Teachers' use of situated learning approaches to teach environmental topics in Natural Science and Health Education: A multi-case study of two Namibian teachers

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Abstract

This study focuses on the use of situated learning approaches in the teaching of environmental topics in Natural Science and Health Education (NSHED) and is the first of its kind in Namibia. Although situated learning approaches, as examples of learner-centred pedagogy, are advocated in national education policies, little empirical research has been conducted in Namibia into how situated learning approaches play out in classroom practice. Therefore, the goal of this study was to find out how NSHED teachers use situated learning approaches when teaching environmental topics. The study reviews the characteristics of situated learning theory and clarifies situated learning approaches as a form of learner-centred pedagogy which is actively promoted in the Namibian schooling system.

The study commences with a contextual profile of the communities around the two selected schools. This describes the socio-economic and social-ecological context in which learners are taught about environmental topics. The profile also describes the under-performance of the schools in recent national assessments, especially in relation to environmental topics in NSHED.

Drawing on data generated through document analysis, semi-structured interviews and classroom observations, the study concluded that:

1. NSHED teachers both knew about and wished to create an authentic context to enhance situated learning approaches. However, their understandings and applications of situated learning tended to be basic.
2. Teachers dominated the scaffolding process and their scaffolding strategies did not enable learners to increase independence in performing.

3. Despite the use of situated learning approaches, learners' engagement with lesson content was superficial, and the teachers did little to encourage deeper reflections or critical thinking.
4. The teachers appeared to use situated learning approaches to clarify subject content but not to encourage broader environmental understanding, action-taking and change.

Based on the research findings, the study recommends that situated learning approaches be integrated into pre- and in-service teacher training with the aim of enhancing teachers' understanding regarding the use of situated learning approaches in the teaching of environmental topics in NSHED.

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My final gratitude goes to my friends and family, my two children, Sinte and Kenned Junior, who were deprived of their mother's love and suffered due to my late nights of work and time away from home.

Table of Contents

LIST OF ACRONYMS

NSHED	Natural Science and Health Education
UNESCO	United Nations Educational, Scientific and Cultural Organisation
UN	United Nations
NEEN	Namibia Environmental Educators Network
NIED	Namibia Institute for Educational Development
Sida	Swedish International Development Agency
MEC	Ministry of Education and Culture
BETD	Basic Education Teachers Diploma
TERP	Teacher Education Reform Project
CPD	Continuous Professional Development
MCA	Millennium Challenge Account
ZPD	Zone of Proximal Development
SEEN	Supporting Environmental Education in Namibia
DESD	Decade of Education for Sustainable Development
ESD	Education for Sustainable Development
MoE	Ministry of Education
	Directorate of National Examination and Assessment

LIST OF APPENDICES

LIST OF FIGURES

LIST OF TABLES

CHAPTER 1: INTRODUCTION AND CONTEXT

1.1 Introduction

This environmental education research project investigated Natural Science and Health Education (NSHED) teachers' use of situated learning approaches when teaching environmental topics. The purpose of this chapter is to provide a background to the study, including an overview of social-ecological issues in Namibia, especially in the Zambezi region where this case study was conducted. The chapter then explains the rationale for this study and its potential significance. The research purpose and goals are also discussed and the chapter concludes with an overview of the chapters that follow.

1.2 Researcher's background and motivation

Since 2000, I have worked for the Ministry of Education in Namibia in the ranks of Teacher, Principal, Education Officer, Inspector of Education and currently as Deputy Director. This range of educational experience has influenced my interest in environmental education and classroom practices. As a classroom teacher, I was responsible for implementing the curriculum, mainly the subjects Biology and Geography where environmental education has been mainstreamed in Namibia since 2004. My job as a Principal required that I monitor the implementation of the curriculum at a school level as well as carry out some teaching functions. As a Principal, I also taught Social Studies and NSHED to Grades 5-7, also subjects in which environmental education is mainstreamed.

My interest in environmental education grew further when I became an Inspector of Education whose main task was to monitor the implementation of curriculum in schools and analyse results of tests, exams and standardised achievement tests.

Another factor that motivated me to conduct this study was the under-performance of learners in NSHED. In 2010, the Namibian Ministry of Education's Directorate of National

Examinations and Assessments (DNEA) introduced the Standardised Achievement Tests (SATs) in Grades 5 and 7 in English, Mathematics and NSHED. Both the baseline and follow-up tests conducted in 2010 and 2012 respectively, indicated that learners performed poorly in NSHED as they obtained below 60% at both national and regional levels. The learners' performance in the environmental component of NSHED was even poorer at both national and regional levels, especially on the topic of Soil Conservation for which learners scored an average of 34% (Ministry of Education [MoE], 2013). Furthermore, implementation of the situated learning approach, which is an example of learner-centred approaches, seems to be unexplored by Namibian teachers. I therefore, became interested in understanding how teachers are teaching these environmental topics, especially the ways in which they are (or perhaps are not) using situated learning approaches to make these environmental topics in the NSHED curriculum more relevant to their learners' lives.

1.3 Aim and potential significance of the study

My intention to gain more insight into how NSHED teachers implement situated learning approaches is reflected in the following research question which guided this study:

> **How do Natural Science and Health Education (NSHED) teachers use situated learning approaches in the teaching of environmental topics?**

Insights gained from this case study will be shared with the Regional Continuous Professional Development Coordinating Committee and National External Evaluators teams which I coordinate, with a view to providing guidance for the Senior Education Officers (advisory teachers) for NSHED throughout Namibia. Ultimately, insights from this research might be used by the Namibian Institute for Educational Development (NIED) and the University of Namibia's Continuous Professional Development Unit to inform a professional development course that focuses on the use of situated learning approaches in NSHED.

1.4 Context of the research

This investigation took place in the Zambezi region of Namibia which, until 2013, was known as the Caprivi region. The choice of the research site was based on proximity and financial consideration. It meant that I would carry out the research without leaving my duty station or incurring additional travelling costs.

This region, whose terrain is mostly made up of swamps, flood plains, wetlands and woodlands, is located approximately 1 200 kilometres north-east of the capital city, Windhoek. Figure 1.1 indicates the location of Namibia within Southern Africa and shows that the Zambezi region connects Namibia to four countries, namely Zambia, Botswana, Zimbabwe and Angola. It is politically divided into seven constituencies; these are Katima Mulilo Rural, Katima Mulilo Urban, Kabbe South, Kabbe North, Kongola and Sibbinda. The region is further divided into five educational circuits: Bukalo, Ngoma, Sibbinda, Cincimane and Katima Mulilo.

Ngoma circuit where the case study took place is situated in Katima Rural constituency and is one of five educational circuits in the Zambezi region. Figure 1.2 shows the location of the research site. This region is characterised by high rainfall averaging 600mm per year. The average temperatures range from 20˚C to 35˚C during summer and 7˚C to 28˚C in winter (Simalumba, 2011).

Figure 1.1: Location of Namibia and the Zambezi Region within Southern Africa

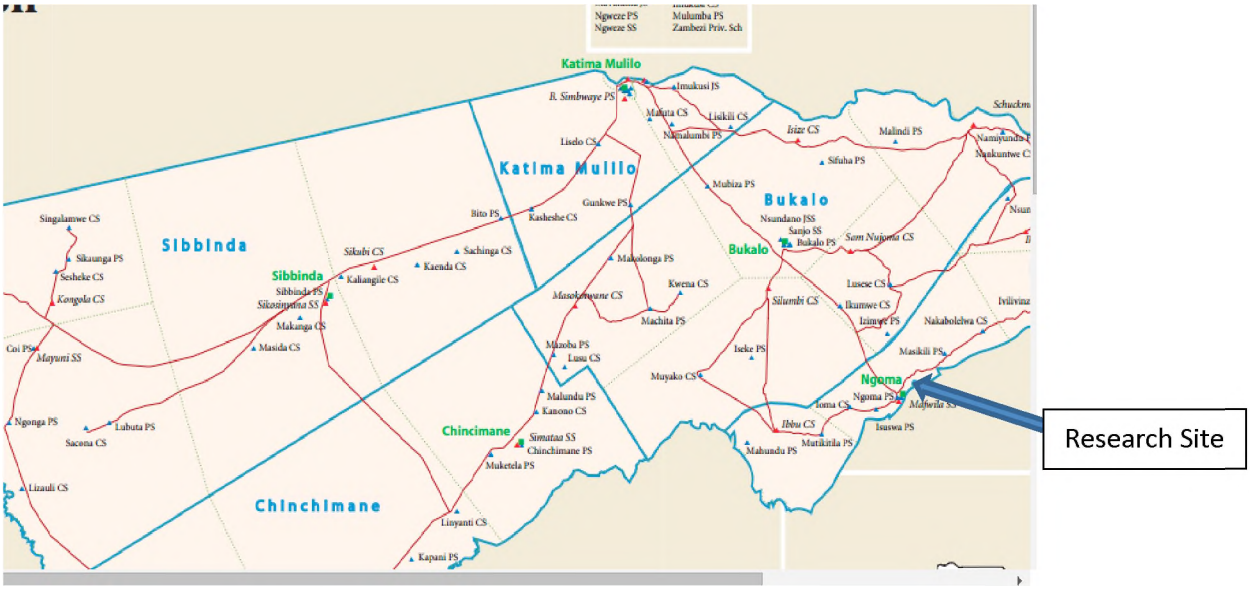

Figure 1.2: Map showing the location of the research site (MoE, 2007)

1.4.1 Overview of the Zambezi region

The Zambezi region has an approximate population of 90 596 and an annual growth rate of 1.3%. There are 46 497 women and 44 099 are men. The majority of the population (about 69%) live in rural areas. The Zambezi region's median age is 20. Median age is used to indicate the status of a population and ascertain whether it is mainly young or old. If a population has a median below 20, it is considered to be young, if it is between 20 and 29 it is intermediate and if it is 30 and above, it is an old population (Namibia, 2014). The majority of the population falls within the age group of 15-19 years which constitutes 55% of the total population. The age group 5-14 years (the participants in this study) is the second largest and constitutes 25% of the population (Namibia, 2014).

More than one third of the population in Zambezi region lives below the poverty line. The National and Housing Census carried out in 2011 indicated that, despite the reduction in the poverty index for Namibia from 37.9% to 26.9% in 2011, the Zambezi region's poverty index increased by 7.2% from 32.1% in 2001 to 39.3% in 2011 (Namibia, 2014). This may be attributed to the fact that 61% of the population is economically active of which 62.3% of this group is employed, meaning the most dominant source of income in the Zambezi region is from wages and salaries. The unemployment rate increased from 17% in 2001 to 38% in 2011, thus only 68% of the total population in Zambezi is employed. The third highest economic activity is farming with most farmers engaged in crop and livestock farming.

In the Zambezi region, 18% of the total population is in school and, despite the fact that only 6% of the population has completed tertiary education, the literacy rate stands at 78%. This means the majority of the population is able to: "read and write with understanding in any language" (Namibia, 2014, p. 21).

Most households reside in houses with walls made from sticks, with mud clay or cow dung. Most (82.8%) households use wood and charcoal from wood as the main source for cooking and candles are the main source for lighting (Namibia, 2014).

1.4.2 Social-ecological challenges in Zambezi region

Namibia faces a range of social-ecological challenges. To understand the term social-ecological challenges, one must first recognise that humans live and interact with the natural environment, creating a 'social-ecological system'. This system emphasises "the integration of humans and nature or linkages between social and ecological systems" (Plummer, 2010, p. 97). This interaction between ecosystems and human societies can be beneficial or problematic to either or both parties.

Having established that there is an interaction between humans and the environment, I now proceed to define social-ecological challenges as environmental problems which are *unintentionally* caused by human actions on the environment (Keyburz-Graber, Wolfensberger & Hoferkut, 2003). To explore this definition, I will reflect on the Namibian context where 82.2% of the population uses wood for cooking, probably because it is affordable, easily accessible and culturally familiar. However, burning wood releases carbon dioxide (CO_2), oxides of nitrogen (NOx), volatile organic compounds (VOCs) and particulate matter as it burns, resulting in air pollution, including indoor pollution. People who burn wood for cooking do not deliberately cause air pollution; it is a negative consequence of their inter-relationship with the natural environment.

In Namibia, social-ecological challenges may include: land degradation; water scarcity; pollution; deforestation; potential loss of biodiversity; and climate change. Some of these are a result of human interactions with the environment. As reported by Kamwi (2015, p. 4):

> The high reliance of the Namibian population on the natural environment for their livelihood and the existing fragility of our environment make Namibia one of the most vulnerable countries to climate change impacts. In recent years we have encountered severe floods events, the worst drought for over 30 years in 2013, while the current concerns over water shortage are a taster for what we can expect as climate change starts to bite.

In Namibia, climate change has resulted in increased temperatures, unpredictable rainfall patterns, and increased frequency of floods and drought. The Zambezi region has been prone to both floods and drought. This has resulted in the loss of land productivity, reduced production of crops, and low quality of life, ultimately negatively affecting income and deepening poverty (Sikuka, 2012). This may also be a contributing factor to the high levels of poverty in the Zambezi region where farming is the third largest economic activity (Namibia, 2014).

Climate change is not only a concern for Zambezi region; it is a national concern. In the years between 2000 and 2010, Namibia received millions of Namibian dollars to support climate change issues and around 2011 some environmental education school clubs received grants from the Africa Adaptation Programme for Namibia (AAP-Namibia) to address climate change (Sikuka, 2012). In addition, Namibia has achieved some milestones in addressing climate change. Table 1.4 below highlights the key policy milestones in responding to climate change.

Table 1.1: Key policy milestones in responding to climate change in Namibia (adapted from Kamwi, 2015, p. 6)

Year	Policy response to climate change
1995	Namibia ratified the United Nations Framework Convention (UNFCC)
2001	Namibia established the Climate Change Committee (NCCC)
2011	Namibia developed a National Climate Change Policy
2012	Namibia developed a Disaster Risk Management Act
2014	Namibia developed a National Climate Change Strategy and Action Plan, 2013-2020 (NCCSAP)

Most people in the Zambezi region, particularly in rural areas, depend on land for their livelihood. They cut down trees and clear land to cultivate crops, fence their kraals, and build their traditional homes, fuel wood and illegal felling of trees. In some cases, homesteads are built entirely of wood harvested from local indigenous trees. Deforestation has been a concern over a long time, even prior to Namibia's independence in 1990, and continued to be a concern after independence. In 2003, experts met in Windhoek to discuss mismanagement of forest resources (Tjaronda, 2003). In 2012, deforestation was reported as one of the key environmental threats in Namibia (Poolman, 2012). Deforestation can also lead to desertification, land degradation and potential loss of biodiversity.

Waste management and disposal is also one of the socio-ecological challenges experienced by the inhabitants of Zambezi region. Waste in the Zambezi region is mostly collected for disposal in urban areas whereas in rural areas the most common method of waste disposal is through burning of garbage. This, coupled with the fact that 82.8% of households in the Zambezi region use wood and charcoal as a main source of cooking fuel has huge implications for air pollution in the region (Namibia, 2014). Furthermore, research on the state of the environment on waste management and pollution control in Namibia conducted in 2001 revealed that:

> The capacity to manage and control waste and pollution in Namibia is limited. Waste management is properly implemented in urban areas and municipal areas; whereas in rural areas, it is carried out by individuals who most often just burn the waste to reduce its volume and present disposal by wind. ... Zambezi region produced approximately 26 000 tons of waste per annum (Namibia, 2001, p. 1).

Indoor air pollution is another social-ecological challenge experienced in Zambezi region given that most households in Zambezi region (82.8%) use wood as a source of energy for cooking. A report compiled by the World Health Organisation in 2012 reveals that, "children living in households that use wood/straw for cooking fuel are more likely to exhibit symptoms of Acute Respiratory Infections (ARI) than children living in households with other sources of cooking fuel" (Namibia, 2012). Worldwide, indoor air pollution is "responsible for nearly two million premature deaths annually, including 900 000 deaths in children under the age of five" (UNEP, 2012, p. 3). In Namibia, acute respiratory infections which are a result of indoor pollution account for 29% of the deaths (Namibia, 2012).

To address these social-ecological challenges, Namibia has developed legislation in line with international conventions on environmental issues and sustainable development. This legislation has led to the integration of environmental education in the National Curriculum by the Ministry of Education in Namibia and ultimately the inclusion of environmental topics in the NSHED syllabi. The vision for environmental education in Namibia is as a "...cross-curricular orientation to learning that emphasises all aspects of human activity in order to develop in learners a sustainable approach and use of resources" (Burt, 2003, p. 3). It is for this reason that approaches such as situated learning approaches are needed in Namibian schools. Situated learning involves situated, engaged, reflective learning, the promotion of active participation and encouragement for learners to come up with innovative ideas and solutions

to mitigate the impact of these challenges. The situated learning approach will be defined and discussed in greater detail in Section 2.5.1.

1.4.3 Challenges and priorities in teaching NSHED in the Zambezi region

The Natural Science and Health Education curriculum is designed as a three-year Upper Primary course from Grades 5-7 (NIED, 2006, p. 2). It integrates Natural Science, social, economic, physical, mathematical and technological learning areas. The NSHED syllabi comprises of 48 topics of which 27 (56.2%) are for science, 17 (35.4%) are health education and four (8.3%) are environmental topics (NIED, 2006).

After Namibia attained independence in 1990, NSHED was introduced as part of the curriculum reform in the early 1990s by the In-service Training and Assistance for Namibia (INSTANT) project which was funded by the European Union and the Life Science Project funded by the Danish. These funders partnered with the Namibian government and more specifically the Ministry of Education to improve the teaching of Science and Mathematics Education. These subjects had been neglected among the black population under the apartheid system (Ottevanger, 2001).

NSHED is one of the carrier subjects into which environmental topics are integrated. In 2003, the organisation, the Danish-funded programme called Support for Environmental Education in Namibia (SEEN) conducted an audit of the Namibian curriculum for environmental education with the aim of:

- Identifying environmental themes through which topics/issues of priority importance in Namibia may be taught.
- Auditing curriculum using this thematic approach to identify presence of themes in each subject, within each phase level.
- Analysing 'conceptual maps' according to highlighted topics, location and progression. (Burt, 2003, p. iii)

The following themes were identified: natural resources, poverty and inequality, development and environment, society and governance and globalisation. After the identification of the themes, a mapping exercise was carried out. This mapping exercise aimed at identifying carrier subjects where each theme was taught. NSHED was identified as one of the subjects where the environmental themes 'Natural Resources' and 'Health and Environment' were dominant (Burt, 2003).

The inclusion of science and environmental education content in the NSHED syllabi came with new requirements and expectations for teachers. These requirements included, amongst others, correct interpretation of syllabi, use of appropriate teaching methods, understanding of content, understanding of learners and their needs. These requirements seem to have not been fully met as the SATs results for 2010 recorded poor performance in NSHED, especially in the environmental topics (Nambia. MoE, 2010).

1.5 Overview of the study

Chapter 2 reviews literature relevant to the study's context and aims as well as its theoretical framework. It begins by briefly reviewing the history of environmental education in Namibia, tracing how both international and national regulatory frameworks have led to the introduction of environmental education in Namibia. The chapter then discusses how teacher training and development have evolved in Namibia, as well as the emergence of teaching approaches in pre- and post-independence Namibia. Thereafter, the chapter discusses situated learning approaches including the theoretical underpinnings, definitions, characteristics, and limitations. The section also briefly highlights strategies for classroom teachers wanting to design situated learning processes. The chapter then discusses the characteristics of learner-centred teaching and argues that situated learning approaches fall within the broad category of learner-centred

methodologies. The chapter concludes by considering some limitations of using situated learning approaches at the micro-level, the classroom.

Chapter 3 is the methodology chapter that outlines the research design decisions taken to investigate how NSHED teachers use situated learning approaches to teach environmental topics. This chapter includes an account of how interviews and classroom observations were used to generate qualitative data about the teachers' use of situated learning approaches. The chapter further highlights data management strategies to safeguard against loss, as well as a detailed account of how data was analysed. The chapter concludes with a description of steps taken to ensure that the study was conducted in an ethical manner and to ensure that research findings were trustworthy.

Chapter 4 presents the case study data. It narrates how NSHED teachers used situated learning approaches when teaching environmental topics. Photographs and direct quotations from the transcribed interviews and audio-visual recordings of classroom observations are used in this chapter to enhance the quality of the descriptions.

Chapter 5 presents a theoretically-informed discussion of the case study data with a view to answering the research question: "How do NSHED teachers use situated learning approaches in the teaching of environmental topics?" Four analytical statements were developed which critically reflect on how NSHED teachers used the situated learning approaches when teaching environmental topics. The analytical statements are:

- *Analytical statement 1*: The teachers know about and wish to create an authentic context to enhance situated learning approaches. However, their understandings and applications of situated learning tend to be basic.

- *Analytical statement 2*: Teachers dominated the scaffolding process and their scaffolding strategies did not enable learners to increase independence in performing tasks.
- *Analytical statement 3*: Despite the use of situated learning approaches, learners' engagement with lesson content was superficial, and the teachers did little to encourage deeper reflections or critical thinking.
- *Analytical statement 4*: The teachers appeared to use situated learning approaches to clarify subject content but not to encourage broader environmental understanding, action-taking and change.

Chapter 6 presents a conclusion to the research report, as well as my recommendations. I make recommendations to the Ministry of Education, Arts and Culture to integrate Situated Learning Approaches in pre- and in-service training to enhance teachers' understanding of situated learning approaches and enhance teachers' understandings of what creating an authentic context entails. I further recommend that teachers should design lessons on environmental topics with the intention of encouraging learners to take action and bring positive social-ecological change in their context.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

This chapter reviews literature relevant to the study's context and aims as well as its theoretical framework. It begins by briefly reviewing the history of environmental education in Namibia, tracing how both international and national regulatory frameworks have led to the introduction of environmental education in Namibia. The chapter then discusses how teacher training and development have evolved in Namibia, as well as the emergence of teaching approaches in pre- and post-independence Namibia. Thereafter, the chapter discusses situated learning approaches including the theoretical underpinnings, definitions, characteristics, and limitations. The chapter also briefly highlights strategies for classroom teachers wanting to design situated learning processes. The chapter then discusses the characteristics of learner-centred teaching and argues that situated learning approaches fall within the broad category of learner-centred methodologies. The chapter concludes by considering some limitations of using situated learning approaches at the micro level, the classroom.

2.2 Environmental education in Namibia

2.2.1 Background of environmental education in Namibia

In this section, I set the scene for the reader by highlighting events which led to the inclusion of environmental topics in the NSHED curriculum. In my discussion, I will refer to international and national legislation and policies highlighting their influence in the inclusion of environmental education in the Namibian curriculum.

Namibia has environmental clauses entrenched in its post-independence Constitution. For example, Article 95 (l) states that:

> The State shall actively promote and maintain the welfare of the people by adopting policies aimed at the maintenance of ecosystems, essential ecological processes and biological diversity of Namibia and utilization of living natural resources on a sustainable basis for the benefit of all Namibians, both present and future. (Namibia, 1990)

Article 91(c) gives the Ombudsman powers to deal with environmental issues by stating that his duty is: "to investigate complaints concerning the over-utilization of living natural resources, the irrational exploitation of non-renewable resources, the degradation and destruction of the ecosystem and failure to protect the beauty and character of Namibia" (Namibia, 1990).

The Constitution has guided the development of a number of national policies which have addressed environmental education or environmental sustainability in one way or another. According to Namibia's *Vision 2030*, "We shall embrace the idea of sustainable development, the type of development that meets the needs of the present, without limiting the ability of future generations to meet their own needs" (Namibia, 1990, p. 11). This idea is also evident in the First and Second National Development Plans for Namibia where sustainable development is identified as a crucial strategy for development. The legislative documents as discussed above led to the integration of environmental topics into the broad curricula and in particular, the NSHED curricula.

In 1991, the Namibian Environmental Education Policy, which was coordinated by the Ministry of Environment and Tourism, was developed through consultations with stakeholders from various ministries, non-governmental organisations, and donor communities and private individuals (Namibian Environmental Educators Network [NEEN], 2004). This national policy laid the foundation for the introduction of environmental education into the school curriculum

for the first time. These developments were spearheaded by 'Enviroteach', an environmental education Programme initiated by the Desert Research Foundation of Namibia, in collaboration with the Namibian Institute for Educational Development (NIED) which is responsible for curriculum reform and teacher professional development (Enviroteach, 1998). Currently, the Ministry of Education promotes environment-oriented learning through the National Curriculum for Basic Education which was designed and developed by the Namibian Institute for Educational Development (NIED) and has outlined an environmentally sustainable society as one of its goals.

The National Curriculum for Basic Education is the official policy for teaching, learning and assessments. It gives direction to the planning, organising and implementation of teaching and learning (NIED, 2010, p. 1). This is the framework which is used to devise syllabi as well as teaching and learning support materials in various subjects including NSHED. This policy states that "the aims of the curriculum in relation to developing an environmentally sustainable society are to provide the scientific knowledge and skills, and attitudes and values needed to ensure that the environment is respected and sustained" (NIED, 2010, p. 8).

In 1992, at the Rio conference, Namibia's founding President declared that all Namibians will have access to environmental education through formal and non-formal education (Enviroteach, 1998). This was a first step in ensuring that environmental education is integrated into the education system. Furthermore, Namibia ratified a number of international agreements concerning the environment, such as the Ramsar (1973) and Vienna Conventions (1988), the Montreal Protocol (1990), the Convention on Climate Change (1992), Biological Diversity (1992), Agenda 21 (1992), Combating Desertification (1994) and Basel Convention (1999) (Namibia. Ministry of Environment and Tourism, 2008, p. 7).

Some of these international agreements, in particular the Tbilisi Declaration (UNESCO & UNEP, 1977) and the Rio Earth Summit's Agenda 21 (UN, 1992) are international declarations that have influenced and provided indicators of the extent of environmental education's incorporation into the Namibian curriculum (Kanyimba, 2002). These declarations emphasise the significance of diverse teaching approaches in enabling learners to participate fully in environmental education processes. One of the goals of environmental education as outlined in the Tbilisi Declaration is to "utilize … a broad array of educational approaches to teaching and learning…with due stress on practical activities and first-hand experience" (UNESCO & UNEP, 1978). Here the Tbilisi Declaration is advocating for diverse teaching and learning approaches.

As a policy imperative, therefore, environmental education is implemented in Namibian schools as a subject in lower primary schools and mainstreamed in all other subjects from Grades 5-12 as a cross-curricular issue. One of the subjects in which environmental education is mainstreamed in upper primary schools is NSHED.

The NSHED syllabus is designed as a three-year upper primary course for Grades 5-7 (NIED, 2006, p. 2). This is one of the subjects which acts as a carrier for environmental learning. Table 2.1 below indicates the environmental learning themes/ topics within the NSHED syllabus as well as the Basic Competencies to be attained by learners.

Table 2.1: Environmental learning topics/ themes and basic competencies in NSHED curriculum

Learning Theme /Topic	Competencies to be achieved
Ecosystem	Investigate human activities which have a positive and negative impact on the environment and describe how the abovementioned impacts will influence the health and well-being of people in the community
Air pollution	Explain how sustained exposure to polluted air could affect their lungs
Water storage and conservation	Describe ways and explain the importance of conserving water
Conservation of soil	Investigate and report on practices of soil conservation as found in their local environment

Source: NIED, 2006, p. 46

To ensure that the education sector plays a role in implementing Education for Sustainable Development (ESD), the Namibian government developed an ESD strategy which is Namibia's response to the United Nations' declaration of the Decade of Education for Sustainable Development (UNDESD) in 2005. This document provides a framework for the development of specific strategies for various stakeholders and sectors and its main aim is to provide a mechanism for "adopting a holistic approach to sustainable development through engaging sectors and stakeholders" (UNESCO, 2009, p. 1). Furthermore, the strategy calls for "an overall re-orientation of education through formal, informal and non-formal learning to enhance implementation of sustained development across sectors" (UNESCO, 2009, p. 1).

Namibia has continued to be a signatory to international agreements such as the Millennium Development Goals, the Sustainable Development Goals and most recently, the Global Action Programme, all of which advocate for re-orientation of education and inclusion of education for sustainable development into curricula.

The next section will highlight the training which teachers have received in implementing the Natural Science and Health Education curriculum where environmental topics are integrated. This section will also set the scene for how teachers are trained to implement the curriculum.

This is of relevance to the study because the training that teachers receive influences classroom pedagogy and the adoption of educational approaches such as situated learning, one of the examples of learner-centred approaches

2.3 Teacher education and development in Namibia

In this section, I discuss teacher education and development in Namibia, outlining how it has evolved from the colonial era, through independence in 1990 to the current status of teacher professional development opportunities in Namibia. This section considers whether NSHED teachers in Namibia are properly trained and prepared for providing relevant education.

According to the Swedish International Development Agency (Mendelson, 1997, p. 19), "Teacher Education [in Namibia] before independence was fragmented and, in the view of many people, largely inferior". At independence in 1990, 36% of Namibia's 13 000 teachers had no professional training (MBECS, 2004). This prompted the Namibian government to prioritise in-service training of teachers and consider teacher education as one of the areas for reform at independence in 1990. The reforms were conducted in the interests of the improvement of educational quality, evidenced, for example, in the following quotation by the Ministry of Education three years after independence: "Perhaps the most important challenge in improving the quality of our education system is to ensure that our teachers are well prepared for the major responsibilities they carry as they are responsible for structuring the learning environment" (Namibia. Ministry of Education and Culture], 1993, p. 37).

The Ministry of Education introduced the Basic Education Teacher Diploma (BETD) Pre-Service programme in 1993 at the colleges of learning. This programme was founded on the principles of learner-centred pedagogy. The central concept in the BETD (Pre-service) was Critical Practitioner Enquiry (CPI). This concept highlighted the relationship between

educational practice and enquiry; it further required teachers to be researchers who critically reflect on their teaching practices and the context in which they teach.

In order to improve the skills of practising teachers, in-service training courses were introduced with the support of development partners. The Swedish International Development Agency (Sida) was one of the partners involved in the Teacher Education Reform project (TERP) which supported three main areas: the *Basic Education Teacher Diploma (BETD), training of teacher educators,* and *teaching of students*. The BETD INSET programme, a distance learning programme which targeted unqualified and under qualified teachers was introduced in 1994 (MBECS, 2004) as a national three-year programme preparing teachers to meet the demands of the new education system. It qualified teachers to teach in Grades 1 to 10. The programme promoted a democratic pedagogy and a methodology that promotes learner-centeredness (Nyambe & Wilmot, 2008). This programme adopted a reflective teaching approach and operated on the principle of Practice-Based Inquiry (PBI) which provided practising teachers with the skills to critically reflect on their teaching practices (Ministry of Basic Education Culture Science, 2004).

The Enviroteach project, a teacher development initiative focussing on environmental education, initially focussed on the development of materials for secondary education. Later, it also targeted the BETD programme for which many teaching and learning support materials in environmental education were produced, and where in-service training was conducted. This ground-breaking project marked the start of professional development initiatives aimed at promoting health and sustainable development in Namibia.

Another initiative towards teacher professional development was the Namibia Languages Competency Project which was mainly run by the Centre for External Studies at the University of Namibia and aimed to promote the teaching and use of indigenous Namibian languages.

Since 2010, teacher training has improved through the introduction of degree courses for all teachers as a minimum qualification to be obtained at the University of Namibia. This was achieved through the incorporation of Colleges of Education into the University of Namibia as satellite campuses across the regions.

In-service training has also taken a new turn with the introduction in 2011 of the Continuous Professional Development (CPD) programme which is an innovative approach to educator professional development. The CPD programme views in-service professional development as the ongoing, life-long, continuing and never-ending professional learning of teachers which is anticipated to improve classroom effectiveness and learner performance by focusing on subject matter knowledge, pedagogic content knowledge and is driven by teachers' professional needs rather than centrally designed programmes. It is spearheaded by the University of Namibia's Continuing Professional Development (CPD) unit in collaboration with the Ministry of Education's Namibian Institute for Educational Development (NIED) and funded by the Millennium Challenge Account (MCA).

With these developments as a backdrop, I now discuss the emergence of teaching approaches in Namibia, both pre-independence and post-independence.

2.4 Emergence of teaching approaches in Namibia

2.4.1 Pre-independence era

Prior to independence in 1990, the education system in the then South West Africa, today Namibia, was characterised by different education systems and administration based on race. Education was administered by 11 different administrations based on race and ethnic groups (Shilongo, 2004). Education resources were inequitably distributed, resulting in schools for

black learners receiving less resources; for example, most of these schools were built by community members.

The unequal resource distribution also affected the state of education in terms of quality (Mendelson, 1997). The "content, pedagogy, assessment practices and ethos of the colonial education were irrelevant and unsuitable to the needs and aspirations of the Namibian people" (MBECS, 2004, p. 3). The teaching methodologies used at that time were characterised by rote learning. The materials used in the teaching and learning process were not relevant to learners' lives. Learners were simply educated to serve their masters in the form of manual labour. Assessment methods focussed on measuring learner's performance and not necessarily their understanding and application of knowledge and learners were not allowed to have an input in classroom activities (Shilongo, 2004).

2.4.2 Post-independence era

After independence, the country's education system went through a reformation process, in line with the Constitution of Namibia.

> To eradicate apartheid mentalities and replace the pre-independence Bantu education methodologies characterised by rote learning, democratic educational pedagogical methods were adopted and promoted by the government … This approach to teaching and learning seeks to create a classroom environment where the educator builds on the knowledge and experiences of learners [and] encourages them to ask questions. (MBECS, 2014, p. 7)

The reform as outlined above was based on four major goals of education: equity, access, quality and democracy. Consequently, teaching methodologies were changed from memorisation and rote learning to democratic pedagogies which encouraged systematic analysis, promoted critical thinking, investigations, experimentation and discussions among

learners (Shilongo, 2004; Nyambe & Wilmot, 2008). One such democratic education pedagogical method that seeks to enhance meaning-making in the classroom is the situated learning approach. As this approach is the focus of this study, I discuss it in more detail in the next section.

2.5 The situated learning approach

2.5.1 Definition of the situated learning approach

Lave and Wenger (1991) have defined the situated learning approach as an instructional, pedagogic approach in which knowledge is constructed, learning is socially situated, and learners engage with one another in authentic tasks and contexts and in a community of practice. Herrington and Oliver (1995) supported this by explaining situated learning as a pedagogic strategy where learners use real life situations to construct knowledge. To situate learning is to create a learning environment in which learners experience real situations (Shor, 1987). In other words, learning becomes contextualised in a real situation, enabling learners to participate actively in learning as what they will be discussing relates to their daily lives and thus gives them an opportunity to "create meaning from the real world" (Stein, 1998).

2.5.2 Theoretical underpinnings of Situated Learning Theory

Situated learning theory is a social constructivist learning theory which views learning as embedded in context and social interaction. It was developed by Jeanne Lave and Etienne Wenger (1991) as a theory which describes how learning takes place in a community of practice. Researchers have indicated that situated learning theory originates in the fields of psychology, anthropology, sociology and cognitive science and has in particular a close relationship with cognitive apprenticeship theory (Clancy 1995; Vincini, 2003). The situated learning approach is seen to have been influenced by Vygotsky's theory of Zone of Proximal Development which is defined as the distance between the actual development level as

determined through independent problem solving and the level of potential development as determined through problem solving in collaboration with other peers (Clancy, 1995). Both the Zone of Proximal Development and situated learning theory recognised that learners create knowledge, meaning and understanding through social interactions with peers or learning artefacts (tools).

