A CURRICULUM FRAMEWORK FOR ENVIRONMENTAL EDUCATION IN THE SOUTH AFRICAN FURTHER EDUCATION AND TRAINING BAND

By

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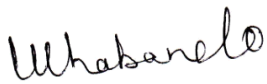
Promoter: Professor LP Louw

DECLARATION

I, Bontle Beauty Tlhabanelo, hereby declare that this thesis, “A CURRICULUM FRAMEWORK FOR ENVIRONMENTAL EDUCATION IN THE SOUTH AFRICAN FURTHER EDUCATION AND TRAINING BAND” is my own attempt; that, where work from the previous studies has been used or adapted, this has been stated and acknowledged. This study differs from others already submitted to this and other universities, in the field of research, because it examined the integration of Environmental Education in four subjects, instead of one. I surrender this work as the intellectual property of the University of the Free State.



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DECLARATION OF EDITING

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The editing was done electronically, using Track Changes, to enable the candidate to accept or reject the suggested changes; thus, retaining her authorial discretion and right to assert authorship.

Please note that the language editing of this thesis was done on very short notice and with very little time at my disposal. Another language editor left Mrs Tlhabanelo in the lurch and consequently I was approached to edit the thesis.

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ABSTRACT

Environmental crises have attracted those working in the education sector in an attempt to change the attitudes of society towards the environment. The prevailing climatic conditions and other environmental problems, as well as my observation that the transformation of the curriculum in South Africa does not adequately address these problems, have persuaded me to join those researchers with an environmental concern, and with the belief that Environmental Education (EE) is an indispensable instrument to teach learners about environmental protection.

Hence, the aim of the study was an attempt to examine what curriculum framework for EE in the Further Education and Training (FET) band can be proposed for promotion of the optimal implementation of EE.

To achieve that, qualitative research approach underpinned by interpretive paradigm was employed. The choice was based on the fact that both the paradigm and approach are subjective in nature, allowing the participants freedom to put forward their views without any fear or favour. This study was directed by phenomenological and constructivist research strategies. Phenomenological strategy assisted the researcher to understand and experience the phenomenon under investigation from the view and experiences of the selected participants. Constructivist strategy enabled the researcher and the participants to put together new ideas by interpreting new experiences in light of prior knowledge so that the new ideas come to make sense. The site of the study was Mamusa Circuit. Four secondary schools, including three township schools and one town school. Purposeful selection of participants was done. For focus group interview, teachers of Life Sciences, Physical Science, Life Orientation and Geography, which are most closely related to EE in the FET band, were targeted. Two groups of six participants in each, though two members did not turn up due to urgent private matters. For face-to-face interviews, participants included four principals, seven deputy principals, five departmental heads, and nine-teen teachers whose subjects contain EE content to certain extend or may be used to teach EE. Data were generated from the literature review, unstructured focus group interviews using open-ended questions, and semi-structured individual interviews (which will be referred to as face-to-face interviews in this study). Document analysis was also employed to enhance triangulation. CAPS documents analysed were for Life Sciences, Physical Science, Life Orientation and Geography.

The study revealed:

- In terms of literature, there are continuing debates regarding the definition of EE, with Stapp's frequently referred to.
- Teachers experience conceptual difficulty regarding the concept of EE.
- As is the case in many other countries, India, United States of America, Zimbabwe and South Africa do not have a separate EE curriculum framework in the FET band. Environmental Education topics are infused in other subjects like Sciences, Social Studies/Geography, and Life Orientation.
- Challenges facing EE globally include limited research on EE as a separate elective subject. Others are physical and human resources.

The study recommends the following:

- EE as an independent elective subject; and
- Regarding the provision of physical resources and the school curriculum, EE must be given equal treatment as the recently introduced subjects in the FET band.

Further recommendations:

- Further research is necessary to examine the curriculum framework for optimal implementation of EE in the FET band of secondary schools. More research is required on the topic, 'a Curriculum Framework for EE in the FET band: an elective subject'.
- Moreover, this research can serve as a future pilot project for implementation of the curriculum framework for EE as an elective subject in the FET band.

In conclusion, there is need for EE as an elective subject in the FET band in order to address the environmental crises.

KEY CONCEPTS: Curriculum framework; Environmental Education; Further Education and Training band.

DEDICATION

This last piece of work in my study life is dedicated to my husband, Victor Andrew Mbufela, for being my steadfast pillar throughout; especially, since we are in our empty nest years.

My special appreciation goes to my late father, Joseph Jantjie, and my 84-year-old mother, Keorapetse Merriam Jantjie, who despite criticism, provided a good education foundation for a girl-child.

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ACRONYMS AND ABBREVIATIONS

AEETAP	Africa Environmental Education and Training Action Plan
ANC	African National Congress
BVEER	Bharati Vidyapeeth Institute of Environmental Education and Reseach
C2005	Curriculum 2005
CAPS	Curriculum and Assessment Policy Statement
COP	Conference of the Parties
DANCED	Danish Cooperation for Environmental and Development
DBE	Department of Basic Education
DEAT & T	Department of Environmental Affairs and Tourism
DESD	Decade of Education for Sustainable Development
DoE	Department of Education
EEASA	Environmental Education Association of Southern Africa
EDSC	Educational Development Support Centre
EE	Environmental Education
EIA	Environmental Impact Assessment
EIC	Environment as an Integrating Context
EMA	Environmental Management Act
FET	Further Education and Training band
GET	General Education and Training
IEEPI	International Environmental Education Policy Initiative
INDCs	Intended Nationally Determined Contributions
IUCN	International Union for Conservation of Nature
LFS	Learning for Sustainability
LO	Life Orientation
NATED 550	National Assembly, Training & Education Department 550 curricula
NCERT	National Council for Education, Research and Training
NCF	National Curriculum Framework
NCS	National Curriculum Statement
NEPA	National Environmental Policy Act
NPE	National Policy of Education
OBE	Outcomes-Based Education
PET	Physical Education Task
RDP	Reconstruction and Development Program

SADC	Southern African Development Community
SADC-REEP	SADC Regional Environmental Education Programme
SMT	School Management Team
UNFCCC	United Nations Framework Convention on Climate Change
UNEP	United Nations Environmental Program
UNESCO	United Nations Educational, Scientific and Cultural Organizations
WSSD	World Summit on Sustainable Development

CHAPTER 1

INTRODUCTION AND ORIENTATION

1.1 INTRODUCTION

Environmental crises have attracted the attention of those working in education in an attempt to change the attitudes of society towards the environment. Nair and Bindu (2016: 39) attest to this when they state:

> This is clearly laid out by UNESCO for the Decade of Education for Sustainable Development (UNDP 2005), to promote education in solidarity capable of generating responsible attitudes and commitments, and that prepares citizens to make well-founded decisions aimed at achieving culturally plural, socially just and environmentally sustainable development.

However, Conde and Sanchez (2010: 478) hold the view that the "integration of Environmental Education into the school curriculum is still a topic of concern". The prevailing climatic conditions and other environmental problems, as well as my observation that the transformation of the curriculum in South Africa does not adequately address these problems, have persuaded me to join those researchers with an environmental concern, and with the belief that Environmental Education (EE) is an indispensable instrument to teach learners about environmental protection. Hence, this study is an attempt to examine what curriculum framework for EE in the Further Education and Training (FET) band can be proposed for promotion of the optimal implementation of EE.

My interest on this research is influenced by my personal experience. The 36 years of being in the Education system gave me the opportunity to think about this chosen topic. As a former Biology teacher, departmental head, deputy principal, acting principal, subject advisor for Natural Science and Biology, Provincial and National examiner for Biology and currently the Circuit Manager whose functions include curriculum monitoring and support as a core, I have gained enough experience (in addition to my observation of the deteriorating environment), that teachers have never succeeded in employing an interdisciplinary approach to the teaching of environmental content. Everyone focuses on his/her subject specific topics. Main obstacles include

among others, lack of training in this approach, a demand for extra long hours for effective planning and implementation, team arguments which are time-wasting and others.

With this experience, my focus is to investigate whether I cannot propose a curriculum framework for Environmental Education (EE) in the FET band, that can afford it a proper position for optimal implementation.

1.2 BACKGROUND AND RATIONALE

This study proposes a curriculum framework for EE in the South African Further Education and Training (FET) band, which could promote the optimal implementation of EE, as stated above.

There is a need for a paradigm shift in thinking if we want to save the environment. Moreover, there is need for better strategies, a relevant curriculum, relevant aims, guiding principles, and teaching-learning methods and resources that will accommodate EE in the entire school curriculum. Kimiti and Kipkoech (2013: 56) support this by saying, “The effectiveness implementation of the school curriculum is significantly determined by selection of the appropriate teaching methods”.

EE, as a major vehicle for developing awareness and sensitivity about major problems of the environment (Kumler 2010; Nkambwe & Essilfie 2012), emanated from various developments by consecutive international fora. These developments included inter alia the evolution of the concept EE (Barakatt 2011); the establishment of international organisations concerned with the environment the United Nations Educational, Scientific and Cultural Organisation (UNESCO 2010.); as well as conferences and summits that contributed to an enhanced understanding of EE and related issues such as Tblisi conference (Hanneman 2013). According to Pisano, Endl and Berger (2012: 6), Rio+20 made a mark by coming up with objectives, which included “to ensure a renewed political commitment to sustainable development; to assess the progress achieved and the gaps in implementation of the decisions of previous conferences on sustainable development; and to outline strategies for facing emerging challenges”. The conference contributed to the field of EE and sustainable development. Sustainable development is an important component of EE; therefore, the incorporation of these objectives will enhance the understanding of EE in the FET band. In addition, an integrated, holistic form of EE has been advocated by the various

reports including the UNESCO Annual Report 2010 (Galuh 2010) and the UNEP Quarterly Progress Report (UNEP 2010) and others.

The aforementioned developments encouraged many countries, including India, South Africa, Zimbabwe and Botswana, to participate in the global initiatives aimed at promoting EE. These activities included curriculum change to accommodate environmental content. For example, in 1995, Botswana joined other countries in integrating EE in its school curricula. EE was incorporated "in all subjects as part of an overall improvement of the school curricula" (Nkambwe & Essilfie 2012: 19). However, there has been little progress with the incorporation of EE in Botswana as teachers were given the autonomy to manage this integration. With the advent of independence in Zimbabwe, numerous attempts were made to reform the curriculum (Munikwa 2011). The reforms included the Quality Education and Vulnerability Programme (Sibanda 2009: 1). EE emerged as an important component of the Programme in Zimbabwe (Sibanda 2009) as the country, known for its good education system and high adult literacy, could not miss the opportunity to keep abreast with the latest developments in education. The latest development is the introduction of the Curriculum Framework for Primary and Secondary Education 2015-2022 (Updated curriculum framework n.d.), which was developed with the intention to prepare learners for the global changes in their environment and the education system itself (Ministry of Primary and Secondary Education 2014). This is discussed at length in Chapter 3.

These conferences and international declarations can be regarded as the foundation for EE in government departments and other related structures. They provide a platform for arguments on environmental issues. They also provide valuable blueprints for institutions, including schools, for integration.

South Africa, like other African countries, has been motivated to hold conferences on environmental issues. The first Environmental Education conference was held at Treverton School in Mooi River in 1982 (EEASA 2019). Thus, Treverton School can be regarded as the pioneering institution in the compilation of EE programmes. The question is, "What progress has been made since this forum?". To answer this question, we trace the history of the South African EE curriculum.

As part of the global world, South Africa was motivated to deal with issues of EE by the Belgrade Charter and the Tbilisi Principles Songqwaru (2012).

According to them, the school curriculum concentrated on issues of ecological perspective. This implies that teachers, as the implementers of the school curriculum, were driven by the definition of Stapp and his associates, which focused on the biophysical aspect.

In addition to conferences and other fora observed by South Africa, the ruling party , African National Congress (ANC) and government have important documentation in place to refer to and promote Environmental Education.

South African researchers such Mobokazi (2009: 16); Mosala, Venter and Bain (2017: 332) and others, refer to the RDP quotation as one of those that will always provide foundation to emphasise the importance of the environment as a totality as follows, Reconstruction and Development Programme (RDP), advocates for the recognition of environmental issues:

> …for programmes to rekindle our people's love of land, to increase environmental consciousness among our youth, to empower communities to act on environmental issues and to promote an environmental ethic. (African National Congress (ANC) Reconstruction and Development Programme [RDP] 1994: 40).

Again, an important document that cannot be ignored when referencing, is the Bill of Rights. The Bill of Rights in the Constitution of the Republic of South Africa ensures "the right of every citizen to a healthy environment" (South Africa 1996: 11). This shows that the South African government is serious about environmental issues, and that it should be everybody's responsibility to protect the environment so that both the environment and people are healthy and safe.

Like other countries, South Africa supports the Agenda 21 Manifesto for Education which values environmental education (UNESCO 2010). Chapter 36 of this agenda persuades education to inculcate ethics and skills that will enable learners to actionalise sustainable development. This aims to capacitate people to use the environment and its resources in a way that is sustainable for next generations.

The NATED 550 Curriculum was followed by Curriculum 2005, which was implemented by means of outcomes not objectives, from 1998 onwards (Moodley 2013). In 2003, a Revised New Curriculum Statement was accepted and implemented from January 2004 in the General Education and Training (GET) phase (Department Basic Education 2011b). The revised version phased out the phase organisers, of which the environment was one phase organiser (Schudel 2012). This implied that EE again faced the problem of being integrated in the curriculum.

From 2006, the National Curriculum Statement (NCS) was implemented in the FET band (Makhoba 2009). Environmental content was still found in a few subjects, such as Geography and Life Sciences. To improve its implementation, the NCS was amended with the introduction of the Curriculum and Assessment Policy Statement (CAPS) (Du Plessis & Marais 2015).

Whilst the national curriculum in South Africa has changed from NATED 550 to Curriculum 2005, and the NCS was amended to become CAPS, none of these documents afforded EE the status of an independent subject in the FET band. This happens despite that an interdisciplinary integration of EE in other subjects has proven to be unsuccessful because of many challenges, such as lack of trained teachers and curriculum developers, lack of clear guidelines by CAPS on how and what EE topics to integrate across subjects and grades and others. This situation of the curriculum and continuous deterioration of the environment encouraged me to examine if one could not propose an EE curriculum that could find a proper position for EE integration in the FET band of the school curriculum.

1.3 PROBLEM STATEMENT

Although the importance of EE has been acknowledged at different levels (commissions, reports and official education documents – as mentioned above), EE is currently scattered across various subjects in the South African FET schools' curriculum. These subjects include Life Sciences, Geography, Physical Sciences and Life Orientation, and often it is incorporated simply as sub-themes or topics within these subjects. As a Deputy Chief Education Specialist (a Circuit Manager) dealing with, among others, the monitoring of a curriculum in the FET band, I have observed various challenges. These challenges include the current fracturing of the main

knowledge components that EE should address, and the subsequent neglect of paying attention to EE issues in the curriculum. As none of the aforementioned subjects seems to take full ownership of EE, the latter seems to be in competition with all the other subject-related themes that also have to be addressed. It is therefore often difficult to address environmental problems, such as pollution and food security, in class. In addition, the relevance of certain current EE themes in the curriculum can be questioned.

Over the years, attempts made towards the development of the curriculum framework for EE as an independent subject have not been successful. “It has been acknowledged that Environmental Education is not a subject with a body of knowledge and skills like other disciplines” (Kimaryo 2011: 34). What the researchers ignore is that EE develops skills, attitudes and values, as well as critical thinking, all of which empower the learner to take sound decisions in solving environmental problems. The general suggestion by other researchers that EE should be taught across other subjects does not do justice to EE.

Studies on EE have confirmed that its integration occurs across other subjects in the school curriculum such as Biology/Life Sciences, Physics, Geography and chemistry (Abdullah et al. 2011; Hassan & Ismail 2011; Makhoba 2009; Makokotlela 2009). According to them, this seems to be the most effective way of teaching environmental content.

If the findings of studies, such as those of Makhoba (2009), reflects that teachers show a preference for teaching certain topics over others, what assurance do we have that they will teach across subjects? According to Makhoba (2009: 62), “The idea of practicality and relevance of the environmental theme to the learning area seems to be the factor that contributed the most to the environmental theme being the most or at least interesting”.

The argument is that this is because teachers have not been trained in how to integrate themes across their subjects. Those who have undergone training in EE in South Africa are rare, and mostly they have not had a chance to teach it at FET schools because EE is not taught as an independent subject (Rosenburg 2009).

For a few years now, South Africa has been experiencing a serious shortage of water, which has led to a series of destructive community protests. Community actions use schools as targets for these destructive marches, to such an extent that some schools have been burnt down, and learners have to repeat their grades as the schools cannot function properly – sometimes for as long as a year.

Now is the time for the Department of Basic Education to consider introducing a curriculum framework for EE, which will educate learners in the wise use of their resources. These future parents will have an impact on environmental issues, now and tomorrow.

Given the prevailing situation concerning the nature of the EE curriculum framework and its implementation in the FET curriculum in schools in South Africa, the study aims to investigate the challenges that make it difficult for the Departments of Education in countries around the world, to incorporate Environmental Education as a subject on its own in the school curriculum. A deeper research is done with particular focus on the three countries, India, Zimbabwe and South Africa. I am therefore convinced that this sample is adequate for this study, especially being informed by other researchers who reflect in their studies that, although it is offered in colleges and universities, many countries have not integrated EE as an independent subject in secondary schools, but through other subjects. These include both the developing and developed countries such as Tanzania, Botswana, Lesotho, England, Germany, Sweden, Greece, Romania and others (Boca & Saraçli 2019; Glackin & King, 2018; Ketlhoilwe 2007; Kimaryo 2011; Mwendwa 2017; Ntanos et al 2018; Radeiski 2009; Verma & Dull 2017).

The study reviews the existing literature on the problem, and further does an empirical research by means of interviews, and document analysis of the South Africa's latest Curriculum and Assessment Policy Statement (CAPS) of the three subjects, namely, Life Sciences, Physical Science, Geography and Life Orientation. The findings are used to propose a curriculum that gives EE a proper recognition in the FET band curriculum.

1.3.1 Primary question

Given the challenges surrounding EE in the curriculum, my main research question is as follows:

What curriculum framework can be proposed for EE in the South African FET band?

1.3.1.1 Sub-questions

To gain greater insight into the problem being examined, the question above was broken down further, as follows:

- What is the understanding of the concept of EE?
- How are curricula for EE structured in the school curricula of the selected countries?
- What are the challenges facing EE in schools globally, and, more specifically, in the FET band curriculum in South Africa?

1.3.2 Aim of the study

The study seeks to propose a curriculum framework for EE in the South African FET band to promote the optimal implementation of EE.

1.3.3 Objectives of the study

The intention of the study is:

- To describe EE as a knowledge terrain.
- To explore how the school curricula for EE are structured within the selected countries.
- To investigate the challenges facing EE in schools globally, and more specifically in the FET band curriculum in South Africa.
- To answer the primary question of the study.

1.4 LITERATURE REVIEW

This section is discussed in detail in Chapter 2 and Chapter 3, and will be applied in Chapter 4 and Chapter 5. Chapter 2 deals with concept clarification of operational concepts, such as environment, education, EE, FET band, and curriculum framework. Chapter 3 deals with the historical and global situation of EE. This chapter includes the review of frameworks regarding curricula and their implementation of EE in schools in the selected countries, as well as some examples of models which might be used as curriculum frameworks for the implementation of EE in the FET band.

The following section provides the paradigm and research approach that guided the study.

1.4.1 Theoretical framework

A qualitative research approach was selected to inform the study. The decision to work with a qualitative research approach was informed primarily by the potential of this approach to focus on perspectives and subjective meanings (Taylor & Medina 2013).

Qualitative research follows an interpretive paradigm. Creswell (2009) refers to a paradigm as a worldview, others refer to it as consisting of epistemologies and ontologies (Žukauskas, Vveinhardt & Andriukaitiene 2018). An interpretive research paradigm is informed by an ontological assumption of relativism, and the epistemological view subscribes to subjectivity and the real world (McKenna, Richardson & Manroop 2011). Relativism means that people attach subjective meanings to what they perceive (Thomas 2010). In other words, this refers to the knowledge about and the meanings we attach to the environment we live in.

For this study, a theoretical framework is interpretivism. A theoretical framework "serves as the foundation upon which a research is constructed" (Adom, Hussein & Agyem 2018 :6).
"A Theoretical framework determines how a given researcher formulates his/her research problem – and how s/he goes about investigating the problem, and what meaning s/he attaches to the data accruing from such an investigation" (Sitwala 2014: 185).

Interpretivism is used because while positivism focuses on the "cause and effect" (Creswell 2009: 7), this deals with how "the individuals seek understanding of the world" (Grover 2015: 3). With this, a researcher and participants will interpret what they observe in their own space.

Also, interpretivism is highly appropriate because the researcher attempts to come up with a curriculum framework for EE in the South African FET band to promote the optimal implementation of EE. This is done through interaction with the participants by means of interviews. The reason for selecting this theory is that "people are said to learn when they have gained experience from what they learn" (Suhendi & Purwarno 2018: 88), hence the use of teachers and officials whose subjects contain environmental content, as participants. That is, the researcher does not tell participants.

This study is non-positivist and all participants are regarded as dynamic human beings who are knowledgeable, capable of sophisticated forms of interpretation, and who have had experiences, fears and aspirations that anchor the study. This research does not require them to be static so that they can be controlled (Chilisa 2011).

1.4.2 Clarification of key concepts

In this section, the three key concepts of the tittle of the study are broadly defined to introduce them to the reader.

The study is based on the three key concepts curriculum framework, Environmental Education and Further Education and Training band. These three key concepts are clarified in detail in Chapter 2 where the researcher starts by defining their key terms which serve as their building blocks, and elaborate further on the historical origin and distinct features. The key terms for curriculum framework are curriculum and framework, while those for Environmental Education (EE) are environment and education. The clarification of operational concepts is critical because of the importance of language and communication in synergising the thinking and subsequent actions of people. Synergy, in turn, is significant to understand the social structural arrangements of people; thus, the power of communication and language is based on the recognition that people are creatures who can think and speak (Meko 2013).

1.4.2.1 Curriculum framework

Broadly defined, the term curriculum framework refers to:

> an overarching document that fulfils some or all of the following: placesnational statements of vision, economic development and education policy in a curriculum context; sets out broad aims and objectives of the curriculum at the various stages of schooling; explains the educational philosophy underlying the curriculum and approaches to teaching, learning and assessment that are fundamental to that philosophy; outlines the curriculum structure, its subjects and rationale for the inclusion of each in the curriculum; allocates time to the various subjects in each grade; provides guidelines to subject curricula developers, teacher trainers and textbook writers; prescribes requirements for curriculum implementation, monitoring and evaluation. (International Bureau of Education [IBE]-UNESCO 2011).

In South Africa, our latest framework is Curriculum and Assessment Policy Statement (CAPS) (Department of Basic Education 2011a). In this case, this study seeks to propose specifically, a curriculum framework for EE in the South African FET band to promote the optimal implementation of EE.

1.4.2.2 Environmental Education

This is one concept that is fiercely debated upon in the fields of Environmental Education and Environmental Studies. Gradually researchers in the field of Education are making their mark especially about the type of curriculum framework for EE in secondary schools (Downsborough 2014, Dube 2012, Songqwaru 2013). Many researchers find the definition by Stapp in 1969 serving as a basis for debates on the definition of EE (Stevenson et al. 2014). Definition by Stapp (1969: 30-31 as cited in Dube (2012: 2) states that "Environmental education is aimed at producing a citizenry that is knowledgeable concerning the biophysical environment and its associated problems, aware of how to help solve these problems and motivated to work towards their solution".

Although its main emphasis was on the natural environment, it also supplied a platform for arguments at diferrent conferences.

One of the appropriate definitions of EE for this study and this era of climate change, poverty, shortage of basic resources, HIV-AIDS and others, is provided by the Tbilisi Declaration UNESCO (1978) as cited in Erhabor & Don (2016: 5368) and Karama (2016: 3) stating:

> Environmental Education is a learning process that increases people's knowledge and awareness about the environment and associated challenges, develops the necessary skills and expertise to address the challenges, and fosters attitudes, motivations, and commitments to make informed decisions and take responsible action".

It means, a curriculum for EE in the FET band, should be able to enhance attitudes and values, and capacitate learners with the expected techniques and strategies to perform desirable activities which will protect the environment in totality.

For the purpose of this study, “Environmental Education is a learning process that increases learners' knowledge and awareness about the environment and associated challenges, develops the necessary skills and expertise to address the challenges, and fosters attitudes, motivations, and commitments to make informed decisions and take responsible action” (Erhabor & Don 2016: 5368; Karama 2016: 3).

1.4.2.3 Further Education and Training band

While internationally mainstream schools are classified into primary type and secondary type, in South Africa schools are further divided into bands. These bands are categorised according to grades. Grade R to Grade 9 is called the GET band (General Education and Training), while Grade 10 to 12 is referred to as the FET band (Department of Basic Education 2011e: vii). FET schools therefore refer to secondary schools composed of both the GET band (Grade 8 and 9) and the FET band (Grade 10 to 12). Grade 8 and 9 offer the general status, such as Social Studies (a combination of Geography and History) and Natural Science (a combination of Physical Science and Life Sciences), while Grade 10 to 12 of the FET band offer subject that have a separate status like Geography and Life Sciences. Hence, the proposal for an EE Curriculum Framework in the FET band so that it could be afforded an independent status. In the GET band, it would have to compete with the already competing parts on one subject, on the one hand, and the other stand-alone subjects, like Life Orientation, on the other hand.

Chapter 2 is designated for clarification of concepts of the study, providing both definitions and lengthy discussions on the history of the concept EE. As mentioned in the first paragraph of 1.4.2 above, this section serves to introduce the reader to the key concepts of the study, namely, curriculum framework, Environmental Education, and Further Education and Training band. Therefore, further unpacking of them and definitions of the key terms making up these defined key concepts of the title of the research are provided in Chapter 2. The key terms for curriculum framework are curriculum and framework, while those for Environmental Education (EE) are environment and education.

1.4.3 The need for a curriculum framework for Environmental Education in the FET band

The impact of environmental crises on the environment and our health demands new approaches to be found in the field of education. The reality of climate change necessitates policy-makers and decision-makers to move away from spending too much time at conferences and summits and rather start thinking about introducing an EE curriculum framework in schools. The following section presents a brief global, as well as South African, perspective in this regard.

From the global perspective, a basis for the curriculum framework for EE in the FET band was provided by initiatives such as the Stockholm Conference; an international conference by United Nations in Belgrade in 1975 which produced the Belgrade Charter; and the Tbilisi Declaration (Hanneman 2013). These encouraged EE to be an integral part of the education process. Though slowly so, schools began to integrate environmental themes across all standards' curricula (Venkataraman 2008).

The discussion presented above outlined developments taken by South Africa regarding EE. In addition to the initiatives provided above, one document that is fundamental for reference for EE researchers of curriculum in South Africa is the White Paper of 1995. Principle 17 of the White Paper on Education and Training (Department of Education 1995: 18) advocates for EE as follows:

> Environmental Education, involving an interdisciplinary, integrated and active approach to learning, must be a vital element of all levels and programmes of the education and training system, in order to create environmentally literate and active citizens and ensure that all South Africans, present and future, enjoy a decent quality of life through sustainable use of resources.

The South African government has admirable legislation in place – that is, laws, acts, regulations and policies – but the problem is putting them into practice. This also applies to legislation in the education system. Poor policy implementation results in poor performance in the education sector. If this were not the case, progress in the integration of EE in the curriculum would have been visible. The failure to implement policies could be attributed to a lack of political will, a lack of planning, and the deliberate deviation from policy by implementers (Ajulor 2018).

The availability of a curriculum framework for EE will assist teachers in the FET schools band to be clear about environmental content. It will connect the learners to their environment and they will realise the interdependence between themselves and the environment. This realisation of interdependence will cultivate a sense of responsibility within them.

1.5 RESEARCH METHODOLOGY

Research methodology refers to the manner in which data is gathered and ultimately analysed for a phenomenon under study. The process is usually procedural, performed through phases or stages. This is an element of science. “Methodologies explicate and define the kinds of problems that are worth investigating; what constitutes a researchable problem; testable hypotheses; how to frame a problem in such a way that it can be investigated using particular designs and procedures; and how to select and develop appropriate means of collecting data” (Mafuwane 2011: 68). According Franklin (2012) as cited in Sithole (2018: 25), “research methodology is a particular sort of undertaking, an investigation of the aims, concepts, and principles of reasoning of some disciplines, and relationships between its sub-disciplines”. These definitions show that a research methodology is not something that you can quickly decide on, as it determines the credibility of your study. For this study, qualitative research methodology is employed.

1.5.1 Research design

A multitude of definitions is provided in the literature. Amongst them, the one presented by (Labaree 2013) is the most comprehensive, and is helpful in the present research. (Labaree 2013: 2), refers to research design as “the overall strategy that you choose to integrate the different components of the study in a coherent and logical way, thereby, ensuring you will effectively address the research problem; it constitutes the blueprint for the collection, measurement, and analysis of data”. The design must be able to provide answers to the problem under study. A qualitative approach was used in this research to assist in designing and implementing a proper curriculum framework for EE the FET band. A qualitative design entails exploring the participants’ thoughts or observations about the phenomenon (Creswell 2009).

1.5.1.1 Interpretive research paradigm

The term has its origin in the Greek word *paradeigma* meaning “pattern” (Kivunja & Kuyini 2017: 26). The literature regards Kuhn as a pioneer in the use of the term paradigm (Thomas 2010: 292). Paradigm refers to “the beliefs and principles that shape how the researcher sees, interprets and acts within the world” (Kivunja & Kuyini 2017: 26). This implies a framework that enables the researcher to observe a phenomenon or event under study. In this study, the framework is used to enable the researcher to examine the current curriculum of the FET band in secondary schools, in order to understand the status of EE. This structure guides the choice of methodology and techniques for credibility and confirmability of the findings of the study.

I have opted for interpretive paradigm for this research. The interpretive paradigm is preferred for its subjective nature, as compared to positivist research, which is objective. Participants are free to put forward their views without any fear or favour. “The researchers do not seek answers for their studies in rigid ways. Instead, they approach the reality from subjects, typically from people who own their experiences and are of a particular culture” (Thanh & Thanh 2015: 25).

1.5.1.2 Qualitative research approach

The study is positioned in a qualitative approach as it focuses on perspectives and subjective meanings (Creswell 2009). It gives the participants the freedom to express their views about the phenomenon under study. This approach will assist in designing and implementing a proper curriculum framework for EE in the FET band. Furthermore, the approach creates an opportunity for the researcher and the respondents to be closer, but without manipulating the actions of the respondents.

Moreover, qualitative research “draws on philosophical ideas in phenomenology, which is the philosophical base of interpretivism to support quality rather than quantity” (Thomas 2010: 296). The choice for this research approach by the researcher emanates from different considerations, including the following:

> Relativist ontology – the belief that there are differing realities that should be accommodated, and that every person is entitled to his/her view; and the epistemological view that subscribes to subjectivity and the real world (McKenna et al. 2011). It is the belief that understandings are created

throughinteraction between the researcher and the participant. Participants are studied in their “natural” environment; the researcher allows the participants to attach meaning to the issue under study; the acknowledgement that no research is value-free (Axiological)□□

and most importantly, the “researcher is the key instrument” for data collection and analysis (Creswell 2009: 175).

1.5.1.3 Research strategy

This study is directed by phenomenological strategy as reflected in the second paragraph above. In simple language, phenomenology means “the study of phenomena” or situation (Kakulu, Byrne & Viitanen 2009: 3). With this type, the researcher tried to understand and experience the phenomenon under investigation from the view and experiences of the selected participants (Kakulu 2014). Phenomenological strategy assisted the researcher to gain a better understanding of the status of EE in the FET band curriculum, by means of focus group and face-to-face interviews, as well as Curriculum and Assessment Policy Statement (CAPS) documents of Life Sciences, Geography, Physical Science and Life Orientation subjects.

Constructivist strategy has also been used because individuals construct knowledge and meaning from their experiences. They are actively participating and free to voice their ideas. In this study, new information assisted the researcher to propose a curriculum framework for Environmental Education in the FET band as an elective subject for optimal implementation of EE, as informed by empirical research findings that Environmental Education is incorporated in the curriculum through other subjects such as Life Sciences, Geography, Physical Science and others, which compromises its identity and status.

Research strategy is again discussed in Chapter 4.

1.5.2 Research methods

1.5.2.1 Demarcation of the study

Four secondary schools in the Mamusa Circuit, including three township schools and one town school. The selected participants were heterogeneous in terms of location, culture, medium of Language of Learning and Teaching (LOLT), home language, and race and colour. However, as required by the purposeful selection method, the

participants consisted of members who are knowledgeable and experienced about the environmental content in their subjects (Langkos 2014). This was the phenomenon under study. The town school is a former white school that has been converted into a parallel-medium school. The three township schools admit learners from farms and the township and informal settlement. The researcher selected schools that were within her reach. The researcher is the Circuit Manager in the Mamusa Circuit, meaning that conducting research in the Circuit required fewer expenses. It was also a timesaving factor.

1.5.2.2 Selection of participants

Phenomenological strategy was employed with an attempt to produce a dense and credible description of the phenomenon investigated. In order to attain this, the following questions were kept in mind for the selection of the participants:

Which participants are targeted?
What selection technique is employed?
What size should the sample be?
How were participants recruited?

Purposeful selection technique was used in order to obtain a rich data about the phenomenon. The rationale for the use of purposeful selection method was to collect the best information on environmental content from experienced participants in subjects related to EE (Maimela 2015; Silverman 2010); thus, to obtain a dense description of the phenomenon under study as already mentioned. This provides the reader of the study with an opportunity to form a picture of the behaviour or responses displayed by participants during the course of the empirical investigation.

The selected participants comprise:

- Four principals, one from each selected school. Principals are viewed as managers and accounting officers of curriculum.
- Seven deputy principals. Deputy principals are the curriculum champions and drivers.
- Seven departmental heads were targeted, although only five availed themselves. Departmental heads are the most important component of the SMT. They are responsible for monitoring and moderating the work of teachers and learners; this includes both formal and informal tasks. They manage the

departments, which are determined by subject streams. These departmental heads are subject/stream specialists at school level; namely for the Mathematics and Science Department, the Commerce Department, and the Humanities Department.

- For focus group interview, teachers of Life Sciences, Physical Science, Life Orientation and Geography, which are most closely related to EE in the FET band, were targeted. Two groups of six participants in each, though two members did not turn up due to urgent private matters.
- For face-to-face interviews, Seventeen teachers were targeted. Two participants were added to make a total of 19 teachers. The targeted participants for face-to-face interviews were new faces for Life Sciences, Physical Science, Life Orientation and Geography, not the participants used in the focus group. But it came to my attention at a focus group interview that I might run short of the targeted number because not many learners offer Physical Science, Life Sciences and Geography in this era as more learners have begun to prefer commercial and technical subjects, also that subjects like Mathematics, Mathematical Literacy, Tourism, Business Studies, Economics and Technology also contain environmental content, I therefore included teachers of these subjects.
- The participants also included departmental officials; that is, a FET Curriculum Coordinator and two SESs. One of the SESs (curriculum) is a former lecturer of Environmental Education and the other one a specialist in Life Sciences, who assumed the post of deputy principal before the face-to-face interviews were conducted. The reason for selecting these officials was to gain from their expertise and experience in these subject fields within their related curriculum/guidelines. These participants also majored in Mathematics, Life Sciences, Physics and Chemistry, or Geography. Furthermore, they are also responsible to capacitate teachers for effective implementation of curriculum in the classroom.

The selection of teachers was not an easy and straightforward process as already explained in bullets 4 and 5 of 1.5.2.2. However, for document analysis, the researcher focused on the four selected subjects, namely Life Sciences, Physical Science, Geography and Life Orientation, as these subjects were most closely related to EE. Also convinced that the data is more than adequate in comparison with other researchers who only focus on one document.

The next section presents a brief outline of the techniques used for the gathering of the data. This outline includes a description of the focus group interviews, the document analysis, and the face-to-face interviews. I used secondary literature review as an additional research method.

1.5.2.3 Data collection

Data collection plays a pivotal role in any academic investigation. In this way, the researcher is able to find or validate answers regarding the main question of the study. “Data collection is the process of gathering and measuring information on variables of interest, in an established systematic fashion that enables one user to answer stated research questions, test hypotheses, and evaluate outcomes” (Prabha & Kabadi 2016: 17). To collect data successfully, the researcher has to choose the methodology that will yield the desired results. The researcher of the present study employed the qualitative research method for the collection of data, for the reasons mentioned above (see section 1.5.1.2).

In line with qualitative methodology, the researcher personally collected data during the focus group and face-to-face interviews except for one participant of the face-to-face interview who was uncomfortable with her. Arrangement was made for a trained assistant in the face-to-face interview technique to interview her. The researcher also did document analysis for Life Sciences, Geography, Physical Science and Life Orientation CAPS documents.

The data collection techniques in the present study included the focus group interviews, document analysis and face-to-face interviews. These techniques were selected because they are relate well with the philosophical framework of the research paradigm and methodology, that is, they made it possible for the researcher to understand the participants’ experiences about the study. In phenomenology, the interviews assist in exploring the knowledge already gained by participants with regards to the topic at hand. They also serve as a means of establishing a dialogue relationship with the participants. Secondary literature review was used as an additional research method as mentioned earlier. These are briefly described below:

- The literature review on the global situation regarding EE – it begins with a discussion of the important international landmarks that have influenced and shaped policies and other frameworks in EE. A description of curricula

frameworks, reflecting the place of EE in secondary schools, follows this discussion. It includes examples from both the international arena and the Southern African Development Community (SADC). The countries reviewed here are not necessarily the best in the world but have been selected for various reasons. India is one of the few countries of interest regarding the integration of environmental content though, like other countries, EE has not yet acquired the status of a stand-alone subject. United States of America was selected to check if its financial muscle has a positive effect on the incorporation of EE in the secondary school. Zimbabwe was selected as a representative of the SADC countries with historically the best education system, if compared to South Africa. This study was conducted in South Africa. I am therefore convinced that this sample is adequate for this study, especially being informed by other researchers who reflect in their studies that although it is offered in colleges and universities, many countries have not integrated EE as an independent subject in secondary schools, but through other subjects. These include both the developing and developed countries such as Tanzania, Botswana, Lesotho, England, Germany, Sweden, Greece, Romania and others (Boca & Saraçli 2019; Glackin & King, 2018; Ketlhoilwe 2007; Kimaryo 2011; Mwendwa 2017; Ntanos et al 2018; Radeiski 2009; Verma & Dull 2017).

- Focus group interviews (see Annexure B1)**:** Unstructured focus group interviews served as a baseline for other techniques. The researcher personally conducted them at the beginning of the study during the second meeting with the participants. This is in line with qualitative methodology. Twelve participants were invited to an interview and two separate focus group interviews were conducted. There were five participants in each group, as one participant of each group of six was not available at the time of the interviews due to urgent unforeseen circumstances. One group included the FET Curriculum Coordinator and Life Sciences SES, as well as teachers, while the other group included the SES for the Educational Development and Support Centre (EDS), as well as teachers. The focus groups were homogenous in terms of profession and knowledge of environmental content, but heterogeneous in terms of age, race, ethnicity, income, level of education, community of residence, organisation association, and work experience. Heterogeneity here is seen to not have a negative impact on the topic, as it does not focus on sensitive issues,

which could discriminate or introduce prejudice in terms of age, race, ethnicity, income, level of education, community of residence, and organisation association.

All the participants, including the FET Curriculum Coordinator, the Life Sciences SES, and the SES for the Educational Development and Support Centre, majored in and taught either one or two of the subjects, namely Physical Sciences, Life Sciences, Geography or Life Orientation, in the FET band. The SES for the Educational Development and Support Centre has lectured the subject Environmental Education at the former Taung College of Education, now serving as an FET college (Vuselela). Unstructured interviews were employed (see Annexure B1). The unstructured interviews were used to acquire information concerning the study. In this study, the phenomenon is the curriculum framework for Environmental Education in the FET band. These were informal and open-ended interviews, which were used at the beginning of the empirical research to determine both the participants' background and interest in the study and topic. They allowed the participants to use their own language and to go into more detail than a structured interview would have allowed, obtaining a fuller picture of the person's experiences. The interviews were informal, and the participants were emotionally prepared to see the researcher and the SMT members as equals in terms of subject teaching. The fact that they were prepared to look through the lens of a teacher, and not a higher rank, made them feel relaxed and encouraged them to share their views on the topic under investigation. The interviews were recorded by HP 6560b laptop and Samsung J5 cellphone voice recorders, and then transcribed.

