potentially influence learners' attitudes and achievements in Biology. Some of the factors experienced by all five teachers involved in this study are associated with parental background and family environment. Others relate to individual characteristics such as self-concept, locus of control, career and achievement motivation. Participants further revealed that variable factors associated with school influences such as classroom climate, pace and teaching style also do have an effect on learners' attitudes toward the subject. When participants were asked to comment on their experiences of learners' attitudes toward the NSSC Biology curriculum, they had the following to say:

Van Wyk: The fact that we are dealing with living organisms in Biology lessons might be the reason why my learners love Biology so much. Learners do enjoy practical activities. Through practical activities learners discover the importance of Biology in their everyday life.

Botha: The fact that in Biology we learn things around us might be the reason why learners have a positive attitude toward NSSC Biology curriculum.

Martha: Interest in Biology should be developed for boys and older learners. Learners who have low interest in careers associated with Biology, their interests should be increased perhaps through contact with professional biologists.

Selma: Teachers' attitude toward learners and the subject had a significant role on learners' attitude toward the subject. My attitude toward Biology influenced most of my learners positively.

Saima: Although my learners regard Biology as an easy and interesting subject, their interest is being influenced by the career they would like to pursue after completing Grade 12.

Generally, all five participants experienced that most learners in their respective schools do have positive attitudes toward Biology as a school subject. Participants each highlighted different factors that might contribute to the positive attitudes of learners toward Biology as a school subject. Van Wyk emphasised regular practical activities in which learners interact with laboratory equipment as the reason why learners develop positive attitudes toward Biology. He attributed the learners' positive attitude toward Biology to the use of living

organisms during the lessons. On the other hand, Martha who does not conduct more practical activities because of lack of resources argued that the use different instructional strategies during the lesson might be a contributing factor on why her learners develop positive attitudes toward Biology education. Selma attributed the teachers' attitudes toward learners and the subject as the main reason why learners develop positive attitudes toward Biology as a subject.

During the interview Saima revealed that although learners in her school regard Biology as an easy and interesting subject, she argued that learners' attitudes toward NSSC Biology differ with gender and age. Similarly, Martha experienced that positive attitudes toward Biology are more popular among young learners and girls. Saima expressed the view that the degree of interest of learners in NSSC Biology decreases as learners get to Grade 12 compared to when they are in Grade 11. Saima perceives that this could be influenced by the field of study that learners wish to pursue after Grade 12. This was noted when Saima emphasised that *learners who wish to pursue careers in the field of Biology and other related courses do show more interest in the NSSC Biology curriculum compared to those who wish to pursue their career in other field of studies*. According to Saima, those learners who wish to become nurses or doctors always develop a more positive attitude toward Biology than those who wish to become engineers, for example.

The influence of teachers, on the other hand, is another variable which seems to be important in influencing learners' interest in Biology. Data presented in this study by Selma indicate that teachers can significantly affect learners' attitudes toward Biology. Selma emphasised that teachers' characteristics and attitudes toward learners and the subject do have an influence on learners' attitudes toward any subject. Selma argues that learners take their teachers as role models for deciding about their career. Therefore, Selma felt that it is important for Biology teachers to act as role models to motivate learners to develop positive attitudes toward Biology as a school subject in Namibia. These findings corroborate those of Osborne, Simon and Collins (2003). According to Osborne et al. (2003), teachers' perceptions of the subject, and the attitudes of peers and friends toward the subject are some of the factors that influence learners' attitudes toward any subject, including Biology.

There are distinctive findings in this theme. According to all teachers, learners do have positive attitudes toward NSSC Biology. However, the regional statistics revealed that every year learners perform poorly in the NSSC Biology national examination in comparison to other subjects offered in the same curriculum (see Appendix L). Since teachers are positive

about learners' attitudes toward Biology, the poor performance might be attributed to contextual factors. Poor results might be attributed to the nature of Biology as a subject, which requires practical activities, but these do not take place in most schools because of the lack of teaching resources. Lack of practical activities might lead to learners entering the examination with limited knowledge of practical activities, which may disadvantage them. Furthermore, the poor performance of learners in NSSC Biology might be attributed to the high number of learners per class. During interviews the participants revealed that the implementation of the NSSC Biology curriculum is compromised by the high number of learners per class. Teachers argued that they cannot attend to individual learner's needs because of the class size. However, a study should be carried out to investigate the relationship between learners' attitudes toward Biology and their performance.

4.8.6 IMPACTS OF THE LANGUAGE POLICY ON NSSC BIOLOGY CURRICULUM

Four out of five participants in this study experienced that the introduction of the language policy in which English was emphasised as the language of instruction in all public schools left the majority of teachers marginalised. Teachers argued that they were confused as to what language to use in classes to ensure that the subject content is successfully communicated to the learners. When asked how they experience the language policy in the implementation of NSSC Biology curriculum, participants commented as follows:

Van Wyk: Mother tongues play major roles in communication. Coming from an Afrikaans speaking background make it difficult for me to explain some Biological concepts in English. It would be better if I can teach in Afrikaans compared to English.

Botha: English as a language of instruction is not a problem to me since English is my home language. However, I do experience problem with my learners since English is their second language. Textbooks are written in English and most learners have poor English proficiency.

Martha: My interest as a teacher is to use indigenous languages in the delivery of NSSC Biology curriculum. Explaining Biology concepts in English is not easy to some of us given our historical background. However, indigenous languages are confined to one tribe or nation.

Selma: English as a language of instruction is limited when it comes to explanation of Biological concepts. I hardly express myself very well in English compared to my mother tongue. However, I am in support of English as a language of instruction since it's a universal language.

Saima: The selection of English as a language of instruction over indigenous languages was a harsh decision in my view. Before independency in 1990, only a fraction of the population could read and write English compared to indigenous languages.

The findings of this study are in line with the literature reviewed in Chapter 2, which revealed that language of instruction is crucial in the implementation of any curriculum. It allows teachers to convey curriculum content to the learners. During the interviews Martha and Saima stated that while they were in favour of using indigenous languages in the teaching of Biology, the Department of Education mandates the use of English in all public schools. According to Martha and Saima, the differences between teachers and the Department of Education on the language policy compromise the implementation of the NSSC Biology curriculum, since most teachers have poor English proficiency. During the interviews Saima revealed that she does practice code switching to help learners to understand the concepts covered. Saima experiences of the challenge in using English in teaching Biology is in line with the finding by De Beer (1993). According to De Beer (1993:3), most teachers experience challenges in teaching science (in English) to mainly second-language speakers. Therefore, code-switching might be used in science education where teachers can briefly code switch from English to the mother tongue or, more practically in culturally diverse classrooms, to a vernacular language.

Saima's arguments against the use of English as the language of instruction in the implementation of the NSSC Biology curriculum is in line with the point made by Jansen (1995:255) in which he criticises the sudden shift from Afrikaans to English as a medium of instruction in 1990. Jansen (1995:255) argues that the use of English as the medium of instruction over Afrikaans was too risky, since most teachers in the country had poor English proficiency at that time. Similarly, Rollnick (2000:100) argued that expecting learners to learn a new and difficult subject through the medium of a second language is unreasonable, giving them the double task of mastering both science content and language. This double task entails the acquisition of two conceptually difficult and different skills at once – one being related to language and the other related to the subject content (Bohlmann, 2001). Participants in this study perceive the poor English proficiency among teachers and learners as an indication of how nothing or very little has been done since independence to improve English proficiency among teachers.

During the interviews all participants made the point that the use of English as the medium of instruction is a major concern, which the Ministry of Education overlooked after independence in 1990. Furthermore, Saima argues that the selection of English as the medium

of instruction over indigenous languages was not fair, because when the language policy was implemented in 1990, only about 8% of the Namibian population were able to speak and read English. On the same note, Van Wyk emphasised that he prefers teaching in his mother tongue. Selma shared the same sentiment: *English as a language is limited when it comes to explanation of concepts; I hardly express myself very well in English compared to my mother tongue*. In addition, Selma noted that although teachers are willing to teach, they are faced with learners who are not ready to learn as a result of their poor English proficiency. According to Selma, poor English proficiency among learners makes it difficult for the teachers to develop all learning skills in the classroom. Similarly, Botha, whose has English as her first language, experienced challenges in conveying the subject content to learners, since they have poor English proficiency. Botha and Selma therefore perceived that the implementation of the NSSC Biology curriculum is compromised in most schools in the region as a consequence of the language policy.

All teachers who took part in this study argued that if good results are to be achieved in the NSSC Biology curriculum, the language policy in schools should be revisited. Botha argues that many teachers should be trained as English teachers, especially at the junior secondary level. Botha believes that if learners are well prepared at the junior secondary level, they would hardly experience problems with the use of English at senior secondary level. Botha further recommended the need for the NSSC Biology curriculum to be reviewed in order to promote the use of English throughout the syllabus.

Although some teachers argued in favour of the use of indigenous languages in implementing the NSSC Biology curriculum, they seem to value the use of English as the language of instruction. This was indicated by Martha and Selma, who advocated that the selection of English as the medium of instruction in schools was considered at a broader perspective. That is to say English was selected as the medium of instruction because of its functionality beyond national borders; it's less divisive tendency between different ethnic groups, and as promoting educational training on a national rather than a regional basis.

4.8.7 INTENSIFICATION OF TEACHERS' WORK

During the interviews all participants, regardless of their age, gender and marital status, stated that like any new curriculum the NSSC Biology curriculum not only increased their workload, but also intensified it. Participants noted an increase in administrative work on the part of the teachers. They stated that they spend much of their time on administration rather than on teaching. Participants indicated that they are overworked. When participants were asked to

describe their experiences on the workload associated with the NSSC Biology curriculum, they had the following to say:

Van Wyk: I don't call myself a teacher but rather an administrator. I do much work on administration level than teaching. I hardly visit the gym regularly due to marking.

Botha: Overcrowded classrooms intensify my workload. I hardly finish marking learner's exercise during school hours; I carry school work home if I want to finish on time. However, this interferes with my family time.

Martha: During the week I have to sacrifice my family time on school work. I hardly give attention to my family since I have to do marking as well as lesson preparation. I carry work home. I feel like neglecting my children and husband so much.

Selma: I hardly watch my favourite television programs at times because I am occupied by school work. We are spending more time on administration work than teaching. I am getting stressed at a time due to workload.

Saima: I use peer marking to reduce marking load. Instead of giving individual activities, I do give group tasks as they are easy to mark. As a married lady and a mother of one I need more time with my family.

The findings of this study are in line with the literature reviewed in Chapter 2, which showed that change and transformation are never simple or easy. Popkewitz (1988:92) argues that in order to reform and change, we must question our underlying assumptions about society. This study reveals that over the past years, teachers in Namibia have been experiencing major changes in the teaching process as a result of societal demands. According to the participants, the Department of Education in Namibia has transformed societal demands into new regulations and procedures. However, participants perceived that even though the demands are meant to improve the quality of education in the country, in most cases teachers do an experience major extension of their responsibilities. According to Van Wyk, the extension associated with teachers' work in most cases led to the distraction from their normal activity, which is teaching. Van Wyk argues that he spent more time on administrative work rather than teaching itself.

Gitlin (2001) indicates that the intensification of teachers' work might lead to self-regulating tendencies among teachers. Gitlin (2001:3) argues that because of the intensity of teachers' work, teachers adopt mechanisms to adjust and manage the effect of these forces. For

instance, some teachers would have simplified tasks for their learners, while others may follow the recommended tasks and textbooks. In an effort to reduce the workload, some teachers may set menial tasks for learners to enable them to get administrative work done. This was indicated by Saima, who said *I use peer marking to reduce marking load. Instead of giving individual activities, I do give group tasks as they are easy to mark.* Gitlin (2001:3) argues that because of the legality and the functional significance of any curriculum, it is important to understand how the teachers experience the implementation of such a curriculum.

This study has shown that teachers spend most of their time on marking and planning rather than on teaching. During the interview Martha emphasised that, unlike with the H/IGCSE curriculum, in the NSSC Biology curriculum teachers are expected to do lesson planning, marking, create teaching aids, evaluate lessons and counsel learners with psychological problems, although they are not professional counsellors. Martha, who taught Biology for 18 years, noted that writing lesson plans is a waste of time since she does not follow lesson plans when she conducts her lessons. When asked why she writes lesson plans if she does not use them, Martha stated that *I only write lesson plans to ensure that I don't get misconduct from the school management. I only use the syllabus when I am teaching.* Similarly, Van Wyk stated that *all I need to deliver quality work to my learners is the syllabus, writing lesson plans are a waste of time.* When asked what they should do instead of writing lesson plans, Martha emphasised that instead of writing lesson plans they could better prepare teaching activities to ensure that quality teaching takes place in their classes.