The other theory which has contributed to situated learning theory is the Cognitive Apprenticeship theory. In their paper 'Situated cognition and the culture of learning', Brown, Collins and Duguid (1989, p. 32) argued that "learning and cognition are fundamentally situated in context". They drew explicitly on theories of situated cognition and proposed that for learning to take place, learners should be placed in real life situations where they will become apprentices (Brown et al., 1989).

Both the situated learning approach and situated cognition emphasise the importance of context. They both suggest that "learning is effective when it occurs in meaningful contexts" (Choi & Hannafin, 1995, p. 54). These two theories differ in the sense that the situated learning approach considers context more broadly to include learning situations that *mirror* real life situations whereas in situated cognition, people are engaged in an actual context and are interacting with concrete tools (Billet, 1996).

Billet argued that the situated nature of learning can be best understood by drawing jointly on theories of situated cognition (that view learning as an internal process within an individual) and socio-cultural theories of learning (that view learning processes as negotiated with social partners in complex cultural and social settings). Both cognitive and socio-cultural theories recognise that learning should be 'manipulated', that is, they recognise that learning is not stagnant but can be continuously adapted or transformed due to interactions or cognitive processes within the learner. Billet (1996, p. 263) elaborated: "... although all learning is

situated, the nature of the situation and circumstances in which knowledge is appropriated is influential in determining the likely prospect of subsequent redeployment to other situations and settings".

Emerging from these definitions and theoretical underpinnings is the understanding that context and activity are crucial aspects of any situated learning approach. In the following section, I explore the more particular characteristics or components of situated learning.

2.5.3 Characteristics of situated learning approaches

Lave and Wenger (1991) have identified three main characteristics of the situated learning approach:

- **Learning occurs in a community of practice** which is defined as a group of people who have a common concern for something and learn collectively over a prolonged period of time to either find solutions to their concerns or better their practice (Lave & Wenger, 1991).

- **Learning occurs in an authentic context**. This refers to settings, conditions, values, beliefs, and environmental clues which mirror real life situations and problems. This means that, within a situated learning approach, content to be taught should be embedded in authentic, real-world challenges (Stein, 1998).

- **Learning commonly occurs through legitimate peripheral participation**. This is the process by which learners move from being beginners/novices to becoming experts in a community of practice through interactions, collaboration, coaching and scaffolding as well as engagement in an authentic context (Lave & Wenger, 1991).

Herrington and Oliver (1995) built upon the work of Lave and Wenger (1991) to propose six features of situated learning which can help researchers determine the extent to which the teacher is using situated learning approaches. The six features are:

- **Apprenticeship** (learners observe others and later become active participants);
- **Collaboration** (learners work together and interact with one another);
- **Reflection** (learners use their prior knowledge to predict and experiment to solve problems);
- **Coaching** (teacher provides the skills and strategies where learners lack knowledge to solve a problem; the teacher facilitates the learning process);
- **Multiple practice** (the learners are exposed to a demonstration or oriented to a lesson before they are given a chance to participate);
- **Articulation** (learners acquire knowledge to discuss and debate a topic and present their findings).

To guide the analysis of this study's data (as described in Chapter 3), I have drawn on Lave and Wenger's (1991) and Herrington and Oliver's (2005) accounts of situated learning to propose five key characteristics of most relevance to NSHED classroom practice. These are:

- Authentic context;
- Expert performance and modelling (scaffolding);
- Integrated assessment of learning;
- Collaborative learning; and
- Reflection and articulation.

I now discuss these five characteristics in more detail

2.5.3.1 Authentic context

Authentic context refers to settings, conditions, values, beliefs, and environmental clues which mirror real-life situations and problems. This means that, within a situated learning approach, content to be taught should be embedded in authentic, real-world challenges (Stein, 1998). An authentic context can be a physical or virtual environment which resembles challenges, limitations, and possibilities that reflect the way knowledge will be used in real life (Gullikers, Bastiaens & Martens, 2005). This implies that an authentic context can be either social or physical and learners need not be in a real physical setting for it to be an authentic learning context. An authentic context can be created through language (narrative stories, examples relating to the learners' context) and teaching and learning support materials (Stein, 1998), that reflect real-life situations relevant to learners' contexts.

The purpose of an authentic learning context is to expose learners to situations (including options and challenges) which they are likely to encounter in real life. This may stimulate or motivate them to learn and thus ultimately acquire skills and competencies relevant to their daily lives (Gullikers et al., 2005).

Creating an authentic context when teaching environmental topics is important because environmental topics deal with real-life situations in the communities where learners reside. It is therefore not surprising that Namibian national educational policies (discussed in section 2.2.1 above) also support this aspect of situated learning. Appendix 1 contains extracts from these national policies which advocate for a creation of an authentic learning context.

2.5.3.2 Expert performance and modelling (scaffolding)

Pea (2004) described scaffolding as a process through which teachers use a variety of teaching methods to provide support to learners to acquire skills and reach higher levels of comprehension which they would not have achieved without assistance. Pea (2004) drew on Vygotsky's concept of the zone of proximal development to describe scaffolding as a

developmental process through which a learner moves from the *inter-psychological plane* (learning from others) to an *intra-psychological plane* (internalisation of learning within an individual). All in all, scaffolding is a process which allows learners to achieve tasks which seemed impossible without the support of experts.

There are three main types of scaffolding which should complement each other. *Verbal scaffolding* refers to the support given to the learners to improve their language proficiency and deeper comprehension of content being taught. This is done through prompting, questioning and elaboration (Pea, 2004). *Procedural scaffolding* occurs when teachers provide differentiated support to learners and gradually move them from doing tasks in groups to a point where they can carry out a task individually and independently (Pea, 2004). The third type is *instructional scaffolding* which refers to the use of tools such as visuals, imagery, diagrams, pictographs and models to support the teaching and learning process (Hogan & Presley, 1997).

During the scaffolding process, the teacher becomes a mentor and facilitator of the learning process (Ellis & Larkin, 1998). Since scaffolding is used to increase the capability of learners to carry out tasks on their own, it is therefore expected that during this process, teachers, experts or peers model or demonstrate to learners how to solve a problem or carry out a task (Fisher & Frey, 2008). This support and assistance is given to learners to enable them to achieve a learning goal or perform a task which they could not have done successfully if carried out on their own. Scaffolding can be done through presenting appropriate examples, giving learners some problems to solve, demonstration of skills which learners can imitate (Pea, 2004). It is worth noting that scaffolding should not only be done by teachers; it can also be provided by peers, parents, other experts or even through the use of videos and other teaching and learning support materials.

Figure 2.1 below indicates clearly that if teachers spend most of the time lecturing to learners as a form of scaffolding, learners only retain a smaller percentage of content being taught, whereas if the teacher uses practical experiences and peer teaching methods, the retention rate increases.

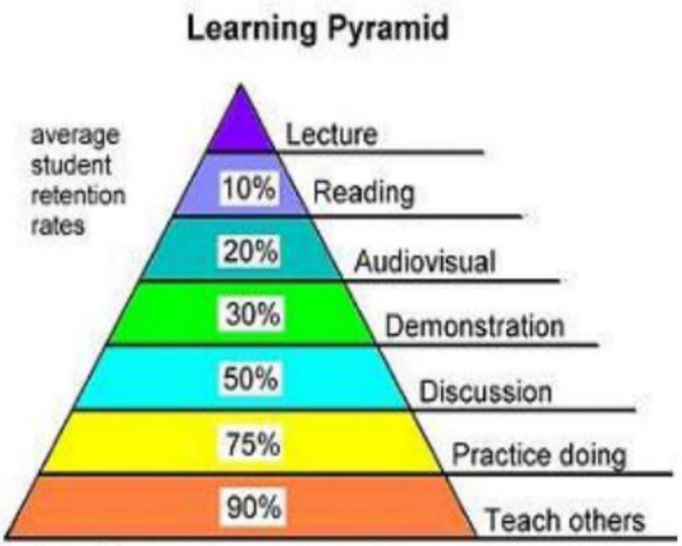

Figure 2.1: Average rate of student retention rates (Source: Lalley & Miller, 2007, p. 67)

This discussion suggests that for learners to become independent (acquire skills and perform tasks on their own), all three types of scaffolding (verbal, instructional and procedural) should be incorporated during the scaffolding process. The implication, therefore, is that learners should be allowed to talk either by asking questions or responding to questions or even discussing with their peers (verbal scaffolding); they should be provided with opportunities for peer collaboration and tutoring (procedural scaffolding); and teachers should use teaching and learning support materials to support the scaffolding process (instructional scaffolding).

2.5.3.3 Integrated assessment of learning

Assessment is an evaluation of learners' competency and understanding of the content being taught and should be integrated in the teaching and learning process (NIED, 2010, p. 5). Assessment plays a crucial role in the development of learners' critical thinking and reflections;

it is therefore important for the assessment of learning to be closely aligned with the learning context and for teachers to use the appropriate level of questions when assessing learners. Low order questions such as 'name…' and 'list…', amongst others, only test the student's ability to memorise and recall facts and details without understanding the facts, but higher order questions such as 'evaluate…' and 'analyse…' would stimulate critical thinking and reflection.

Reeves, Herrington and Oliver (2005) argued that in a situated learning approach, assessment should be an integrated, ongoing part of learning and various types of assessment methods should be used. This resonates with the NSHED syllabi for Grade 5-7 which guide teachers to use multiple types of assessment methods such a investigations, projects, topic tasks and topic tests (NIED, 2006).

2.5.3.4 Collaborative learning

In situated learning situations, learning occurs in specific social settings through collaboration and interaction with others (Clancy, 1995). This resonates with Brown et al.'s (1989) proposal that learning is a process that is supported through social interaction. In a collaborative setting, learners are engaged in discussions, dialogue and debate and thus are more likely to solve problems collectively, develop meaning and understanding as well as be exposed to multiple perspectives on the topic under discussion (Brown et al., 1989).

The use of collaborative learning develops skills which go beyond the classroom situation. Brown et al. (1989) claimed that learners who are taught collaboratively would develop collaborative work skills when they become adults. Collaborative work skills are crucial in dealing with environmental problems because, mostly, solutions to environmental challenges are mitigated through a process of organisational networking and collaboration with individuals, non-governmental organisations, agencies, countries and even within continents (Kyburz-Graber et al., 2003).

2.5.3.5 Reflection and articulation

Articulation refers to how learners debate, discuss and present ideas during the teaching and learning process (Herrington & Oliver, 2005). Articulation is central to the situated learning approaches because these approaches use cooperative and participative teaching methods as a means of acquiring knowledge (Stein, 1998). During these teaching methods, learners need to discuss, debate and present findings. Articulation is also central to learning because it leads to language development of learners. Language "influences culture and thinking and is central to … the development of higher cognitive skills [such as reflections]" (Chisholm & Leyendecker, 2008, p. 197). During reflections, learners use language to recount and articulate their experience to their peers (Pea, 2004).

Reflections are "those intellectual and affective activities in which individuals engage to explore their experiences in order to lead to new understanding and appreciations" (Boud, Keogh & Walker, 1985, p. 19). Expanding on John Dewey's work, Rogers (2002) identified four criteria of reflection:

- Reflection is a meaning-making process that moves a learner from one experience into the next with deeper understanding of its relationships with and connections to other experiences and ideas. It … makes continuity of learning possible and ensures progress of the individual.
- Reflection is a systematic, rigorous, disciplined way of thinking.
- Reflection needs to happen in interaction with others.
- Reflection requires attitudes that value the personal and intellectual growth of oneself and others. (Rogers, 2002, p. 845)

This then means that 'reflection' is a social process which requires collaboration, articulation, interactions with the content and review of content acquired (Herrington, 2006).

2.5.4 The relationship between situated learning approaches and learner-centred education

In the Namibian context, learner-centred education presupposes that:

> Teachers have a holistic view of the learner, valuing the learners' life experiences as the starting point for their studies. Teacher should be able to select content and methods on a shared analysis of learners' needs, use local and natural resources … a learner-centred approach demands a high degree of learners participation, contribution and production. (Namibia. Ministry of Basic Education Culture and Sports, 2004, p. 13)

The characteristics of situated learning approaches discussed in section 2.5.3 are closely related to, and complementary of, the characteristics of learner-centred teaching as defined by the Ministry of Education in Namibia (Namibia. Ministry of Education, 1993). Learner-centred education:

- uses learners' existing knowledge as a starting point;
- encourages learners' curiosity to learn by way of challenging tasks;
- requires teachers to present material that is relevant to learners' lives;
- allows learners to become active participants in their learning;
- encourages the use of collaborative learning; and
- requires teachers to use a variety of assessment strategies.

The above discussion on the characteristics of situated learning approaches and of learner-centred approaches establishes that situated learning, as introduced in the post-independence Namibian education system, is a form of learner-centred pedagogy. Having established that

situated learning approaches are is an example of learner-centred teaching, I now consider the implications for teaching.

2.5.5 Guidelines on implementation of situated learning approaches

In this section, I discuss practical guidelines for teachers to design situated learning approaches in a classroom situation. To do so, I draw on the perspectives of Stein (1998) and Herrington and Oliver (1995) whose work in the 1990s explored the pedagogical implications of situated learning theory.

Situated learning uses cooperative and participatory teaching methods to produce and share knowledge; this positions the learner at the core of teaching practice. This further implies that teachers should incorporate participation, community, content and context in their pedagogy (Stein, 1998). According to Stein (1998) and Herrington and Oliver (1995), to design situated learning approaches in classrooms, teachers should:

- **Provide authentic context and activities:** Content presented should reflect how knowledge will be used in real world situations. The activities or content should be able to support the acquisition of desired knowledge. For example, when teaching about air pollution in NSHED, the teacher can use local examples or teaching and learning support materials that are relevant and meaningful in the learners' context. Learning activities can be oriented to finding solutions to problems within that context, for example, when learners discuss soil conservation, the teacher should provide activities which address how they can conserve soil in their local environment. This will support learners to create meaning through what they are learning.

- **Provide access to expert performances and the modelling of process:** The teacher can use the socio-cultural environment as a teaching resource. These teaching resources can be seen as tools (human or non-human) to mediate learning. For

example, the NSHED teacher can invite an expert on an environmental topic to give a talk, or use teaching and learning support materials such as videos or posters.

- **Provide multiple roles and perspectives:** Learners should be provided with various opportunities to engage in an activity in diverse ways.

- **Support collaborative learning:** Learners should be given opportunities to work together in collaboration with their peers. They should be encouraged to discuss issues with each other so that they learn from one another.

- **Provide coaching and scaffolding at critical times:** The teacher's role should change from that of transmitter of information (content) to that of facilitator of learning. By playing an active facilitation role, the teacher can coach learners so that they move from the periphery towards the centre of their community of practice.

- **Promote reflection to enable abstractions to be formed:** Learners should be encouraged to reflect on the content they are learning. They should be encouraged to apply their experiences, prior knowledge and everyday knowledge to create meaning and solve problems.

- **Promote articulation to enable tacit knowledge to be made explicit:** Learners should be encouraged to collaborate and interact with others so that they could acquire tacit knowledge; the unspoken and hidden knowledge held within individuals and can only be passed on from one individual to another through interpersonal contact in joint or shared activities.

- **Provide for integrated assessment of learning within tasks**: The teacher should be able to assess the intellectual growth of the learners during tasks. Assessment should be an integral part of the teaching and learning process.

In this section, I have presented some guidelines on how teachers can create situated learning environments in their classrooms. In the next section, I will discuss the limitations of situated learning approaches as advanced by critics of this approach to teaching and learning.

2.5.6 Limitations of using a situated learning approach at classroom level

Anderson, Reder and Simon (1996) argued that situated learning cannot be applied to traditional school classrooms because schools are formal institutions, guided by a set curriculum. He lists the following as limitations to situated learning:

- Time constraints: Teachers are expected to complete and attain the prescribed learning outcomes within a specific time frame. Time is therefore limited as teachers would require more time to create authentic learning tasks that are relevant to local contexts, especially as these may not be provided in the textbooks teachers are using.

- Learners are expected to write standardised tests which do not include examples from their local context and therefore they might find sitting for these tests a challenge.

- Knowledge created through situated learning processes is context specific and might not be easily transferred or applied in other contexts.

Greeno (1997), one of the supporters of situated learning, however, dismissed these challenges raised by Anderson et al. (1996), claiming that transfer or application of knowledge in other contexts is indeed possible, but this is dependent on how well learners understand the content and created meaning in the initial learning activity. For example, if learners develop a good foundational understanding of the health risks posed by water contaminated by sewage in their local context, they should be able to transfer and apply this knowledge to consider other issues of water contamination elsewhere. In the same manner, learners can use knowledge and meaning created during situated learning processes to answer questions in tests that are more generalised or abstract as learners are able to apply their knowledge.

2.6 Conclusion

This chapter started with a brief discussion of the history of environmental education in Namibia, focusing on how both international and national regulatory frameworks have led to the introduction of environmental education in Namibian schools. I also discussed how teacher training and professional development have evolved in Namibia, as well as the emergence of learner-centred teaching approaches in post-independence Namibia. Thereafter, the chapter discussed situated learning approaches by sketching the definitions, theoretical underpinnings, and characteristics of the approach. The chapter also discussed characteristics of learner-centred teaching with the aim of establishing the link between situated learning approaches and learner-centred approaches. In addition, the chapter briefly highlighted how teachers in a classroom situation can design situated learning processes. The chapter concluded with a discussion of the identified limitations of using situated learning approaches at the micro-level, the classroom.

Having established an overview in this chapter of the policy background and theorisation of situated learning approaches to teaching environmental topics in NSHED classrooms, in the following chapter I present the research design decisions taken to investigate how Natural Science and Health Education teachers use situated learning approaches to teach environmental topics.

CHAPTER 3: METHODOLOGY AND RESEARCH DESIGN

3.1 Introduction

This chapter outlines the research design decisions taken to investigate how NSHED teachers use situated learning approaches to teach environmental topics. This includes an account of how the qualitative data was generated, managed and analysed. The chapter also describes steps taken to ensure that the study was conducted in an ethical manner and that the research findings are trustworthy.

3.2 Research orientation and design

This research takes the form of a qualitative, interpretive case study. It is interpretive because it recognises that "individuals' assumptions and experiences contribute to the ongoing construction of reality" (Wahyuni, 2012, p. 71). As such, an interpretive study aims to "describe and understand how people make sense of their world" (Bertram & Christiansen, 2014, p. 26).

My research is a case study which is defined as a logical, comprehensive study of a case in context; the case can be that of individual, group, event or community (Bertram & Christiansen, 2014; McLeod, 2015; Cohen, Manion & Morrison, 2011). Case studies "provide unique examples of real people in real situations" (Cohen, Manion & Morrison, 2007, p. 253). A case study can either be ethnographic (focussing on understanding the customs and culture of research participants and these are detailed single case studies) or naturalistic (focussing on general aspects and not culture or custom of research participants) (Bertram & Christiansen, 2014). In this study, Mr Anata's and Mr Enari's use of situated learning approaches to teaching environmental topics are my two case studies. Two teachers were selected due to time constraint and the process of data analysis involved in case studies. I needed to provide thick, naturalistic descriptions of the context in which they taught in order to draw conclusions on

their use of situated learning approach to teach environmental topics. The case studies can be considered naturalistic because they were concerned with the general aspects of teaching environmental topics in two Grade 7 NHSED classes and one Grade 5 class within a limited time frame.

In as much as case studies are beneficial because they provide detailed data which reflects the case, they can be time consuming, their findings cannot be generalised to a larger population, and the likelihood of researchers manipulating the research findings to suit their view point is high, thereby making findings potentially biased (Bertram & Christiansen, 2014). Due to the clear parameters and small sample of this study (two NSHED teachers), I did not experience the case study as excessively time consuming. In Section 3.5, I discuss how I attended to the risk of manipulated or biased research findings. As will be evident in the discussions and recommendations of Chapters 5 and 6, I have been conscious to avoid inappropriate generalisations to a larger population, while recognising the value of the insights from this study being relevant to my wider work within the Namibian Ministry of Education.

3.3 The data generation process

3.3.1 Introduction

In this sub-section, I discuss how I generated data in the two research sites. I collected data from 24-27 March 2015; Appendix 2 shows the fieldwork plan. The focus of my study was on how NSHED and teachers used the situated learning approaches when teaching environmental topics within NSHED. The participants in my study were Mr Enari and Mr Asata who were, at the time of the study, NSHED teachers. I used three data generation methods: document analysis, observations, and semi-structured interviews. Section 3.3.3 provides a detailed discussion of how I applied each data generation method, highlighting the advantages and limitations of each.

3.3.2 Site selection

The research was conducted with two Grade 7 classes in separate primary schools in Ngoma Circuit, in Namibia's Zambezi Region. My sampling criteria were proximity, availability of Grade 7 class groups, and costs of travelling to and from the research site. I therefore selected schools with Grade 7 class groups which were nearer to my duty station. I negotiated access to the schools by writing a letter to the Deputy Permanent Secretary of Education to request permission to conduct research in these schools (see Appendix 3) after my request was granted (Appendix 4), I then informed both the Regional Director and the principals of these schools. No further sampling of classes was required since there was only one Grade 7 class group at each of the selected schools. Through interviews and observations, I investigated how these teachers used situated learning approaches in their classrooms, solicited their intentions and perspectives on situated learning approaches and tried to understand the origins of their perspectives (Maxwell, 1996; Cohen, Manion & Morrison, 2000). I also analysed documents to find out how they support situated learning approach. These research methods are discussed in detail in the next sub-section.

3.3.3 Data generation methods

3.3.3.1 Observations

Observation is a data generation method where a "researcher goes to the site of the study … and obtains first hand data" (Bertram & Christiansen, 2014, p. 84). Being on site enables the researcher to see things which participants may not reveal in an interview or questionnaire.

McLeod (2015) described three types of observation methods:

- **Controlled observations**: Other authors refer to this type of observation as unobtrusive observation (Driscoll, 2011) or laboratory observation (Bertram & Christiansen, 2014). The researcher decides on the venue, time, sample population, and context and uses a standard procedure to conduct observations. With this type of observation, behaviour

may be measured by a scale, and at times, observations are coded by using numbers or letters to describe characteristics. The benefits of using this type of observation are that data is easily and quickly analysed, the process is less time consuming and enables the researcher to conduct several observations, thus making it easier to generate findings from a large population. However, the degree of validity is low because it is an overt observation which is an observation where participants are aware that they are being studied and may therefore behave differently than normal.

- **Naturalistic observations**: This is a type of observation where behaviour is observed in natural surroundings and researchers simply record what they see and this increases the degree of validity. Although this type of observation may lead to generation of new ideas, it is done at a micro-scale and therefore findings cannot be generalised to a large population. This type of observation is covert (participants are not aware that they are being observed).
- **Participant observation**: This is the type of observation where the researcher joins in and becomes part of the observed group. This type of observation may pose a challenge for recording purposes because the researcher, being part of the observed group, may not be able to record and might have to rely on memory of events. In some cases the researcher may become too engrossed, lose objectivity and ultimately compromise the validity of data.

In light of the above descriptions, the observation method which I used was to some extent a controlled observation. I had decided on the site (venue) and population. The participants were aware that they were being studied and I used a structured observation tool. The tool did not, however, produce coded or quantitative data as I documented all the interactions I observed as thick descriptions. This feature is thus more typical of naturalistic observations.

I conducted four (4) classroom observations (two per teacher) to generate data on how NSHED teachers use situated learning approaches when teaching environmental topics. It also gave me an opportunity to gain insights into the teaching and the learning processes.

My classroom observations were guided by an observation schedule which I developed (see Appendix 5). I video recorded lessons and transcribed the classroom interactions (see Appendix 6) in order to produce valid and reliable data of my observations (Cohen et al., 2000).

As useful as the audio-visual recordings and transcriptions were, I did encounter some challenges with conducting observations. In one situation, the batteries for the camera were low but fortunately the person I had requested to take the videos for me had another device (laptop computer) which he used to continue recording. While transcribing the videos, I realised that some responses from learners were inaudible and I therefore had to go over my rough handwritten notes and in some cases listen to the video over and over until I could logically deduce what had been said. The next time I do research and take videos of lessons, I will move closer to every speaker when they give their responses. To mitigate the effect that I and my recording assistant would have on the participants, we sat at the back of the classroom. The teacher also introduced us and the purpose of our visit at the start of the lesson to put the learners at ease; this helped in minimising our effect on the teacher's and the learners' behaviour during the lesson.

3.3.3.2 Document Analysis

Cohen et al. (2011) described document analysis as a study of recorded human communication. Document analysis provided an opportunity for me to "get insights from an inaccessible person or subjects and historical stories" (Songqwaru, 2012, p. 46). I am aware that documentary reports may be biased since they may have been written for a different purpose and context.

This limitation was addressed by comparing the data from documents with data generated from interviews or observations (triangulation).

I analysed policies, teaching and learning support materials and legislation to find out what mandates and guidelines they present regarding situated learning approaches. I developed a table with extracts which supports situated learning from these policies (Appendix 1). For this study, the following documents were analysed: the Namibia Environmental Education Policy; the NSHED Upper Primary Syllabi, Environmental Education Policy, Broad Curriculum for the Ministry of Education and Standardised Achievement Tests (SATs) Reports from 2010 – 2013.

3.3.3.3 Semi-structured interviews

An interview is an "interchange of views between the researcher and the respondents" (Cohen et al., 2000, p. 267). An interview can also be defined as "conversation with a purpose to gather information" (Berg & Bacon, 2001, p. 66). I used a semi-structured interview format because it allowed me to request and clarify additional and specific information (Cohen et al., 2000). The interviews were conducted on 26 and 27 March 2015 for Mr Asata and Mr Enari respectively.

The two teachers were interviewed to find out how and why they use situated learning approaches in their teaching practice. Questions relating to their knowledge of the content of policy documents with regard to situated learning were also posed. All the questions that I asked were influenced by my research question and achieving the goals of the study. To this end, I developed an interview schedule which served as a flexible guide during the interview process (Appendix 7).

I used my cellular phone to record the interview between myself and each teacher and after which I listened to the audio and transcribed our conversation word for word. A challenge I

faced was that transcribing a conversation is time consuming. However it was immensely useful to have a recorded conversation as it offered me an opportunity to replay it repeatedly until I could grasp what the teachers meant.

3.4 Data management and analysis

3.4.1 Data management

While I was generating data, I immediately indexed and stored the digital data into files on my computer that were secure and readily accessible. I backed up my work electronically and saved it in different locations including Dropbox and in my email account to safeguard against loss of work. I created a file with a table of contents to store hard copies of data. Table 3.1 contains a list of all data sources and the index I allocated to each piece of data. These are the indexes I used to refer to specific data sources during analysis and reporting.

Table 3.1: Data sources and their indexing

Data source	**Index**
Transcription of Interview: Mr Asata	Int.01
Transcription of Interview: Mr Enari	Int.02
Lesson Observation 1	Ob.1
Lesson Observation 2	Ob.02
Lesson Observation 3	Ob.03
Lesson Observation 4	Ob.04

3.4.2 Data analysis

Research question

The research question that guided this interpretive study is:

'How do Natural Science and Health Education (NSHED) teachers use situated learning approaches in the teaching of environmental topics'?

Bertram and Christiansen (2014) have identified two approaches to data analysis, *Inductive analysis* (where patterns emerge from data to enable the researcher to draw up hypothesis and conclusion) and *Deductive analysis* (the type of analysis where the researcher uses a set of categories based on a theory to categorise and organise the data). In this study, I used the deductive analysis approach. I will now explain how this has been used in my study by referring to the three flows of activity in data analysis as identified by Miles and Huberman (1994) cited in Bertram and Christiansen (2014). These are: data reduction, data display and conclusion drawing.

3.4.2.1 Data reduction

This is the process of "selecting, focussing, simplifying, abstracting and transforming data that appear in written-up field notes or transcriptions … it involves organising and sorting data into codes or categories and looking for patterns and relationships" (Bertram & Christiansen, 2014, p. 116).

To reduce data, I firstly transcribed the video recordings of lesson observations and interview audio recordings. I then identified five characteristics of the situated learning approach as discussed in section 2.5.3 and developed a colour coding key for each characteristic. This coding key is what I used to colour code identified phrases with similar or common characteristics on my transcribed interview and observation data. I then grouped the sentences into analytical memos (an example is provided in Appendix 8). Below, I discuss how each analytical category is crucial to the study with the aim of providing a rationale for the choice of these analytical categories. Table 3.2 below shows the analytic categories and the coding key.

Table 3.2: Analytical categories and coding key

Analytic Category	Colour
Authentic context	Blue
Expert performance and modeling (Apprenticeship)/ Scaffolding	Red
Integrated assessment of learning	Pink
Support collaborative Instruction	Yellow
Reflection and articulation	Grey

Analytical category 1: Authentic context

An authentic context is the starting point of any situated learning approach. The body of literature as reviewed in section 2.5.3 indicates that for any teaching approach to be considered as a situated learning approach, the lesson should be situated in a context. Literature still indicates that an authentic context can be a physical or virtual context as long as it mirrors real life situations which are relevant to the learner's context. I therefore used the coding key as indicated in Table 3.2 to highlight in blue any phrases or instances indicating, for example, the use of local examples or exposing learners to real life situations.

Analytical category 2: Expert performance, coaching and scaffolding

I chose to combine expert performance, coaching and scaffolding into one analytical category because these terms are closely related. Scaffolding as discussed in section 2.5.3 occurs when the teacher exposes learners to expert knowledge through posters, activities, videos, coaching and so on to enable them to move from the periphery to become experts in that particular practice. Scaffolding can be provided by an expert, teacher or peer. I coded in red anything that related to the use of posters, expert knowledge, coaching, guiding activities or providing new information and grouped them under this category in the analytical memo.

Analytical category 3: Integrated assessment of learning within tasks

Integrated assessment of learning within tasks is crucial to the situated learning approach. It is through assessment that teachers are able to identify learners' knowledge gaps and thus provide scaffolding, expert performance or coaching (Herrington, 2006). Therefore, when coding data,

I searched for moments where teachers sought to find out what learners had learnt, and I coded these phrases and moments pink.

Analytical category 4: Collaborative learning

It is important for teachers to foster positive collaborative interactions between learners during situated processes. Collaboration, as previously discussed in Section 2.5.3.4, can take place in groups or pairs. These interactions may stimulate learners' critical reflections and enable them to articulate what they have learnt. I coded in yellow any phrases or instances where teachers had given tasks to learners to work collaboratively in groups or in pairs under this analytical category.

Analytical category 5: Reflection and articulation

As already stated when discussing analytical category 1 above, context is the starting point of any situated learning approach so that learners can relate what they have learnt to their real lives and use knowledge created to solve real-life problems. This characteristic of situated learning needs to be complemented by learners' ability to reflect on taught content or presented problems, participate meaningfully in discussions, provide responses to questions and even ask questions. I colour-coded in grey and grouped instances in the data where learners responded to questions, contributed to discussions or asked questions.

After organising data into codes and categories, I looked for patterns and relationships within my data and produced analytical statements. I used these analytical statements to discuss findings and draw conclusions in Chapters 5 and 6. In the following section, I describe this study's data display, the second of Miles and Huberman's (1994, cited in section 3.4.2) three flows of activity in data analysis.

3.4.2.2 Data display

Data display consists of "organised, compressed assembly of information that permits the researcher to draw conclusions … it might consist of verbatim quotes from interviews … matrices, graphs, charts, maps or networks" (Bertram & Christiansen, 2014, p. 116).

I presented my data in Chapter 4 by using thick descriptions to describe what I had observed during the lesson observations. In my thick descriptions, I used verbatim quotes from interviews and classroom observations; I also used photographs to support my descriptions. I produced tables to summarise how each analysed policy document supports a specific characteristic of the situated learning approach (see Appendix 1).

3.4.2.3 Conclusion drawing

This is the flow where researchers "start to draw conclusions from the start of data collection … they note patterns and possible explanations" (Bertram & Christiansen, 2014, p. 116). As explained above in Section 3.4.2.1, I drew conclusions from the analytical statements which were derived from analytical memos. These insights and findings are presented in Chapters 5 and 6.

3.5 Validity

Validity is an important dimension of effective research (Cohen et al., 2001). The readers and users of this research would want to be assured that the data and research findings are valid and reliable (Maxwell, 1996) and not influenced by the researcher's perspectives and ideologies. I did the following to ensure the validity and reliability of data generated:

- I was able to triangulate the study's data by using a variety of data generation methods. For instance, by interviewing the teachers and observing their classroom practice, I was able to get a fuller understanding of their use of situated learning approaches.

- The analytical tools I developed and my interpretation of the data was guided by situated learning theory so as to minimise the influence of my personal views, opinions and expectations of the data.
- I audio-recorded and transcribed interviews, and video-recorded the classroom observations so that I could re-view the data as many times as I needed to (Appendix 9).
- Member checking: I gave the transcripts and my data summaries to the research participants for them to confirm that this reflected their views and experiences accurately.

3.6 Research ethics

The Ngoma education circuit where I conducted this research was the same circuit which I had previously supervised as an Inspector of Education. There was therefore a risk that some teachers might feel intimidated or intentionally misrepresent their classroom practices or their perspectives on situated learning as they would be conscious that they were being observed by a senior official. To minimise this risk, I was transparent and explained the purpose and focus of the study, emphasising that they were co-participants in the study and that they could make a valuable contribution to it. I emphasised that the study sought to strengthen pedagogy and was not for evaluation or reporting purposes. I also gave the teachers a chance to review and modify their responses before the data was analysed. Member checking (noted above in terms of validity) also added to the democratic principles I abided by in this study.

Additionally, I sought permission from the Deputy Permanent Secretary for Formal Education in Namibia; I sent a letter to him requesting permission to conduct the study in the schools. The request for permission to conduct research and the response granting me permission to conduct the study, are attached as Appendix 3. I sought teachers' consent verbally and explained their rights to them, indicating that they could withdraw from the study at any stage and that they could be assured of anonymity throughout the study.

Furthermore, to protect the identity of the study participants, I used pseudonyms for the schools and the teachers. Both the teachers' and schools' names used throughout the study are not real names. The other thing I did to protect the identity of children through photographs used in the study was to blank out their faces in each photograph so that they could not be recognised.

3.7 Conclusion

In this chapter, I discussed the research design decisions taken to investigate how NSHED teachers use situated learning approaches to teach environmental topics. I highlighted what an interpretive study entails, its advantages and limitations. I also discussed a case study and the different types of case studies as identified by researchers, highlighting their advantages and limitations. I then continued to describe the three data generating processes which I had used and their application in this study. Processes of data management and data analysis have also been explained. Methods of ensuring that the data generated and presented is reliable and trustworthy have also been discussed in a short section under validity. The chapter concluded with a discussion on ethical issues, giving an account of how access to schools was negotiated and how the research participants were made to feel at ease.