Documents: Another important technique used for gathering data was document analysis (see Annexure C). Document analysis was used because documents form an important source in research as they "provide background and context, additional questions to be asked, supplementary data, a means of tracking change and development, and verification of findings from other data" (Bowen 2009: 30).

Document analysis helped the researcher to formulate questions for the face-to-face interviews. According to Yin (2009: 103), "The most important use of documents is to corroborate and augment evidence from other sources" of information. In other words, it serves as a complementary tool (Bowen 2009).

The researcher examined the policy (curriculum) documents of the four subjects, namely Physical Sciences, Life Sciences, Geography and Life Orientation in the FET band curriculum, as well as the assessment instruments, such as examination papers in these subjects, to examine the amount of time allocated to EE content. The researcher was looking for guidelines, principles, aims, skills and specific content or themes, conceptualisations and time allocation regarding EE.

Finally, semi-structured, face-to-face interviews were used to strengthen the study's findings. These interviews enhanced a rapport between the researcher and the participants as the researcher was present in person, to ask questions and observe gestures of the participants, and thereby enriching the information required about the study (Doyle n.d.). They are described in detail in Chapter 4.

The responses of the participants during the interviews were captured by means of HP 6560b laptop and Samsung J5 cellphone voice recorders as mentioned in bullet 2 of 1.5.2.3 above. This method of recording information was convenient, as the researcher had to concentrate on eliciting the responses without losing what was being said while taking notes. It is also less time consuming as one can sustain the interview session without pausing for note taking. It further enables the researcher to later transcribe accurately what was said. Hence, the verbatim responses of the interviewees were gathered by means of HP 6560b laptop and Samsung J5 cellphone voice recorders and this data was analysed at a later stage.

1.5.2.4 Data collection procedure

During the first visit paid to the four selected FET schools, a letter of permission from the Acting District Director of Education was produced by the researcher. At the same time, departmental officials, that is, the FET Curriculum Coordinator and two SESs, were also consulted. During this visit, the researcher requested principals to arrange for a meeting between the SMT, the teachers, and the researcher. This meeting would be held during the second visit. The SMT and the teachers of three township schools, as well as the departmental officials and the researcher converged on the identified host school. These schools are not far apart; thus, one can walk between them. A

separate meeting was held with the town school's SMT and the teachers as it is situated a distance from the other schools.

The second visit at the school was to meet with all participants including the teachers. This visit was for the researcher to introduce herself and purpose of the meeting, which was to request for their participation in her study.

The researcher conducted focus group interviews during the third visit (i.e. the second meeting). These visits were followed by a lengthy period of document analysis by the researcher; that is, the CAPS documents for Life Sciences, Physical Science, Geography and Life Orientation.

Finally, the researcher conducted face-to-face interviews for all participants except the one who was assigned a trained assistant. This phase of the research comprised a large portion of the time of the total study period.

To ensure trustworthiness, data were collected through multiple sources (Creswell 2009: 175). Data collection techniques included focus group interviews, then document analysis, and finally face-to-face interviews. The interviews were recorded by HP 6560b laptop and Samsung J5 cellphone voice recorders, and then transcribed.

Section 1.5.2.5 below briefly summarises how the data collected was analysed. The description of the data analysis is dealt with at length in Chapter 5.

1.5.2.5 Data analysis

The methodology of qualitative research has grown over the years. This growth reflects evolution in the definition and description of terms, including the term 'data analysis'. This is a process that is ongoing, for example, new themes keep on emerging during the analysis of interview responses. A later definition of data analysis comes from Flick (2013: 5) who states, "Qualitative data analysis is the classification and interpretation of linguistic (or visual) material to make statements about implicit and explicit dimensions and structures of meaning-making in the material and what is represented in it". This enables the researcher to understand what the participants understand about the phenomenon being investigated.

The qualitative data that emerged from the interviews and documents were analysed by means of classification into major themes and sub-themes (adapted thematic

approach) (see Chapter 5). Document analysis was done for the four selected subjects to determine the amount of environmental content they contain.

1.6 MEASURES OF TRUSTWORTHINESS

While quantitave researchers prefer “reliability, objectivity and validity to ensure trustworthiness of the inquiry findings, qualitative researchers favour credibility, transferability, dependability and confirmability as trustworthiness criteria to ensure rigour of qualitative findings” (Anney 2014: 272). These are discussed below:

Credibility: refers to “the confidence that can be placed in the truth of the research findings” (Korstjens & Moser 2018: 121).

In order to achieve this, methodological triangulation was applied for gathering multiple forms of data; that is, by means of focus group interviews, document analysis and face-to-face interviews. Secondary literature also used to enhance trustworthiness. To ensure credibility of the findings, a lot of time was spent on face-to-face interviews and document analysis. Though the estimated time for an interview was 30-40 minutes per interviewee, they were allowed more than that. The participants were also allowed to provide examples. The researcher also did some probing where necessary. For documents, the researcher greatly familiarised herself with the CAPS documents, by reading them several times to limit information to the topic of study. In the case of the thematic analysis, the reading of interview material and CAPS documents was also done repeatedly to arrive at the various themes and sub-themes.

Transferability: “The researcher provided a rich account of descriptive data, such as the context in which the research was carried out; its settings; purposeful selection of participants; demographics; background of schools; data collection procedures; exerpts from interview instruments and documents” (Korstjens & Moser 2018: 122).

Dependability: As mentioned in the last paragraph of the discussion of credibility above, thematic analysis was used for interviews and CAPS documents. This is in line with phenomenological strategy and qualitative research approach.

Confirmability: The researcher maintained her impartiality when interpreting data. To ensure this, in the collection of the data, the interview responses were captured by HP 6560b laptop and Samsung J5 cellphone voice recorders, which were then transcribed

word-for-word. These documents are available. Interview instruments have been annexured for the reader or auditor.

As more studies are conducted compared to decades ago, so more questions are formulated on the quality of paradigms and research methodologies. Qualitative research is not free from this criticism. According to Tracy (2010: 841), “For qualitative research to be of a high quality, it must be rigorous”. The question is: “How rigorous should it be?”. For this study, techniques such as triangulation and purposeful selection of participants were employed to render this a rigorous study.

1.7 DEMARCATION OF THE TERRAIN

The study was conducted at all four secondary schools in the education circuit mentioned earlier. The other two secondary schools in the Circuit were excluded from the study because of their outlying rural location. Three of these schools have a history of consistently high academic performance (80 to 100%) in the FET band, including Grade 12 performance. One bounced back over the past two years after underperforming for a number of years. The three principals have vast experience in the management and administration of the secondary school sector and consequently could assist in understanding curriculum issues. The particular schools were also chosen because their geographical location was accessible to the researcher. The targeted phase was the FET band (Grade 10-12) for two reasons: first, it provided a basis for proposing a proper curriculum framework for EE, and secondly, for the preparation of a choice of career in EE at higher education institutions with the aim of responding to environmental crises. The selected participants included four principals, seven deputy principals, five departmental heads (of the seven who were targeted), and 19 teachers. Initially the targeted group was teachers of Life Sciences, Physical Science, Life Orientation and Geography, which are mostly related to EE in the FET band. However, planning for selection of participants was improved as mentioned in bullet 5 of 1.5.2.2. The population also included departmental officials; that is, a FET Curriculum Coordinator and two SESs. The FET Curriculum Coordinator coordinates all the subjects in the FET band, one SES advised on Life Sciences before he switched to the post of deputy principal where he also monitors and moderates departmental heads of the Mathematics and Science department, and the other SES coordinates the teaching of second-chance matric candidates who failed subjects, including Life Sciences, Physical Science and Geography. The FET Curriculum Coordinator and the

one SES (currently the deputy principal) have also majored in Mathematics and Sciences, while the other SES has majored in EE. They are experts in the field and thus understand curriculum issues.

1.8 SIGNIFICANCE OF THE STUDY

Given the current global and national deteriorating state of the environment, especially climatic conditions, the study is quite relevant to this era. The worst current challenges, such as pollution, land degradation and global warming (Msezane 2017), need a better approach to be solved.

Although government and the Department of Environmental Affairs have the documents and programmes in place for the protection of the environment, these attempts have not allowed the South Africa' s curriculum the opportunity to showcase EE as an integral tool (Rosenburg 2009) for this mandate. Environmental policy marginalises the Department of Basic Education and curriculum because its mission is mainly about environmental management (Department of Environmental Affairs 2019).

Many studies have been and are still conducted in the field of education with the concern that EE is not properly integrated in the school curriculum (Evans, Whitehouse & Gooch 2012; Green & Somerville 2015; Maharajh, Nkosi & Mkhize 2016; Mathenjwa 2014; Mwendwa; 2017; Ralph & Stubbs 2014 and many others). While they identify more or less the same challenges, they still believe in an interdisciplinary approach for integration of EE, yet this has never happened because of lack of training of teachers and curriculum developers, which is frequently found by these researchers in their studies. The recent finding also highlight that the recent CAPS does not provide clear guidelines on how to integrate EE through other subjects and across the grades (Hebe 2019). Given the current global and national deteriorating state of the environment, and findings by other researchers, this study attempts a different approach.

First, it is envisaged that this study will resuscitate arguments among researchers, curriculum developers, teachers and other government officials on the status of Environmental Education in both the fields of Education and Environmental Studies. That is, whether EE should remain as an issue of environmental management monitored and supported by government departments such as the Department of

Environmental Affairs, or be transferred to the Department of Education as it is believed that learners are fast agents of transformation. Second, this study intends to intensify a dialogue on the choice of an approach. Whether it is time that EE as a stand-alone subject in the curriculum should be considered to solve environmental problems. Although the interdisciplinary approach for EE has been widely preferred by researchers, this study opts for EE as an autonomous elective subject in the FET band. This proposal is informed by shortcomings of interdisciplinary approach which have been experienced for years. These include among others, (1) demand for an enormous amount of time and energy for team planning in addition to own individual planning; (2) capacity issues as other members strongly persuade their positions which lead to disagreements and little progress; (3) teachers of elective subjects such as Geography are isolated by those of the general curriculum such as Social Studies; (4) learners confused by contradictory messages of the teams; (6) financial constraints for teachers' extra time incentives; (7) to cater for learners' intellectual diversity; (8) infrastructure that does not make provision for team teaching and learning; (9) passive resistance to the interdisciplinary approach due to all the demands mentioned (Cassady 2017); lack of training for the teachers and curriculum developers, in the integration of EE in the curriculum across other subjects and grades (Maharajh et al. 2016; Mathenjwa 2014). Although lack of training is mentioned by every EE researcher, it has never been addressed.

Lack of proper curriculum framework for the integration of EE has seen a total side-lining of EE content for many years.

Therefore, the study hopes to provide impetus for future research by the old and young researchers, to further research the position of EE regarding the relevant approach for effective integration of Environmental Education in the FET band curriculum. So far the Department of Environmental Affairs has done little justice to EE. So, this study also provides grounds for a research regarding the appropriate Government Department that can drive EE.

The study also appeals for a support for a debate that proposes that the FET band be given an opportunity to provide adequate content foundation and progression to institutions of higher education which offer EE.

1.9 ETHICAL MEASURES

Ethical clearance (UFS-EDU-2011-0068) was obtained from the Ethics Committee of the Faculty of Humanities at the University of the Free State (UFS). The researcher adhered to all the requirements as set out by the relevant UFS policies on research ethics. The researcher sought permission to conduct the empirical research from the Acting District Director of Education and it was granted for four secondary schools in the Circuit of Education (see Annexure A 1). In this regard, an agreement was reached that the daily activities of the schools would not be disrupted by the research; that respect, anonymity and confidentiality of the research participants would be guaranteed; and that the research would pose no harm to any participants.

At the first meeting (i.e. the second visit), the researcher introduced herself to the focus group participants, and explained the purpose of the meeting as mentioned in the second paragraph of 1.5.2.4. She showed them proof of ethical clearance certificate issued. She assured them that the study will not pose any physical harm, and that she will also make sure that they will not be negatively emotionally affected, or else she will take full responsibilty. They were also allowed an opportunity to come up with their preferred names to ensure anonymity and confidentiality. Although requested to participate in the study, they were also informed that their participation was voluntary and that they were free to withdraw from the study at any time. She then presented the aim of the thesis. They were given time to ask questions if they needed to clarify anything. This was followed by the administration of the consent forms, that is, the participants were requested to sign consent letters.

An ethical obligation rests on the researcher to ensure that the investigation proceeds correctly at all times, and that no one is deceived or in any way negatively affected by the findings (Ethical issues in conducting research 2007). Furthermore, the information must be formulated and conveyed clearly and unambiguously to avoid or minimise misappropriation by subjects, the public, or colleagues.

For the face-to-face interview the same ethical requirements procedures were followed with ‘privacy’ added because these are individual interviews.

1.10 CHAPTER LAYOUT

Chapter 1: Introduction and orientation.

It has introduced the study and provided orientation in relation to the aim and o bjectives of the study. This chapter highlights the background and rationale of the study; literature review; research methodology and measures of trustworthiness; demarcation and significance of the study; as well as ethical measures.

Chapter 2: This chapter reviews the literature of the study. It defines the key concepts such as Environmental Education; Further Education and Training (FET) band and curriculum framework.

Chapter 3: Also reviews literature. It discusses the historical, global situation and frameworks regarding curricula and their implementation of Environmental Education, including those in schools of selected countries. Three examples of ways that may be used as curriculum frameworks for EE in the FET band are also discussed here.

Chapter 4: Presents research methodology.

Chapter 5: Data analysis and interpretation.

Chapter 6: Summary, conclusios and recommendations. This is a concluding chapter which entails the summary of the research, the conclusions from its findings and the recommendations arising from the findings.

1.11 SUMMARY

This chapter introduced the study by means of offering background information and orienting the reader to the status quo with respect to EE. This, together with the problem statement, shows that although there have been many developments in the field, such as the hosting of conferences, EE has not yet found an appropriate place in the FET band. The intention of this study, therefore, is to propose a curriculum framework for EE in the South African FET band to promote optimal implementation of EE as a stand-alone subject.

In addition, the objectives of the study were outlined in this chapter, as were the qualitative research methods selected for the study. This reflects the rationale for choosing the particular data collection and analysis procedures. The chapter also demarcated the terrain of study and the value of the study was explained, as the value of future research in this field. Moreover, the ethical considerations were described.

Although a comprehensive description of the literature review is provided in Chapter 2 and Chapter 3, the first chapter also introduced clarification of the key concepts (see the paragaraph below), and briefly mentioned relevant literature tha is highlighting the need for an EE Curriculum Framework in the FET band.

The following chapter provides a review of the literature and clarifies key concepts in the field, namely Environmental Education, Further Education and Training (FET) band, and curriculum framework.

CHAPTER 2

LITERATURE REVIEW ON OPERATIONAL CONCEPTS

2.1 INTRODUCTION

The purpose of the study is to propose a curriculum framework for EE in the South African Further Education and Training (FET) band, which could promote the optimal implementation of EE, as already mentioned in Chapter 1. To achieve this purpose, I need to clarify, in terms of the literature and theoretical concepts, the topic of the study. A number of definitions are found in the field of Education and Environmental Education, including the key ones for this research. The fact is, even though researchers use the same concepts, they attach different meanings to them (Unified Compliance Framework 2019).

This chapter attempts to clarify these key concepts as it is important to put the researcher and the reader "on the same page" about the phenomenon under study (Whitfield 2012: 1). Important concepts of the topic are Environmental Education (EE), Further Education and Training (FET) band, and curriculum framework. These concepts were introduced in Section **1.4.2 and are further clarified and discussed in Section 2.2 below, to enlighten** the reader on the topic under investigation.

2.2 CLARIFICATION OF KEY CONCEPTS

2.2.1 Environmental Education

In this section, the terms environment and education are defined, followed by a detailed description.

2.2.1.1 Environment

Many researchers in the field of EE and other fields have attempted to define the term environment (Neill 2008).

In most cases, decades ago, the definition of the concept environment was restricted to the natural environment only (Dube 2012); that is, the living and non-living elements

surrounding a particular individual (Reddy 2008). This implies that there is a daily natural interaction between organisms in their habits “for survival and reproduction” (Department of Basic Education 2011b: 33). In this environment, plants as producers of food depend on non-living components, such as “soil, light, temperature, and water” (Department of Basic Education 2011b: 33), while animals and human beings depend on this food and these non-living elements to survive.

Other researchers view the environment as a socio-economic environment. Investigations reveal that the cultural background and language of a learner have an impact on the learner’s behaviour and academic performance. It can be positive or negative; “thus, the socio-cultural level of the family determines to a large extent the child’s attitude toward school, and taste for culture, wealth and accuracy of the language, the aspirations of the child”, which is congruent with that of the parent (Langa & Langa 2017: 8). Soare (2015) therefore encourages the school environment to have a profile of the learner in order to know how to handle him/her.

For some researchers, the environment is a political one for learners. Schools, especially public ones, cannot be divorced from the political climate (Wales, Magee & Nicolai 2016). This is echoed by Kelsall, Hart and Laws (2016), when they say that the manner in which communities resolve issues of violence affect the future financial planning of the country. It is therefore imperative that the school should capacitate learners to understand political issues, including the impact of protest actions by a community against poor service delivery.

In his study on sustainable development, Mensah (2019: 10) confines his understanding of the term to the “natural environment and how it remains productive and resilient to support human life”. Contextualisation of the concept ranges from the needs or interest of an individual to different fields and spheres. Sociologists define it differently from economists, as already reflected above, as well as in the health professionals. Health professionals will include issues of the state of people’s health, which are determined by his/her “physical, biological, psycho-social, chemical, economic and even cultural factors” (Healthy People 2020).

From this, nobody can claim an absolute definition of the term because everybody contextualises it. Environment can therefore be viewed as a system made up of aspects functioning together. If one aspect is dysfunctional, it affects the others. That

is, social, political, economic and cultural environments may affect the natural environment.

After defining the concept environment and arriving at the working definition, the concept ‘education’ is defined below. In the next section, the concept is defined and described in different ways and from different perspectives.

2.2.1.2 Education

The concept education will be discussed from two different angles, namely its etymological meaning, and the distinction between real, narrower and broader meanings of education. Furthermore, education will be examined from two perspectives, namely the conservative and the liberal perspective. The aim here is to indicate the evolution of the concept as influenced by the interest and debate among educationalists.

(i) Etymological meaning of the word education

This section spells out the origins and history, and how the form and meaning of the concept education had changed over time. The concept education is not simple to define because its meaning can also be contextualised.

According to Kumar and Ahmad (2007-2008: 1), the “term education has been derived from the Latin words *educare or educere and educatum*”, with educare referring to “training” or “moulding”. It implies conditioning or shaping behaviour.

With formal schooling in place, educere is needed. Educere means “to lead out” (Iheanacho 2016: 91). This implies that a learner is born with the potential, so the teacher is only required to assist in the realisation of that potential. As developments in society occur, they need knowledge, and knowledge is brought about by education. That is why in this era, the global society needs EE to be equal to the might of environmental problems, in order to solve them. Both educare and educere are essential for the development of a learner to adulthood, filled with environmental knowledge and skills, as they complement each other.

Educatum refers to the “act of teaching or training" (NCERT 2014: 3). There has always been a debate as whether the concepts education and training mean the same thing, or not. According to Sirková, Taha and Ferencová (2014: 170), “Both concepts

– education and training are often associated, but they are not strictly identical". Sirková et al. (2014: 170) state, "Training is about responding to some external stimulus and education is for growth". Other authors, however, have a problem with this definition of training. They are sceptical as to whether training can "bring about major long-term changes in attitudes" (Masadeh 2012: 64). In contrast to the above definition of training, Masadeh (2012: 64) views education as "activities which aim at developing the knowledge, skills, moral values and understanding required in all aspects of life rather than knowledge and skill relating to a limited field of activity". For EE, educatum implies that the learner should be enabled to learn from what he/she is doing or seeing, or the knowledge gained outside the classroom in the environment (Bhatt 2017).

These definitions portray education as including teaching, training and moulding. It includes teaching, which is the process of assisting the learner to inquire, recall, understand, synthesise, "apply and evaluate information, and do creative things with information" (Killen 2015: 35; Msimanga 2017: 40); training, which is focused upon gaining a particular skill (Masadeh 2012); and moulding, which shapes the behaviour of an individual "by imparting a sense of self-respect and confidence to learners" (Sreejith 2015: 8).

The question is:, What is effective teaching?, Coe et al. (2014: 2) define "effective teaching as that which leads to improved learners' achievement using outcomes that matter to their future success". It means it must be assessed against the progress registered by the leaners. However, what one regards as a desirable outcome might not mean the same to the other assessor (Polikof 2014; Popham & Ryan 2012). Both educare and educere are essential for the development of a learner to adulthood.

The interest in defining the concept education has divided researchers, authors and other interested parties into two – those who specialise in one aspect of the definition to stress their point and those who are adamant to show that the concept education includes two or more aspects in developing the learner. Winters (2013) views education as the acquisition of knowledge. In other words, Winters thinks that only one aspect, which is developed in a learner, is enough to claim he/she is educated. Education is a societal "development and empowerment" (Ramana 2012: 18). He is supported by Naziev (2017: 2) who states that in the past in the Soviet Union and Russia education was defined as "the socially organised and regulated process of

continuous transference of socially significant experience from the previous to the following generations". In other words, this type of education must inculcate culture and beliefs that will enable the learner to take part in community activities with confidence, and even pass this on to the younger ones.

As mentioned above, there are those authors who view education as a process that develops the learner's two or more aspects to become a responsible adult. "Through education, human lifestyles can be achieved that support ecological integrity, economic and social justice, sustainable livelihoods and respect for life." (UNESCO 2008: 1). "Education is the process whereby a learner gradually adapts himself in various ways to his physical, social, and spiritual environments" (Singh 2009: 3). It means that, with the education received, the learner will be able to change his attitudes and habits of relating to the environment, and how he uses the environment and its resources. These aspects are provided by authors such as Dodds (2016) in the broader meaning of education (see Section ii below).

As scholars try to come up with a comprehensive concept, they make a distinction between the narrower and broader meaning of education, and the true definitions of education. These concepts are described in the following sections.

(ii) Narrower, broader and real meaning of the word education

Narrower meaning of the word education: Some people, especially those outside the education sphere, have the understanding that simple instruction is education. "There is a deliberate effort made with a definite 'purpose' to develop certain amount of knowledge, skills, attitudes and habits in the institution" (NCERT 2014: 4). In this instance, there is the specific intention to attain a specific goal; for instance, to acquire a job certificate, and nothing more. If the aim of education is to lead a child to a responsible adulthood, then the type of learning described here does not meet this requirement. Education is not instruction, therefore, "youths need an education that strongly emphasises reasoning and allows learners to think critically, not simply to memorise" (Johan & Harlan 2014: 6). Hence, education in its broader sense is defined in the next section, as compared to the narrower meaning. This definition shows that education is not limited to one aspect, time or space.

The term education in the broader picture: in contrast to the narrower meaning, education is not restricted to a specific goal, nor to the classroom only; it is a lifelong activity (Boyer et al. 2013). In their study, a team of researchers for NCERT viewed

education as “a lifelong process where all the experiences, knowledge and wisdom an individual acquires at different stages of one’s life through different channels (i.e., formally, informally and incidentally)” (NCERT 2014: 5). In contrast to researchers who focus on one aspect of a learner’s development, as reflected earlier in this section, the broader meaning of education views the learner as having the potential to grow physically, intellectually, emotionally, socially, aesthetically, morally, historically, culturally and economically (Reutzel 2014: 35-36). Some researchers emphasise the importance of education that focuses on the emotions and social aspect of the learner (Dodds 2016; Elias 2009; Van Velsor 2009), that learners who are socially and emotionally stable perform better in the classroom (Durlak et al. 2011). During the social activities, learners are able to develop and strengthen physically, intellectually, aesthetically, morally, culturally and economically as they interact with others.

Real education: How does real education differ from narrower and broader education? Proponents of the real education view it as “a purposive, conscious or unconscious, psychological, sociological, scientific and philosophical process, which brings about the development of the individual to the fullest extent and also the maximum happiness and prosperity” (Kumar & Ahmad 2007-2008: 3). This implies that education is deliberate, but not for a specific goal, as reflected by the narrower meaning. An individual may be aware or unaware of the fact that he is learning. From the psychological point of view, teachers as philosophers play the role of guides during teaching and learning. An individual may be aware or unaware of the fact that he is learning. From the psychological point of view, teachers as philosophers play the role of guides during teaching and learning.

In this definition, real education recognises that a learner is a social being and therefore should be enabled to live in harmony with others. It means instilling moral values, ethical values, positive thinking, and positive attitudes of helping other members of society. This education further enables a learner to be an active, independent participant in dealing with societal issues, such as environmental problems and the solutions thereof. It is acknowledged that without the association with other learners and teachers, “the capacity for learner autonomy may not even develop due to the inherently social aspect to autonomous learning” (Anderson 2015: 8).

The definition of real education is similar to the broader meaning as they both imply developing a learner holistically. The definition of a broader sense of education in fact emphasises and expands the meaning of real education.

From the above discussion, there are two perspectives that could be used to clarify the concept education. These are the conservative and liberal perspectives.

(iii) Perspectives of education

The definition of the concept education evolved from its simple to complex form over many years (Amjad 2014; Dushi 2012; Gupta 2014; Swastik 2012). The following section discusses the conservative and liberal views on the concept of education.

A conservative perspective of education

This view represents the old school of thought about education, which is still applicable today. In this case, home education is "the living force that shapes" learning (Jones 2014: 93). Conservatives see education as a medium of imparting culture and traditions from adults to children. This refers to educare, as already defined in Section (i) above. It means the teacher prepares the learner for the impact of cultural and social activities on the environment. The next paragraph clarifies the concept of liberal education.

A liberal perspective of education

Arguments on the definition of liberal education had been going on for many years (Schneider 2008). The concept liberal education should not be confused with liberal arts, as they are often used interchangeably. Liberal arts refer to "specific disciplines (the humanities, social sciences, and sciences)" (Godwin 2013: 15), while a liberal perspective is typically seen within qualitative research where it views education as an interaction in which the learner seeks an understanding of the world in which he/she lives. Learners develop subjective meanings of their experiences (Creswell 2009). Moreover, "Education is defined as an appeal whereby the non-adult may deliberately refuse to respond to the appeal" because education should be spontaneous (Definition of education 2010). This implies that the learner cannot be forced to acquire education, but must choose to seek education. As a participatory knowledge claim, EE is ideally suited to this perspective, as learners are to become participants who are more active. Learners are given the opportunity to be creative, innovative and critical, and discover and solve environmental problems themselves.

The concept liberal education refers to "a philosophy of education that empowers individuals, liberates the mind from ignorance, and cultivates social responsibility –

characterised by challenging encounters with important issues, and more a way of studying than specific content" (Schneider 2013: 4). In other words, the mind of the learner is not channelled but allowed freedom to register what it wants to experience. This implies that the liberals regard education as an agency for developing a clever learner for the complicated world. The situation is complex because the learner has to deal with the challenges brought to him/her by culture and tradition against other issues such as social, spiritual, economic and technological ones. In this complicated situation a learner must also acknowledge diversity (Scott 2014); that is, how to interact with people in terms of different races, socio-economic status, ethnicity, and culture. The curriculum is therefore structured in such way that it caters for diversity. Apart from diversity, a learner must be empowered to keep pace with the fast changing world, which includes the changing state of the natural environment.

Informed by the discussion above, "the broad objective of liberal education is the development of the common and distinctively human capacities to be exercised in all aspects of life, in contrast to technical training for some specific task" (Crittenden 2006: 106). Liberal education views a learner as an individual who is capable of "reflecting on values, opinions, judgements, and connect them to the whole of knowledge" (Lyons 2015: 6).

This type of perspective follows multidisciplinary and interdisciplinary approaches "to cultivate critical thinking, analytical skills, and a sense of social responsibility" within learners (Godwin 2013: 2). These equip learners to vigilantly address environmental problems without been told how to do it.

After defining the concept education, a workable definition of the concept for this study is as follows: education is a participatory process that makes the learner feels free to acquire knowledge, skills and understanding of the environment (natural, social, economic, technological, cultural, and personal). This he/she acquires through creativity, exploration, observation, innovation, critique and discovery, thereby developing skills, values and attitudes that will enable him/her to involve himself/herself actively in the problem solving of environmental crises experienced by the citizenry in South Africa.

The previous sections attempted to define the concepts of EE, namely, environment and education. The next section shows how the concept has evolved over decades.

2.2.1.3 History of the definition of Environmental Education

The debate over a definition for the concept of EE has waged over many decades. This section includes a chronology of the origins of the term; antecedents and concurrent movements of EE; the nature and characteristics of EE; and a working definition for the study.

(i) Brief history of the concept Environmental Education

This section endeavours to understand the roots of EE. The definition of the term had attracted competition among researchers, authors, environmentalists, EE teachers, the media, artists, leaders, and other members or institutions of global societies. Everybody wanted to defend his/her case when it came to the definition. The problem is, each researcher contextualises it according to his/her needs, others according to the phenomenon or event they are interested in, for example, those interested in energy conservation would define it accordingly, those desperate for climate change would come up with their definition, and so on (Jorgenson, Stephens & White 2019).

The bottom line is, this was, and still is, pressurised by environmental problems facing organisms, both living and non-living. These include climate change; pollution; deforestation; desertification; contamination by pesticides and toxic metals; and destruction of biodiversity. Many of these crises occur because of lack of knowledge of environmental awareness.

Where does EE come from?

Although the history of EE can be tracked as far back as the 1700s, this section discusses the roots of EE from the period of Dr William Stapp. Although it existed in past centuries, the first modified definitions of EE included those of Stapp and his associates. In 1969, Stapp and his associates developed a considered definition of EE – a definition that is consistent with many of those one finds in the literature today (Barakatt 2011). The definition by Stapp et al. (1969: 30-31 as cited in Dube 2012: 2) states, “Environmental education is aimed at producing a citizenry that is knowledgeable concerning the biophysical environment and its associated problems, aware of how to help solve these problems and motivated to work towards their solution”. Although this definition focused on the natural environment, it provided a basis for arguments on EE.

The definition by Stapp and his associates provided a platform for conferences and other fora to come up with a more encompassing definition of EE. The Stockholm Conference of 1972 was the pioneer of the conferences for the debate on EE (Sonowal 2009). The stance of the Stockholm Conference to protect the environment was motivated by the state of the natural environment at that time. Principle 2 of the Declaration of the United Nations Conference on the human environment [Stockholm Declaration, 1972] (2017: 1) advocated that:

> the natural resources of the earth, including the air, water and land, flora and fauna and especially the representative samples of natural ecosystems, must be safeguarded for the benefit of present and future generations through careful planning or management, as appropriate.

This clearly mandates people to plan to take care of the environment and its natural resources so that their children and grandchildren can have their share in future.

The Belgrade Charter improved on the understanding of EE advocated by the Stockholm Conference. The definition was expanded to include the “goals, objectives, audiences and guiding principles of EE” with the aim to protect the environment (Carter & Simmons 2010: 8).

One significant definition of EE is provided by the Tbilisi Declaration, namely, “Environmental Education is a learning process that increases people’s knowledge and awareness about the environment and associated challenges, develops the necessary skills and expertise to address the challenges, and fosters attitudes, motivations, and commitments to make informed decisions and take responsible action” (Erhabor & Don 2016: 5368; Karama 2016: 3). This implies that EE enhances learners’ potential to be aware of the environmental problems in their surroundings, and equip them with appropriate skills such as investigative, problem-solving and critical mind skills, which enable them to take wise decisions about the improvement of the environment. It also inculcates positive attitudes of ‘putting themselves in the shoes’ of the environment. This definition provides for the holistic development of learners.

The definition of EE is not complete without clarification of its nature and characteristics. It is therefore fitting that the fundamental characteristics of EE are examined below.

Features of EE

EE is distinguished from other forms of interaction by the following characteristics:

Lifelong process: EE is a process that allows an individual to learn about the environment as long as he/she lives. “Education is not preparation for life, education is life itself” (McHale 2015: 1). This implies that education is like your life, which is busy with daily activities. It is a lifelong human activity and you only stop learning when you are dead. It means education is an ongoing process (CANDO 2011). It is during this period that, in the environment, a learner encounters the new knowledge daily, consciously and unconsciously. “Understanding the environment in which we all live, work and play is vital to making informed decisions that affect our everyday lives” (National Environmental Education Foundation 2010: 4). According to Gurova and Pronkina (2013: 158), “Lifelong education is not a development stage of the educational system. Rather, it is a necessary integral part of the process of the integration of science, education and production”. This implies that like science, education empowers learners to continuously investigate phenomena and find better solutions for environmental issues. It also enhances learners’ economic sense of dealing with the environment.

Interdisciplinary: Many researchers believe that EE is interdisciplinary in nature. The argument is as follows: “Learners would perceive the interrelationships, not only between natural resources, but also between people and other aspects affecting society” (Tan & So 2019: 115). It also implies that EE depends on other subjects, such as Geography and Life Sciences, to make it whole. The researcher’s argument would be that perhaps it is because EE had found that other subjects had already secured their places in the curriculum; hence, this perception and treatment.

Learner-centred: EE is learner-centred (California Alliance for Arts Education 2015). Therefore, it allows learners the opportunity to participate in environmentally focused activities. As naturally curious, learners are motivated to do their best when they are made to think that they own an activity. It should be taken into account that learning is not a straightforward process, it is complex, ongoing, “recursive, relational” and spontaneous in people. The duty of the teacher is to strengthen learning by means of supportive interactions, and create a conducive environment in which a learner would feel that he is in control of the learning process (Cornelius-White 2007: 7)..

This implies that the teaching-learning process is not one-directional; that is, from teacher to learner. A learner-centred strategy promotes autonomy and collaboration that empowers learners to be active members of teaching and learning (Wright 2011). This situation changes the mindset of the teacher as having superior knowledge over the learner.

Although the learner-centred approach seems to be the best because it offers learners the opportunity to improve on their independent skills (Emaliana 2017; Lestari & Widjajakusumah 2009), there are still those researchers who do not agree with this approach. Baeten, Dochy and Struyven (2013) state that a mix of the two approaches, that is, learner-centred and teacher-centred, works well.

In practice, no approach is absolute, as a number of factors, including the type of curriculum, determine it. In that way, an appropriate approach is selected. For example, the learner-centred approach needs teachers to ensure that they implement a curriculum that supports both learners' learning outcomes and satisfies the interests and aspirations of learners (Harris et al. 2013: 7). According to Harris et al. (2013: 7), evaluation will therefore have to transit from the usual "summative and formative assessment" to a continuous approach. This would be a challenge for teachers as these types of assessment are usually prescribed.

Thought-provoking: The severity of environmental crises demands critical thinking and well thought-out solutions. These are achieved during practical activities, which demand intensive observation and appropriate action (Rahman et al. 2018). EE has a task to fulfil in this regard, or else it will fail the environment. EE enhances learners' ability to question environmental issues in order to arrive at sound conclusions and solutions.

Every subject is guided by goals, and so is EE: Most researchers refer to the goals of the Tbilisi Declaration of 1977 (Karama 2016). Ogar, Mbu and Etim (2017: 112) reflect UNESCO's (1977c: 25) Tbilisi Declaration goals as follows:

> To foster clear awareness of, and concern about, economic, social, political and ecological interdependence in urban and rural areas; to provide every person with opportunities to acquire the knowledge, values, attitudes, commitment and skills needed to protect and improve the environment; to create new patterns of behaviour of individuals, groups and society as a whole towards the environment.

The UNESCO-UNEP (2012: 1) highlights the following objectives for EE:

> *Awareness:* to help social groups and individuals acquire an awareness and sensitivity to the total environment and its allied problems; *knowledge:* to help social groups and individuals gain a variety of experience in, and acquire a basic understanding of, the environment and its associated problems; *Attitudes:* to help social groups and individuals acquire a set of values and feelings of concern for the environment, and the motivation for actively participating in environmental improvement and protection; *Skills:* to help social groups and individuals acquire the skills for identifying and solving environmental problems; *Participation:* to provide social groups and individuals with an opportunity to be actively involved at all levels in working toward resolution of environmental problems.

The deduction made here is that both the goals and objectives above mandate EE to strive to enhance awareness of environmental problems among learners. EE intends to empower learners to be able to identify these problems, and to participate actively, individually or collectively, to solve them. EE also intends to inculcate values of respecting the environment, as one respects oneself and others. All these will be determined by the attitudes.

Researchers have competed to provide objectives for EE. However, there are those that are still referred to by researchers today, even though they were presented many years ago. Odia (2016: 169) presents Stapp et al.'s (1997) "major objectives of Environmental Education, which help individuals acquire" the following:

> A clear understanding that man is an inseparable part of a system, consisting of man, culture, and the biophysical environment, and that man has the ability to alter the interrelationship of this system;
>
> A broad understanding of the physical environment, both natural and man-made and its role in contemporary society;
>
> A fundamental understanding of the biophysical environmental problems confronting man; how these problems can be solved, and the responsibility of citizens and government to work towards their solution;
>
> Attitudes of concern for the quality of the biophysical environment, which will motivate citizens to participate in biophysical environmental problem solving.

These objectives emphasise the importance of the presence of a human being in the environment, and how his/her culture and attitudes can affect the state of the environment. A positive attitude towards the environment may encourage an individual to modify his/her culture, which will make him/her vigilant in addressing environmental problems. However, the opposite will further destroy the biophysical environment. Hence, an understanding of the environment as the main resource and its associated resources (products) is required from learners as a matter of urgency.

These objectives are problematic because the concern and focus is on the biophysical environment and its resources, not on the total environment, which is made up of other aspects such as social, political and cultural. According to Halilu (2016: 31), “A strong understanding of how the environment and its resources are used requires knowledge of the social, political, economic, technological processes, institutional arrangements and aesthetic considerations which govern their utilisation”.

The concept Environmental Education is better understood from the three contexts, namely, “education about**,** in and for the environment” (Verma & Dhull 2017: 1550). How “education about the environment” is differentiated from “in and for the environment” is displayed by the definition (Yeshalem 2013: 3-5). “Education about the environment” refers to “the teaching of basic scientific facts, concepts and problems connected to the biophysical environment” (Yeshalem 2013: 19). With this approach, teaching takes place in a designated structure normally called classroom where knowledge about environmental issues is simply imparted to the learners (Kimaryo 2011).

Education *in* the environment means taking teaching and learning outdoors (Gough & Gough 2010: 3) where learners are able to encounter nature. In other words, the environment is a teaching-learning aid. Learners are given “the skills and expertise to tackle the enormous complexity of contemporary environmental problems” (Molsemi et al. 2009: 514). It means learners are given the opportunity to investigate, observe, assess and come up with solutions for prevailing environmental issues. Methods for education *in* the environment range from an activity behind the toilets where learners will be studying green algae or moss, to the recycling of waste paper at school, and longer field trips, excursions and educational tours.

Education *for* the environment focuses on what happens to the environment. According to Kimaryo (2011: 28), it “advocates the learning of Environmental

Education which aims at the preservation and improvement of the environment by making individuals develop attitudes or concern for the environment so that they can take action to address various environmental problems or promote environmental quality". In other words, this type of education has to enhance values and attitudes in learners, which will develop sound concern for environmental issues and how to handle them. This will motivate learners to employ effective strategies to protect the environment.

The distinction between the three is summarised by Mertz et al. (2010: 156) as follows:

> Teaching about the environment addresses knowledge outcomes such as those found in the curriculum documents; teaching for the environment concerns teaching that results in action to improve or benefit the environment; and teaching in the environment includes activities that take place outside of the classroom in a natural locale.

EE has its roots in other disciplines, movements or concepts. The following section delves deeper into the antecedents of EE.