All participants in this study, regardless of their age, gender and marital status, stated that they experience stress derived from the amount of time they devoted to their school work. Botha, who takes part in extramural activities at school as well as being a mother of one, stated that stress stems from the large number of daily tasks which overburdens them and as a result the work spills over into the afternoon and weekends. According to Botha, this interferes with her family time. Similarly, Botha, Martha, Selma and Saima, who are both mothers, stated that they often neglect their families in order to complete their school work. Martha, who is married jokingly, stated that *lack of time led to fewer bonding opportunities with my spouse, especially during the week. When I got home I am tired and go to bed earlier.* Apart from lack of time with families, Van Wyk, who is not married nor has a child, claimed that he finds it difficult to maintain his physical health because of the heavy workload. Van Wyk expressed little or no time for physical exercise due to overloaded schedules, which resulted in fatigue, irritability and increased stress. This was revealed during the interview when he (Van Wyk)

said; *I hardly go to gym during the week; neither do I watch my favourite television programs because I am busy marking.* It seems that all participants regardless of their age, gender and marital status are frustrated by the workload associated with the NSSC Biology curriculum.

During interviews all the participants emphasised that the high number of learners per class intensified their workload in the NSSC Biology curriculum. They said that they hardly finish marking learners' tasks during lessons. However, Saima developed a new strategy to mark learners' tasks. Because of the context in which Saima works, she resorts to peer marking in order to save teaching time. Saima argued that if she does individual marking during the lesson she can hardly finish the marking. Similarly, Selma only does sample marking to save teaching time. During the interview Saima stated that *I usually give group tasks as they are easy to mark.* Saima revealed that because of the overcrowded classes, she resorts to group assessment instead of individual assessment. According to Saima, group assessments reduce her workload since they are easy to mark. The responses of Selma and Saima might demonstrate how overcrowded classrooms may compromise the quality of assessment in the NSSC Biology curriculum.

However, the literature reviewed in Chapter 2 criticised the group assessment method (used by Saima) to assess learners. According to Beets et al. (2014:160), assessing learners in groups is problematic as in most cases teachers award the same grade to all learners in the group regardless of who contributed to the activity. According to Beets et al. (2014:160), this type of assessment is inconsistent and would not reveal learners' achievement. In addition, it frustrates learners who participated and could lead to the withdrawal of such learners.

Lastly, this study shows that teachers in the Erongo region of Namibia are being overburdened. According to the participants' descriptions, four of the teachers involved in this study are responsible for extramural activities either at school level, regional level or national level. Martha revealed that apart from teaching they are expected to attend to extramural activities. This was echoed by Botha, who pointed out that *as teachers we don't have enough time to rest. After school we are expected to train learners in different sport codes as well as accompany them to participate in different competitions during the weekends.*

4.8.8 TEACHERS' PERCEPTION OF CURRICULUM CHANGE

In this study there was consensus among the five participants on the necessity for curriculum change, which is in line with the literature reviewed. Participants emphasised that curriculum change is necessary at times because of changes in society, and changes in political and social

priorities. When asked how they experience curriculum change in Biology education, participants commented as follows:

Van Wyk: I think curriculum change is not an issue to debate but the manner in which the change is implemented. I feel curriculum change is required given the influence of globalisation on our day-to-day activities. However, curriculum change in Namibia is taking place so fast.

Botha: There is nothing bad about curriculum change. I hope all of us like changes. However, changing the curriculum without proper planning and training of personnel can cause disruption, insecurity and confusion among teachers.

Martha: Although change is good, too many changes become confusing and lead to unnecessary administration work. Continuous curriculum change may lead to disillusion and frustration among teachers.

Selma: Curriculum is changing so much but yet no improvement in terms of results. I feel there is something wrong with the curriculum change and implementation.

Saima: I don't have the problem with curriculum change but I feel as teachers we need to be consulted when changes are implemented.

All participants in this study are in support of curriculum change. However, they felt that changes that occur too frequently may lead to stress among curriculum implementers. Botha felt that changing the curriculum after every five years may cause disruption, insecurity and waste of resources. Similarly, Martha, who has taught in all three curriculums, stated that continuous curriculum change in the country resulted in frustration and confusion among teachers. In addition, Van Wyk said that *changing the curriculum without proper training of teachers lead to stress and resistance [to] the new curriculum among teachers*. These findings are in line with Jacobs, Vakalisa and Gawe (2004:314). According to Jacobs et al. (2004:314), curriculum change can arouse unhelpful emotions and despair; at the same time, if taken positively it can raise hope, and lead to growth and progress. All participants in this study said that the introduction of the NSSC Biology curriculum posed a range of challenges with regards to underlying assumptions and goals, the subject demarcations, the content, the teaching approach and the methods of assessment.

With regard to curriculum change in Biology from Cape Education Department to H/IGCSE and then to the current NSSC curriculum, Martha felt that changes are taking place too fast.

She argued that before teachers have acclimatised to one policy, they are expected to catch up with other new policies and move to another change. According to Martha, this may cause confusion among teachers. Apart from Van Wyk and Martha, all teachers pointed out that they are well versed with the old teaching method compared to the new teaching method associated with the NSSC Biology curriculum, which they are struggling to cope with because it is not working for either the teachers or the learners. Participants stated that they find it difficult to implement the learner-centred teaching approaches in their classes as required by the NSSC Biology curriculum. The findings of this study are in line with the literature reviewed in Chapter 2. Jacobs et al. (2004:314) point out that despite training which is meant to prepare teachers for changes in the curriculum, teachers always show signs of confusion and struggle in applying changes in their classrooms.

Saima felt that the NSSC Biology curriculum is too broad and prescriptive. According to Saima, the NSSC Biology curriculum put more focus on achieving outcomes and teachers may do any activities to achieve the outcomes. Saima argues that the focus on achieving outcomes may end up compromising the quality of teaching, since some teachers may adopt activities of poor quality in an attempt to reach the outcome. Similarly, Selma argues that she does not see curriculum change as a solution to poor performance in NSSC Biology. Selma, who is teaching in an under-resourced school, holds the view that the curriculum would have positive effect if adequate teaching resources were available. The study reveals that teachers seemed to be worried about the teaching resources required in the new curriculum, which affects the teaching of NSSC Biology. During the interview Martha made the point that *curriculum change is required; however, teaching materials should be made available to teachers to enable them to implement the curriculum effectively*. Martha added that curriculum change in Namibia has financial implications as additional teaching materials need to be bought, teachers need to be trained, and continuous support needed to be provided to enable proper implementation of the new curriculum.

Participants stated that they experience problems with the NSSC Biology curriculum because learners are not ready to take up responsibility for their own learning activities and work in groups as stipulated in the NSSC Biology curriculum. Based on the participants' responses, learners seemed to enjoy the lessons that are teacher-centred because that is how they are taught in some of the other subjects. Martha and Selma revealed that although the new university graduates seemed to have knowledge about the teaching method of the NSSC Biology curriculum, they claimed that they always faced criticism from peers who were trained to implement the H/IGCSE curriculum, which emphasised the lecture method as

opposed to the NSSC curriculum. According to Martha and Selma, that seems to be the reason why even the new university graduates switched to the teacher-centred approach. During the interviews conducted with Botha, Martha, Selma and Saima, participants indicated that they do not see any reason for them to change the way they teach, because they had not received adequate training to enable them to effectively implement learner-centred teaching approaches.

On the other hand, Martha argued that the new changes assumed that learners are ready for the changes, which did not seem to be the case with the learners in their classes. During the interview Saima stated that *we do not have clear understanding and knowledge of the new teaching approaches and that is the reason why we cannot even notice whether what we are doing is in accordance with the needs of new curriculum or not.*

During the interviews the teachers expressed the view that the new curriculum has intensified their workload, since there is too much administrative work and the newly developed policy demanded more practical activities in both Grades 11 and 12. According to Martha in the previous curriculum (H/IGCSE) more practical activities were only required in Grade 12.

Based on the participants' experiences, it seems that although the new curriculum was introduced to make a positive contribution to the teaching of Biology, there is a lot to be done to ensure that the desired results are achieved. Participants seemed not to have a clear understanding of the new curriculum and in some cases they seemed to be ignorant or hesitant to take responsibility for the implementation of the NSSC Biology curriculum. According to the participants, the issue of whether teachers should implement the new teaching approach left most of them feeling stranded, which affected the implementation of the NSSC Biology curriculum in most schools. This study indicates that teachers' perceptions and understanding of the new curriculum needs to be corrected to make sure that the new curriculum is well implemented. The research findings show that most schools lack the capacity and resources to support the new curriculum. Teachers seemed to be having some difficulties in fulfilling the needs of new curriculum because of the inadequacy of their teaching resources as well as the poor infrastructure in some schools.

4.9 CONCLUSION

This chapter presented an analysis and interpretation of the research findings based on the problem statement, research question and the literature reviewed in Chapter 2. Data constructed through semi-structured interviews revealed that the NSSC Biology curriculum was introduced to bring about an improvement in the teaching and learning of Biology. The research findings further indicated that although curriculum change is necessary from time to time, the implementation process is not problem-free and that this has major implications for teachers.

The challenges experienced by Grade 11 and 12 Biology teachers of the implementation of the NSSC Biology curriculum range from lack of or inadequate training, lack of support from subject advisors and heads of departments, lack of sufficient resources and overcrowded classrooms, to mention just a few. Although participants supported the notion of curriculum change, they indicated that the NSSC Biology curriculum intensified their workload. However, the participants expressed different views on the workload associated with the NSSC Biology curriculum. Some participants expressed the view that the NSSC Biology curriculum did not reduce their workload, especially with respect to assessment. Teachers articulated their frustration in implementing the NSSC Biology curriculum, because there is too much content per term. They further stated that in most cases they have to rush through the content to complete the syllabi, since the work is too much to cover in the term.

Apart from the workload, participants felt that the NSSC Biology curriculum has no clear guidelines on the assessment policy. The research findings revealed that while most of the participants experienced challenges with policies associated with the implementation of the NSSC Biology curriculum, there were some participants who did not experience challenges as far as the curriculum policies associated with the NSSC Biology curriculum are concerned. They emphasised that they adapted the curriculum policies in their teaching by incorporating their knowledge of the previous curriculum (H/IGCSE).

Lastly, participants emphasised that in the introduction of any curriculum, including NSSC Biology, educators as key players in the curriculum need to be supported in their roles if implementation is to be successful. According to the participants, support can take the form of curriculum training, the provision of necessary resources and monitoring. During the study the participants advocated that those who are entrusted with the responsibility of curriculum development should consider teachers' inputs in the development of the curriculum. Furthermore, teachers stated that law makers should stop assuming that curriculum implementation can translate directly into the classroom reality without teachers' inputs from

the planning and designing phases to its implementation. In addition, participants said that if law makers plan to change teachers' classroom practices, this should be done at the beginning of curriculum development. Therefore, participants in this study urged law makers to undertake institutional programmes that can improve the knowledge and understanding of teachers about the curriculum, which might change teachers' beliefs.

During the data-construction process, eight themes emerged that shaped the researcher's understanding of the lived experiences of the Grade 11 and 12 Biology teachers regarding the implementation of the NSSC Biology curriculum. The following chapter provides the conclusions to the research findings and presents a number of recommendations. The significance of the research findings is highlighted and opportunities for further research are indicated.

CHAPTER 5

CONCLUSION AND RECOMMENDATIONS

5.1 INTRODUCTION

Chapter 4 provided the analysis and interpretation of data constructed through semi-structured interviews. The units of analysis in this study were five Grade 11 and 12 NSSC Biology teachers from three high schools in the Erongo region of Namibia. Participants were purposively selected. Data were gathered through semi-structured interviews. Data were analysed and interpreted in response to the research question stated in Chapter 1. In this chapter the researcher steps back in order to take a broad view of the research process. This study was guided by the main research question: How do Grade 11 and 12 Biology teachers in the Erongo region of Namibia experience the implementation of the NSSC curriculum? The lived experiences of Grade 11 and 12 Biology teachers of the implementation of the NSSC curriculum were explored through the following interview questions:

- How do you experience curriculum training in NSSC Biology?
- How do you experience the support from the subject advisors and heads of departments on the implementation of NSSC Biology curriculum?
- How do you experience the implementation of assessment policy in the NSSC Biology curriculum?
- How do you experience teaching and learning in the NSSC Biology curriculum approach?
- How do you experience learners' attitudes toward the NSSC Biology curriculum?
- How do you experience the impact of the language policy on the implementation of the NSSC Biology curriculum?
- How do you experience the workload associated with the NSSC Biology curriculum?
- How do you experience curriculum change in Biology education since independence?