CHAPTER 4: DATA PRESENTATION

4.1 Introduction

This chapter presents the data generated in March 2015 and describes how the two NSHED teachers used situated learning approaches when teaching environmental topics to Grade 5 and 7 learners.

Data is presented that describes the dimensions and characteristics of situated learning approaches as evident in the classroom settings. The following characteristics as identified by Lave and Wenger (1991) and Herrington (2005) will be used for discussion in this section: authentic context; expert performance; coaching and scaffolding; collaborative instruction; reflection and articulation; as well as integrated assessment of learning within tasks. Although each aspect is presented separately here, it is important to remember that these aspects are interrelated and it is only when all are supported in an integrated way that a truly situated learning approach is implemented.

The structure of this chapter is guided by data collection methods as described in Section 3.3.3. As such, each case study is presented according to: (i) document analysis of how policy documents promote and support situated learning approaches, (ii) classroom observations of the teachers using situated learning approaches to teach environmental topics in NSHED, and (iii) interview data.

4.2 Policy documents on situated learning

In this section I discuss how each policy document promotes or supports the use of the situated learning approach. The policy documents discussed in this section are: the NSHED syllabi, the Namibian Environmental Education Policy, the broad school curriculum and the Education for Sustainable Development (ESD) strategy for Namibia. These policy documents have been

introduced in section 2.2.1 and relevant extracts related to the situated learning approach have been summarised and are presented in Appendix 1. Table 4.1 below indicates the dimensions supported by each policy document. Detailed information on how each document supports the use of situated learning approach is contained in Appendix 1.

Table 4.1: The situated learning dimensions supported by each policy document

	Expert performance, coaching and scaffolding	Collaborative learning	Reflection and articulation	Integrated assessment of learning within tasks (authentic assessment)	Authentic context
NSHED syllabi	☑	☑	☑	☑	☑
Namibian Environmental Education Policy		☑			☑
National Curriculum for Basic Education	☑	☑	☑	☑	☑
Namibia's Education for Sustainable Development strategy	☑	☑	☑	☑	☑

4.3 Case study A: Mr Asata

4.3.1 Introduction

Mr Asata, the only NSHED teacher at Liseli Primary School, is a 27-year-old male teacher who has three years of teaching experience. His highest qualification is a Basic Education Teachers Diploma specialising in NSHED Grades 5-7. This section presents two of Mr Asata's environment-oriented NSHED lessons, based on my classroom observations and interview data. First, I begin with a description of the context of the school, community and social-ecological context in which Mr Asata teaches.

4.3.2 Context of Liseli Primary School

Liseli Primary School is located on the banks of the Chobe River, 68 km from the town of Katima Mulilo in the Ngoma area, in the Katima rural constituency. Figure 4.1 below shows the location of the Ngoma area where the study took place.

Figure 4.1: Map showing the location of Ngoma (Mendelson & Roberts, 1997)

The Zambezi region where Ngoma area is situated is located in the north-eastern part of Namibia and receives the highest rainfall in Namibia with an average rainfall of 600mm per year. The average temperatures range from 20-35 degrees Celsius in summer and 7- 28 degrees Celsius in winter (Simalumba, 2011). The area is prone to annual floods mainly caused by heavy rainfall. The severity of the floods differs from year to year, depending on the amount of rain received in that particular year. Figure 4.2 shows a picture of the Ngoma area during flooding. Floods have both negative and positive effects. They bring fish which locals can sell to generate an income to take care of their families but they can also bring waterborne diseases such as diarrhoea and bilharzia. Floods are largely responsible for the loss of land productivity as soil erosion due to water runoff during floods can also occur, resulting in soil losing the nutrients. This may lead to reduced production of crops, low quality of life and may ultimately have an effect on income and promotion of poverty (Sikuka, 2012). Most parents in this community still use traditional methods of subsistence crop farming, animal farming and fishing and are almost entirely dependent on these practices for their livelihoods (see Figure 4.3).

Figure 4.2: Ngoma area during flood times

Figure 4.3: Local ways of farming

The main source of energy for lighting is candles and paraffin lamps and firewood is mainly used for cooking. Wood and grass are the most used natural resources and are mostly cut for building purposes. Most houses in this area are built with traditional mud and thatched grass, and the courtyards are enclosed by reeds and wood. Figures 4.4 and 4.5 depict houses where learners from this community typically live. The roofs of the houses are thatched with grass and the walls are built with mud whereas the fencing is mostly built with reeds and wood.

Waste management and disposal poses a serious environmental challenge in this area as it is not a municipal area and does not receive municipal services such as waste collection. Residents generally resort to burning their waste, thereby contributing to air pollution through smoke emissions. Figure 4.6 illustrates a typical scenario in the area of domestic waste accumulating in undesignated areas.

Figure 4.4: Courtyard made with wood and reeds and roof thatched with grass

Figure 4.5: Walls of the house built with mud and roof thatched with grass

Figure 4.6: Waste disposal and management practices in the Ngoma area

Liseli Primary School offers Grades 1-7 with a total enrolment of 361 learners. The Grade 7 class in which this case study was conducted has 43 learners, 20 girls and 23 boys. The percentage of learners passing in Grade 7 for the past three years has increased from 55.5% in 2012 to 76 % and 86% in 2013 and 2014 respectively.

The learners struggle to express themselves in English despite the national policy requirement that the medium for instruction from Grades 1 to 3 is mother tongue instruction; thereafter, all lessons are expected to be conducted in English (NIED, 2010). The learners' English proficiency may have an effect on their performance and participation in NSHED.

In 2010, the Grade 7 cohort participated in Standardised Achievement Tests (SATs). Their performance in Natural Science and Health Education, particularly in the environmental education component, is presented below in Table 4.1. These scores indicate clearly that the school's performance in environmental topics within NSHED is substantially lower than national and regional performances.

Table 4.2: Standardised Achievement Test results in environmental topics within NSHED at Liseli Primary School (Source: Namibia. MoE, 2010)

Environmental topic tested	**Cognitive level tested**	**Learner's achievements (Average percentage scores by learners)**		
		National	Regional	School
Explain the importance of conserving soil	Application	36%	30%	5%
Discuss the importance of conserving soil	Comprehension	36%	30%	5%
Distinguish between human made and natural air pollution	Comprehension	30%	32%	21%

4.3.3 Lesson 1: Air pollution

4.3.3.1 Lesson overview

This lesson was taught in the first term; it was the third lesson in the series of five sub-topics under air pollution. The basic competency to be achieved at the end of lesson was "to

distinguish between man-made and natural air pollution". (Appendix 10 contains the NSHED syllabus indicating these basic competencies.) According to the syllabus, by the time this lesson was conducted learners should have learned about sources of air pollution and they should have described at least three different sources of pollution. According to the regional scheme of work for Grade 7, these learners would have studied living organisms, plants and, under environment where this topic falls, they would have learnt about ecosystems, storage and conservation of water as well as conservation of soil.

This lesson took approximately 40 minutes. Mr Asata introduced the lesson by taking learners outside the classroom to the school dumping site where institution workers were burning papers. This was an impromptu activity in response to a learning opportunity on the school grounds. Thereafter, the learners returned to the classroom and Mr Asata asked learners to define human-made air pollution. Learner 1 defined human-made air pollution as "gases" (ob.01//9) and Learner 2 said "Human made air pollution are the ones that are caused by human activities" (Ob.01//11). Mr Asata then repeated what the Learner 2 said and gave examples of human-made air pollution. He said:

> Human made air pollution are the ones caused by human activities, like the one you saw outside, burning papers, they are caused by us human beings … So whatever activities done by human beings which cause air pollution is known as human-made air pollution. (Ob.01//12)

The teacher then asked learners to name the different sources of air pollution which are found in their community. Learner 4 responded with "fire from burning wood" (Ob.01//24). Mr Asata corrected the learner, saying it was "smoke from burning fire" (Ob.01//25). It seems the teacher also gave an inaccurate response as he used a direct translation from his vernacular language into English. I understood his intention was to explain that when a fire burns, there will be

smoke emissions, and these are a source of air pollution. Mr Asata prompted learners to give more answers. They gave responses such as exhaust oil and cigarette smoke. The teacher asked learners to talk in pairs and discuss different ways they could avoid or prevent air pollution. He asked learners to give answers according to the sources of air pollution which were listed before. The learners gave responses to the teacher's question and thereafter the teacher asked them to classify the sources of pollution into natural and human-made air pollution.

4.3.4 Lesson 2: Air around us

4.3.4.1 Lesson overview

This lesson took place during the first term and was taught to the Grade 5 class. 'Air around us' is one of the topics under the main topic, Air. The upper primary NSHED syllabus indicates that one of the basic competencies to be achieved by learners under this topic is to "investigate and report on ways that air movement affects living and non-living things in their local environment" (NIED, 2006, p. 14).

The lesson took approximately 50 minutes. Mr Asata introduced the lesson as 'The air around us' and asked learners to define 'air'. Learner 1 responded: "Air is a mixture of gases" (Ob.04//10). The teacher repeated this definition and wrote it on the chalkboard. The teacher asked learners to give examples of gases they knew. The learners' responses were: "oxygen" (Ob.04//13) "carbohydrate" (Ob.04//15) and "nitrogen" (Ob.04//18). The teacher corrected the second learner by saying, "Carbohydrate is not a gas, it is a nutrient" (Ob. 04//16). He then explained that "Air is a combination of the two gases, mainly oxygen and nitrogen" and asked them to discuss in pairs a definition for wind. The learners defined wind as "moving air" (Ob.04//24). The teacher emphasised this definition and repeated it over and over again and wrote it down on the chalkboard.

Six minutes after the lesson commenced, the teacher then moved to another sub-section of the lesson and informed learners that they would now look at the benefits of wind. Learners were

given an activity to: "go around the environment, to go around the school to identify for me the benefits of wind in our environment" (Ob.04//29). Learners were asked to find a clue or example of how humans and animals benefit from wind. The learners moved outside of the classroom to investigate the benefits of wind. They discussed in groups and these discussions were held in their vernacular language. Learners discussed and looked around the school grounds but some learners just walked and others just stood without taking part in the discussions. They spent approximately 10 minutes observing and recording the benefits of wind for both humans and animals and thereafter learners were told to go back inside the classroom.

Mr Asata asked learners to report what they had seen outside regarding the benefits of wind to both animals and humans. Learners reported in their groups; some learners struggled to read what they wrote down and some simply used direct translations from the vernacular into English. Some of the learners tried to give examples not seen outside e.g. "Wind makes the fast air to fly" (Ob.04//38), "Wind is making fast" (Ob.04//45) and "kites flying" (Ob.04// 45), these responses were incorrect or their meaning was unclear. The teacher asked learners to explain what they meant but they couldn't. Some learners gave relevant answers. Group 5 said, "wind speeds up evaporation of sweat" (Ob.04//50). The teacher wrote down what learners had reported in their groups and continued to correct learners if they reported on things which they did not observe. He explained the cooling effect of wind: "So the benefit of wind or moving air is cooling effect. So wind outside there can also cool our body temperature or regulate our body temperature to normal. From there we have also drying effect" (Ob.04//58). Some of the examples he used were local examples which were relevant to the learners' context. The teacher gave an example of clothes drying due to the effect of wind: "When we went around, there were some clothes on the wire, so without wind there is no way your clothes can dry out, so wind can also help to dry our clothes" (Ob.04// 60). The teacher expanded on the benefits

of wind and gave examples of these benefits: "The other benefit is pollination, who can define pollination for us? What is pollination" (Ob.04// 67).

After 37 minutes, Mr Asata proceeded to another sub-section of the lesson on "the harmful effects of wind". He asked learners to give examples of the harmful effects of wind which they had observed outside and he instructed them to discuss with a friend. Learners gave examples as observed outside in pairs: "Wind breaks trees" (Ob.04// 110), "Wind can kill houses" (Ob.04// 114), "Wind causes soil erosion" (Ob.04//117). At a glance, the first two responses may seem to be wrong but after careful scrutiny one realises that these learners were using direct translations from their mother tongue to English. Mr Asata corrected the learners, when the learner responded that "wind breaks trees" he corrected him saying "wind can uproot trees" (Ob.04//111). Figures 4.7 and 4.8 below shows learners discussing and recording their findings.

Figure 4.7: Learners discussing the effects of wind on plants, animals and humans

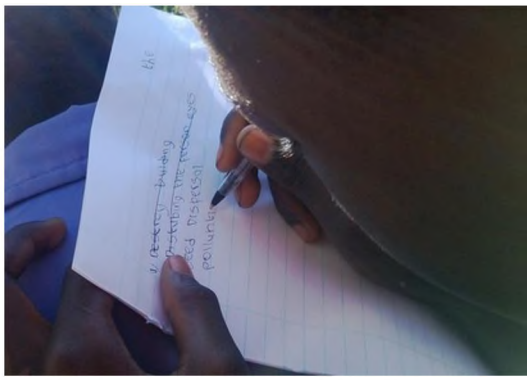

Figure 4.8: Learner recording their observations on the effects of wind on plants, animals and humans

4.3.5 Teacher's selection of teaching and learning support materials to support a situated learning approach

The teacher did not use any posters or field guides during the lesson. He mostly drew illustrations on the chalkboard. By writing and drawing illustrations on the chalkboard, the teacher strived to use situated learning approach by explaining lesson content and concepts to learners.

The teacher used the textbook *Natural Science and Health in Context* during the lesson. Appendix 11 lists some examples of the causes of air pollution identified in this textbook, and some of those examples, such as burning wood and digestive gases from animals, are relevant to the learners' context. The textbook states that: "Cigarette smoke, exhaust fumes from cars, smoke from cooking, fires and burning bush ... are all sources of pollution as a result of human activity. Digestive gases from animals ... are examples of natural air pollution" (Appendix 11). All these examples of pictures and those given in words are relevant to these learners' context and thus assisted the teacher to create an authentic context when teaching about air pollution.

4.3.6 Interview data

When asked about the environmental topics which Mr Asata normally teaches, he said: "I normally teach about the terminology, like the herbivores, carnivores and omnivores. I also normally teach about air pollution, soil and water conservation" (Int.01//25). In terms of his approach to teaching environmental topics, Mr Asata stated that he normally gives terminology to learners to define them by themselves: "For the terminology, I normally used to give them to learners, to find out themselves what these terminology is all about" (Int.01//30). He also mentioned that he would encourage learners to experience things in their local environment. For example, Mr Asata explained how he used a leaking tap at the school whilst teaching about water conservation: "I still remember that our tap nearby the school was still leaking, so repairing the damaged tap was the key so learners will have to find out themselves how water can be lost by leaking taps … so it was a great experience for them because they saw what actually happened in water conservation" (Int. 01//34). He summarised his approach as: introducing the lesson, giving learners work to find out more information themselves, and thereafter elaborating on the topic.

When asked to explain his understanding of a situated learning approach, Mr Asata said: "this is the approach whereby learners have to be given a chance to find out themselves exactly what

the lesson is all about, not the teacher himself to spoon feed them" (Int.01//49). Through this, he related the situated learning approach to the learner-centred approach and added that a challenge of implementing the situated learning approach is that it is time consuming and, to be implemented effectively, requires more time than a transmissive approach.

According to Mr Asata, the advantages of using a situated learning approach are:

> It is much easier for learners to master what they need to find out than what the teacher gave them exactly, so it is easier for them, it makes learning, teaching and learning much easier, and also it enhances an experience that learners won't forget in their lives because when they master and discover things themselves, then it is much easier for them to master them whenever they are asked the question. (Int.01//71)

He indicated that he had learnt about situated learning through one of his subjects during pre-service teacher education. However, he indicated that policy documents such as the NSHED syllabi and the SATs reports did not offer any guidance on the use of situated learning approach. He further stated that he had never heard about the Environmental Education Policy.

On the use of teaching and learning support materials, Mr Asata indicated that he normally uses charts and textbooks and, to some extent, these resources include examples to which learners can relate.

4.4 Case Study B: Mr Enari

4.4.1 Introduction

Mr Enari, the NSHED teacher at Mason Combined School, is a 41-year-old male teacher who has 19 years of teaching experience. His highest qualification is a Senior Primary Teachers Diploma specialising in Natural Science and Health Education Grades 5-7. As with the previous case study, this section presents two lesson observations, each beginning with a lesson overview and then a description of how the teacher used situated learning approaches;

thereafter I present interview data. I preface this case study with a description of the context of the school and community in which Mr Enari teaches.

4.4.2 Context of Mason Primary School

Mason Combined School is 88 km away from the town Katima Mulilo and is situated alongside the banks of the Chobe river. Most parents in this community depend on subsistence farming and fishing for their livelihoods. The locals still use traditional methods of farming and practise both crop and animal farming. Figure 4.9 below shows an example of crop farming practised in the Ngoma area.

The main source of energy for lighting is candles and paraffin lamps and for cooking is firewood (see Figures 4.10 and 4.11). Wood and grass are the most used natural resources as these are mostly cut for building purposes. Most of the houses in this area are built with traditional mud and thatch grass, and the courtyards are enclosed by walls mostly made of reeds and wood. Figure 4.12 shows one of the houses where learners from this community live. The roof of the house is thatched with grass and the walls are built with mud whereas the fencing is mostly done with reeds and wood.

Figure 4.9: Local ways of farming

Figures 4.10 and 4.11: Firewood used for cooking in a hut

Figure 4.12: Courtyard made with wood and reeds and roof thatched with grass

Figure 4.13: Waste disposal and management practices at Mason Combined School

Waste management and disposal is a significant problem in this area as it is not a municipal area and thus residents usually resort to burning waste, thus contributing to air pollution through smoke emissions. Figure 4.13 shows a rubbish pit dug to dump rubbish and a closer look at the picture reveals the black patches on the ground from rubbish that has been burnt.

Mason Combined School is a primary school offering Grades 1- 10. It has a total enrolment of 208 learners. The Grade 7 class where the case study was conducted has a total of ten learners (four girls and six boys). The performance of learners promoted from Grade 7 to Grade 8 at this school has been high and has fluctuated from 100% pass rate in 2012 to 73.3% and 100% in 2013 and 2014 respectively.

The Grade 7 cohort of 2010 participated in Standardised Achievement Tests (SATs). Their performance in NSHED, particularly in the environmental education component, is indicated below in Table 4.3.

Table 4.3: Standardised Achievement Test results in environmental topics within NSHED at Mason Primary School (Source: MoE, 2010)

Environmental topic tested	Cognitive level tested	Learner's achievements (Average percentage Scores by learners)		
		National	Regional	School
Explain the importance of conserving soil	Application	36%	30%	40%
Discuss the importance of conserving soil	Comprehension	36%	30%	0%
Distinguish between human made and natural air pollution	Comprehension	30%	32%	22%

It is clear from Table 4.2 above that the school's performance in environmental topics within NSHED is better than the national average in some topics but much lower than the national average in others. Learners seemed to do better with questions which required them to have application skills than those which tested their comprehension level.

4.4.3 Lesson 1: Air pollution

4.4.3.1 Lesson overview

This lesson was taught in the first term. It is the second in a series of five sub-topics on air pollution. According to the lesson plan prepared by Mr Enari, the basic competency to be achieved by the end of the lesson was: "Name at least three sources of air pollution and describe at least three sources of air pollution" (Appendix 12). On the same lesson plan, it is indicated that the presentation of subject content and learning tasks would be to: "ask learners to discuss and find some sources of air pollution based on the local environment. Explain and give some examples" (Appendix 12). According to the syllabus (Appendix 10), by the time this lesson would have been taught, learners would have acquired prior knowledge of sources of air pollution and they would be able to describe at least three sources of pollution. This would help the learners to interact more with the content that was being presented at the time of the study.

The lesson lasted for 40 minutes. The teacher introduced the lesson by telling learners that they are going to look at air pollution; he reflected on the previous lesson on air pollution and made links to the present lesson's focus: "That's pollution in our environment" (Ob.02//17). The teacher wrote down the topic on the chalkboard. He asked learners to identify the sources of air pollution in their environment. He read the examples of sources of air pollution listed on a poster pasted on the classroom wall, which Mr Enari had prepared to support learning in this section. He gave learners a worksheet, read the activity and instructed learners to discuss questions 4 and 5 in pairs or in groups. They were given two minutes to discuss these questions. Question 4 required them to identify the sources of air pollution in their environment. Question 5 on the same worksheet required learners to describe two ways of reducing pollution in their environment. Of the two questions, Question 5 encouraged learners to critically reflect on how they could apply the knowledge gained to solve a problem of pollution within their environment.

At the end of the discussion, the learners gave feedback to Mr Enari who wrote their responses on the chalkboard. Examples which learners gave for question 4 (sources of pollution) included, but were not limited to: "burning wood" (Ob.02//48), "burning fire" (Ob.02//49), and "smoking cigarettes" (Ob.02//50). These responses are relevant to the learners' context and experiences. The teacher continued to write the learners' responses on the chalkboard. The teacher then asked learners to think of ways to reduce air pollution. He gave them three minutes to discuss how they could reduce pollution in their environment. Learners discussed in groups while Mr Enari walked around monitoring their progress. After four minutes, learners gave feedback: "People must try to buy solar ovens" (Ob.02//69), "You must [use] bicycles to reduce pollution from cars" (Ob.02//91), "Build fire breakers" (Ob.02//96) and "Plant trees to stop blowing wind" (Ob.02//87). Mr Enari asked learners whether they knew what a solar oven is. After they responded no, he explained:

> It is something that is using the sun's energy. It is made of other materials, card box and glass. Glass can trap the sun's energy and use it for cooking. In other words, when we use this solar oven, you find that there is nothing like smoke or gas produced. (Ob.02//74)

The learners continued to give responses such as "that people should use bicycles instead of cars as a form of transport" (Ob.02//).

Mr Enari continued to write these responses on the chalkboard. Group 3 gave an example of fire breaks. The teacher then explained: "If this is a field you can either remove some grasses, making some cut lines along, maybe your grazing land, so if you remove the grass here, you will find that if anyone burns this portion, it will mean that you are going to prevent other pieces, so this is what we call the fire break". He drew some illustrations on the chalkboard of how the fire breaks prevent or control the spread of fire. The teacher then read aloud from the list on the chalkboard ways of reducing air pollution as identified by learners. Mr Enari instructed learners to answer questions 4 and 5 on the worksheet and asked them if they had any questions on the lesson. One learner asked, "How do wood stoves affect air pollution?" (Ob.02//122). The teacher responded saying:

> Wood stove is a form of a stove you use using wood. So you find out that from this wood, things can be produced. In our villages we have those small shelters where we always make fire. Do you always check on the roof? What do you always see? There are some brown dark substances that are created in the grass; those things are some of the things that come from burning wood. Those are some of the pollutants from burning wood. (Ob.02//129)

The teacher concluded the lesson by informing learners that the next topic would be on how air pollution affects humans (Effects of air pollution on humans). He gave them homework to research the effects of air pollution on humans.

4.4.4 Lesson 2: Effects of air pollution on humans

4.4.4.1. Lesson overview

This lesson took place during the first term and focused on the fourth basic competency to be achieved under the topic 'Air Pollution', as per the NSHED syllabus. This basic competency states that learners should "explain how sustained exposure to polluted air could affect their lungs" (NIED, 2006, p. 46). The regional scheme of work for NSHED Grade 7 (see Appendix 13) indicates that by the time of the lesson, learners would have learnt topics such as those presented in section 4.4.3.1.

Mr Enari introduced the lesson by briefly recapping the previous lesson as well as the homework question he had given to the learners. The teacher then wrote the homework question on the chalkboard: "Find out what will happen if you are exposed to polluted air?" (Ob.03//9). He then asked learners to give responses to the homework question. Learners responded as follows: "People can affect for that pollutant" (Ob.03//12), "to make people die or sick" (Ob.03//14), "animals will be affected for that pollutant" (Ob.03//17). Some of these responses were direct translations from their vernacular language, some did not address the homework question and some were correct. The teacher proceeded by saying: "The reason why I gave you this homework question is more related to what we are going to discuss today. We are looking at what will happen if we are exposed to polluted air … we need to know what will happen or what effects can this pollution have on our lungs if we are exposed to pollutant air" (Ob.03//24).

Mr Enari reminded learners of what they had learnt the previous year in Grade 6 on the respiratory system and took out a poster with a drawing of the human respiratory system and

pasted it on the chalkboard. The teacher emphasised the effects of air pollution and read them out from a chart and informed learners that their focus would be on effects of pollution on their lungs: "If we are exposed to polluted air, what form of effects does this polluted air have on our lungs?" (Ob.03//33). The teacher firstly explained how the human respiratory system functions using the poster before he went onto the topic for that day. He explained how particulate matter could be inhaled from the nostrils up to the alveoli; he continued to refer to his poster on the chalkboard. After he had explained how the respiratory system works, he handed out a worksheet to the learners and gave them three minutes to discuss in groups the effect of breathing polluted air on their lungs. The teacher guided learners by prompting them to think of what could happen to their air passages if they breathed in polluted air (telling them not to page through the books for answers).

The teacher walked around to ensure that learners were discussing. Learners discussed for four minutes and thereafter gave feedback by reading out the answers written down in their groups. Their responses were: "the lungs will start getting holes, have lung problems and start coughing" (Ob.03//48), "damage lungs and get sick" (Ob.03//49) and the last group said "affect your lungs; it can damage your wind pipe" (Ob.03// 50). It can be observed here that the learners' responses before instruction at the start of the lesson were wrong and their responses to the same question after instruction by the teacher were more in line with what was being taught and what they ought to achieve by the end of the lesson. The teacher further explained how people breathe in and out and how the respiratory system operates. He pasted a poster he had prepared on effects of breathing polluted air on the lungs and used it to explain the effects to the learners and also drew some illustrations on the chalkboard to support his explanations. The teacher then invited questions from the learners. One learner asked, "How can dust damage the lungs?" (Ob.03// 73) and he responded to this question with a series of other questions to

the learners and finally said: "If dust particles are deposited for a long time, it can block the bronchia and stops the lungs to work properly and can cause disease" (Ob.03//82) and thereafter he concluded the lesson. Figure 4.14 shows learners discussing Figure 4.15 shows a learner giving feedback after discussion.

Figure 4.14: Learners working collaboratively to answer questions

Figure 4.15: Learners answering a question

4.4.5 Teacher's selection of teaching and learning support materials to support situated learning approach

The teacher did not use any field guides during the lesson. He used posters, one of which was drawn by himself and the other by the publishers of the textbook which he used. He also drew illustrations on the chalkboard.

Mr Enari used the textbook, *Natural Science and Health Education*, written by Liz Dillet, Rose Elphick and Theresa Squazzin. This book was published by Longman Namibia in 1999.

The textbook supported situated learning approaches through the use of local examples as sources of air pollution. On page 189, the pictures used as sources of air pollution were burning fires, smoking cigarettes and spraying of insecticides. These are examples which learners could easily relate to and therefore, by using them, the teacher was able to create an authentic context.

The activity on pages 160 and 161 of the textbook also showed that assessment activities were integrated in the learning activity. One of the questions on investigating air pollution was: "What are the sources of air pollution in your environment". This was an opportunity for the

assessment activity to guide learners to apply the theoretical content to their own lives and experiences.

Mr Enari required his learners to discuss and report on assessment activities as contained in this textbook.

4.4.6 Interview data

Mr Enari has 19 years of teaching experience; his highest qualification is a Senior Primary Diploma (SPD). In response to the question of the environmental topics that he normally teaches in NSHED, he listed pollution, air and water.

According to him, his approach to teaching is that he normally asked learners to find out what they know, and then integrates the topic with the environment where he is teaching and then proceeds with the lesson (Int.02//28). He further stated that he normally gives learners practical activities and sometimes they go outside to "expose themselves to some of the things, for example, the environment either in the form of an investigation or a project" (Int.02//38). Mr Enari also said that he normally involves the learners during lessons by asking them questions and discussing.

He defined the situated learning approach as "the teaching method which is more based with the situation where you are living or where you are with the learners, is like, for example, you are trying to make learners understand or integrate what they know with what they are expected to learn and to compare what they are learning to the situation that they are living" (Int. 02//50). He, however, stated that he had been trained through the Ministry of Education in the learner-centered approach and not the situated learning approach.

Although Mr Enari indicated that policy documents such as the NSHED syllabi and the SATs reports do to some extent guide learners to learn more about the environment, he indicated that he had never heard of the Environmental Education Policy (Int.02//92).

The teaching and learning support materials that he normally uses are charts, textbooks and sometimes local materials from the environment. He indicated that some of the teaching and learning support materials are "a bit related to our environment and some are not as they were taken from an environment different from that of the learners".

Mr Enari identified the following challenges when implementing situated learning approaches:

> Some of the challenges … is with the learners, [they] do not participate … if you give [them] practical activities to do, you might find that some of the learners… might not be doing more activities …you have to repeat and give those learners enough time to do the activities and it seems it take time to do or to treat such topics. (Int.02//134)

4.5 Conclusion

In this chapter, I have presented data gathered through different methods of data collection as described in Chapter 3 (Section 3.2.3). I presented data on classroom observations and interviews with both NSHED teachers. This data was presented by firstly describing the context of the area where data was collected, thereafter describing the lessons by using the aspects of situated learning approaches as discussed in Chapter 2 (section 2.5.3) to illustrate how the teachers supported a situated learning approach during instruction. In this chapter, I have also discussed how teachers and the learning support materials they used supported situated learning. In the following chapter, I reflect on Mr Asata's and Mr Enari's teaching practice in relation to situated learning theory and environmental education by drawing on the analytical memos and a careful analysis of collected data and to answer the study's research question.

CHAPTER 5: DISCUSSION AND INTERPRETATION

5.1 Introduction

In this chapter, I analyse and discuss the data presented in Chapter 4. To do this, I draw on the analytical memos as described in Section 3.4.2.1 (see also Appendix 8), to develop four analytical statements. These analytical statements which respond to the study's research question are:

- *Analytical statement 1*: The teachers know about and wish to create an authentic context to enhance situated learning approaches. However, their understandings and applications of situated learning tend to be basic.
- *Analytical statement 2*: Teachers dominated the scaffolding process and their scaffolding strategies did not enable learners to increase independence in performing tasks.
- *Analytical statement 3*: Despite the use of situated learning approaches, learners' engagement with lesson content was superficial, and the teachers did little to encourage deeper reflections or critical thinking.
- *Analytical statement 4*: The teachers appeared to use situated learning approaches to clarify subject content but not to encourage broader environmental understanding, action-taking and change.

This chapter considers these four analytical statements and draws on relevant literature to reflect holistically and critically on the ways and extent to which situated learning approaches were used by the NSHED teachers when teaching environmental topics.

5.2 Analytical Statement 1:

The teachers know about and wish to create an authentic context to enhance situated learning approaches. However, their understandings and applications of situated learning tend to be basic.

Creating an authentic context is crucial to any situated learning process because, "the function of an authentic context is to show … relevance and stimulate [learners] to develop competencies that are relevant for their learning" (Gulikers et al., 2004, p. 510). As reported in Chapter 4, the teachers participating in the study showed a concern for creating an authentic context when teaching environmental topics in NSHED. The semi-structured interviews and the classroom observations revealed that the teachers made efforts to create an authentic context, but that their application thereof was limited by their understanding of situated learning approaches.

Mr Asata showed a fundamental understanding of what it means to create an authentic context when he explained that he normally "… lets the learners experience the environment by letting them go outside the class, walk around, finding out exactly what the topic is all about on the environment where they are living" (Int.01//58). This resonates with Mr Enari's response that he "will take them outside, expose them to some of the things [in] the environment" (Int.02//29). This indicates that both teachers' understandings of creating an authentic context centre on exposing learners to the local environment. Herrington and Oliver (1995) would regard this understanding as limited as he believes that authentic context can be created by using both the real and virtual environments. These virtual environments can be created with pictures, posters, videos or even storytelling.

The teachers' particular understanding of creating an authentic context affected how they applied the concept of situated learning approaches in their classrooms. Mr Asata tried to use context as a starting point when teaching about air pollution. He firstly took the learners to observe paper being burnt at the rubbish dump but his learners merely observed without additional mediating tools such as information about the effects of pollution, or a worksheet to guide their observations, or activities to propose solutions to the problem of waste disposal in their community. The visit to the school's rubbish dump was spontaneous and responsive to the unfolding classroom interactions, but was not well-developed in terms of conceptual depth, clarity of explanations, and linkages to prior knowledge and own context. Based on his interview responses and the elements of his lesson, it appears that Mr Asata consciously aimed to situate his Natural Science lesson in an authentic context, but lacked a sophisticated understanding of what it meant to create *and sustain* an authentic context.

He also gave examples during the lesson which were relevant to learners' experiences and context. For example, he gave an example of using lead-free petrol when explaining how pollution caused by smoke from exhaust cars could be reduced (Ob.01//43). This is relevant to learners' context because petrol filling stations in Namibia have both leaded and unleaded petrol pumps.

During his lesson on 'Air Around Us', Mr Asata created an authentic context when he asked learners to go outside and observe the effects of wind on humans, animals and plants: "I want you to go around the environment, to go around the school to identify for me the benefits of wind in our environment" (Ob. 04//l 29). By doing this, he gave his learners an opportunity to investigate the effects of wind in their own local environment. He also gave an example of wind's benefits by referring to the sweat which had evaporated on learners once they went outside the classroom: "People were sweating inside here but when we went outside, their sweat has dried up, and so it has cooling effect" (Ob.04//51). Another example he gave was of

the drying effect of wind when he explained that if one washed clothes in the night and hung them in a room where there is no sunlight, the clothes will still be dry the next day. He attributed this to moving air in the room (Ob.04//62). This is a very familiar experience for many learners who, due to their socio-economic status, have only one shirt which they wash at night and wear the next morning. This example made the subject content on the drying effect of wind more meaningful for the learners.

Mr Enari also created an authentic context when he based his lesson on a real life problem. The topic 'Effects of Pollutants (Air Pollution) on Humans' (Ob.03//6) addressed real life problems affecting learners on a daily basis. In his teaching, Mr Enari contextualised the lesson to help learners relate to the content being taught. He also used examples to which learners could relate: "Let's take an example that locally here we have pollutants like carbon monoxide, particulate matter" (Ob.03//51). In another instance, he said: "We have to make sure that our lungs are protected. Smoking can cause cancer. Cancer is one of the problems that those people who smoke can have" (Ob.03//70). Cancer is a common disease which learners are familiar with and would be interested in preventing. Mr Enari also helped to establish an authentic context for learning by pasting a poster of the respiratory system on the chalkboard. By doing this, he allowed learners to connect the abstract ideas of what they were learning with the real life situation of their own respiratory system, guiding them to consider their real life situations and to apply their knowledge.

He further created an authentic context when he informed learners that their lesson would be based on the sources of air pollution in their environment: "The first thing we are going to have here; we want to look on the sources that we have in our environment" (Ob.02//18). The whole lesson was focused on the learners' context, including the questions he asked such as: "What type of sources do we have in our environment?" (Ob.02//21). The prepared worksheet also referred to the learners' local environment, for example, question 4 on the worksheet required

learners to list four sources of pollution in their environment. Mr Enari drew on learners' knowledge and experience of their own environment during the lesson by saying: "Some people use woodstoves; let's think of the things that we are using in our homes" (Ob.02//53) and by giving examples which were highly relevant to learner's daily lives:

> In our villages, we have those small shelters where we always make fire. Do you always check on the roof? What do you always see? There are some brown dark substances that are created in the grass; those things are some of the things that come from burning wood, those are some of the pollutants from burning wood. (Ob.02//130)

This example of burning fire in traditional huts to explain pollutants from burning wood is relevant to learners' contexts as most of them use firewood for cooking and they could easily relate to the teacher's example.