(ii) Antecedents

EE emerged from the fields of "nature study" (Nature study n.d.), "conservation study" (Carter & Simmons 2010: 11) and "outdoor education" (Hursen & Islek 2017).

Nature study

This is learning that takes place in the natural settings (Kuo, Browning & Penner 2018). Nature study is an interdisciplinary, science-based, social and educational reform movement, making it to be recognised as a prototype of EE (University Libraries 2009). The benefits of learning that is connected to nature outside the classroom include a learner's intrinsic motivation to learn as compared to a classroom confined situation (Dettweiler et al 2015; Skinner, Chi & the Learning-gardens Educational Assessment Group 2012). Studies have shown that this type of learning reduces stress levels (Bell & Dyment 2008; Chawla 2015; Wiens, Kyngäs & Pölkki 2016). Outdoor activities are linked to academic performances; for instance, in a recent study in the District schools of Columbia, the finding was that learners in schools with high levels of tree cover achieved higher test scores (Kweon et al. 2017). These examples also apply to outdoor education discussed below.

Outdoor education

In earlier days, outdoor education was in the form of camps and workshop, without a formal curriculum. It means education outside the mortar-and-brick classroom. It allows the learners to investigate, observe, collect and analyse data. In other words, it provides experiential learning (James & Williams 2017). This also promotes teamwork among learners (Borland 2011). Barakatt (2011: 2) supports this, stating, “Nature study and outdoor education forced an appreciation of the multiplicity of factors that the classroom tended to isolate”.

Conservation education

According to Carter and Simmons (2010: 11):

> Conservation education extended the ideas of enjoyment, relaxation, and health embodied in nature study while emphasising the need to conserve natural resources so that both nonconsumptive and extractive pursuits could be maintained in perpetuity.

This implies that there should be a balance between the actions of using the environment and maintaining its state so that it can continue providing for human needs. Ogar, Mbu and Etim (2017: 113) confirm this by stating, “Conservation education steadily gained momentum throughout the middle of the twentieth century and remains a robust part of the educational mosaic today”. This education was also intended to change how learners reacted towards the environment. It might be easy to impart knowledge, but changing these other aspects in learners requires good approaches. EE in formal education will do well in this regard, as some of conservation education’s goals are part of its aims and objectives.

The three types of education or movements discussed above remain points of reference for the field and concept of EE. There are even those researchers and teachers who say that these concepts were simply replaced by the concept EE.

(iii) Concurrent movements of Environmental Education

As EE was developing, so were other movements. These included Resource-use Education; Progressive Education, and Population Education (Kane 2013).

Resource-use Education

The Resource-Use movement ensured that humans used resources in the most efficient way possible so that enough can be left for the coming generations (Upland Software 2015). This is what is called sustainable development.

Progressive Education

This term is also contested, like the others. Some researchers concentrate on the special needs of individual learners, while others are interested in the parents of learners; some describe learning as an ongoing process, "while others believe that tasks should result in authentic products that can be shared" (Kohn 2008: 1).

Progressive education is the basic view that schools should serve as leaders or guides of any change or transformation in society (Bruce & Hogan 2013). According to Bruce and Eryaman (2015: 46), progressive education "generally aims to develop self-actualizing individuals who can take charge of their own lives and participate fully in the creation of a greater public good". Garte (2017: 8) therefore supports this view by saying that progressive education is "child-centred, nature-based education". It is supposed to allow the learner to participate actively in society by displaying his/her potential to deal with life issues, including those related to the environment. In other words, a learner is assisted to choose his/her direction and destiny. This encourages independent thinking, which lacks in a teacher-centred approach. However, progressive education is criticised for how countries like America implement it. Though the movement ended in the 1950s, its principles are still being visibly applied in schools where learners are seen as people "who do not think, who do not question, and who do not care about what is right or wrong" (McAllister 2018: 226).

It seems there has never been agreement on the definition of progressive education. It has different meanings, as informed by different forms. Progressive education is done through the learner as the agent of change or transformation in society, for the society.

Population Education

Population education is another concurrent movement of EE. The concept is old as physical population itself. Population is not static. So, as population changes, or the context changes, so do the definitions of the concepts population and population education. In this way, there is never a right or wrong definition of the concept.

This type of education means “the factual knowledge about population dynamics required to understand the nature and magnitude of the burden imposed by population growth” (Saviashok 2011: 1). It implies the study of the interaction between population and its environmental impact.

In general, population issues that should be dealt with are “the size, structure, distribution, density, growth and so on of the population; the trends in population change at different levels ranging from local to global as well as the factors that determine or influence these changes; the consequences of population change on different aspects of human life – social, economic, political, cultural, as well as on environment and ecological balance and so on; the human reproductive issues; and various measures of population control” (Population education: concept and development 2018: 9). This is a relevant definition for the learning of EE content as it focuses on the entire environment.

Nzobonimpa and Zamroni (2017: 130) provide a relaxed definition of population education when they write, “Population education deals with everyday-life issues. Students get motivated to learn it since it talks about everyday life in simple and factual way”. Perhaps this understanding might motivate teachers and interested parties in education and EE to support the incorporation of Environmental Education in the FET curriculum.

(iv) Contestation about the definition of Environmental Education

As environmental problems increase, so are new understandings of the concept Environmental Education by various researchers to attempt to match the solutions. This contestation goes back to the time of 1975 Belgrade international workshop on Environmental Education when researchers of the developed countries displayed “biases regarding educational systems and environmental concerns”, to them, EE did not need any special attention as it was not differing from other subjects (Gough & Gough 2010: 2).

Pe’er, Goldman and Yavetz (2007) define Environmental Education in terms of a family’s socio-economic status. “They assume that growing up in a well-educated family supports more pro-environmental attitudes…, and have greater exposure to ecological ideas than less educated individuals” (Maurer & Bogner 2019:11).

Moyo and Masuku (2018: 390) define Environmental Education as the acquisition of general knowledge and awareness about the environment, its problems, as well as possible solutions. They recommended to the government of China “to educate its citizens about the importance of keeping the environment safe from any possible threats such as pollution” (Moyo 2018: 306). This definition is weak for researchers who wish to promote the integration of EE in the FET band. The FET band curriculum requires a definition that is more concerned about education that makes the learner more intellectually capable, critical and an ethical member of society to treat the environment with an understanding that the relationship between human beings and the natural environment should be of mutualism.

Sinnett (2019) views EE as related to nature conservation education, but also looking at cultural value because both are concerned with the protection of natural resources; however, the difference is that EE does not only focus on ecology and biodiversity, but includes issues of environmental destruction and pollution and how they affect the quality of the production of the environment. Sinnett’s study shows concern about the exploitation of the environment due to mining. Liu and Guo (2018) are among the researchers who focused more on Environmental Education in management education. They encouraged people to capacitate themselves with environmental values by means of ecological education. These studies also related to sustainable development because there should be a balance between the use of resources for economic, social and cultural benefits and the quality of the natural environment. This requires EE.

The debate about the definition of EE has forced some researchers to move away from conducting studies on the concept Environmental Education to Education for Sustainable Development, or to deal with the two concepts simultaneously. This has further brought confusion on the identity of EE and its status in the curriculum. With her study, ‘Implementing Education for Sustainable Development: The role of Geography in South African Secondary Schools’, Dube (2012: iii) “attempts to respond to better teaching and learning of Environmental Education and Education for Sustainable Development (EE and ESD) in schools as one of the main responses to the worsening state of the global environment”. She considers Geography as an important driver for EE and sustainable development as an integral theme for EE in the curriculum. Dube (2012) found that teachers struggle with the definition of the concept environment and Environmental Education. The meaning of Environmental

Education by the “teacher participants is still that of conservation education where they promote the teaching of knowledge and protection of the biophysical environment and tend to exclude the human dimension” (Dube 2012: 196).

A study conducted in 18 countries (Australia, Belgium, Canada, China, England, Estonia, Finland, Germany, Japan, Korea, Taiwan, Latvia, Mongolia, Netherlands, Peru, Scotland, Sweden, and the US) (Laurie et al. 2016: 240) concluded that “when curriculum includes sustainability content - delivered in terms of local, social, economic and environmental contexts - teaching and learning transforms teaching in all contexts. Also, ESD pedagogies facilitate learning of knowledge, and promote learning skills, perspectives and values necessary to foster and maintain sustainable societies”. Laurie et al. (2016: 234-239) understand ESD as a process that:

> Improves test scores and helps achieve other desired outcomes, such as improved learner attendance and problem-solving skills-outcomes typically associated with schooling. Increased curricular relevance associated with ESD leads to increased learner engagement and commitment (EE definition). ESD perspectives foster further engagement with ESD topics in learners’ private lives, including lifelong learning, informal learning and social entrepreneurship. ESD perspectives also increase learner’s influence on their education, while projects such as twinning schools in different countries increase empathy, understanding, stewardship and intellectual engagement. It improves the competency of the school. It can provide a rich, exciting, engaging and relevant school curriculum by educators choosing contexts, choosing themes, choosing problems for kids to solve that are local and real. The core idea and the practice of ESD will become the standards of quality education and quality learning, which are necessary for a sustainable future. It improves the outcomes of education by putting emphasis not only on cognitive aspects of teaching but on developing the spiritual [so that] a person treats the surrounding world, people, and cultural heritage with sensitivity, care, and respect.
>
> It encourages interdisciplinary and cross-curricular work, and when developed through the use of Inquiry Based Learning strengthens research skills, questioning, risk-taking, critical thinking and collaborative learning.
>
> Staff and pupils reflect on and debate the purposes of education and schooling and contribute to formulating and taking forward the school’s vision and values.

It helps prepare learners for a sustainable future by ensuring that they are environmentally responsible, globally aware, economically astute, socially responsible, and technologically proficient citizens who are capable of coping with the emerging challenges and opportunities we are facing now and will continue to face in the future.

It is the way learners change their own lifestyles, values, and behaviour toward building a sustainable future.

It provides learners with opportunities to face complex issues dealing with a wide range of projects, especially in middle and high schools. With club activities and other extra-curricular activities, learners can further develop problem-solving skills and values. In addition to knowledge which is emphasized by most subjects, ESD highlights the importance of skills for the action and values for SD.

It shares many similarities with entrepreneurial pursuits. The ability to deal with problems from different perspectives, to creatively find solutions and move forward are common features.

ESD can provide knowledge that is driven towards taking action on issues; it can also provide knowledge that allows kids to look at the reality of what is going on around them, the complexity of decisions that they are hearing at the political level.

The more practice learners have with solving real world problems today, the more likely they will be able to. The implementation of ESD promotes and supports the collaboration of science and practice (e.g. action research).

ESD provides an integrated perspective on education. However, teacher capacity is important when it comes to adopting the ESD approach in classes. Educational institutions can be role models with regard to sustainable action and management.

The question is, should ESD be defined within EE? To avoid competition, Slovenia has introduced a “Curriculum of Environmental Education as Education for Sustainable Development” in upper secondary schools (Šorgo & Kamenšek 2012: 1069). Environmental Education as Education for Sustainable Development means that “ESD should be focusing of scientific facts and logical reasoning” (Šorgo & Kamenšek 2012: 1068). However, Boca and Saraçli (2019: 3) suggest that, “Environmental education, regardless of the manner in which it is connected to sustainable development, must face its own limits”. That means it should not blame the scientific approach for its failure

to raise environmental awareness, to empower the learner with the necessary EE knowledge, skills and attitudes, and enhance collective problem-solving; rather, its task should be to develop a citizen who will have the commitment to use the resources of the environment with the knowledge that the coming generations should also benefit (sustainable development).

The journey of defining the concepts from environment to education led to this working definition of EE for the study:

> Environmental Education is a learning process that increases learners' knowledge and awareness about the environment and associated challenges, develops the necessary skills and expertise to address the challenges, and fosters attitudes, motivations, and commitments to make informed decisions and take responsible action (Erhabor & Don 2016: 5368; Karama 2016: 3).

Having clarified the concept of EE and the synopsis of the understanding of ESD although it was not the focus of the study, the following sections will clarify curriculum framework. Finally, the concept of the Further Education and Training (FET) band of schools will be defined. The study deems it necessary to clarify the concept curriculum framework because one research question to be answered is: “Which curriculum framework for Environmental Education for the FET band can be proposed to respond to the identified challenges facing Environmental Education in schools?”

2.2.2 The concept curriculum framework

The concept ‘curriculum framework’ is clarified and supplemented by the discussion of different types of curriculum frameworks in the education system.

2.2.2.1 Curriculum framework

The concept curriculum framework comprises two concepts, ‘curriculum’ and ‘framework’, which are briefly discussed in this section.

(i) Framework

A number of researchers have attempted to define the concept ‘framework’ (Adom, Hussein & Agyem 2018; Commonwealth of Pennsylvania 2014). Framework is a structural plan or basis of a project, a structure supporting or containing something (Reverso-Softissimo 2014). A “framework organises, controls and/or regulates the

content of the curriculum" (Atiah 2018: 2), but it can also have a bearing on how a particular curriculum of the school is managed (International Bureau of Education (IBE) UNESCO 2017); for example, that which the school wishes to achieve by the curriculum is shaped by its framework.

(ii) Curriculum

Many meanings are attached to the concept 'curriculum' as determined by its purpose and context. The origin of the curriculum is the Latin word meaning "a course" or a racing chariot (Audet n.d.). According to the Collins English Dictionary (2004: 139-140), curriculum means "all the courses offered by a school or college". This further specifies what is to be taught by each subject in the curriculum, namely the curriculum framework (Commonwealth of Pennsylvania 2012; Commonwealth of Pennsylvania 2014).

As with other concepts, the concept 'curriculum' has also been defined differently by different authors, depending on its use and particular situation. Le Grange (2006: 189) in Van Wyk and Higgs (2012: 172) view curriculum as a document that guides which "knowledge is included or excluded" for a particular subject or grade. The curriculum thus serves as a blueprint for the teacher during his/her teaching and learning activities. Holtzhausen (2012: 147) defines curriculum as follows:

> A curriculum is a plan for the process of learning and teaching and can be seen as a procedure for determining learning outcomes and the learning content of the specific module and the way in which students will be exposed to the learning content (the what). It also makes provision for assessment criteria as well as methods of facilitating learning and technology that will be used (the how).

Curriculum may be referred to "the sum of all the activities, the educational foundations and contents, their sequencing in relation to the amount of time available for the learning experiences and opportunities, the characteristics of the teaching institutions, the characteristics of the learning experiences, in particular from the point of view of the approaches to be used, the resources for learning and teaching, evaluation and teacher profile" (Harvey 2009:1). This will serve as the working definition for this study. The next section clarifies the concept curriculum framework

(iii) Curriculum Framework

As indicated in Section 2.2.2 above, the concept curriculum framework is clarified by defining different types found in the literature. These differ according to the context in which they are employed.

Curriculum framework is a plan that directs a curriculum. It serves as a signpost for the teacher in executing daily programmes. It is a document that guides the teacher on which objectives to achieve, the knowledge and skills to be acquired by learners, the environmental themes to teach, the amount of time to spend, the practical activities to be done, and what to test or examine.

Curriculum frameworks can be envisaged from different perspectives:

'Intended or specified curriculum' is often referred to as a "written and/or official" document (UNESCO 2009-2014: 1) because it is normally produced by or under the authority of the Department of Basic Education, in this case, or the other departments. It prescribes what is to be done; where, when and how it is to be done by the school and teacher; as well as what is expected from learners. When the intended curriculum is actionalised in the school or classroom, it takes the form of an 'implemented' 'enacted curriculum' (UNESCO-International Bureau of Education (IBE). n.d.) In other words, when the activities expected by the intended curriculum are carried out in the classroom.

'Achieved' or 'learned curriculum' is the development experienced by leaners at school. "It includes what the learner understands, learns and retains from both the intended curriculum and the hidden curriculum" (The Nature of Curriculum n.d: 17). In other words, the situation in which objectives have been attained or learning outcomes realised, as well as behavioural change.

A 'hidden curriculum' refers to "learners' experiences of school beyond the formal structure of the curriculum, and in particular the messages communicated by the school or education system concerning values, beliefs, behaviours and attitudes" (Mitchell 2014: 1). This implies the unintentional inculcation of values in learners, and the transfer of norms and beliefs at the school. Teachers may abuse a hidden curriculum at the expense of learners "when they do not understand the hidden curriculum well" (Alsubaie 2015: 125). To curb this, it is advised that teachers should receive intense training on the hidden curriculum.

A 'null curriculum' is a curriculum that contains activities that are not meant to be taught at school (Face to Face Intercultural 2008). The danger may be that teachers may deliberately omit some topics because of their subjectivity or lack of interest. It is therefore important to understand what a null curriculum means, because "…what schools do not teach may be as important as what they do teach" (Eisner 1985 in Gholami et al. 2016: 220).

With the South African government advocating the Fourth Industrial Revolution, an electronic curriculum is a necessity in schools. An 'electronic curriculum' refers to "computer-based learning including educational materials available on CD or DVD, online courses, electronic mechanisms to search the literature, e-mail, and various applications of instructional technology including providing laptops to learners, multimedia projection systems, and internet-compatible classrooms" (Hendrickson et al. 2004: 1041). This type of curriculum encourages creativity and innovation; it also increases interest among learners because they see activities in motion. Learners are able to watch environmental problems live, and assist in how they can solve them. Moreover, this curriculum improves a social element of teamwork among learners. A learner learns without the fear of being teased by others when making mistakes (Gharaibeh & Alsmadi 2012).

In South Africa, the Gauteng Department of Education (DoE) is leading with the provision of laptops to learners to encourage e-learning. A number of schools are also making progress in the "paperless" method (Digital curriculum n.d.). The hope is expressed that the other eight provinces could persuade the Department of Basic Education to introduce a compulsory electronic curriculum.

In South Africa, we have moved away from the use of syllabi to curriculum, with the Curriculum and Assessment Policy Statement (CAPS) currently in place. CAPS is "a single, comprehensive, and concise policy document which replaces the Subject Statements, Learning Programme Guidelines and Subject Assessment for all subjects listed in the National Curriculum Statement" (Department of Basic Education 2011a: 3).

This section attempted to make a distinction between curriculum frameworks. Though there are different types of curriculum frameworks, it is advised that all teachers, in all contexts, develop a clear grasp not only of the written or official curriculum but also of the hidden and null curricula (Face to Face Intercultural 2008). With the South African

government emphasising the Fourth Industrial Revolution for the use of Information and Computer Technology (ICT), e-learning is not luxury but a necessity in teaching and learning.

2.2.3 Further Education and Training (FET) band of schools

While internationally mainstream schools are classified into primary type and secondary type, in South Africa schools are further divided into bands ((Department of Basic Education 2011e: vii). These bands are categorised according to grades. Grade R to Grade 9 is called the GET band (General Education and Training), while Grade 10 to 12 is referred to as the FET band. FET schools therefore refer to secondary schools composed of both the GET band (Grade 8 and 9) and the FET band (Grade 10 to 12). Grade 8 and 9 offer the general status, such as Social Studies (a combination of Geography and History) and Natural Science (a combination of Physical Science and Life Sciences), while Grade 10 to 12 of the FET band offer subject that have a separate status like Geography and Life Sciences. Hence, the proposal for an EE curriculum framework in the FET band so that it could be afforded an independent status. In the GET band, it would have to compete with the already competing parts on one subject, on the one hand, and the other stand-alone subjects, like Life Orientation, on the other hand.

2.3 CONCLUSION

Chapter 2 focused on the clarification of key concepts of the study. These key concepts included Environmental Education (EE), Further Education and Training (FET) band, and curriculum framework.

The chapter reflected an evolution of the term Environmental Education. It became clear that researchers keep on searching for the meaning of the concept, which will assist in solving environmental problems holistically. Definitions included the earlier one by Stapp and his associates in 1969, which is regarded as the foundation for contemporary definitions. The definition by UNESCO appears to be the favoured one in recent decades as it includes other aspects of the environment, and refers to learners who must be educated holistically. In clarifying EE, the characteristics that make up its nature were also outlined. Moreover, EE was defined from three situations, namely education in, about, and for the environment.

In addition, the concept curriculum framework was clarified. A distinction was made among different perspectives of curricular frameworks. However, it was advised that all curriculum frameworks should be employed to complement teaching and learning in schools. Keeping with the latest developments, as championed by the current President of South Africa, President Cyril Ramaphosa, e-learning is important for the learning of the child.

South Africa's concept of the FET band was also described, with a recommendation to integrate EE in this band.

This chapter has clearly shown that there will always be contestation for sponsoring subjects' or fields' terms and concepts, as well as how individuals understand them. In other words, it depends on the researcher's context at a particular moment.

The progress regarding the integration of EE in the countries selected for the study is reviewed in the next chapter. As mentioned in Chapter 1, the selected countries include India as an international example, Zimbabwe as a SADC example, and South Africa as both a SADC example and the site where the study was conducted.

The researcher will do an in-depth literature review in Chapter 3 and, is satisfied that India and Zimbabwe, when compared to South Africa, are a fair representation of a global review of the study.

CHAPTER 3

ENVIRONMENTAL EDUCATION: AN OVERVIEW OF THE GLOBAL SITUATION AND THE IMPLEMENTATION OF CURRICULUM FRAMEWORKS IN THE SCHOOLS OF SELECTED COUNTRIES

3.1 INTRODUCTION

The chapter reviews the historical global situation on EE. It begins with a discussion on important international landmarks that have influenced and shaped policies and other frameworks in EE. Then will follow a discussion on the curricula frameworks, including the international and SADC examples. The countries that will be reviewed are not necessarily the best examples in the world, but they have been selected for various reasons. India was selected because it is one of only a few countries showing an interest in EE issues. Zimbabwe was selected as a representative of SADC countries with historically the best education system when compared to South Africa, while South Africa was the country where this study was conducted. As indicated in Chapter 1, I am therefore convinced that this sample is adequate for this study, especially drawing from other researchers who reflect in their studies that although it is offered in colleges and universities, many countries have not integrated EE as an independent subject in secondary schools, but through other subjects. These include both developing and developed countries such as Tanzania, Botswana, Lesotho, England, Germany, Sweden, Greece, and Romania (Boca & Saraçli 2019; Glackin & King 2018; Ketlhoilwe 2007; Kimaryo 2011; Mwendwa 2017; Ntanos et al. 2018; Radeiski 2009; Verma & Dull 2017).

This chapter will end by discussing some examples of curriculum frameworks that can be used as general ways for the integration of EE in the school curriculum. Although there are many, I have chosen these because of their complementary function to the EE curriculum, as we know that the definition of Environmental Education

encompasses many aspects, such as physical, social, economic, political, cultural. In other words, it aims to develop the learner holistically.

Whereas these curriculum frameworks deal with the teaching of EE content, they show special focus; hence, the use of complementing a proper EE curriculum framework, suggested by this study.

3.2 HISTORICAL, GLOBAL SITUATION OF ENVIRONMENTAL EDUCATION

A number of important international landmarks have influenced and shaped policies and other frameworks in EE globally. These are discussed below in chronological order:

3.2.1 The Stockholm Conference (1972)

The Stockholm Conference resulted from the growing global concern over the changes in environmental conditions (deforestation, climate change, ozone depletion), and the issue of resource preservation was prioritised. The stance of the Stockholm Conference to protect the environment was therefore motivated by the state of the natural environment at that time.

Developments of the conference included a mandate for "existing institutions to take greater efforts to address environmental issues; the development of new sources of environmental obligations; and new techniques for implementing environmental standards" (Udapudi & Sakkarnaikar 2015: 67). As already indicated in Section **2.2.1.3 (i), it was here that** clear marching orders were given by Principle 2 of the Declaration of the United Nations Conference on the Human Environment (Stockholm Declaration, 1972; 2017: 1) that:

> the natural resources of the earth, including the air, water and land, flora and fauna and especially the representative samples of natural ecosystems, must be safeguarded for the benefit of present and future generations through careful planning or management, as appropriate.

This conference attempted to influence the legal footing for environmental protection but did not succeed at that stage. For example, the formulated Action Plan emphasised the signs instead of the causes of environmental problems. However, the conference could still be regarded as "a solid basis on which to build a more structured

framework" (Aguila & Viñuales 2019: 4). It can also be considered the initiator of a platform for public participation in the talks about environmental matters. These include debates for formal education.

Regarding school curriculum, Meerah, Halima and Nadeson (2010: 5716) state, "Education is the bridge to sustainability and its role has been lauded as one of the prescribed solutions to environmental conservation since the World Conference of 1972 in Stockholm". This document will serve as a blueprint for the EE policy that will guide the themes dealing with conservation of the environment and its resources. Learning will therefore enhance the learners' skills of conservation and preservation of resources.

As countries continued to negotiate about environmental obligations, the next move in the form of a charter came into being – the Belgrade Charter in 1975.

3.2.2 Belgrade Charter (1975)

The continuing deteriorating state of the natural environment led to a discussion workshop, which was held in Belgrade. Thus, the Belgrade Charter continued on what was initiated by the Stockholm Declaration (Karama 2016). The Charter emphasised that Environmental Education be "institutionalised," including in formal education (Sauvé, Berryman & Brunelle 2007: 34). It implied that EE should be a compulsory part of the school curriculum across all grades.

Debates about the Belgrade Charter included an argument about its radical approach in the history of EE. Thus, one-on-one questioning of the weaknesses and potentials of EE policy initiatives (Maluleke 2005) informed it. This called for the redefinition of the UNEP's IEEPs (International Environmental Education Policy Initiatives) to include issues of curriculum development and learning approaches. The employment of a radical approach in addressing curriculum framework issues in EE by the Belgrade commission explains how the conservative state-centred frameworks (particularly the focus on nature conservation and ecology studies) were slowly giving way to new frameworks in education policy debates. The goal of the Charter was on developing someone, be it a learner, who will be able to identify and curb environmental issues (Ogar, Mbu & Etim 2017). It means, if learners are educationally well equipped, they

will understand that in order to continue benefitting from the environment, they should practice conservatory actions.

Though the Charter was welcomed as a better tool for EE, it did not fulfil its mandate. Although the definition was “consistent with the emphasis on action, it was not sufficiently clear with the teachers”, which led to the goals of EE expressed by Hungerford in 1980 (Sanera 2008: 3). Again, it never explained in detail the integration of Environmental Education into the school curriculum.

3.2.3 Tbilisi Principles (1977)

The Belgrade Charter laid the foundation for the Tbilisi Declaration in 1977. The Tbilisi principles focused mainly on international EE framework issues, and on how to disseminate them to host countries. These frameworks helped to provide a more formal intergovernmental recognition of the EE concept developed earlier in Belgrade. The Conference’s themes included to formulate a rationale that would inform the curriculum and teaching methods. Therefore, Tbilisi helps, among others, to compare other teaching approaches with its recommended interdisciplinary and problem-solving strategies for integration of EE into national education curricula, as well as the appropriate education materials to be used (Hanneman 2013).

The beauty about the Tbilisi Declaration was that it presented goals and objectives, as already stated in Section 2.2.1.3 (i) above. The Tbilisi Declaration “highlighted that investigating peoples’ environmental awareness, attitudes, and behaviour towards environmental issues could inform educational approaches geared towards a more sustainable future” (Hashemzadeh 2016: i). These are integral to any research and implementation of EE topics in the FET band curriculum. The goals and objectives supply a solid basis for proper implementation of EE in the FET band. If EE can be incorporated as an independent subject, these goals and objectives will encourage teachers to work hard on social, economic, moral and cultural aspects that are usually ignored in the classroom, due to the focus on the acquisition of subject knowledge.

Although the definitions of the Belgrade Charter and the Tbilisi Declaration were “consistent with the emphasis on action, they were not sufficiently clear with the teachers”, which led to the goals of EE by Hungerford in 1980 (Sanera 2008: 3).

3.2.4 Brundtland Report (1987)

Following the Tbilisi Declaration was the Brundtland Report. The Brundtland Report was named after the chairperson for the commission. The Brundtland Report concentrated on the sustainable use of resources. The document also served as a pioneer in defining sustainable development (Gilani, Pons & De la Fuente 2019) – the understanding being that when people use the environment and its resources, they must use methods that will ensure that future individuals will also benefit from the same environment.

The Brundtland Report presented the basic features of sustainable development as follows: “safeguarding long-term ecological sustainability; satisfying basic human needs; and promoting intragenerational and intergenerational equity” (Holden, Linnerud & Banister 2014: 131). The first feature cautions the users of the environment to utilise it in such a way that they do not compromise its ability to support the needs of future generations, and that people will still have a chance to protect natural habitats. This requires preservation and conservation of the environment and its resources.

The second feature, “satisfying basic human needs” (Holden 2016: 25), forms an integral part of sustainable development. Even today, many community protests occurring in South Africa are influenced by the demand for basic needs, including water, sanitation and electricity, and employment. Because of the high rate of unemployment, there is a dire need for food, housing and health care. These human needs are also contained in the Brundtland Report.

“Intragenerational and intergenerational equity is also a prerequisite for sustainability, which emphasise that a sustainable world must provide for the basic needs of all the people living today (Intragenerational) without precluding the ability of future generations to meet their own needs (intergenerational)” (Bell & Cheung 2009: 5). This understanding is still relevant to this study and has created a basis for further definitions and meanings. Interest in the definition of this concept includes other issues in the meaning. For example, countries like the United States of America, the United Kingdom and Finland include the following aspects:

> …crime rate; participation of 14 year olds in social organisational work; teacher capabilities; workforce skill level; the number of nineteen year olds in the UK with level 2 qualifications; classes taught in a minority language; children in public care; daily

smokers, and internet users; the manner in which children get to school; obesity rates; and R&D expenditures" (Holden et al. 2014: 130).

These issues are highly prevalent in South Africa, and if we want to reduce their rates, an EE curriculum in the FET band is appropriate because it is the only subject that deals with the environment and the learner as a totality. The introduction of Life Orientation has failed dismally to address them. Crime in our country has become an acceptable norm. Maybe if it is a prescribed reading, learners will transform the rest of society as reflected by progressive education in Section 2.2.1.3 iii.

This document is important. Reference to sustainable development in the EE curriculum will be prominent. This will motivate learners to ac in a sustainable manner. This will also remind learners about their position in the environment and the desirable interaction with everything in that environment, regarding the rights of everyone or everything.

Summits and other platforms continued to be held on sustainable development. Examples include the Rio Summit in 1992 and the World Summit on Sustainable Development in Johannesburg in 2002, which will be discussed in the following sections.

3.2.5 Rio Summit (1992)

Rio ratified the principles of the Stockholm Declaration stated above (Section 3.2.1)**.** The concern about sustainable development was an important matter of discussion at the Rio Summit hosted by Brazil in 1992 (Noga & Wolbring 2013). A global plan of action for sustainable development, called Agenda 21, was the outcome of the Rio Summit. The fact that member states approved Agenda 21 internationally at the highest political level lends its special authority and importance in development circles (Maluleke 2005; Johnston 2011). Agenda 21 strived to reduce the negative human stress "on the natural environment, while simultaneously addressing social issues such as poverty, health and consumption" (Young 2014: 198). It can therefore be attested that this conference managed to stretch the "scope of the environment to the concept of sustainability" (Michelsen 2015: 41).

"The non-binding character and the lack of implementation of its principles, the commitments made at Rio were purely symbolic without any impact" (Puhlmann n.d.: 3). Due to this failure, Rio could not even persuade governments and education

departments to integrate EE as a subject on its own in the school curriculum. This means that Rio only managed to raise awareness, but failed to change the mindset of the people and to influence action in order to solve environmental problems.

For the FET band curriculum, Rio stresses sustainable development from the Stockholm Declaration stated above (Section 3.2.1). This will increase the level of commitment of teachers and learners to sustainable ways of living. This will assist in focusing EE policy and re-focusing the policies of other subjects like Geography, Agricultural Science and Physical Science, as well as the health and safety policies of the school.

3.2.6 WSSD in Johannesburg (2002)

South Africa agreed to hold a global summit, the World Summit on Sustainable Development (WSSD), in 2002 (Death 2011). The WSSD did not aim at coming up with anything new or revisiting Agenda 21. Instead, it was instructed to implement those resolutions already taken “in Rio in 1992” (Von Schirnding 2005: 1). The Summit arrived at three important products:

The Johannesburg Declaration on Sustainable Development, that highlighted that an increasing socio-economic breach between the advantaged and disadvantage puts more pressure on food security; this helps curriculum developers to include a theme on how politics influence issues of class economy, so that learners can learn about them. This land issue is already debated in South Africa, as was the case in Zimbabwe years ago. The curriculum will guide, as informed by legislation, how this sensitive issue should be attended to.

The Johannesburg Plan of Implementation (Ololade 2012) that developed a timetable to attend to the lowering of the “loss of biodiversity by 2010” and increasing the number of citizens to “access clean drinking water by 2015” (Sustainable development. 2015); if included in the EE curriculum, it teaches the learners how to reduce the loss of biodiversity locally, for instance, to avoid indiscriminate killings of animals and unnecessary destruction of vegetation.

The Type II commitments by governments and other stakeholders that bind governments and stakeholders to make commitments for the implementation of sustainable development at all levels – commitments mentioned in the Plan.

Regarding the curriculum, the suggestion by the WSSD for the Decade of Education for Sustainable Development (DESD) was a clear sign that “education and learning lie at the heart of approaches to sustainable development” (Padmanabhan & Rao 2009: 3). It implies that this summit was to ensure that the important features of sustainable development were included in the curriculum of formal education from primary school to colleges and universities.

This summit endorsed the concept of sustainable development, as outlined in Agenda 21. The stance taken at this forum changed the perception regarding sustainable development as an element of Environmental Education. “Education for sustainable development is no longer an ‘add-on’ in the curriculum alongside environmental, consumer or climate education; instead it is an approach offering an opportunity to fundamentally rethink education” (Michelsen & Wells 2017 :8). The implication is that, with time and pace, sustainable development is gaining recognition in education in institutions of higher education.

The concern is, if summits are already pushing for the integration of sustainable development when secondary schools have not even made an introduction of EE as a subject, will this be successful. There is a need for the incorporation of EE as a start in the FET band curriculum, my argument being that sustainable development is an element of EE, while EE is holistic in nature. Environmental problems need a holistic approach.

Some scholars are positive about these fora on environmental problems. There are those who think that with time, results will show that these fora and resolutions taken will enhance values of caring (Falkner 2012). He holds the following view:

> The rise of global environmentalism has had a lasting, and potentially transformative, impact on international relations. Over the last hundred years, international society has slowly but steadily been ‘greened’, despite the many setbacks in the search for practical solutions to specific environmental problems (Falkner 2012: 503).

Death (2011: 1) assessed some conferences, including the WSSD, to be “moments of political theatre”. This implied talk shows without actions, as Van Alstine, Afionis and Doran (2012: 5) interpreted Death, “Such fora simply function as a means through which political elites put up symbolic performances aimed at reassuring the global

audience of the utmost seriousness with which environmental sustainability concerns are treated".

This argument is supported by Mbokazi (2016: 50) when affirming that the WSSD was not successful on agreeing on important essentials for sustainability and alternative "commitments, goals and targets of achieving sustainable developments. Most of the achievements reaffirmed existing efforts and approaches that are already incorporated into the UN Millennium Declaration Goals and other previous agreements". These are real talk shows.

Whether the WSSD was a success or not depends on the progress in implementation of the commitments and targets. For example, although there were agreements on targets, such as that of sanitation, the inability to agree to that of "renewable energy" was a setback considering the current situation of the shortage of electricity in South Africa. The targets of WSSD regarding the issues of bio-diversity loss and improving availability of water were later emphasised at a summit held in New York in 2010; perhaps to show the seriousness of the matter (United Nations 2010).

It is evident that researchers would agree that the WSSD has not done any justice to EE as a whole, as its focus was to push sustainable development. However, this also has a positive effect because it motivated some authors to compile a framework to encourage sustainable practices, which could be used in the development of an EE curriculum. The framework contains five themes which have become principles of ESD used to encourage "futures thinking; critical thinking and creative thinking; participation in decision-making; partnerships; interdisciplinary and systemic thinking", which enhance the skills of creative thinking (Parker & Prabawa-Sear 2020: 198; UNESCO 2016). These themes are in line with EE goals and objectives (Section 2.2.1.3 i) to encourage a change of attitude, enhance sceptical analytical skills and values for active participation as an individual, as well as a collective in identifying and solving environmental problems.

3.2.7 Rio+20 (2012)

Two decades later, after Rio 1992, Rio+20 was hosted at the same venue in Brazil in 2012 (Noga & Wolbring 2013). This took place ten years after the WSSD in Johannesburg in 2002. The emphasis was on sustainable development and poverty alleviation, but without affecting the quality of the natural environment.

The purpose of Rio+20 was to review Rio 1992. The vision included “to renew commitment to sustainable development and to ensuring the promotion of an economically, socially and environmentally sustainable future for the planet and for present and future generations; that poverty eradication, changing unsustainable and promoting sustainable patterns of consumption and production and protecting and managing the natural resource base of economic and social development are the overarching objectives of and essential requirements for sustainable development” (United Nations 2012a: 1). This could be achieved by a change of attitudes, and appropriate strategies and instruments. Rio+20 provides important sustainable themes for the EE curriculum. Inclusion in the FET band will motivate learners to practice better production and consumption methods. This is about promoting resource efficiency. South Africa is currently experiencing a serious shortage of water and energy. Implementation of the Rio+20 conference could help the government to think about making electricity available to citizens by means of exploring new methods, which will not only generate sufficient electricity but also be affordable to the poorest of the poor (Spalding-Fecher, Winkler & Mwakasonda 2005). This theme in the curriculum will motivate learners to use a simple method of saving electricity by only lighting rooms that are being used at that particular time, and to water lawns and trees with laundry water. It means doing more with the little you have to promote sustainable development. Yes, topics like conservation are in subjects like Geography. but not all learners take these subjects, and the integration approach is a challenge for teachers.

The fourth goal of the conference therefore emphasised the need to capacitate learners qualitatively so that by 2030 they will be able to take sustainable actions (United Nations 2015).

3.2.8 Conference of the Parties (COP)

Another international landmark concerning the environment is the Conference of the Parties (COP). COPs were held over the years to address the crises brought about by climate change. This section assesses all the milestones that have been achieved to date since the first COP was held in 1995. Hence, it will only deal with the COPs that have made a significant impact on environmental issues.

Acknowledging that COPS had no impact on the suggestion of the EE curriculum in formal education, including the FET band, does not underrate their contributions to environmental issues, especially climate change, which has a serious negative impact

on all life. The main aim of this section is therefore to highlight the progress shown by COPs, which will serve as a blueprint for a chapter in the EE curriculum dedicated to the history of the fora, which will deal with climate change and sustainable development, which are topics to be included in the FET band curriculum. Knowing the history will assist curriculum developers or education representatives who serve as delegates at these conventions to become vigilant with agreements regarding the implementation of EE in schools.

3.2.8.1 COP 1

The pioneer of the COPs, namely COP 1, was hosted in Berlin, Germany in 1995. Not much was done during this conference on committing to dealing with the global warming crisis due to the opposition by developed countries. Satisfactorily, other binding agreements were reached such as that “they would adopt policies and measures to prevent dangerous and thropogenic interference with the climate system; developed countries should take the first steps to prevent dangerous climate change; nations have common but differentiated responsibilities to prevent climate change” (UN 1992 in Brown 2011: 13). The implication is, as the highest contributors of green gases, America, China and others should be exemplary in accountability. The Berlin conference, therefore, provided a basis for the agreements of the succeeding COPS on climate change.

3.2.8.2 COP 3

In order to heighten the Berlin mandate, COP 3, the Kyoto Protocol, took place in Japan in 1997 and was adopted with the commitment to set targets to reduce emission (Carbon dioxide, Methane, Nitrous oxide, Hydrofluorocarbons, Perfluorocarbons and Suphur hexafluoride) in industrialised countries, with the intention to be operational in operational in 2005 (Morchio 2013). Although the Protocol developed a framework, mechanisms and rules that included those for reporting developments achieved by developing countries on their pledges, as well as evaluation of that leading to accountability for amounts of emissions, the protocol was not legally binding (Talberg 2009). This posed a threat to developing countries.