This chapter offers some conclusions based on the research findings. The conclusion reflects on whether the aim of the study and research question has been addressed by the outcomes of the study. Based on the research findings, recommendations are proposed to guide educational stakeholders to improve the implementation of the NSSC Biology curriculum. The chapter also reflects on the research process undertaken. Limitations of the study are considered and recommendations for future studies are offered.

5.2 MAIN FINDINGS

Although the findings of this study are not from all high schools in the region, the selected high schools represent the demography of the schools in the region. Therefore, there is a possibility that the challenges experienced by the five NSSC Biology teachers who took part in this study might be applied to all Biology teachers in the region. The research findings in this study revealed that Grade 11 and 12 Biology teachers who took part in this study do experience numerous challenges with regard to the implementation of the NSSC Biology curriculum. Among the challenges experienced by the NSSC Biology teachers are:

- Lack of training on curriculum implementation;
- Lack of support;
- Poor assessment policy guide;
- The deficient context of teaching and learning;
- Learners' attitudes toward NSSC Biology;
- The impact of the language policy on NSSC Biology curriculum;
- Intensification of teachers' work;
- Frequent curriculum change in Biology education.

5.2.1 LACK OF TRAINING ON CURRICULUM IMPLEMENTATION

The research findings revealed that teachers in the Erongo region of Namibia received little or no training at all after the implementation of the NSSC Biology curriculum in 2006. Those who attended the training pointed out that the training was inadequate and could not prepare them to implement the NSSC Biology curriculum effectively. Participants felt that training on the implementation of the NSSC Biology curriculum needed to address the challenges faced by teachers in a practical manner. During their interviews the participants stated that training on the implementation of NSSC Biology curriculum should be conducted more frequently, possibly twice a term. Participants argued that this would allow them to meet their subject advisors and discuss critical issues encountered during the implementation of the NSSC Biology curriculum.

During the interviews the Biology teachers stated that, unlike other subjects, the NSSC Biology curriculum requires teachers to use advanced technology such as microscopes, water-testing kits and DNA-sequencing kits. Participants argued that while these types of technologies are effective in the teaching of NSSC Biology, proper training of teachers on the use of these technologies is required to allow both learners and teachers to benefit from these types of technologies.

Furthermore, participants felt that the use of computers in Biology education improves learners' understanding as well as helping teachers to explain the concepts covered. However, they also noted that the use of computers in Biology education requires proper training on how to use them effectively. Participants pointed out that the term 'computer' in itself creates anxiety in most teachers because of their fear of the unknown. Therefore, teachers advocate for basic training on word-processing skills and computer proficiency. Participants felt that computer training would ease fear of the unknown among teachers. In addition, teachers argued that there is a need for them to be trained in the effective use of the internet. Teachers emphasised that training in the use of the internet would enable them to access valuable teaching resources. However, some participants noted that the use of computers as teaching aids does have the harmful potential of emphasising only a limited set of information-retrieval skills. Therefore, they argued that Biology teachers should be trained to enable them to manipulate and challenge information that exists outside the format of the internet.

5.2.2 LACK OF SUPPORT

Participants described the lack of support from the subject advisors and the school management team. The research findings show that lack of support from subject advisors and heads of departments caused confusion among teachers on how to implement the NSSC Biology curriculum effectively. Participants revealed that in most cases they are stressed, since there is no one to help them out when things get tough. Data constructed through semi-structured interviews showed that the only support teachers get from heads of departments is the provision of curriculum documents such as the scheme of work and the syllabi. Participants perceived a lack of clarity on the roles and responsibilities of the regional management team regarding the mediation and implementation of the NSSC Biology curriculum.

During the interviews the participants stated that the use of advanced technology such as computers in Biology education is extremely effective. It enables teachers to reach learners' multiple intelligences and teach them word processing, graphing and internet research skills, which are becoming increasingly important for today's learners. Apart from the use of computers, the participants emphasised the use of television programmes in Biology education. Participants argued that there are great films on biological topics available in local markets, which teachers can buy and use in classes if money made available. Furthermore, the participants outlined the importance of documentaries from television as well as some programmes on public television that can be tape-recorded and used in Biology classes. Participants argued that the advantage of using this technology in class is that learners are

able to learn from someone other than their teacher. However, participants stated that the use of advanced technology in Biology education is hindered by the lack of funds in most schools in the Erongo region. Participants emphasised the need for the Department of Education in the region to develop the long-term plans to raise more funds to acquire the appropriate technology in recognition of its potential benefits. Participants demanded that the Department of Education in the region to provide Biology teachers with computers, televisions, VCRs and overhead projectors as well as additional money for the schools to buy videos, CDs and laboratory equipment such as microscopes to ensure that quality education is taking place in the region. Lastly, the study revealed that most schools lack the basic equipment necessary for Biology experiments. The equipment not available includes chemicals, test tubes, slides, Petri dishes, microscopes, water- and DNA-testing kits, thermometers and filter papers, to mention just a few.

5.2.3 POOR ASSESSMENT POLICY GUIDE

During the interviews the participants stated that the assessment standards in the NSSC Biology curriculum are too generic and unclear in terms of what to assess and how it should be assessed. Participants argued that this led to varied and inconsistent assessment practices among schools and teachers in the region. Furthermore, participants claimed that lack of clarity and common understanding around assessment policy in NSSC Biology led to widespread misunderstanding among teachers and subject advisors.

Data constructed through interviews showed that unlike Grade 8 to 10 Life Sciences, Grade 11 and 12 Biology does not have a proper assessment policy guide. Participants argued that they find it difficult to assess learners since the assessment policy does not stipulate the assessment criteria. Participants agree with Beets (2014:169) and Boston (2002:2) that assessment plays a crucial role in relation to the curriculum and teaching. Teachers stated that school-based assessments allow them to measure learners' progress and to diagnose areas of inadequate progress to enable remediation and focused teaching. Furthermore, participants stated that school-based assessments provide crucial feedback to learners and parents about academic progress. However, teachers argued that because of the context in which they teach, they are forced to assess learners by means of summative assessments rather than formative assessments, as prescribed by the curriculum. Teachers stated that classes are too big, which means that a learner centred-approach is hardly feasible. Teachers added that the 45 minutes allocated to each period is not sufficient for effective teaching and assessment. Therefore, some teachers resorted to group assessments because this decreases marking time. However,

teachers felt that group assessments are problematic, since all learners are awarded equal marks regardless of who contributed to the task.

During the interviews some participants emphasised that as a result of the lack of clear guidelines on assessment policy, they resorted to the checklist approach to assessment, which they acknowledged as problematic. The study showed that teachers' attempts to implement the assessment policy are negatively affected by various external and internal social factors as well as by contextual school factors.

5.2.4 THE DEFICIENT CONTEXT OF TEACHING AND LEARNING

In line with the literature reviewed, the findings of this study indicate that teachers do experience problems in teaching the NSSC Biology curriculum. Participants perceived that the problems experienced with the implementation of NSSC Biology curriculum are the results of curriculum implementation without proper training of teachers as well as lack of necessary teaching materials. Teachers revealed that they did not receive adequate training that could have benefited them in the implementation of the NSSC Biology curriculum. These findings are in line with those of Moalosi and Molwane (2010). According to Moalosi and Malwane (2010:29), the challenges experienced by most South African teachers on the implementation of CAPS emanate from poor teacher training. As a result of the lack of proper training on the implementation of the curriculum, the participants found it difficult to implement the NSSC Biology curriculum.

Teachers stated that with the introduction of the NSSC Biology curriculum, new textbooks have to be published, resulting in schools spending large amounts of money in the procurement of relevant textbooks. It was noted during the interviews that although textbooks were published, not all learners could afford them due to financial constrain. Lack of textbooks among learners implies that teachers will spend most of their time on the preparation of learners' worksheets. However, teachers stated that the preparation of learners' worksheets was complicated by the lack of necessary facilities in under-resourced schools.

5.2.5 LEARNERS' ATTITUDES TOWARD NSSC BIOLOGY

Although data collected during the semi-structured interviews revealed that most learners in the Erongo region of Namibia have positive attitudes toward Biology as a school subject, participants noted that learners' attitudes toward NSSC Biology differ with age and gender. Teachers revealed that positive attitudes toward Biology are more popular among young learners and girls. It was noted during interviews that boys tended to have negative attitudes toward Biology as a school subject. Participants commented that the level of interest

decreases as learners get to Grade 12 compared to when they are in Grade 11. Teachers claimed that this could be influenced by the field of studies that learners wish to pursue after Grade 12.

5.2.6 THE IMPACT OF THE LANGUAGE POLICY ON NSSC BIOLOGY CURRICULUM

The literature reviewed in Chapter 2 showed that the language of instruction is crucial in the implementation of any curriculum. It allows teachers to convey curriculum contents to the learners. Participants in this study argued that the introduction of the language policy in which English is emphasised as the language of instruction in all public schools left the majority of teachers and learners marginalised. Teachers argued that they are confused as to what would be the appropriate language to use in classes to ensure that the subject content is successfully delivered, since most learners had low levels of English proficiency.

5.2.7 INTENSIFICATION OF TEACHERS' WORK

Data constructed in this study revealed that NSSC Biology teachers in the Erongo region of Namibia are overburdened. Participants stated they felt stressed as a result of the workload associated with the NSSC Biology curriculum. During the interviews participants pointed out that, unlike with H/IGCSE curriculum, teachers in the NSSC curriculum are expected to do planning, marking, create teaching aids, evaluate lessons, attend to extramural activities and offer counselling to learners with social problems, although they are not professional counsellors.

Participants in this study revealed that they always take school work home after school and over weekends. Participants stated that almost all of this work entails marking and preparation. They felt that school work interfered with their family time. In addition, the research findings indicate that teachers appear to be confronted with a situation whereby they feel greater responsibility for their work and yet have less control over the manner in which their work is conducted.

5.2.8 FREQUENT CURRICULUM CHANGE IN BIOLOGY EDUCATION

In this study there was consensus among the participants on the necessity for curriculum change, which is in line with the literature reviewed. Participants emphasised that curriculum change is necessary at times, because of the changes in society, and changing political and social priorities. However, participants claimed that changes that occur too frequently may lead to stress among curriculum implementers. Participants felt that changing the curriculum every five years may cause disruption, insecurity and waste of resources. Participants' arguments are in line with the findings of Jacobs, Vakalisa and Gawe (2004:314). According

to Jacobs et al. (2004:314) curriculum change can arouse negative emotions and despair; at the same time, if undertaken taken positively, it can raise hope, and promote growth and progress.

Data constructed in this study indicated that the introduction of the NSSC Biology curriculum posed a range of challenges to teachers with regards to its underlying assumptions and goals, the subject demarcations, the content, the teaching approach and the methods of assessment. The research findings of this study demonstrate its importance. In the next section the researcher will discuss the contribution of this study.

5.3 CONTRIBUTION OF THE STUDY

Since this empirical study considers issues of curriculum policy, theory, development, dissemination, implementation and practice at the classroom level, the findings of this study highlight the importance of teachers' lived experiences in the process of curriculum development as well as implementation. During the process of curriculum development, teachers are often taken for granted and viewed simply as skilled technicians who dutifully implement a given set of teaching techniques in accordance with the directives of a distant authority (Handal and Herrington, 2003). Furthermore, Handal and Herrington (2003) claimed that policy makers generally view teachers as technicians and do not include them in the curriculum development process.

This study could assist in making policymakers aware of the importance of including teachers in the process of curriculum policymaking. The findings of this study revealed that the most important persons in the implementation of any curriculum are the teachers. With their knowledge, experience and competencies teachers are central to any curriculum improvement effort, because they are responsible for introducing the curriculum within and outside of the classroom. Handal and Herrington (2003) stress the central role of the teachers in the development and implementation of the curriculum and call on policy makers to take teachers' attitudes and perceptions into account. Through this study policy makers could come to realise that teachers' roles should go beyond just implementing the curriculum. While curriculum specialists, administrators and outside education companies spend countless hours developing a curriculum, it is the teacher who knows best what the curriculum should look like (Handal & Herrington, 2003). After all, teachers work directly with the learners who are meant to benefit from the curriculum. This demonstrates that in order to develop a strong curriculum, teachers must play an integral role in every step of the process.