During their NSHED lessons, both teachers used local examples that were relevant to learners' daily lives. However, their relevance and contribution to the learners' understanding of the lesson content cannot be determined because, according to Herrington and Kevin (2009, p. 4) an authentic context, *"needs to reflect the way the knowledge will ultimately be used*...it presents the whole environment first rather than introduce elements one by one" (Herrington & Kervin, 2007, p. 4, my emphasis). Similarly, "teachers should … select learning content and methods *on the basis of learners' needs within their immediate environment and community*" (NIED, 2006, p. 1, my emphasis). These expectations of situated learning go beyond the extent to which both teachers tried to create an authentic context in the lessons I observed. They limited their creation of an authentic context to giving local examples relevant to learner's lives yet fell short of giving learners ample time to discuss and interact with each other so that they could create meaning and knowledge on how they would use the acquired knowledge to solve real-life problems.

Brown, Collins & Duguid (1989) argued that creating an authentic context is not simply about giving suitable examples from real-world situations to illuminate the concept or issue being taught, or giving shorter disconnected examples. Rather, it is about providing a rationale and motivation for learning and sustaining a prolonged engagement in a complex learning environment. This view is supported by Chisholm and Leyendecker (2008) who described learning as a mentally active process where meaning is developed by relating prior knowledge and experiences in the cultural and social context to the content being taught.

This implies that an authentic context is crucial for learners. It enables them to understand concepts, develop meaning and use the acquired knowledge to find solutions to real life problems. In an authentic context, teachers need to support learners to comprehend the content being taught, and acquire skills and knowledge to solve real life situations. The teachers' approaches to scaffolding learning in situated learning processes are the focus of the next analytical statement.

5.3 Analytical Statement 2:

Teachers dominated the scaffolding process and their scaffolding strategies did not enable learners to increase independence in performing tasks.

As discussed in Section 2.5.1, scaffolding is a process through which teachers use a variety of teaching methods to support learners to acquire skills and reach higher levels of comprehension which they could not have achieved without assistance (Pea, 2004). Scaffolding is an important process in situated learning processes and when teaching environmental topics in NSHED because scaffolding increases the capability of learners to carry out tasks on their own and achieve a learning goal (Fisher & Frey, 2008). Scaffolding is crucial in increasing the capacity of learners to work independently. This resonates with the aim of the situated learning approach which is to equip learners with skills and knowledge which they can use to solve real life

problems as well as the goal of environmental learning which is the development of critical thinking skills and commitment to action (NIED, 2006). The main reason why learners are taught environmental topics is for them to acquire knowledge and skills on how they can mitigate the impacts of social-ecological challenges within their context. In the Zambezi region, the knowledge and skills are required to mitigate the impact of challenges such as climate change, air pollution, deforestation, and inappropriate waste disposal, among others (see Section 1.5).

Analytical memo 3 indicates that both Mr Asata and Mr Enari explained that they normally elaborated and clarified concepts and content when learners did not understand. Mr Asata said, "I come in and explain more between natural and man-made pollution" (Int01//46). Mr Enari also indicated that, "After finding out what the learners know is when I will try to bring in the learners, what they will say or what they will tell me according to what they know and then I will integrate it with the topic we are going to discuss. Then I think is when I will proceed with the topic" (Int.02//30).

In both case studies, the teachers explained and elaborated on concepts and content when learners seemed not to know the answer or understand concepts. Mr Asata said: "What do we mean by natural air pollution? We refer to pollution which occurs naturally in the environment, doesn't need human assistance" (Ob.01//19). Mr Asata said, "We cannot avoid digestive gases from animals. Who can tell me why we can't prevent it? … (Learners are silent)…Who can give me the reason for not preventing gas from animals? This is because it falls under natural air pollution. There is no way we can prevent it because it falls under natural air pollution" (Ob.01//49).

In case study 2, Mr Enari used similar scaffolding strategies when teaching environmental topics in NSHED. Mr Enari said:

> They must buy and use solar ovens; do we know what solar oven is? [*Learner response*]. It is something that is using the sun's energy. It is made of other materials, card box and glass. Glass can trap in the sun's energy and use it for cooking. In other words, when we use this solar oven, you find that there is nothing like smoke or gas produced" (Ob.02//72).

Later in the same lesson, Mr Enari said:

> If we are exposed to pollutant air, what form of effects does this pollutant air have on our lungs? [*Learners are silent*]. So before we come to this part, let's have a look on parts of our lungs. Our lungs forms part of the respiratory system, we have the parts, some of them are not labelled, the nostrils, then we have got wind pipe, bronchus, bronchioles, these are the lungs. (Ob.03//32)

These demonstrations are in line with the NSHED syllabus which advocates for direct, teacher-led scaffolding: "teachers should decide when learners need directed learning and when they need reinforcement or enrichment learning" (NIED, 2006, p. 3).

In as much as both teachers exhibited some scaffolding strategies, they tended to dominate the scaffolding process. They did not provide adequate time for learners to interact with them as teachers and neither did they involve learners in peer teaching activities nor involve experts or even show videos of experts giving lectures on the topics they were teaching.

The teachers' use of teaching and learning support materials was insufficient; in both cases it was limited to the use of a poster. Other teaching and learning support materials were hardly used to enhance learners' understandings during the lessons. In case study 2, Mr Enari referred to a poster showing the pollutants and their main sources, but this interaction was brief and did little to enhance learners' understandings (Ob.02//72).

Learners were given opportunities to collaborate but their collaboration was normally rushed as they were sometimes only given two minutes and their participation was minimal. Mr Enari said: "Can you think of other effects that are possible that can cause problems to our respiratory system? So I give you a piece of paper here, discuss in two or three minutes" (Ob.03//43). As discussed in section 2.5.3.4, the situated learning approach considers social interactions to be crucial in knowledge creation. Therefore, if learners spend such limited time interacting with one another, they are unlikely to deepen their understanding of concepts or acquire tacit knowledge which is mostly acquired through interpersonal interactions (Bereiter, 2002).

In this section I have discussed teachers' scaffolding strategies exhibited in the two case studies. The scaffolding process affects the extent to which learners engage with the NSHED content. If done effectively, scaffolding should enable learners to develop critical thinking skills and increase their independence to carry out tasks. This is of relevance to the following analytical statement in which I discuss learners' limited engagement with the content, noting the teacher's role in facilitating deeper reflections and deeper thinking.

5.4 Analytical Statement 3:

Despite the use of situated learning approaches, learners' engagement with lesson content was superficial, and the teachers did little to encourage deeper reflections or critical thinking.

Critical thinking and reflections are crucial in environmental learning because one of the key goals of environmental learning is development of critical thinking skills and commitment to transformations to sustainability (Kyburz-Graber, Posch & Peter, 2003). This is supported by the Education for Sustainable Development (ESD) strategy for Namibia which states that: "The overall aim of ESD is … giving people knowledge to help them find new solutions to their social, economic and environmental issues" (UNESCO, 2009, p. 6). In NSHED, critical

thinking skills are required so that learners can apply them when solving problems (NIED, 2006). Reflections seem to have an important role in enabling critical thinking because when learners think critically about something, they would need to assess, evaluate and choose appropriate strategies or create new meaning.

Reflections are "those intellectual and affective activities in which individuals engage to explore their experiences in order to lead to new understanding and appreciations" (Boud et al., 1985, p. 19). Rogers also defined reflection as the "process of reconstructing and re-organizing experiences which will lead to the meaning of experience" (2002, p. 845) More instrumentally, critical thinking is described by Halpern (1996) as the use of cognitive skills and strategies to achieve a desired outcome.

There seems to be an assumption in the literature that when situated learning approaches are used as a teaching strategy, learners' levels of understanding and participation increase. However, data from these two cases suggests that it does not necessarily increase. There was no evidence in the observational or interview data that teachers encouraged learners to develop deeper reflections and critical thinking. Learners' responses to questions asked during the lessons did not exhibit deeper reflections. Learners offered only very simple and brief responses; they did not (or could not) elaborate or explain their ideas when asked. For example, during the lesson on the air around us, when Mr Asata asked learners to investigate the benefits of wind, learners gave responses such as "kites flying" (Ob.04//45), "wind is making fast" (Ob. 04//45), "wind makes the fast air to fly" (Ob.04/ 39). These responses do not indicate that learners were engaged in deeper reflections about the lesson content. Some learners said, "wind speeds up evaporation of sweat" but they could not elaborate to show their understanding of the cooling effects of wind and nor did the teacher probe learners during that interaction to gauge the depth of their understanding.

The same trend was also observed in case study 2, lesson 1, when learners responded to the Mr Enari's question on naming the sources of pollution. Mr Enari did not ask learners to expand on their responses to find out whether they understood how the listed sources caused air pollution. Another example is when learners gave responses on how to reduce pollution; learners did not explain further how the use of solar ovens could reduce air pollution. This indicates that learners did not engage critically with the lesson content. Nor did they show evidence of reflecting on the relevance and applicability of the content being taught to solve real-life problems within their local environment.

Cumulatively, the quality of the interactions amongst learners during the lessons' scaffolding activities, and the types of questions posed by the teachers during assessment, appear to have done little to enhance the development of learners' critical thinking skills and deeper reflections. As discussed under Analytical Statement 2, the teachers' ineffective scaffolding techniques directly affected the quality of learners' engagement with the lesson content and contributed to them giving brief and shallow responses.

Teachers play a crucial role in ensuring that their learners develop grade-appropriate critical thinking skills and engage in reflections. One of the methods they can employ is to ask higher order questions which encourage critical thinking and reflections.

In this section, I discussed the limitations of learners' engagement with content and how it affected deeper reflections and critical thinking. I further discussed why deeper reflections and critical thinking are critical in environmental education, specifically in the teaching of environmental topics in NSHED. I also noted the role that scaffolding and integrated assessment can play in enabling deeper reflections and critical thinking. I now move on to discuss the role of teachers in encouraging learners to be action-oriented.

5.5 Analytical Statement 4:

The teachers appeared to use situated learning approaches to clarify subject content but not to encourage broader environmental understanding, action-taking and change.

In both case studies, there was evidence that both Mr Enari and Mr Asata used situated learning approaches to enable their learners to grasp and understand content. There was, however, little to no evidence of them encouraging learners to apply the acquired knowledge to solve social-ecological issues in their local community. This is primarily evident from the type of questions they asked learners during the lessons. For example, Mr Asata asked:

> What are human made air pollution … [*Learner responds*] … thank you very much. Human made air pollution are the ones caused by human activities, like the one you saw outside, burning papers, they are caused by us human beings, us human beings we used to burn papers. So whatever activities done by human beings which cause air pollution is known as human made air pollution. (Ob.01//08)

Mr Enari similarly asked lower order questions which did not encourage critical thinking. Mr Enari asked: "What type of sources do we have in our environment? … So to do this part, I have prepared a simple worksheet and then this worksheet I will give it to you" (Ob.02//21). These types of questions are lower order questions that required learners to recall facts.

The teachers did not design activities for learners to explore solutions to the challenges of air pollution in their community. For example, in case study 1, section 4.3.3.1 when Mr Asata took learners to the school rubbish dump, he could have designed an assessment in the form of a project encouraging learners to come up with alternative ways of disposing rubbish instead of burning and ultimately reduce air pollution around their school. Instead, he used the onsite visit

to the rubbish dump merely to stimulate interest and followed up by asking learners to return to the classroom and define human-made air pollution.

This is in contrast with the vision of ESD which is "a world where everybody has the opportunity to benefit from education and learn the values, behaviour and lifestyles required for a sustainable future and for positive societal transformation" (UNESCO, 2014, p. 14). To achieve this vision, the Global Action Programme has developed a two-fold approach to multiply and to scale up ESD action by integrating sustainable development into education and education into sustainable development.

An objective of Global Action Programme is "to re-orient education and learning so that everyone has the opportunity to acquire the knowledge, skills, values and attitudes that empower them to contribute to sustainable development" (UNESCO, 2014, p. 14). These ESD commitments resonate with the one of the major premises of the situated learning approach, that learning and action are inseparable. This implies that environment-oriented learning should be designed in such a way that learners are equipped with skills and knowledge and inspired to take action in response to environmental challenges affecting their communities (UNESCO, 2009, p. 6).

Sfard (1998, p. 5) argued that there are two metaphors for learning, *the acquisition metaphor* where learning is conceived as an "act of gaining knowledge to enable a learner to construct meaning" and the *participation metaphor* "where learning is conceived of as a process of becoming a member of a community [where a learner will have] the ability to communicate and act according to its particular norms" (Sfard, 1998, p. 6). She further argued that these metaphors exist concurrently where authentic learning occurs. She cautioned that: "An adequate combination of the acquisition and participation metaphors would bring to the fore the advantages of each of them…[Giving] full exclusivity to one conceptual [metaphor] would

be hazardous" (Sfard, 1998, p. 11). Figure 5.1 below indicates the advantage of considering both metaphors of learning. If only one is considered, then other aspects or reasons for learning will be neglected.

Acquisition metaphor		Participation metaphor
Individual enrichment	Goal of learning	Community building
Acquisition of something	Learning	Becoming a participant
Recipient (consumer), (re-)constructor	Student	Peripheral participant, apprentice
Provider, facilitator, mediator	Teacher	Expert participant, preserver of practice/discourse
Property, possession, commodity (individual, public)	Knowledge, concept	Aspect of practice/discourse/activity
Having, possessing	Knowing	Belonging, participating, communicating

Figure 5.1: The two metaphors of learning (Sfard, 1998, p. 7)

Bereiter (2002) discussed a third metaphor of learning, the *knowledge-creation metaphor*. This metaphor helps learners to advance their knowledge and guide the transformation of practices as well as support learners in reflecting on and changing their communities. This implies that when situated learning approaches are used to teach environmental topics in NSHED, learners should be able to acquire knowledge (acquisition metaphor), use the acquired knowledge collaboratively with others (participation metaphor) and discover / create new ways of addressing challenges within their community (knowledge creation metaphor). It is therefore crucial for teachers to consider that, "Knowledge is not learnt for its own sake, but must always lead to new understanding and new skills and the creation of new knowledge" (NIED, 2010, p. 4). Learning experiences should be deliberately planned to give learners opportunities to acquire knowledge, use it and create new knowledge. These types of learning processes were not observed in the two case studies presented in this study. Both teachers focussed their efforts on transmitting to learners declarative knowledge (formal knowledge) as prescribed by the curriculum. Such an approach reflects only the acquisition metaphor of learning. It further reflects that procedural knowledge (knowledge embedded in skills) which is analogous with the participation metaphor of learning and the hidden/tacit knowledge comparable to the

knowledge-creation metaphor (knowledge based on impressions or sense of things) are neglected (Bereiter, 2002).

In both cases studied, the teachers simply taught the content as prescribed in the syllabus. The assessment carried out during the lesson had little application, analytical and synthesis aspects and thus deeper reflections were not supported. The teachers' concentration on the transmission of procedural knowledge to learners did not promote deeper reflections on their learning or equip learners with skills which could enable them to take action to reduce the sources and risks of air pollution in their community. If all three metaphors of learning were taken into consideration when implementing situated learning approaches in environment-oriented learning in NSHED, learners might be able to construct new ideas and knowledge on how to respond to air pollution and other social-ecological challenges within their context. One of the earliest guiding principles of environmental education is that it should be a "continuous lifelong process, beginning at the pre-school level and continuing through all formal and non-formal stages" (UNESCO, 1978)

5.6 Conclusion

In this chapter, I drew on the analytical memos and data presented in Chapter 4 to discuss how Mr Asata and Mr Enari used situated learning approaches when teaching environmental topics in their NSHED classrooms. The chapter has highlighted that, although the teachers expressed a willingness to use situated learning approaches, their understanding of what such an approach means for pedagogy and assessments was limited. These pedagogical shortcomings did not promote reflection, critical engagement or a contextualised action-taking approach for learners to consider addressing air pollution problems in their homes and communities.

In the following, and final, chapter, I make conclusions and share some recommendations that are of relevance to the implementation of the situated learning approach when teaching

environmental topics in NSHED. I also reflect on the research process by highlighting what I could have done differently, lessons learnt through this research process as well as possible future research avenues in situated learning approaches in environmental education.

CHAPTER 6: CONCLUSION AND RECOMMENDATIONS

6.1 Introduction

In this chapter, I reflect on the analytical statements as presented in Chapter 5, and offer concluding insights that respond to the study's research question. These lay the foundation for recommendations with regard to the use of situated learning approaches when teaching environmental topics in NSHED. To my knowledge, this research that aims to provide deeper insight into the use of situated learning approaches is the first of its kind in Namibia. With this in mind, I provide a brief review of the research process that informed this study, highlighting lessons learnt and reflecting on what I could have done differently. I also make recommendations for further study.

6.2 Summary of research findings

This study aimed to develop an understanding of how teachers use situated learning approaches to teach environmental topics in NSHED. In both case studies, the teachers seemed to have a basic understanding of the situated learning approach and reported that they attempted to implement the approach in their NSHED teaching. Indeed, during the four lessons that I observed, the teachers were putting into practice most aspects of situated learning approach. However, in both case studies, the teachers did not successfully enable the kind of situated learning processes as described in the literature outlined in Chapter 2.

The teachers seemed to understand the significance of creating an authentic context but in the lessons I observed, this was mostly limited to making brief reference to local examples from everyday life. The scaffolding process was mainly dominated by teacher-led explanations and activities; they did not explore other ways of providing scaffolding such as inviting and involving experts or drawing on other learners for peer teaching. This was a missed opportunity because it is during this process that learners' capacities to complete tasks independently could

be enhanced. As discussed in section 2.5.3.2, effective scaffolding can enable the development of deeper reflections and critical thinking skills in learners.

Although both teachers supported the concept of collaborative instruction, this was rushed and mostly teacher-led. In the lessons I observed, learners were not given ample time to discuss and participate in their learning so that they could enhance understanding of content being taught. For instance, most group discussions were limited to two or three minutes. The consequence of these rushed, knowledge-deprived interactions was evident in the simplicity of the responses which learners gave to the questions asked.

The ultimate goal of using situated learning approaches is to equip learners with skills, knowledge and competencies to take action or be actively involved in resolving some social-ecological issues in their context. However, in both case studies it was evident that the teachers used situated learning approaches to teach content and not as a means to encourage learners to take action.

It is therefore important that when learners are taught environmental topics, the teachers should strive to reduce the gap between educational processes and real life; the activities given by teachers should be developed around environmental problems in – and of relevance to – the community in which the learners live.

6.3 Recommendations for the use of situated learning approaches

Recommendation 1:

Situated Learning Approaches should be integrated into pre- and in-service teacher training

Teachers need to be equipped with knowledge and skills on the application of situated learning approaches when teaching environmental topics. As discussed in Section 5.4, an important aim of environmental education is to encourage and enable learners to mitigate the impact of social-

ecological challenges in their context and teachers play a major role in developing learners' abilities to do so. According to the United Nations Global Action Programme (GAP), teachers are perceived "to be powerful agents of change for delivering an educational response to sustainable development" (UNESCO, 2014, p. 20). As such, it is imperative that teachers "acquire the necessary knowledge, skills, attitudes and values" (UNESCO, 2014, p. 20) or they may not be able to bring about change in learners' attitudes towards environmental sustainability.

Integrating situated learning approaches in pre- and in-service teacher training will equip teachers with the skills and knowledge and clear guidelines on how to implement situated learning approaches. It is crucial, therefore, for the University of Namibia and other higher education institutions offering qualifications to Namibian teachers to integrate innovative teaching approaches so that teachers are well-oriented to situated learning approaches prior to their employment. It is also important that those already in service be supported through, for example, professional development courses.

In Namibia, it would also be of great benefit to build the capacity of Senior Education Officers, those who are members of the Regional Continuous Professional Development Committees, and those tasked with the responsibility of planning teacher professional development and the monitoring of teaching and learning in NSHED.

Recommendation 2:

Teachers' understanding of what creating an authentic context entails should be enhanced.

Recommendation 1 above calls for teachers to be equipped with pedagogical knowledge so that they would know how to implement the situated learning approach. There is still a need for teachers to be engaged in practical learning so that they would understand from observing others what creating an authentic context entails. Training of teachers in reflexive learning

processes, and acquiring knowledge about different learning contexts and situations (Songqwaru, 2012) is crucial to enhancing teachers' understanding of what creating an authentic context entails. Data from this study has revealed that teachers' understandings of creating an authentic context is limited to giving local examples whereas literature indicates that creating an authentic context is more than simply giving local examples when teaching. To effectively create authentic contexts, teachers need to have subject matter knowledge. Once they understand the content they are teaching and also understand what an authentic context is, then they would be able to create a relevant context when teaching. This implies that teachers should be assisted in syllabi interpretation both pre-service and in-service. The relevance of an authentic context and its application in a teaching and learning environment has been discussed in Chapter 2.

Recommendation 3:

Lessons on environmental topics should be oriented to contextualised action-taking and change.

The aims of ESD and environmental education have already been discussed in Recommendation 1 above. It is important that teachers plan lessons with these broad aims in mind. Lessons should be presented in ways that encourage learners to take action in addressing relevant social-ecological issues surrounding them. Teachers would be better able to achieve this if they were equipped with knowledge and skills on how to plan lessons in this way. It may also be helpful to consider the three metaphors of learning as suggested by Sfard (1998) and Bereiter (2002) when designing teaching and learning interventions.

6.4 Reflections

In this section, I reflect on the overall research process. Conducting this interpretive case study has been an opportunity for me to learn more about research and in particular data analysis and the development of analytical memos. I have found the process of developing analytical memos to be very useful because they assisted me with the daunting task of presenting my data. My research skills have developed through this research project; they are skills that I will be able to use professionally because I deal with policy formulation and quality assurance. Similar processes of data sorting, reduction and data analysis supported by analytical memos can be used.

6.5 Limitations and recommendations for further study

There are limitations to the study because only two teachers were observed and interviewed. I feel that more teachers should have been involved in the study for a richer data set but this could not be possible due to time constraints and the processes involved in data analysis. Insights gained from these two cases have been interesting and indicative of challenges to taking a situated learning approach to teach environmental topics in NSHED. Ideally, this case study approach could be extended to five to ten other schools in the Zambezi region, and even to schools in other regions of Namibia. I also feel that a comparison between an urban and a rural school could have added another perspective to the research.

Further studies could be set up as action research projects in which teachers are firstly capacitated on the situated learning approach and thereafter participate in reflective cycles of teaching and innovation.

6.6 Conclusion

This chapter has discussed the analytical statements presented in Chapter 5 and these formed the basis upon which findings of the study were derived. Recommendations based on the findings were also shared.

This study contributes to the field of educational research, particularly on the use of the situated learning approaches when teaching environmental topics in NSHED. It has been established that teachers who participated in this study had limited knowledge and understanding of situated learning approaches to teaching and learning. Their level of knowledge and understanding with regard to the use of situated learning approaches affected how they used this approach when teaching environmental topics in NSHED.

It has further been established (albeit only through literature and not case study data) that the use of situated learning approaches may equip learners with relevant knowledge and skills and even encourage them to develop innovative ways to mitigate the impact of social-ecological challenges within their local community. Furthermore, the use of the situated learning approaches has long-term benefits as learners may acquire collaborative skills which they will need in future when dealing with environmental issues. The recommendations suggested in this study could be used to influence the pre-service and in-service teacher programmes in Namibia.

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APPENDICES

Appendix 1: Document Analysis of National Policies and how they support Situated Learning Approach

ASPECTS OF SITUATED LEARNING	NSHED SYLLABI	EE POLICY	BROAD CURRICULUM	EDUCATION FOR SUSTAINABLE DEVELOPMENT (ESD) STRATEGY
AUNTENTIC CONTEXT	The learning content in this syllabus is based on the Namibian context…teachers are therefore urged where appropriate to use local examples to illustrate scientific issues, concerns and processes. (P.3)	An important strategy in achieving this is the need to promote environmental education amongst children and adults by incorporating environmental issues into the school curricula.(p.3)	An appropriate pedagogy is learner-centered through free and structured play-learning.P.3	Therefore, training and development approaches will be tailored to local needs and geared to provide knowledge and skills of social environmental concerns. (P.24)
	Teachers have a holistic view of the leaner valuing the learner's life experience as the focal point of learning and teaching. (P. 1)	In turn, the MBESC responsible for formal education has set out its aims to encourage and promote in learners a holistic understanding of the dynamic interdependence of all living things and their environment..	In the Lower Primary phase the learners learn to read and write in two languages; they learn basic mathematics; they learn about the community and nature around them and how to look after their health; and they develop their creative and expressive abilities.P.3	Educational research is needed to…ensure learning approaches that are issues – based and relevant. (P.25)
	Teachers should therefore select learning content and methods on the basis of learner's needs within their immediate environment and community. (P.1)	an involvement in practical activities to preserve and sustain the natural environment through…a learner-centered methodology that promotes learning through understanding….continuou	All our learners need to understand the nature of these risks and challenges, and how they will impact our society and the quality of life of our People now and in the future. P.3	To establish sustainable development issues and concerns in the country that needs to be incorporated into the curricula at all levels. (P. 39)

		s assessment of the learning process...		
ASPECTS OF SITUATED LEARNING	**NSHED SYLLABI**	**EE POLICY**	**BROAD CURRICULUM**	**EDUCATION FOR SUSTAINABLE DEVELOPMENT (ESD) STRATEGY**
	Places more emphasis on the learners' understanding of the physical and biological world around them at the local, regional and international level. (P.2)	Environmental Education must involve an holistic approach and thus an interdisciplinary focus in the relation between human beings and the environment.P.6	they must understand how these risks and challenges can be addressed on a personal, local, national and global level and how they can play a part in addressing these risks and challenges in their own school and local community. P.3	Contextually relevant approaches to ESD are essential in a culturally diverse society. (P. 25)
			Preparation for a knowledge-based society requires a learner-centered approach to teaching and Learning. P.4	
REFLECTION & ARTICULATION	Leaners should possess the ability to communicate fluently by being able to tell, act out, draw, write, explain, show, discuss, display, report and dramatize. (P. 2)			
	Learners should have the ability to think critically in solving problems and apply these skills to tasks.(P.2)		Knowledge is not learnt for its own sake, but must always lead to new understanding and new skills and the creation of new Knowledge .P.4	The overall aim of ESD is to... by giving people knowledge to help them find new solutions to their social, economic and environmental issues. (P. 6)
			to enable the learners to think scientifically, solve problems, and	...to enhance critical thinking for generating solutions and alternatives. (P. 25)

			reflect on and apply knowledge, skills, values and attitudes;P.14	
ASPECTS OF SITUATED LEARNING	**NSHED SYLLABI**	**EE POLICY**	**BROAD CURRICULUM**	**EDUCATION FOR SUSTAINABLE DEVELOPMENT (ESD) STRATEGY**
SUPPORT COLLABORATIVE INSTRUCTION	Taking part in learning activities by reflecting to others and taking responsibility of one's actions. (P.2)	The emphasis will therefore be on participation, sharing, exchanging of ideas and skills among the interested groups. P.8	There are three sets of preconditions for the successful implementation of the curriculum and the provision of quality education: first, the curriculum itself; secondly, conditions in and around the school which promote teaching and learning, including the teachers themselves; and thirdly, conditions in society at large which enable learners to use the knowledge and skills which they have gained. P.5	ESD is also action-centered and focused and requires participatory, practice based, learner centered approaches. (P.25)
	Learners learn best when they are actively involved in the learning process through a high degree of participation, contribution and production. (P.3)		Learners must be able to work effectively, independently and in groups;P.10	Material development that supports active, participatory and practical engagements with issues at both local and global levels is needed. (P. 25)
	Cooperative and collaborative learning should be encouraged wherever possible. (P.3)			
	Working in groups, in pairs, individually or as a whole class must			

	therefore be organized as appropriate to the task in hand. (P.3)			
ASPECTS OF SITUATED LEARNING	**NSHED SYLLABI**	**EE POLICY**	**BROAD CURRICULUM**	**EDUCATION FOR SUSTAINABLE DEVELOPMENT (ESD) STRATEGY**
EXPERT FPRMANCE & MODELLING (APPRENTINCESHIP)	The teacher should also decide when learners need directed learning and when they need reinforcement or enrichment learning		teachers are equipped with all the necessary teaching aids, technology and other relevant materials to support effective learning and have the skills to develop and adapt materials themselves to suit multi-ability groups of learners. P.5	...to strengthen contextual and active approaches to learning. (P.25)
			teachers teach effectively so that learners progress evenly through each phase. P.5	
INTERGRATED ASSSEMENT OF LEARNING WITHIN TASK	Assessment are...to support learning		At each step of the way, learners must show how competent they are in what they understand and can do. P.5	ESD requires changes in the methods used for...and assessment. (P.25)
	The use of formal written and oral tests ...therefore should not take a great deal of time. (P.47)		Learners' progress and achievements will be continually assessed. P.5	
	The teacher should as far as possible use the same sort of situation as ordinary learning and practice situations to		Systematic assessment gives a clear picture of each learner's progress and achievements, and areas that need strengthening. It should be used to improve	

	assess the competency of the learner. (P.47)		teaching and learning strategies. P.11	
	Types of assessments should be Practical investigations, projects, topic tasks and topic tests. (P.49)			
ASPECTS OF SITUATED LEARNING	**NSHED SYLLABI**	**EE POLICY**	**BROAD CURRICULUM**	**EDUCATION FOR SUSTAINABLE DEVELOPMENT (ESD) STRATEGY**
INTERGRATED ASSSEMENT OF LEARNING WITHIN TASK	Investigate human activities which have positive and negative impact on the environment. (P.45)			Ensure that the curriculum content….translates the principles of ESD in a practical way. (P.32)
	Investigate and report on practices of soil conservation as found in their local environment. (P.46)			
	Describe at least 3 sources of air pollution(Wood smoke from cooking fires, burning bush, exhaust fumes from cars)6 (P.45)			

Appendix 2: Field Work Plan

Date	Activity
20-23 March 2014	Document Analysis
26 March 2014	Interview with Mr Asata
27 March 2014	Interview with Mr Enari
24 March 2014	Class Observation 1 Mr Enari
24 March 2014	Class Observation 2 Mr Asata
25 March 2014	Class Observation 3 Mr Enari
25 March 2014	Class Observation 4 Mr Asata
May 2015	Analysis of Data
June 2015	Writing of thesis
November 2015	Finalistion of Thesis

Appendix 3: Letter requesting for permission to conduct study

Zambezi Regional Council

Directorate: Education

Ngoma Circuit

Enquiries: J. Mamili-Mbangu

Tel: 066250611

Email: joymbangu@yahoo.com

10/03/2014

Mr. C. M. Kabajani

Under Secretary: Formal Education

Ministry of Education

Windhoek

Dear Sir,

Re: Request for permission to conduct research in Ngoma Circuit Schools

I'm currently enrolled with Rhodes University for a Master's Degree in Environmental Education and am in my second and final year of my study where I must engage in research. It is against this background that I hereby wish to request for permission to conduct research in 3 schools in Ngoma circuit.

The research will be focussing on how Grade 7 Natural Science and Health Education teachers use situated learning approaches to enhance curriculum relevance. The research will be available to the Ministry and insights gained from this case study research will be shared with the Regional Continuous Professional Development Coordinating committee and hopefully inform a professional development course that will focus on the use of situated learning approaches in Natural Science and Health Education.

I will be grateful if my request will be considered.

Yours in Education,

Ms. Joy Mamili

Appendix 4: Letter granting access to do research

REPUBLIC OF NAMIBIA
MINSTRY OF EDUCATION

Enquiries: C.M. Kabajani
Tel. 061-2933356
Fax.061-2933219
Ref: 5/1/5

Private Bag 13186
WINDHOEK

17 March 2014

Dear Ms. Mamili

Re: Request for permission to conduct research in Ngoma Circuit Schools

Your letter dated 10 March 2014 bearing the above mentioned tittle has reference:

1. Permission is hereby granted for you to conduct research in Ngoma Circuit schools as per your request.
2. Kindly ensure that your research does not disrupt normal teaching and learning activities at schools.
3. The Regional Director is hereby informed of the approval for you to conduct research in Ngoma Circuit by copy of this letter

Wishing you success in your studies.

MINISTRY OF EDUCATION
Office of the
Deputy Permanent
Secretary: Forma[illegible]ucation
2014 -03- 17
Private Bag 13186
WINDHOEK, NAMIBIA

Mr. C.M. Kabajani
UNDER SECRETARY (FORMAL EDUCATION)

Appendix 5: Observation Schedule

Observation tool (To observe the use of situated learning approaches)

School_____ Subject _____

Topic:

_____

_____

Basic
Competency:_____

_____

_____

_____

_____

Lesson
Objective_____

_____

_____

_____

Summary/ Description of the lesson

SUMMARY/ DESCRIPTION OF THE LESSON AS A WHOLE. (STEP BY STEP BASIC DESCRIPTION OF THE LESSON. E.G. ALONG THE LINES OF): "THE TEACHER STARTED THE LESSON BY xxxxx, AFTER 10 MINUTES, HE HANDED OUT A WORKSHEET AND ASKED LEARNERS TO xxx. LEARNERS STRUGGLED TO xxxx AND THE TEACHER WENT TO THE CHALKBOARD AND RE-EXPLAINED xxxx BY DRAWING A DIAGRAM OF xxx. THEREAFTER, HE DIRECTED LEARNERS TO xxx .... ETC.}.

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	Aspect observed	Comments
1.	The lesson focuses on solving an environmental concern/issue?	
2.	Were the examples given during the lesson relevant to learners' context?	
3.	Learners are Collaborating with each other, actively involved and engaged during the lesson	

4. Learners were able to predict and experiment to solve a problem	
5. There is evidence that learners are able to relate the content to their everyday lives.	
6. What teaching and learning materials did the teacher use during the lesson and how did these support Situated Learning approach.	

Other
Observations:_____

Video Transcription
Lesson observation 4
Teacher: Mr. Asata
School: Liseli P.S
Date: 25/03/2015
Topic: Air around us

Teacher: okay today we are on air around us. Can somebody define the word air for us, what is air? Our lesson is all about air, now what is air?

Learner 1: Air is a mixture of gases

Teacher:' Air is a mixture of gases, do we agree

Class: yes

Teacher: we define air as a mixture of gases. Now what type of gases are we talking about?

Learner 2: Oxygen

Learner 3: Carbohydrate

Teacher: Is carbohydrate a gas? Carbohydrate is not a gas, it is a nutrient. Thank you very much for trying.

Learner 4: nitrogen

Teacher: nitrogen and oxygen are the main gases. The two common gases are nitrogen and oxygen. Air is a combination of the two gases, mainly oxygen and nitrogen. Now what about wind? Some people can confuse air and wind. Air is a mixture of gases, mainly nitrogen and oxygen. what about wind? Talk to your friend and talk about what is wind. Ask your friend nearby. We define air as a mixture of gases, now what about wind?