The Kyoto Protocol witnessed the suggested target by the European Union of a 15% reduction in greenhouse gas emissions, lower than those of 1990, by the year 2010,

while other developed countries like the United States suggested from 8 to 10% (Brown 2011: 15). These industrialised countries agreed on an overall reduction average of 5.2%. However, as mentioned above, the rules are not binding, compromising implementation and worsening environmental conditions.

3.2.8.3 COP 13

COP 13, which took place in Bali, Indonesia in 2007, followed the Kyoto Protocol meeting. The focus of this meeting was to negotiate a “roadmap, timetable and concrete steps” for agreements to be finalised in 2009 (Bali Road Map n.d.). The Roadmap contained the Bali Action Plan, which was viewed as “a comprehensive process to enable the full, effective and sustained implementation of the convention through long-term cooperative action, now, up to and beyond 2012, in order to reach an agreed outcome and adopt a decision” (Bali Action Plan n.d.: 1; Bali Road Map n.d.: 1).

The Bali Action Plan reflects many future decisions, including: (1) a long-term partnership action and commitment to emission reduction targets and means of implementation; (2) industrialised countries to define relevant, weighable, adjudicable and reportable mitigation commitments; (3) adaptation actions for climate change by developed countries to cater for developing countries which are especially susceptible to the severe climatic conditions; (4) developed countries to supply the means for the transfer of advanced technologies to the developing countries in order to deal effectively with climate change; (5) sustainable funding for developing countries to deal with severe climatic condition, adaptation and empowerment (Gebler 2010).

The Bali Action Plan was in preparation for COP 15. The Action Plan was, however, “only a rough and narrow goat-track, strong on intentions but weak on substance and leading along a cliff edge, rather than a clearly defined road to meaningful outcomes” (Christoff 2008: 472). It means its good proposals lacked clarity and courage.

3.2.8.4 COP 15

The COP 15 talks saw an opportunity to use the Nationally Appropriate Mitigation Actions (NAMAs) as approaches to solve climate change problems, especially the reduction of greenhouse gas emissions (Brown 2011). However, developing countries were not bound by this, as was supposed to be the case with developed countries, as

contained in the Kyoto Protocol. COP 15 was hosted in Copenhagen in 2009, and gave birth to what was called the “Copenhagen Accord” (Centre for Climate and Energy Solutions C2ES 2009). The Accord provided the essential features of the next frameworks and negotiated for funding with developed countries to assist other countries that were financially underprivileged so that they could deal with the issues of climate change (Averchenkova 2010: 1). A sad part of this initiative was that the Accord was left hanging. It is common knowledge that any discrimination leads to resistance. Failure to legally bind the developing countries created a loophole in the agreements, which collapsed the mission of COP 15.

In Copenhagen, there was a significant signal regarding a compromise on the way forward to reduce emissions from deforestation and degradation, which makes up nearly 15% of the overall global environmental emissions. Also, it did not clearly explain where the money for assisting the vulnerable nations will be secured, as well as failed to disclose the amount to be availed (Huq, Chandani & Anderson 2010).This is another shortfall. Failure to adopt the Copenhagen Accord did not render it useless, it still made a mark by providing essential “elements of future framework among major emitters and representatives of the main negotiating groups” (Averchenkova 2010: 1). COP 15 provided the foundation for COP 16.

3.2.8.5 COP 16

COP 16, the Cancun Agreements of 2010 in Mexico, which formalised the commitments set out in Copenhagen, was written and the Green Climate Fund was created mainly for climate actions in developing countries (Hultman 2010). This was a disciplined and promising conference as compared to the Copenhagen one because governments committed to forget about previous issues that caused deadlocks on climate discussions. The agreements, however, comprised both the Protocol and Convention tracks.

The COP 16 agreements were regarded as the most successful (Muñoz 2011) because they were able to re-deal with the issue of “multilateralism” (Maiero, Villalobos-Prats, & Campbell-Lendrum 2010: 3) in order to take better steps to address the issue of climate change.

COP 16 agreements were as follows:

- To streamline the international landscape of climate negotiations;

- To detail what needs to be done by COP 17 to define a globally shared vision for long-term cooperation action on climate change;
- To initiate the Cancun Adaptation Framework;
- To urge developed countries to increase emission reduction ambitions and demand improved, more frequent and more standardised disclosure and reporting from developed countries;
- To make progress on the issue of emission reduction efforts in developing countries;
- To achieve partial success on the issue of REDD+ (reducing emissions from deforestation and forest degradation);
- To call for an agreement on and development of new market mechanisms; To determine the governance of the Climate Green Fund;
- To establish a formal Technology Mechanism under the Convention, under the guidance and fully accountable to the COP, to analyse the development, deployment and diffusion of climate-relevant technologies in developing countries; and,
- To determine to avoid the emergence of a gap between the first and second commitment period of the Kyoto Protocol. (UNEP 2010: 1).

Although COP 16 was regarded as the most successful, as indicated above, matters of robust debate continued. However, it seems, not every COP was successful in stamping authority on negotiations and implementation of its agreements, leading to failure to meet deadlines, and therefore rolling-over became a norm. With this one, delegates were doubtful as to whether developed countries would agree to the level of reduction of emissions, and which ones would agree to financial assistance to developing countries to achieve an appropriate workforce and technologies. The biggest flop was that COP 16 did not emphasise the curriculum as a tool to achieve its agreements.

3.2.8.6 COP 17

COP 17 was held in Durban, South Africa in 2011 (Working together, saving tomorrow today 2011). All countries agreed to start reducing emissions, including the United States and emerging countries. It was decided to negotiate an agreement that would come into force in 2020.

COP 17 agreed on the following:

(i) “The second commitment period to the Kyoto Protocol and mitigation targets” (UNFCCC’s Durban Platform explained 2012: 1). The United States were among the developed countries that did not commit, while the EU and others did. The Durban conference was regarded as a saviour after the Copenhagen flop and the inability of the Cancun Conference to save the environment.

(ii) The “Durban platform” pack (Morgan & Cameron 2011). COP 17 seemed to be victorious when it launched a new platform of negotiations called Durban Platform for Enhanced Action (DPEA) and resuscitated the Ad Hoc Working Groups namely, the Ad Hoc Working Group on the Kyoto Protocol (AWG KP): Supervising second commitment to Kyoto Protocol, so that countries “turn their economy-wide targets into quantified emission limitation or reduction objectives and submit them for review by 1 May 2012” (Osafo, Sharma & Abeysinghe 2012: 2); and the Ad Hoc Working Group on Long-Term Cooperative Action (AWG LCA): For negotiations on “mitigation, adaptation, finance (Committee and Green Climate Fund), technology development and transfer, capacity building and transparency of action and support” (Selenius 2013: 23). The Finance Committee and “The Green Climate Fund” were developed and launched by the Durban COP (Boyle 2011: 1). The objective of this Fund was to change the direction of how things had been done by prioritising developing countries that are susceptible to severe climatic conditions. These same countries do not have the financial muscle to deal with the gas discharges affecting them. So the intention of this funding was to provide financial assistance to them (Green Climate Fund n.d.). The guiding principles of the Fund included “transparency”, directing “financial resources to developing countries”, “scalable and flexible”, a “continuously learning institution guided by processes for monitoring and evaluation”; and working hard to improve “the impact of its funding for adaptation and mitigation” (Governing instrument for the Green Climate Fund n.d.).

The pack was a milestone in the history of attempts to deal with climate change because the document was made official after years of struggle. In addition, for the first time, the pack did not make a discriminatory distinction between developed and developing countries. This became an obliging document for negotiations for all governments.

(iii) "Implementation of the Cancun Agreements": Many of the resolutions taken in Cancun received positive ratifications (Countries commit to COP 17 outcomes 2012). These included:

- "Mitigation by developed and developing countries (Boyle 2011: 1) equals negotiations for targets mitigation to be achieved by 2012 by developed countries still on the agenda, while developing countries were motivated to come up with approaches for reducing emissions and most appropriate mitigation actions . Both developed and developing countries were expected to submit reports in January and December 2014 respectively. Developing countries were expected to submit a register for NAMAs (Nationally Appropriate Mitigation Actions). That is, how they would respond to contributions or assistance regarding financial, technical and capacity-building support.
- The Adaptation Committee was launched to create a conducive environment for support and direction, a platform for sharing of opinions regarding climate change, and the establishment of strong partnerships among stakeholders on evaluating the set actions (Bennet 2011).

  "Technology mechanism" (Minister on COP 17 Outcomes and United Nations Security Council Presidency 2012) was put in place under the guidance of a special committee to outline and provide direction for technologies to be used to deal with climate and other environmental issues and to perform these in a designated centre.
- The REDD+ talks included two items: (1) the emphasis by the "Subsidiary Body for Scientific and Technological Advice (SBSTA) on adopting guidance for a Safeguard Information System (SIS) on how safeguards are implemented and considered, and also examined the question of reference levels and reference emission levels for REDD+". (2) "Financing modalities that took place within the Ad Hoc Working Group on Long-term Cooperative Action (LCA) (Durban COP 17: UNFCCC fudges decision on climate finance and makes little progress on REDD+ safeguard implementation 2012). This matter was not attended to by the Cancun meeting.

COP 17 was a promise of a positive direction in dealing with climate crises if compared to the previous conferences. However, like COPs 1, 3, 13, 15 and 16, it does not come up with clear guidelines regarding EE in formal education. Although students and learners are usually invited to such fora, they feel that these are just for communication

and their presence does not encourage the incorporation of EE in the school curriculum (Gaunt 2012).

3.2.8.7 COP 18

COP 18, hosted in Doha, Qatar took place in 2012. Agreements included the following:

“Amendment of the Kyoto Protocol” as the sole legal document for the control and monitoring of the reduction of “greenhouse gases” (Waagsaether n.d). However, important pieces of accountability were retained. Disappointing were the United States of America, China, Russia and Canada who did not give the necessary support (Sustainability n.d.).

“The Kyoto Protocol’s Market Mechanisms - the Clean Development Mechanism (CDM), Joint Implementation (JI) and International Emissions Trading (IET)” were “allowed to continue operating as of 2013” (Legg 2012).

A resolution was taken to bind countries to keep their temperatures under “2 degrees Celsius temperature rise, which ended as a weak talk-show” (Jagger 2012).

Developed countries reconfirmed financial support and technological resources to developing countries for effectively dealing with climate crises, which according to research, is not equitable to the level of adaptation and mitigation needs of the developing countries (United Nations 2012b).

Article 6 of Doha reassures “education, training and skills development” (United Nations 2013 :17) for actionalising issues of mitigation and adaptation by parties. (Dialogues on action for climate empowerment). This has nothing to do with EE in the classroom.

COP 18 has shown significant progress as outlined above. “The failure of Doha would have had strong reverberations” (Marcu 2012: 4). The wish was that it could sustain the challenges for the sake of progress in combatting further climate change problems and sustainable development.

3.2.8.8 COP 20

COP 20 took place in Lima, Peru in 2014. This meeting took a step forward in the sense that ultimately all parties agreed that they would submit information on how they would reduce their CO2 emissions by March 2015. However, they did not get the necessary support from governments for evaluating their commitments (Amponsem 2015). It therefore meant that the matter was put aside for COP 21.

The transfer of appropriate technologies made good progress and was of good assistance to developing countries (African Climate & Development Initiative 2014)

Just like at the other meetings, the progress on negotiations was negligible. COP 20 extended the Durban platform for further negotiations to 2020 (Fuhr, Schalatek & Santos 2014). This was a failure on its side.

The Lima agreement was binding to all countries, developing and developed, in contrast to the Kyoto meeting that focused on industrialised countries. Moreover, the target for financial contributions to the "Green Climate Fund was increased, reaching 10.2 billion dollars" (Schalatek & Watson 2018: 1). This was a financial advantage for developing countries to do their planning and acquisition of appropriate mechanisms to tackle climate change problems.

COP 20 expressed the need for 'climate change education and training for teachers and learners" (UNESCO n.d.). However, as already indicated above (Section 3.2.8.7), this does not refer to proper Environmental Education in the classroom, but only a topic(s) based on climate change and public awareness for sustainability.

The shortfalls meant that much had to be done for COP 21 in Paris.

3.2.8.9 COP 21

COP 21 was hosted in Paris, France in 2015 (Kulovesi 2014). The Paris agreement was a reflection of "the completion of a decade of long transition from a top down binding regime focused on developed country mitigation to a bottom up and substantively non-binding approach to global cooperation on climate change with key binding process elements" (Doelle 2015: 1). According to Streck, Keenlyside and Von

Unger (2016: 3), “The agreement creates a global process of engagement, follow-up, regular stock-take exercises and cooperative action”. The Paris agreement can therefore be seen as one of the milestones regarding the culmination of activities in the history of conferences dealing with climate change.

COP 21 managed to succeed in a number of agreements or decisions, which are discussed below:

The Paris agreement changed direction by “adopting a bottom-up structure for emissions targets (“nationally determined contributions”), balanced by top-down provisions for strong global emission goals and key accountability provisions, such as reporting and review” (Stern 2018: 3). According to Stern (2018: 3), “It shifted the paradigm of differentiation – continuing to assure developing countries that their priorities for growth and development would be fully respected, but putting in place more supple means of differentiating than the 1990s firewall erected between developed and developing countries”. Thus, there was no correlation between the paper agreement and practice.

Accepting a global warming goal of well below 2°C or the ambitious target of 1.5°C. (Clémençon 2016: 3). This was a positive accommodation for small islands states and the African continent that had been negotiating for years for this target. Regarding net zero emissions, countries did not arrive at a common agreement for the target for greenhouse gas emission. Different Paris agreement drafts suggested different targets and timeframes (Resnick 2017).

Although it cannot be said with confidence that the COPs showed significant progress over the years, the Paris agreement showed that for the first time all the countries committed to reducing emissions (Caytas 2018). The Paris agreement managed to clarify a “universal, legal framework to strengthen the global response to the threat of climate change” (Streck et al. 2016: 4). It showed that the opinions of developing countries also counted.

Moreover, it can be said that adaptation and loss and damage were missing from the preceding agreements. In the Paris agreement, there was a winning situation for developing countries because Article 8 was given an opportunity to “recognise ‘loss and damage’ as a separate issue from ‘adaptation’” (Article 7) (Abeysinghe, Craft & Tenzing 2016: 5).

Article 9 of the Paris agreement made provision for financial support and mobilisation of climate finance to developing countries by developed countries (Paris Agreement n.d.: 8-9). This is voluntary for other countries.

Provision by Technology Transfer (Article 10): Though developed countries did not agree to the suggestion that they should carry the burden for the transfer of technologies and associated financial support, Article 10 asked that all participating countries join hands to realise the importance of technology in dealing with climate change issues for the benefit of developing countries (Rimmer 2019). The Paris agreement spells out that technologies are essential for mitigation and adaptation to deal with climate change. Developed countries will take the lead.

Transparency of action and support (Article 13): The Paris agreement put in place a transparency framework that recognises the unique strengths of countries (UNFCC 2015). This was informed by the argument between developing and developed countries in which the developing countries wanted a clear distinction between the two, whereas developed countries where opposed to this. Technically, developing countries still enjoyed, although with some limitations, the distinction between developed and developing countries regarding responsibility and financial contribution towards climate change mandates. Developed countries take the lead in mitigation and finance matters. Finally, developing countries were able to defend their arguments to a greater extent, as reflected by the successes mentioned above.

Questions have been asked whether the Paris agreement was a success or failure. One could say it was a milestone when compared to its predecessor, the Kyoto Protocol, “if one accepts the premise of grievous urgency and of causality to global warming of CO2 emissions induced by anthropogenic activity” (Caytas 2018: 4). Clémençon (2016: 3), however, was disappointed by the fact that the Paris agreement did not produce a legal paper and clear guidelines that ensured that the “world can stay below a 2°C - even less a 1.5°C warming - over pre-industrial times”. It also does not specify how this can be achieved. “Instead it provides a framework for getting momentum going on greenhouse gas reduction, with some oversight and accountability” (Resnick 2017).

The Paris agreement failed to stamp its authority for compensation for the loss and damages experienced by countries because of extreme climatic conditions, usually

caused by industrialised countries. This implies that the Paris agreement “does not provide a basis for any liability or compensation” (Vulturius 2016: 1).

Issues of Environmental Education in schools was just ‘a drop in the ocean’. 4 December 2015 was used to “showcase good practices and lessons learned on climate change education” (Ace day at COP 21 2015).

However, the Paris agreement attended to many questions that were not answered previously; what is left is vigorous implementation. COP 21 not only provided a foundation for COP 22, but also for future conventions. The Paris agreement was the stop of the previous struggle and the beginning of beautiful ideas to deal with climate problems (Kinley 2016). This agreement is a full package of global legislation, goals, and progressive steps that guide these goals (Bodansky 2016).

Below COP 24 is discussed, which is prioritised over 22 (as indicated in the first paragraph of Section 3.2.8).

3.2.8.10 COP 24

COP 24 took place in Katowice, Poland, in 2018. This conference developed a “rule book” outlining the progress on the implementation of agreements of rules and procedures on mitigation, transparency, adaptation, finance, and periodic stocktakes of COP 21 (Katowice 2018). This is an important product of the Katowice conference that will ensure maximum functioning of COP 21.

Though implementation of the Paris agreement appeared to be heading in the right direction at the Katowice conference, there were challenges. The new special Report on Global Warming of 1.5°C of the Intergovernmental Panel on Climate Change was not well received (Gills & Morgan 2019). Moreover, the negotiations contained in the rulebook were difficult to conclude in order to implement later, as expected by the Paris agreements and in 2020. The attention of negotiators was also distracted by challenges facing countries, as citizens in France were protesting against a new gas tax among other grievances (Nunes 2018). In addition, during discussions, the latest information presented at COP 24 showed an increase in emissions.

It is worth noting that even though the Convention of Parties (COPs) show progress in issues of climate change problems and sustainability, they are failing in education and

curriculum design guidelines for EE, as if it is not public knowledge that education is an important tool for any process to take off.

This part of the thesis discussed important international landmarks that influenced and shaped policies and other frameworks in EE. COP 21 appears to be vigilant in an attempt to deal with environmental issues, especially those linked to climate. However, there is a need for EE in the FET band, not climate change education.

Credit can be given to all these events, as outlined in this section, for the contribution they made to environmental issues. Though not that convincing, I agree with Fihlo, Manolas and Pace (2015: 113) when they applaud these developments as being "instrumental in catalysing actions at the national level, especially in those countries where Environmental Education was not given the emphasis it required".

The following section will look into the history of EE and developments regarding its integration and implementation in three selected countries. The progress and challenges facing attempts to integrate EE in school curricula will also be discussed. Some examples of models that could be suggested to assist in the design or development of an EE curriculum in the FET band of schools will also be discussed.

3.3 ENVIRONMENTAL EDUCATION CURRICULUM FRAMEWORK: AN INTERNATIONAL EXAMPLE

This section traces EE curriculum frameworks at international level. India has been selected because it is one of the countries showing progress, although it had to be legally persuaded to do so (Chhokar 2010). United States of America was selected to determine whether its giant economy matches its ability to integrate EE in the secondary school curriculum. The discussion starts with the history from a general point of view, that is, what is happening in the country, followed by the curriculum framework in the education system, with the challenges facing EE integration.

Like other countries, India and the United States of America were motivated by international developments such as the Stockholm Conference in 1972 (see Section 3.2.1); followed by an international conference held in Belgrade in 1975 that produced the Belgrade Charter containing the marching orders for the global framework for EE (see 3.2.2); the Tbilisi Declaration two years later at the world's first intergovernmental conference on environmental education in Tbilisi, Georgia (USSR) (see Section 3.2.3),

and others. However, the US also faces the same challenges as India, which impedes its integration of EE as an independent subject.

3.3.1 India

3.3.1.1 History of Environmental Education in India

(i) The roots of EE

The beginning of an era for environmental concerns can be linked to certain forefathers in India, such as Mahatma Gandhi. In 1937, Mahatma Gandhi advocated for a school curriculum by the name of Nai Talim, meaning Basic Education for all (Book on Mahatma Gandhi's 'Nai Talim' n.d.). "This philosophy of education was based on the experiments he did right from 1904 when he was in South Africa to his stay in ashrams in India at Sabarmati (Gujarat) and Sevagram (Maharashtra)" (Takwale, Sawant & Deshmuckh 2010: 1). It is a strategy that seeks to develop "the total personality of body, mind and soul" (Takwale et al. 2010: 1). The principles of Nai Talim prepare a learner for work in the community and for a career. With these principles as guidelines, activities and career pathing should include the identification of, and problem solving of environmental issues.

EE has its roots in the way of life of Indians, which is driven mainly by religion and culture passed from generation to generation – for instance, the belief that people are the most important creatures in the entire environment. As Sharma (2010: 47) puts it, "the entire creation is one indivisible and entire universe constitutes a life unto which every aspect including the human is integrated". This serves to remind people that creation has put them above other creatures, to monitor them, but also to understand that they are all members of the environment. Cultural practices and beliefs should not affect the environment negatively, for example, the merciless killing of animals and the unnecessary destruction of vegetation, because this will have a negative impact on the physical and economic aspects of the environment.

(ii) Legislation

EE in India is influenced by international and national developments. As it happens in other countries, there are initiatives by governments for the provision of environmental issues in India (C.P.R. Environmental Education Centre 2015). These include major environmental policies and legislation in India, which are discussed below:

The Constitution of India: Like in other countries, the Constitution of India also recognises Environmental Education because it recognises that environmental problems are negatively affecting the environment. Environmental issues were included in the constitution after the “Forty-second Amendment Act, 1976” (Bhat, Hussain & Zahid 2017: 15). Article 48 A states, the “state shall endeavour to protect and improve the environment and to safeguard the forests and wildlife of the country” (The Constitution [Forty-second Amendment] Act, 1976; The Constitution [One hundred and Third Amendment] Act, 2019). The obligation for every citizen is further emphasised and extended by 51 A (g), as it states, “It shall be the duty of every citizen of India to protect and improve the natural environment including forests, rivers and wildlife and to have compassion for living creatures” (Tarabout 2019: 1; The Constitution [Forty-second amendment] Act, 1976; The Constitution [One hundred and Third Amendment] Act, 2019). The Constitution is the supreme law of the country, which mandates everyone, including learners, to protect the environment. It therefore provides reference for this disposition to be translated into EE curriculum implementation for secondary schools. It is upon the education department to make use of it.

Prevention of Cruelty to Animals Act of 1960: Taking care of animals is an environmental issue. This is enforced by the Prevention of Cruelty to Animals Act (No. 59 of 1960 as amended by the Central Act 26 of 1982), and again in 2016 failing to fulfil its mandate, and was therefore called the Prevention of Cruelty to Animals (Amendment) Act, 2016 (Mahajan 2016: 3).

The duty of the Act is to declare it a crime to beat, torture, cruelly kill or abandon an animal, or fail to provide sufficient food to animals, and permits any diseased animal to roam the street. Though it does not say anything about the curriculum, this provides reference for the treatment of animals in the environment. Reference to it will boost the FET band curriculum to observe an EE objective (Attitudes), which requires learners to acquire a set of values and feelings of concern for the environment and the motivation for actively participating in environmental improvement and protection.

The Water (Prevention and Control of Pollution) Act of 2003: Water is an essential and precious commodity. The Indian Government amended the Act on water several times (1978, 1988 and 2003) to deal with issues of water pollution. Unfortunately, in India the “right to clean water is not a fundamental right in the Constitution” (Hewameealla

2016: 1). According to Hewameealla (2016: 1), Article 21 of the Constitution is legally understood as “right to life encompassing the right to safe and sufficient water”. Therefore, India is more concerned about the prevention of water pollution, which will affect all life in the environment. This serves as a curriculum theme.

Air (prevention and control of pollution) Act of 1981 amended 1987: India was also concerned about air pollution; hence, the amendment of the Air Act of 1981 (Chand 2018) to become the Air Act of 1987 (Desai & Sidhu 2019: 218) for effective combating and controlling air pollution. India is one of the countries with the highest air pollution in the world. There is thus a need for frequent amendments of the Air Act to control air pollution. As acts are amended, so should the education policy, which guides the curriculum.

An integrated approach is suggested. By an integrated approach we mean that the education department, as part of other government departments, can assist with the introduction of a proper EE curriculum in secondary schools in formal education, so that learners can develop an ethos that will be displayed at home.

Environment Protection Act of 1986, amended in 1991: This Act makes provision for a safe, secure and healthy environment for people, and other living and non-living components of the ecosystem. This Environment Protection Act is in the first place informed by Articles 48 A and 51 A (g) of the Constitution, as reflected above (Tarabout 2019). With the Constitution, this Act and others, are valuable documents to advise the education policy of India for proper implementation of EE in secondary schools. This will encourage learners to make it a priority to take care of the environment at all costs, to preserve it, to replenish it, and to conserve it and its resources for future generations.

National Conservation Strategy and Policy Statement on Environment and Development of 1992: These serve to provide approaches and guidelines for the FET Environmental Education Curriculum in order to take appropriate actions to solve environmental problems. Major problems in India are “pollution, energy-related ones, solid municipal waste, agricultural factors and overpopulation” (Chandra 2015: 3). Waste is simply dumped on the outskirts of towns, as there are no proper landfill sites (Reddy 2014).

Biological Diversity Act of 2002: The Act provides material for the inclusion of conservation of biodiversity, sustainability, and the equitable use of biological

resources in the EE curriculum (Buhtani & Kohli 2012). This will teach learners the importance of taking care of their biodiversity to avoid extinction of the most important and endangered species. “Biodiversity is important for the normal functioning of ecosystems that are responsible for the supply of oxygen, food, fresh water, fertile soil and fuel, besides ecological services such as moderating storms and mitigating climate change” (Sundararaju 2019). Although India has made progress in formulating acts, policies and other pieces of legislation, including this act to promote conservation of the environment and its resources, there is little progress in conservation because there is no proper EE curriculum in secondary schools to promote this.

National Environment Policy of 2006: India also developed the National Environment Policy, as motivated mainly by the Constitution. The Policy complements the documents discussed above. Together with the Constitution and National Conservation Act and the Policy Statement on Environment and Development, they form the most important blueprints for the compilation of school’s EE policy and the introduction of a proper EE curriculum in secondary schools. The Policy is “intended to be a guide to action: in regulatory reform, programmes and projects for environmental conservation; and review and enactment of legislation, by agencies of Central, State, and Local Governments” and secondary schools (Ministry of Environment & Forests 2006: 3).

The following objectives of the Policy can be used to guide EE policy that informs the EE curriculum:

Inclusion in the EE curriculum of the theme of the protection and conservation of critical ecological systems and resources”, which are important for the livelihoods, economic growth and human wellbeing; intra-generational equity: livelihood security for the poor; sustainable development for inter-generational equity; integration of environmental concerns into schools’ EE policy and an EE curriculum document, plans, programmes and projects; and the efficient use of environmental resources to minimise adverse environmental impacts in the EE curriculum document (Ministry of Environment and Forests 2006: 8-9).

However, failure to actionalise these objectives and principles of the Policy will declare it redundant. To ensure success, reliable strategies are required.

The section discussed the pieces of legislation employed by the Government of India in its attempt to promote solving of environmental issues across all sectors of the country. The Constitution is very clear about the right for the protection of the environment. Although other pieces of legislation are not specifically referring to Environmental Education, they provide essential documents and guidelines for reference for an EE curriculum in secondary schools. The next section reviews how the economy of the country, the Constitution, acts and policies influence the curriculum framework of EE in formal education.

The problem with India, like many countries around the world, is implementation. Perhaps to get this right, the introduction of EE in schools as an independent subject will assist learners, who are future parents, to implement the acts. As long as there is no cooperation among government departments and other stakeholders, the acts and policies will collect dust on the shelves. The best approach and institution to force people to learn is by means of compulsory education.

3.3.1.2 Curriculum framework and implementation

(i) Legal ruling and National Education Policies

India is also affected by many environmental problems (Sharma 2010). The rapid industrialisation and development and subsequent liberalisation of the economy in India have put pressure on the government to rethink approaches to deal with environmental issues (Rangarajan 2009; Ravindranath 2007; Sonowal 2009). It is in this regard that the education department should advise government about the use of Environmental Education as a school subject in secondary schools. The developments in the country have increased air and water pollution, which also affect infant death rates and "life expectancy rates" (Chandra 2015: 1). Serious environmental problems in India include an population explosion as mentioned above under *National Conservation Strategy and Policy Statement on Environment and Development of 1992* (see Section 3.3.1.1), pollution in all forms (Chandra 2015); greenhouse gas emissions, which are a global crises (Greenstone & Hanna 2014), municipal solid waste (Dube, Nandan & Dua 2014): groundwater depletion, loss of biodiversity, and deforestation; hence, the continuous conventions to try to save the environment. These themes must be included in schools' environmental policy and the teaching of EE.

India is one of the countries with a high population rate; that is, “18% of the world’s population on 2.4 percent of its land area” (Nagdeve 2007: 2). Hence, it requires not only health education but also EE.

As indicated in the first paragraph of section 3.3.1.1 above, the first move to integrate EE in the school curriculum was taken by Mahatma Gandhi with his approach of Nai Talim, meaning Basic Education for all Book on Mahatma Gandhi’s ‘Nai Talim’ launched, n.d.). By this he saw learners as “reflective learners, skilled with useful knowledge, who were integrated into community life through engagement in productive work and who desired to undertake service for humanity” (Haigh 2008: 244).

The deteriorating state of the environment in India has been debated in courts, pushing the Supreme Court into taking a firm position about environmental issues in formal education. As stated by Hedge (2003: 1), the Supreme Court of India said the following on 22 November 1991:

> We accept in principle that through the medium of education awareness of the environment and its problems related to pollution should be taught as a compulsory subject. Learned Attorney General pointed out that the Central Government is associated with education at the higher levels and University Grants Commission can monitor only the undergraduate and postgraduate studies. The rest of it, according to him, is a state subject. He has agreed that the University Grants Commission will take appropriate steps immediately to give effect to what we have said, i.e. requiring the University to prescribe a course on environment. They would consider the feasibility of making this a compulsory subject at every level in college education. So far as education up to the college level is concerned, we would require every State Government and Education Board connected with education up to the matriculation stage or even intermediate college to immediately take steps to enforce compulsory education on environment in a graded way. This should be so done that in the next academic year there would be compliance with this requirement.

With this, the Court directed accountable officials to ensure that environmental concerns were imparted through the medium of education. The Court therefore required departments and authorities connected to education to introduce EE as a “compulsory subject” (Sonowal 2009: 16). This ruling puts pressure on those concerned, who had to secure physical, human and financial resources for this special

task. The problem with this ruling lies in the name; it says education awareness not Environmental Education. Again, the emphasis on being a compulsory subject is more on colleges of education than secondary schools, which means, India, like other countries, is faced with challenges that prevent it from incorporating EE as a subject in its schools.

The position of EE can be credited to the Constitution and preceding Environmental and Education policies on environmental concerns, especially the issues of the 'protection and improvement of the quality of the environment', as discussed in the previous section.

The National Policy on Education (NPE) of 1968 instructed for teaching up to at least the "age of 14 which included the English, official and Hindi national dialects ('three dialect equation') as well old Sanskrit dialect on the way of life and legacy" of India, as mandated by the needs of the country (Pandit 2017: 206), not accommodating Environmental Education as a subject. Perhaps the feeling was that Sanskrit is an important language for passing on the knowledge of cultural heritage, an element of Environmental Education, from generation to generation.

The 1986 NPE emphasised the education of learners up to the age of 14; that is, "universalisation of elementary education" (UEE) (Saha 2016: 16). Govinda and Mathew (2018) assessed this as a failure. According to them, the UEE "could be seen as a continuous repositioning of the targets to mask the failures due to inappropriate policies and programmes, poor implementation and governance, and inadequate financial investment. In either case, the UEE target and timelines were missed every time" (Govinda & Mathew 2018: 8). Regarding EE, the NPE encouraged awareness for protection of the natural environment but failed to mandate the inclusion of EE as a subject. It also recommended that the curricula deal with tribal issues, focus on the "rich cultural tribal identity of students and that instruction be provided initially in tribal languages and introduce regional languages in later stages" (Chunawala & Natarajan 2010: 132-133). The NPE emphasised the value of the language and culture of minority groups as environmental essentials. It even stressed, according to Chunawala and Natarajan (2010: 133), "the need to implement Constitutional guarantees that are given to these groups to establish and administer their own educational institutions (such as madrassas and maktabs which are religious institutions that impart general education to Muslim minority population)".

As education evolved in other parts of the world, there was also a need for education in India to transform in order to meet the changing needs of the country and the impact it has on the natural environment. The 1986 NPE was reviewed and became the 1992 NPE, which contains environmental issues. Paragraph 3.4 of the National Policy on Education (with modifications undertaken in 1992) states the following:

> The National System of Education will be based on a national curricular framework, which contains a common core along with other components that are flexible. The common core will include the history of India's freedom movement, the institutional obligations and other content essential to nurture national identity. These elements will cut across subject areas and will be designed to promote values such as India's common cultural heritage, egalitarianism, democracy and secularism, equality of sexes, protection of the environment, removal of social barriers, and observance of small family norm and inculcation of the scientific temper. All educational programmes will be carried on in strict conformity with secular values (National Policy of Education 1992: 5).

The curriculum will address among others, the protection of the environment. However, it does not explain how this will be done.

The curriculum of secondary school will combine Science, Technology, Society and environment in the teaching and learning of Science. Learners would do fieldwork and practical work both indoors and outdoors (Sharma 2004) "using the immediate environment such as farming, factories, industries and the community".

The 1992 NPE did not meet the needs of the citizens of India, including EE curriculum. Therefore, there had to be further modifications in policy formulation and curriculum. This and the earlier ones of 1968 and 1986 stipulated beautiful objectives and goals, but which mostly could not be achieved, as expected. Failure could be attributed to factors such as inadequate clarity on guidelines and external factors such as the "politicisation of the education system" (Little 2010: 18; Ministry of Human Resource Development 2016: 33).

The NPE of 2016 suggests that there should be a provision in the curriculum "to equip the learners on issues of climate change, global warming, pollution, depletion of water

resources, various facets of environmental degradation" (Ministry of Human Resource Development 2016: 101). This should be a curriculum that empowers learners with practical skills, such as observation and investigation, which will enable the learner to participate in critical problem solving of environmental issues. The NPE addressed, among others, a common curriculum for Science, Mathematics and English. This is mentioned here because in India, Science is a carrier subject for EE. The report on the draft for the 2016 NPE was released in 2016. NPE 2016 also failed to recognise the importance of EE curriculum.

NPE 2017: In 2017, the Kasturirangan Committee was appointed to look into the report of the 2016 NPE. The Kasturirangan Committee responsible for the new policy was instructed to "make Indian education contemporary, learner-centric, research-oriented, improve its quality, and internationalise it to produce better citizens of tomorrow" (UK India Business Council 2018: 5). These are also the requirements for an Environmental Education learner – education that affords a learner the opportunity to display their critical thinking to explore the current or prevailing environmental issues themselves by means of research to improve the quality of the environment. However, it is also passive about Environmental Education.

In closing this section, India, like other countries, have polices in place and review them. Although they include environmental issues, not a single policy from 1968 to the latest 2017 national policy has recognised the importance of EE in schools. Education policies are the guidelines for curricula; without their assistance, there is little hope for positioning EE in the school curriculum.

(ii) Conferences assisting the EE curriculum

Apart from these policies, India held conferences, seminars and other fora to debate environmental issues and the EE curriculum. In 1979, India held a seminar under the direction of the Indian Environmental Society in partnership with the International Programme on Environment Management, where the focus was to integrate "Gandhian" philosophy and "values" as a package (Halder 2012: 2223). There was no emphasis on the EE curriculum.

India also hosted the First International Conference on Environmental Education in 1980. It was here that the late Mrs Indira Gandhi acknowledged that EE should awaken "social consciousness and make the community aware of the fact that the

good of the individual and that of the community are both harmed by ecological disruptions" (Halder 2012: 2223). However, this never received the attention it deserved, which could have advocated for the integration of EE in secondary schools.

India held the second International Conference on EE in 1985. One of the main goals of the Conference was "the strengthening of Environmental Education" (Baldwin & Berberet 2009: 373). Recommendations included the establishment of a national EE training and research centre in India and integrating "the study of human values and cultural differences in the curriculum" (Baldwin & Berberet 2009: 373). India is passionate about socio-cultural issues, but like education policies, conferences also did little to position EE in the school curriculum.

(iii) Curriculum development

The national education policies, which were previously discussed, inform curriculum development. For example, the NPEs of 1968 and 1986 guided the 1975 curriculum framework for the "Ten-Year schools" and the 1988 National Curriculum Framework for Elementary and Secondary Education, and 1986 NPE also served as the basis for others, including the National Curriculum (2005) (Yadav 2011). Although it is mandatory for all national curricula to contain environmental awareness (Sarkar 2012), they are failing to integrate EE in the curriculum. At least, the curriculum includes important features of EE such as "education should be "child-centred", with the teacher playing the role of a facilitator in the process of learning (Little 2010: 19).

Curriculum frameworks and their role in the integration of EE are discussed in the following section. The discussion ranges from the 1975 to the 2005 curricula.

The National Curriculum for the ten-year school (1975): Curriculum for higher secondary (XI-XII) allowed learners to make a choice of their subjects and programmes of study, with much more opportunity for vocational streams. In the curriculum, EE was taught across other subjects, like Science, History, Geography and Agriculture.

In reaction to the *National Policy on Education (NPE) of 1986*, the late 1980s and the beginning of the 1990s experienced new schemes implemented to extend "the coverage of quality primary education" (Kidwai et al. 2013: 9). This saw the curriculum reflecting EE concerns such as conservation of resources, preservation of cultural heritage, insistence on the inculcation of values, and protection of the environment

and of natural resources. Environmental issues were taught in other subjects, as mentioned above.

The National Curriculum Framework for School Education (NCFSE-2000): The aim of NCFSE-2000 was to ensure that education develops the learner holistically. However, this was criticised by educationists and social activists for focusing on issues that overemphasised majoritarian perspectives and culture as the main view of the people of India, ignoring other matters such as Environmental Education to address the serious issue of poverty (Kumar 2012).

The National Curriculum Framework (NCF) (2005): This served as a milestone in the history of curriculum development in the education system in India (NCERT 2005). The impression is that EE is a compulsory part of the syllabus in schools throughout the country. The curriculum stresses that "environmental concerns should be emphasised in every subject and through a wide range of activities involving students" (Yadav 2011: 9). In other words, there should be many different practical activities outside the classroom to bring learners closer to the natural environment. This approach enables the learners to develop a variety of skills that make them understand their environment and associated problems. Like NCFSE-2000 above, this curriculum has not been successful in integrating EE in the curriculum as a subject, although it created that impression. As EE intends to provide children with knowledge, attitudes and skills so that they are well equipped to contribute to the achievement of sustainable development, one of the skills should be that of questioning, rather than absorbing what the teacher says. This actively involves learners in the planning and carrying out of their learning activities. This curriculum helps the learner to "comprehend the roots and re-establish the links between education and the habitat" they find themselves in (Farlex 2011: 4).

NCF 2005 prepares the learner for socio-cultural situations (NCERT 2005). NCF 2005 proposes five guiding principles for curriculum of which one is relating knowledge to life outside the four walls of the classroom (Kidwai et al. 2013).This enhances learners' values, which make them create relationships of peace with their immediate environment.

In a study conducted in the higher school education system in six districts of North Bengal in India, Halder (2012) found that environmental issues were incorporated in the syllabus. He presents the main themes as follows:

Class VIII: Balance in nature; impact of population on environment; harnessing of resources; environmental pollution.

Class IX: Understanding ecosystem; depletion of resources; waste generation and management; environmental values and ethics.

Class X: Restoring balance in ecosystem; pollution; issues of environment such as resettlement; striving for a better environment.

Class XI and XII: Man and his environment; environment and development; environmental pollution and global issues; energy; biodiversity; environment management; sustainable development; nature observation/practical aspects (Halder 2012: 2226-2228). However, the concern is, EE is not yet given the status it deserves, which is a subject in its own right, despite severe environmental issues in India.