The literatures revealed that although large amounts of money are spent on the implementation of a new curriculum, several of these attempts at renewal often fail (Sarason, 1990). According to Sarason (1990), the main reason for the failure is the lack of understanding of the schools' culture by policy makers and curriculum developers. Hence, successful implementation of any curriculum requires understanding of the traditions, the roles and responsibilities of individuals in the school system. Therefore, policymakers and curriculum developers should identify, analyse and address any discrepancies between teachers' opinions and ideas offered for curriculum innovation (Sarason, 1990). The findings of this study help policy makers and curriculum developers to understand that curriculum implementation is an interaction between those who have created the programme and those who are charged with delivering it. This suggests that policymakers should no longer assume that curriculum implementation is a process that translates directly into classroom reality. Teachers are those who ultimately decide the fate of any educational enterprise. Consequently, teachers' attitudes, feelings and perceptions should not be devalued before the launching of any innovation.

Furthermore, the study showed that the provision of teaching resources to schools alone may not be sufficient for effective implementation of the NSSC Biology curriculum. The findings of this study show that teachers' schooling and university education do influence whether and how they use the resources provided. For example, even if all Biology teachers are to be provided with computers, there is a possibility that some teachers will not use them because of their fear of unknown. The study revealed that the term 'computer' itself can create anxiety among teachers. Therefore, it is important that teachers' confidence in the use of computers in education is restored through basic training in word-processing skills and computer proficiency. Computer training would ease fear of unknown among teachers. These findings demonstrate that it is not simply a matter of putting resources in place, but a matter of how teachers are supported to make use of the available resources that lead to the effective implementation of any curriculum. Teachers' training in the use of technologies in the implementation of the NSSC Biology curriculum is crucial to teachers in the Namibian context, given a history of poor education in the country. This study urges policy makers and curriculum developers to ensure that proper programmes are in place to equip teachers with the skills on how to use technologies in the teaching of Biology.

The research findings indicate that many teachers are reluctant to critique the NSSC Biology curriculum for fear of victimisation by their immediate supervisors. This study provided a platform for teachers to express their views and describe their experiences of the NSSC

Biology curriculum in a non-threatening environment. Finally, the research findings add value to the literature on how policymakers, curriculum developers and implementers should approach the process of curriculum reform at national, regional and school levels. The study has given credence to Aoki's (1999) call to legitimate the curriculum-as-lived by teachers alongside the curriculum-as-planned.

The study showed that teachers had some common experiences of the implementation of NSSC irrespective of school type and their biographies. However, there were nuanced differences in teachers' experiences based on the schools they taught, their own education and years of teaching experiences.

5.4 RECOMMENDATIONS FOR EDUCATIONAL STAKEHOLDERS

The main purpose of this study was to explore the lived experiences of Grade 11 and 12 Biology teachers of the implementation of NSSC curriculum in the Erongo region of Namibia. Based on the research findings and data interpretation a number of recommendations can be made.

Firstly, the research findings showed that most Biology teachers in the Erongo region are struggling with the implementation of the NSSC Biology curriculum because of lack of support. In this regard, the researcher recommends that the Department of Education in the region ensure that teachers are supported with a rich and satisfactory teaching environment. Given the finding that some teachers in the region lack important documents required for effective implementation of NSSC Biology curriculum, the researcher recommends that the Department of Education ensure that all teachers in the region are in possession of the latest subject syllabi, scheme of work and year plan, since some of the participants indicated that they are not in possession of the latest documents. Relevant teaching materials such as teachers' guide, teaching aids and textbooks must be made available to all teachers in the region to ensure that quality teaching is taking place in all high schools.

During the interviews it was established that some schools in the region are well resourced while others are under-resourced. Teachers argued that the unequal distribution of teaching resources among schools in the region promotes inequality of learning opportunities among learners, which may result in poor performance. In this regard the researcher recommends equal distribution of teaching resources among schools in the region. For example, while the region maintains the standards of well-resourced schools, under-resourced schools should be improved by increasing the budget allocation for stationery per candidate and ensuring that all schools receive their stationery supplies before the beginning of the school calendar. The

researcher further recommends that additional funds to be made available by the Department of Education in the region to support under-resourced schools. The research findings reveal the necessity for some schools' infrastructure to be repaired as well as organised in such a way that they provide an environment conducive to effective teaching.

Since teachers expressed the view that subject advisors are largely unavailable, the researcher recommends the need for subject advisors to visit schools more regularly in order to provide guidance and support to teachers on how to deliver specific concepts and skills, especially in problematic areas as stated by the teachers. In an attempt to motivate teachers to change their classroom practices as well as to change their beliefs about teaching, the researcher sees the need for the Department of Education in the region to encourage teachers reflect on their own classroom experience as a means to improve it. The research findings indicate that informing teachers about changes and directing them on how to enact the curriculum is not enough. Therefore, the researcher recommends teachers to be provided with hands-on experiences with the materials that they are required to use in their respective classes during lesson delivery.

Since the research findings indicated that most teachers in the region work in isolation, the researcher finds it necessary for the Department of Education to create platforms for teachers to meet their peers to discuss matters related to the subject. The researcher argues that sharing ideas with peers creates a supportive environment among teachers. This was also revealed in the literature reviewed in Chapter 2, which highlighted that peer support makes it easier for the teachers to find solutions to the problems they encounter, for example, in the delivery of the NSSC Biology curriculum. Furthermore, working together, sharing ideas and experiences helps teachers to implement the curriculum more effectively.

As the research findings showed, that there is lack of professional development programmes in the region; hence the researcher recommends the Department of Education to introduce professional development programmes in the region. This can be done through in-service training and workshops. Through professional development programmes, teachers can be motivated to further their studies and in the process they can identify diverse teaching approaches in their profession which would enable them to develop effective classroom strategies themselves. The research findings indicate the necessity for research on the different ways to implement the school curriculum in the region to support teachers' professional development as well as to allow teachers to effectively facilitate the implementation of the NSSC Biology curriculum. In order to improve teachers' curriculum

experience, the findings of this study as well as that of the previous studies conducted in different countries should be taken into account when new curricula are developed to ensure that the needs of teachers are addressed.

Secondly, the research findings of this study revealed that overloaded content, unavailability of teaching and learning materials, and overcrowded classrooms are some of the challenges that hinder effective teaching and learning of the NSSC Biology curriculum. Furthermore, the study revealed that teaching of the NSSC Biology curriculum is being compromised since teachers are struggling to teach large amounts of subject content in a short period of time. Based on these findings the researcher recommends that school managements and teachers develop a range of strategies to facilitate managing of the heavy workload associated with the NSSC Biology curriculum. These strategies could include prioritising tasks, minimising the number of meetings as well as utilising the meeting time more effectively. In an attempt to reduce teachers' workload, school management teams could use support staff for non-professional duties. Furthermore, the research findings revealed the need for the schools' management to improve teachers' professional development to increase efficiency as well as effectiveness, especially in problematic areas such as planning and marking of learners' tasks. In addition, the researcher recommends a review of NSSC Biology contents in order to reduce the content covered in both Grades 11 and 12. The researcher argues that reducing the subject content will help teachers to implement the curriculum more effectively, since the subject content can be covered within a given time without rushing through the content. Furthermore, the researcher recommends that more funds be made available to allow under-resourced schools to buy textbooks and photocopy machines.

Since all teachers involved in this study experienced overcrowded classrooms, the researcher recommends that the Ministry of Education ensures that more classrooms are built in the region to reduce the number of learners per class. This allows teachers to give one-on-one attention to all learners.

Thirdly, the findings of this study as well as the literature reviewed in Chapter 2 revealed that assessments are not only central to teaching and learning, but are an integral necessity for the optimal functioning of the whole educational system. According to Beets et al. (2014:169), the purpose of assessment in schools is to improve learning, inform teaching and help learners to achieve the highest standards they can, as well as to provide meaningful reports on learners' achievement, but not only for promotion purposes as teachers in this study revealed. Similarly, Boston (2002:2) argues that since the aim of assessment is to gain an understanding

of what learners can do in order to make responsive changes in teaching, teaching techniques such as teacher observation, questioning and classroom discussion have an important place alongside the analysis of tests and homework. Therefore, the researcher recommends that assessments should be designed in such a way that they provide teachers with information for self-evaluation as well as for the learners' self-evaluation. Assessment should be used to inform teachers about the areas of the syllabus where learners have difficulties. That is to say, assessments should be used to modify teaching methods and strategies in order to support the teaching process.

Furthermore, the researcher recommends that training on assessment policy be conducted in the region to educate teachers on the main purpose of assessment. The researcher argues that to measure the effectiveness of the assessment, teachers must ensure that the assessment tools used in assessment should assess what they are supposed to assess. In addition, the researcher recommends that the assessment method selected, the assessment tasks as well as associated criteria should measure learners' attainment of the intended learning outcomes. In addition, the researcher recommends that NSSC Biology teachers to be trained on how to design quality assessment tasks. The assessment tasks given to learners should be aligned to the curriculum objectives. In addition, the researcher recommends that the Department of Education in the country set up a clear assessment policy for Grades 11 and 12 to guide teachers on how to implement the assessment policy.

Fourthly, since the research findings indicate that most Biology teachers in the region experience challenges with the implementation of the NSSC Biology curriculum, the researcher recommends intensive teacher training on the implementation of the NSSC Biology curriculum. Based on the research findings, there is a need for all Biology teachers in the region to be adequately trained to allow them to acquire skills that enable them to develop and create learning opportunities that allow learners to explore different types of knowledge that develop the whole range of their thinking abilities. The researcher argues that proper training of teachers on the implementation of the NSSC Biology curriculum can help teachers to develop positive attitudes toward individual differences and enable them to utilise their differences to meet social and individual needs. The researcher recommends that teachers' training to be extended as well as reinforced through collaboration and peer support. This can be done through workshops and meetings where teachers can discuss solutions to the challenges they are experiencing in the implementation of the curriculum. Based on the research findings, the researcher recommends that subject advisors to be retrained so that they can help teachers in the implementation of the NSSC Biology curriculum.

Lastly, the research findings indicate that NSSC Biology teachers who took part in this study are using the traditional assessment method instead of alternative assessment methods. The study further showed that feedback on learners' performance is provided in the form of grades and usually done at the end of the term or year. Based on these findings, the researcher recommends that NSSC Biology teachers to familiarise themselves with different types of assessment. Furthermore, the researcher recommends the use of valid and reliable assessment methods in assessing learners in NSSC Biology. According to Bachman and Palmer (1996), valid assessment methods are those assessment procedures that provide accurate information about what is being measured. Bachman and Palmer (1996) further argue that reliable assessment methods are those assessment procedures that produce consistent results regardless of the situation or the context in which the assessment procedures are conducted.

5.5 RECOMMENDATIONS FOR FURTHER STUDIES

The research findings in this study raise numerous questions that could guide future studies in this area. Firstly, the NSSC Biology teachers who participated in this study represented only a small number of Biology teachers in the Erongo region of Namibia. Hence the findings of this study cannot be generalised because of its inherent phenomenological restrictions; therefore, the researcher recommends that future studies consider a much bigger sample of NSSC Biology teachers across the region to confirm the findings of this study. Given the findings of this study, the researcher further recommends that future studies explore the lived experiences of the learners in the NSSC Biology curriculum. The researcher argues that although learners engage with the NSSC Biology curriculum in a short period of time, investigating their lived experience might give insight into and understanding of the implementation of the NSSC Biology curriculum. In addition, the researcher argues that research findings on learners' lived experience of the implementation of NSSC Biology curriculum might provide teachers with a deeper insight on how they can approach the NSSC Biology curriculum. Lastly, the researcher recommends that further studies be conducted on the lived experiences of teachers teaching different subjects in the NSSC curriculum to establish whether the findings of this study are unique to Biology only or also apply to other subjects in the NSSC curriculum.