Learner 5: Wind is moving air

Teacher: Wind is moving air, thank you very much, wind is defined as moving air. Now let us come to the benefits of wind. How can people benefit from moving air and wind? There are many ways in which human beings can benefit from moving air and wind. Animals, plants and we can benefit from wind. Now let us find out, I want you to go around the environment, to go around the school to identify for me the benefits of wind in our environment. How can human beings, animals and plants benefit from moving air? We go outside to find out. In your groups there find out. Take a piece of paper and find out how humans, plants and animals benefit from wind. Find out around the school. Remain in your group, make sure you remain in your group. Write even two.

Teacher: don't remain behind, okay, let's go around the school, and let's go this side.

Teacher: Let's hope you saw something around here. Okay now, we can report back what we saw outside. I exposed you to various effects of wind on plants and animals; I hope you wrote down something useful. Now the first group can report.

Group 1: wind makes the fast air to fly

Teacher: what do you mean by that?

Group 1: Animals depend on air to breathe

Teacher: animals depend on air to breathe, is that what you found outside, the next group?

Group 2: Wind is making fast

Teacher: what do you mean by that? Seed dispersal, you mentioned something about seed dispersal.

Group 3: wind makes the kite to fly

Teacher: did you see any kite flying outside? What did you observe outside and what did you discuss in your groups?

Group 4: wind is blowing the papers

Teacher: where?

Group 5: wind speeds up evaporation of sweat

Teacher: people were sweating inside here but when we went outside people they sweat has dried up, so it has cooling effect

Teacher: Pollination

Group 6: Plants need air to grow; animals need air to grow up

Teacher: Thank you very much, now eh, the benefits of air, the first benefit of air, that group over there mentioned sweating, many people were sweating inside here but when we went outside their sweat dried completely. So the benefit of wind or moving air is cooling effect. So wind outside there can also cool our body temperature or regulate our body temperature to normal from there we have also drying effect, on drying effect, when we went around there were some clothes on the wire, so without wind there is no way your clothes can dry out, so wind can also have help to dry our clothes, for example during rainy time, we also used to hang our clothes inside the room, come the following morning, the clothes are dry, now what makes them to dry if they are inside the room, the room is closed, no sunlight inside the room. So what made the clothes dry? What makes them dry?

Teacher: it is air or moving wind, causes the clothes to dry, wind can dry our clothes without sunlight.

Teacher: the other benefit is pollination, who can define pollination for us? What is pollination?

Teacher: We define pollination as the transfer of pollen grains from the anther, the male part of the flower to the female part of the follower, the stigma. Remember, a flower has a male part and a female part, wind can also help in pollination, can move the pollen grain from the anther to the stigma. So wind can also help in pollination.

Teacher: they are many benefits of wind, what else? The ones you observed outside.

Learner 6: Rain

Teacher: Did you see any rain outside today?

Learner 7: Hunting

Teacher: Hunting is someone hunting an animal today? Yes we agree but we should mention what we observed outside, let's just add on what you observed outside.

Learner 8: Grass moving

Teacher: you saw grass moving

Learner 9: Transport

Teacher: Transportation, now we talk about transport, about boats, moving boats, the wind can help in getting one boat

Learner 10: entertainment

Teacher: Entertainment, how? The kite flying. Can the kite fly without wind, yes or no?

Class: No

Teacher: Can you justify your answer, we need wind to blow the kite

Teacher: what else are the benefits of wind, yes; there are many benefits of wind

Learner 11: source of energy

Teacher: have you seen the windmill before?

Class: Yes

Teacher: can it work without wind?

Class: No

Teacher: so it needs wind in order to do what, so to provide us with water. So it is a source of energy because it uses wind to produce water. Wind is a source of energy because the windmill needs wind to provide us with water. A windmill needs moving air to provide us with water. What else?

Learner 12: Dispersing air pollution

Teacher: dispersing air pollution, the last time we went outside there you saw that someone was burning some rubbish. There wind was trying to do what? To disperse the air pollution. In other words can move the smoke from rubbish and disperse in different directions. What else is the benefit of wind?

Learner 13: Rain

Teacher: what else, the last one.

Teacher: hunting, remember animals use wind to hunt, especially lions, they use wind to hunt, and there is no way an animal can hunt without wind. They use wind to capture its prey.

Teacher: these are the benefits of wind, bow let's come to the harmful effects of wind. When we went outside, think about any harmful effects of wind you saw outside. Discuss with your friend and write it down for me. Talk to your friend.

Pair 1: wind breaks trees

Teacher: wind can uproot trees, next group, what did you find out?

Pair 2: factories

Teacher: what do you mean by factory? Justify your answer.

Pair 3: wind can kill the house

Teacher: Wind can destroy buildings. Thank you very much

Learner 14: Wind can cause diseases

Learner 15: Wind causes soil erosion

Teacher: The first harmful effect of wind, strong wind can cause soil erosion. What is soil erosion?

Teacher: the removal of topsoil by wind or water. To remove top soil which is rich in humus and this causes the soil erosion. What other harmful effects of wind, apart from soil erosion, someone mentioned about uprooting of trees.

Appendix 7: Interview guide

Introduction

My name is Joy. Z. Mamili, a Masters of Education Student at Rhodes University majoring in Environmental Education. I would like to ask you a few questions regarding the use of situated learning approaches in Natural Science and Health Education. The aim of this interview is to gain insight into your classroom practice especially in the use of situated learning approaches. Your responses will be treated as confidential and you will be given a chance to review and modify your responses at the end of this interview. You are free to withdraw from this interview at any stage when you feel uncomfortable; however your participation will be of great value to the designing of professional development courses in NSHED.

Gender_____
Age _____
Qualification _____
Years of experience_____

1. What environmental topics do you normally teach in NSHED?
2. _____
   _____
   _____
   _____
   _____
   _____
   _____
   _____Explain how you normally teach /approach the teaching of these environmental topics?_____
   _____
   _____
   _____
   _____
   _____
   _____
   _____
   _____
   _____
   _____
   _____
   _____
3. What do you understand by Situated learning approach?

_____
_____

4. What do you think are the advantages and shortcomings of using a situated learning approach?

   3.1.
   Shortcomings_____

5. 3.2.
   Advantages_____

6. Were you trained on the use of Situated Learning approaches?

   If yes, where did you get this training and what did the training teach you about this approach?

7. Are you familiar with what these policies say about situated learning approaches and to what extent have they guided you?

A) NSHED Syllabus
B) Namibian EE policy
C) SATS reports (2010-2013)

1. What teaching and learning support materials do you use in teaching Environmental topics in NSHED?

7.1. To what extent does these TLSM promote situated learning approaches? Elaborate more on your response.

8. What challenges have you ever experienced in implementing situated approaches?

Thank you for your time.

Appendix 8: Analytical memos

Data coding

Coding key

Aspect	Colour
Authentic context	Green
Expert performance and modeling (Apprenticeship)/ Scaffolding	Red
Integrated Assessment of learning	Pink
Support Collaborative Instruction	Yellow
Reflection and Articulation	Grey

Analytical Memo 1. Authentic context	Data source
Mr. Asati said that" Learners have to experience on how to conserve water in the environment in where they are"	Int.01//33
Mr. Asati said" Leaners have to experience the environment, go outside the class, walk around find out exactly what the topic is all about on the environment where they are living in"	Int.01//58
Mr. Asati said" you have to put them in learning in actual learning situation"	Int.01//102
Mr. Asati said "I normally use to use some charts produced from like when I'm teaching about pollution, learners have to see some charts about the sources of air pollution also the outside environment is one of the key aspects on that because learners have to experience the environment to find out sources of air pollution around their school"	Int.01//116
Mr. Asati said "you find that on around the school that there is a some plants that are grown to serve as wind breakers so learners have to experience the outside environment … which ways of preserving soil is shown by the school	Int.01//121
Mr. Enari said" by integrating the topic with the environment where I'm teaching"	
Mr. Enari said "will make them go outside expose themselves to some of the things for example the environment"	Int. 02//29
Mr. Enari said "…and to compare what they are learning to the situation that they are living"	Int.02//37 Int.02//53
Mr. Enari said "the topics are related to the environment where they are living and are exposed to some of the things that they are learning and it will be better for them to understand those things because those things are some of them are things that they see and do in their everyday life"	Int.02//62
Mr. Enari said "they should at least learn more about their environment and the topics themselves which we have there, they more based on the environment"	Int.02//92
Mr. Enari said "… some of them they are more a bit related to our environment try to stick to our environment"	Int.02//126
Mr Asata said "like the one you saw outside, burning papers, they are caused by us human beings, us human beings we used to burn papers"	Ob.01//13
Mr. Enari said "The first thing we are going to have here, we want now to look on the sources that we have in our environment"	Ob.02//18 Ob.02//33

Mr. Enari said "we have got sources we did last week so now we want to extract, pick some of the sources that we can see in our environment"	Ob.02//130
Mr. Enari said ".In our villages we have those small shelters where we always make fire. Do you always check on the roof? What do you always see? There are some brown dark substances that are created in the grass; those things are some of the things that come from burning wood. Those are some of the pollutants from burning wood"	Ob.03//24
Mr. Enari said "We are looking what will happen if we are exposed to pollutant air, the question is we need to know what will happen or what effects can this pollution have on our lungs if we are exposed to pollutant air?	Ob.03//69
Mr. Enari said "So we have to know that these pollutants are not good if we are exposed to them… Smoking can cause cancer. Cancer is one of the problems that those people who smoke can have. Any question?	Ob.04//28
Mr. Asata said "I want you to go around the environment, to go around the school to identify for me the benefits of wind in our environment"	Ob.04//51
Mr. Asata said "people were sweating inside here but when we went outside people they sweat has dried up, so it has cooling effect"	Ob.04//61
Mr. Asata said "for example during rainy time, we also used to hang our clothes inside the room, come the following morning, the clothes are dry, now what makes them to dry if they are inside the room, the room is closed, no sunlight inside the room"	Ob.04//99
Mr. Asata said "dispersing air pollution, the last time we went outside there you saw that someone was burning some rubbish"	

Analytical statements

1. Both teachers see the value of creating an authentic context when using Situated Learning Approach to teach environmental topics in NSHED and sought to create an authentic context
2. Creating an authentic context is likely to add value in the teaching of Environmental topics in NSHED when using situated learning approaches.

Analytical Memo 2. Integrated Assessment of learning within tasks	Data source
Mr. Asati said "I normally used to give them to learners, to find out the name of that themselves what are those terminologies… and from there when I start teaching"	Int.01//30
Mr. Asati said "if it is about distinguishing between natural and human made pollution, they have to find out themselves the difference between the two, the types of air pollution and from there they elaborate more on how the difference between the two"	Int.01//43
Mr Enari said "I might first of all find out what the learners know...after finding out what the learners knows is when I will try to bring in the learners what they will say or what they will tell me according to what they know and then … I will proceed with the topic"	Int.02//28
Mr. Enari said " I will ask questions then I will allow them only at least to come up with a little bit knowledge which is leading to what I have to teach in class and after I realize that they have something which is a bit related to what I have to teach, then I will add on top or we will discuss as a class. And then I will try to compare what they have given me with what I'm supposed to teach"	Int.02//43
Mr. Asata asked ""What are human made air pollution … ***(Learner responds)*** …thank you very much. Human made air pollution are the ones caused by human activities, like the one you saw outside, burning papers, they are caused by us human beings, us human beings we used to burn papers. So whatever activities done by human beings which cause air pollution is known as human made air pollution"	Ob.01//08
Mr Asata Asked ". Now what sources of air pollution that you know around?"	Ob.01//23
Mr. Asata asked ". How can we avoid agents of air pollution or minimise? Like the first one smoke from exhaust cars, how can we avoid them? how can we avoid smoke from burning wood"	Ob. 01//33
Mr. Asata said "find out how we can avoid smoke from burning wood…instead of burning wood or papers what must we do"	Ob.01//34
Mr. Asata said "We cannot avoid digestive gases from animals. Who can tell me why we can't prevent it"	Ob.01//49
Mr. Enari said "What type of sources do we have in our environment… so to do this part, I have prepared a simple worksheet and then this worksheet I will give it to you "	Ob.02//21
Mr Enari said "describe two ways on how we can reduce this…I will give you only 2 minutes, try to identify sources that you can find in our environment"	Ob.02//35 Ob.02//45

Mr. Enari said "Can someone give me some of the sources we can find in our environment"	Ob.02//67
Mr. Enari said "let's think of ways on how we can reduce this air pollution. ; Let's think of some, one or two ways, let's think of how we can reduce … someone is saying people must buy solar ovens; they must only buy or use"	Ob.02//84
Mr. Asata said "Let's think of ways how maybe people can reduce, maybe you can discuss with your friend ways on how you can reduce air pollution. Let's have two minutes in your groups talk to your friend (Learners respond) …we have to plant more trees around to stop the blowing of wind, that's another way; I say this is another way of reducing pollution by wind"	Ob.03//9
Mr. Enari said "The homework question was "find out what will happen if you are exposed to pollutant air?" Then go through this one, anyone who can give us the answers?	Ob.03//43
Mr. Enari said ". Can you think of other effects that are possible that can cause problems to our respiratory system, so I give you a piece of paper here, discuss in 2 or 3 minutes…okay we are going to have answers from each group. Your question or our discussion is, think of the effects pollutant air have in our lungs"	Ob.04//8
Mr. Asata said "Can somebody define the word air for us, what is air? Our lesson is all about air, now what is air ***(Learners responds)…***we define air as a mixture of gases. Now what type of gases are we talking about?"	Ob.04//13
Mr. Asata said "Now what type of gases are we talking about,(**Learners respond)…** Is carbohydrate a gas, Carbohydrate is not a gas, it is a nutrient. Thank you very much for trying"	Ob.04//26
Mr. Asata said "How can people benefit from moving air and wind? Now let us find out, I want you to go around …the school to identify for me the benefits of wind in our environment… Okay now, we can report back what we saw outside"	Ob.04//46
Mr. Asata said "did you see any kite flying outside? What did you observe outside and what did you discuss in your groups"	Ob. 04//67
Mr. Asata said "the other benefit is pollination, who can define pollination for us? What is pollination ***(silence)*** we define pollination as the transfer of pollen grains from the anther, the male part of the flower to the female part of the follower, the stigma"	Ob. 04//87
Mr. Asata said "Can you justify your answer, we need wind to blow the kite"	

ANALYTICAL STATEMENT(s)

- **Both teachers see the value of integrating Assessment of learning within tasks when using Situated learning to teach Environmental topics in NSHED**
- **Integrated assessment of learning is likely to play a major role when using Situated learning approach to teach environmental topics in NSHED**
- **Integrating assessment of learning within tasks when using situated learning approach can be valuable if used to inform the teaching and learning process of Environmental topics in NSHED.**

Analytical Memo 3. Expert performance, Coaching and Scaffolding	**Data source**
Mr. Asata said "and from there I come in and elaborate more between natural and human made pollution"	Int.01//46
Mr. Enari said "After finding out what the learners knows is when I will try to bring in the learners what they will say or what they will tell me according to what they know and then I will integrate it with the topic we are going to discuss then I think is when I will proceed with the topic"	Int.02//30
Mr. Enari said "after I realize that they have something which is a bit related to what I have to teach, then I will add on top"	Int.02//45
Mr. Asata said "What are human made air pollution … ***(Learner responds)*** …thank you very much. Human made air pollution are the ones caused by human activities, like the one you saw outside, burning papers, they are caused by us human beings, us human beings we used to burn papers. So whatever activities done by human beings which cause air pollution is known as human made air pollution"	Ob.01//12
Mr. Asata said "what do we mean by natural air pollution, we refer to pollution which occurs naturally in the environment, doesn't need human assistance"	Ob.01//19
Mr. Asata said "We cannot avoid digestive gases from animals. Who can tell me why we can't prevent it? … (Learners are silent)…Who can give me the reason for not preventing gas from animals? This is because it falls under natural air pollution. There is no way we can prevent it because it falls under natural air pollution"	Ob.01//49
Mr. Enari said "And then we have an extract on the wall and then on this activity"	Ob.02//27
Mr Enari said "Below is a chart showing the pollutants and their main sources"	Ob.02//29

Mr. Enari said "they must buy and use solar ovens; do we know what solar oven is…(***learner response***)... it is something that is using the sun's energy. It is made of other materials card box and glass. Glass can trap in the sun's energy and use it for cooking. In other way, when we use this solar, you find that there is nothing like smoke or gas produced"	Ob.02//72
Mr. Enari said "this one is referring in our homes, many people use firewood for cooking, so instead of using wood maybe, if we can use solar ovens it is another way of reducing some of the other gases"	Ob.02//82
Mr. Enari said "In our villages we have those small shelters where we always make fire. Do you always check on the roof? What do you always see? There are some brown dark substances that are created in the grass; those things are some of the things that come from burning wood. Those are some of the pollutants from burning wood"	Ob.02//130
Mr. Enari said "If we are exposed to pollutant air, what form of effects does this pollutant air have on our lungs? (***Learners are silent)***So before we come to this part lets have a look on parts of our lungs, our lungs forms part of the respiratory system, we have the parts, some of them are not labelled, the nostrils, then we have got wind pipe, bronchus, bronchioles, these are the lungs"	Ob.03//32
Mr. Enari said "if you are exposed to any of these pollutants, what are the possible effects that can we take for example, in short, have also identified the information we are going to compare what you have given me with what I'm having here as we know our lungs are responsible for gaseous exchange in our bodies, we breathe in oxygen and breathe out carbon dioxide…"	Ob.03//52
Mr. Enari said "Any question... ***(Learner asks question)*** let me repeat what I was saying, in your lungs you have got cilia, if you breathe in small particles, these particles can do what? ***(Learners respond)*** the cilia help us to do what, to trap what? ***(Learners responds)*** so if dust particles are deposited for a long time, it can block the bronchia and stops the lungs to work properly and can cause disease"	Ob.03//72
Mr. Asata said "Now what types of gases are we talking about, (**Learners respond)** Is carbohydrate a gas, Carbohydrate is not a gas, it is a nutrient. Thank you very much for trying… nitrogen and oxygen are the main gases. The two common gases are nitrogen and oxygen. Air is a combination of the two gases, mainly oxygen and nitrogen"	Ob.04//13
	Ob.04//55

Mr. Asata said "Thank you very much, … the benefits of air…that group over there mentioned sweating, many people were sweating inside here but when we went outside their sweat dried completely. So the benefit of wind or moving air is cooling effect" Mr. Asata said "the other benefit is pollination, who can define pollination for us? What is pollination ***(silence) we*** define pollination as the transfer of pollen grains from the anther, the male part of the flower to the female part of the follower, the stigma"	Ob.04//67

Analytical Statements

- **The use of Teaching and learning support materials when exposing learners to expert performance, coaching and scaffolding in the use of situated learning approaches to teach environmental topics is crucial.**
- **The involvement of experts, teachers and peers when exposing learners to expert performance, coaching and scaffolding in the use of situated learning approaches to teach environmental topics is important.**
- **Mr Asata and Mr Enari exposed learners to expert performance, coaching and scaffolding but this is only done by them and their use of Teaching and learning support materials is inadequate.**

Analytical Memo 4. Support Collaborative Instruction	Data source
Mr. Asata said "…you group your learners in groups say for them to do this and this activity"	Int.01//139
Mr. Enari said "we will discuss as a class"	Int.02//46
Mr. Asata said "Talk to the person next to you, talk to your friend nearby you"	Ob.01//34
Mr. Enari said "Although it is something which sees that you can do individually, you can also discuss with your friend"	Ob.02//40
Mr. Enari said "let's discuss mainly in groups or in pairs"	Ob.02//77
Mr. Enari said ". Can you think of other effects that are possible that can cause problems to our respiratory system, so I give you a piece of paper here, discuss in 2 or 3 minutes…okay we are going to have answers from each group. Your question or our discussion is, think of the effects pollutant air have in our lungs"	Ob.03//43
Mr. Asata said "Talk to your friend and talk about what is wind. Ask your friend nearby"	Ob.04//22
Mr. Asata said "How can human beings, animals and plants benefit from moving air…In your groups there find out. … Remain in your group; make sure you remain in your group. Write even two.	Ob.04//30
Mr. Asata said "When we went outside, think about any harmful effects of wind you saw outside. Discuss with your friend and write it down for me. Talk to your friend"	Ob.04//107

ANALYTICAL STATEMENT(s)

- **Both teachers see the value of integrating Assessment of learning within tasks when using Situated learning to teach Environmental topics in NSHED**
- **Integrated assessment of learning is likely to play a major role when using Situated learning approach to teach environmental topics in NSHED**
- **Both teachers seek to integrate assessment of learning within learning tasks but do not effectively use feedback to inform their content.**

Analytical Memo 5. Reflection and Articulation	Data source
Mr. Asata said "and from there they elaborate more on how the difference between the two"	Int.01//45
Mr. Asata said " it enhances an experience that learners won't forget in their lives, because when they master and discover things themselves then it is much easier for them to master them whenever they are asked questions"	Int.01//75
Mr. Enari said "I will ask questions then I will allow them only at least to come up with a little bit knowledge which is leading to what I have to teach in class"	Int.02//43
Mr. Enari said "the advantages is that learners will really understand the topic better"	Int.02//61
Mr. Enari said "and the approach that we have to use is that learners they have to experience by using their senses, touching, seeing those things is"	Int.02//94
Learner 2 responded " Human made air pollution are the ones that are caused by human activities"	Ob.01//11
Leaner 4 responded " fire from burning wood"	Ob.01//24
Learner 8 responded " avoid burning wood from municipal area"	Ob.01//36
Learners1 responded "burning wood"	Ob.02//48
Learner2 responded "burning fire"	Ob.02//49
Learner3 responded " smoking cigarette"	Ob.02//50
Learner 4 responded" wood stoves"	Ob.02//52
Learner 2 asked "how do wood stoves affect air pollution"	Ob.02//122
Learner 1 said " people can affect for that pollutant"	Ob.03//12
Leaner 2 said " to make people die or sick"	Ob.03//14
Learner 3 said " animals will be affected for that pollutant"	Ob.03//17
Learner 4 said "if you breathe pollutant air, it can stop blood from carrying oxygen."	Ob.03//19
Group 1 said "wind makes the fast air to fly"	Ob.04//39
Group 1 said "Animals depend on air to breathe"	Ob.04//40
Group 6 said "Plants need air to grow; animals need air to grow up"	Ob.04//54
Pair 3 said "wind can kill the house"	Ob.04//114

ANALYTICAL STATEMENT(s): Teachers provided an opportunity for learners to articulate but did seek for deeper reflections from their responses.

INTERVIEW 02: INT.02
Name of teacher: Mr. Enari
Date: 27 March 2014
School: Mason PS

JM: Ok, Good Morning Sir

Enari: Good Morning, How are you?

JM: Fine

JM: My name is Joy. Z. Mamili, a Masters of Education Student at Rhodes University majoring in Environmental Education. I would like to ask you a few questions regarding the use of situated learning approaches in Natural Science and Health Education. The aim of this interview is to gain insight into your classroom practice especially in the use of situated learning approaches. Your responses will be treated as confidential and you will be given a chance to review and modify your responses at the end of this interview. You are free to withdraw from this interview at any stage when you feel uncomfortable; however your participation will be of great value to the designing of professional development courses in NSHED. Do you give me permission to continue?

Enari: Yes you can

JM: If I can just have your age and qualification

Enari: Gender: M

Enari: Age: 41 Years

Enari: Qualification: Senior Primary Diploma (SPD)

Enari: Years of experience: 19 YEARS

JM: My first question is what environmental topics do you normally teach in NSHED?

Enari: Topics are, that is pollution, Air, Water, that is, if I recall these are the environmental topics.

JM: Can you explain to me how you normally teach these topics, like how you approach the lesson when you are teaching the lesson.

Enari: the way I always approach the topic first of all, I might first of all find out what the learners know, by integrating the topic with our environment where I'm teaching. After finding out what the learners knows is when I will try to bring in the learners what they will say or what they will tell me according to what they know and then I will integrate it with the topic we are going to discuss then I think is when I will proceed with the topic.

JM: when you are teaching the actual topic after you have integrated the learner's prior knowledge and after you have found out what the learners know and also with the local environment, what else do you do when you are teaching?

Enari: sometimes I do sometimes have some practical activities which I sometimes do with my learners If I can have learners activities that will make them go outside expose themselves to some of the things for example the environment either in form of an investigation or either a project.

JM: To what extent are your learners involved like in the classroom when you are teaching? To what extend are the learners participating and or to what extent do you allow your learners to participate in a lesson?

Enari: Sometimes, for example if I found out what they know, I will ask questions then I will allow them only at least to come up with a little bit knowledge which is leading to what I have to teach in class and after I realize that they have something which is a bit related to what I have to teach, then I will add on top or we will discuss as a class. And then I will try to compare what they have given me with what I'm supposed to teach.

JM: What do you understand by term Situated learning approach? If you hear this word situated learning approach, what comes to your mind?

Enari: Is like for example this approach the teaching method which is more based with the situation where you are living or where you are with the learners, is like for example you are trying to make learners understand or integrate what they know with what they are expected to learn and to compare what they are learning to the situation that they are living.

JM: My other question is now that you have defined situated learning Approach, What do you think are the advantages or shortcomings of using a situated learning approach in a classroom approach? If we start with shortcomings, disadvantages what do you think will be the disadvantages or even the limitations or shortcomings?

Maybe the question I did not understand it

I just want to find out the advantages and shortcomings disadvantages of situated learning

Enari: the advantages is that if you are using this approach, the advantages is that learners will really understand the topic better because the topics are related to the environment where they are living and are exposed to some of the things that they are learning and it will be better for them to understand those things because those things are some of them are things that they see and do in their everyday life.

JM: And the disadvantages?

JM: you don't think there are any disadvanatges?

Enari: I don't think there is any

JM: Were you trained on the use of situated learning approach? Did you receive any training regarding situated learning approach?

Enari: ah, no

JM: Ok, so, you were not trained on..

Enari: Maybe the term itself, maybe it is a bit confusing, situated learning, I don't know whether, maybe there there is a term maybe related to to that one, maybe I don't know exactly the definition of situate learning approach what it does mean really

JM: Which other one were you trained on?

Enari: Yeah, in our training we learnt about this Learner Centred Education

JM: ok, this Learner Centred Education, you were only trained like in your studies?

Enari: Yes, in my studies because I started my BETD for 3 years and then I had some some problem, later after a year or two I switched to Iol where I learnt about different Learner centred Education where there are many approaches which you can use in teaching and learning

JM: according to your definition of what you have defined previously of situated learning approach, because you said that it is a teaching method which is more based with the situation where you are living or where you are with the learners, is like for example you are trying to make learners understand or integrate what they know with what they are expected to learn and to compare what they are learning to the situation that they are living. What would you say, to what extent are these polices like the Natural Science and Health Education Syllabus, does it talk about situated learning approach, does it guide you on how you should use situated learning approach?

Enari: With the syllabus, on the introduction of the syllabus, this approach is explained especially in science whereby you find that the topics in Natural Science that learners they should at least learn more about their environment and the topics themselves which we have there, they more based on the environment and the approach that we have to use is that learners they have to experience by using their senses, touching, seeing those things is when they can understand better what they are learning.

JM: Now the Namibian Environmental Educator's policy? Are you familiar with it and its contents on Situated Learning Approach?

Enari: No, im not familiar with that one

JM: then the SATs reports, those reports which they normally send after the grade 7 write the SATs, do they say anything about Situated Learning Approach and to what extent have they guided you?

Enari: I went through the reports eh, maybe the term itself, I don't know whether it is a bit new to me or maybe it is explained in a different way, but we are sometimes advised whenever we go through the reports that whenever we treat the topics we have to use those reports to improve the results and to make sure that the learners understand the topics where they are not doing well.

JM: Are these reports referring on something like, if you think back and reflect on your own understanding on what Situated Learning Approach is, do the reports refer to anything like that?

Enari: Yeah, they refer most especially on the topic, some of the topics where learners appear to be not doing well, they refer, are always advise that these topics is likely that maybe we don't treat them in a correct way because it seems most you find that most of the topics that are more practical, it seems we don't have more time, we do always approach our learners in a theoretical way other than practical.

JM: What teaching and learning support materials do you use when you are teaching environmental topics in your subject?

Enari: We use sometimes, the textbooks, the charts, already prepared charts on the environment and also we use our own local materials.

JM: Now these charts on the environment, are they prepared by the teachers or they come already prepared with textbooks by the publishers?

Enari: Some of them are prepared by the publishers; especially I sometimes use these ones

JM: To what extent do these teaching and learning support materials promote Situated Learning Approach? Let's say for example, the textbooks, the charts, the local material, do they promote situated learning Approach?

Enari: To a certain extent they promote because some of them they are more a bit related to our environment and some are not because they were taken from the different environment which is not the same like our environment here so we have sometimes to ---- from the charts and then try to stick to our environment.

JM: So according to your own understanding, like what you told me what situated learning Approach is? What challenges have you ever experienced in implementing this when teaching?

Enari: Some of the challenges, sometimes maybe is with the learners, some learners do not participate, coming to the practical activities if you give some learners practical activities to

do, you might find that some of the learners, they might not be doing more activities, you have to repeat and give learners some practical activities to do. You might find that some of the learners, they might not be doing those activities, you have to repeat and give those learners enough time to do the activities and it seems it takes time to do or to treat such topics.

JM: Do you think in your opinion you need training on Situated Learning Approach. More training or you are satisfied with?

Enari: No, I think I need more training

Republic of Namibia

MINISTRY OF EDUCATION

UPPER PRIMARY PHASE

NATURAL SCIENCE AND HEALTH EDUCATION SYLLABUS

GRADES 5 - 7

FOR IMPLEMENTATION IN 2007

Ministry of Education
National Institute for Educational Development (NIED)
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Okahandja
Namibia

Natural Science and Health Education Upper Primary Phase Syllabus Grades 5 - 7

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TABLE OF CONTENTS

INTRODUCTION

The revised syllabi for Natural Science and Health Education Grades 5-7 have been developed in such a way that they describe the intended learning outcomes and assessment practices for the Upper Primary Phase within the science mainstream. The learning experiences and subsequent outcomes in the natural science subjects are tailored towards promoting the learners' knowledge and understanding of their physical and mental health as well as the physical and biological world of which they are a part. The Natural Science and Health Education syllabi for the upper primary therefore integrate natural science, social, economic, physical, mathematical and technological learning areas of the broad curriculum and seek to motivate learners to effect changes in behaviour which promote good health and help them acquire and use the skills necessary to secure improvements in health.

Furthermore, the Natural Science and Health Education syllabi were developed in a clear and simple style in order to convey the ethos of learner-centred education. Learner-centred education presupposes that teachers have a holistic view of the learner, valuing the learner's life experience as the focal point of learning and teaching. Teachers should therefore select learning content and methods on the basis of the learners' needs within their immediate environment and community.

The themes and topics in the Natural Science and Health Education curriculum embrace content matter in all other subjects across the curriculum. Under ideal conditions, the Natural Science and Health Education syllabi for Grades 5-7 would require 3 periods per week.

RATIONALE

Learning experiences in the natural science area are focused upon promoting teaching and learning for understanding. Namibia, like most African countries, is rich in natural resources. The exploration of these resources requires scientific knowledge and relevant skills. The acquisition of scientific knowledge and skills presents itself as a prerequisite for a progressive national economy and improved standard of life for our people. Thus it is important for our learners to acquire knowledge and skills which will foster their understanding of the interaction of human being and the environment in order to satisfy human needs. It must be understood that the physical and biological world around us is quite complex and therefore needs to be understood in a holistic manner by the society in order to sustain the natural resources.

The sustainability of our natural resources, however, requires advanced technology through the efficient and effective usage of equipment, materials and processes. Modern technology is required in order to assist our learners and society to solve problems through planning, design, realisation, and evaluation of activities and goals.

AIMS

The main aim of the syllabi in the natural science area is therefore to provide essential scientific background for our learners with the hope of producing the much-needed scientists for the country. The Namibian society needs to be scientifically literate if it is to cope with challenges of appropriate global technology and other requirements.

The subject Natural Science and Health Education within the natural science area promotes the following aims in the curriculum guide:

Knowledge with Understanding

- develop knowledge, understanding, creativity, practical and experimental skills as a solid foundation for academic training to prepare learners for creative and meaningful adult life

- help learners develop self-confidence, self-knowledge and understanding of the world in which they live, through meaningful scientific activities

Values and Attitudes

- develop a sense of responsibility towards the environment, relating scientific practices to sustainable use of natural resources

- demonstrate desirable behavioural patterns and frame of mind in interacting with the environment in a manner that is protective, preserving and nurturing

- develop attitudes and practices, further knowledge and activities that promote the physical and mental health of the society

- develop and enhance respect for, understanding of, and tolerance of other people's beliefs, cultures and ways of life

Scientific Skills

- develop a lively, questioning, appreciative and creative intellect to enable learners to discuss issues rationally, to make careful observations and analysis, to think scientifically, to solve problems and apply these skills to tasks

- promote Information Communication Technology (ICT) as a tool to enhance understanding of the learning content

Democratic Principles

- promote equality of opportunity for females and males, enabling both sexes to participate equally and fully in all spheres of society and fields of employment

lay a foundation for informed and responsible attitudes and choices towards the balance of population growth, ecological sustainability, and the quality of life for all citizens of Namibia

COMPETENCIES AND LEARNING OUTCOMES

Competencies

Basic Competencies are the basic cognitive operations, skills and attitudes and values that all learners in Namibian schools are expected to demonstrate, and which can be assessed. The Basic Competencies specified in the natural science subjects are intended to help teachers identify the normal progress and all-round development of the learners at each stage. The expectation from the Ministry is that most learners in the Upper Primary Phase will achieve the Basic Competencies, some very well or exceptionally well, and will progress from one grade to the next. Learners who partly achieve the Basic Competencies will also be able to progress to the next year with compensatory teaching.

It is important to know that entry into Upper Primary education will depend on the learner's performance in the summative assessment at the end of Lower Primary Education. Likewise, promotion through grades 5-7 will depend on the performance of learners from one grade to another as per criteria stipulated on page 36 of the Pilot Curriculum for Formal Basic Education of 1996.

Learning Outcomes

On completing Grade 7, learners in the Natural Science stream should be in a position to discover and develop their potential and interests in essential science that prepares them for varied aspects of life. They should possess the necessary skills in the scientific area of learning as tools to understand the scientific principles embedded in their natural environment.

The skills include the following:

Communication Skills: the ability to communicate fluently by being able to tell, act out, draw, write, explain, show, discuss, display, report and dramatise

Information Skills: recognition that information becomes accessible in various forms and learners need to develop higher cognitive skills of analysis, interpretation and evaluation to use information effectively

Self-Management and Competitive Skills: learners develop self-confidence, self-reliance and understanding of the world in which they live through meaningful activities

Problem Solving Skills: the ability to think critically in solving problems and apply these skills to tasks

Participation: taking part in learning activities by relating to others and taking responsibility for one's actions

Physical Skills: the ability to use appropriate techniques and to handle apparatus/ material competently with due regard for safety; these skills are essential for most subject areas as they are concerned with the development of the psychomotor skills which are fundamental for the learner's daily life

Work and Study Skills: equip learners to play an effective and productive role in the economic life of the nation

PARTICULAR FEATURES OF THE SUBJECT AT THIS PHASE

The subject Natural Science and Health Education within the natural science area places more emphasis on the learners' understanding of the physical and biological world around them at the local, regional and international level. It thus includes how society uses natural resources to satisfy its needs, and how the environment may be changed in ecologically sustainable ways. At this phase and subject area the application of scientific knowledge and attitudes to health is of special relevance for the individual, the family, and society as a whole.