In 2010, the Supreme Court (Shetye 2012) accepted NCERT's request of adopting EE as an infusion model in higher secondary schools, rather than having it as a separate subject. In this model, various environmental concerns are infused into various subjects such as Science, Language and History. This approach is in accordance with NCF 2005; at the same time, it is a very effective way of transacting environmental concerns to the learners. For class IX, the infusion approach is to be followed, earmarking ten percent of the total marks of Social Science, Science and Languages for EE questions. Questions can be of any type, like subjective, objective, or fill-in the blank spaces. The EE questions asked in the question paper are compulsory. While calculating the marks, principals should indicate the marks for EE. For class X, the infusion model is followed for the internal assessment component only. For class XI, the project approach is to be followed, for class XII, the project approach is to be followed, and the grades secured to be communicated to the GOA Board of Secondary and Higher Secondary Schools Education (Shetye 2012).

India acknowledges the fact that the deterioration of the environment has now become a cause of concern. "It has become imperative to make Environmental Education as a tool for life-long learning right from one's childhood" (Bhat et al. 2017: 14). It means EE must form part of primary education at home; as 'charity begins at home'. This will form a foundation for EE at school.

Like any new initiative or development, the curriculum framework of India was also challenged, as is happening in other countries around the world. The following section presents challenges facing this curriculum.

3.3.1.3 Challenges

The 1992 NPE did not meet the needs of the citizens of India. Therefore, there had to be further modifications in policy formulation and curriculum. This, and the earlier ones of 1968 and 1986, stipulated beautiful objectives and goals but could not be achieved as expected. Failure could be attributed to factors such as inadequate clarity on guidelines and external factors such as the “politicisation of the education system” (Little 2010: 18; Ministry of Human Resource Development 2016: 33).

NCF 2005 failed to take into consideration that a review of the curriculum also involves a review of both physical, monetary and human resources; as well as enough research studies in EE and continuing social biases (Chhokar 2010). Almeida and Cutter-Mackenzie (2011) are also concerned about the lack of research and the quality of EE activities in schools in India.

There are no clear guidelines on how the curriculum framework should integrate EE; thus everybody is entitled to his/her own way of teaching environmental concerns (Farlex 2011).

This shows that India, like other countries attempting to integrate EE in schools, is facing similar challenges. Hence, the attempt to implement EE in school curricula has become a global concern.

There is provision for EE in schools, but it does not enjoy the status of other subjects in terms of period allocation and assessments. The status of EE remains the same. In higher secondary stage, EE is integrated in subjects like Biology, Chemistry, Physics and Geography (NCERT 2005).

The findings reflect that “Environment Studies is allocated one (most schools) or a maximum of two (few schools) classes a week” (Halder 2012: 2228). The findings also indicate that there are “no specialist teachers for EE” (Halder 2012: 2231).

For a successful implementation of the curriculum framework for EE in India, certain pointers should guide the strategies used, such as to envisage the rightful place of environmental concerns, which will protect EE against competition with other subjects in the school curriculum. This approach will provide the opportunity for other pointers, such as correct time allocation in the timetable and correct assessment of environmental content.

If the planning for the integration of EE in the school curriculum can get these pointers right, then we can hope for the optimal implementation of EE. In most cases, these factors, if not correctly prepared for, result in failure to introduce a new subject curriculum. “Curriculum development may be defined as a process in which the learning opportunities, materials, equipment and other resources are constantly planned, assessed and reviewed” (Makaran 2015: 15).

Practical activities are still taught in the classroom, rather than allowing learners to see, smell, touch, and hear what they want to learn about. To them, environment and environmental issues are abstract concepts.

India is in a disastrous state regarding climate change, high population growth and pollution, among other environmental problems. As Gandhi cautioned, “A time is coming when those who are in a mad rush today of multiplying their wants, will retrace their steps and say: what have we done” (Khoshoo & Moolakattu 2009: 144). This statement should be a wake-up call for the people of India, including the Department of Education, to consider the introduction of a curriculum framework that will deal with environmental concerns.

As it is a belief that India shows interest in EE, literature reflects that India, like other countries attempting to integrate EE in schools, is facing similar challenges, as already alluded to above. While attempting to include environmental issues, much needs to be done regarding EE as a subject. This is reflected by legislation including education policies, which have been reviewed several times. Researchers in India are worried about the status of Environmental Education. Some researchers in India advocate for “environmental awareness for sustainability of the environment” (Pandey 2014: 156), while other researchers believe that the country has the potential to incorporate “EE as an independent subject” (Verma & Dhull 2017: 1548).

It is hoped that India, just like many other countries showing an interest in the infusion of EE into the curriculum, will improve the curriculum framework that will promote proper integration and implementation of EE.

3.3.2 United States of America

3.3.2.1 History of Environmental Education in the United States of America

The United States of America has been selected to determine whether as a giant economy, its education system shows this financial muscle by accommodating Environmental Education in formal education, in particular, at secondary level.

(i) The roots of Environmental Education

The foundation for Environmental Education in the US is the document by Rachel Carson called "*Silent Spring* in 1962" (Hanneman 2013: 3); oil spills in the 1960s and early effects of air pollution witnessed in the US and Europe, as well as the concerns about nuclear war and the effects of fallout radiation (Venkataraman 2008). These were followed by international developments, already mentioned in Section 3.3 above.

The US also has initiatives in place in an attempt to accommodate EE in secondary schools. These are discussed in the following sections.

(ii) Legislation

Like other countries, the US attempts to use pieces of legislation to promote the integration of EE in formal education. These are discussed in this section.

Constitution of the United States of America: As compared to India and South Africa, it is "pre-ecological" (Cannon 2015), in other words, it does not refer to Environmental Education (Burns 2017). However, in response to the disastrous conditions of pollution and waste of the natural resources in the 1950s and 1970s, many laws emerged. Those regarded as prominent by researchers in the law field are discussed in the following section.

National Environmental Policy Act (NEPA) of 1969: NEPA formulated environmental policy of the federal government, monitoring federal agencies (Burns 2017). The purpose of NEPA is "to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man; and to enrich the understanding of the ecological systems and natural resources important to the Nation" (Carter & Simmons 2010: 6; National Environmental Policy Act 2004, 2012).

This could serve as an important document for integration of EE in secondary schools in America, because it would encourage proactive behaviour of prevention in learners and also to have a clear understanding of the processes of the ecosystems.

The Endangered Species Act of 1973 (ESA): It is regarded as an important segment of the bill of rights for biodiversity. It therefore makes the standards of conduct already in place uncomfortable, stipulating a clear mandate that federal agencies should not endanger species or alter their habitat in any way (Burns 2017). The purpose of ESA is to avail mechanisms that ensure conservation of the ecosystems of endangered or threatened species (Ruhl 2009). In a study conducted on the actual recovery rate of 110 species in 50 countries, the findings revealed that “90 percent of species are recovering at the rate specified by their federal recovery plan, giving this act a remarkably successfully recovery rate” (Suckling, Greenwald & Curry 2012: 1). This act helps the EE curriculum and programmes to promote the preservation and conservation of endangered species, and all other organisms as, if not careful, the rest may be affected by extinction.

The Clean Air Act (CAA) of 1965 amended in 1990 and 2015: Was more concerned “over what post-war affluence was pumping into the environment in the form of waste and emissions” (Carter & Simmons 2010: 6), in contrast with others, more concerned about the health and protection of the citizens than the natural environment (United States Environmental Protection Agency (EPA) 2015: 3). “By reducing emissions from many of the worst sources of air pollution, EPA has dramatically improved air quality. In so doing it has prevented hundreds of thousands of premature deaths and reduced disease and suffering for millions of people” (Welker-Hood et al 2011: iv). Those complaining must know that it is the responsibility of the nation to implement. This document is recommended for environmental policy and EE curriculum in secondary schools to include themes that will help learners to understand the relationship between air pollution and health (illnesses such as asthma), environment (affecting terrestrial and aquatic life), and economy (reduction of agricultural production) (United States Environmental Protection Agency (EPA) 2015: 1-2).

The Clean Water Act 1972, 1977, 1987, 2015: The purpose of the act is to protect the quality of water for the people and make it a habitable environment for aquatic life. In September 2019 the Trump administration closed the chapter on the repeal of Obama’s “Clean Water rule – removing vital protections under Clean Water Act for

nation's streams and wetlands" (American Sustainable Business Council n.d.). Environmentalists are worried about this amended Clean Water Act 2015, that it will allow "more pollution coming from the industries and farmers to contaminate streams and wetlands" (BBC News 11 December 2018). While that is the case, the act guides EE curriculum on the conservation and protection of aquatic life.

The Environmental Education Act became the law in 1970, bringing with it an Office of Environmental Education within the US Office of Education in the former Department of Health, Education and Welfare and funding for states to implement EE within their K-12 systems through several means. However, its life span was only five years. Inadequate funding was the main cause of this. This shows lack of interest by the US on the EE curriculum. But, at least EE had an opportunity to be part of federal legislation and infrastructure.

Then the *National Environmental Education Act 1990:* Section 5-8 of the act focuses on capacitating teachers in EE by means of training programmes based on theory and better teaching strategies, career pathing and environmental topics to be included in the school curriculum, and subsequent assessment. The act also has to ensure the availability and maintenance of the EE library and other resources, but not the erection of buildings; financial assistance for seminars and other fora with the inclusion of material; support for networking; review of programmes; opportunities for internships; and awards for contribution to EE (United States Environmental Protection Agency (EPA) 2018).

3.3.2.2 Curriculum framework and implementation

(i) Policies and institutions assisting Environmental Education

Education reform policy

The Act was re-introduced many times but failed to gain a grip in Congress, leading to the final version of 2015 Every Child Succeeds Act, which contained some items of the previous one to persuade the state to extend EE to elementary, middle and high schools. The fact that the act is not mandatory, and that still it does not allow EE to be an independent subject, does not assist the incorporation of EE in high schools. The act does not receive favour from many Americans, as they do not believe in

environmental issues; “91% of them do not believe in climate change”. Parents are also resisting because the act has raised the scores of learners, and this is extra work for them (Downey 2011: 1 - 5). Fortunately, many schools have diverted their budget, time and resources to meet the testing and curriculum requirements of the act as per federal education legislation (Feinstein 2009; Hanneman 2013).

In the US, in order “to conserve the natural resources and protect the natural environment, Environmental policy includes governmental actions at the federal, state and local level” (Fasolya 2016: 86). In addition, the public opinions regarding the economic development, management of energy, and the rights of people and business sector are taken into account when formulating the policy (Ballotpedia 2016).

The North American Association for Environmental Education (NAAEE)

NAAEE is active in producing a series of Guidelines for Excellence that stipulate the criteria for high standard EE. Compilation of these is through active participation of educators. The first document, *Environmental Education Materials: Guidelines for Excellence*, was released in 1996 (NAAEE 2009) and provides guidelines for compiling and selecting EE material.

Several blueprints in the NAAEE’s *Guidelines for Excellence* series advocate for the development of learners’ skills and dispositions as Americans for America (NAAEE 2009, NAAEE 2010). The guidelines for teaching materials (NAAEE 2009) suggest that EE should prepare learners to acquire fundamental skills required for active participation in problem solving of environmental issues, and that materials should enhance societal and civic accountability in the learner regarding environmental problems. Fortunately, the K-12 conceptual framework is giving this attention (NAAEE 2010).

NAAEE joined the National Council for the Accreditation of Teacher Education (NCATE) in 2000. NCATE performs the accreditation function of over 60% of the teacher education programmes in the US. NAAEE, therefore, has the capacity ‘to influence the development of teacher standards for the other member fields (e.g., science teachers, elementary school teachers, social studies teachers) (Simmons 2011). Also compiled is ‘Standards for the Initial Preparation of Environmental Educators’ (NAAEE 2007), which have already shown progress in the performance of

the educators. “These standards describe seven teacher competencies related to Environmental Education practices (e.g., environmental literacy, learning theories and knowledge of learners, instructional planning and practice, professional responsibilities)” (Simmons 2011).

Environmental Protection Agency (EPA)

EPA plays a significant role in lifting the standard of integration of EE in the US. EPA presents the following components of EE that educators should take into account when preparing lessons:

- comprehending the essence of environment and issues occurring within it;
- awareness and knowledge of the environment and issues occurring within it;
- positive attitude towards the environment and striving to enhance or promote the quality of the environment;
- skills and abilities needed to detect and solve environmental issues; and
- taking part in activities leading to environmental issues resolving (United States Environmental Protection Agency (EPA) 2016).

These components have tapped into UNESCO’s goals and objectives of Environmental Education (see Section 2.2.1.3 i).

The EPA established an Office of Environmental Education (OEE) to be in a better position to promote EE and literacy.

Office of Environmental Education (OEE)

The purpose of OEE is to perform functions as already outlined in the discussion of the *National Environmental Education Act 1990* above.

(ii) Curriculum development

The previous 20 years have observed more growth in initiatives and EE programmes in the US, as indicated above. This led to many primary and secondary schools, and higher education institutions having put more efforts in the integration of environmental topics across the curriculum (Venkataraman 2008).

For starters, US Environmental Education is distinguished by remarkable diverse forms, “directions and methodological approaches, deep penetration of the ideas of environmental ethics in the content of all the subjects, extensive involvement of communities and, in particular, public non-governmental organizations in the process of forming US citizens’ careful and responsible attitude to the environment” (Fasolya 2016: 87). In order to deal with such problems, the US Environmental Education system therefore aims to ensure that Americans have close relationships with the natural environment; enhances attitudes and life styles which are environmentally friendly; and to develop a holistic view of the environment as a set of physical, economic, social, cultural, political and other aspects working together. This means that interference with one aspect will affect others either positively or negatively. EE system also aims to include learners in solving local environmental problems such as waste management by simple recycling (Simmons 2011).

In the US, there is no official mandatory common policy of the state towards Environmental Education; thus, there is inconsistency in the integration of EE among amongst states (McFarlane & Ogazon 2011). Most of the directives on education matters are from the federal, state or local (schools) level. It is the responsibility of federal government to fund all EE initiatives, which are mostly programmes and projects implemented by non-governmental organisations, and Environmental educators (Морозова 2007).Technically, the main intention of US EE is environmental literacy, not proper EE in secondary schools.

America, like other countries, offers EE in the form of Environmental Studies in colleges and universities but “very rarely in middle and high school” (Downey 2016: 1). In schools, EE is taught through other subjects such as Science (Biology, Earth system science, Chemistry, Physical); Social Science (e.g., civics and government, economics, geography, and history); Arts, Mathematics; English Language, Arts (Hanneman 2013; NAAEE 2010). The approach by which these subjects are taught in the classroom may not support robust EE, resulting in under teaching and learning. Many Americans are not happy about this state of affairs because America is contributing a huge amount to the current severe climate conditions. Besides this, researchers have a strong view that EE has an impact on all aspects of the learner. There are even suggestions that outdoor EE can improve the academic and affective performances of learners with Emotional, Cognitive, and Behavioural Disabilities (ECBD) (Szczytko, Carrier & Stevenson 2018). ECBD includes learners with Attention

Deficit Hyperactive Disorder (ADHD), autism and dyslexia. After several attempts to put these learners on par academically with non-ECBD learners, studies found that outdoor EE is able to improve their performance; for example, activities in a green environment reduced ADHD levels and play activities increased their concentration span (Amoly et al. 2014; Flouri, Midouhas & Joshi 2014; Kuo, Browning & Penner 2018).

In a Yale Environment 360 Interview with Michelle Nijhuis, Charles Saylan, a frustrated Environmental Educator said, “Environmental Education has failed because it’s not keeping pace with environmental degradation, with human impacts on the environment. I also think that it’s failed to provoke action”. He aired his vision about the overhaul of Environmental Education by insisting, “If Environmental Education is to be truly effective in creating responsible citizens who will help stop human degradation of the environment, it must go well beyond platitudes and occasional class trips” (Nijhuis 2016).

In some parts of America there are developments regarding the Environmental Education curriculum, but mostly in the form of programmes and projects. In California, in order to promote EE, the Education and Environment Initiative (EEI) was legislated in 2003, “which resulted in the development of a K-12 model curriculum aligned with state-wide Environment Principles and Concepts (EP & Cs) and California’s academic content standards” (California Environmental Protection Agency Education and the Environment Initiative 2012). The objective of EEI is to “help prepare learners to become responsible environmental stewards and future leaders of science, economists, and green technology” (Hanneman 2013: 8), as well as “to develop the efficacy of the EEI curriculum” (California Environmental Protection Agency Education and the Environment Initiative Phases and Timeline 2012).

In 2016, EP & Cs were integrated into California’s revised curriculum framework for History/Social Science and Science. Principle 1 emphasise that the health of learners depends on the health of the natural environment; in other words, destruction of the environment by people will bring poverty, which affects people. In this case, EE is viewed as an asset for healthy, critically-thinking learners with a strong interaction with their natural environment, a treasure that is pivotal for sustainability of the natural environment (United States Environmental Protection Agency 2010). Principle 2 and concepts remind learners that their economic and political use of the environment

determines the viability of the natural environment. Principle 3 and concepts emphasise that human use of the natural environment can change the operation of the ecosystem. Principle 4 and concepts reflect that use of the environment can change the rate of production of the environment, while Principle 5 and concepts teach learners that the decisions to use the environment as influenced by social, economic and political gains affect the state of the environment accordingly; for instance, mining exhausts the quality of soil, which is the habitat of other organisms, in fact this affects the food chain and web (California Education and the Environment Initiative 2019).

Washington: One state that is pursuing Environmental Education is Washington, as Environmental Education is necessary for all public schools in the state in order to attain sustainability (Education for Environment and Sustainability 2016). However, like India and other states in the US, they follow the interdisciplinary approach as well, incorporating environmental aspects across many different subjects. The focus is on conservation of the environment and its natural resources, in all grades, using the sciences, social studies, humanities, and other appropriate areas as vehicles for integration of EE (Education for Environment and Sustainability 2016).

Northampton County, Virginia has also registered a significant progress in EE programmes. Here integration of EE into the curriculum and programmes is the same as in Washington. Here the intention includes teaching learners about the best methods, including appropriate technologies of protecting the natural environment; a collective approach, which involves creativity, and acknowledging others culture and ethical systems in dealing with environmental issues. The programme also aims to teach learners the best sustainable practices while pursuing economic and political developments (Watson 2017). This programme includes a number of projects whereby learners are practical and creative, for example, construction of a boat which is then used to “measure the coastal marine environment and compare the findings with those of the previous years” (Watson 2017: 11). The benefits of this programme include learning about EE themes for the target subjects like Geography, Biology, Physical Science and Mathematics, enhancing attention in other classes, and an opportunity to link the environment with other subject topics, such as Economics, History, Language and Art.

3.3.2.3 Challenges

Though the US is a giant economy, the country shows little progress in the integration of Environmental Education. It is faced by challenges experienced by other countries, developed or developing.

Policies that support teacher EE are limited. In this case, “with no formal requirement and accountability involved, environmental education in the US has received little assistance from curriculum developers, academics and interested parties concerned with EE in secondary schools” (Glackin & King 2018: 3). “While there are examples of successful Environmental Education programs in the US, they are by no means widespread or nationally recognizable as they could be” (Watson 2017: 12). It is notable that, like with other countries, EE is incorporated in other subjects like Geography, Biology, Physical Science and Mathematics. There is no clear distinction between Environmental Education, Environmental Literacy and Advocacy (Reardon 2011), as well as between “Environmental Education and environmental science” (Carter & Simmons 2010: 12). Although they have a conceptual understanding, the confusion comes with a practice. The use of an integrated approach towards EE in K-12 schools is faced with time and budgets constraints. Preparation by the teacher is usually not up to standard because it requires more time, which is actually not available because of the workload of the teacher. Interdisciplinary curriculum is also compromised by the teachers because they focus on their specific subject content on which learners are assessed. Teachers are not confident in teaching subjects they have not specialised in, especially Mathematics and Sciences ((Forbes & Zint 2011; Mosely, Desjean-Perrotta & Utley 2010); therefore, teaching EE through these subjects becomes a nightmare. Although NAAEE has provided models and strategies to develop skills that enable a learner to have an understanding and ability to attend to environmental problems, and personal as well as civic accountability (NAAEE 2010), it seems, EE materials and teaching tend to emphasise environmental “awareness”, affirmation and acquisition of “knowledge”, without including emphasis on the ‘development of skills’ and willingness for action. Environmental Education programmes for pre-service training tend to focus on outdoor activities and ignore capacity-building on strategies for “citizenship skills” (Simmons 2011). A small number of states in the US have prescribed requirements for teacher training in EE (Simmons 2011). In conclusion, it is notable that, like other countries, EE is incorporated in other subjects like Geography, Biology, Physical Science and Mathematics. It could be

argued that the US has the financial muscle, technologies, and material to set a standard for the incorporation of EE in the secondary school curriculum. This is based on the evidence that the US, more than most countries, is strongly engaged in improving environmental practices, conducting studies, revealing new findings, and applying new and advanced strategies, as well as promoting programmes and policies related to sustainability as an important concept in EE. There is need for a uniform Environmental Education policy for all states in the US, There is need for the spread of successful environmental and sustainability education programmes across the country, as a build-up for EE as an independent subject in the secondary school curriculum. If countries like United States of America can take a lead in integrating Environmental Education in the secondary schools, this will serve as a model for other countries. I believe with its financial muscle, it is only left with the attempt to change Americans' attitudes towards the environment.

3.4 ENVIRONMENTAL EDUCATION CURRICULUM FRAMEWORK: EXAMPLES FROM THE SOUTHERN AFRICAN DEVELOPMENT COMMUNITY

3.4.1 Introduction

This section discusses the Environmental Education curriculum framework of the two selected SADC countries. Zimbabwe has been selected as a country that is believed to have a good education system, compared to South Africa; whereas South Africa is the host country for this study.

SADC countries are vulnerable to environmental conditions, such as unfavourable climate change, pollution, abject poverty, deforestation and destruction of biodiversity, land degradation due to unemployment and poverty (Darkoh 2009: 93-97), HIV-AIDS, inadequate sanitation infrastructure, and a shortage of clean drinking water and electricity, which are currently a serious problem in South Africa (Environment and sustainable development n.d.). According to Lotz-Sisitka et al. (2017: 1), "A lack of clear and sustained environmental awareness in many African countries has contributed to environmental degradation within the continent".

Like India and the US, SADC countries were encouraged by international developments, as mentioned in Section 3.3 above. SADC countries are part of the initiatives providing a platform or blueprints, which can be used to guide the integration of EE in the FET band .

Some of these include:

The Environmental Education Association of Southern Africa (EEASA): It was established in 1982 at Treverton in South Africa. This is a body composed of volunteers from all walks of life and fields concerned about the environment. EEASA focuses on a "broad view of the environment and environmental processes such as socio-ecological, socio-political, socio-economic, and at the heart of it there is the need to protect the integrity and viability of the ecological systems" (EEASA 2019:1). With these, teachers in the FET band will have a better understanding of the concept environment, which it is not limited to the natural environment.

EEASA has also served as an institution of reference for research studies, as is now the case in this study. Researchers include education department officials like me and teachers in the FET band who are interested in seeing the role that can be played by EE in secondary schools. It holds conferences and workshops, which includes discussions about the incorporation of EE in the FET band; it also distributes publications, such as:

The Environmental Education Bulletin, which is a forum for the exchange of opinions and for promoting scholarly articles on EE;

Monographs (thus far it has also developed four): on "Evaluation on Environmental Education; Projects in Water Quality Monitoring; Indigenous Knowledge; Environmental Education; Ethics and Action; and Learning in a changing world";

Journals – The Southern African Journal of Environmental Education (SAJEE), with volume 34 recently published (EEASA 2018: 1). SAJEE performs the functions of reporting and furthering the study and implementation of EE by creating a forum for parties interested in EE, such as "researchers, scholars, practitioners, policy makers and curriculum developers" (EEASA 2018: 1).

As already mentioned, these publications provide significant references to researchers and teachers on how to integrate EE in the curriculum.

The activities of EEASA are made possible by programmes, such as the SADC Regional Environmental Education Programme (SADC-REEP).

SADC Regional Environmental Education Programme (SADC-REEP): It was produced in 1993, with the focus of empowering teachers in the region to enhance EE activities in order to ensure sustainable development of the environment (SADC-

REEP-SADC Regional Environmental Education Programme n.d.). Capacity gaps have been found in the SADC-REEP. One study revealed that SADC-REEP courses emphasise “mainly education, agricultural science, natural resources management, water and forestry, with less focus on issues such as climate change, waste and pollution” which affect SADC members. My view is that this is positive for EE in schools. Another serious gap is that SADC is not supporting the establishment “of national Environmental Education centres, as was originally planned” (SADC Regional Environmental Education Programme 2012: 23). This information will persuade education department in South Africa, also in the North West province, to convert the current centres (EDSCs), which happen to be aimless, into Environmental Education centres, which will encourage the teaching of EE in the FET band.

Consolidated Text of the Treaty of the Southern African Development Community, 2015: A new document was produced which comprised the previous treaties. This Treaty contained “the Treaty of the Southern African Development Community, 1992; the Agreement Amending the Treaty, 2001; the Agreement Amending Article 22 of the Treaty, 2007; the Agreement Amending the Treaty, 2008; the Agreement Amending Article 10A of the Treaty, 2009; the Agreement Amending Articles 10 and 14 of the Treaty, 2009” (Southern African Development Community: SADC Treaty. 2015).

The objectives of this consolidated version regarding EE included the following: “To promote sustainable and equitable economic growth and socio-economic development that will ensure poverty alleviation with the ultimate objective of its eradication; enhance the standard and quality of life of the people of Southern Africa and support the socially disadvantaged through regional integration; and achieve sustainable utilisation of natural resources and effective protection of the environment” (Southern African Development Community 2015: 6). The objectives emphasised the wise use of the natural environment, which would result in improvement of its quality so that it could produce enough food and other resources for the present generation equally, and future ones. Wise utilisation of the natural environment is only possible by better approaches and technologies.

Legislation guiding EE: play a role in the pursuit of EE in SADC region. The policies and other pieces of legislation are informed by EE and EE-related initiatives carried out globally and regionally. The United Nations Educational, Scientific and Cultural Organization (UNESCO)’s Education 2030 agenda (UNESCO 2015a) is insisting on the need to incorporate “sustainability and global citizenship concerns into education

in ways oriented towards the common good" (Mandikonza & Lotz-Sisitka 2016: 108). This means that the EE curriculum should reflect sustainability in its approach. The concern is, will EE still maintain its identity? UNESCO (2015b) argues that the most important aim of Environment and Sustainable Education (ESE) is to give education a second thought as the best way to empower learners to live in a sustainable manner.

SADC countries do not have special or specific EE policies from the Departments of Education for their schools. If they are in place, implementation is a problem. For instance, "Botswana School Environmental Policy and Management Plan (SEP) pack, adapted from South African SEP" was left somewhere to collect dust without monitoring, as is the situation in South African schools (Maki-Murakami 2012 15). EE is guided by other documents, strategies or guidelines, including those of other departments, or even for specific programmes or projects. This illustrates that EE frameworks that guide the curriculum often straddle between two or more ministries. Thus, the fight against environmental problems will not be won if Education Departments in SADC countries are not taking full responsibility for implementing EE, but rely on other initiatives (such as strategies) rather than policies based on the law.

Handbook on Environmental Assessment Legislation in the SADC Region is one of the documents used in SADC to guide EE. The book contains "Environmental Impact Assessment (EIA) legislation and the administrative arrangements of each SADC country" (Walmsley & Patel 2011: 3). The document reflects different definitions of the term 'environment' by SADC countries. When most countries "provide a holistic interpretation of the term to include the natural, social and cultural environments", Lesotho, South Africa and Zambia limit their definition to "physical surroundings of the human being and the influence that these physical components have on humans, rather than seeing human beings as an integral part of the environment and agents of change within that environment" (Walmsley & Patel 2011: 7). This creates a problem for those researchers interested in the meaning of Environmental Education.

Africa Environmental Education and Training Action Plan (AEETAP): The Plan is one of the vehicles to raise awareness and drive education and training about EE in Africa. To deal with EE challenges facing Africa, education and training are regarded as the best vehicles to do it. The relevance of AEETAP for the study is found in its goals. The goals of the AEETAP also focus on capacity building for teachers, those who formulate policies and other guidelines, and "leaders and decision makers" to understand all the logistics of planning and implementing approaches and programmes for "environment

and sustainable development" (Lotz-Sisitka et al. 2017: 5). The Action Plan therefore seeks a paradigm shift in the fields of education and training, and the environment.

AEETAP views information and communication technology (ICT) as one of the best resources to be used to "promote innovation based on best sustainability practices" as EE requires the best approaches with appropriate technologies to deal with aspects of management of natural habitats; distributes information about materials on environmental issues; and "water management and sanitation" (Lotz-Sisitka et al. 2017: 1).

Although there are many initiatives by SADC on issues of the environment, these were selected as they affect curricula in schools (but not to say those not selected are not). As the study is not about legislation and associated documents, but on the extent to which the SADC region considers EE as part of formal education, the researcher found these initiatives adequate to discuss. As mentioned previously, policies without action will not assist in the incorporation of EE and problems facing it in SADC region. Furthermore, education, with the EE curriculum remains the only tool that can achieve implementation. Other government departments can make laws and policies, but without Environmental Education in schools, teaching and learning it will be a fruitless exercise.

3.4.2 Zimbabwe

3.4.2.1 History of Environmental Education in Zimbabwe

As mentioned in the introduction above, Zimbabwe was selected for this study as a SADC country with a historically better education system than South Africa. Currently, Zimbabwe has the highest adult literacy rate in Africa of approximately 90 percent (Capital Campus 2014; Staff Reporter 2018; UNESCO 2015). Zimbabwe's number of graduates is also among the highest on the continent (Mutepfa, Mpofu and Chataika 2007). The aim is to review as to whether it is also registering its superior standing when it comes to Environmental Education in its curriculum.

As in India, there are initiatives to deal with environmental problems in Zimbabwe. These include the following:

(i) The Constitution

The Constitution makes provision for the citizens of Zimbabwe to live in a safe environment that is free of harm. Citizens are compelled to take care of the

environment and practice sustainability so that future citizens can also benefit from the same environment (Constitution of Republic of Zimbabwe 2013).

The Constitution (2013) states:

> "Every person has the right to-
>
> a. safe, clean and potable water; and
> b. sufficient food;
>
> and the state must take reasonable legislative and other measures, within the limits of the resources available to it, to achieve the progressive realisation of this right" (Zimbabwe 2013: 43-44).

The Constitution mandates government departments to observe and implement this right. For the education department it means the curriculum should ensure that Environmental Education, which is currently across other subjects, should emphasise themes that highlight that no learner must be without a meal or clean drinking water. This can emphasised through subjects like History, the languages and Life Orientation. Whether the legislation is effected is debatable considering what we see about Zimbabwe on television – women still walking long distances with buckets of water on their heads.

(ii) The Environmental Management Act of 2002

The Ministry of Environment, Water and Climate is given the authority by the Environmental Management Act (EMA) (Chapter 20: 27) to:

> regulate the management of the environment and promote, coordinate and monitor the protection of the environment and the control of pollution; to monitor the environment, trends in the utilisation of natural resources, and the impact of such utilisation on the environment; to ensure that persons and institutions responsible for causing environmental harm meet the cost of remedying that harm (Chapter 5-ERM 2011: 17).

The act is available to be used by secondary schools to guide topics to be addressed in the EE curriculum. It implies that the curriculum should make teachers and learners, as directed by law, protect the environment and use it in a manner that will not cause its deterioration, or else they will bear the costs.

EMA also serves to inform secondary school curriculum, teachers and learners as implementers, about "the right to live in a clean environment that is not harmful to their

health; as well as access to environmental information" (SADC Environmental Legislation Handbook 2012: 494). This can only be achieved if people themselves can learn through EE the importance of the environment and that it needs their care.

(iii) Environmental Impact Assessment (EIA) Policy of 1997

This policy guides environmental policy and curriculum in secondary schools. "The guidelines cover EE topics like" mining and quarrying; forestry; agriculture; transport; energy; water; urban infrastructure and tourism" (Mangena 2014: 228). EIA is based on the Constitution and the EMA of 2002, mentioned above. According to Mangena (2014: 229), "These legal frameworks are homo-centric" and therefore make this "policy biased towards the interests and values of human beings, one of the reasons why Zimbabweans have generally become a menace to the environment". In other words, the EIA does not consider the fact that the ecosystem shows an interaction between living and non-living components of the environment. This can be corrected through the curriculum.

(iv) National Environmental Policy and Strategies of 2009

The Policy attempts to lower poverty levels among the people of Zimbabwe. The goal of the National Environmental Policy therefore is:

> to avoid irreversible environmental damage, maintain essential environmental processes, and preserve the broad spectrum of biological diversity so as to sustain the long-term ability of natural resources to meet the basic needs of people, enhance food security, reduce poverty and improve the standard of living of Zimbabweans through long-term economic growth and the creation of employment (SADC Environmental Legislation Handbook 2012: 497).

Hence, Zimbabwe has programmes in place that take care of biodiversity for sustainability – to protect the environment so that it has the capacity to produce more resources, including food for the people of Zimbabwe. Chibememe et al. (2014) opine that Zimbabwe is among the countries that pay attention to environmental issues.

This policy provides important strategies that learners can learn about on how it deals with preservation and sustainable development, food security and poverty reduction. In the EE curriculum of secondary schools, this enables learners to be taught how to approach these environmental issues on a smaller scale.

(v) The United Nations Millennium Goals (MDGs)

Zimbabwe has adopted the United Nations Millennium Goals as set out in the UN Millennium Declaration of 2000. Zimbabwe observes the eight Millennium Goals in order to improve the state of the environment, health and gender issues. These goals include:

> the eradication of extreme poverty and hunger; achieving universal primary education; promoting gender equality and women empowerment; reducing child mortality; improving maternal health; combating diseases such as malaria, HIV/AIDS and other diseases; ensuring environmental sustainability; and getting rid of colonially inspired subject boundaries (Millennium Development Goals n.d.).

Zimbabwe has registered good progress on some Millennium Development goals. The results given are those of 2014. The Ministry of Macro-Economic Planning and Investment Promotion's (2015) Executive Summary presents the areas of progress as follows:

> …lowering the rate of transmission of HIV (MDG 6); the enrolment for universal primary education was at 92.2 percent in 2014 with gender parity (MDG 2); gender parity in both primary and secondary education (MDG 3); child death rate declined (under five and infants) (MDG 4); maternal mortality ratio dropped significantly (MDG 5); Zimbabwe remains among the best in the region in terms of biodiversity conservation, and significant deforestation attempts underway (MDG 7); partnerships have been successful in ICT and drugs (MDG 8) (Ministry of Macro-Economic Planning and Investment Promotion 2015: n.p.).

(vi) Zimbabwe's media

The media is a tool that is used in Zimbabwe to spread information about environmental matters. One of its goals is to inculcate positive values, attitudes and behaviour change of the public towards the biophysical and cultural environment (Mapira 2013). This is an effective mode of communication, affordable to people, especially the poor who cannot afford expensive technology. This will also serve for the provision of supplementary current material or a hidden curriculum of the EE curriculum so that learners are updated with the latest developments regarding EE.

Though not visible enough, the initiatives described above have assisted advocacy for Environmental Education in Zimbabwe. They have revealed the gaps that still have to be closed in order to integrate EE in the country. Some have reflected on their limitations and therefore have to be revisited to fulfil their mandates. The following section focuses on EE in formal education.

3.4.2.2 Curriculum framework and implementation

With the advent of independence, numerous attempts were made to reform the curriculum and make it more responsive to the country's needs in terms of churning out functional and articulate school graduates (Munikwa 2011). Some of the reforms undertaken were:

(i) Education with Production in the early 1980s, which was designed to marry theory with practice in every subject. If well implemented, this could assist those through which EE is taught because EE is a practical subject.

(ii) Schools on the Shop floor in the early 1990s, which attempted to link schools with the work place and vocationalisation of the school curriculum (Education Act 1996; Munikwa 2011). These were the initiatives that could be used to motivate learners to consider Environmental Education as a career.

(iii) Quality Education and Vulnerability Programme: Since 2001, the Programme has worked on HIV/AIDS issues and EE. The aim is that teachers develop skills and attitudes that promote the development and well-being of all children, inclusive of orphans and the vulnerable (VVOB 2008-2013). EE emerged as an important component of the Quality Education and Vulnerability Programme in Zimbabwe to feature various practical tasks that allow participants to reflect on their attitudes towards the natural environment, learn about environmental facts, and prepare for concrete environmental action. These activities include “the journey of my life in the natural environment; the web of life; market place on global warming and current environmental problems; ecological footprint survey; urban jungle and Madlusuthe's farm; recognising environmental problems and designing remedial action; compost making, mulching and natural pest management; and planning for action through word cafe and tree planting (Sibanda 2009).

Educational programmes in Zimbabwe were evaluated, including *Better Environmental Science Teaching (BEST)*, *Education with Production, ZIMSCIENCE*

and Polytech Education (Chikunda 2007). BEST attempts to provide a wider perspective to the teaching of Environmental Science. BEST also aims to enhance an EE theme, sustainable management of the environment (Chikunda 2007).

These activities develop various aspects in the learner; that is, physically, morally, emotionally, cognitively, aesthetically and socially. The Programme may provide the foundation for the proper integration of EE content in the secondary school (Forms III to VI) curriculum.

(vi) Nziramasanga Commission: The Presidential Commission of Inquiry into Education and Training (CIET) initiated one of the attempts to include EE in formal education called the Nziramasanga Commission, in 1999. The Commission instructed the incorporation of EE in schools (Mukuni 2013: 974). It further recommended the adoption of a diversified curriculum that caters for different learning capabilities (Yan 2015). However, in secondary schools, EE is infused into other subjects. As EE in secondary school is infused into subjects like Geography, Biology and Agriculture, the Commission suggested that EE should be formally assessed in these subjects. Another product of the Commission was the “National Environmental Policy” (Mukuni 2013: 974). The Ministry of Environment and Tourism established an “Environmental Education Consultative Forum” that was tasked to advocate for an Environmental Education Policy and to facilitate EE programmes and projects (Risiro 2014: 265).

Two-pathway structure: One of the recommendation by the Nziramasanga Commission allowed learners an opportunity to be directed into either the Skills pathway or the vocational skills pathway with other academic subjects (Gonye et al. 2012; Wako et al. 2013). If Environmental Education were one subject in the Skills pathway or vocational skills pathway, it would advantage the learners in the self-employment sector or workforce. However, it seems, like other initiatives, implementation of vocational education failed (Mandiudza, Chindedza & Makanye 2013).

These were a step in the right direction for EE curriculum, which could see the optimal integration in the school curriculum. This was showing political will, which is needed from all countries to encourage the incorporation of EE for the solving of environmental problems.

(v) Educational institutions:

Various universities, including Zimbabwe Open University, offer EE in some of their courses. Therefore, these can assist and make it possible for the education system in the country to incorporate EE in secondary schools.

According to Risiro (2014), EE in Zimbabwe has not been incorporated into subjects like the Humanities, Languages and Educational Foundations. Some aspects of EE in primary school are included in Environmental Science, which has replaced Nature Studies. This subject is in essence Environmental Education. In secondary schools, environmental aspects are taught in selected subjects, such as Science, Biology, Geography and Agriculture (as mentioned above). It is, however, possible for a learner to go through his/her secondary education without basic EE. This implies that Zimbabwe is not different from other countries regarding the approach to integrate EE.

(vi) Latest developments in curriculum:

The Deputy Minister and the Minister of Education in Zimbabwe have expressed concern about the curriculum as both the primary and secondary education curriculum leaned heavily on the academic side and paid little attention to scientific, technical and vocational skills training. These skills are considered critical for survival in today's tough economic environment (Ncube 2017). Zimbabwe wants to emulate Iran's education system, which imparts scientific and technical skills to pupils at an early age, and hopes to achieve this through strong bilateral relations between the two countries.

Their concern did not include EE as a separate subject to attend to the serious environmental problems of population growth, pollution, climate change and deforestation facing the country. The skills mentioned here will do better in a subject like EE.

Last reviewed in the 1980s, the latest curriculum became operational in primary and secondary schools in January 2017 (Chirume & Ngara 2018). The new curriculum was informed by other initiatives, such as the Presidential Commission of Inquiry into Education and Training (CIET) mentioned above.