5.6 CONCLUSION

The aim of this study was to explore the lived experiences of Grade 11 and 12 Biology teachers of the implementation of the NSSC Biology curriculum. The research design for this study was characterised by its qualitative, exploratory, contextual and descriptive nature. The qualitative method was selected for this study because it helps the researcher to create a holistic picture of the phenomenon within the context in which it occurs (Huberman & Miles, 1994:6). The interpretive paradigm was adopted as the orientation most appropriate for this study, because it seeks to understand the lived experiences of teachers. Le Grange (2014:2) argues that the interpretive paradigm allows the researcher to understand the situation and make sense of the phenomenon within its social and cultural context. Although there are different approaches rooted in the interpretive paradigm, this study employs a phenomenological epistemology. Through phenomenological epistemology, the researcher observes, records and interprets “lived experiences” of teachers through clear and detailed descriptions (Magrini, 2012:1). Semi-structured interviews were used as the appropriate tools for data construction in this study.

According to Jacobs et al. (2004:314), curriculum change can arouse negative emotions and despair; at the same time if taken positively, it can raise hope, and promote growth and progress. In this study there was consensus among the participants on the necessity for curriculum change from Cape Education Department to H/IGCSE and most recently to NSSC. Participants stated that curriculum change is necessary at times to respond to changing societal, political and social priorities. Furthermore, participants claimed that curriculum change in Namibia is necessary to solve educational challenges that arise as a consequence of globalisation and the use of modern technologies. However, participants also felt that changing the curriculum too often may result in confusion and frustration among teachers.

The research findings in this study indicate that the implementation of the NSSC Biology curriculum is negatively influenced by social, contextual and capacitation factors. Furthermore, participants stated that lack of training, inadequate support, poor assessment policy guidelines, the language policy, workload and frequent curriculum changes are some of the challenges they experienced in the implementation of the Biology curriculum. In addition, the study shows that all teachers from under-resourced schools indicated lack of resources as the main challenge in the implementation of the NSSC Biology curriculum. In addition, participants are worried about lack of support from the Department of Education in the region. Teachers seemed not to be impressed by the implementation of the NSSC Biology curriculum in their schools. Teachers argued that the support they got from the subject

advisors is inadequate to implement the NSSC Biology curriculum effectively. According to the participants, a low level of proficiency in the language of teaching is another factor that hampers effective implementation of the NSSC Biology curriculum. However, participants argued that if the Department of Education would provide them with sound professional support in terms of training, resources and co-operation among all educational stakeholders in the region, the NSSC Biology curriculum would be implemented more effectively and efficiently.

During the interviews the participants noted the lack of teachers' involvement in the development of NSSC Biology curriculum. Uiseb (2009:45) claimed that teachers' involvement in curriculum development as well as adequate training and support can reduce teachers' frustrations, which may in turn result in more effective implementation of any curriculum. Uiseb (2009:45) points out that the successes of different organisations' reforms – in this case the schools – are based on the initiatives of individuals who are ready and able to translate the organisations' purpose into the reality. In addition, the literature reviewed in Chapter 2 showed that in schools the teachers are the key implementers of any curriculum reform and have an impact on the teaching process (Uiseb, 2009:45).

The research findings further show that the implementation of the NSSC Biology curriculum cannot be effective if teachers continue to encounter challenges that undermine their success. Teachers state that curriculum materials which are designed to support teaching should be designed in ways that bring changes in classroom practices that are consistent with a learner-centred approach. Participants in this study argued that if they were involved in the development of the NSSC Biology curriculum, they would be able to take ownership of the curriculum and as a result implement the curriculum as planned. Participants stated that imposing the curriculum on them tends to frustrate them to the extent that they will then fail to implement the curriculum as expected. Therefore, the researcher argues that there is a need for curriculum designers to involve teachers in the development, dissemination and implementation of any curriculum.

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APPENDIX A**GENERATING INITIAL CODE**

Profile	Data Item	Initial Codes
	1. Participants' experiences on curriculum training	
Van Wyk	I never received any training with regard to the implementation of NSSC Biology curriculum since I joined teaching profession two years back. It seems subject advisories do not know their work. Everyone is doing his/her own things at the school level.	Never attend training, everyone on his/her own
Botha	If they hardly offer a one-day workshop, how can they manage with the training? No training neither regular workshops taking place in this region regarding to the implementation of NSSC Biology curriculum.	Hardly offer a one-day workshop, No training neither regular workshops
Martha	I only attended the training in the first year of the implementation of NSSC Biology curriculum. However, I don't call it training but rather a workshop to familiarize teachers with the new changes that were made in the old curriculum (H/IGCSE). It was just an information sharing session.	Training only in the first year, rather call it a workshop, information sharing session
Selma	I attended two training on the implementation of NSSC Biology curriculum at my previous region. It helped me so much on how to approach the NSSC Biology curriculum. Since I moved to this region, I never attended any training. I am of the opinion that the Department of Education should make it compulsory for each region to offer regular training on the implementation of NSSC curriculum in general.	Two training at previous region only, never attended any training in this region
Saima	I don't understand why the curriculum keeps on changing while we don't receive any training on how to implement it. We need training on how to use modern technology to present our lessons. Changing the curriculum without proper teachers' training is a waste of tax payers' money.	We don't receive any training

	<p align="center">2. Participants' experiences on the support from the subject advisors and head of departments on the implementation of NSSC Biology curriculum.</p>	
Van Wyk	<p>I am on my own. The last time I met my subject advisor is when they were here with the regional team to inspect our administration files. She hardly visits our school. The head of department majored in Mathematics, she knows little about Biology.</p>	<p>I am on my own, head of department majored in Mathematics, she knows little about Biology</p>
Botha	<p>The only support I received so far from my subject advisor is the provision of curriculum documents such as syllabus and scheme of work. No materials or financial support from the regional office.</p>	<p>Syllabus and scheme of work, no materials or financial support</p>
Martha	<p>Things had changed so much since independence. During the Cape Educational Department curriculum advisors were more visible. They usually help us with regard to lesson planning, lesson presentation as well as with the subject content. Now I am on my own, I only get help from my friends in other regions when things get tough. The head of department knows nothing about Biology, he specialised in Mathematics and Physical science. I feel like a lost bird as far as support is concern.</p>	<p>on my own, I only get help from my friends in other regions</p>
Selma	<p>I rely heavily on my previous region for support. The last time I met the subject advisor was last year October 2014 when they came to inspect grade 10 continuous assessment marks. The head of department help here and there; however, lack of necessary teaching resources hinders the implementation of NSSC Biology curriculum.</p>	<p>Rely heavily on my previous region for support,</p>

Saima	<p>So far I never experience support in term of resources from the regional office. Our school is under resourced. No proper equipment like microscope. The head of department is hardly help since the departmental budget is not effective. The only thing the head of department ask from me is my preparation file every Monday to put up her signature. Often I used my money to buy chemicals to conduct practical activities.</p>	<p>Never experience, departmental budget is not effective, used my money to buy chemicals to conduct practical activities.</p>
<p>3. Participants’ experiences of the implementation of assessment policy in NSSC Biology curriculum</p>		
Van Wyk	<p>Since there is no proper assessment policy guide for grade 11 & 12, different teachers assess learners using different tools. Due to time constrain, I only use summative form of assessment. I hardly use formative assessment due to class size. I spend more time on practical activities.</p>	<p>no proper assessment policy guide, use summative form of assessment</p>
Botha	<p>Lack of proper assessment policy guide for grade 11 & 12 complicated the assessment process. Time constrains and subject contents are the reasons why I only assess learners through test and examination. I hardly give exercise and project due to class size.</p>	<p>Lack of proper assessment policy guide, assess learners through test and examination</p>
Martha	<p>I use formative continuous assessment such as homework and class activities to evaluate my learners’ performance. However, time and class size do compromise the quality of assessment given to learners. I hardly finish marking during the lesson. Learners are not taking assessment serious.</p>	<p>formative continuous assessment,</p>

Selma	<p>Although there is no proper assessment policy guide from the Department of Education, I did develop one at my school. I am of the opinion that assessment should be enforced among learners since they prepare learners for the final examination. However, overcrowding is another challenge facing teachers during assessment.</p>	no proper assessment policy guide
Saima	<p>The process of assessment is complicated by the number of learners in our classes. How can you conduct practical activities with 46 learners in a class? To make matters worse there is no proper laboratory at our school. I have resorted to summative form of assessment.</p>	summative form of assessment
<p>4. Participants ‘experiences on the teaching of NSSC Biology curriculum approach</p>		
Van Wyk	<p>Teaching is going well since our school is among the well-resourced schools in the region. My learners enjoy the teaching of Biology since it involves hands-on minds-on. Practical activities are conducted twice a week. However, high number of learners per class and the workloads are some of the challenges in the teaching of NSSC Biology.</p>	well-resourced schools, high number of learners per class
Botha	<p>Lack of training complicated teaching in NSSC Biology curriculum. I am still teaching in the old style (lecture method) due to high number of learners per class. The workload is too much, yet the time is too short.</p>	Lack of training complicated teaching, workload is too much, time is too short
Martha	<p>Teaching NSSC Biology curriculum is complicated by the lack of necessary teaching resources. The curriculum encourages activities that promote higher order thinking skills, yet there is no provision of teaching resources from the Department of Education.</p>	Lack of necessary teaching resources

Selma	<p>Teaching NSSC Biology is very much stressful as there is a lot of work. Classes are overcrowded. I always feel as lacking the time and resources to make a difference in my teaching. I hardly give each learner a one on one attention as my classes are too big.</p>	<p>Stressful, overcrowded, as lacking the time and resources</p>
Saima	<p>The use of English as the medium of instruction complicated the teaching process. Classes are too big. No resources to conduct practical activities. My work has been intensified.</p>	<p>use of English, practical activities</p>
<p>5. Participants' experiences on learners' attitudes toward NSSC Biology curriculum</p>		
Van Wyk	<p>The fact that we are dealing with living organisms in Biology lessons might be the reason why my learners love Biology so much. Learners do enjoy practical activities. Through practical activities learners discover the importance of Biology in their every day's life.</p>	<p>Living organisms, love Biology, discover the importance of Biology</p>
Botha	<p>Frequent use of living organisms in Biology lessons and practical works may be the reason why learners have a positive attitude toward NSSC Biology curriculum.</p>	<p>practical works</p>
Martha	<p>Interest in Biology should be developed for boys and older learners. Learners who have low interest in careers associated with Biology, their interests should be increased perhaps through contact with professional biologists.</p>	<p>Develop interest</p>
Selma	<p>Teachers' attitude toward learners and the subject had a significant role on learners' attitude toward the subject." My attitude toward Biology influenced most of my learners positively.</p>	<p>Teachers' attitudes toward subject and learners</p>
Saima	<p>Although my learners regard Biology as an easy and interesting subject, their interest is being influenced by the career they would like to pursue after completing grade 12.</p>	<p>Influenced by the career</p>

6. Participants' experiences on the impact of the language policy on the implementation of NSSC Biology curriculum		
Van Wyk	Mother tongues play major roles in communication. Coming from an Afrikaans speaking background make it difficult for me to explain some concept in English. It would be better if I can teach in Afrikaans compared to English.	Mother tongues play major roles in communication
Botha	English as a language of instruction is not a problem to me since English is my home language. However, I do experience problem with my learners since English is their second language. Textbooks are written in English and most learners have poor English proficiency.	English second language, learners have poor English proficiency.
Martha	My interest as a teacher is to use indigenous languages in the delivery of NSSC Biology curriculum. Explaining Biology concepts in English is not easy to some of us given our historical background. However, indigenous languages are confined to one tribe or nation.	Biology concept in English, historical background
Selma	English as a language of instruction is limited when it comes to explanation of Biological concepts. I hardly express myself very well in English compared to my mother tongue. However, I am in support of English as a language of instruction since it's a universal language.	Limited, explanation of Biology concept, indigenous language
Saima	The selection of English as a language of instruction over indigenous languages was a harsh decision in my view. Before independency in 1990, only a fraction of the population could read and write English compared to indigenous languages.	Indigenous language, harsh decision

7. Participants' experiences on the workload associated with the NSSC Biology curriculum		
Van Wyk	I don't call myself a teacher but rather an administrator. I do much work on administration level than teaching. I hardly visit the gym regularly due to marking."	Administration work, marking
Botha	Overcrowded classrooms intensify my workload. I hardly finish marking learner's exercise during school hours; I carry school work home if I want to finish on time. However, this interferes with my family time.	Intensification of work, interferes family
Martha	During the week I have to sacrifice my family time on school work. I hardly give attention to my family since I have to do marking as well as lesson preparation. I carry work home. I feel like neglecting my children and husband so much.	Sacrifice, marking, lesson preparation, neglecting
Selma	I hardly watch my favourite television programs a times because I am occupied by school work. We are spending more time on administration work than teaching. I am getting stressed a time due to workload.	Occupied, administration, stress, workload
Saima	I use peer marking to reduce marking load. Instead of giving individual activities, I do give group tasks as they are easy to mark. As a married lady and a mother of one I need more time with my family.	Peer marking, group tasks, need more time