LINKS TO OTHER SUBJECTS AND CROSS-CURRICULAR ISSUES

Cross-curricular issues such as environmental education, population education, human rights and democracy, information and communication technology and HIV and AIDS form an integral part of the natural science curriculum. The cross-curricular issues thus serve as a direct link of the natural science syllabi to other subjects for the Namibian school curricular.

GENDER ISSUES

The subjects Natural Sciences and Mathematics are essential to help foster logical thinking skills and form part of the foundation needed for pursuing most careers. Therefore, including gender perspectives is important for the science curriculum in order to raise awareness of gender stereotyping (e.g. gender roles we previously associated with doctors, nurses, farmers, artisans, mechanics, lawyers, etc.). Teachers are obliged to promote gender equity in all spheres of life. In all activities carried out within the scientific area of study, female learners should experience the confidence which will motivate them to continue in the natural science stream throughout their school career and beyond.

LOCAL CONTEXT AND CONTENT

The learning content in this syllabus is based on the Namibian context, although the themes and topics are on a variety of scales to meet international standard. Teachers are

therefore urged where appropriate to use local examples to illustrate scientific issues, concepts and processes.

APPROACH TO TEACHING AND LEARNING

The approach to teaching and learning in the science mainstream is based on a paradigm of learner-centred education as described in the Ministry's policy documents, including curriculum guides and a conceptual framework of syllabus revision. This approach ensures optimal quality of learning when the following principles are put into practice.

The aim is to develop learning with understanding, including the skills and attitudes required to contribute to the development of society. The focal point for teaching and learning is based on the principle which states that learners bring to the school a wealth of knowledge and social experiences gained continually from the family, the community and through interactions with the environment. Learning at school must involve, build on, extend and challenge the learner's prior knowledge and experiences.

Learners learn best when they are actively involved in the learning process through a high degree of participation, contribution and production. At the same time, each learner is an individual with her/his needs, pace of learning, experience and abilities. The teacher must be able to explore the needs of learners, the nature of learning to be done, and how to shape learning experiences accordingly. Teaching strategies must therefore be varied but flexible within well-structured sequences of lessons.

The teacher must decide, in relation to the learning objectives and competencies to be achieved, when it is best to convey content directly and when it is best to let learners discover or explore information themselves. The teacher should also decide when learners need directed learning, and when they need reinforcement or enrichment learning. She/he must furthermore decide when there is a particular progression of skills or information that needs to be followed or when learners can be allowed to find their own way through a topic or area of content.

Working in groups, in pairs, individually or as a whole class must therefore be organised as appropriate to the task in hand. Cooperative and collaborative learning should be encouraged wherever possible. In such cases, tasks must be designed so that pair or group work is needed to complete it, otherwise learners will not see any relevance in carrying out tasks together. As learners develop personal, scientific and communication skills, they can be gradually given increasing responsibility to participate in planning and evaluating their work, under the teacher's guidance.

SUMMARY OF LEARNING CONTENT

Teachers should realise that there are certain aspects of the syllabus that should not be taught as separate entities and at fixed times during the school year. These include incidental topics such as general knowledge, field trips, project work, investigations and observations, social events, etc.

Table: Summary of Learning Content for Grades 5-7 Natural Science and Health Education

GRADE 5	GRADE 6	GRADE 7
HEALTH EDUCATION		
Topic 1 Health education	**Topic 1 Social health** **Topic 8 Human body** **Topic 9 Human development**	**Topic 1 Health education** **Topic 8 Human body** **Topic 9 Human development**
SCIENTIFIC PROCESSES		
	Topic 2 Scientific processes	**Topic 2 Scientific processes**
MATTER		
Topic 3 Matter	**Topic 3 Matter**	**Topic 3 Matter**
ENVIRONMENT		
Topic 4 Water **Topic 5 Soils** **Topic 6 Air** **Topic 7 Living organisms** **Topic 8 Environment**	**Topic 4 Water** **Topic 5 Air** **Topic 7 Living organisms** **Topic 10 Environment**	**Topic 7 Living organisms** **Topic 10 Environment**
LIGHT AND ENERGY		
Topic 2 Sunlight	**Topic 4 Water continued**	**Topic 4 Forces and energy** **Topic 5 Light**
ELECTRICITY AND MAGNETISM		
	Topic 6 Magnetism	**Topic 6 Electricity**

LEARNING CONTENTS

NOTE:

The learning content outlined below is designed to provide guidance to teachers as to what will be assessed in the overall evaluation of learners. It is not meant to limit, in any way, the teaching program of any particular school.

The learning content is set out in THREE columns:

(a) **Themes and Topics** (b) **Learning Objectives** (c) **Basic Competencies**

Themes and Topics refers to those components of the subject which learners are required to study. The **Learning Objectives** are derived from the topic and are the general knowledge, understanding and demonstration of skills. The **Basic Competencies** are the detailed and specified content of the syllabus, which will be assessed.

GRADE 5 LEARNING CONTENT

TOPIC 1 HEALTH EDUCATION

1.1 Community health

1.2 Disease

1.3 Fitness and the human body 1.4 Hygiene

1.5 General and personal safety

TOPIC 2 SUNLIGHT

2.1 Sunlight in our daily lives

2.2 The effects of sunlight: heat and light

2.3 Sources of heat and light

2.4 Sunlight as the source of all heat and light on Earth

TOPIC 3 MATTER

3.1 Identification of states of matter

3.2 All materials have mass

3.3 Breakdown of materials (degradation)

TOPIC 4 WATER

4.1 Water around us

4.2 Water cycle

4.3 Importance of water to plants, animals, and humans

4.4 Importance of clean water 4.5 How to clean dirty water and purify contaminated water

4.6 Water conservation and storage

TOPIC 5 SOILS

5.1 Types of soil found in Namibia

5.2 Importance of soil

5.3 Fertility of soils

5.4 Making humus

5.5 Conservation of soil

TOPIC 6 AIR

6.1 Air around us

6.2 Air that is moving (wind)

6.3 Air under pressure

6.4 Air is a material and has mass

6.5 Air transmits sound

TOPIC 7 LIVING ORGANISMS

7.1 Characteristics of living organisms

7.2 Plants

7.2.1 Local plants

7.2.2 Variations among plants (flowering and non-flowering plants)

7.2.3 Life cycle of a plant

7.2.4 Dispersal of seeds /fruits

7.3 Animals

7.3.1 Variations among animals (including birds, mammals, reptiles and arachnids)

7.3.2 Life cycles of animals

TOPIC 7 LIVING ORGANISMS

(continued)

7.4 Nutrition

7.4.1 Sources of food

7.5 Human body

7.5.1 Different systems of the human body

7.5.2 Support system

7.5.3 Digestive system

7.6 Human development

7.6.1 Physical development

7.6.2 Social development

TOPIC 8 ENVIRONMENT

8.1 Ecosystems

8.2 Animal dependency on plants

8.3 Dependence of plants on animals

8.4 Impact of overgrazing and deforestation on vegetation

THEMES AND TOPICS	LEARNING OBJECTIVES Learners will:	BASIC COMPETENCIES Learners should be able to:
TOPIC 1 HEALTH EDUCATION		
This topic should be taught together with Topic 9 HUMAN DEVELOPMENT		
1.1 Community health	• realise the impact of local health factors and services on their health and that of their families and community, and value the role which Primary Health Care (PHC) can play in this regard	identify and report on local health factors and services affecting the health of individuals, families and the community describe and relate how the lack of provision of local community health services affects the health of people at home or at school state what is meant by PHC outline the role of PHC make and carry out a plan to promote activities that will improve the health situation at home and at school and support the PHC system explain the concept of immunisation in simple terms give reasons why children should be immunised against common diseases when they are young
1.2 Disease	• know basic information about diseases, types of diseases, methods of prevention, and the impact of disease	state how to prevent malaria and TB differentiate between HIV and AIDS in simple terms investigate and describe misconceptions (myths) about HIV and AIDS state ways in which HIV is and is not transmitted explain why sexual abstinence before marriage and faithfulness after marriage is the most effective protection against possible HIV infection
1.3 Fitness and the human body	• understand practices that contribute to health and apply these practices to their own lives	state how different physical activities and adequate rest contribute to health in terms of blood circulation, prevention of heart diseases, muscles and support system

		discuss practices which contribute to their own fitness based on their own lifestyles (e.g. draw, act out /role play)

THEMES AND TOPICS	**LEARNING OBJECTIVES** **Learners will:**	**BASIC COMPETENCIES** **Learners should be able to:**
1.4 Hygiene	• realise the importance of hygiene and apply hygienic practices	describe how personal hygiene practices contribute to good health and recognise how this can be a social asset state practices for personal hygiene
1.5 General and personal safety	• know safety principles for the prevention of common accidents, unsafe situations in their local environment and care in case of accidents • know that touching can be good and bad and realise there are strategies for protecting themselves against unwanted touching	identify accidents that have occurred in their local environment describe how such accidents could have been prevented state universal precautions for handling blood and wounds state the steps that can be taken to avoid unsafe situations explain how to apply safety principles of prevention and care for common accidents and unsafe situations in their local environment give examples of good /wanted touching and where it occurs give examples of bad /unwanted touching and where it occurs identify and discuss preventive measures to protect themselves against bad /unwanted touching
TOPIC 2 **SUNLIGHT**		

2.1 Sunlight in our daily lives	• understand the impact and importance of sunlight in their local environment	observe and report on the location of the Sun at dawn and sunset and the Sun's "movement" during the day observe and report on shadows at different times of the day and infer that light travels in a straight line discuss and explain how sunlight travels from the Sun to the Earth illustrate the meaning of night and day with a drawing of the Earth and Sun make a sundial and explain how it works find out and report on local stories and cultural beliefs about the Sun including how the Sun might be used as a symbol, as in the Namibian flag

THEMES AND TOPICS	**LEARNING OBJECTIVES** **Learners will:**	**BASIC COMPETENCIES** **Learners should be able to:**
2.2 The effects of sunlight: heat and light	• understand the effects of heat and light on living organisms and non-living things in their local environment	state that the Sun is the most important source of heat and light investigate that the Sun gives off heat investigate and report on the heating effect of sunlight on objects of different colours explain ways in which heat and light affect the activities and behaviours of animals and humans in their local environment investigate and report on uses of heat and light in their local environment (evaporation of water, solar heating /cooking /power) observe and report on ways in which heat and light affect the activities and behaviours of animals and humans in their local environment experiment and report on how sunlight is the source of energy for green plants

		identify dangers to eyes and skin from too much direct sunlight and describe preventive measures
2.3 Sources of heat and light	• know sources of heat and light other than the Sun	name and identify sources of heat other than the Sun discuss the effects of heating investigate the expansion and contraction of solids, liquids and gases when heated and cooled
2.4 Sunlight as the main source of all heat and light on Earth	• understand that sunlight is the most important source of heat and light on Earth	discuss the fact that life on Earth is dependent on the Sun identify the sources in the home and school from which we get heat and light and explain how they relate to sunlight
TOPIC 3 MATTER		
3.1 Identification of states of matter	• know of materials which can exist in different forms (states of matter): solids, liquids, and gases	name the three phases in which water occurs classify substances as solid, liquid or gas describe water as a material that can exist in different forms: ice, liquid water, and steam /vapour demonstrate or observe that when ice melts it forms water and when water evaporates it becomes a vapour

THEMES AND TOPICS	LEARNING OBJECTIVES Learners will:	BASIC COMPETENCIES Learners should be able to:
		explain that when ice melts it forms water and when water evaporates it becomes a vapour explain the processes of evaporation and condensation investigate and explain the difference between steam and water vapour (boiling kettle) name common substances other than water which appear in two or more forms (candle wax, butter, chocolate, ice cream, petrol)
3.2 All materials have mass	• understand the principle that all materials have mass	explain and apply the principle that all materials have mass demonstrate that two objects have different masses (one is heavier, the other lighter) measure the mass of objects
3.3 Breakdown of materials (degradation)	• know that different materials degrade differently and at different rates	evaluate that different materials degrade differently and at differed rates (e.g. experiment where materials are covered with soil) explain and show how different materials break down through different sources /processes demonstrate and explain that materials exposed to the same processes may break down at different rates describe safe and unsafe ways to reuse wastes observe and record wastes that are produced at home, at school, or in their local environment explain and define biodegradable and non-biodegradable material and infer the implications of littering of these materials in their local environment
TOPIC 4 WATER		

4.1 Water around us	• know sources of water in their local environment	• describe the location and storage of water in their local environment (rivers, lakes, underground water, ocean, clouds, reservoirs, etc)

THEMES AND TOPICS	**LEARNING OBJECTIVES** **Learners will:**	**BASIC COMPETENCIES** **Learners should be able to:**
		• investigate and report on local cultural beliefs, stories, and practices about gathering, transporting and using local water (traditional containers and rules for the storage of water; local rain patterns, etc)

4.2 Water cycle	• understand the water cycle in nature which entails repeated evaporation and condensation	discuss the roles heating and cooling play in changing water from one phase to another, explain the way in which water changes from one phase to another in nature and indicate causes of water changing from a: − solid to a liquid (melting) − liquid to a vapour (evaporation) − vapour to a liquid (condensation) − liquid to a solid (freezing) name the factors (wind and temperature /Sun) which influence evaporation in nature distinguish between steam and vapour and observe that evaporation takes place without boiling state that the cloud /steam caused by condensation of water when water evaporates or boils explain in simple terms the formation of − clouds − rain − dew − frost discuss the water cycle in nature (repeated evaporation and condensation) as experienced in the local environment describe the effects of evaporation for the local water resources (oshanas, dams and reservoirs) make a diagram of the water cycle indicating the change of water from a liquid (streams and bodies of water) to a vapour to a liquid (rain, clouds or steam) interpret stages /phases of the water cycle

THEMES AND TOPICS	LEARNING OBJECTIVES Learners will:	BASIC COMPETENCIES Learners should be able to:
4.3 Importance of water to plants, animals, and humans	understand the relationships between water and plants, animals, and humans appreciate the value of water and know its importance in their every day life	describe the importance of water to plants, animals and humans identify and report on ways in which water is used by plants, animals, and humans in their local environment discuss the effect of lack of water on animals, humans and plants state the uses of water at home, school and in their community
4.4 Importance of clean water	• know the difference between clean and contaminated water	state the difference between clean water and contaminated water identify and record common ways that water is contaminated in their local environment
	• understand the importance of clean water	• discuss the importance of clean water (for plants and animals)
	• understand how local environmental health factors involving clean water affect the health of people in the home and at school	identify and state health factors in their local environment involving clean water and explain how they affect the health of people at home and school plan and demonstrate ways that they can help to keep water clean
4.5 How to clean dirty water and purify contaminated water	• know the process for filtering dirty water	explain the need for purifying contaminated water by boiling explain methods to filter dirty water and filter dirty water by at least one of these methods explain how water is made safe by boiling

4.6 Water conservation and storage	• understand the need and methods of storing and conserving water in their local environment • know and apply practices that will conserve water at home and school	list ways of conserving water and identify ways in which water is stored at home and in their community discuss the importance of water storage describe the various methods of storing water as applied in their community explain the importance of conserving water • describe how water can be wasted and plan and report on practises that do not waste water at home and at school

THEMES AND TOPICS	**LEARNING OBJECTIVES** **Learners will:**	**BASIC COMPETENCIES** **Learners should be able to:**
TOPIC 5 SOILS		
5.1 Types of soils found in Namibia	• know different types and characteristics of soils in their local environment • realise that soil types differ in terms of water holding capacity and fertility	investigate characteristics of different types of soil, locate and report on different types of soils in their local environment describe and compare the similarities and differences of these soils (loam, clay and sand) in terms of water holding capacity and fertility identify different types of soil: loam, clay and sand investigate and report on soil that has been damaged (e.g. eroded) in their local environment
5.2 Importance of soil	know the value of soils in their local environment to plants, animals, and people understand the relationship between soil and plants	describe the value of soil in their local environment to plants, animals, and people describe the relationship between soil and plants that are found in their local environment (to anchor plants and provide required nutrients)

	• realise that crops (and consequently people) can be affected by various types of soil	investigate and report on ways that their local soils are used for building, pot making, traditional ornaments, etc. explain how crops (and, consequently, people) are affected by various types of soil in their local environment
	• realise that soil can be used for different purposes	• state ways in which soils are used for building, pot making and traditional ornaments
5.3 Fertility of soils	• know characteristics of humus and other components that make soil fertile	define humus and describe characteristics of humus state components of fertile soil: humus, minerals, air, and water
	realise that humus and other soil components are important to plants realise the importance of these components for plant growth	describe ways in which humus and other soil components are important to plants investigate ways in which humus and other soil components are important to plants explain how the components in soil are necessary for plants to grow

THEMES AND TOPICS	**LEARNING OBJECTIVES** **Learners will:**	**BASIC COMPETENCIES** **Learners should be able to:**
5.4 Making humus	• understand how to make humus	• explain how to make humus by composting plant and animal materials
	• know how to apply humus to plants and realize the importance of humus in caring for a plant	list ways of applying humus to plants discuss ways of applying humus to a plant and explain how to care for a tree or other plant
5.5 Conservation of soil	• understand the importance and know practices of conserving soil in their local environment	state ways of conserving soil discuss the importance of soil conservation investigate and report on practices of soil conservation as found in their local environment
TOPIC 6 AIR		

6.1 Air around us	• know characteristics of air in the local environment	explain what the atmosphere is state the composition of air around us (nitrogen, oxygen and carbon dioxide), state that nitrogen is the biggest fraction of air, and that oxygen is the most important for life investigate the characteristics of air: − takes up space (volume) − has mass − can be compressed − warm air rises state reasons for the presence of oxygen in the atmosphere, water and soil
6.2 Air that is moving (wind)	• understand the movement of air (wind)	explain and demonstrate wind as the movement of air gather data and report on air movement in their local environment by making and using simple apparatus to study wind direction and wind strength investigate and report on ways that air movement affects living and non-living things in their local environment (birds soaring, clouds drifting, windmills, water waves, sand movement, rocks weathering, kites flying, sail boats) observe and report on smoke and other air pollution found in their home, school or their local environment and suggest ways to prevent the harmful effects

THEMES AND TOPICS	**LEARNING OBJECTIVES** **Learners will:**	**BASIC COMPETENCIES** **Learners should be able to:**
6.3 Air under pressure	• understand effects of air under pressure	• observe, describe and report on the effects of air under pressure using simple apparatus such as: balloons, syringes, bicycle pumps and bicycle inner tubes

6.4 Air is a material and has mass	• understand that air is made of matter and thus has mass	state that, though air cannot be seen, it is made of matter and thus has mass demonstrate and explain why a balloon filled with air is heavier that one without air observe and report on the effect that heated air rises (e.g. over a candle, open fire, or heated ground) explain why heated air is lighter than cold air
6.5 Air transmits sound	• understand that air is a medium for the transmission of sounds	identify and describe sounds in their local environment, and explain that they are transmitted through the air investigate and report on sound by making a musical instrument that transmits sound through air
TOPIC 7 LIVING ORGANISMS		
7.1 Characteristics of living organisms	• be familiar with the characteristics of life and understand that there are seven characteristics (they need to remember only four: growth, feeding, reproduction and movement) • realize that these characteristics are important for the organism	state the difference between living and non-living things define the terms feeding, movement and reproduction list growth, feeding, reproduction and movement as the characteristics of living organisms carry out an experiment to observe some of the characteristics of life (growth, movement and feeding) • discuss the importance of these characteristics for the organism
7.2 Plants (local)		
7.2.1 Variations among plants (flowering and non-flowering plants)	• know the four groups of plants (mosses, ferns, conifers and flowering plants) and understand how leaves of the four groups of plants differ and are alike	list the four groups of plants: mosses, ferns, conifers and flowering plants discuss the differences and similarities among the four groups of plants in terms of their leaves

THEMES AND TOPICS	LEARNING OBJECTIVES Learners will:	BASIC COMPETENCIES Learners should be able to:
	• know the major parts in the structure of a flowering and a non-flowering plant	identify the major parts in the external structure of a flowering and non-flowering plant collect various flowers and make a drawing of each examine the structure of a flowering plant
	• understand that organs of plants have specific functions	list the major parts and functions of a flower make a model of a flower describe the functions of the stem, leaves and roots
7.2.2 Life cycle of a plant	• know the stages in the life cycle of a bean /pea plant	observe and draw different stages in the life cycle of bean /pea plant state the different stages in the life cycle of a bean /pea plant
	• know the factors important for the growth of a bean /pea plant	state factors important for the growth of a bean /pea plant discuss the factors important for the growth of these plants
7.2.3 Dispersal of seeds /fruits	realise that seeds /fruits of flowering plants are dispersed (spread) in different ways understand the importance of seed dispersal	describe different ways in which seeds /fruits from local plants, near home or school, are dispersed outline the importance of seed /fruit dispersal make drawings of the structure of wind and animal dispersed seeds
7.3 Animals		
7.3.1 Variations among animals (including birds, mammals, reptiles)	• know the similarities and differences among animals in their local environment	• describe the similarities and differences of some externally visible features of birds, reptiles and mammals

	• realise that some animals in their local environment can be harmful to humans	name animals in their local environment which can be harmful to their health (e.g. certain snakes, scorpions and spiders) describe different ways in which some animals can be harmful to humans explain how to avoid harmful animals in their environment (snakes, spiders and scorpions)

THEMES AND TOPICS	**LEARNING OBJECTIVES** **Learners will:**	**BASIC COMPETENCIES** **Learners should be able to:**
7.3.2 Life cycles of animals	• understand the main features of the life cycle of birds, mammals and reptiles and realise that life cycles are generative (life begets life)	identify some stages in the life cycles of a bird, a reptile or a mammal find out about and report on the life cycle of a bird, mammal, reptile or an arachnid discuss the similarities and differences in the life cycles of birds, reptiles, or mammals
7.4 Nutrition		
7.4.1 Sources of food	• know that food can be found in different sources • know and understand the importance of a balanced diet and realise that poor eating habits can lead to nutritional deficiencies	list the main sources of food identify food types from the main sources discuss the importance of food types for human health define a balanced diet as the diet containing all the necessary food substances in the right amounts describe the effects of poor eating habits in relation to lack of a variety of food (e.g. goiter and marasmus) describe how the effects of poor eating habits can be prevented through a balanced diet
7.5 Human Body		

7.5.1 Different systems of the human body	• appreciate that the human body consists of different systems and know where these systems are located	identify from a given diagram the different systems of the human body and label the parts describe the basic functions of each system (respiratory, excretory, circulatory, reproductive, digestive, support and nervous systems)
7.5.2 Support system	• know the structures of the human support system and identify the various parts	identify the structures of the human skeleton explain how the skeleton acts as a support system of the body identify parts of the body protected by the skeleton
7.5.3 Digestive system	• know the various parts of the digestive system and acknowledge the necessity of its functions for healthy living	identify the different parts of the digestive system from a diagram state the functions of each part identified

THEMES AND TOPICS	**LEARNING OBJECTIVES** **Learners will:**	**BASIC COMPETENCIES** **Learners should be able to:**
	• know the basic structure and function of teeth and be aware of activities /practices that can damage teeth	list activities /practices that can damage teeth identify various teeth from given diagrams describe the functions of various teeth discuss good oral hygiene describe the effect of too much sugar on teeth
7.6 Human development		
7.6.1 Physical development	• realise and appreciate the physical changes in boys and girls when maturing	list the physical changes in maturing boys and girls explain the kinds of physical changes which occur in maturing boys and girls (secondary sexual characteristics) explain their physical development and appreciate this important step towards adulthood

7.6.2 Social development	• know factors in their local social setting that can influence their behaviour and thus their physical, mental, emotional and social development	identify the common pre-adolescent social behaviours identify causes and reasons for these behaviours (e.g. need to establish self concept, peer pressure, gender roles) explain ways that they are affected positively and negatively by peer pressure suggest ways of responding to peer pressure discuss gender roles for pre-adolescents in the home, school and community
TOPIC 8 ENVIRONMENT		
8.1 Ecosystems	• know different ecosystems and be aware of their importance for human existence	identify the different ecosystems from diagrams describe characteristics of an ecosystem in terms of living and non-living factors explain the importance of an ecosystem for human existence
8.2 Animal dependency on plants	• know ways that animals are dependent on plants	list animals that feed on plants (in their locality) describe at least three ways that animals may be dependent on plants describe how animals that eat other animals depends on plants suggest what might happen to animals, in the local environment, if plants disappeared

THEMES AND TOPICS	**LEARNING OBJECTIVES Learners will:**	**BASIC COMPETENCIES Learners should be able to:**
8.3 Dependence of plants on animals	• know different ways in which plants are dependent on animals	state ways in which plants are dependent on animals list the potential pollinators of plants investigate and record ways in which animals pollinate various flowering plants /flowers

8.4 Impact of overgrazing and deforestation on vegetation	• realise that deforestation and overgrazing can have negative impact on the vegetation /environment	define deforestation and overgrazing describe the impact of deforestation and overgrazing on vegetation discuss how these negative impacts can be reduce

GRADE 6 LEARNING CONTENT

TOPIC 1 SOCIAL HEALTH

1.1 Puberty and sexual development

1.2 Emotional development

1.3 Self-esteem

1.4 Feelings and emotions

1.5 Acceptance and support of others

1.6 Family

1.7 Peer pressure

1.8 Substance abuse

TOPIC 2 SCIENTIFIC PROCESSES

2.1 Equipment & procedures

2.2 Decanting

2.3 Filtering

2.4 Distilling

TOPIC 3 MATTER

3.1 Sunlight in our daily lives

3.2 Colours in sunlight

3.3 Properties of matter

3.4 Matter and environment

3.5 Forces between matter

3.6 Floating

3.7 Matter and static electricity

3.8 Matter and electric current

TOPIC 4 WATER

4.1 Physical properties of water

4.2 Water as a solvent

4.3 Importance of sufficient clean water

4.4 How to clean dirty water and purify contaminated water

4.5 Energy from water

TOPIC 5 AIR

5.1 Air around us

5.2 Air pollution

TOPIC 6 MAGNETISM

6.1 Properties of magnets

6.2 Forces and fields between magnets

6.3 Making and use of magnets

TOPIC 7 LIVING ORGANISMS

7.1 Characteristics of living organisms

7.2 Plants

7.2.1 Variations among plants

7.3 Nutrition in plants

7.3.1 Photosynthesis

7.4 Animals

7.4.1 Variations among animals (including insects, fish and amphibians)

7.4.2 Life cycle of animals

7.4.3 Sustainable use of animals in Namibia

7.4.4 Care of animals

7.4.5 Animal dependency on plants

TOPIC 8 HUMAN BODY

8.1 Breathing system

8.2 Respiration

8.3 Circulatory system

TOPIC 9 HUMAN DEVELOPMENT

9.1 Physical development

9.2 Mental and emotional development

9.3 Social development

TOPIC 10 ENVIRONMENT

10.1 Ecosystems

THEMES AND TOPICS	LEARNING OBJECTIVES Learners will:	BASIC COMPETENCIES Learners should be able to:
TOPIC 1 SOCIAL HEALTH		
This topic should be taught together with Topic 9 HUMAN DEVELOPMENT		
1.1 Puberty and Sexual Development	• know the basic structures of male and female reproductive organs	describe the differences between the reproductive organs of a male and a female (from given diagrams) explain the role of the basic structures of male and female reproductive organs
	• appreciate the physical changes in boys and girls when maturing from pre-adolescents to adolescents (puberty) and realise that sexual responses are normal	discuss physical changes (e.g. voice changes, breast growth, pubic hair growth) and sexual responses (e.g. wet dreams, feelings of attraction, masturbation) that occur during puberty (in boys and girls) define sex as the biological definition of both male and female
	• know the difference between sex and sexual intercourse	• define sexual intercourse as a physical act between people involving reproductive organs
1.2 Emotional development	realise and appreciate the emotional changes in boys and girls when maturing from pre-adolescents to adolescents (puberty) know ways that gender roles benefit some and inhibit others	discuss emotional changes that may occur during puberty and how to deal with difficulties explain the process of menstruation in simple terms explain that gender means masculine or feminine (the behaviour roles that are expected of males and females) discuss how gender roles are practiced in their cultural environments discuss how a person's gender role evolves as s/he grows up discuss the possible changes in gender roles as they grow up

1.3 Self-Esteem	• understand their own uniqueness, feel good about themselves and be motivated to stay healthy	explain that self-esteem is the way a person feels about her/himself and how it affects the decisions they make identify their own strengths and weaknesses and what makes them unique and special
1.4 Feelings and Emotions	• appreciate different feelings, their causes and how to manage them	identify what makes them feel good and bad explain how they deal with these feelings

THEMES AND TOPICS	**LEARNING OBJECTIVES** **Learners will:**	**BASIC COMPETENCIES** **Learners should be able to:**
		• investigate and report on people learners can talk to about their feelings and problems
1.5 Acceptance and Support of Others	• understand the importance of developing tolerance and respect for others who are both similar and different, and of supporting people in need	identify and explain ways that some learners are disadvantaged discuss ways that they can assist and encourage each other in accepting all people identify sources of support for people in need
1.6 Family	• realise and respect that there are different types of families, and learn how to deal with difficulties in the family	identify and explain different family structures compare and discuss ways of dealing with changes that occur in families (e.g. death, divorce, marriage) discuss how friends and family members can give support to those who are adversely affected by changes in their families
1.7 Peer Pressure	• realise peer pressure exists and develop skills to resist it	identify common adolescent social behaviours discuss why people commit these behaviours (e.g. need to establish self concept, peer pressure, gender roles) describe positive and negative affects of peer pressure discuss how to resist negative peer pressure

	recognise characteristics of good and bad friendship and know how to set boundaries in friendships know situations in the community when alcohol is used and understand why people used it	identify characteristics of good and bad friendships discuss how to set boundaries in friendships investigate and report on situations in the community in which people use alcohol and why
1.8 Substance Abuse	• understand the effects of substance abuse on individuals, families, communities and society and develop a desire to avoid substance abuse	describe substance abuse identify the health, social and economic effects of alcohol, tobacco and drugs describe how the media is used to influence people to use alcohol discuss ways in which substance abuse can negatively influence their future identify sources of support for substance abusers and /or their families /loved ones

THEMES AND TOPICS	**LEARNING OBJECTIVES** **Learners will:**	**BASIC COMPETENCIES** **Learners should be able to:**
TOPIC 2 **SCIENTIFIC PROCESSES**		
This topic is an introduction to some of the basic scientific skills. The skills in this topic should not the taught in isolation as they form an integral part of the other topics.		
2.1 Equipment & procedures	• know appropriate techniques, how to handle apparatus /material competently and have due regard to safety	identify and outline the use of equipment use appropriate techniques and handle, with due regard to safety, the following equipment: glass beaker, funnel, filter paper, flat-bottomed jar, spirit burner, Liebig condenser
2.2 Decanting	• know how to separate water and insoluble impurities by decanting	• investigate and describe the process of decanting whereby water is carefully poured into a second beaker, leaving behind the sediment or insoluble impurities

2.3 Filtering	• know how to separate water and insoluble impurities by filtering	investigate and describe the process of filtration whereby water is filtered resulting in a clear filtrate study the uses of filtration (e.g. municipalities that use large sand filters)
2.4 Distilling	• know how to separate water and soluble impurities by distilling	• investigate the process of distillation of a solution of water and soluble impurities
TOPIC 3 MATTER		
3.1 Sunlight in our daily lives	• understand how small scale solar technology works	• find out about and report on ways of heating and cooking using the Sun (e.g. a solar oven)
3.2 Colours in sunlight	• understand that sunlight is composed of various colours	observe and state that sunlight is a mixture of different colours which can be separated (by using a prism, drop of oil on water, or other methods) analyse sunlight to conclude that it is composed of various colours and identify the different colours of white light find out and report on local stories involving the rainbow
3.3 Properties of matter	• know how to classify different types of matter and identify and compare properties of matter	analyse everyday materials in their local environment to establish properties and uses of the materials collect and classify different types of plastic, paper, glass, wood, fabric and metal

THEMES AND TOPICS	**LEARNING OBJECTIVES** **Learners will:**	**BASIC COMPETENCIES** **Learners should be able to:**
		• identify and compare properties (such as hardness, texture, colour, lustre, flexibility, smell, brittleness and malleability) of paper, glass, cotton, plastic, wood, and metal

3.4 Matter and environment	• know how to distinguish between natural, human-made and recycled materials	explain the difference betweens natural or human-made (synthetic) material and identify and classify materials in the local environment as natural or human-made state the importance of recycling materials identify objects in their environment which are reused items or are made from recycled materials such as soda bottles, oil drums and paper
3.5 Forces between matter	• know forces as integral parts of life	identify forces in everyday life identify pushing and pulling forces (repulsion and attraction) state that forces are measured in newtons name five effects of pushing and pulling forces , giving examples of each classify and explain forces in terms of contact and noncontact forces name and identify different types of forces describe how to build a simple spring balance to measure different forces
3.6 Floating	• understand that some objects float in water while others sink	• compare and distinguish between objects by carrying out tests to determine which objects float and which sink in water
3.7 Matter and static electricity	understand that static electricity exists and accumulates on certain materials know lightning as a form of static electricity	observe and describe what occurs when they rub plastic combs with a dry cloth and then attract small pieces of paper to the comb observe and describe what happens when an air filled balloon is rubbed on a clean chalk board state that objects are either charged or uncharged (neutral) explain the spark that jumps from our finger to a metal object when the air is dry

THEMES AND TOPICS	LEARNING OBJECTIVES Learners will:	BASIC COMPETENCIES Learners should be able to:
		• explain the relationship of a spark jumping from their finger to a metal object and of lightning striking from a cloud to another cloud or other object
3.8 Matter and electric current	understand that electricity can be used to light a bulb understand that electricity can be dangerous	explain the proper use of electrical outlets and appliances explain the danger of bare electrical wires build a simple flashlight construct a simple closed circuit which contains a single cell, a bulb and a switch
TOPIC 4 WATER		
4.1 Physical properties of water	understand the phase change of water realise the role of perspiration in maintaining a constant body temperature	revise the water cycle (with more emphasis on the aspects of the cycle) and explain the importance of the phases (revision from Grade 5) analyse and explain the basic properties of water (evaporation, surface tension, etc) and describe the phases in which water can change compare and describe the rate of evaporation of water, in containers holding the same volume of water but with different surface areas discuss the effects of evaporation on the local water resources (oshanas, dams and reservoirs) explain that the evaporation of perspiration cools the body and keeps it at a safe temperature find out and report on ways that other animals (dogs, cattle, cats, birds) cool themselves