The concept curriculum is as dynamic as the concept education, and the education system itself. The education of decades ago only forms the foundation of education

today. Therefore, from time to time, the curriculum of the country has to adapt to the latest developments, locally, regionally and globally. As curriculum change is a serious business of government, the opinions of all stakeholders are acknowledged.

As there was little progress in the implementation of the far-reaching recommendations of the CIET Report, several other initiatives were attempted to evaluate it (Agere 2017). This led to the birth of the Curriculum Framework for Primary and Secondary Education (2015-2022), as mentioned previously. The purpose of the new curriculum was “to motivate Zimbabwean learners to cherish their Zimbabwean identity, history and cultural heritage and prepare them for participatory citizenship” (Chirume & Ngara 2018: 16). It also sought to develop citizens who would make the country proud so that they could compete globally with their skills (Utete-Masango 2017).

- The new curriculum includes aims that address Environmental Education, and reads as follows:

  Promote and cherish the Zimbabwean identity;
  Prepare learners for life and work in a largely agro-based economy and an increasingly globalised and competitive environment;
  Foster life-long learning in line with the opportunities and challenges of a knowledge society;
  Prepare learners for participatory citizenship, peace and sustainable development; and Prepare and orientate learners for participation, leadership and voluntary service (Ministry of Primary and Secondary Education 2015: 6-7).

If environmental content can be integrated, Aim 1 above will use EE deal with issues of heritage, history, culture, traditions and Indigenous Knowledge Systems and their the impact on the environment.
Aim 2 equips the learner with the necessary skills and capabilities for life in general and at the workstation. These involve interpersonal relationships, as EE is a social phenomenon that prepares learners to cope with life with other people in the social environment.
Aim 3 stresses ICT, which will help EE to identify and assess environmental problems in a quicker and more effective way. In fact, this is one of the reasons the curriculum in Zimbabwe was updated. The aim also seeks to enhance the creativity and innovation required by EE for the solving of environmental problems created by the

very same society. The fourth aim is aligned to EE because it provides the opportunity for accountability, tolerance and respect with the intention to preserve and protect it. If EE can be integrated, learners will learn to use the environment in such a manner that everybody will benefit from it. Aim 5 enhances self-discipline, responsibility and accountability towards others and the environment (Makuvaza 2018).

- Learning areas in secondary school: As far as learning areas in secondary schools are concerned, “at Form 3 and 4 learners continue with the broad-based general education they started at Form 1 and 2” Munikwa (2011), but at an advanced level. Broad-based general education is similar to what we refer to as General Education and Training (GET) in South Africa in which learners are offered subjects in a combined form, for example, Social Studies, whereas in FET this is differentiated into Geography and History, Natural Sciences in GET, and becomes two separate subjects, Life Sciences and Physical Sciences, in FET.

  In Zimbabwe, in Form 3 and 4, learners are given the opportunity to choose their pathways. For instance, “a learner who takes up a Science, Technology, Engineering and Mathematics (STEM) pathway would study Additional Mathematics, Physics, Chemistry, Geography and Biology”. As mentioned above, the content becomes complex when compared to that of the general education learning areas in Form 1 and 2 (Mathematics, Physical Chemistry and Physical Science). However, there are those Environmental Education themes, such as HIV/AIDS and poverty, which are incorporated in both the general education learning areas and the pathway subjects. For example, “climate change and environmental issues can be integrated into EE through Geography”. In Form 5 and 6, learners continue with the pathways they have selected in Form 3 and 4, as mentioned above. At this stage, learners are taught in preparation for “tertiary education or self-employment”; the Life skills Orientation Programme (LOP) is compulsory for all forms. It attempts to play one of the roles of EE. Schools are compelled to take learners out of the classroom to observe their sites regarded as national heritage venues. The aim is to enable learners to acquire skills such as “problem-solving, self-management, communication, leadership and teamwork, initiative and enterprise, learning and technological skills” (Ministry of Primary and Secondary Education 2015: 37-39).

- Teaching and Learning method: According to Mawonde (2018: 1), “The old curriculum was largely knowledge-based and was no longer responding to the

needs of industry and was out of sync with global trends". As in India, the Curriculum Framework for Primary and Secondary Education (2015-2022) stresses learner-centred approaches. This is a feature of Environmental Education (see Section 2.2.1.3 i). The approach includes EE methods such as investigation, project-focus learning and problem solving, as well as the ability to design. The discovery method "includes active, hands-on learning opportunities for learners" (Castronova 2011: 2). The problem-solving method empowers a learner to actionalise the knowledge and skills acquired to come up with a solution to an environmental problem at hand. The learner is left to explore with the teacher assisting in his/her journey. This develops and enhances the skills mentioned in the previous paragraph. In this way, the learner owns his/her learning and knows that it is his/her responsibility to investigate and analyse environmental problems and come to sound decisions on how to solve them. This approach connects the learner with the natural, social, political, cultural and economic worlds. These are the aspects of the concept Environmental Education.

- Assessment: The Curriculum Framework for Primary and Secondary Education (2015-2022) emphasises the assessment of the learner as a totality. In other words, it looks into his/her knowledge and skills acquired, capabilities displayed, attitudes improved and values enhanced on the natural, social, political, cultural and economic worlds. These are in line with UNESCO's definition and goals (see Section 1.4.2.2 and 2.2.1.3).

Although the curriculum in Zimbabwe has been updated, the concern is still the implementation of the Environmental Policy and the place of EE in this revamped curriculum (Chibememe et al. 2014; Mapira 2014; Mukuni 2013). The concern is that the Environmental Policy is not being implemented as expected, and that EE will still be taught through other subjects, like Science and Geography, in secondary schools when the updated curriculum is phased in the school curriculum in 2021 and 2022.

3.4.2.3 Challenges

As in India, curriculum change in Zimbabwe is affected by many problems. They include the lack of implementation of environmental policies, resistance to change by stakeholders, lack of infrastructure, financial constraints, curriculum change and inadequate teacher training.

In Zimbabwe, some of the reforms did not last the distance due to resistance from key stakeholders. These include:

Education with Production**:** it did not receive much support from implementers the general populace; hence, it collapsed. It also lacked emphasis on EE. The government's efforts to vocationalise secondary education by twinning schools with factories were only taken on board by a few schools in urban centres, which managed to establish links with industries. It is also not clear on the position of Environmental Education. In addition, at Form 3 level, all learners continue with the Academic Education Core subjects chosen from the Skills Areas.

“It can be asserted from the onset that the Academic Education has been accorded leverage over the Skills Areas subjects which could be a recipe for disaster in the implementation phase” (Munikwa 2011: 25). The learner must make the following choices in the Form 3 class:

> Option 1: General/ Academic Core Subjects (Business/Commercial as a major (at least two subjects) and one subject (elective) from Technical-Vocational).
> Option 2: General/ Academic Core subjects (Technical-Vocational as a major (at least two subjects) and one subject (elective) from Business/Commercial, while also in Form 3 and 4, all learners are expected to do a course in Computer Studies.

One can deduce that a learner can major in Business/Commercial or Technical-Vocational. This is a welcome development as it allows learners to pursue their areas of strength. It can also be acknowledged that the options are to guarantee an all-round education for learners, and bring in a degree of diversity and relevance into the secondary school curriculum. The Academic Core Subjects are English, Mathematics, Science, a local language (Shona or Ndebele) and History. Learners are expected to take a minimum of nine subjects, five of which will be common to the all-core subjects and four from the electives. The implementation of the Two-pathway Education structure means that all learners will leave school with at least one subject from the Skills Area pathway. This seems reasonable; however, there appears to be no mechanism in place to ensure that it is enforced. If Environmental Education were one subject in the Skills pathway, it would advantage the learners in the work force, but the fact that it is not a compulsory nor elective subject says that Zimbabwe should reconsider its position in the curriculum. Of significance is the fact that only one elective

subject, namely Computer Studies, is deemed mandatory for all learners; hence, this subject may be taken by the majority of learners to meet the expected obligations at the expense of other subjects. According to Munikwa and Chinamasa (2010), some Ordinary Level candidates were found to not take any subject in the Vocational and Technical Areas. This development is a cause for concern and should be attended to immediately.

Provision is made for 13 subjects from the skills areas (electives) offered by the Zimbabwe Schools Examination Council (ZIMSEC) (Bowora 2007).The secondary school curriculum presents a commendable variety of subjects for the learners, which could be an effective tool for meeting the demands of a varying labour market.

Curricula are informed by policies. These policy decisions have been enunciated through policy circulars for schools to implement. However, many efforts to reform curriculum are adopted as policy, but not implemented in practice. Guro and Weber (2010) confirm this fact. The impression is that there is always a gap between the national policies and what is happening on the ground asserts that subject policy circulars for education programmes are not guided by other documents, there is a need for a holistic educational reform paradigm that will also accommodate Environmental Education.

Taking an educational innovation as a complex system calls for a support framework for frequent teacher training and in-service programmes in the process that requires adjusting to new way of doing things (Carl 2009). If these could include EE, environmental problems such as those of unemployment and poverty in Zimbabwe could be alleviated. It can be asserted that there should be mechanisms in place to assist teachers in adjusting to their new roles. The new demands on the school system, such as the need to incorporate EE in secondary schools, may disturb the operations of the system. The critical underlying factor is that educational reform should be accompanied by long-term support mechanisms to enable teachers to learn the new operations in their school environment. Carl (2009) projects that successful implementation of any programme is hinged on the extent to which stakeholders are informed, and have been prepared for the programme, and whether they are prepared to associate with it. This scenario would empower teachers to get a grip on their new responsibilities. Such a system may be ideal for effective Environmental Education

curriculum implementation. However, such a situation may not be feasible in the Zimbabwean education system in the current economic environment.

From the above discussion, it would appear that the updated curriculum in Zimbabwe has potential benefits that could go untapped if the place of EE as an independent subject is not considered in future. The new curriculum is applauded as it attempts to embrace emerging paradigms, such as the incorporation of e-learning and the use of learner-centred methodologies, the promotion of collaborative learning, and the introduction of both formative and summative evaluation, which take into cognisance cognitive, affective and psychomotor domains (Adeyemi 2008). This is applauded because it offers learners the opportunity to "navigate on their own and be guided accordingly in producing useful citizens who exhibit Ubuntu and contribute meaningfully to nation building" (Dzvimbo, Magijani & Zimhondi 2018: 42). This curriculum also makes learners entrepreneurs in their own right after the completion of their studies (Hwami 2013; Uriah & Wosu 2012). However, for the abovementioned benefits to be achieved there is a major price to be paid if EE cannot find its place in the school curriculum. What it implies is that ICT learners will not be able to link ICT with its impact on the environment.

The government under President Ernest Mnangagwa has reversed its decision to maintain this new education curriculum. The latest development is that the curriculum should be reviewed to first fix major problems, which include inadequate infrastructure; allowing inputs from parents; and, most importantly, to ensure that schools become economic units that contribute to the national coffers, for example, water retention projects, which will then be used to facilitate horticulture projects (Ncube 2017).

In conclusion, though Zimbabwe is regarded as having a better education system in Africa, even when comparing it with the host country of the study, South Africa, just like other countries, Environmental Education is taught through subjects like Geography, Biology and Physical Science.

It is hoped that future reviews of this new (2015-2022) curriculum will make provision for the proper integration of EE in secondary schools, as is the situation in primary schools. It is further hoped that as Science and Technology are strongly considered for the new curriculum at primary school level, EE should also be considered in secondary schools.

3.4.3 South Africa

As mentioned earlier in this section, South Africa is a SADC country and the site where the study was conducted. This section deals with the history of EE as informed by pieces of legislation, the curriculum framework, and the challenges regarding the incorporation of EE in the school curriculum, as done with India and Zimbabwe above.

3.4.3.1 History of Environmental Education in South Africa

Progress regarding the integration of environmental content in the country does not differ much from that of the international community discussed above. In the 1960s, South Africa (like other countries) focused on EE from the *nature conservation* perspective, which was then replaced by this Environmental Education in the 1980s (O'Donoghue 2007). This was promoted by organisations such as the Wilderness Leadership School and the South African Conservation Society (Maluleke 2005). A review exposes that "little more than subtle expansions and shifts in emphasis from earlier concerns with learning and change as outlined in Tbilisi Principles for Environmental Education in 1977 and subsequent international documents framing EE South Africa" has been achieved (O'Donoghue 2014: 9). Like the rest of the world, South Africa is faced with a climate change problem, which has called for debate (Worth 2009), a topic to be dealt with in the FET curriculum. Although there is a political will and commitment by the current President, from the Copenhagen Summit in 2009, and hosting the Green Economy Summit in May 2010, as well as the UN Framework Convention on COP17 in 2011 (Lethoko 2018), the Department of Basic Education has not done enough to afford EE a better position in the school curriculum. Funds, such as the Green Fund, have been availed for projects and programmes on climate change (Nhamo & Nhamo 2014; Wilson 2013), showing that South Africa is ready to deal with the problem. However, the Department of Basic Education seems to be lagging behind with consideration of an EE curriculum as the best tool for these developments. For example, there is the Partnership for Action on the Green Economy (PAGE) in place comprising "government departments (Environmental Affairs; Science and Technology; and Higher Education and Training) partnering with international agencies interested in work, 'green jobs' and skills for sustainability" (Rosenberg, Lotz-Sisitka & Ramsarup 2018: 1), but Department of Basic Education is not part, whereas it is supposed to provide a foundation for Higher Education and Training.

There are legislative documents that recognised the importance of Environmental Education:

(i) The White Paper on Education and Training (1995): In the 1990s, EE became more issue-focused and more diverse; its teaching methodology became more integrated, and the learning outcomes more holistic. The White Paper on Education and Training of 1995 (Department of Education 1995: 18) confirms this when it states the following:

> Environmental Education, involving an interdisciplinary, integrated and active approach to learning, must be a vital element of all levels and programmes, of the education and training system, in order to create environmentally literate and active citizens and to ensure that all South African citizens, present and future, enjoy a decent quality of life through sustainable use of resources (South Africa 1995: 18).

With the current environmental conditions globally and here at home, there is a need for the review of the policies of the Department of Education, in other words, the interdisciplinary approach for EE is not applicable any longer. The country needs EE as an independent subject in the FET band to deal with, among others, the current electricity and water crises.

(ii) The role of the Constitution of the Republic of South Africa (South Africa 1996), the White Paper on National Environmental Management Policy Act (NEMA 1998), and the Reconstruction and Development Programme (African National Congress (ANC) Reconstruction and Development Programme [RDP] 1994) regarding the recognition of environmental problems and possible solutions were discussed in Section 1.2 (Background and Rationale) of the study. The following section will provide additional information.

(iii) The White Paper on Integrated Pollution and Waste Management For South Africa (2000): The Department of Environmental Affairs released this paper to provide a reference for Environmental Education in schools to identify and solve environmental problems (Department of Environmental Affairs and Tourism 2000; Centre for Environmental Rights 2013). The document aligns itself with international developments, like Zimbabwe, by providing proactive guidance to Environmental Education in the sense that it emphasises prevention and avoidance. In other words,

it advocates for the prevention of pollution to avoid environmental destruction, rather than spending too much thought on the damage done The question is: “How many people are aware of this White Paper?”. The Paper talks about establishing partnerships for implementation, but if these partnerships are not led by the Department of Education, any department or any other stakeholders attempting to raise awareness of environmental issues will not succeed; hence, the need for an EE curriculum in the FET band of secondary schools. The truth is, I, the researcher, only came across this document for the first time while doing the study’s literature review, so how many people have not even seen it? The fact remains that Environmental Education is the most important tool for teaching people that appropriate management of pollution and waste will improve the quality of the environment and the lives of all living in it.

(iv) South African Millennium Development Goals (MDGs): Like Zimbabwe, South Africa also observes the Millennium Development Goals. The goals of EE will be weighed against these goals to check its impact on teaching and learning. In the Millennium Development Goals Country Report of 2015, Minister T.J. Radebe stated the following:

> MDGs were a natural fit for South Africa as they aligned seamlessly with our own development agenda as expressed through the Freedom Charter and were endorsed by successive Governments since 1994, while the basic rights espoused by the MDGs were already entrenched in the Constitution. Thus, implementation of the goals was a confirmation of the developmental path South Africa embarked on and gave further impetus to the endeavours of post-apartheid South Africa (Statistics South Africa 2015: iii).

Despite what is stated above, South Africa has shamefully underperformed in this regard. The country only managed to achieve more than what was expected on “universal access to education; and halved poverty” (Statistics South Africa 2015: iii), which includes school learners. From my experience as a Circuit Manager, feeding of learners in schools has had a positive impact: that is, it has improved the health of learners and improved school attendance rates. Feeding has also encouraged some schools to establish food gardens and they have managed to obtain position 1 and 2 respectively at the national competition level in my Circuit. This same Circuit is being utilised for this study. The food gardens also serve as a tool for practical activities for Agricultural Science. The introduction of an EE curriculum could benefit greatly from

this project, as it could cater for topics like pollution, erosion, land degradation, conservation and preservation, ecosystems, and many others.

Perhaps South Africa has also shown fair progress in “access to basic water supply”, although at present the taps are dry as the country is experiencing a severe drought (Millennium Development Goals n.d.). This had been long coming, and because EE was only taught to Geography learners in school, their numbers were not enough to spread the message. If EE was introduced as a subject long ago, we would not be experiencing this problem.

(v) National Environmental Management Act (NEMA) 62 of 2008: South Africa has a history of environmental problems. These problems include poverty, which has also been prioritised as a Millennium Goal; unemployment; diseases; poverty; pollution; waste management and biodiversity. These are Environmental Education topics for the FET band. EE as an independent subject can do better in teaching these than as they are taught in Geography.

NEMA is “the framework environmental legislation which enables the environmental preservation detailed in the Constitution” (Du Toit 2016: 10). The Government Gazette 31789 No. 22 of January 2009 reflects that NEMA makes a provision for cooperative governance among different government departments and levels in order to deal with matters affecting the environment (Van der Linde 2009). This is done through integrated environmental management (IEM) (Chapter 5). This gives different government departments and other stakeholders the responsibility of working together in:

> identifying, predicting, and evaluating the actual and potential impact on the environment, socio-economic conditions and cultural heritage, the risks and consequences and alternatives and options for mitigation of activities, with a view to minimising negative impacts, maximising benefits, and promoting compliance with principles of environmental management set out in section 2 of Chapter 1 of the Act (Government Gazette 2009).

The implication is that every institution, including schools, and individuals are responsible for the protection and sustainable development of the natural environment by means of legislation and other means. In this study, these will include schools’ environmental policy and the EE curriculum in the FET band.

This further implies that, while people are pursuing their economic (for example, mining, grazing and ploughing) and social (for example, motor racing) interests, they should use methods that will retain or even promote the quality of the natural environment. NEMA acknowledges EE as reflected by Principle 2(2), which, even if puts people first, 4(b) acknowledges that all components, living and non-living, of the environment interact, and therefore any effect on one will have an impact on others. In other words, environmental degradation, for instance, will not only affect the quality of the environment, but will also up poverty levels and the mortality rate among plants, animals and human beings.

Although NEMA emphasises the need for collaboration to deal with environmental management, it is not clear on how it will collaborate with the Department of Education on the incorporation of EE in the system.

(vi) White Paper on Environmental Management Policy (1998): The vision of the Environmental Management Policy assists the EE curriculum to inculcate values of peaceful interaction between citizens and the environment. “The policy seeks to unite the people of South Africa in working towards a society where all people have sufficient food, clean air and water, decent homes and green spaces in their neighbourhoods that will enable them to live in spiritual, cultural and physical harmony with their natural surroundings” (Department of Environmental Affairs and Tourism 1998: 13).

The vision obliges the Education Department to:

> Re-think the EE curriculum in the FET band that will encourage learners to display compassion to the environment, by protecting it in whatever activities they perform. It therefore emphasises sustainable development as a priority of the Policy;
>
> Capacity building, Goal 5 echoes the need for EE, to “increase learners awareness of, and concern for, environmental issues; and assist in developing the knowledge, skills, values, and commitment necessary to achieve sustainable development” (Goal 2); Goal 6: ”Develop and maintain information management systems to provide accessible information to interested and affected parties that will support effective environmental management” (Department of Environmental Affairs and Tourism 1998: 20-28).

The Policy has only managed to achieve goal 2 to a lesser extent at a few universities, such as the University of South Africa, which offer Environmental Studies/Environmental Education. Considering that there are more FET schools than universities, the government can only do itself good by introducing an independent EE curriculum. The Policy acknowledges the importance of EE. It is time that the government reconsiders the curriculum in the FET band of schools as the leader of an integrated approach to sustainable development, which is intended by the Policy.
FET band schools, which offer Information Technology (IT) and Computer Application Technology (CAT), could also be used to achieve the goal.

The above legislative frameworks can be employed as blueprints for EE implementation in the Education Department, as well as in the FET band of schools. They can be used to reveal that co-operative and integrated environmental management needs to be institutionalised with the Department of Education and supported by other government departments, even if others formulate legislative frameworks. History has shown that South Africa has admirable acts and policies, but that they lack implementation, mostly because there are no clear guidelines for the roles, responsibilities and accountability of the different implementers. These are shadowed by the approach of co-operative and integrated management.

3.4.3.2 Curriculum framework and implementation

The above initiatives laid a foundation for curricula and implementation in South Africa.

There is a general perception that consideration for EE in schools only became visible after 1994. However, researchers and institutions have long intervened regarding Environmental Education in an attempt to change people's attitudes towards the natural environment (O' Donoghue 2007).

The North West Province, the "Bophuthatswana homeland" during the apartheid era, should be applauded for allowing EE to be offered in the form of Environmental Studies in the 1980s (Mokhele 2007: 6; Motshegwa 2006: 2-3). The partnership between its "university (the University of Bophuthatswana then) and Bophuthatswana National Parks and with support of the government of the day increased the number of teachers trained in Environmental Studies in Colleges of Education from 1986" (Motshegwa 2006: 2-3). However, these teachers could not apply their acquired knowledge because there was no EE in the FET band of schools, and they had no idea of an

integrated approach to teaching and learning. The incorporation of EE in the curriculum was meant to be motivated by the White Paper on Education and Training of 1995, as mentioned in Section 3.4.3.1 B above.

Below is a discussion on the evolution of the curricula, recognising the accommodation of EE:

(i) NATED 550 curricula

For many years, the school curriculum in South Africa was NATED 550. In an attempt to transform the education system, an Interim Curriculum (IC) was put in place during the period 1995 to 2006 (Songqwaru 2012). The teachers followed rote learning and a teacher-centred approach in the teaching of subjects like Life Sciences, Physical Science and Geography, which contained EE topics. It was content-driven and exam-driven (From NATED 550 to the new national curriculum: Maintaining standards in 2009/2010).

(ii) Curriculum 2005

A new curriculum, called Curriculum 2005, was introduced in 1998 in line with suggestion of the White Paper. It replaced the old route learning methodologies with an Outcomes Based Education (OBE) – a more holistic and learner-centred approach It attempted to integrate skills, knowledge and values in learning areas (now called subjects). It could have been suitable for teaching EE if it was given a chance in the FET band. It referred to “environment” as the “Phase Organiser” in the GET band, which provided an opportunity for environmental themes to be taught through other subjects (Schudel et al. 2008). This meant to oblige teachers of other subjects to teach environmental content in their subjects. Curriculum 2005 was phased out before being elevated to the FET band.

(iii) National Curriculum Statement (NCS)

As the word transformation was advocated everywhere, interested parties in education were also looking forward to seeing that in the system. A change in curriculum in the FET band brought the National Curriculum Statement (NCS) in 2006. Regarding EE, NCS was informed by the following principles: “Active and critical learning; high knowledge and high skills; human rights, inclusivity, environmental and social justice; and lastly, valuing indigenous knowledge systems” (Department of Basic Education

2011a: 4-5). This implies that the NCS focuses on developing learners' high knowledge and skills that empowers them to actively participate in learning processes by questioning environmental issues, rather than been told about them. The NCS observes and integrates principles of human rights, and social and environmental justice, as stated in the Constitution and other legislative frameworks, such as NEMA and the White Paper on Environmental Management Policy (see Section 3.4.3.1).

As EE is not a separate subject in the NCS, teachers are expected to infuse EE across all the subjects. Researchers who believe in this cross-curricular approach include Makhoba (2009).

Curriculum and Assessment Policy Statement (CAPS)

In trying to keep up with international trends and the needs of society, the NCS was amended for implementation in 2012. "A single comprehensive Curriculum and Assessment Policy Statement (CAPS) document was produced which replaced Subject Statements, Learning Programme Guidelines and Subject Assessment Guidelines in Grades R-12" (Department of Basic Education 2011a: 3). CAPS 2 was implemented in 2014 to accommodate technical subjects (Department of Basic Education 2011a).

Empirical research will reveal the position of EE and its implementation. A review will be done on CAPS 1, introduced in 2012, and CAPS 2, introduced in 2014.

3.4.3.3 Challenges

As in India and Zimbabwe, curriculum change in South Africa faced many challenges. These include lack of infrastructure, resulting in overcrowding, which is impeding the implementation of the Outcomes Based Education approach and the interdisciplinary nature of EE in the curriculum. Ketlhoilwe (2007) attests to a shortage of buildings, sudden frequent changes of curriculum after 1994, and subsequent inadequate teacher training.

Between 1994 and 2012, teachers were exposed to three changes in curriculum. While they were still grappling with the existing one, a new one was introduced, as explained above. This makes it difficult for teachers to focus on properly integrating environmental themes across the subjects. Each teacher is concentrating on his/her

own themes in his/her own subject, and sometimes this leads to information being repeated to learners.

Another challenge is a political one. The country is currently experienced a shortage of water and electricity, but instead of starting to think about introducing EE as an independent tool for environmental solutions, it is busy discussing the introduction of History as a compulsory subject for all learners, and ICT. Environmental problems are larger than the HIV/AIDS problem, which has been allocated as a Life Orientation subject. Why can EE not be introduced as a separate subject as it deals with the environment as a totality; that is, physical, social, political, economic, cultural, and so forth.

NEMA lays claim to integrated environmental management, but in South Africa, this is written and spoken about, but it has never been practically applied, as government departments function in silos.

Other challenges facing curricula, which are similar to those of India, Zimbabwe and many other countries around the world, include the following:

(i) NATED 550 curricula

The NATED 550 Curricula was conceptually demanding and lacked clear guidelines regarding the integration of EE (Songqwaru 2012). Each teacher taught his/her own subject as an isolated subject, even if there were common themes between the subjects. The Curricula was teacher-centred, and learners were expected to swallow everything (From NATED 550 to the new national curriculum: Maintaining standards in 2009, 2010). The NATED 550 Higher and Standard Grade Curricula also had the following weaknesses: they “covered less topics as compared to NCS; content-driven; progression of skills within a year; less comprehensive regarding aims and outcomes; no description of the desired outcomes; assessment guidance not organised; and many high order questions in exam papers” (From NATED 550 to the new national curriculum: Maintaining standards in 2009, 2010: 4-6).

(ii) Curriculum 2005

Curriculum 2005 was phased out before it could be introduced into the FET band in secondary schools. There was a lack of continuity in the education system because there was a gap between the FET band and tertiary institutions offering EE as a programme.

Curriculum 2005 forced individualised teaching, plan for remediation and enrichment, administering diagnostic assessment and keeping extensive information about the learner including personal one. This was stretching teachers who had to spend long hours on thorough planning and preparation. For EE, which demands practical work, there was no or little time to take learners out of the classroom. Most teachers, including the principals I know, left teaching due to the stress put on them by this curriculum.

Other challenges included inadequate training (especially raised by teacher unions). It has become a norm that training takes between three and four days in South Africa, which leaves a teacher to study on her/his own while implementing the curriculum at the same time. Other challenges included insufficient LTSM; a shortage of classrooms and furniture to cater for individualisation as learners had to perform activities according to their own pace (differentiation); and a shortage of teachers. If teachers felt that they were not adequately trained, how could they integrate environmental concerns, which needed a cross-curricular approach. The practical nature of environmental content demanded some of the above-mentioned resources, which were insufficient.

The Outcomes Based Education methodology of Curriculum 2005 demanded parental involvement for continuous interventions, which never exists, especially in public schools. This put more pressure on the teachers who had to act in loco parentis, in the true sense of the word. The unavailability of parents makes learning difficult, as there is no link between EE learning at school and cultural and indigenous knowledge affecting the environment.

(vi) National Curriculum Statement (NCS)

Overall, the National Curriculum Statement **(**NCS) can be considered the best curriculum. However, it also had its weaknesses, including the limitation to EE as a separate subject, but encouraging its place by means of a cross curricula approach such as Curriculum 2005, which employed OBE methodology. As teachers were not professionally trained to teach in the integrated approach required by NCS, it was difficult for them to integrate EE themes across other subjects.

Teachers experienced the same problem mentioned above; that is, the lack of adequate training to be able to transit smoothly from Curriculum 2005 (primary

teachers) or the old NATED 550 curricula (FET band teachers) to the new curriculum. Furthermore, the learner-centred approach was difficult to follow due to inadequate resources in schools (Grussendorff 2010: 5). This demanded that each learner must be well resourced to perform his/her activities.

The NCS also covered too many themes, which could disable an integrated approach to EE and promote rote learning, and "the suggested sequencing, progression and pacing of material was strenuous and unrealistic due to this breath of the curriculum" (Grussendorff 2010: 4).

Regarding assessment, the NCS did not differentiate between Higher Grade and Standard Grade. This might be why the Education Department has come up with progression due to the number of years in a phase (a learner is not allowed to spend four years in a phase of three years); pass with adjustment (PWA) where a candidate is given a certain percentage to each of the three subjects to effect progression; condonation in Mathematics; and multiple exam opportunity (MEO) in which a candidate is allowed to write some subjects this year and the rest the following year. For EE the problem is that the MEO candidates fail to come back to school the following year to attend lessons for the remaining subjects. Thus, there is little time allocated for the integration of environmental issues across the other subjects by both teachers and learners as they focus more on rote studying of their subjects' topics. Hence, the need for a separate curriculum for EE in the FET band.

(vii) Curriculum and Assessment Policy Statement (CAPS)

The Curriculum and Assessment Policy Statement (CAPS) can be considered as an amended NCS. Regarding the challenges facing curricula, CAPS faces the same challenges as other curricula, especially those similar to NCS.

Empirical research will reflect further challenges or gaps, if there are any. It will also indicate whether there is proper integration of environmental content by teachers.

The need for EE as an independent subject in the FET band is confirmed by the findings on amount of EE content found in some subjects. An additional factor is based on the stream choice. Out of the 30 subjects in the FET band, six of them contain EE content, according to the analysis of this study. This is not enough to identify and solve environmental problems in the country. These are described below.

Environmental Education contents are scattered among subjects, as follows:

- For Life Sciences

Here the analysis focuses on two strands, which deal with environmental content, these are strand 3: Environmental Studies; and strand 4: Diversity, change and continuity. Environmental Studies is dealt with in two grades in the FET band, Grade 10 and 11. Grade 11 content is then assessed (examined) in Grade 12.

In Grade 10, the environmental studies strand deals with one topic only, “Biosphere to ecosystems” (Department of Basic Education 2011a: l0). This section is structured to introduce learners to some of the interactions that occur in nature and to the terminology and concepts that describe them (Department of Basic Education 2011: 33). For the Grade 11 curriculum, the terminology and concepts selected in Grade 10 are supposed to be used across all strands, where appropriate (Department of Basic Education 2011a: 33).In Grade 10, strand 3 (Environmental Studies) should also use the local area to introduce how humans influence the environment in which they and other organisms live. The effect man has had on the environment, both locally and globally, is examined in more detail in Grade 11. This section also builds on the knowledge that has to be acquired during the senior phase of the GET band (Department of Basic Education 2011a: 33).This is a problem for the teacher who does not have a guideline or prescription of where and when to apply them, especially new teachers. Learners will also find it difficult to contextualise the meaning of these terms and concepts within the familiar contexts of their local area, as well as in South Africa as a whole. Strand 3: Environmental studies in Grade 11 comprises two topics, namely, population ecology, which was introduced in Grade 10, and the human impact on the environment, as mentioned in the discussion of Grade 10 above. The section on population ecology is structured with the intention that learners must explore the impact of people on their environments (global, international and local). Learners are encouraged to suggest solutions to local environmental problems. The intention is that learners will become more informed and more sensitive to environmental issues and will modify their behaviour to lessen their impact on the environment (Department of Basic Education 2011a: 49). The second topic, human impact on the environment, must be completed in Grade 11 and at the end of Grade 12 (Department of Basic Education 2011a: 51).

Strand 4: Diversity, Change and continuity: In Grade 10, environmental content is on biodiversity and classification; and the history of life on earth. Biodiversity and classification is extended to Grade 11, and in Grade 12, the content is on evolution (Department of Basic Education 2011a: 35 - 65).

- Geography:

Grade 10 deals with the atmosphere, population, Geomorphology and water sources, and Grade 11 deals with the atmosphere, Geomorphology, Development Geography, and resources and sustainability. EE content in Grade 12 includes climate and weather, Geomorphology, rural and urban settlement, and the Economic Geography of South Africa. The analysis shows that all topics in all grades contain EE content, but the fact is, not all learners take the Geography stream; that is why there is need for EE as an elective, not meaning that it should be compulsory. This is to cater for those interested in it or as a career path (Department of Basic Education 2011b: 11).

- Life Orientation (LO):

Out of six topics, only one topic directly addresses EE content, namely social and environmental responsibility (Department of Basic Education 2011c: 8). This topic reflects parallels between LO and EE, which are stipulated in Chapter 5 (see Table 5.3).

- Physical Science

Physical Science consists of six main knowledge areas, which inform Physical Science in the FET band (Department of Basic Education 2011d:8). Those are:

- Matter and Materials
- Chemical systems
- Chemical change
- Mechanics
- Waves, sound and light
- Electricity and magnetism (Department of Basic Education 2011d: 8 - 9).

Just like Geography, all the above topics have environmental content and concerns, but because only a few learners meet the requirements of choosing Physical Science

as an elective subject, there is a need for integration of EE in the FET band to provide these learners with an opportunity to have knowledge and skills that will enable them to solve environmental problems. For example, in matter and material, learners explore the impacts of plastic; in chemical system they study about the hydro- and lithospheres with reference to water, mining, energy resources and fertilisers and how their use impact on the environment; in chemical change they explore physical and chemical change, energy and chemical change, reactions in aqueous solution and acids bases; and with the topic of waves, sound and light learners are able to deal with the frequency, amplitude, period and speed waves as well as electromagnetic radiation. The topic of electricity and magnetism teaches learners about the use of energy and environmental impact of various forms of energy (Department of Basic Education 2011d: 10-11).

- Agricultural Management Practices (AMP)

  Topics related to the environment are soil and water management, waste management and general climatic requirements for crop production (Lethoko 2016: 84).

As indicated above, EE topics are scattered in subjects denying the holistic identity and approach of Environmental Education to teaching. The second reason is that these EE topics inadequate to address all environmental problems in the country. Thirdly, these subjects maintain their identity, Life Science is scientific and biological, Physical Science is scientific, physical and chemically oriented in its approach, Geography is physical in nature and practice, AMP focuses mainly on agricultural issues, and LO concentrates on social aspects. Resource management overlaps across these subjects. Lastly, it is only LO that is a compulsory subject, and with only one out of six topics containing EE, this calls for a review of CAPs to integrate EE in the FET band.

After analysing the EE content in subjects that contain it in the FET band, the following section looks at four common approaches to EE.

3.5 A CURRICULUM FRAMEWORK FOR OPTIMAL INTEGRATION OF ENVIRONMENTAL EDUCATION IN THE FET BAND

3.5.1 Introduction

This section deals with some examples of curriculum frameworks that are viewed as general ways of conceiving what EE is intended to achieve. These approaches teach learners to avoid certain theoretical divides that make them unable to observe and respect the important relationships with their habitat. Learners understand that problems like poverty, hunger and diseases cannot be divorced from the state of health of the environment and its resources. These curriculum frameworks deal with the teaching of EE content.

Although others exist, the following are regarded as the four prominent frameworks for Environmental Education: Environmental Science Literacy; Environmental Values Education; Education for Sustainability, and Eco-justice Pedagogy (Ferkany & Whyte 2012). These frameworks are discussed in the following sections.

3.5.2 Examples of curriculum frameworks for Environmental Education

3.5.2.1 Environmental Science Literacy

According to Ferkany and Whyte (2012), the primary and probably most common curriculum framework for EE is Environmental Science Literacy. Environmental Science Literacy looks at science teaching and learning in the FET band of schools as central to developing future citizens who can use scientific evidence to debate publicly about environmental problems. Among education scholars, EE is widely regarded as primary to the origin of science education (SE) (Pedretti 2014). This is because environmental decision-making often requires scientific or factual information.

A number of researchers promote Environmental Science Literacy as a curriculum framework for EE (Anyanwu 2015; Læssøe, Schnack & McKeown 2010). A study conducted by scholars, including Laure Hartley, Jonathan Schramm and Charles Anderson, found that college students do not possess fundamental knowledge of the components of elements and compounds (Hartley, Schramm & Anderson 2011). According to their study, “Students often try to reason about large-scale or small-scale phenomena by inappropriately applying cultural models or their own embodied experiences, both of which are situated in the macroscopic world” (Hartley et al. 2011:

74). This hampers the possibility that decisions on climate change made in the public space vigilantly integrate current scientific understandings (Schramm & Anderson 2011). In the FET band of secondary school, Environmental Science Literacy is required for learners to understand the carbon cycle so as to grasp the idea that concentrations of carbon dioxide are increasing, instead of believing, without evidence, that nature absorbs carbon dioxide, or other fallacies. The goal of science literacy should prepare learners to "better apply the principles of conservation of matter and energy when reasoning about biological processes such as photosynthesis and respiration" (Hartley et al. 2011: 65). This group of scholars sees the need for change in how Life Sciences textbooks are written and how FET band teachers at secondary school teach the fundamentals of science. They offer several opinions on how to think about science teaching and apply it to EE. First, learners, like scientists, should understand that "all processes and interactions take place in a hierarchy of systems at multiple scales, constrained by fundamental physical laws" (Hartley et al. 2011: 65). Second, learners must learn to interpret and understand climatic and natural resource models like the Keeling Curve (which reports atmospheric concentrations of carbon from Mauna Loa, Hawaii). It is believed that learners who are literate in models like these can actually see themselves and their societies in them. Third, learners must also learn to appreciate and embody scientific standards like arguments from evidence instead of authority, dedication to rigour in method, and collective validation of data (Schramm & Anderson 2011). Appreciation of these values inculcates respect for the environment in learners.

Environmental Science Literacy is an attractive curriculum framework for the FET band in schools because it gets learners to see environmental issues through the eyes of widely accepted standards of knowledge, skills and values used in science. The fact that science is already part of the schools provides a point of entry for the learners to be prepared to handle environmental issues as responsible citizens. The complex nature of current environmental problems needs a vigilant curriculum. Environmental Science Literacy is based on the objectives of Environmental Education, namely, awareness, knowledge, attitudes and participation (Hollweg et al. 2011) (see Section 2.2.1.3 i). Hence, it is relevant to complement EE in the FET band curriculum.

3.5.2.2 Environmental Values Education

The second curriculum framework applicable for EE focuses on values. The third goal of EE, as determined by the Tbilisi Declaration of 1977, is attitudes (see Section 2.2.1.3 i). This approach will complement the EE curriculum because it is in a better position to deal widely with attitudes. No matter which approach is employed, if it does not emphasise the attitudes, it will not succeed in changing the mindset of learners. Human values link to satisfaction of biological, social, political, cultural, aesthetic and economic needs. These needs place heavy demands on the environment. As all of these come from the planet earth, there is an obvious connection between our values and the natural environment.