8. Participants' experiences on curriculum changes in Biology education since independence		
Van Wyk	I think curriculum change is not an issue to debate but the manner in which the change is implemented. I feel curriculum change is required given the influence of globalization on our day to day activities. However, curriculum change in Namibia is taking place so fast.	the manner in which curriculum change, influence of globalization
Botha	There is nothing bad about curriculum change. I hope all of us like changes. However, changing the curriculum without proper planning and training of personnel can cause disruption, insecurity and confusion among teachers.	Nothing bad, planning and training, disruption
Martha	Although change is good, too many changes become confusing and lead to unnecessary administration work. Continuous curriculum change may lead to disillusion and frustration among teachers.	Change is good, confusion, disillusion, frustration
Selma	Curriculum is changing so much but yet no improvement in terms of results. I feel there is something wrong with the curriculum change and implementation.	Improvement, implementation
Saima	I don't have the problem with curriculum change but I feel as teachers we need to be consulted when changes are implemented.	Teachers' training, consultation

APPENDIX B

Mr. Aloovi Onesmus. A
Faculty of Education
Stellenbosch University
Private Bag X2
Matieland
South Africa
22 April 2015

The Directorate of Education
Erongo region
Private Bag 5024
Swakopmund
Dear Sir

RE: PERMISSION TO CONDUCT A RESEARCH IN ERONGO REGION (SWAKOPMUND CIRCUIT)

My name is Aloovi Onesmus a Master's (MEd) student at Stellenbosch University in South Africa. As part of my study I have to undertake a research project and for that reason I am here by requesting your office to grant me the permission to conduct this study in your region.

The study will involve four secondary schools in Swakopmund circuit. The secondary schools which will involve in this study are **A** High School, **B** High School, **C** Secondary School and **D** High School (names of schools are withheld for ethical reason). The researcher will spend a week at each school. As part of data construction interviews will be conducted with all grade 11 & 12 Biology teachers. All interviews will be conducted in such a way that it will not interfere with normal teaching and learning. Tape recorders will be used during interviews. This will help the researcher to keep all valuable information from the interviewees. The participants' identities, schools and that of the region will be protected during and after the study. Please do email me the proof of permission as soon as possible.

For any query please feel free to contact me at +27844015517 or by email: tousha3@hotmail.com

Your assistance in this regard is highly appreciated

Yours in Education

Aloovi. O.A

APPENDIX C

Mr. Aloovi Onesmus. A
Faculty of Education
Stellenbosch University
Private Bag X2
Matieland
South Africa
25 April 2015

The principal
School X
P.O.BOX X
Swakopmund

Dear sir/madam

RE: PERMISSION TO CONDUCT A RESEARCH AT YOUR SCHOOL

I Aloovi Onesmus Aloovi a master's (MEd) student at Stellenbosch University in South Africa here by seeking your permission to conduct a research at your respective school. The aim of the study is to explore the grade 11 & 12 lived experience of the implementation of NSSC Biology curriculum.

The study will involve all grade 11 & 12 Biology teachers at your school. Teachers involve in this study on a voluntary basis. As part of data construction, interviews will be conducted with all teachers involve in this study. All interviews will be conducted in such a way that it will not disrupt normal teaching and learning at school. Tape recorders will be used during interviews to help the researcher to keep all valuable information. Participants' identity and that of the school will be protected during and after the study. The outcome of this study will be a thesis.

For any query please feel free to contact me at +27844015517/+264813113619 or by email: tousha3@hotmail.com

Your assistance in this regard is highly appreciated.

Yours in Education

Aloovi. O.A

APPENDIX D



ERONGO REGIONAL COUNCIL

DIRECTORATE OF EDUCATION

Telephone : 064-4105101
Fax : 064-4105136
E-mail: dirsec@moe.org.na

Private Bag 5024
SWAKOPMUND

Enquiries : Mr. J. /Awaseb
Date : 05 May 2015

Mr. Aloovi Onesmus A.
Faculty of Education
Stellenbosch University
Private Bag X2
Matieland
South Africa

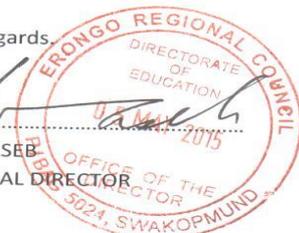
RE: PERMISSION TO CONDUCT A CASE STUDY IN SWAKOPMUND CIRCUIT

Your request to conduct a case study at our secondary schools has been approved with the following conditions:

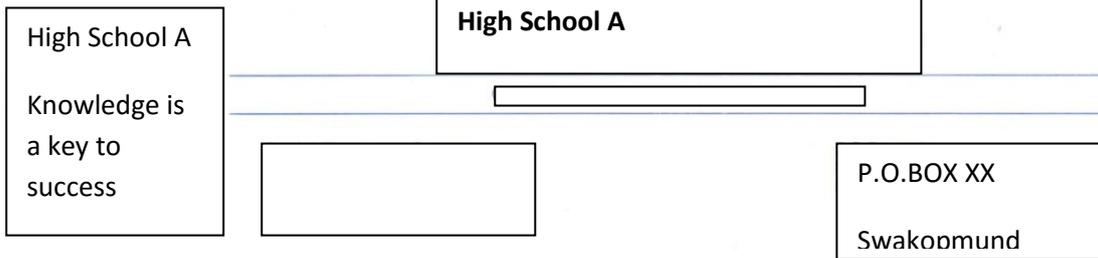
1. The case study should not interfere with the normal school hours.
2. All activities should be discussed with the school management and prior approval must be obtained from the principal.
3. Participation of teachers should be voluntary.

Kind regards,


.....
J. /AWASEB
REGIONAL DIRECTOR



APPENDIX E



Mr. Aloovi Onesmus. A
Faculty of Education
Stellenbosch University
Private Bag X2
Matieland
South Africa

22 April 2015

Dear Sir

Re: Permission to conduct a research at [redacted] High School

We hereby confirm receipt of your letter dated 14 April 2015. We would like to accept your request as to do the research in June and July 2015.

Regards

APPENDIX F



B High school

**Light of
knowledge**

B High School

XXX Street

P.O. Box xx

Tel. No: +264 64 xxxxx

Vineta

Fax. No: +264 64 xxxxx

Swakopmund

Email: xxxhighschool@gmail.com

Namibia

June 10, 2015

To: The Rector
Faculty of Education
Stellenbosch University
Private Bag X2
Matieland
South Africa

Attention: Mr. Aloovi Onesmus A.

RE: PERMISSION TO CONDUCT RESEARCH AT HIGH SCHOOL B

Your letter dated April 14, 2015 has reference.

Permission is hereby granted to Mr. Aloovi Onesmus to conduct research at our school. The Biology Teachers are informed and are in full support.

We trust that his stay here with us will be a success.

Yours in Education

MR. XXXXXXXX

APPENDIX G

Secondary School C

☎ 064-40xxxx

e-mail XXX@jy.na

Swakopmund, NAMIBIA

10 June 2015

Mr. Aloovi Onesmus. A

Faculty of Education

Stellenbosch University

Private Bag X2

Matieland

South Africa

Dear Mr. Onesmus,

PERMISSION TO CONDUCT RESEARCH

1. Your letter dated 14 April 2015 bears reference.
2. Permission is hereby granted to you to conduct the above mentioned research at our school during the period stated in your request letter.
3. However, care must be taken to ensure that your presence at the school, especially during working hours does not interrupt teaching and learning programs.

Wish you the best in your endeavours.

Kind regards,

.....

Mr. XXXX

PRINCIPAL

APPENDIX H



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Approval Notice

New Application

07-Dec-2015

Aloovi, Onesmus OA

Proposal #: DESC/Aloovi/Sep2015/1

Title: Grade 11 & 12 Biology teachers' lived experiences of the implementation of the Namibian Senior Secondary Certificate (NSSC) Curriculum

Dear Mr Onesmus Aloovi,

Your **New Application** received on **02-Sep-2015**, was reviewed

Please note the following information about your approved research proposal:

Proposal Approval Period: **22-Sep-2015 -21-Sep-2016**

Please take note of the general Investigator Responsibilities attached to this letter. You may commence with your research after complying fully with these guidelines.

Please remember to use your **proposal number (DESC/Aloovi/Sep2015/1)** on any documents or correspondence with the REC concerning your research proposal.

Please note that the REC has the prerogative and authority to ask further questions, seek additional information, require further modifications, or monitor the conduct of your research and the consent process.

Also note that a progress report should be submitted to the Committee before the approval period has expired if a continuation is required. The Committee will then consider the continuation of the project for a further year (if necessary).

This committee abides by the ethical norms and principles for research, established by the Declaration of Helsinki and the Guidelines for Ethical Research: Principles Structures and Processes 2004 (Department of Health). Annually a number of projects may be selected randomly for an external audit.

National Health Research Ethics Committee (NHREC) registration number REC-050411-032.

We wish you the best as you conduct your research.

If you have any questions or need further help, please contact the REC office at 218089183.

Included Documents:

Permission letter_ Namib high

Permission letter_Swakopmund

Interview questions

Research Proposal

Informed consent form

DESC Checklist form

Permission letter_Costal School

Permission letter_Directorate of Education

Sincerely,

Clarissa Graham

REC Coordinator

Research Ethics Committee: Human Research (Humanities)

Investigator Responsibilities

Protection of Human Research Participants

Some of the general responsibilities investigators have when conducting research involving human participants are listed below:

1. Conducting the Research. You are responsible for making sure that the research is conducted according to the REC approved research protocol. You are also responsible for the actions of all your co-investigators and research staff involved with this research. You must also ensure that the research is conducted within the standards of your field of research.
2. Participant Enrolment. You may not recruit or enrol participants prior to the REC approval date or after the expiration date of REC approval. All recruitment materials for any form of media must be approved by the REC prior to their use. If you need to recruit more participants than was noted in your REC approval letter, you must submit an amendment requesting an increase in the number of participants.
3. Informed Consent. You are responsible for obtaining and documenting effective informed consent using **only** the REC-approved consent documents, and for ensuring that no human participants are involved in research prior to obtaining their informed consent. Please give all

participants copies of the signed informed consent documents. Keep the originals in your secured research files for at least five (5) years.

4. Continuing Review. The REC must review and approve all REC-approved research proposals at intervals appropriate to the degree of risk but not less than once per year. There is **no grace period**. Prior to the date on which the REC approval of the research expires, **it is your responsibility to submit the continuing review report in a timely fashion to ensure a lapse in REC approval does not occur**. If REC approval of your research lapses, you must stop new participant enrolment, and contact the REC office immediately.

5. Amendments and Changes. If you wish to amend or change any aspect of your research (such as research design, interventions or procedures, number of participants, participant population, informed consent document, instruments, surveys or recruiting material), you must submit the amendment to the REC for review using the current Amendment Form. You **may not initiate** any amendments or changes to your research without first obtaining written REC review and approval. The only exception is when it is necessary to eliminate apparent immediate hazards to participants and the REC should be immediately informed of this necessity.

6. Adverse or Unanticipated Events. Any serious adverse events, participant complaints, and all unanticipated problems that involve risks to participants or others, as well as any research related injuries, occurring at this institution or at other performance sites must be reported to Malene Fouch within **five (5) days** of discovery of the incident. You must also report any instances of serious or continuing problems, or non-compliance with the RECs requirements for protecting human research participants. The only exception to this policy is that the death of a research participant must be reported in accordance with the Stellenbosch University Research Ethics Committee Standard Operating Procedures. All reportable events should be submitted to the REC using the Serious Adverse Event Report Form.

7. Research Record Keeping. You must keep the following research related records, at a minimum, in a secure location for a minimum of five years: the REC approved research proposal and all amendments; all informed consent documents; recruiting materials; continuing review reports; adverse or unanticipated events; and all correspondence from the REC

8. Provision of Counselling or emergency support. When a dedicated counsellor or psychologist provides support to a participant without prior REC review and approval, to the extent permitted by law, such activities will not be recognised as research nor the data used in support of research. Such cases should be indicated in the progress report or final report.

9. Final reports. When you have completed (no further participant enrolment, interactions, interventions or data analysis) or stopped work on your research, you must submit a Final Report to the REC.