4.2 Water as a solvent	• understand factors that effect the rate of dissolving	define the concepts: solution, solvent, solubility, insolubility, dissolved substance, saturated and unsaturated solutions state factors which influence the solubility of a substance describe how the following will affect the rate of dissolving: − temperature − particle size − stirring

THEMES AND TOPICS	**LEARNING OBJECTIVES** **Learners will:**	**BASIC COMPETENCIES** **Learners should be able to:**
		• investigate and explain how crystals can be reclaimed from solutions
4.3 Importance of sufficient clean water	• know about health problems found in Namibia related to the scarcity of clean water	discuss that a scarcity of clean water could lead to health problems of the eyes, skin and scalp find out and report on preventive measures to avoid contracting these health problems
	• understand how pit latrines and rubbish pits should be located so that they do not contaminate local water sources	suggest why pit latrines should be built downhill from water sources explain the location of household rubbish pits in improving sanitation and health
4.4 How to clean dirty water and purify contaminated water	• know methods to clean water	name sources of water pollution name and classify impurities which occur in water describe the different purification techniques (as described in the scientific methods) investigate and record how the local municipality uses the process of filtering explain the importance of boiling and chlorination to remove bacteria, algae and fungi from water

4.5 Energy from water	• understand that water could be used as a source of energy	show and explain how water and steam can be used as a source of energy (falling water /running water /hydroelectricity, e.g. Ruacana) build a water wheel
TOPIC 5 AIR		
5.1 Air around us	• understand the effects of wind for plants and humans /animals	observe and explain some beneficial effects of moving air (e.g. seed dispersal, cooling effect, etc.) observe and explain the effects of moving air that might be harmful to humans (e.g. tornadoes and hurricanes)
5.2 Air pollution	• know various sources of air pollution and understand the effects of polluted air on their lungs /health	• describe at least three sources of air pollution (wood smoke from cooking fires and burning bush, exhaust fumes from cars, mica dust, smoke from electric power stations and mine smelting stations)

THEMES AND TOPICS	**LEARNING OBJECTIVES** **Learners will:**	**BASIC COMPETENCIES** **Learners should be able to:**
		• explain the results on their lungs from sustained exposure to polluted air
TOPIC 6 MAGNETISM		
6.1 Properties of magnets	• understand the effects and properties of magnets on a substance	classify magnetic and non-magnetic substance investigate and explain how to test for magnets describe the effects of magnets on different substances sketch the magnetic field pattern that surrounds a bar magnet

6.2 Forces and fields between magnets	• know forces and effects of magnetic fields between magnetic substances	investigate the polarity of a magnet and identify the north and south showing poles of the magnets name the north showing pole "north pole" and the south showing pole as "south pole" investigate and discuss the effects of magnetic poles on each other describe the magnetic field pattern that surrounds a bar magnet describe an experiment to indicate the existence of a magnetic field around a magnet
6.3 Making and use of magnets	• know how to make, use and store magnets	investigate the directional properties of magnets in a compass in finding direction investigate magnetic forces as forces that can act over a distance study and investigate some uses of magnets investigate the making of a magnet by stroking a suitable metal with another magnet suggest and show the proper storing and safekeeping of magnets

THEMES AND TOPICS	**LEARNING OBJECTIVES** **Learners will:**	**BASIC COMPETENCIES** **Learners should be able to:**
TOPIC 7 LIVING ORGANISMS		
7.1 Characteristics of living organisms	• know and be familiar with five characteristics of living organisms (growth, feeding, reproduction, movement and respiration) and understand the basis of classifying living things	list five characteristics of living organisms (growth, feeding, reproduction, movement and respiration) define respiration as the process by which energy is released from food explain the process of respiration in plants and animals

		describe growth, movement and feeding in living organisms
7.2 Plants		
7.2.1 Variations among plants	know that flowering plants can be grouped into monocotyledons (maize plants) and dicotyledons (bean plants) understand how leaves and flowers from different local trees and other plants differ and are alike realise that plants are the source of our food	list examples of monocots and dicotyledons as found in their local environment differentiate between monocotyledons and dicotyledons compare and explain how the leaves and flowers from different local trees and other plants differ and are alike identify plants from which processed foods come (bread, biscuits, breakfast cereals, crisps, cool drinks and sweets) give examples of different food crops in Namibia give examples of foods that come from plants grown outside Namibia describe how plants are sources of food
	• realise the differences between cultivated and wild plants and their adaptation to a dry environment	identify and describe the differences between cultivated and wild plants describe characteristics of slow-growing and fast-growing plants as an adaptation to a dry environment
7.3 Nutrition in plants		
7.3.1 Photosynthesis	• understand that green plants produce food through photosynthesis using the energy from the Sun	define photosynthesis as the process by which green plants produce their own food list the requirements for photosynthesis name the end products of photosynthesis explain how carbohydrates produced during photosynthesis are used as energy source in plants

THEMES AND TOPICS		LEARNING OBJECTIVES Learners will:	BASIC COMPETENCIES Learners should be able to:
7.4	Animals		
7.4.1	Variations among animals (including insects, fish and amphibians)	• realise that animals are classified into different groups	give local example of the following animal groups: insects, amphibians and fish explain the criteria used to classify animals into different groups describe the external features used to classify animals compare the different groups of animals and infer why animals are grouped the way they are synthesise (design and construct) a model of an imaginary animal for one of the animal groups
7.4.2	Life cycle of animals	• understand the main features of the life cycles of two of the following: insects, amphibians or fish	identify and name the stages in the life cycles of two common animals found in their local environment (insects, amphibians or fish) carry out a comparative outline on the life cycle of insects, amphibians and /or fish
7.4.3	Sustainable use of animals in Namibia	• understand the value of Namibia's wild and marine animals to the economy and the environment	identify some of the common wild animals in Namibia's National Parks explain the value of wild animals to the local and national economy explain the value of wild animals to the environment describe what is meant by endangered name one of Namibia's endangered animals name an animal product that Namibia uses from the sea
7.4.4	Care of animals	• understand how to feed and care for animals at home or at school	list the needs of an animal in captivity (space, water, shade, air and /or food) explain how to feed and care for an animal (dog, goldfish /guppies) at school or at home

7.4.5 Animal dependency on plants	• understand the relationship between plants and animals	describe the relationships between plants and animals carry out an investigation to determine how animals are dependent on plants in their local environment describe how animals are dependent on plants in their local environment

THEMES AND TOPICS	**LEARNING OBJECTIVES** **Learners will:**	**BASIC COMPETENCIES** **Learners should be able to:**
TOPIC 8 HUMAN BODY		
8.1 Breathing system	• understand the basic structure and functions of the breathing system	identify and label the structures of the breathing system describe the functions of the following parts: nasal cavity, voice box, wind pipe, ribs and diaphragm describe the path of air through the parts of the breathing system (demonstrate how the lungs get inflated with air using lungs of a goat or a sheep) explain inhaling and exhaling with reference to the ribs and diaphragm
	• know diseases that can affect the breathing system and realise that smoking can harm the lungs	list common diseases of the breathing system describe how common diseases can be prevented (coughs, colds, asthma, bronchitis and TB) suggest how sustained exposure to polluted air and smoke can damage the lungs explain the effect of smoking on the lungs with reference to nicotine and tar state that smoking can lead to cancer, bronchitis and emphysema

8.2 Respiration	appreciate the role of respiration in living organisms know the different forms of respiration	list the different forms of respiration state the waste products of respiration explain the importance of respiration in living organisms carry out an (elementary) experiment to demonstrate the different forms of respiration
8.3 Circulatory system	• appreciate and understand the role of the circulatory system and know its various parts	identify the parts of the circulatory system describe the basic functions of the parts of the circulatory system (no in-depth study of the structure and functions of the various parts is required) describe the functions of the chambers of the heart

THEMES AND TOPICS	**LEARNING OBJECTIVES** **Learners will:**	**BASIC COMPETENCIES** **Learners should be able to:**
TOPIC 9 HUMAN DEVELOPMENT		
This topic should be taught together with Topic 1 SOCIAL HEALTH		
9.1 Physical development	• know the stages and characteristics of human growth development and understand and appreciate that each person grows and matures at a different pace	identify the stages and characteristics of human growth development from diagrams describe the physical changes that take place in humans from birth to death (infancy, toddler, childhood, adolescents adulthood and old age) explain how each person grows and matures at a different pace
	• understand physical changes in females at the onset of menstruation	• describe physical changes in females involving the menstrual cycle and relate it to conception

9.2 Mental and emotional development	• realise the importance of self awareness and its connection to self esteem and mental development • realise the impact of emotional changes on their behaviour	state the factors that contribute to self awareness and self esteem as a pre-adolescent predict how better self awareness leads to better self esteem and better mental development outline positive personality traits relate the mental and emotional changes that take place in humans from birth to death (infancy, toddler, childhood, adolescents, adulthood and old age) • outline emotional changes in females involving the menstrual cycle and relate it to conception
9.3 Social development	• know the factors, in their local setting, that can influence their behaviour and thus their physical, mental, emotional and social development	name the common pre-adolescent social behaviours state the reasons and causes for these behaviours (need to establish self concept, peer pressure, gender roles) discuss ways in which pre-adolescents are affected positively and /or negatively by peer pressure suggest ways of responding to peer pressure state ways that they can assist and support each other in accepting all people outline the qualities of a good friend

THEMES AND TOPICS	**LEARNING OBJECTIVES** **Learners will:**	**BASIC COMPETENCIES** **Learners should be able to:**
	• realise that maturity and respect are important in interactions with others who are both similar and different than they are	list ways in which some learners are special and thus might require special attention suggest how they can show respect to others who are both similar and different than they are
TOPIC 10 **ENVIRONMENT**		

10.1 Ecosystems	• know the basic terminology of ecosystems and understand the energy flow between organisms • understand the negative impact of human activities on the ecosystem /environment	explain the following terms: herbivores, carnivores, omnivore, food chain and food web construct simple diagrams of a food chain and food web to illustrate the flow of energy describe the differences and similarities between a food chain and food web discuss the flow of energy in a food chain discuss human activities that can influence the ecosystem negatively (at school, home and in the local community) suggest measures on how to prevent these negative impacts

GRADE 7 LEARNING CONTENT

TOPIC 1 HEALTH EDUCATION

1.1 Sexuality and sexual health

1.2 Goal-setting and decision-making skills

1.3 Communication skills 1.4 Relationships

1.5 STDs, HIV and AIDS

1.6 Teenage pregnancy and family planning

1.7 Violence and abuse

TOPIC 2 SCIENTIFIC PROCESSES

2.1 Estimating & measuring

2.2 Observing

2.3 Classifying

TOPIC 3 MATTER

3.1 Nature of matter

3.2 From Earth into space

3.2.1 The solar system

3.3 Building blocks of matter 3.3.1 Atoms and molecules

3.3.2 Elements and compounds

3.3.3 Mixtures and solutions

3.4.1 Air around us

TOPIC 4 FORCES AND ENERGY

4.1 Nature and effects of forces

4.2 Weight and mass

4.3 Energy in everyday examples

4.4 Sources of energy

4.5 Forms of energy and energy conversions

TOPIC 5 LIGHT

5.1 Basic concepts of light

5.2 Transmission, absorption and reflection

5.3 Reflection by mirrors

TOPIC 6 ELECTRICITY

6.1 Static electricity

6.2 Electroscope

6.3 Electric current

6.4 Electrical sources

6.5 Conductors and insulators

6.6 Cells and bulbs in series, bulbs in parallel **TOPIC 7 LIVING ORGANISMS**

7.1 Characteristics of living organisms

7.2 Plants

7.2.1 Flowering and non-flowering plants

7.3 Animals: variations among animals (including mammals, birds, reptiles, fish,

insects and amphibians)

TOPIC 8 HUMAN BODY

8.1 Different systems of the human body

8.2 Digestion

8.3 Excretion

8.4 Nervous system and drugs

TOPIC 9 HUMAN DEVELOPMENT

9.1 Physical development

9.2 Mental and Emotional development

TOPIC 10 ENVIRONMENT

10.1 Ecosystems

10.2 Storage and conservation of water

10.3 Conservation of soil

10.4 Air pollution

THEMES AND TOPICS	LEARNING OBJECTIVES learners will:	BASIC COMPETENCIES learners should be able to:
TOPIC 1 HEALTH EDUCATION		
This topic is a continuation of some basic everyday values and skills. The values and skills in this topic should not the taught in isolation from other topics and should be predominantly assessed during continuous assessment. This topic should be taught together with Topic 9 HUMAN DEVELOPMENT.		
1.1 Sexuality and sexual health	• understand that all humans are sexual beings but that sexual feelings bring new responsibilities	identify from diagrams the different stages of sexual development from infancy to old age investigate and report on different sources of information and support about sexual health and sexuality discuss their own understanding of sexuality in terms of emotions and physical expression explain that sexual feelings can be powerful but that each individual has the responsibility to control her/his actions and no one has the right to exploit other's feelings
	• understand the term sexual (reproductive) health and know how to maintain sexual health	explain what constitutes sexual health (physical and emotional) explain why sexual health is important discuss and compare methods of maintaining sexual health (abstinence, faithfulness, condom use) and identify abstinence as the most effective method

	• know risky sexual practices and the impact thereof on the community and society	identify risky sexual practices (sex without a condom, multiple sexual partners, sugar daddies /mommies) describe the impact (physical and emotional) of risky sexual practices on the individual, family, community and society describe different ways of showing affection that are safe
1.2 Goal-setting and decisionmaking skills	• know skills for setting goals and making healthy decisions	explain what it means to set goals and how good health helps us reach our goals outline a set of goals for the short and long-term explain the importance of making informed decisions in order to reach goals discuss what influences decisions around sexual

THEMES AND TOPICS	**LEARNING OBJECTIVES learners will:**	**BASIC COMPETENCIES learners should be able to:**
		behaviour and how to resist negative influences
1.3 Communication skills	• know the values, desires and needs of communication skills and know how to resist pressure	differentiate between verbal and non-verbal communication explain what negotiation is and why it is necessary in all sexual and other relationships
1.4 Relationships	• know different types of romantic relationships and prepare learners to be responsible and respectful in relationships	distinguish between healthy and unhealthy relationships and the benefits and consequences of each type explain the importance of gender equality in relationships state procedures to follow if they are being pressured by an adult to develop a sexual relationship identify sources of support if they are being pressured by an adult to develop a sexual relationship

1.5 STDs, HIV and AIDS	• understand the correct basic scientific information about STDs, HIV and AIDS and recognise that getting HIV is not inevitable in that it is preventable • realise that the abuse around HIV and AIDS increase the spread of the pandemic	describe sexually transmitted diseases (STDs) in terms of transmission, prevention, and consequences thereof explain what HIV and AIDS are, how they attack and destroy the body , and that people with HIV usually don't show any signs or symptoms but they can still spread the disease state three ways HIV is transmitted (blood contact, sexual intercourse, mother to child) and three ways it is not transmitted state that no one knows for sure where HIV and AIDS came from but that they affect all kinds of people all over the world explain that there is no cure yet for HIV /AIDS but there are life-prolonging treatments • discuss the myths and taboos around HIV and AIDS
1.6 Teenage pregnancy and family planning	• know what it means to be a responsible parent and why and how to prevent teenage pregnancy	discuss what it means to be a responsible parent and what qualities and resources are needed discuss why abstinence, contraceptives and condom use are requirements to prevent teenage pregnancy explain why teenage pregnancy should be prevented (both for mother and child)

THEMES AND TOPICS	**LEARNING OBJECTIVES learners will:**	**BASIC COMPETENCIES learners should be able to:**
		define fertilisation as the joining of male and female sex cells explain how to prevent pregnancy (e.g. abstinence, contraceptives, condoms)

1.7 Violence and abuse	• know abuse, causes of abuse, and ways of avoiding and combating abuse and acknowledge that abuse is never the victim's fault	discuss sexual abuse and feelings associated with it explain why people commit sexual abuse and how to avoid situations that may put someone at risk of sexual abuse investigate and report on where to go and whom to talk to if abused
TOPIC 2 SCIENTIFIC PROCESSES		
This topic is an introduction to some of the basic scientific skills. The skills in this topic should not the taught in isolation as they form an integral part of the other topics.		
2.1 Estimating & measuring	• know how to estimate and measure length, mass, time, temperature and the area of regularly shaped (right-angled) objects	estimate and measure: length, mass, time and temperature temperature of melting ice the height of fellow learners and the mass of school bags using an appropriate method calculate the area of regularly shaped (right-angled) objects convert minutes and hours to seconds convert units of length, mass, time and area follow sequence of instructions; use appropriate techniques; handle apparatus /material competently and have due regard for safety make and record estimates and measurements accurately handle and process experimental observations and data
2.2 Observing	• know how to observe properties such as colour, size, feel, sound, shape and smell of a variety of substances	make and record observations observe properties such as colour, size, feel, sound, shape and smell of a variety of substances

THEMES AND TOPICS	LEARNING OBJECTIVES learners will:	BASIC COMPETENCIES learners should be able to:
		observe properties of a variety of common substances such as sugar, salt, tea, coffee, sand, pepper and flour process experimental observations and data
2.3 Classifying	• know how to group common objects in a number of different ways	compare and distinguish properties of common objects group (classify) objects in a variety of ways
TOPIC 3: MATTER		
3.1 Nature of matter	• know the characteristics of a variety of matter	characterise a variety of matter by its colour, smell, taste, melting point and boiling point describe different properties of substances name the three states of matter do simple investigations to show that different substances have different properties
3.2 From Earth into space		
3.2.1 The solar system	• know that we live on a planet, which, along with eight other planets, is around our Sun	describe the paths of the planets as orbitals seen from the Sun draw a diagram of the solar system which depicts the planet's relative distances from the Sun state that Mars is Earth's nearest neighbour and has similarities to Earth discuss some ways Earth and Mars are similar and some ways they differ
3.3 Building blocks of matter		

3.3.1 Atoms and molecules	• know that every element has a name and a symbol (know at least the first 10 elements, as well as C, O, U, Cu, Au, Fe, Ag, Al, N, Pb, Cl)	state that atoms are the smallest building blocks of matter explain that all matter consists of elements or combinations thereof state that the Periodic Table is a classification of all existing elements classify elements into metals and non-metals state that every element has a name and a symbol (know at least the first 10 elements, as well as C, O, U, Cu, Au, Fe, Ag, Al, N, Pb, Cl)

THEMES AND TOPICS	**LEARNING OBJECTIVES learners will:**	**BASIC COMPETENCIES learners should be able to:**
3.3.2 Elements and compounds	know that atoms combine to form compounds, which are the building blocks of all material (an extension of the particle model) understand the difference between an element and a compound	state that elements combine together chemically to form compounds (e.g. water, H_2O and carbon dioxide, CO_2) name practical examples of most common elements, compounds and mixtures found in everyday life, the Earth's crust, the atmosphere and water

3.3.3 Mixtures and solutions	know the difference between elements, mixtures and compounds understand that compounds can be pure substances	observe examples of commonly known substances to show and explain the difference between elements, mixtures and compounds describe the mixing of substances to make solutions as a physical process demonstrate and investigate the mixing of solids and solids, solids and liquids, and liquids and liquids experience and explain that the components of mixtures can be separated by methods (through simple experiments, e.g. with iron filings and sulphur), but not those of compounds as they have chemically combined describe the separation (physical change) of mixtures and solutions, e.g. sorting with a magnet, evaporation, filtration and distillation do simple experiments to separate the components of mixtures, e.g. by hand sorting (different size stones), using a magnet (iron and sulphur), evaporation (salt and water), filtration (silt and water) and distillation (water and ink) discuss water as a solvent and its many uses in everyday life distinguish between clean /pure water and polluted water and examine pure and polluted water under the microscope discuss the disadvantages and dangers of polluted water use and explain the use of a sand filter to clean water, boiling to kill germs

THEMES AND TOPICS	LEARNING OBJECTIVES learners will:	BASIC COMPETENCIES learners should be able to:
3.4.1 Air around us	• know the composition of air and be able to test for the presence of water, oxygen, and carbon dioxide	state the composition of air in the atmosphere (oxygen. carbon dioxide & nitrogen) investigate the presence of water vapour and carbon dioxide in the air describe a test for and test for the following: − water − water vapour − carbon dioxide − oxygen state and demonstrate that air supports combustion state and demonstrate that one fifth of the air around us consist of oxygen which supports combustion /respiration state that four fifths of the air around us consists of nitrogen which does not support combustion name two substances which are essential for combustion explain how to put out fire (a camp fire, household fires, electrical fires)
TOPIC 4 FORCES AND ENERGY		
4.1 Nature and effects of forces	• know forces as integral parts of life	identify and name forces describe pushing and pulling (repulsion and attraction) classify forces in contact and non-contact forces state that forces are measured in newtons name five effects of pushing and pulling forces, giving examples of each

4.2 Weight and mass	• know the existence of the Earth's gravitational pull and the Earth's gravitational field constant	explain why objects fall to Earth explain the existence of the Earth's gravitational pull and the Earth's gravitational field constant identify and compare the effects of Earth's gravitational pull on different objects explain weight as a manifestation of Earth's gravitational pull explain the difference between weight and mass

THEMES AND TOPICS	**LEARNING OBJECTIVES learners will:**	**BASIC COMPETENCIES learners should be able to:**
4.3 Energy in everyday examples	• understand that people use energy for their everyday living requirements	describe energy as the ability to do work investigate the activities of people in the local environment determine the energy requirement of these activities
4.4 Sources of energy	• know the different sources of energy that are available to people and know the difference between renewable and non-renewable energy sources	investigate and name the energy sources available in their local environment demonstrate by means of simple experiments how energy sources are used list the most important energy sources for Namibia identify four fuels commonly used give examples of how the fuels identified are used state that fuels are limited and that energy sources can be exhausted distinguish between renewable and non-renewable energy sources in the local environment explain how energy sources are used

4.5 Forms of energy and energy conversions	• know energy in its different forms and know the law of energy conversion	distinguish between different forms of energy state the law of energy conservation identify energy conversions and identify different forms of energy conversions in practical examples describe the movement of energy through the local environment (by naming the different types of energy)
TOPIC 5 LIGHT		
5.1 Basic concepts of light	know how to make a shadow clock or sundial know that light travels in straight lines and how this leads to the formation of shadows	state the difference between luminous and illuminated objects explain that light travels in straight lines and how this leads to the formation of shadows make a shadow clock or sundial

THEMES AND TOPICS	**LEARNING OBJECTIVES learners will:**	**BASIC COMPETENCIES learners should be able to:**
5.2 Transmission, absorption and reflection	• understand the properties of light by using different apparatus	state and show that light travels in straight lines explain divergent, convergent and parallel rays or beams of light investigate what happens when light falls on different objects that are translucent, transparent and opaque use apparatus such as a torch, mirror, glass window, Perspex ruler, and black plastic to explain properties of light

5.3 Reflection by mirrors	• know reflection in plane mirrors, using ray boxes or pins, so as to determine the position, nature and size of the image	describe the formation, and give the characteristics, of an optical image formed by a plane mirror investigate reflection in plane mirrors, using ray boxes or pins, so as to determine the position, nature and size of the image determine what happens when light falls on transparent, translucent (glass surface of solar panels), and opaque surfaces identify everyday applications of reflection such as the uses of different kinds of mirrors, the reflecting surfaces behind lights and the reflecting surfaces behind solar cookers
TOPIC 6 ELECTRICITY		
6.1 Static electricity	• understand charge, know how to charge objects	explain the existence of electrons explain the existence of charge due to the imbalance of electrons and protons explain that charging by friction simply means the separation of charges describe how objects can be charged by friction study and explain the effects of charged objects on one another describe and investigate how it is possible for different objects to attract and repel each other due to their charges charge and explain ways of charging objects by friction, e.g. combs, pen, glass and Perspex rods, plastic straws and pens rubbed on wool, silk, and hair

THEMES AND TOPICS	**LEARNING OBJECTIVES learners will:**	**BASIC COMPETENCIES learners should be able to:**

		• study and explain examples in everyday life where charging takes place by friction as in − walking on a carpet − pulling off a jersey − pulling blanket and sheets apart
6.2 Electroscope	• know the working of an electroscope	explain and demonstrate how an electroscope can be charged explain and demonstrate the use an electroscope to test for charges explain and demonstrate how charges on a charged electroscope are able to discharge by flowing to the Earth • explain earthing
6.3 Electric current	• understand current as the movement of charge	explain the term discharge as the movement of charge (electrons) state lightning as a form of discharge state that moving charges (positive or negative) are known as an electric current outline that electric current is determined by the flow of charges discuss the difference between static electricity and electric current
6.4 Electrical sources	know that electrical current requires a source realise that a cell is a source of chemical energy which can be used to produce electrical energy	state that electrical current requires a source discuss that a cell is a source of chemical energy which can be used to produce electrical energy state that a cell has positive and negative terminals • state that electrical current is the flow of charges − negative charges (e.g. electrons) move from a negative to positive terminal − positive charges move from a positive to negative terminal state that current will only flow in a closed circuit describe the difference between a closed and an open circuit

THEMES AND TOPICS	LEARNING OBJECTIVES learners will:	BASIC COMPETENCIES learners should be able to:
6.5 Conductors and insulators	• know what a conductor and an insulator is	explain what a conductor and an insulator is use an electroscope to test for conductors and insulators compare substances to see which are better conductors, e.g. metals, plastic, wood, water and solutions
6.6 Cells and bulbs in series and parallel	• know how to construct simple circuits and draw the circuit symbols	explain how to construct and draw (using circuit symbols) a circuit using a cell, conductor wires, a switch and a bulb construct series and parallel circuits using a cell, conductor wires, a switch and a bulb sketch and identify circuit symbols for a cell, conductor wires, a switch and a bulb
TOPIC 7 LIVING ORGANISMS		
7.1 Characteristics of living organisms	• know and understand all the basic characteristics of living organisms	revise characteristics of living organisms from grade 6 define sensitivity as the ability of living organisms to respond to stimuli (the ability of living organisms to detect changes and make appropriate responses) and excretion as the removal of metabolic waste products from the body investigate how animals react to different stimuli in the environment describe sensitivity as the important principle for survival
7.2 Plants		

7.2.1 Flowering and non-flowering plants	• realise the difference between flowering and nonflowering plants and understand the adaptability of plants to their specific environment	revise flowering plants from grade 6 identify structures of a non-flowering plant describe the differences and similarities between flowering and non-flowering plants describe the functions of plant structures (flowering and non-flowering plants) describe the adaptations of Welwitschia mirabilis in Namibia

THEMES AND TOPICS	**LEARNING OBJECTIVES learners will:**	**BASIC COMPETENCIES learners should be able to:**
7.3 Animals: variations among animals (including mammals, birds, reptiles, fish, insects and amphibians)	• understand how to classify animals into their major groups and how they are adapted to the environment for survival	(revise grades 5 and 6 work as outlined – one added feature for animals with backbones and two added features for animals without backbones) explain the criteria used to classify each animal group describe the life cycles of a local insect and a mammal describe how a fish and an insect (as selected in their locality) are adapted to their environment
TOPIC 8 HUMAN BODY		
8.1 Different systems of the human body	• appreciate that the human body consist of different systems and know where they are located in the human body	(revise the system as done in grade 5 syllabus) identify and label the different systems of the human body describe the basic functions of each system explain the importance of these systems for human existence

8.2 Digestion	understand how food nutrients are made available to the body know different forms of digestion realise the importance of chewing food know the importance of enzymes in the digestion of food	define digestion as the breakdown of food substances into soluble substances describe the different forms of digestion discuss the importance of chewing food define enzymes as biological catalysts (proteins) which speed up or slow down a reaction but do not get used up during the reaction state the end-products of starch, fat and protein digestion
8.3 Excretion	• understand the basic structure and function of the excretory organs	identify the different excretory organs identify and label the different structures of the kidney (ureter, urethra and bladder) name the substances removed from each organ
8.4 Nervous system and drugs	• understand the basic structure and function of the nervous system and the influence of drugs on it	identify the human nervous system from diagrams in terms of central and peripheral nervous system identify a reflex arc from diagrams explain the basic function of the reflex arc describe the influence of drugs on the nervous system

THEMES AND TOPICS	**LEARNING OBJECTIVES learners will:**	**BASIC COMPETENCIES learners should be able to:**
TOPIC 9 HUMAN DEVELOPMENT		
9.1 Physical development	• realise and appreciate the physical changes in boys and girls when maturing and acquire knowledge about human reproductive parts	explain the kinds of physical changes which occur in maturing pre-adolescent boys and girls (secondary sexual characteristics of boys and girls) identify the different structures in male and female reproductive systems from diagrams state the functions of the various parts of the male and female reproductive systems

9.2 Mental and Emotional development	• analyse the importance of self awareness and its connection to self esteem and mental development	(revise the work of grade 6) identify the factors that contribute to self awareness and self esteem as a pre-adolescent
TOPIC 10 ENVIRONMENT		
10.1 Ecosystems	• understand the basic terminology on the ecosystem and know the three ecosystems common to Namibia	explain the following terms: ecosystem, habitat, community, population and species study the structure and make-up of an ecosystem in their locality list the different ecosystems commonly found in Namibia
	• know the characteristics of these ecosystems	• describe the characteristics of each ecosystem in terms of living and non-living factors
	• realise the importance of the interrelationship between biotic and abiotic factors in the local environment	• outline the interrelationship of the organisms found in an ecosystem
	• understand ways in which human activities affect a local environment and influence the health of people in the community	investigate human activities which have a positive and negative impact on the environment describe how the above mentioned impacts will influence the health and well-being of people in the community
	• appreciate the importance of energy flow in an ecosystem and understand why this is important for the survival of organisms in that ecosystem	describe the energy flow through living organisms within the chosen local environment (food chain, food web) discuss the importance of energy flow through an ecosystem
THEMES AND TOPICS	**LEARNING OBJECTIVES learners will:**	**BASIC COMPETENCIES learners should be able to:**
10.2 Storage and conservation of water (revision of Grade 5)	• understand the need and methods of storing and conserving water in their locality (home and school)	list ways of conserving water describe ways of conserving water explain the importance of conserving water

10.3 Conservation of soil	• appreciate and understand the importance of conserving soil	list ways of conserving soil describe ways of conserving soil discuss the importance of conserving soil investigate and report on practices of soil conservation as found in their local environment
10.4 Air pollution	• understand the effects of polluted air	name at least three sources of air pollution describe at least three sources of air pollution (wood smoke from cooking fires and burning bush, exhaust fumes from cars, mica dust, smoke from electric power stations and mine smelting stations) distinguish between human-made and natural air pollution explain how sustained exposure to polluted air could affect their lungs name controls and regulations against air pollution

ASSESSMENT

INTRODUCTORY REMARKS

Purpose of Assessment

In learner-centred education, continuously assessing the progress and achievements of each learner is an integral part of the teaching and learning process. The main purpose of assessment is to get as reliable a picture as possible of the progress of the learner in terms of achieving the Basic Competencies of the syllabus and Process Skills. Assessment will inform the teacher of problems, guide ensuing compensatory teaching and inform whether learners are ready to move on to other objectives and competencies or the next skill. Information gathered through assessment will be used to:

inform the learner

The information gathered about the learners' progress and achievements should be used to give feedback to the learners about their strong and weak points, where they are doing well, and why, and where they need to try more, how, and why.

inform the parents

The parents should be regularly informed about the progress of their child, encouraged to reward achievements and given suggestions as to how they can support their child's learning activities.

evaluate the teaching/learning process

The progress and achievements of the learners can be used by the teacher to evaluate the teaching and learning process in terms of: relevance of content, learner participation, appropriate methods of teaching, optimal use of group work, individual work, and teacher directed teaching, etc.

TYPES OF ASSESSMENT

Formative Assessment

Assessment of this type is formative because the observations made and information collected are used both to guide the learner and to help shape and direct the teaching-learning process. Assessment has a formative role for learners if and when:

it motivates them to extend their knowledge and skills, and establish sound values;

it promotes healthy study habits;

it is used to motivate them to extend their knowledge and skills and to establish sound values;

assessment tasks help learners to solve problems intelligently by using what they have learned;

the teacher uses the information to improve teaching methods and learning materials.

Summative Assessment

At the end of a school year, the progress and achievements of the learner throughout the year are summed up. This is called summative assessment. Where there is an end-of year test or examination, the summative assessment will consist both of the continuous assessment and the final assessment. On the basis of this, a decision must be made as to whether or not a learner is able to go on to the next year, or needs to be held back.

Continuous Assessment

Continuous assessment should be planned and programmed at the beginning of the year and be kept as simple as possible. Marks given for class activities, assignments, homework, or short tests on completion of a topic can be recorded for continuous assessment. In order not to take up too much teaching time with assessment, no fewer than 5 (1 in the first term, and 2 each in terms two and three) and no more than 9 (three per term) assessments should be done.

National Assessment

There will be a national assessment at the end of Grade 7, relating to the Learning Objectives and Basic Competencies of the syllabuses, and using various types of questions to test a broad range of skills and knowledge.

Examples of Assessment Tasks:

Practical Investigations: These are assessments of practical skills done during a practical activity where learners are required to plan and carry out investigations, and collect, report and analyse information. Except for one big investigation or project during the first or second term, these activities should assess not more than two skills and should count 15 marks each.

Topic Tasks: These are activities that most teachers already use in their day-to-day teaching. These are recorded, assessed activities that could introduce a topic, be used during the teaching of a topic and /or revision a topic. They may well include assessment involving competencies to do with locating information, conducting

surveys, analysing information or presenting information. Topic tasks will involve assessments of Basic Competencies in all assessment objectives; however, not all assessment objectives need to be present in every topic task. The greatest emphasis should be placed on assessment objectives B and C (see section 12.4) to meet the weighting shown in the Test Specification Grid on page 53. Each topic task should count 10 marks.

Projects: A project is a longer assignment than a topic task or practical investigation, and gives learners an opportunity to complete an investigation into one of the themes /topics outlined in the syllabus. This type of investigation will enable the teacher and learner to pursuer a topic in greater depth and in a more lively and creative way than possible with short discrete topic tasks or practical investigations. The project should count 30 marks and the final mark should be divided by two (to give 15 marks – same as the practical investigations) when entered into the record forms.

Topic Tests: Completed topics should be concluded with a test indicating the achievements of the learners in these topics.

End of Term Test: This will be a more comprehensive topic test of the term's work. However, the end of term test should not be seen as an examination. Teaching at the end of term 1 and 2 should continue after the end of term test is written. No homework should be assigned during the time of writing the end of term tests.

METHODS OF ASSESSMENT

Informal Methods

The teacher must assess how well each learner masters the Basic Competencies described in the subject syllabuses, and from this gain a picture of the all-round progress of the learner. To a large extent, this can be done in an informal way through structured observation of each learner's progress in learning and practical situations while they are investigating and interpreting phenomena and data, applying knowledge, communicating, making value judgements, and their participation in general.

Informal continuous assessment (CA) is frequently carried out on a day-to-day basis; much is done casually in normal classroom activities. It does not interfere with normal teaching, gives useful feedback to the teacher and the learner and will be used in a diagnostic way. Informal CA consists of tasks and activities that are not specially designed for their validity as assessment tasks or activities. Examples of informal assessment are tasks assigned as homework and worksheets, or the teacher's personal day-to-day records about learners' behaviour, class participation or motivation. These

records do not have a prescribed format. They are very important because such evidence can be particularly useful, for example in cases where learners have been absent for formal assessment and examinations, and a judgement has to be made about their performance on the basis of other evidence.