Many studies have been conducted on the curriculum framework for environmental values in secondary schools. These included those that found that environmental ethics of girls were more than those of boys (Raju 2007); and, overall, the majority of teachers had moderate levels of environmental awareness (Larijani 2010). Singh, Kumari and Singh (2014) found that Science and Arts teachers had more environmental awareness in comparison to Commerce teachers. One of the scholars who is a proponent of a curriculum framework for environmental values is Gene Hargrove. His priority is to educate learners with environmental values and virtues that best equip them as citizens and environmental professionals. Curricula should focus on “character development, in terms of values and virtues, rather than on the teaching of specific ethical principles” (Hargrove 2008: 264). This researcher provides several procedures for selecting values and virtues that are justifiable for teaching and learning in the FET band of school. First, they should be widely accepted and consistent with the history of the opinions that actually formed environmental views in specific countries and their relationships with the environment. Second, values and virtues should be drawn from what is needed to facilitate environmental decisions and accountabilities by citizens, including learners; and third, teachers may include elements of environmental values and virtues in the FET band curriculum (Hargrove 2008). Assistance of this framework to the EE curriculum will empower teachers to enhance the values of respect and care for the environment in learners. It is a fact that the teachers of current subjects, such as Life Sciences, Physical Science, Geography and so forth, concentrate on the acquisition of knowledge and greatly fail to deal with the values aspect of the learner, as it is not examinable. EE means, developing a non-

adult to a responsible adulthood in totality; that is, among others, morally and aesthetically.

3.5.2.3 Education for Sustainability

Another EE framework enhances sustainability. Sustainability is an element of EE, although there is a debate about it. Many scholars have conducted studies on the Education for Sustainability framework (Eames, Cowie & Bolstad 2008; Ferkany & Whyte 2012; Nikolopoulou, Abraham & Mirbagheri 2010).

Sustainability can have a number of meanings, ranging from education to acquire values (as discussed above); for example, stewardship, and the rights of indigenous peoples to business education and the wise use of resources (Ferkany & Whyte 2012). The concept of sustainability needs to be described concerning poverty, health, and peace. CAPS principles of the South curriculum also emphasise these elements. Nikolopoulou, Abraham and Mirbagheri (2010: xii) state, “Sustainability is, in the final analysis, a moral and ethical imperative in which cultural diversity and traditional knowledge needed to be respected”. There is a need for new or better strategies, which will change the mindset of learners, to capacitate them to handle environmental issues in a sustainable way (Eames, Cowie & Bolstad 2008: 48). Zsoka et al. (2013) state that if you want a sustainable environment, then your teaching and learning should strive for knowledge, skills and attitudes on and about the environment. It is assumed that current knowledge and understanding is enough and the pathway toward sustainability is not clearly signalled; thus, requiring learning to be more open-ended and future oriented (Kuzich 2011).

More researchers are beginning to realise the importance of including sustainability issues in schools’ activities (Boca & Saraçli 2019; Kuzich 2011; Mokhele 2011). The concern is about the approaches to promote an EE status that will encourage sustainability; hence, the proposal for EE as an independent elective subject. As Baker (2008) argues, this will promote a participatory curriculum framework that has the goal of global survival and coexistence through the co-evolution of teachers and learners with the content and process of learning that may lead to more equitable and sustainable ways of living. However, Mokhele (2011: 78) argues, “Few teachers, policymakers, learners and other education stakeholders have the experience needed to make such a focus on environmental learning workable within South Africa’s current education system”. A better strategy therefore requires the re-orientation of teachers

on issues of sustainability, as it is mandatory to pass on this knowledge to learners. Kuzich (2011: 1) attest to this when saying, “To develop future learners who have the knowledge, skills and capacity to address the root causes of unsustainability requires a wholesale transformation of the foci of curriculum and teacher pedagogy”. This implies that the curriculum, as the core function of the school, should also transform to the EE curriculum.

Addressing sustainability within the curriculum requires reconstruction. It means that what teachers do in the classroom, specifically teaching methods and resources must be relooked. As Alexander (2008: 1) puts it, “Teaching without the bigger picture” is happening in the classroom. Increasingly the bigger picture has been eroded for teachers due to an increased reference for standardised curricula and educational outcomes in a highly performative context that has re-oriented education to serve narrow educational objectives. This has placed curriculum, often organised as a set of content descriptors, at the forefront of teachers’ work requiring them to be mere technicians, delivering and assessing knowledge (Abbey 2003).

3.5.2.4 Eco-justice Pedagogy

Just like Environmental Values Education, Eco-justice Pedagogy emphasises that there are problems with worldviews that see the environment instrumentally as the primarily economic resource. Eco-justice Pedagogy seeks to help learners learn to view environmental problems (resource depletion, climate change, etc.) inclusively with what are often represented as simply human or social problems (poverty, discrimination, etc.) (Martusewicz, Edmundson & Lupinacci 2011). This version offers several guides for curriculum development. First, environmental education should teach learners to think creatively and ethically about the ways in which beliefs and behaviours are responsible for the joint environmental and cultural crisis. In other words, culture and tradition should not be imposed on learners regarding their use of the environment. Second, learners must rethink their interdependence with the environment. Third, learners should be empowered to base their knowledge on that of the community in order to solve environmental problems. “In this way we bring our hearts and minds to the protection of the places that we love by engaging democratic and sustainable ways of life” (Martusewicz et al. 2011: 19).

These approaches teach learners to avoid certain theoretical divides that make them unable to observe and respect the important relationships with their habitat. Learners

understand that problems like poverty, hunger and diseases cannot be divorced from the state of health of the environment and its resources.

As indicated above, no curriculum framework is without its limitations. Each framework has advantages and disadvantages, which may complement those of others. The following section highlights the limitations of the four curriculum frameworks discussed above.

Each framework for EE offers attractive ways of fostering learning outcomes, such as scientific understanding, acquisition of values and virtues, and multicultural awareness. While each framework stresses various kinds of knowledge, awareness, skills and values, there usually seems to be a clear connection to education virtues that do not receive the degree of elaboration that it should.

Certain approaches of teaching environmental values seek more than learners' memorisation of what the values are. Hargrove's approach implies that learners learn to embody them and practise them in their daily lives, changing not just their behaviour, but also their motives, desires and skills. Education in values would also mean helping learners to develop environmental virtues, which include respect for nature, ecological sensitivity, and care for the environment.

Environmental Science Literacy aims at giving learners an opportunity to acquire a special scientific understanding. It means knowledge other than that they acquire at school. This is why the version offered by Schramm and Anderson (2011) will include standards upheld by members of trustworthy scientific communities. Scientists and learners alike do not adopt these standards by memorisation. They are embodied and become implicitly accepted. To apply the standard of scrupulousness and degree of exactness in research investigation, a learner must possess significant intellectual virtues such as thoroughness, patience, courage and humility. In this way, Environmental Science Literacy is about grasping some scientific understanding of an environmental problem, but also in developing traits and dispositions of trustworthy scientists and faithful interpreters of scientific evidence. Schramm and Anderson (2011) also suggest that learners should be prepared to do much more than be competent at scientific understandings; they must be able to work with current science and make presentations in the public sphere that is well informed by good scientific understanding. They recommend for learners to be well prepared when they enter public discussions demanding scientific knowledge and skills. Being able to play these

public roles requires intellectual virtues like flexibility and open-mindedness, and the virtues of harmonious team work as one of the objectives of EE. Implicit in Schramm and Anderson's literacy curriculum framework is the importance of preparing learners to be virtuous interpreters of scientific evidence and virtuous public presenters of scientific knowledge. The latter role requires practical and deliberative virtues that facilitate active participation with sceptical audiences and collaboration with experienced people in the field of science teaching. Environmental Science Literacy also emphasises experiential activities, while EE adds values to that.

People have different values – often influenced by their culture. The value difference is a sensitive and complicated subject. Environmental issues like sustainability, technology assessment, climate change and natural resource management involve disagreements among individuals (Ferkany & Whyte 2012). It therefore requires practical skills for individuals to appreciate that differences will always exist. They have to have the character that allows them to persevere despite antagonism among them, to possess the ability to remain unwavering and know when to seek compromise, and to have self-confidence in solving problems as a group. This curriculum framework will thus demand the same practical skills from a teacher who teaches learners EE. Diversity must be understood as a motivating factor in all life systems and not just as a matter of cultural politics.

If Education for Sustainability is to result in the disruption of the invisible normative structures and ways of thinking that led us into the current state of affairs, teaching must complement such a stance. Teaching must also change, as indicated above. This can only happen if it is informed by the curriculum that moves away from the mere transmission of facts on EE to action-oriented activities (Davis 2010). Stevenson (2007: 269) suggests what this means for teachers:

> Principles that frame sustainability discourse (such as biodiversity and intergenerational equity) need to be translated into curriculum and pedagogical practices that will intellectually and emotionally engage learners in developing deep meaningful understandings and enduring dispositions – by no means a simple or easy task for teachers. Simply put, policy discourse must be (re)contextualised and transformed by teachers into their own discourse of practice, and most importantly, into pedagogical actions.

This means teachers must change their teaching methods and aids in the classrooms.

Education for sustainability demands certain strategies, which place time pressures on the curriculum of the school. According to Tilbury (2011: 26-27), the most commonly used strategies are “role-plays and simulations; group discussions; stimulus activities; debates; critical incidents; case studies; reflexive accounts; critical reading and writing; problem-based learning; fieldwork and outdoor learning, and modelling good practice“. These strategies are considered central to Education for Sustainability initiatives as they put learners in a better position to “ask critical reflective questions, clarify values, envision more positive futures, think systemically, respond through applied knowledge and explore the dialectic between tradition and innovation” (Tilbury 2011: 29). While it seems sustainability offers another approach to teaching, UNESCO considers it as not engendering the kind of change that supports sustainable practices (Kuzich 2011). What must be considered is the teachers’ teaching intent; that is, the alignment of vision and action that has sustainability as an organising ethos.

These strategies demand more time from an already overcrowded curriculum. That is why I propose that some subjects, especially those that do not support the solving of environmental crises, be replaced by EE, as it accommodates sustainability.

The virtues and approaches listed above would also be relevant for Eco-justice Pedagogy. One of the goals of this curriculum framework is to prepare learners for community-based problem solving. One premise in these arguments is that we do not have sufficient community relations to deal with the ecological crisis – which means that if there are not enough community relations it is a problem because learners also have to have the skills to build a community in the absence of immediate community relationships. Eco-justice Pedagogy would have to do as much as possible to equip learners with participatory virtues, like those mentioned above.

The truth of the matter is that environmental problems are complicated and messy, and handling them well requires competency in values as well as virtues. Prominent curriculum frameworks in EE should contribute to preparing learners to grapple with these problems. I with agree Ferkany and Whyte (2012) who state that there is a need for greater emphasis to be placed on equipping learners with the character virtues needed to participate in the difficult deliberations about environmental problems. They further argue that science literacy must supplement its curricula with teaching and learning in the ethical dimensions of environmental problems.

The researchers mentioned above and curriculum developers regard these frameworks as general ways of conceiving what EE is ultimately supposed to accomplish. An implication of this failure is that learners will not be ready to understand environmental crises even at a local level, such as mere conservation and preservation issues, pollution and erosion, as well as global issues such as climate change. These curriculum frameworks have a common goal of attending to environmental crises. Environmental crises are so complex that no EE curriculum framework will consider itself absolute in trying to address them; curriculum frameworks should therefore be employed in a complementary manner. Current and future researchers can learn from these frameworks and may even adapt them for their own curriculum frameworks.

3.5.3 Summary

This chapter dealt with the arguments of scholars on curriculum frameworks. The prominent EE frameworks that were discussed are Environmental Science Literacy; Environmental Values Education; Education for Sustainability; and Eco-justice Pedagogy. Environmental Science Literacy focuses on scientific knowledge and skills. It looks at science teaching and learning in the FET band of schools as central to developing future citizens who can use scientific evidence to debate publicly about environmental problems. Environmental Values Education stresses the teaching and learning of environmental values. Proponents of this curriculum believe that values are the cornerstone of teaching and learning for EE and that human values link to satisfying biological, social, political, cultural, aesthetic and economic needs, which place demands on the environment.

Education for Sustainability is another prominent curriculum framework. Different meanings are attached to the concept sustainability. Nikolopoulou et al. (2010: xii) argue that, “Sustainability is, in the final analysis, a moral and ethical imperative in which cultural diversity and traditional knowledge needed to be respected”.

Eco-justice Pedagogy helps learners to learn about environmental problems. This version offers several guides for curriculum development. First, environmental education should teach learners to think creatively and ethically about the ways in which beliefs and behaviours are responsible for the joint environmental and cultural crisis. In other words, culture and tradition should not be imposed on learners regarding their use of the environment. Second, learners must rethink their

interdependence with the environment. Third, learners should be empowered to learn from their interactions with one another and gain from the knowledge of those older than them. These engagements also enhance values. “In this way we bring our hearts and minds to the protection of the places that we love by engaging democratic and sustainable ways of life” (Martusewicz et al. 2011: 19).

Although these curriculum frameworks have the common goal of attending to environmental crises, their approaches and the complexity of environmental crises require a complementary or new approach as no framework can claim its victory in dealing with environmental challenges. However, current or future researchers can learn from these frameworks and could adapt them for their own curriculum frameworks. Environmental Education is holistic; that is, the way it views the environment is the way it aims to develop all aspects of the learner; hence, physically, intellectually, socially, emotionally, morally, economically, and politically so that the learner can see the environment in the same way. The study therefore acknowledges that the frameworks discussed do not differ from the current curriculum, which teaches EE through other subject, in other words, through a fragmented approach. Hence, the recommendation for an independent EE curriculum that will include the aspects of these curriculum frameworks.

3.6 CONCLUSION

Chapter 3 reviewed the historical, global situation of EE. It began with a discussion on important international landmarks that had influenced and shaped policies and other frameworks in EE. These included conferences and summits, such as the Stockholm Conference, the Tbilisi Conference, the Rio Summit, and world summits on sustainable development. The aims of these efforts focused on, among others, the redefinition of EE and guiding principles for EE frameworks. For example, the Tbilisi Conference helped to integrate EE into national education curricula and promote interdisciplinary and problem-solving strategies in curricula and education materials.

National initiatives regarding EE in the four countries under study were also reviewed. This discussion was followed by a review on curriculum frameworks, which included both international and SADC examples. The examples reviewed here are not necessarily the best in the world, but they were selected for various reasons. The US was selected to determine whether, as an economic giant, it has made any progress regarding the incorporation of EE as an independent subject. India is one of the few

countries that show an interest in curriculum containing environmental issues. Zimbabwe was selected as a representative of a SADC country with historically the best education system when compared to South Africa. South Africa is the country where this study was conducted and has made good progress regarding education for sustainable development in the SADC region. Further empirical research was done to confirm the status of EE in CAPS in the FET band in South Africa. Analysis was done on some subjects containing EE content, and the findings have shown that it is either inadequate or the focus is on the individual subject's identity, or the subject is not compulsory, resulting in denying learners knowledge of EE.

The review reflected barriers impeding EE incorporation and the implementation thereof in the four selected countries. The common challenges included the lack of infrastructure, changes of curriculum, inadequate teacher training, the lack of research studies in EE, and resistance to change by stakeholders (including teachers). Overall, there has been little progress regarding the framework for integration in secondary schools in the four countries under study. In fact, all the four countries incorporate EE through other subjects like the Sciences, Social Sciences, Mathematics, Languages and so forth. USA is prominent with the EE programmes. Examples of curriculum frameworks that can be used as general ways of integrating EE were also discussed. Therefore the conclusion is, because they also focus on one aspect, they do not differ from the current situation of teaching EE across other subjects in a fragmented approach. This study therefore strongly recommends an EE curriculum, which gives it an independent status.

CHAPTER 4

RESEARCH METHODOLOGY

4.1 INTRODUCTION

For every study, a paradigm and research approach are important. In order to answer the question of this study, the interpretive paradigm and qualitative research approach were chosen. A detailed description of their use will be presented in the following section. The main question is: What curriculum framework can be designed for Environmental Education in the South African Further Education and Training band to promote the optimal implementation of Environmental Education?

As indicated in 1.5, research methodology is the way in which data is gathered and ultimately analysed for a phenomenon under study. “Research methodology implies scientific analysis of the research methods, so as to find a solution to the problem at hand while the research method pertains to all those methods, which the researcher employs to undertake the research process, to solve a given problem” (Surbhi 2016).

The process is usually procedural, performed through phases or stages. This is an element of science. “Methodologies explicate and define the kinds of problems that are worth investigating; what constitutes a researchable problem; testable hypotheses; how to frame a problem in such a way that it can be investigated using particular designs and procedures; and how to select and develop appropriate means of collecting data” (Mafuwane 2011: 68). According to Sithole (2018: 25), “research methodology is a particular sort of undertaking, an investigation of the aims, concepts, and principles of reasoning of some disciplines, and relationships between its sub-disciplines”. These definitions show that a research methodology is not something that you can quickly decide on, as it determines the credibility of your study. For this study, qualitative research methodology is employed.

4.2 RESEARCH DESIGN

“Research design and methodology” (Creswell 2009: 5) are defined differently by different researchers. These two concepts need to be understood because they are important apparatus of the study.

“Research design is a plan or proposal to conduct research” (Creswell 2009: 5). From the definitions given in the section above, one can say it is important to plan in an organised way in order to obtain information about a phenomenon; in this case, an appropriate curriculum framework for EE in the FET band. The careful plan shows how this information is gathered. As mentioned in section 1.5.2, Labaree (2013: 2) refers to research design as “the overall strategy that you choose to integrate the different components of the study in a coherent and logical way, thereby, ensuring you will effectively address the research problem; it constitutes the blueprint for the collection, measurement, and analysis of data”. Consideration for the particular plan requires in-depth thinking about the whole study because it is the research design that serves as a signpost. Planning starts the moment you think about a research question until you analyse the data collected. In other words, planning is sequential. The researcher in the present study used a qualitative approach to assist in designing and implementing a proper curriculum framework for EE in the FET band. A qualitative design entails exploring the participants’ thoughts or observations about the phenomenon (Creswell 2009).

4.2.1 **Interpretive research paradigm**

As indicated above, a paradigm is an important guide of every study.

Some researchers, like Creswell (2009), prefer to use the term “world view”. For this study the term paradigm is used. The literature regards Kuhn as a pioneer in the use of the term paradigm (Thomas 2010: 292). The term has its origin in the Greek word *paradeigma* meaning “pattern”, and refers to “the beliefs and principles that shape how the researcher sees, interprets and acts within the world” (Kivunja & Kuyini 2017: 26). This implies a framework that enables the researcher to observe a phenomenon or event under study. In this study, the framework is used to enable the researcher to examine the current curriculum of the FET band in secondary schools, in order to understand the status of EE. This structure guides the choice of methodology and techniques for credibility and confirmability of the findings of the study.

As Kivunja and Kuyini (2017: 26) say, “A research paradigm inherently reflects the researcher’s beliefs about the world that she/he lives in and wants to live in”. Interpretive research “embraces a wide range of philosophical and sociological thought which shares the common characteristics of attempting to understand and explain the social world from the point of view of the actors directly involved in the process” (Dube 2012: 128). The researcher will attempt to understand the view of the participants on the problem under examination.

A research paradigm comprises three elements: ‘ontology, epistemology, and methodology” (Thomas 2010: 292). The way the researcher looks at “reality and the existence of things” is referred to as ontology (The concept of existence: Definitions by major philosophers n.d.), meaning searching for the truth about the phenomenon under investigation. Scotland (2012: 9) refers to it as “the study of being”. The reality is, human developments around the world impact negatively on the environment, and climate change and other effects are visible. The literature discussed in Chapter 2 and Chapter 3 provides the reality that environmental concerns in many countries are taught using an interdisciplinary approach, which seems to be having no effect on solving the environmental crises. It is for this reason that the study proposes a curriculum that could be used to address these problems.

Epistemology has to do with how knowledge is generated and passed over (Scotland 2012: 9). In this study, environmental knowledge, including Indigenous Knowledge System (IKS) from home, may be transferred to the school environment. The curriculum in the FET band would then be able to refine this knowledge for appropriateness. “Ontology is concerned about knowledge that is external while epistemology is concerned about uncovering this knowledge that is external to the researcher and learn about it” (Edirisingha 2012).

The interpretive paradigm has been chosen because it allows the researcher to study participants and phenomenon under examination, through what the participants see, say and their experiences. The experiences assist the researcher in understanding the data (Thanh & Thanh 2015: 24). Researchers who employ this paradigm are of the view that an understanding of the context in which any form of research is conducted is critical to the interpretation of data collected. This context is necessary for the understanding of what the participants think about the issue under study; in this study, what curriculum framework for EE is appropriate in the FET band.

The interpretive paradigm is preferred for its subjective nature, as compared to positivist research, which is objective. Participants are free to put forward their views without fear of being intimidated. “The researchers do not seek answers for their studies in rigid ways. Instead, they approach the reality from subjects, typically from people who own their experiences and are of a particular culture” (Thanh & Thanh 2015: 25).

Interpretivist researchers prefer to use qualitative methods, as there is a link between the two (Nind & Todd 2011). This study also uses these methods for reasons that are explained in the next section.

4.2.2 **Qualitative research approach**

The study is positioned in a qualitative approach as it focuses on perspectives and subjective meanings.
This section defines and describes why qualitative research, utilising the interpretive paradigm. This is a “means for examining and understanding the meaning people attach to the problem” (Creswell 2009: 4). In other words, as reflected in the description of the interpretivist paradigm above, the researcher depends on the participants’ views on the problem.

Interpretivists believe that reality is not something easily understood and that it keeps on changing (Thanh & Thanh 2015). In other words, a new reality about the same phenomenon emerges from time to time. This is in contrast with positivism that depends on numbers to determine behaviour of individuals. Followers of this paradigm mostly use quantitative methods. Interpretivist researchers use methods that enable them to understand in depth the relationship on human beings to their environment.

Another reason qualitative research was considered valuable for this study is that the study was conducted in the “natural setting” (Creswell 2009: 175). The researcher visited the schools to obtain data on the research question by means of focus group and face-to-face interviews. The atmosphere in which the data is collected also makes the participants feel part of the study.

The “researcher is a central and vital instrument for collection and interpretation of data” (Steward 2010: 292). The researcher personally interviewed FET band teachers and analysed CAPS documents of Life Sciences, Physical Science, Geography and

Life Orientation. This makes the researcher responsible for the success and quality of the data collected.

Qualitative research gave the researcher the opportunity to utilise three instruments; that is, focus group interviews and face-to-face interviews, and document analysis. This assisted the researcher in comparing information and obtaining better data than she would have with one technique.

Emergent design: After agreeing that my promoter was not comfortable with Critical Emancipatory Research approach, which I wished to explore, I changed to qualitative research. I also had to focus on the circuit schools rather than district schools due to the attitude of some principals of former Model C schools, by being reluctant to allow me access to the school as this was evident in the last minute postponement for a reason not convincing, the other one insisted that this was a private matter so he could not assist with the logistics. Remember, the principal is accountable for the administration of access into the school. Two departmental heads also did not avail themselves.

This approach was also observant in trying to respond to the question of the study by examining the problem internationally, regionally and locally (including at school level); and across government departments and non-governmental organisations. The main research question is, What curriculum framework can be designed for Environmental Education in the South African Further Education and Training band to promote the optimal implementation of Environmental Education? The approach was also followed when clarifying the concepts environment, education and Environmental Education, which were defined from different perspectives.

4.2.2.1 The relevance of qualitative research

The researcher chose qualitative research as the study's approach in order to design the curriculum framework for EE in the FET band in a way thought to be proper to enhance its implementation in a more effective way. The researcher understands that he/she should not impose, but allow participants to express their views about the problem under investigation. As already mentioned in the previous section, research takes place in a natural environment. In this study, the problem is the curriculum and the site is the FET school. "The researcher does not bring individuals into a laboratory nor does she typically send out instruments for individuals to complete" (Creswell 2009: 175). In this way, the researcher is in direct contact with the participants during

the interview processes and able to observe their reactions toward the problem. Other reason for choosing this research is that the researcher is a key instrument, as explained above, which gives him/her the opportunity to collect data without any manipulation so that he/she obtains credible outcomes. The researcher typically gathers multiple forms of data (two types of interviews and document analysis). The problem under study requires immense insight, and this could only be obtained through qualitative methods of interviews, and document analysis.

The next section deals with the research strategy.

4.2.3 Research strategy

This study is directed by phenomenological strategy as reflected in the second paragraph above. In simple language, phenomenology means “the study of phenomena” or situation (Kakulu, Byrne & Viitanen 2009: 3). With this type, the researcher tried to understand and experience the phenomenon under investigation from the view and experiences of the selected participants (Kakulu 2014). Phenomenological strategy assisted the researcher to gain a better understanding of the status of EE in the FET band curriculum, by means of focus group and face-to-face interviews, as well as Curriculum and Assessement Policy Statement (CAPS) documents of Life Sciences, Geography, Physical Science and Life Orientation subjects.

Constructivist strategy has also been used. This strategy was selected because it actively engages participants in a research and gives them freedom of opinion (Roustaee, Kadir & Asimiran 2014). This strategy enabled the researcher and the participants “to put together new ideas by interpreting new experiences in light of prior knowledge so that the new ideas come to make sense” (Akpan & Beard 2016: 394). In other words, individuals constructed knowledge and meaning from their experiences. The new information, assisted the participants and researcher “to reconcile it with our previous ideas and experience, and these changed what we believed” (Olusegun 2015: 67). Empirical research found that Environmental Education is incorporated in the curriculum through other subjects such as Life Sciences, Geography, Physical Science and others. It also revealed that EE is little in other subjects, or is given the least time, or teachers focus on their subject specific content in subjects like Geography which contain more EE content. Also that teachers are unable to use a multidisciplinary approach. These findings influenced the

researcher to discard the current knowledge that EE is doing better by means of a multidisciplinary approach. The researcher then took a position of proposing for a curriculum framework for Environmental Education in the FET band as an independent elective subject for optimal implementation of EE,.

4.3 RESEARCH METHODS

4.3.1 Demarcation of the study

As outlined in 1.5.2.1, the site of the study was Mamusa Circuit. Four secondary schools, including three township schools and one town school. The selected participants were heterogeneous in terms of location, culture, medium of Language of Learning and Teaching (LOLT), home language, and race and colour. However, as required by the purposeful selection method, the participants consisted of members who are knowledgeable and experienced about the environmental content in their subjects (Langkos 2014). This was the phenomenon under study. The town school is a former white school that has been converted into a parallel-medium school. The three township schools admit learners from farms and the township and informal settlement. The researcher selected schools that were within her reach. The researcher is the Circuit Manager in the Mamusa Circuit, meaning that conducting research in the Circuit required fewer expenses. It was also a timesaving factor.

4.3.2 Selection of participants

Phenomenological strategy was employed with an attempt to produce a dense and credible description of the phenomenon investigated. In order to attain this, the following questions were kept in mind for the selection of the participants:

Which participants are targetted?
What selection technique is employed?
What size should the sample be?
How were participants recruited?

Purposeful selection technique was used in order to obtain a rich data about the phenomenon. The rationale for the use of purposeful selection method was to collect the best information on environmental content from experienced participants in subjects related to EE (Maimela 2015; Silverman 2010); thus, to obtain a dense description of the phenomenon under study as already mentioned. This provides the

reader of the study with an opportunity to form a picture of the behaviour or responses displayed by participants during the course of the empirical investigation.

The selected participants comprised:

- Four principals, one from each selected school. Principals are viewed as managers and accounting officers of curriculum.
- Seven deputy principals. Deputy principals are the curriculum champions and drivers.
- Seven departmental heads were targeted, although only five availed themselves. Departmental heads are the most important component of the SMT. They are responsible for monitoring and moderating the work of teachers and learners; this includes both formal and informal tasks. They manage the departments, which are determined by subject streams. These departmental heads are subject/stream specialists at school level; namely for the Mathematics and Science Department, the Commerce Department, and the Humanities Department.
- For focus group interview, teachers of Life Sciences, Physical Science, Life Orientation and Geography, which are most closely related to EE in the FET band, were targeted. Two groups of six participants in each, though two members did not turn up due to urgent private matters.
- For face-to-face interviews, Seventeen teachers were targeted. Two participants were added to make a total of 19 teachers. The targeted participants for face-to-face interviews were new faces for Life Sciences, Physical Science, Life Orientation and Geography, not the participants used in the focus group. But it came to my attention at a focus group interview that I might run short of the targeted number because not many learners offer Physical Science, Life Sciences and Geography in this era as more learners have begun to prefer commercial and technical subjects, also that subjects like Mathematics, Mathematical Literacy, Tourism, Business Studies, Economics and Technology also contain environmental content, I therefore included teachers of these subjects.
- The participants also included departmental officials; that is, a FET Curriculum Coordinator and two SESs. One of the SESs (curriculum) is a former lecturer of Environmental Education and the other one a specialist in Life Sciences, who assumed the post of deputy principal before the face-to-face interviews were

conducted. The reason for selecting these officials was to gain from their expertise and experience in these subject fields within their related curriculum/guidelines. These participants also majored in Mathematics, Life Sciences, Physics and Chemistry, or Geography. Furthermore, they are also responsible to capacitate teachers for effective implementation of curriculum in the classroom.

The selection of teachers was not an easy and straightforward process as already explained in bullets 4 and 5 of 1.5.2.2. However, for document analysis, the researcher focused on the four selected subjects, namely Life Sciences, Physical Science, Geography and Life Orientation, as these subjects were most closely related to EE. Also convinced that the data is more than adequate in comparison with other researchers who only focus on one document.

The next section presents a brief outline of the techniques used for the gathering of the data. This outline includes a description of the focus group interviews, the document analysis, and the face-to-face interviews. I used secondary literature review as an additional research method.

4.3.3 Data collection

Data collection plays a pivotal role in any academic investigation. In this way, the researcher is able to find or validate answers regarding the main question of the study. “Data collection is the process of gathering and measuring information on variables of interest, in an established systematic fashion that enables one user to answer stated research questions, test hypotheses, and evaluate outcomes” (Prabha & Kabadi 2016: 17). To collect data successfully, the researcher has to choose the methodology that will yield the desired results. The researcher of the present study employed the qualitative research method for the collection of data, for the reasons mentioned above (see section 1.5.1.2).

In line with qualitative methodology, which encourages an establishment of rapport between the researcher and participants, the researcher personally collected data during the focus group and face-to-face interviews except for one participant of the face-to-face interview who was uncomfortable with her. Arrangement was made for a trained assistant in the face-to-face interview technique to interview her.

The researcher also did document analysis for the selected subjects of the study in the FET band, namely, Life Sciences, Geography, Physical Science and Life Orientation CAPS documents.

4.3.3.1 Data collection procedure

During the first visit paid to the four selected FET schools, a letter of permission from the Acting District Director of Education was produced by the researcher. At the same time, departmental officials, that is, the FET Curriculum Coordinator and two SESs, were also consulted. During this visit, the researcher requested principals to arrange for a meeting between the SMT, the teachers, and the researcher. This meeting would be held during the second visit. The SMT and the teachers of three township schools, as well as the departmental officials and the researcher converged on the identified host school. These schools are not far apart; thus, one can walk between them. A separate meeting was held with the town school's SMT and the teachers as it is situated a distance from the other schools.

The second visit at the school was to meet with all participants including the teachers. This visit was for the researcher to introduce herself and purpose of the meeting, which was to request for their participation in her study.

The researcher conducted focus group interviews during the third visit (i.e. the second meeting). These visits were followed by a lengthy period of document analysis by the researcher; that is, the CAPS documents for Life Sciences, Physical Science, Geography and Life Orientation.

Finally, the researcher conducted face-to-face interviews for all participants except the one who was assigned a trained assistant. This phase of the research comprised a large portion of the time of the total study period.

To ensure trustworthiness, data were collected through multiple sources (Creswell 2009: 175). Data collection techniques included focus group interviews, then document analysis, and finally face-to-face interviews. The interviews were recorded by HP 6560b laptop and Samsung J5 cellphone voice recorders, and then transcribed.

4.3.3.2 Data collection techniques

The data collection techniques in the present study included the focus group interviews, document analysis and face-to-face interviews. These techniques were selected because they are relate well with the philosophical framework of the research paradigm and methodology, that is, they made it possible for the researcher to understand the participants' experiences about the study. In phenomenology, the interviews assist in exploring the knowledge already gained by participants with regards to the topic at hand. They also serve as a means of establishing a dialogue relationship with the participants. Secondary literature review was used as an additional research method as mentioned earlier.

(i) Literature review

The literature study has been presented in Chapter 2 and Chapter 3. A "literature review shares the results of other studies that are related to the one being undertaken" (Creswell 2009: 25). It joins the debate that is taking place on the topic in that particular field by expanding on what already exists. This study discussed important international landmarks that had influenced and shaped policies and other frameworks in EE. Chapter 2 defined the operational concepts and provided a brief history of EE, while Chapter 3 presented the status of curricular frameworks for for the selected countries. This was ended with examples of prominent curriculum frameworks that could be used as general ways to incorporate EE in secondary schools. The discussion in Chapter 3 included both the international and Southern African Development Community (SADC) examples. The countries reviewed are not necessarily the best in the world but have been selected for various reasons. India is one of the few countries showing an interest in the development and implementation of the EE curriculum. USA is a giant economy, so the study determines if there is a match between this and integration of EE in the secondary schools. Zimbabwe was selected as a representative of the SADC countries with historically the best education system when compared to South Africa, while South Africa was the country where this study was conducted. I am therefore convinced that this sample is adequate for this study, especially being guided by what is reflected by literature that, although it is offered in colleges and universities, many countries have not integrated EE as an independent subject in secondary schools, but through other subjects. These include both the developing and developed countries such as Tanzania, Botswana, Lesotho, England, Germany, Sweden, Greece,

Romania and others (Boca & Saraçli 2019; Glackin & King, 2018; Ketlhoilwe 2007; Kimaryo 2011; Mwendwa 2017; Ntanos et al 2018; Radeiski 2009; Verma & Dull 2017).

(ii) The interview process

Interviews were employed as one of the data collection techniques. These are considered as an effective tool. According to Mears (2012: 170), “The interviews refer to purposeful interactions in which the interviewer is interested in learning what the interviewee knows about the topic, to discover and record the interviewees’ experiences, thoughts, and feelings about the topic, and its significance or any meaning that the topic might have”. It is understood that an interview should be thoroughly planned for beforehand.

The researcher started with unstructured focus group interviews and ended the data collection process with semi-structured face-to-face interviews, after the document analysis.

- *Unstructured focus group interviews*

These types of interviews were unstructured and served as a form of a baseline for other techniques. They were conducted at the beginning of the study during the second meeting with the participants. The researcher personally conducted them.

Twelve participants were invited to an interview. Two separate focus group interviews were conducted. There were five participants in each group, as one of each group of six was not available at the time of the interviews due to urgent unforeseen circumstances. One group included the FET Curriculum Coordinator and the SES for Life Sciences, as well as teachers, while the other group included the SES for Educational Development and Support (EDS), as well as teachers. SMT members also formed part of the group. The focus groups were homogenous in the sense that all the participants were qualified teachers and their subjects contained environmental themes or content. They are heterogeneous in terms of issues that did not influence the topic of study; that is, the problem under examination had nothing to do with gender, race, etc. What is important is that all the participants, including the FET Curriculum Coordinator, the Life Sciences SES and the SES for EDS (the former college Environmental Education lecturer), had majored in and taught either one or two of the subjects, Physical Sciences, Life Sciences, Geography and Life Orientation

in the FET band. The specialist for Educational Development and Support has taught EE.

In this research, the phenomenon under study is the curriculum framework for EE in the FET band. Thus, the informal and open-ended interviews at the beginning of the empirical research were used to determine both the participants' background and their interest in the topic. They allowed the participants to use their own language and go into more details than the structured interviews, so as to obtain a fuller picture of the person's experiences. The interviews were informal, and the participants were prepared to look through the lens of a teacher, not at the rank of the researcher; that is, with a session of mentoring, the participants were emotionally prepared to look at the researcher and the SMT members as equals in terms of subject teaching. The informality of the interviews helped to increase the participants' sense of comfort (except one who was naturally fearful) in expressing their opinions.

Though an unstructured focus group interview was preferred as a baseline over the unstructured individual interview, the unstructured focus group interview was not without limitations. First, it almost took the pattern of an unstructured individual interview, as there was little interaction among the participants. Second, one member of each group was not available due to urgent unforeseen family matters. Third, because the participants were relative strangers because they do not teach at the same schools, one participant did not participate openly and freely, although unstructured interviews make provision for that. However, the open-ended nature of the interview allowed the researcher an opportunity to be more keen to make follow-ups and to let interviewees elaborate on certain issues.

Heck (2011) sees the contact among a group as motivation for sharing experiences and expressing opinions among members of a group; it also alleviates fears. In this way, it increases the number of responses required for a topic. It also assisted the participants to express details about their environment, interests, and expectations regarding the study. In contrast to the face-to-interviews, the participants in the group interviews made further inputs on the topic because others stimulated their thoughts. However, a focus group has a habit of allowing other participants to dominate the research process. Therefore, these challenges must be taken into consideration during the analysis of the collected data.

According to Thomas (2010: 134), “The direction of the unstructured interview is determined by both the interviewer and the interviewee, not predetermined”, and although the questions will not be the same for all the interviewees, “it is possible to generate rich data, information and ideas in such conversations because the level of questioning can be varied to suit the context and that the interviewer can quiz the interviewee more deeply on specific issues as they arise” (Thomas 2010: 134). The disadvantage is that it is time-consuming. Smithson (Alshengeeti 2014: 40) argues, “The use of focus groups as a thick data-gathering method, ending up with some ‘sound-bite’ quotations to illustrate themes, ignores the complexities of focus group behavior”. An advantage of the focus group interview is that interviewees have the chance to come up with opinions as a group and ultimately a proposition based on what they have come across.

Focus group interviews were generally economical in terms of money and time. During the second meeting, two participants were not available due to urgent family matters.

- *Face-to-face interviews*

These were also personally conducted by the researcher except for one participant who indicated that she was not comfortable with the researcher, and an agreement was reached to provide a trained assistant. Semi-structured, face-to-face interviews were used to strengthen the study’s findings. These interviews enhanced a rapport between the researcher and the participants as the researcher was present in person, to ask questions and observe gestures of the participants, and thereby enriching the information required about the study (Doyle n.d.).

The researcher used semi-structured face-to-face interviews after the document analysis. For these interviews the sample included 37 participants comprising of four principals, seven deputy principals, five departmental heads and 19 teachers, a SES (a former college EE lecturer), and the FET Curriculum Co-ordinator (see Annexure B2). This sample allowed Afrikaans-speaking teachers to express themselves in their home language, and an Afrikaans-speaking SES (Subject Advisor) was requested to assist with the transcription from an audiotape recorder and subsequently translated it.

The face-to-face interviews verified the data collected by the focus group interview and the document analysis. The semi-structured face-to-face interviews provided “in-

depth information about" the "topic" because there was an atmosphere of freedom (Alshengeeti 2014: 40).

Because the face-to-face interviews were semi-structured interviews, which are less rigid than a structured interview, the researcher had an opportunity to gain more insight about the topic by probing what the respondents were offering (Alshengeeti 2014). In other words, some answers drew the interviewer into further questioning, resulting in clarity of what was intended to be conveyed by the participants.

When comparing the different kinds of tools, these interviews are better than the use of telephonic interviews and questionnaires because the researcher is able to use two senses simultaneously (Hofisi, Hofisi & Mago 2014: 63); that is, depicting the messages from participants' gestures and using your ears. The researcher can also see if the interviewee is bored during the interaction; that is why it is important to plan the interview carefully to avoid this situation.

The interviews utilised in this study assisted the researcher greatly. They established a relationship between the researcher and the participants. This is confirmed by Rahman (2015: 11), when he says that an "in-person interview allows the interviewee to become more comfortable with the interviewer because of personal interaction". Moreover, interviews are "good at obtaining detailed information" as the researcher has an opportunity to probe (Thomas 2010: 314). However, the face-to-face interviews were the most time-consuming and expensive, when compared to the focus group interviews, because the researcher had to revisit schools to reach the target number set when participants were not available because of their tight work schedule.

The responses of the participants during the interviews were captured by means of HP 6560b laptop and Samsung J5 cellphone voice recorders as mentioned in bullet 2 of 1.5.2.3. This method of recording information was convenient, as the researcher had to concentrate on eliciting the responses without losing what was being said while taking notes. It is also less time consuming as one can sustain the interview session without pausing for note taking. It further enables the researcher to later transcribe accurately what was said. Hence, the verbatim responses of the interviewees were gathered by means of HP 6560b laptop and Samsung J5 cellphone voice recorders and this data was analysed in Chapter 5. Thematic analysis method being used for analysis is discussed in Chapter 5.