10. On-Site Evaluations, Inspections, or Audits. If you are notified that your research will be reviewed or audited by the sponsor or any other external agency or any internal group, you must inform the REC immediately of the impending audit/evaluation.

APPENDIX I



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jou kennisvenoot • your knowledge partner

STELLENBOSCH UNIVERSITY CONSENT TO PARTICIPATE IN A RESEARCH

TITLE OF THE RESEARCH PROJECT:

Grade 11&12 Biology teachers' lived experiences of the implementation of the Namibian Senior Secondary Certificate (NSSC) curriculum

You are asked to participate in a research study conducted by: **Aloovi Onesmus. A [QUALIFICATIONS: BEd HONS in curriculum studies (Stellenbosch University); Specialized Diploma in Education (University of Namibia); High Education Diploma (University of Zimbabwe)]**, under the supervision of **Prof: LLL Le Grange** from the **Faculty of Education (Curriculum studies) at Stellenbosch University**. You were selected as a possible participant in this study since you are a grade 11&12 NSSC Biology teacher. I believe your knowledge and experiences of the implementation of grade 11&12 NSSC Biology curriculum will help me to obtain the information required for the completion of my study.

1. PURPOSE OF THE STUDY

The aim of this study is to explore the grade 11 & 12 Biology teachers' experience of the implementation of NSSC curriculum.

2. PROCEDURES

If you volunteer to participate in this study, I shall ask you to do the following things: You will be asked to participate in an interview session that will not last for more than 50 minutes. The interview session will be recorded to allow me to keep all important information. The aim of the interview is to enable me to gain insight knowledge about your lived experiences of the implementation of grade 11&12 NSSC Biology curriculum. The interview will be conducted during your free time and it consists of questions about:

- (a) Biography questions such as your age, career, the grades you are teaching, number of years in teaching profession and teacher/learners ratio
- (b) Interview question which include the following information:
 - Experience of the implementation of NSSC Biology curriculum
 - Experience on the attitudes of learners toward NSSC Biology curriculum

- Experience on the support from the subject adviser on NSSC Biology curriculum
- Experience of the workload associated with the NSSC Biology curriculum
- Experience on curriculum training in NSSC Biology
- Experience of the language policy on the implementation of NSSC Biology curriculum
- Experience of the implementation of assessment policy in NSSC Biology curriculum
- Experience on curriculum change in Biology education

3. POTENTIAL RISKS AND DISCOMFORTS

There are no risks associated with this study. Perhaps the interview process might make you feel a little bit uncomfortable at the beginning. However, there is no need to panic since my interaction with you shall be professional.

4. POTENTIAL BENEFITS TO SUBJECTS AND/OR TO SOCIETY

The literature reviewed reveals that so far no study has been conducted in Namibia concerning grade 11 & 12 Biology teachers' lived experiences of the implementation of NSSC curriculum. It also reveals that little has been done elsewhere on the lived experiences of teachers. Therefore, the findings of this study promise to:

- Make a meaningful contribution towards improving teachers' professional practice.
- Provide much needed baseline data for future studies in this area.
- Open up debate on the grade 11 & 12 Biology teachers' lived experiences of the NSSC curriculum in Namibia.
- Possibly provide insight into what contributes to poor performance in NSSC Biology.

5. PAYMENT FOR PARTICIPATION

No financial remuneration is involved for participating in this study.

6. CONFIDENTIALITY

Any information that is obtained in connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission or as required by law. Confidentiality will be maintained by means of use of pseudonyms when I refer to you in the thesis. The name of your school will not be disclosed.

The data will be kept in my private computer and in memory sticks which is only accessed by me. These will be located in a private room which is not shared with other students. The interviews will be transcribed immediately. The analysis of transcriptions shall be done as soon as I am done with all interviews. The development of a coding system will enable the data to be searched for regularities and patterns as well as for topics covered by the collected data. In the thesis some direct quotations from the interview might be written but I will ask for permission from you to use the quotations.

The information could be released to my supervisor should the need arises. He is fully aware of the University regulations concerning the protection of participant confidentiality. The information could be released only if I experience problems in analyzing the data. The information would not be released to anyone else other than my supervisor.

You have a right to review the tapes and we will have to negotiate on what you would like to be edited. I will be the only one with access to the tapes and they will be erased as soon as the research project is completed. The outputs of the research project will be a thesis.

7. PARTICIPATION AND WITHDRAWAL

You can choose whether to be in this study or not. If you volunteer to be in this study, you may withdraw at any time without consequences of any kind. You may also refuse to answer any questions you don't want to answer and still remain in the study. The investigator may withdraw you from this research if circumstances arise which warrant doing so. Should I feel that your cooperation is not adequate and compromises the data collection process, I will terminate your participation.

8. IDENTIFICATION OF INVESTIGATORS

If you have any questions or concerns about the research, please feel free to contact me Aloovi Onesmus.A at Stellenbosch University, Faculty of Education at Department of Curriculum Studies. Tel: +27844015517 or by email: tousha3@hotmail.com

9. RIGHTS OF RESEARCH SUBJECTS

You may withdraw your consent at any time and discontinue participation without penalty. You are not waiving any legal claims, rights or remedies because of your participation in this research study. If you have questions regarding your rights as a research subject, contact Ms Maléne Fouché [mfouche@sun.ac.za; 021 808 4622] at the Division for Research Development.

SIGNATURE OF RESEARCH SUBJECT OR LEGAL REPRESENTATIVE

The information above was described to me by Aloovi Onesmus in English and I am in command of this language or it was satisfactorily translated to me. I was given the opportunity to ask questions and these questions were answered to my satisfaction.

[I hereby consent voluntarily to participate in this study/I hereby consent that the subject/participant may participate in this study.] I have been given a copy of this form.

Name of Subject/Participant

Name of Legal Representative (if applicable)

Signature of Subject/Participant or Legal Representative

Date

SIGNATURE OF INVESTIGATOR

I declare that I explained the information given in this document to _____
[*name of the subject/participant*] and/or [his/her] representative _____
[*name of the representative*]. [*He/she*] was encouraged and given ample time to ask me any
questions. This conversation was conducted in [*Afrikaans/*English/*Xhosa/*other*] and [*no
translator was used/this conversation was translated into _____ by
_____*].

Signature of Investigator

Date:

APPENDIX J

INTERVIEW SCHEDULE FOR TEACHERS

Research topic: Grade 11 & 12 Biology teachers' lived experiences of the implementation of the Namibian Senior Secondary Certificate (NSSC) Curriculum.

Introduction: Good morning (*afternoon, evening*)

My name is Aloovi Onesmus Aloovi a Master's student at Stellenbosch University. As part of master's program, I am required to undertake a research project on a topic of my interest. This interview is conducted in order to better understand how do grade 11 & 12 Biology teachers in the Erongo region of Namibia experience the implementation of NSSC curriculum?

First of all I would like to assure you that all information you will provide to me will be kept in strictest confidence. No one except my supervisor will see your answers. Your information will be combined with answers I got from other four participants. Your participation is completely voluntary, and you do not have to answer any of the questions you do not want to answer. The interview will take about 40 to 50 minutes (or more, depending on the number follow up questions to be asked). I realize your time is valuable, and I will try to get through the questions as quickly as possible. The interview session will be recorded to help me to keep all relevant information. The interview questions are divided into two parts, namely; the biography questions and main interview questions.

Biographical questions

- (a) How old are you?
- (b) What grade are you teaching?
- (c) For how long have you been teaching biology?
- (d) What are your teaching qualifications?
- (e) What is the teacher/learner ratio at your school?
- (f) Why you have chosen teaching as your career?

Main interview question

- (g) How do you experience curriculum training in NSSC Biology?
- (h) How do you experience the support from the subject advisors and head of departments on the implementation of NSSC Biology curriculum?

- (i) How do you experience the implementation of assessment policy in NSSC Biology curriculum?
- (j) How do you experience teaching and learning in the NSSC Biology curriculum approach?
- (k) How do you experience learners' attitudes toward NSSC Biology curriculum?
- (l) How do you experience the impact of the language policy on the implementation of NSSC Biology curriculum?
- (m) How do you experience the workload associated with the NSSC Biology curriculum?
- (n) How do you experience curriculum change in Biology since independence?

APPENDIX K**ERONGO REGIONAL NSSC BIOLOGY RESULTS (%) IN NATIONAL EXAMINATION AS FROM 2007 TO 2015**

Years	Pass rate in %
2007	45
2008	55
2009	51
2010	56
2011	61
2012	63
2013	57
2014	63
2015	65

APPENDIX L

THE TABLE BELOW COMPARES THE NATIONAL EXAMINATION RESULTS (%) FOR ALL NSSC SUBJECTS OFFERED IN ERONGO REGION AS FROM 2007 – 2015.

SUBJECTS	2007	2008	2009	2010	2011	2012	2013	2014	2015
Accounting	65%	60%	66%	70%	63%	59%	70%	68%	70%
Afrikaans 2 nd language	69%	73%	80%	85%	79%	88%	92%	94%	92%
Art & design	88%	90%	85%	81%	92%	95%	93%	100%	98%
Biology	45%	55%	51%	56%	51%	63%	57%	63%	65%
Business studies	75%	77%	71%	68%	80%	85%	92%	75%	84%
Computer studies	88%	75%	100%	99%	94%	98%	100%	100%	99%
Design & technology	78%	90%	96%	100%	88.7%	94%	100%	98%	100%
Development studies	63%	67.2%	81.7%	70.6%	82%	90%	88.6%	87%	92.4%
Economics	59.2%	66.9%	77%	72%	89%	90.3%	88.7%	94%	95%
English 2 nd language	56%	61%	55.2%	57%	66%	70.8%	69%	77%	73.2%
Geography	60%	55.3%	59%	49%	62%	73%	69%	74%	80%
German 1 st language	99.2%	100%	98%	96%	100%	99%	100%	100%	99.5%
German foreign language	100%	100%	98%	99%	100%	100%	100%	100%	100%
History	68%	57%	72.6%	80%	71%	68%	69%	84%	79%
Home economics	99%	87%	98%	100%	94%	88%	100%	92%	97%
Khoekhoegowab 1 st language	55%	54.3%	59%	68%	54%	63%	66.4	69%	71%
Mathematics	50.6%	56%	53%	60%	66%	65%	68%	70%	77%
Office administration & keyboard	98%	94%	97.4%	100%	99.3%	95%	98%	99%	93%
Oshindonga 1 st language	66%	63%	72%	69.2%	82%	92%	88%	92%	89.6%

Otjiherero 1 st language	70%	68%	62%	71%	80%	76%	88%	74%	83%
Physical science	57%	60%	66%	61%	72%	76%	68%	72%	88%

APPENDIX M**POSITION OF ERONGO REGION HIGH SCHOOLS IN NATIONAL RANKING ORDER OF NSSC CURRICULUM NATIONAL EXAMINATION OUT OF 175 SCHOOLS IN THE COUNTRY 2009 TO 2015.**

SCHOOLS	2009	2010	2011	2012	2013	2014	2015
Duneside private	12	15	20	14	13	20	12
Walvis bay private	21	21	26	23	19	26	25
School C	93	105	92	135	84	131	140
Karibib private	47	48	50	24	18	17	33
School A	16	8	10	16	14	23	16
Westside high	31	36	34	36	26	27	34
Kolin Foundation	57	41	78	65	95	51	43
Kuisebmond ss	62	49	60	58	50	81	72
De Dunine	83	37	61	67	53	77	73
Duinesig ss	-	-	-	-	106	55	75
School B	116	63	70	72	75	67	118
S.I.!Gobs ss	133	97	98	101	131	104	92
Da Palm ss	101	70	122	89	42	129	93
Usakos ss					63	75	101
Martin Luther ss	58	35	77	64	55	62	112
Petrus !Ganeb	77	91	93	86	94	168	154
Swakopmund private	1	2	-	-	-	1	3