Formal Methods

When it is necessary to structure assessment more formally, the teacher should, as far as possible, use ordinary learning and practical situations to assess the competency of the learner. The use of formal written and oral tests can only assess a limited range of competencies and therefore should not take up a lot of time. Tests in any subject should be limited to part of, or one, lesson.

Formal continuous assessment consists of tasks and activities that have been designed for the specific purpose of assessing certain competencies. The aim is to carry out the assessment in a valid way using materials that have been designed for this purpose. The results of learners' performance on assessment tasks are recorded and contribute 50% of the learner's final assessment. Performance in practical investigations, projects, topic tasks and short tests (achievement tests) will be selected, graded and recorded.

No external examination will be written in Grades 5 and 6. In these grades, CA will count 50% towards the final year grade and an internal end-of-year examination will count 50%.

Recording Grades

The grades obtained by learners through continuous assessment must be systematically recorded throughout the year, used to inform the learner and parents on progress and achievements, and to guide compensatory teaching.

ASSESSMENT OBJECTIVES

The three assessment objectives in Natural Science and Health Education are:

A: Knowledge with Understanding

Requires the learner to identify, give examples, name, list, indicate, define and recognise.

B: Handling Information, Application of Knowledge and Solving Problems

Requires the learner to use various forms of information to select, explain, deduce, draw, relate, describe, calculate, find, estimate, predict, determine, analyse, extract and analyse, arrange, compare and discuss, suggest, evaluate, interpret and distinguish. Learners may be asked to translate information from one form to another, for example from tables, graphs and pictures.

C: Practical (experimental and investigative) Skills and Abilities

Requires the learner to carry out an investigation, present a report to their class, collect data and information and create a display, construct, write an essay, conduct a survey, demonstrate practically, produce a poster, write out a news report and analyse.

TERM MARKS AND PROMOTIONAL MARKS

	Grade 5					
COMPONENTS	**TERM 1**		**TERM 2**		**TERM 3**	
	Number & Marks	**Total CA**	**Number & Marks**	**Total CA**	**Number & Marks**	**Total CA**
Practical Investigations	2 × 15	30	1 × 15	15	(1 × 15) × 2	30
Projects			(1 × 30) ÷ 2	15		
Topic Tasks	2 × 10	20	2 × 10	20	2 × 10	20
Topic Tests	(2 × 20) ÷ 2	20	(2 × 20) ÷ 2	20	(2 × 20) ÷ 2	20
End of Term Test	1 × 30	30	1 × 30	30	1 × 30	30
Term Marks		100		100		100

PROMOTION MARK	Term 1	Term 2	Term 3	
	100	100	100	300
	300 ÷ 3			100

GRADES 6 & 7						
COMPONENTS	**TERM 1**		**TERM 2**		**TERM 3**	
	Number & Marks	**Total CA**	**Number & Marks**	**Total CA**	**Number & Marks**	**Total CA**
Practical Investigations	2 × 15	30	1 × 15	15	1 × 10	10
Projects			(1 × 30) ÷ 2	15		
Topic Tasks	2 × 10	20	2 × 10	20	2 × 10	20
Topic Tests	(2 × 20) ÷ 2	20	(2 × 20) ÷ 2	20	(2 ×20) ÷ 2	20
End of Term Test	1 × 30	30	1 × 30	30		
Total Term Marks		100		100		50
Term Marks		100		100	Total Term Marks × 2	100

ROMOTION MARK		Term 1	Term 2	Term 3	300
		100	100	100	
	Average Term mark	300 ÷ 3			100
	End-of-year examination	100 Marks			100
	Average Term mark + End-of-year examination 200 ÷ 2				**100**

END OF YEAR EXAMINATIONS

1. Summative Assessment and End of Year Examination

As part of summative assessment there will be an end of year examination at the end of Grades 6 & 7, relating to the Learning Objectives and Basic Competencies of the syllabus. The end of year examination of Grade 7 will be a semi-national examination set by DNEA and marked at the school. It is preferred that the examination written at the end of the year by Grade 6 learners will be set by the regional cluster. A variety of question types will be used to test a broad range of skills. This summative assessment will consist of both continuous assessment and a final assessment. Continuous assessment will count 50% and the final examination will count 50%.

NOTE:

The end of year examination for Grade 5 should be an end of term test consisting of only the work done in the third term.

The end of year examination for Grade 6 should consist of work done in the second and third terms.

The End of year examination for Grade 7 is a national examination and will consist of all work done during the Grade 7 year.

SUMMATIVE ASSESSMENT			
Component Number	**Component Description**	**Duration**	**Marks**
1	**Written Examination** This will consist of one paper of 90 minutes consisting of two sections. Section A: 20 multiple choice questions (20 marks) Section B: variety of structured questions (80 marks)	90 minutes	100

2	**Continuous Assessment** This will consist of Continuous Assessment Tasks conducted in the school during the year. There should be a minimum as specified by the **promotion mark**.		100
		Total Mark = 200	

2. Test Specification Grid

The test Specification Grid below shows the mark weighting allocated to each Objective for both the written examination and continuous assessment.

Components	**Weighting %**
1. Written Examination	50
2. Continuous Assessment (CA)	50
Total	100

1. Written Examination	
Assessment Objectives for Written Examination:	
Objective A Knowledge with Understanding	50
Objective B Handling Information, Application of Knowledge and Solving Problems	30
Objective C Practical (experimental and investigative) Skills and Abilities	20
Total	100

2. Continuous Assessment (CA)	

Assessment Objectives for Continuous Assessment:	
Objective A Knowledge with Understanding	20
Objective B Handling Information, Application of Knowledge and Solving Problems	30
Objective C Practical (experimental and investigative) Skills and Abilities	50
Total	100

GRADE DESCRIPTORS

The learner's level of achievement in relation to the Basic Competencies in the subject syllabus will be shown in letter grades A - E where A the highest and E is the lowest grade. The relation between the grades and Basic Competencies is shown below.

GRADE A - **Achieved Basic Competencies exceptionally well**. The learner is outstanding in the class in all main areas of competency. (80%)

GRADE B - **Achieved Basic Competencies very well.** The learner is above average in the class, and is more proficient than average in several areas e.g. showing quicker mastery of some competencies, or being able to apply competencies to unknown situations or contexts, or has shown new insight. (60-79%)

GRADE C - **Achieved Basic Competencies.** The learner has mastered the competencies satisfactorily in known situations and contexts. The large majority of learners should reach this level. (45-59%)

GRADE D - **Achieved the minimum number of Basic Competencies to be considered competent.** The learner may not have achieved all the competencies, or may have sometimes need help, but has sufficient competency to go on to the next grade. (30-44%)

GRADE E - **Not achieved the minimum number of Basic Competencies.** The learner has not been able to reach a minimum level of competency for the year's grade, even with extensive help from the teacher and is in need of compensatory teaching. (0-29%)

ANNEXE

A1 Terms used in teaching and assessment

WORD	MEANING
Analyse	Examine information in detail to discover patterns or relationships
Calculate	A numerical answer is required - working must be shown
Compare	Find resemblances and differences
Deduce	Use the information provided to come to a conclusion, e.g. reference to a law or principles, or the necessary reasoning is to be included in the answer
Define	A literal statement is required
Describe	Write down what you do, or what you would see, in as much detail as possible
Determine	Use the information given to work out the answer
Discuss	Give a critical account of the points involved in the topic
Distinguish	Show the difference between one or more variables
Estimate	Implies a reasoned statement or calculation about something
Evaluate	Use the information provided to make a judgement about something
Explain	Give a reason for your answer
Find	A general term which means calculate, determine or measure
Give /state /write down	Write down your answer
Identify	Find out what is unique about a material or situation
Interpret	Reasoning or some reference to theory, depending on the context
Investigate	Examine a problem in a systematic way
List	Give a number of points, generally each of one word
Outline	Give a brief answer writing down the main points
Predict	Make a logical deduction either from your own knowledge, from the information given in the question or both
Recognise	Be aware of a fact or problem
Relate	Find the relationship between one or more variables
Select	Choose from a number of alternatives

Sketch	In case of diagrams, make a simple, freehand drawing, and in graph work, the shape and /or position of the curve should be given
Study	Use the information or data provided to investigate a problem in a systematic way
Suggest	Use your knowledge of science and the information in the question to give what you think is the best answer

A2 Record Forms for Grade 5

CONTINUOUS ASSESSMENT Grade: Year:
School: Teacher:

		Practical Investigation /Project		Total Mark	Topic Task		Total Mark	Topic Test		Total Mark	End of Term Test	CA Mark (Term Mark)	Total Term Mark	Promotion Mark (Average Term Mark)
Name of Learner	Term	1	2		1	2		1	2	40÷2				300÷3=100
	Mark	15	15	**30**	10	10	**20**	20	20	**20**	**30**	100	300	100
	1													
	2													
	Mark	15×2												
	3													
	Mark	15	15	**30**	10	10	**20**	20	20	**20**	**30**	100	300	100
	1													
	2													
	Mark	15×2												
	3													
	Mark	15	15	**30**	10	10	**20**	20	20	**20**	**30**	100	300	100
	1													
	2													
	Mark	15×2												
	3													
	Mark	15	15	**30**	10	10	**20**	20	20	**20**	**30**	100	300	100
	1													
	2													
	Mark	15×2												
	3													

	Mark	15	15	**30**	10	10	**20**	20	20	**20**	**30**	100	300	100
	1													
	2													
	Mark	15×2												
	3													
	Mark	15	15	**30**	10	10	**20**	20	20	**20**	**30**	100	300	100
	1													
	2													
	Mark	15×2												
	3													

		Practical Investigation /Project		Total Mark	Topic Task		Total Mark	Topic Test		Total Mark	End of Term Test	CA Mark (Term Mark)	Total Term Mark	Promotion Mark (Average Term Mark)
Name of Learner	Term	1	2		1	2		1	2	40÷2				300÷3=100
	Mark	15	15	**30**	10	10	**20**	20	20	**20**	**30**	100	300	100
	1													
	2													
	Mark	15×2												
	3													
	Mark	15	15	**30**	10	10	**20**	20	20	**20**	**30**	100	300	100
	1													
	2													
	Mark	15×2												
	3													
	Mark	15	15	**30**	10	10	**20**	20	20	**20**	**30**	100	300	100

	1												
	2												
	Mark	15×2											
	3												

A3 Record Forms for Grade 6 & 7

CONTINUOUS ASSESSMENT Grade: Year:
School: Teacher:

		Practical Investigation/ Project		Total Mark	Topic Task		Total Mark	Topic Test		Total Mark	Total Mark	End of Term Test	CA Mark	Term Mark	Exam mark		Average Term Mark	Promotion Mark
Name of Learner	Term	1	2		1	2		1	2							1	300÷3	100
	Mark	15	15	30	10	10	20	20	20	40÷2	70	30	100	100				100
	1															2		
	2																	
	Mark	10		10	10	10	20	20	20	20	50		50×2	100	100	3	100	200÷2
	3																	
	Mark	15	15	30	10	10	20	20	20	40÷2	70	30	100	100				100
	1																	

Total Mark: Class
Ave. Mark: Class
Ave. %: Class
Total Mark: Class
Ave. Mark: Class
Ave. %: Class
Total Mark: Class
Ave. Mark: Class
Ave. %: Class
Class Ave. %:
for the year

	2																
	Mark	10		10	10	10	20	20	20	20	50		50×2	100	100	100	200÷2
	3																
	Mark	15	15	30	10	10	20	20	20	40÷2	70	30	100	100			100
	1																
	2																
	Mark	10		10	10	10	20	20	20	20	50		50×2	100	100	100	200÷2
	3																
	Mark	15	15	30	10	10	20	20	20	40÷2	70	30	100	100			100
	1																
	2																
	Mark	10		10	10	10	20	20	20	20	50		50×2	100	100	100	200÷2
	3																
	Mark	15	15	30	10	10	20	20	20	40÷2	70	30	100	100			100
	1																
	2																
	Mark	10		10	10	10	20	20	20	20	50		50×2	100	100	100	200÷2
	3																
	Mark	15	15	30	10	10	20	20	20	40÷2	70	30	100	100			100
	1																
	2																
	Mark	10		10	10	10	20	20	20	20	50		50×2	100	100	100	200÷2
	3																

		Practical Investigation /Project	Total Mark	Topic Task	Total Mark	Topic Test	Total Mark	Total Mark	End of Term Test	CA Mark	Term Mark	Exam mark	Average Term Mark	Promotion Mark

Name of Learner	Term	1	2		1	2		1	2							300÷3	100
	Mark	15	15	30	10	10	20	20	20	40÷2	70	30	100	100			100
	1																
	2																
	Mark	10		10	10	10	20	20	20	20	50		50×2	100	100	100	200÷2
	3																
	Mark	15	15	30	10	10	20	20	20	40÷2	70	30	100	100			100
	1																
	2																
	Mark	10		10	10	10	20	20	20	20	50		50×2	100	100	100	200÷2
	3																
	Mark	15	15	30	10	10	20	20	20	40÷2	70	30	100	100			100
	1																
	2																
	Mark	10		10	10	10	20	20	20	20	50		50×2	100	100	100	200÷2
	3																

Total Mark: Class	1	
Ave. Mark: Class		
Ave. %: Class		
Total Mark: Class	2	
Ave. Mark: Class		
Ave. %: Class		
Total Mark: Class	3	
Ave. Mark: Class		
Ave. %: Class		
Class Ave. %: for the year		

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Appendix 11: Extract form NSHED Textbook

Activity

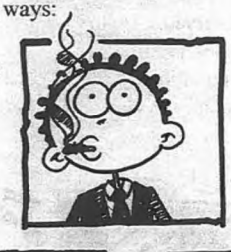
10 steps to make an eco-friendly compost heap:

1. Clear a small area in your garden.
2. Put a layer of twigs and sticks from your garden on the ground and wet them.
3. Cover the twigs with a layer of grass, leaves and the remains of fruit and vegetables from the kitchen. The layer should be about 20cm deep. Water this layer.
4. Sprinkle a thin layer of manure over the grass and wet it.
5. Cover the manure with a mixture of ash and garden soil. Water this layer.
6. Repeat the procedure until the heap is about a metre high.
7. Cover the heap with plastic.
8. Remove the plastic once a week to put water on the heap.
9. After about 4 weeks, use a shovel to turn the heap over. Repeat after 4 weeks.
10. Take the plastic cover off and use!

8.7 Air Pollution

Air is all around us. It is important for all of us to keep our air clean. Air becomes polluted in the following ways:

smoking



exhaust fumes

burning wood

smoke and fumes from industries

digestive gases from animals

Appendix 12: Lesson Plan

Appendix 12: Lesson Plan

TEACHER: N

GRADE: 7 DATE: 24/03/2014

SUBJECT: NATURAL SCIENCE AND HEALTH EDUCATION

THEME AND TOPIC: AIR POLLUTION

TEACHING AIDS AND RESOURCES TO BE USED: N/science in context and 7

LEARNING OBJECTIVES WITH THE LESSON: Learners will:

Understand the effects of polluted air.

BASIC COMPETENCIES (Refer to Syllabus): Learners should be able to:

name at least three sources of air pollution, and describe at least three sources of air pollution.

PRESENTATION OF THE LESSON:

1. Monitoring of homework done:

2. An appropriate short introduction: Ask questions: e.g. Explain on how air is polluted and give some examples.

3. Presentation of subject content and learning tasks: Ask learners to discuss and find some sources of air pollution based on the local environment. Explain and give some examples.

4. Consolidation: Describe and explain how air is polluted.

5. ASSESSMENT / HOMEWORK / TASK / EXERCISES: Home work will be given to learners to do. Q1. What is the difference between human-made and natural air pollution.

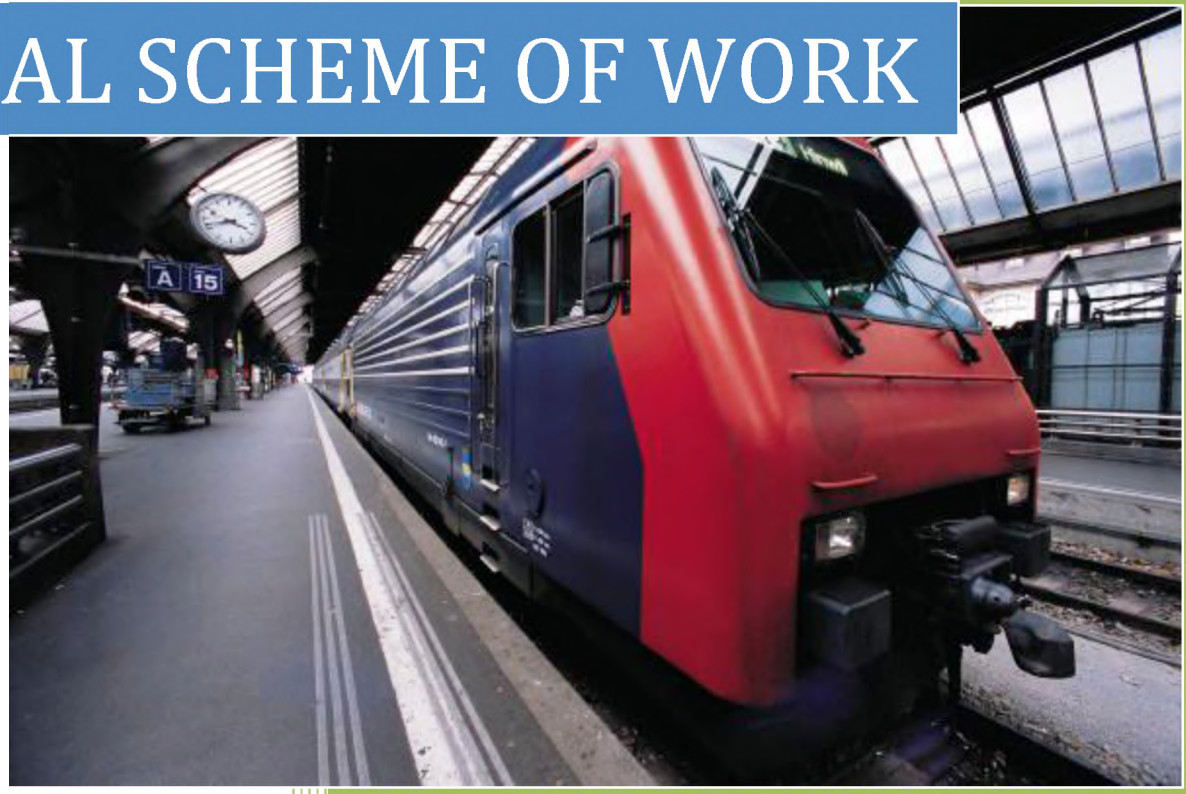
OPPORTUNITIES TO DEVELOP LEARNERS' ENGLISH READING AND WRITING SKILLS IN THE SUBJECT:

Reading activities: Read questions

Writing activities: wrote the given tasks.

Appendix13: Regional Scheme of Work

NSHE REGIONAL SCHEME OF WORK



Joy Mamili-Mbangu

TRIMESTER ONE

THEME/TOPIC	BASIC COMPETENCIES: LEARNERS SHOULD BE ABLE TO	ESTIMATED NUMBER OF PERIODS	RESOURCES	DATE COMPLETED		
				2012	2013	2014
7. Living organisms 7.1 Characteristic of living organisms	• Revise characteristics of living organisms from grade 6 • Define sensitivity and excretion • Investigate how animals react to different stimuli in the environment • Describe sensitivity as the important principle for survival					
7.2 Plant Flowering and non-flowering plants	• Revise flowering plants from grade 6 • Identify structures of a non-flowering plant • Describe the differences and similarities between flowering and non-flowering plants • Describe the functions of plant structures (flowering and non-flowering plants • Describe the adaptations of welwitschia mirabilis in Namibia					
7.3 Various among animals (including mammals, birds, reptiles, fish, insects and amphibians)	• Revise grades 5 and 6 work as outlined one added feature for animals with backbones and two added features for animals without backbones). • Explain the criteria used to classify each animal group. • Describe the life cycles of a local insect and a mammal. • Describe how a fish and an insect are adapted to their environment.					
10. Environment 10. 1 Ecosystems	• Explain the following terms: ecosystem, habitat, community, population and species. • Study the structure and make – up of an ecosystem in their locality. • List the different ecosystems commonly found in Namibia. • Outline the interrelationship of the organisms found in an ecosystem • Investigate human activities which have a positive and negative impact on the environment.					

THEME/TOPIC	BASIC COMPETENCIES: LEARNERS SHOULD BE ABLE TO	ESTIMATED NUMBER OF PERIODS	RESOURCES	DATE COMPLETED		
				2012	2013	2014
	• Describe how the above mentioned impacts will influence the health and well – being of people in the community • Describe the energy flow through living organisms within the chosen local environment (food chain, food web) • Discuss the importance of energy flow through an ecosystem.					
10.2 Storage and conservation of water (revision of grade 5)	• List ways of conserving water • Describe ways of conserving water • Explain the importance of conserving water					
10.3 Conservation of soil	• List ways of conserving soil • Describe ways of conserving soil • Discuss the importance of conserving soil • Investigate and report on practices of soil conservation as found in their local environment					
10.4 Air pollution	• Name at least three sources of air pollution (wood smoke from cooking fires and burning bush, exhaust fumes from cars, micadust, smoke from electric power stations and mine smelting station)					
2. Scientific processes 2.1 Estimating and measuring	Estimate and measure: • Length, mass, time and temperature • Temperature of melting ice • The height of fellow learners and the mass of school bags using an appropriate method. • Calculate the area of regularly shaped (right – angled) objects • Convert minutes and hours to seconds • Follow sequence of instructions use appropriate techniques: Handle apparatus materials competency and have due regard for safety. • Make and record estimates and measurements accurately • Handle and process experimental observation and data					
2.2 Observing	• Make and record observations					

THEME/TOPIC	BASIC COMPETENCIES: LEARNERS SHOULD BE ABLE TO	ESTIMATED NUMBER OF PERIODS	RESOURCES	DATE COMPLETED		
				2012	2013	2014
	• Observe properties such as colour, size, feel, sound, shape and smell of a variety of substances. • Observe properties of a variety of common substances such as sugar, salt, tea, coffee, sand, pepper and flour. • Process experimental observations and data.					
2.3 Classifying	• Compare and distinguish properties of common objects • Group (classify) objects in a variety of ways.					
TRIMESTER TWO						
1. Health Education 1.1 Sexuality and sexual health	• Identify from diagrams the different stages of sexual development from infancy to old age					
	• Identify from diagrams the different stages of sexual development form infancy to old age. • Investigate and report on different sources of information and support about sexual health and sexuality. • Discuss their own understanding of sexuality in terms of emotions and physical expression. • Explain that sexual feelings can be powerful but that each individual has the responsibility to control her/his actions and no one has the right to exploit other's feelings. • Explain what constitutes sexual health (physical and emotional) • Explain why sexual health is important.					

	• Discuss and compare methods of maintaining sexual health (abstinence faithfulness, condom use) and identify abstinence as the most effective method. • Identify risky sexual practices (sex without a condom, multiple sexual partners, sugar daddies (mommies).					

THEME/TOPIC	BASIC COMPETENCIES: LEARNERS SHOULD BE ABLE TO	ESTIMATED NUMBER OF PERIODS	RESOURCES	DATE COMPLETED		
				2012	2013	2014
	• Describe the impact (physical and emotional) of risky sexual practices on the individual, family, community and society. • Describe different ways of slowing affection that are safe.					
1.2 Goal – setting and decision making skills	• Explain what it means to set goals and how good health helps us reach our goals. • Outlines a set of goals for the short and long – term. • Explain the importance of making informed decisions in order to reach goals. • Discuss what influences decisions around sexual behavior and how to resist negative influences.					
1.3 Communication skills	• Differentiate between – verbal and non – verbal communication. • Explain what negotiation is and why it is necessary in all sexual and other relationships.					
1.4 Relationships	• Distinguish between healthy and unhealthy relationships and the benefits and consequences of each type. • Explain the importance of gender equality in relationships. • State procedures to follow it they are being pressured by an adult to develop a sexual relationship. • Identify sources of support it they are being pressured by an adult to develop a sexual relationship.					

1.5 STDs, HIV and AIDS	• Describe sexually transmitted diseases (STDs) in terms of transmission, prevention, and consequences thereof. • Explain what HIV and AIDS are, how they attack and destroy the body, and that people with HIV usually don't show any signs or symptoms but they can still spread the disease. • State three ways HIV is transmitted (blood) contact, sexual intercourse, mother to child) and three ways it is not transmitted.					

THEME/TOPIC	BASIC COMPETENCIES: LEARNERS SHOULD BE ABLE TO	ESTIMATED NUMBER OF PERIODS	RESOURCES	DATE COMPLETED		
				2012	2013	2014
	• State that no one knows for sure where HIV and AIDS came from but that they affect all kinds of people all over the world. • Explain that there is no cure yet for HIV/AIDS but there are life – prolonging treatments. • Discuss the myths and taboos around HIV and AIDS					
1.6 Teenage pregnancy and family planning	• Discuss what it means to be a responsible parent and what qualities and resources are needed. • Discuss why abstinence, contraceptives and condom use are requirements to prevent teenage pregnancy. • Explain why teenage pregnancy should be prevented (both for mother and child) • Define fertilization as the joining of male and female sex cells. • Explain how to prevent pregnancy (e.g. abstinence, contraceptives, condoms)					
1.7 Violence and abuse	• Discuss sexual abuse and feelings associated with it. • Explain why people commit sexual abuse and how to avoid situations that may put someone at risk of sexual abuse. •					

9. Human development 9.1 Physical development	• Explain the kinds of physical changes which occur in maturing pre – adolescent boys and girls (secondary sexual characteristics of boys and girls). • Identify the different structures is male and female reproductive systems from diagrams. • State the functions of the various parts of the male and female reproductive systems.					
9.2 Mental and emotional development	• (revise the work of grade 6)					

THEME/TOPIC	BASIC COMPETENCIES: LEARNERS SHOULD BE ABLE TO	ESTIMATED NUMBER OF PERIODS	RESOURCES	DATE COMPLETED		
				2012	2013	2014
	• Identify the factors that contribute to self-awareness and self-esteem as a pre – adolescent					
8. Human body 8.1 Different systems of the human body	• (revise the system as done in grade 5 syllabus) • Identify and label the different systems of the human body. • Describe the basic functions of each system • Explain the importance of these systems for human existence.					
8.2 Digestion	• Define digestion as the breakdown of food substances into soluble substances. • Describe different forms of digestion • Discuss the importance of chewing food • Define enzymes as biological catalysts (proteins) which speed or slow down a reaction but do not get used up during the reaction. • State the end – products of starch, fat and protein digestion.					
8.3 Excretion	• Identify the different excretory organs • Identify and label the different structure of the kidney (ureter, urethra, and bladder) • Name the substances removed from each organ.					

8.4 Nervous system and drugs	• Identify the human nervous system from diagrams in terms of central and peripheral nervous system. • Identify a reflex arc from diagrams • Explain the basic functions of the reflex arc • Describe the influence of drugs on the nervous system					

TRIMESTER 3

THEME/TOPIC	BASIC COMPETENCIES: LEARNERS SHOULD BE ABLE TO	ESTIMATED NUMBER OF PERIODS	RESOURCES	DATE COMPLETED		
				2012	2013	2014
3. Matter 3.1 Nature of matter	• Characteristic a variety of matter by its colour, smell, taste, melting point and boiling point. • Describe different properties of substances • Name the three states of matter • Do simple investigations to show that different substances have different properties					
3.2 From earth into space 3.2.1 The solar system	• Describe the paths of the planets as orbitals seen from the sun. • Draw a diagram of the solar system which depicts the planet's relative distances from the sun. • State that Mars is Earth's nearest neighbor and has similarities to Earth. • Discuss some ways Earth and Mars are similar and some ways they differ.					
3.3 Building blocks and matter 3.3.1 Atoms and molecules	• State that atoms are the smallest building blocks of matter • Explain that all matters consist of elements or combinations thereof. • State that the Periodic Table is a classification of all existing elements • Classify elements into metals and non – metals. • State that every element has a name and a symbol (know at least the first 10 element as well as C,O,U,CU,AU,Fe,Ag, Al,N, Pb, Cl.					

3.3.2 Elements and compounds	• State that elements combine together chemically to form compounds (e.g. water, H2O and carbon dioxide, CO2). • Name practical examples of most common elements, compounds and mixtures found in everyday life, the Earth's crust, the atmosphere and water.					
3.3.3 Mixtures and solutions	• Observe examples of commonly known substances to show and explains the difference between elements, mixtures and compounds					
THEME/TOPIC	**BASIC COMPETENCIES: LEARNERS SHOULD BE ABLE TO**	**ESTIMATED NUMBER OF PERIODS**	**RESOURCES**	**DATE COMPLETED**		
				2012	2013	2014
	• Describe the mixing of substances to make solutions as a physical process. • Demonstrate and investigate the mixing of solids and solids and liquids, and liquids and liquids. • Experience and explain that the components of mixtures can be separated by methods (through simple experiments, e.g. with iron fillings and sulphur), but not thou of compounds as they have chemically combined. • Describe the separation (physical change) of mixtures and solutions, e.g. sorting with a magnet, evaporation, filtration and distillation. • Do simple experiments to separate the compounds of mixtures, e.g. by hand sorting (different size stones), using a magnet (iron and sulphur), evaporation (salt and water), filtration (silt and water) and distillation (water and ink). • Discuss water as a solvent and its many uses in everyday life. • Distinguish between clean/pure water and polluted water and examine pure and polluted water under the microscope. • Discuss the disadvantages and dangers of polluted water. • Use and explain the use of a sand filter to clean water, boiling to kill germs.					

THEME/TOPIC	BASIC COMPETENCIES: LEARNERS SHOULD BE ABLE TO	ESTIMATED NUMBER OF PERIODS	RESOURCES	DATE COMPLETED		
				2012	2013	2014
3.4.1 Air around us	• State the composition of air in the atmosphere (oxygen, carbon dioxide and nitrogen) • Investigate the presence of water vapour and carbon dioxide in the air • Describe a test for the following: ✓ Water ✓ Water evaporation ✓ Carbon dioxide ✓ oxygen • State and demonstrate that air supports combustion • State and demonstrate that one fifth of air around us consists of oxygen which support combustion/respiration. • State that four fifth of the air around us consists of nitrogen which does not support combustion. • Explain how to put out fire (a camp fire, household fires, electrical fires).					
4. Forces and energy 4.1 Nature and effects of forces	• Identify and name forces • Describe pushing and pulling (repulsion and attraction). • Classify forces in contact and non – contact forces. • State forces are measured in newton's • Name five effects of pushing and pulling forces, giving examples of each.					
4.2 Weight and mass	• Explain why objects fall to Earth • Explain the existence of the Earth's gravitational pull and the Earth's gravitational field constant. • Identify and compare the effects of Earth's gravitational pull on different objects. • Explain weight as a manifestation of Earth's gravitational pull.					

	• Explain the difference between weight and mass.					

THEME/TOPIC	BASIC COMPETENCIES: LEARNERS SHOULD BE ABLE TO	ESTIMATED NUMBER OF PERIODS	RESOURCES	DATE COMPLETED		
				2012	2013	2014
	• Give examples of how the fuels identified are used. • State that fuels are limited and that energy sources can be exhausted. • Distinguish between renewable and non – renewable energy sources in the local environment. • Explain how energy sources are used.					
4.5 Forms of energy conversions	• Distinguish between different forms of energy. • State the laws of energy conservation identify energy conversional in practical examples. • Describe the movement of energy through the local environment (by naming the different types of energy).					
5. Light 5.1 Basic concepts of light	• State the difference between luminous and illuminated objects. • Explain that light travels in straight lines and how this leads to the formation of shadows. • Make a shadow clock or sundial.					
5.2 Transmission, absorption and reflection	• State and show that light travels in straight lines. • Explain divergent, convergent and parallel rays or beams of light. • Investigate what happens when light falls on different objects that are translucent, transparent and opaque. • Use apparatus such as torch, mirror, glass window, Perspex ruler, and black plastic to explain properties of light.					
5.3 Reflection by mirror	• Describe the formation, and give the characteristics, of an optical image formed by a plane mirror. • Investigate reflection in plane mirrors, using ray boxes or pins, so as to determine the position nature and size of the images					

	• Determine what happens when light falls on transparent, translucent (glass surface of a solar panels), and opaque surfaces.					

THEME/TOPIC	BASIC COMPETENCIES: LEARNERS SHOULD BE ABLE TO	ESTIMATED NUMBER OF PERIODS	RESOURCES	DATE COMPLETED		
				2012	2013	2014
	• Identify everyday applications of reflection such as the uses of different kinds of mirrors, the reflecting surfaces behind lights and the reflecting surfaces behind solar cookers.					
6. Electricity 6.1 Static electricity	• Explain the existence of electrons. • Explain the existence of charge due to the imbalance of electrons and protons. • Explain that charging by friction simply means the separation of charges. • Describe how objects can be charged by friction. • Study and explain the effects of charged objects on one another. • Describe and investigate how it is possible for different objects to attract and repel each other due to their charges. • Charge and explain ways of charging objects by friction, e.g. combs, pen, glass and Perspex rods, plastic straws and pens rubbed on wood, silk and hair. • Study and explain examples in everyday life where changing takes place by friction as in. ✓ Walking on a carpet ✓ Pulling off a jersey ✓ Puling blanket and sheets apart.					
6.2 Electroscope	• Explain and demonstrate how an electroscope can be charged. • Explain and demonstrate the use of electroscope to text for charges • Explain and demonstrate how charges on a charged electroscope are able to discharge by flowing to the Earth.					

	• Explain earthing.					
6.3 Electric current	• Explain the term discharge as the movement of charge (electrons) • State lighting as a form of discharge • State that moving charges (positive or negative) are known as an electric current.					

THEME/TOPIC	BASIC COMPETENCIES: LEARNERS SHOULD BE ABLE TO	ESTIMATED NUMBER OF PERIODS	RESOURCES	DATE COMPLETED		
				2012	2013	2014
	• Outline that electric current is determined by the flow of charges					
6.4 Electrical sources	• State that electrical current requires a source • Discuss that a cell is a source of chemical energy. • State that a cell has positive and negative terminals • State that electrical current is the flow of charges. • Negative charges (e.g. electrons) move from a negative to positive terminal. • Positive charges move from a positive to negative terminal. • State that current will only flow in a closed circuit. • Describe the difference between a closed and an open circuit.					
6.5 Conductors and insulators	• Explain what a conductors and an insulator is. • Use an electroscope to test for conductors and insulators. • Compare substances to see which are better conductors e.g. metals, plastics, wood, water and solutions.					
6.6 Cells and bulbs in series and parallel	• Explain how to construct and draw (using circuit symbols) a circuit using a cell, conductor wires, a switch and a bulb. • Construct series and parallel circuits using a cell, conductor wires, a switch and a bulb. • Sketch and identify circuit symbols for a cell, conductor wire, a switch and a bulb.					