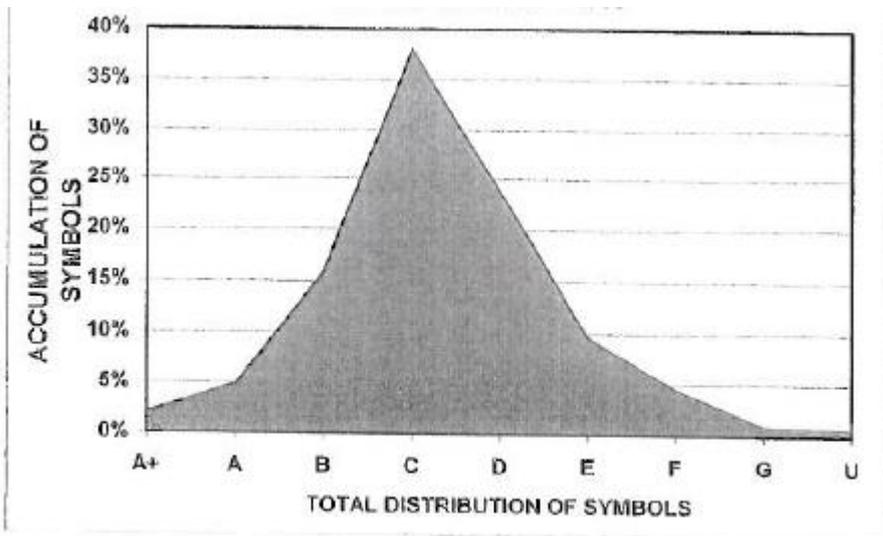
APPENDIX N

NSSC ORDINARY LEVEL RESULTS 2014

ERONGO REGION

SCHOOL A

SUBJECT	A+	A	B	C	D	E	F	G	U	TOTAL G	TOTAL L.	% G
Art and Design	0	1	2	1	0	0	0	0	0	4	4	100.0%
Afrikaans 1st Language	1	0	0	5	8	0	0	0	0	12	12	100.0%
Afrikaans 2nd Language	0	0	3	5	6	4	0	0	1	18	19	94.7%
Accounting	0	0	0	2	0	0	0	0	0	2	2	100.0%
Biology	0	3	10	14	17	8	6	2	1	60	61	98.4%
English 2nd Language	0	4	11	18	11	0	0	0	0	44	44	100.0%
Geography	0	1	3	19	9	5	3	0	0	40	40	100.0%
German 1st Language	0	0	0	1	0	0	0	0	0	1	1	100.0%
German Foreign L.	4	2	14	20	7	0	0	0	0	47	47	100.0%
Mathematics	1	2	3	34	12	7	3	0	0	62	62	100.0%
Physical Science	1	4	10	15	16	10	4	1	0	61	61	100.0%
TOTAL	7	17	56	134	84	34	16	3	2	351	353	
ACCUMULATIVE RESULT	2.0%	4.8%	15.9%	38.0%	23.8%	9.6%	4.5%	0.8%	0.6%			



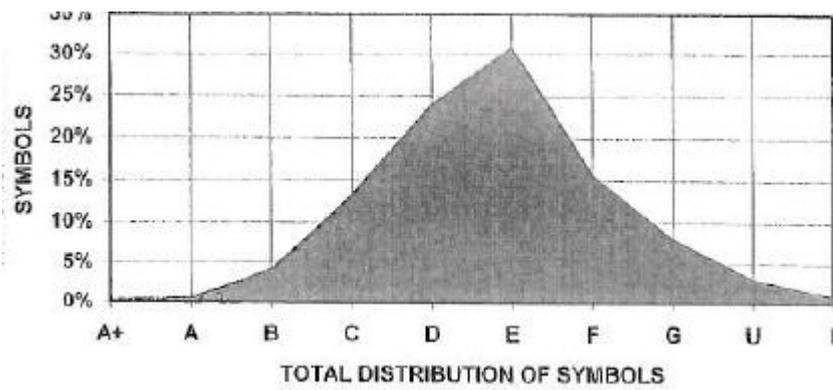
APPENDIX O

NSSC ORDINARY LEVEL RESULTS 2014

ERONGO REGION

SCHOOL B

SUBJECT	A+	A	B	C	D	E	F	G	U	I	TOTAL G	TOTAL L	% G
Afrikaans 2nd Language	0	0	0	4	11	8	1	0	2	0	24	26	92.3%
Biology	0	0	3	7	12	12	17	10	7	0	61	68	89.7%
Computer Studies	0	2	4	4	0	0	0	0	0	0	10	10	100.0%
Design & Technology	0	0	0	1	4	11	1	1	0	0	18	18	100.0%
Development Studies	0	0	1	3	6	14	8	2	0	0	34	34	100.0%
English 2nd Language	0	0	2	12	31	20	2	1	0	0	68	68	100.0%
Geography	0	0	2	5	15	29	15	2	0	0	68	68	100.0%
History	0	0	0	0	0	1	9	8	0	0	18	18	100.0%
Home Economics	0	0	2	8	1	0	0	0	0	0	11	11	100.0%
Mathematics	0	0	0	7	12	18	4	7	3	0	48	51	94.1%
Office Admin & Keyboard	0	0	0	0	0	0	0	0	0	3	0	3	0.0%
Physical Science	1	0	3	3	6	13	7	2	0	0	35	35	100.0%
TOTAL	1	2	17	54	98	126	64	33	12	3	395	410	
ACCUMULATIVE RESULT	0.2%	0.5%	4.1%	13.2%	23.9%	30.7%	15.6%	8.0%	3.0%	0.7%			



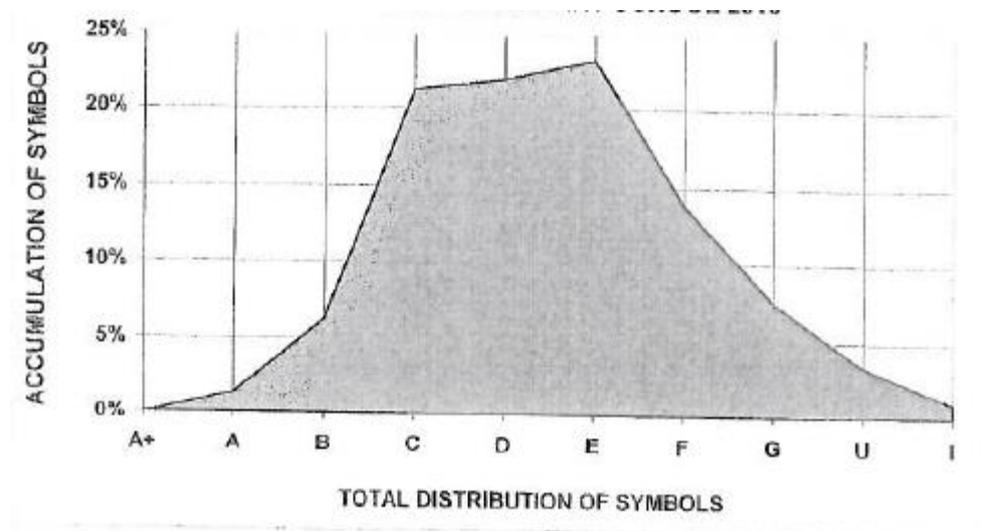
APPENDIX P

NSSC ORDINARY LEVEL RESULTS 2014

ERONGO REGION

SCHOOL C

SUBJECT	A+	A	B	C	D	E	F	G	U	I	TOTAL G	TOTAL L.	% G
Accounting	0	1	0	13	9	17	12	14	11	1	66	78	84.6%
Afrikaans 2nd Language	0	0	7	19	30	10	0	0	0	1	66	67	98.5%
Khoekhoegowab 1st L.	0	0	0	1	4	1	0	0	0	0	6	6	100.0%
Biology	0	1	3	10	13	20	15	16	5	1	76	84	92.9%
Business Studies	0	1	5	22	23	32	15	4	0	2	102	104	98.1%
Computer Studies	0	3	6	4	2	0	0	0	0	0	15	15	100.0%
Economics	0	0	3	15	13	13	5	2	2	1	51	54	94.4%
English 2nd Language	0	2	17	53	38	15	4	0	0	1	129	130	99.2%
Geography	0	2	3	10	13	33	16	7	2	1	84	87	96.6%
Mathematics	0	0	2	22	25	37	33	15	8	1	134	143	93.7%
Physical Science	0	2	7	11	16	19	18	6	0	0	79	79	100.0%
TOTAL	0	12	53	180	186	197	118	64	28	9	810	847	
ACCUMULATIVE RESULT	0.0%	1.4%	6.3%	21.3%	22.0%	23.3%	13.9%	7.6%	3.5%	1.1%			



APPENDIX Q

SCHOOL RULES FOR HIGH SCHOOL A

Rules relating to common courtesy and respect

Learners should:

1. Be punctual at all times
2. Not chew gum while on school premises or in school uniform
3. Take hands out of the pockets when addressing others
4. Not run, shout or misbehave in corridors
5. Not talk during announcements
6. Not use foul language
7. Obey reasonable instructions
8. Attend meetings or extramural activities regularly
9. Not pet, hold hands or “smooch” on the school grounds

Rules relating to rights and safety of others

It is forbidden to:

1. Possess, display or use weapons, matches and lighters
2. Smoke on school grounds or in school uniform or at school related functions
3. Use alcohol in school or in public
4. Use, possess or deal in drugs in school or out of school
5. Bully, intimidate or fight
6. Possess, display or deal in pornography or any material that is deemed inappropriate for teenagers by the school management
7. Steal
8. Cheat or lie
9. Sexually harass others
10. Move in the building during lessons without the written permission of a teacher.
11. Misbehave during school events
12. The use of cell phones or any electronic devices is prohibited.

It is forbidden to:

1. Be in a classroom during break as well as before and after school without the permission of a teacher.
2. Litter
3. Leave classrooms dirty and untidy
4. Vandalize school property in any way, e.g. by writing on desks or leaving dirty marks on walls
5. Write in or damage textbooks
6. Enter “out of bounds” rooms, e.g. staffroom, library, laboratories, without the permission of a teacher
7. Eat or drink in classrooms, the library, the hall or the foyer

Rules related to absenteeism

All learners must:

1. Attend school regularly
2. Attend all prescribed lessons and assemblies
3. Submit a written apology from parents / hostel superintendent for absence due to illness to the class teacher on the day he / she returns to school
4. Submit a doctor’s certificate for any absence of more than 3 days.

5. Submit a written request from parents to the principal for permission to be absent from school for any reason except illness beforehand
6. Learners absent from school during the examination should hand in a doctor's certificate.

If a pattern of absenteeism on Mondays and Fridays, or at the beginning and end of a term is noticed, a written warning may be issued and appropriate disciplinary action instituted.

General

1. No learner is to leave valuables or money unattended at any time during or after school.
2. Learners must carry their textbooks in bags designed for that purpose, i.e. backpacks and plastic bags are not permitted.
3. Radios, Walkman, tape recorders or any other electronic equipment may only be brought to school with the permission of a teacher.
4. Use of cell phones during lessons, assemblies, meetings or school functions is not permitted.
5. No notices / posters may be put up or handed out in school without permission of the principal.
6. The dress code, including hair and jewellery, must be adhered to at all times.
7. Classroom rules and examination rules must be complied with.
8. A learner who is found guilty of criminal offences in a court of law will be recommended for expulsion.

The school reserves the right to take action against any learner behaving in a manner which disturbs or impedes the function of the school as an educational institution or reflects adversely on the good reputation of the school.

APPENDIX R

ASSESSMENT OF PRACTICAL SKILLS AND ABILITIES



Republic of Namibia

**MINISTRY OF EDUCATION
NAMIBIA SENIOR SECONDARY CERTIFICATE (NSSC)**

**BIOLOGY SYLLABUS
ORDINARY LEVEL
SYLLABUS CODE: 4322
GRADES 11 - 12**

2006

**DEVELOPED IN COLLABORATION WITH
UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS**

1. ASSESSMENT OF PRACTICAL SKILLS AND ABILITIES

Scientific subjects are, by their nature, experimental. It is, accordingly, important that an assessment of a learner's knowledge and understanding of Biology should contain a component relating to practical work and experimental skills as identified by Assessment Objective C.

Paper 3 Applied Practical Skills

This paper is designed to test learner's familiarity with laboratory practical procedures.

Questions may be set requiring the learners to:

- Follow carefully a sequence of instructions;*
- Use familiar, and unfamiliar, techniques to record observations and make deductions from them;*
- Recall simple physiological experiments, e.g. tests for food substances, the use of a photometer and the use of hydrogen carbonate indicator, litmus and Universal Indicator paper;*
- Recognize, observe and record familiar, and unfamiliar, biological specimens;*
- Make a clear line drawing from a photograph (or other visual representation) of a Specimen, indicate the magnification of the drawing and label, as required;*
- Perform simple arithmetical calculations;*
- Apply knowledge and understanding to make appropriate conclusion from practical data Provided.*