(iii) Document analysis

Another important technique used for gathering data was document analysis (see Annexure C). This data collection was done by the researcher. Document analysis was used because documents form an important source in research as they "provide background and context, additional questions to be asked, supplementary data, a means of tracking change and development, and verification of findings from other data" (Bowen 2009: 30).

Document analysis, in a thematic way, was selected to complement the focus group and face-to-face interviews. The addition is encouraged by Cohen, Manion and Morrison (2011), who emphasise the use of many qualitative research methods for a particular study to enhance the quality of the findings and "enrich a study throughout the research process" (Wellington 2015: 213). Data on the curriculum for EE were also collected by means of CAPS documents **(**see Annexure C**)**. These are documents for the subjects that claim to contain environmental topics or concern. The four selected subjects were Life Sciences, Physical Science, Geography and Life Orientation. Morse and McEvoy (2014: 5) highlighted that "Documents serve as substitutes for records of activity that the researcher could not observe directly". The implication is that even if we cannot be all over, we still can acquire information about what we are interested in through any mode, which includes documents. "Document analysis is a systematic procedure for reviewing or evaluating documents – both printed and electronic material" (Bowen 2009: 27).

Many researchers regard documents as an outstanding tool for the collection of valuable information on the phenomenon being studied in qualitative research (Creswell 2008; Punch 2009). However, it should be noted that not all documents are "accurate and lacking in bias" (Yin 2009: 103). It is advisable to scrutinise this type of a source before accepting its information as is.

Document analysis was selected because of its advantages in qualitative research, without ignoring its disadvantages. It is naturally "less time-consuming" (Bowen 2009: 31). However, in this study, the researcher spent long on document analysis because she was evaluating large CAPS documents of four subjects, instead of one document, like other researchers in many fields. Although it is sometimes difficult to retrieve documents, the documents were readily available in the schools and therefore made

the exercise inexpensive. Unlike interviews, documents are “unobtrusive and non-reactive” (Creswell 2009: 180), meaning that the researcher cannot change the already-written content in that particular document; rather, the document can be used repeatedly.

Document analysis helped the researcher to formulate questions for the face-to-face interviews. According to Yin (2009: 103), “The most important use of documents is to corroborate and augment evidence from other sources” of information. In other words, it serves as a complementary tool (Bowen 2009). The researcher examined the policy (curriculum) documents of the four subjects, namely Physical Sciences, Life Sciences, Geography and Life Orientation in the FET band curriculum, as well as the assessment instruments, such as examination papers in these subjects, to examine the amount of time allocated to EE content. The researcher was looking for guidelines, principles, aims, skills and specific content or themes, conceptualisations and time allocation regarding EE.

4.3.4 Data analysis

As mentioned in 1.5.2.5, the methodology of qualitative research has grown over the years. This growth reflects evolution in the definition and description of terms, including the term ‘data analysis’. This is a process that is ongoing, for example, new themes keep on emerging during the analysis of interview responses. A later definition of data analysis comes from Flick (2013: 5) who states, “Qualitative data analysis is the classification and interpretation of linguistic (or visual) material to make statements about implicit and explicit dimensions and structures of meaning-making in the material and what is represented in it”. This enables the researcher to understand what the participants understand about the phenomenon being investigated.

The qualitative data that emerged from the interviews and documents were analysed by means of classification into major themes and sub-themes (adapted thematic approach) (see Chapter 5). Document analysis was done for the four selected subjects to determine the amount of environmental content they contain.

4.4 MEASURES OF TRUSTWORTHINESS

While quantitave researchers prefer “reliability, objectivity and validity to ensure trustworthiness of the inquiry findings, qualitative researchers favour credibility,

transferability, dependability and confirmability as trustworthiness criteria to ensure rigour of qualitative findings" (Anney 2014: 272). These are discussed below:

Credibility: Methodological triangulation was applied for gathering multiple forms of data; that is, by means of focus group interviews, document analysis and face-to-face interviews. Secondary literature also used to enhance trustworthiness.

To ensure credibility of the findings, a lot of time was spent on face-to-face interviews and document analysis. "Credibility determines whether the research findings represent a probable information drawn from the participants' original data and is a correct interpretation of the participants' original views" (Korstjens & Moser 2018: 121). To ensure this, though the estimated time for an interview was 30-40 minutes per interviewee, they were allowed more than that. The participants were also allowed to provide examples. The researcher also did some probing where necessary. The researcher even made telephonic follow-ups to ensure clarity in order to obtain the correct interpretation of what some participants intended to convey to the researcher about the phenomenon.

For documents, the researcher greatly familiarised herself with the CAPS documents, by reading them several times to limit information to the topic of study. In the case of the thematic analysis, the reading of interview material and CAPS documents was also done repeatedly to arrive at the various themes and sub-themes.

Transferability: Transferability, "refers to the degree to which the findings described in one study are applicable or useful to theory, practice, and future research" (Moon et al. 2016: 19). The researcher provided a rich account of descriptive data, such as the context in which the research was carried out; its settings; purposeful selection of participants; demographics; background of schools; data collection procedures; exerpts from interview instruments and documents" (Korstjens & Moser 2018: 122). The researcher is confident that the findings of this can extend the debate on the status of EE in the FET band curriculum in future researches. Other researchers can compare the position of this study with those of other researchers with different views and findings .

*Dependability: "*To achieve dependability, researchers can ensure the research process is logical, traceable, and clearly documented" (Nowell et al. 2017: 3). This

enables the reader to provide an opinion about the dependability of the study. “Dependability involves participants’ evaluation of the findings, interpretation and recommendations of the study such that all are supported by the data as received from participants of the study” (Cohen, Manion, & Morrison 2011). As mentioned in the last paragraph of the discussion of credibility above, thematic analysis was used for interviews and CAPS documents. This is in line with phenomenological strategy and qualitative research approach.

Confirmability: Refers “to the degree to which the results of an inquiry could be confirmed or corroborated by other researchers” (Anney 2014: 279). Confirmability is “concerned with establishing that data and interpretations of the findings are not figments of the inquirer’s imagination, but are clearly derived from the data” (Nowell et al. 2017: 3).The researcher maintained her impartiality when interpreting data. To ensure this, in the collection of the data, the interview responses were captured by HP 6560b laptop and Samsung J5 cellphone voice recorders, which were then transcribed word-for-word. These documents are available. Interview instruments have been annexured for the reader or auditor.

As more studies are conducted compared to decades ago, so more questions are formulated on the quality of paradigms and research methodologies. Qualitative research is not free from this criticism. According to Tracy (2010: 841), “For qualitative research to be of a high quality, it must be rigorous”. The question is: “How rigorous should it be?”. For this study, techniques such as triangulation and purposeful selection of participants were employed to render this a rigorous study.

In this study, the following procedures were followed to enhace credibility and dependability:

Triangulation technique as already stated, provides a rich data which enhances credibility and dependability.

“Transcripts” (Creswell 2009: 190) of the focus group and face-to-face interviews were checked to eliminate “finger errors”. The researcher also phoned those who were not audible in the recording to confirm their responses. An external editor was also appointed for editing.

Thematic data analysis by Lichtman (2006) was adapted for analysis of the collected data.

"*Data was constantly compared with the codes*" (Creswell 2009: 190) to avoid losing important information on the topic.

The following procedures were followed to enhance confirmability and transferability:

Triangulation technique ensures confirmability and transferability (Dube 2012). The researcher gathered multiple forms of data; that is, by means of the literature review, the unstructured focus group interview, semi-structured face-to-face interviews, and document (content) analysis. These were used to improve the confirmability and transferability of the findings.

Member checks were also used to strengthen the trustworthiness of the study. The researcher revisited the interviewees, especially those who are fast speakers and those who were not audible enough, to verify data with them. This gave the researcher and the participants the opportunity to correct errors. The participants' words were transcribed verbatim.

The *purposive sampling* of schools was done on the basis of the set criteria. The sample was expanded, as already explained.

4.5 ETHICAL MEASURES

Ethical clearance (UFS-EDU-2011-0068) was obtained from the Ethics Committee of the Faculty of Humanities at the University of the Free State (UFS). The researcher adhered to all the requirements as set out by the relevant UFS policies on research ethics. The researcher sought permission to conduct the empirical research from the Acting District Director of Education and it was granted for four secondary schools in the Circuit of Education (see Annexure A 1). In this regard, an agreement was reached that the daily activities of the schools would not be disrupted by the research; that respect, anonymity and confidentiality of the research participants would be guaranteed; and that the research would pose no harm to any participants.

At the first meeting (i.e. the second visit), the researcher introduced herself to the focus group participants, and explained the purpose of the meeting as mentioned in the second paragraph of 1.5.2.4. She showed them proof of ethical clearance certificate issued. She assured them that the study will not pose any physical harm, and that she will also make sure that they will not be negatively emotionally affected, or else she

will take full responsibilty. They were also allowed an opportunity to come up with their preferred names to ensure anonymity and confidentiality. Although requested to participate in the study, they were also informed that their participation was voluntary and that they were free to withdraw from the study at any time. She then presented the aim of the thesis. They were given time to ask questions if they needed to clarify anything. This was followed by the administration of the consent forms, that is, the participants were requested to sign consent letters.

An ethical obligation rests on the researcher to ensure that the investigation proceeds correctly at all times, and that no one is deceived or in any way negatively affected by the findings (Ethical issues in conducting research 2007). Furthermore, the information must be formulated and conveyed clearly and unambiguously to avoid or minimise misappropriation by subjects, the public, or colleagues.

For the face-to-face interview the same ethical requirements procedures were followed with ‘privacy’ added because these are individual interviews.

4.6 SUMMARY

The chosen paradigm, research methodology and strategies were presented in this chapter. The selected methodology was qualitative research, informed by the interpretive paradigm, as there is a relationship between the two: that is, the focus is on the subjective interpretation of reality. The relevant research strategies selected for the study are interpretive and constructivism. There is a belief that qualitative methods are usually supported by interpretivists and constructivists, because they both portray a world in which reality is socially constructed. So, researchers employ methods that enable them to understand in depth the relationship of participants to their environment and the part those participants play in creating the social structure of which they are part.

A curriculum framework for Environmental Education and its implementation in the FET band is a social problem; hence, the choice of the interpretive paradigm, qualitative research approach, interpretivism and constructivism strategie and qualitative methods to understand what the participants say about it.

The procedure of data collection was also presented in this chapter. The terms population and sample were described. Four secondary schools in the Mamusa Circuit were selected. The purposive sample included four principals, seven deputy principals,

seven departmental heads (but only five availed themselves), and 19 teachers (after two joined the initial group of 17). The purposive sample also included the FET Curriculum Coordinator and two SESs; one for EDS (who is a former lecturer of EE), and the other for Life Sciences (who became a deputy principal during the study period). The data collection techniques included unstructured focus group interviews, document analysis, and face-to-face interviews (semi-structured). The data from the interviews were recorded and then later transcribed.

The data analysis is provided in the next chapter, Chapter 5. The data analysis is done by means of an adapted thematic approach. A description of how the approach was utilised is provided in the chapter.

CHAPTER 5

DATA ANALYSIS AND INTERPRETATION

5.1 INTRODUCTION

A description of the interpretive paradigm and qualitative research was provided in Chapter 1 and Chapter 4, as qualitative methods were used to collect the data in this study. The literature review was discussed in Chapter 2 and Chapter 3, and data on document analysis, focus group interviews and face-to-face interviews were presented and analysed. The data analysis started with the data collected from the unstructured focus group interviews, followed by the CAPS content analysis and, finally, the semi-structured face-to-face interviews.

5.2 DATA ANALYSIS PROCESS

This is a process that is meticulously organised into the “structure” or patterns so that the data gathered for the study provides useful clues that assist the researcher to draw conclusions about the problem of the study (Gray 2009: 493). The intention of “analysis is to understand the various elements of one’s data through the inspection of the relationships among concepts, constructs or variables, to see patterns or trends that can be identified or isolated or to establish themes in the data” (Mabunda 2014: 11).

5.2.1 Focus group interviews

These unstructured interviews were used as the baseline for other techniques. These interviews were used to acquire data about the interviewees’ backgrounds and interests. Pseudonyms have been used to protect the identity of the participants (see Annexure B1).

Thematic analysis was used for interviews, as adapted from Lichtman’s method (see Box 5.1). This analysis method is not commonly used in the research field. This method enabled the researcher to recognise, categorise, describe and report the major and sub-themes from the bulk of information found within the data (Nowell et al. 2017). This method was chosen because it is not rigid, yet it yields good results, such as ethnography “that seeks to identify and describe patterns and themes from the perspective of the

participants, and then attempts to understand and explain these patterns and themes" (Creswell 2009: 199). In this way, the researcher understands the meaning the participants attach to the problem.

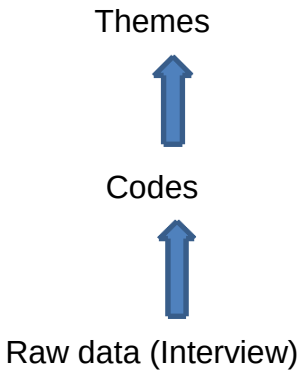
The analysis was done as follows: the researcher read the data several times to familiarise herself with it. As she was reading, she was writing down rough notes by means of abbreviations along the margins of the transcripts. It should be noted that HP 6560b laptop and Samsung J5 cellphone voice recorders were used during data collection to record responses, which were then jotted down word-for-word.

The second stage was that of the coding, which was done manually. "Coding means organising material into chunks or segments of text in order to develop a general meaning of each segment" (Creswell 2009: 227). The researcher did not predetermine codes. In attempting to know the participants and creating a relationship with them, she wanted the discussion of this purposive sample to naturally link to environmental problems and the research question, 'What curriculum framework can be designed for Environmental Education in the South African Further Education and Training band to promote the optimal implementation of Environmental Education?' She did not want to influence the data. Codes assisted in looking for themes, which were categorised into main and sub-themes.

The next procedure was to review the themes. The main and sub-themes identified previously "were reviewed and modified" here (Maguire & Delahunt 2017: 3358). The next phase was where the researcher "defines the theme" (Maguire & Delahunt 2017: 3351), what they mean, and any link between them.

Box 5.1

Stages in qualitative thematic data analysis



Adapted from Lichtman (2006: 168)

Box 5. 2

Focus-group interview analysis: main themes and sub-themes

Theme: Family background

Sub-theme: Geographical Location

Codes:

- Living on a farm,
- Living in a township,
- Comes from a village.

Theme: Education and work experience

Sub-theme: Subjects relating to EE

Codes: Majored in the following subjects containing EE topics:

- Life Sciences,
- Physical Science,
- Geography, and
- Life Orientation.

Sub-theme: Experience of teaching the subjects containing environmental topics

Codes:

- Experience in teaching - from four to 27 years,
- Taught Ecology in Grade 10,
- Taught Population Dynamics in Grade 12,
- Currently dealing with Environmental Studies as a topic in Life Sciences,
- Teaching social and environmental responsibility in Life Orientation,
- All topics in Geography and Physical Science are EE topics.

Theme: Interests/hobbies

Sub-theme: General

Codes:

- Interested in nutrition,
- Going to church,
- Farming,
- Sport.

Sub-Theme: Love for the natural environment/nature

Codes:

- Likes pets and wild animals,
- Crop farming/gardening
- Doing practical activities like cleaning location, and excursion.

Theme: Interest in study

Sub-theme: knowledge

Codes:

- Knowledge development.

Sub-theme: Submission of inputs for introduction of EE Codes:

- Help learners to be aware of the environment,

- To improve township environment.

Sub-theme: Stimulated by awareness of local environmental problems

Codes:

- Littering,
- Scarcity of water,
- Sewage problem,
- Energy problem.

Sub-theme: Enthusiasm to solve environmental problems

Codes:

- Member of Greenpeace,
- General concern about lack of water, sewage and littering problems

Theme: Expectation for study

Sub-Theme: Environmental Education in FET band

Codes:

- Support for introduction of EE
- Would not have been suffering with shortages of water and electricity if EE was taught at schools,

- **Family background**
  - Geographical location

    Three township participants, who experienced sewage and refuse problems, the background of three participants from the village, mine and farm, reminded them of their interaction with the natural environment (ecosystem) and influenced them to participate in the study.

- **Education; work experience**
  - Subjects relating to EE

    As mentioned in Chapter 1 and Chapter 4, a purposive sample was selected, which comprised of teachers of the four subjects that related most to EE. These subjects are Life Sciences; Physical Science (Physics and Chemistry); Geography; and Life Orientation.

    This sample of the focus group interview had the following participants:

    Megga majored in Life Orientation in her Postgraduate Certificate in Education (PGCE).

    Mike and ***KK*** did Geography, while *KK* also majored in EE.

    Za majored in Chemistry, Physics and Mathematical Literacy.

    Mrs B majored in Physics and Chemistry. She has also done Physiology and Biochemistry.

    Wagga has done Physical Science and Mathematics.

    Tono and ***King*** majored in Biology (Life Sciences). Tono also took EE at college.

    Lala majored in Chemistry and Mathematics.

    King majored in Physics, Chemistry and Biology.

    Hence, nine out of the ten participants had majored in one or more of the targeted subjects of the study. One participant only majored in Mathematics, but he was part of the sample by virtue of him being a principal, as mentioned in Chapter 1 and Chapter 4.

One can satisfactorily say that the researcher achieved her representative sample with this baseline technique.

- Experience of teaching a subject related to EE

The participants have experience of teaching the selected subjects. Their experience ranged from four to 27 years.

Mrs B: She has vast experience of teaching Natural Sciences, Physical Science and Biology up to Grade 12 level. She was once a Subject Advisor for Physical Science and was promoted to be the FET Curriculum Coordinator, the position she still holds. She manages all the FET subject advisors. Mrs B's qualifications and experience of both teaching and managing all the targeted subjects of the study, which are Physical Science, Life Sciences, Geography and LO, as well as others subjects, made a significant contribution to the study. Her contribution has shaped the way to the proposed curriculum framework for EE in the FET band.

- **Interest/hobbies**

o General

The participants were so open that they expressed everything they were thinking of. This is an advantage of the qualitative approach. For instance, Wagga, Lala and King like going to church, Mrs B and KK show interest in nutrition by means of growing vegetables and fruit trees. Mrs B, KK and King like farming. King and Mike like sport.

King: Farming and a regular churchgoer like *Wagga* above. Also interested in sport; like *Mike,* he confirms: "I am actually a born athlete".

- Love of the natural environment/nature

Most of the ten participants love the natural environment in one way or the other. Examples are given below:

*Megga'*s passion is health in the environment; *Chippa* and *Wagga* have references to farm life; *Za* likes doing practical things and takes learners out for excursions; *KK* developed a love for the environment when he first visited

Pilanesburg Game Reserve. KK and Mrs B have common interest on farming (livestock and gardening). Mrs B even wished to be married to a farmer but that did not happen as she settled with a priest.

Mrs B: " Like *KK,* I'm also keeping pets such as an Alsatian, Boerbull, German Sheperd, a three-legged cat".

Tono, just like *Za, KK* and *Mrs B,* is practical. *Tono* likes to use her hands.

> ***Tono:*** "That is why I like to be involved in this study because at least there I will help my learners to be aware of the environment, and also at least engage them because our location is very dirty. Also it can improve my location."

King, just like *KK* and *Mrs B,* likes farming and the environment:

> ***King:*** "As I heard most people, you seem to like the environment; I am also one person, I do not just go around throwing things. When I get out, I do not throw a tin over there as if there is a dustbin everywhere. When I am driving I rather wait until I get a dustbin, and then I empty my car dustbin into that."

The participants, confirming that the selection of this sample was a success, expressed a love for the environment in different ways. Their understanding of the concept environment seems to be limited to the natural environment (Dube 2012) (see 2.2.1.1).

- **Interest in the study**
  - o Knowledge development

    The interest of the participants was aroused during the first meeting when the study proposal was explained.

The focus group interviews, which took place during the second meeting, further piqued their interest. Lala and King expect knowledge development. While,

> ***Megga:*** "My passion is health in my environment; hence, my interest in this study."

- Submission of inputs regarding the EE Curriculum in the FET band

Five participants supported the introduction of an EE curriculum in the FET band because instead of saying EE they mentioned environmental awareness and practical activities. Hands-on activity is a feature of EE. They included the following two examples:

> ***Mrs B:*** "Maybe more of awareness in terms of environment. If something could come out of this, and we could increase awareness among the South African public, and how do we do that? We do that to the children. We need to train and educate the new generation to actually take care of our environment."

> ***Tono:*** "My interest is only to..., I like to work with children. I also like to use my hands. That is why I like to be involved in this ... study because at least later I will help my learners to be aware of the environment, and at least engage them because our location is very dirty. Also it can improve my location."

- Awareness of local environmental problems

Most participants expressed their experiences of local environmental problems:

> ***Mrs B:*** "My personal experience is that our children today, our grown-ups today, do not observe anymore; that they show no interest on the environment. I think if I were younger, if I was in the right situation, I would have been one of those Greenpeace. Most definitely, I would have been a real activist as far as that is concerned. When it comes to clean energy, solar energy, all of those options, I am quite informed when it comes to that. Building practices, when people come out with building material and building practices, which are environmentally friendly, where we actually take from the environment, care for the environment, and take the responsibility for the environment. I have my own compost, how many people do that today? And it is just simple to actually have your own compost, etc."

> ***King:*** "I do not just go around throwing things when I get out. I do not just throw a tin over there as if there is a dustbin everywhere. When I am driving, I rather wait until I get a dustbin and then throw rubbish into it. I

hope this study will develop me more and encourage me more regarding the care of the environment."

The participants expressed concerns about visible environmental problems, such as the scarcity of water in the area, which is also a national crisis. For example,

> ***Mrs B:*** "What we were discussing in the DMT meeting this morning was about the problem of water in Mamusa. This is affecting our PSFs. There
> are so many environmental problems, that is why flies are everywhere, in Mamusa and also in Vryburg."

- Enthusiasm to solve environmental problems

Mrs B wishes she could be a member of the Greenpeace; Za takes learners out for excursions, and a general concern about lack of water, sewage and littering problems shows that the participants require a tool to solve these problems.

- **Expectations of the study**

Some of the participants expected to learn about the topic from experienced people. To others, the knowledge gained could help them to interact with their learners on environmental issues. Some also believed that the research would develop their research skills.

Sub-theme: Submission of inputs for introduction of EE

- **Environmental Education in FET band**

The scarcity of water and load shedding of electricity in the chosen site for the study motivated all the participants to recommend for an EE curriculum in the FET band. They also experienced that teaching EE content across other subjects did not work as teachers focus on the subject-specific topics. In addition, because EE topics are the last, they receive little attention:

> ***Mrs B:*** "In the past I thought environmental concerns could be taught through other subjects, but recent environmental problems have made me realise there is a need for EE as a separate subject. *Ag man*! Just last week we

could not stay longer for our monitoring at the school because there was no water to flush the toilets; it was horrible."

As mentioned in section 1.5.3.4, the unstructured interviews were used to obtain information concerning 'participants' personal feelings, attitudes, beliefs and perceptions in relation to the phenomenon' . These were informal and open-ended interviews, which were used at the beginning of the empirical research to determine both the participants' background and interest in the study and topic. They allowed the participants to use their own language and go into more details than in the structured interviews; hence, the researcher obtained a fuller picture of their experiences.

The focus group was free to say anything, and there were indications that they understood the aim of the study. They were more conscious of the local environment. The township, where the study was conducted, had experienced a serious water shortage causing the teachers and learners to leave school earlier as it was a health risk. That is why the participants often spoke about the scarcity of water.

5.2.2 Analysis of CAPS documents

The use of document analysis is encouraged by Cohen, Manion and Morrison (2011) as an important method of qualitative research approach for quality enhancement of the findings (see 4.3.3.2 iii). This is ratified by Wellington (2015: 213) as he states, the documents "enrich a study" (see 4.3.3.2 iii).

The analysis of documents is an orderly strategy for reviewing documents. Scholars analyse existing documents to close the gaps or elaborate on what has been written about the topic they are examining.

In this study, in addition to the above, documents were used to complement the interviews. In that way, document analysis helped the researcher "to corroborate findings across data sets and thus reduced the impact of potential biases that could have existed in the study" (Bowen 2009: 28) (see 1.5.2.3).

The researcher examined CAPS documents of the four subjects, namely, Physical Sciences, Life Sciences, Geography and Life Orientation for Grade 10 to12, to determine the relevance and place of EE themes. These are the subjects mostly related to environmental themes. The researcher was looking for guidelines,

principles, specific contents or themes, conceptualisations, time allocation and assessments regarding EE.

In 4.3.3.2 (iii) Morse and McEvoy (2014: 5) highlighted that “Documents serve as substitutes for records of activity that the researcher could not observe directly”. The implication is that even if we cannot be all over, we still can acquire information about what we are interested in through any mode, which includes documents.

Although document analysis is preferred as a qualitative method of data, it also has its shortfalls, which include insufficient relevant information targeted for a particular study and particular topic as documents are produced for some purpose other than research. As Yin (1994: 80) argues, “An incomplete collection of documents suggests ‘biased selectivity”. It was not a major crisis for the study as the targeted documents, CAPS, were available (as explained above). However, the researcher did struggle with the retrieval of some electronic documents other than CAPS ones, which were protected against private use or could only be purchased. Moreover, “some materials were also incomplete” (Creswell 2009: 180).

The documents analysed were those of the four subjects mostly related to EE. They were the CAPS documents for Life Sciences, Physical Science, Geography and Life Orientation (see Annexure C).

Thematic analysis as indicated in Box 5.1 above.
The procedure included reading and re-reading the raw data, and then arranging relevant information relating to the research question into themes (Labuschagne 2003). See the table below:

Table 5.1 Thematic analysis for CAPS documents

Subject	**Life Sciences (L/Sc)**	**Geography (Geo)**	**Life Orientation (LO)**	**Physical Science (P/Sc)**
Theme	**Broad intentions of the curriculum**			
Sub-theme Codes:	• Equipped with “knowledge, skills and values" (Department of Basic • Education 2011a: 4). Meaningful attainment, application of information, skills; • Enhance local content; • Responsive to worldwide environmental essentials.			
Sub-theme Codes:	Purpose of NSC • Opportunity for tertiary institutions; • Adjustment from school to work environment; • Learner capabilities profile.			
Sub-theme Codes:	CAPS principles “Encourage active and critical learning; specified knowledge and skills to be achieved; progression from simple to complex content; environmental and social justice; Indigenous knowledge system (IKS); and provision of credible, quality and efficient education system” (Department of Basic Education 2011a: 4-5).			
Sub-theme Codes:	Curriculum capacitates learners with crucial skills: • Problem-solving skills; • Decision-making skills; • Important innovative thinking skills; • Successfully working alone; • Team work; • Responsible citizen; • Self-management; • Gathering, analytical, and assessment skills; • Skill of sharing opinions with self and others; • “Effective use of Science and Technology” (Department of Basic • Education 2011b: 5); and • Holistic understanding of environment as a totality.			

Theme	Life Sciences CAPS	Geography CAPS	Life Orientation (LO) CAPS	Physical Science CAPS
Sub-theme	Define Life Sciences "Scientific study of living things" from minute to larger forms, their interrelationships, also with their places (Department of Basic Education 2011a: 8).	Sub-theme: Define Geography "The study of human physical environments" (Department of Basic Education 2011b: 8).	"The study that addresses skills, knowledge and values about the environment and responsible citizenship among others" (Department of Basic Education 2011c: 8).	Sub-theme: Define Physical Science "Study that investigates physical and chemical phenomena" (Department of Basic Education 2011d: 8).
Sub-theme	"Learners of Life Sciences develop" basic skills (Department of Basic Education 2011a: 8):			
Codes:	• Biological knowledge; • Assessment and dialogue abilities; • Thought and skills of science for sceptical Biological investigations.	• Description and clarification of geographical processes; • Showing the interaction between people and the natural environment; • Knowledge about places; • Exercises on geographical language, numbers and graphical representation; • Encouraging the employment of technology; • Pledging for sustainability; • Acknowledge-ment of the gap between the affluent and the poor; • Sensitivity towards others; • Sound decisions and actions when dealing with issues affecting society and environment (Department of Basic Education 2011b: 8).	• Empower learners to form holistic relationships; • Accountable for decisions made; • Respect for rights; • Acquisition of knowledge, skills and values for sound decisions (Department of Basic Education 2011c: 9); • Progression from school to work place (Department of Basic Education 2011c).	Codes: • Foster environmental awareness; • capacitated with research skills; • "Relationship between science, technology, society and environment" (Department of Basic Education 2011d: 8); • Actionalising knowledge of science and technologies; • Career pathing; workforce.
Sub-theme	Environmental Awareness			
Codes:	• Recognition of the value of (Bio-Tech) and L/Sc for human beings; • Acknowledges the undesirable effect of the people on the natural habitats; • Recognises the presence of			

	different plants and animals on the continent; • Meaning of responsible citizenry who knows how to use the environment; • Appreciation of the role played by biologists.			
Sub-theme	Intention of L/Sc	Sub-theme: Prescribed skills	Sub-theme: "Attitudes and values" (Department of Basic Education 2011c: 25).	Investigative Skills
Codes:	• Understanding of science for answering environmental questions; • Empowers learners for involvement that enhances responsibility towards natural environment; • Develops skills for exploration, rethinking, ability to make the whole from parts and share views; • Understanding of therelationship • between L/Sc and EE; • Recognising the impact of ethical issues.	• Oral and visual presentations; • Field/practical/research activities; • Teamwork skills. • A worry about equitable use of resources; • Importance of	"Respect and responsibility" (Department of Basic Education 2011c: 25).	• Categorisation • Sharing ideas; • Weighing risks • "Formulating models, observing and comparing, interpreting, predicting and reflective skills" (Department of Basic Education 2011d: 8).
Sub-theme		Sub-theme: "Attitudes and values" (Department of Basic Education 2011b: 9).		
Code:		• A worry about equitable use of resources; • Importance of Sound decisions; • Putting acquired knowledge and skills into practice; • Recognition of the rights of people.		
Theme	L/Sc aims and assessment			
Sub-theme	Aims			
Codes	• Possession of scientific knowledge and skills for investigations; • Use of science to understand societal			

	knowledge and culture.			
Sub-theme	Skills to be achieved by the above aims: Cognitive:			
Codes:	Scientific language acquisition; Conceptual understanding; Application of acquired knowledge; • "Analysis, evaluation, and synthesis of scientific knowledge, concepts and ideas" • (Department of Basic Education 2011a: 14) • Linking science with indigenous knowledge. • Practical skills: following directions, use apparatus, observe, recording, measuring, interpretation			
Theme	Structure in relation to EE	Structure in relation to EE	Structure in relation to EE	Structure in relation to EE
Sub-theme	"Environmental studies" (Department of Basic Education 2011a: 10).	Sub-theme: "The atmosphere" (Department of Basic Education 2011b: 13).	Sub-theme: "Social and environmental responsibility" (Department of Basic Education 2011c: 8).	Sub-theme: "Matter and materials (Department of Basic Education 2011d: 8).
Codes:	"Biosphere to ecosystems" • (Department of Basic Education 2011a: 10).; • "Population ecology" • (Department of Basic Education 2011a: 10).; • "Human impact On environment" • (Department of Basic Education 2011: 10).	• "Composition and structure; heating; and moisture; earth's energy balance; global air circulation; Africa's weather and climate; Drought and desertification; cyclones" (Department of Basic Education 2011b: 13).	• "Social issues" (Department of Basic Education 2011c: 10). • "Environmental issues" • Department of Basic Education 2011c: 10); • "Active participation in EE activities" • (Department of Basic Education 2011c: 10).	Impacts of plastic Sub-theme: "Chemical systems" (Department of Basic Education 2011d: 8). "Hydrosphere; Lithospheres; Chemical industry" (Department of Basic Education 2011d: 11).
Theme			Topics assisting EE recognition	
Sub-theme:	"Diversity, change and continuity" (Department of Basic Education 2011a: 10).	"Geomorphology" (Department of Basic Education 2011b: 13).	Sub-theme: "Human rights" (Department of Basic Education 2011c: 8).	"Chemical change" (Department of Basic Education 2011d: 11).
Codes:	"Biodiversity And classification" (Department of Basic Education 2011a: 10); "History of life on earth" (Department ofBasic	"Composition and structure; heating; and moisture; earth's energy balance; global air circulation; Africa's weather and climate; Drought and desertification.	"Structure of the Earth; plate tectonics; folding and faulting; earthquakes; volcanoes;	"Physical and chemical change" (Department of Basic Education 2011d: 11).

	Education 2011a: 10); "Natural selection" (Department of Basic Education 2011a: 10); "Human evolution" (Department of Basic Education 2011a: 10).		topography and different types of rocks; slopes; mass movements and human responses; drainage systems; fluvial processes; catchment river management" (Department of Basic Education 2011b: 13).	"Reactions in aqueous solution and acids bases" (Department of Basic Education 2011d: 46). "Energy and chemical change" (Department of Basic Education 2011d: 11).
Sub-theme:			"Human rights" (Department of Basic Education 2011c: 8).	
Theme Sub-theme Codes	Assessment EE strands assessed • "Environmental Studies" (Department of Basic Education 2011a: 10). • "Diversity Change and Continuity" (Department of Basic Education 2011a: 10).	Codes: "Structure of rural and urban settlements and issues" (Department of Basic Education 2011b: 13). Sub-theme: "Population" (Department of Basic Education 2011b: 13). Codes: "Distribution and density; structure; growth & movements; HIV and AIDS" (Department of Basic Education 2011b: 13). Sub-theme: "Development" (Department of Basic Education 2011b: 13). Codes: "Concept; framework; trade; challenges associated with development; development aid" (Department of Basic Education 2011b: 13). Sub-theme: "Economic issues" (Department of Basic Education 2011b: 13). Codes: "Structure; agriculture; mining; secondary and tertiary sectors; strategies for industrial development; informal sectors" (Department of Basic Education 2011b: 13). Sub-theme: "Resources and sustainability" (Department of Basic Education 2011b: 14).	"Responsible citizen" (Department of Basic Education 2011c: 10); "Human rights" (Department of Basic Education 2011c: 10). Sub-theme: "Career path" (Department of Basic Education 2011c: 8). Codes: • "Subjects, and career pathing" (Department of Basic Education 2011c: 10). Theme: Assessment Sub-theme: EE topics assessed Codes: "Social and environmental responsibility" (Department of Basic Education 2011c: 8).	Sub-theme: "waves, sound and light" (Department of Basic Education 2011d: 10). Codes: • "Frequency, amplitude, period, speed waves as well as electro-magnetic radiation" Department of Basic Education 2011d: 27-29). Sub-theme: "Mechanics" (Department of Basic Education 2011d: 10). Codes: • "Energy"; • Forces. (Department of Basic Education 2011d: 10). Sub-theme: "Electricity and magnetism" (Department of Basic Education 2011d: 10). Codes: "Energy" and forces (Department of Basic Education 2011d: 10). Theme: Assessment Sub-theme: EE topics Assessed. Codes:

		Codes: “Sustainable use of resources; floods and erosion; conventional and non-conventional energy management; their impact on the environment” (Department of Basic Education 2011b: 14). Assessment EE topics assessed • “Atmosphere”; • “Geo-morphology”; • “Settlements”; • “Population”; • “Development”; • “Economy”; •“Resources” (Department of Basic Education 2011b: 13-14).		• “Matter and materials” (Department of Basic Education 2011d: 8); • “Chemical systems” (Department of Basic Education 2011d: 8); • Chemical change (Department of Basic Education 2011d: 11); • “Mechanics” (Department of Basic Education 2011d: 10); • “Waves, sound and light, and electricity” (Department of Basic Education 2011d: 10); • “Magnetism” (Department of Basic Education 2011d: 8).

5.2.2.1 Aim and purpose of CAPS for EE

The aim and purpose of the South African Curriculum (CAPS) accommodates EE because it "equips learners with the knowledge, skills and values necessary for self-fulfilment, and meaningful participation in society as citizens of a free country” (Department of Basic Education 2011: 4). The broad intention of the Curriculum is to afford a chance for meaningful attainment and application of information and skills; enhance local content; and responsiveness to worldwide environmental essentials. The purpose is to avail an opportunity for tertiary institutions; adjustment from school to work environment; and develop learners’ capabilities profile. It means, with the provision of EE in the FET band, the learner will continue with it at tertiary level as a career for the future and profile for the workplace. Therefore, it cannot be problematic to integrate EE as an independent subject as these aims and purpose guide all subjects in the school curriculum. They also fit in well with the goals and objectives of articulated the by Tbilisi Conference, which emphasise the same as stipulated in section 2.2.4.1 (iv).

(a) Principles:

Two out of seven principles that highly acknowledge EE include:

“Human rights, Inclusivity, Environmental and Social Justice” (Department of Basic Education 2011a: 5). This principle will help learners to respect the environment, resources, and consequently, the rights of people. It will inculcate sensitivity to environmental issues. Learners will know that the wise use of the environment will maintain the quality of the environment and alleviate poverty and inequality – that is, “Human rights, Environmental and Social Justice”, as stressed in the Constitution (Department of Basic Education 2011a: 5). These two principles are made achievable, including to “encourage active and critical learning; specified knowledge and skills to be achieved; progression from simple to complex content; Indigenous Knowledge system (IKS); and provision of a credible, quality and efficient education system” (Department of Basic Education 2011a: 4-5). All these principles will guide the EE curriculum framework in the FET band. To handle environmental issues, participatory learning of sceptical minds is required; the special knowledge and skills presented under the section dealing with the selected subjects are required; the teaching of environmental content moves from a simple manner of the definition of the concept to the application and evaluation of knowledge.

Valuing indigenous knowledge systems (IKS) acknowledges the identified country’s sites of the natural environment, such as the Taung Skull in the Dr Ruth Segomotsi Mompati District where the study was conducted, the Sudwala caves, the Sterkfontein caves and others. However, learners will also be taught to avoid the negative influences of IKS on the use of the environment for cultural and traditional purposes, for example. This principle makes provision for EE.

The curriculum also empowers learners with crucial skills, including:

“Problem-solving” (Department of Basic Education 2011a: 5), where a learner can start at a smaller scale at school level, like a recycling project;
Important innovative thinking, which enables learners to create models or instruments that can save rain water for gardening projects;
Learners are enabled to successfully work alone so that they can develop a sense of ownership, which teaches them to be responsible and understand consequence management;

The curriculum also enhances teamwork so that learners understand the importance of cooperative activities and integrated governance required by most environmental problems;

The skill of “self-management” and management of their initiatives, which teach them to successfully manage the environment and its products (Department of Basic Education 2011a: 5);

Investigative skills of gathering, analysing, synthesing and assessing information regarding environmental issues, which will inform wise decisions about the next actions to be taken for the protection of the environment; The skill of sharing opinions with self and others;

“Scientific and technological skills to show responsibility towards the environment and health of others” (Department of Basic Education 2011a: 5). The understanding that people’s actions, especially social and economic developments, affect the health of the environment and people equally; examples include mining, use of chemicals during crop production;

A holistic understanding of the environment (Department of Basic Education 2011).

The following sections deal with the data analysis on the four selected subjects that are most closely related to EE.

5.2.2.2 Subject Specific

The document analysis on this section is based on Life Sciences, Physical Science, Geography and Life Orientation. These are the four selected subjects of the study. As mentioned in Chapter 1, these subjects were sampled because they are most closely related to EE. The analysis is based on the definition, subject specific aims, content and skills, time allocation, and assessment.

(i) Life Sciences CAPS

This is the “scientific study of living things” from minute to larger forms, as well as their interrelationships, including with their living spaces (Department of Basic Education 2011a: 8). The definition contains environmental content. But I agree with Reddy (2011) that teachers are failing to implement environmental content in the curriculum. This is supported by a grade 10 Life Sciences teacher who in his study says “I am expected to integrate environment content knowledge in my teaching of Life Sciences within a curriculum that is content referenced” (Songqwaru 2012: 3). By this he means that Life Sciences focuses on its biology content yet teachers are expected to reflect

EE teaching they were never trained to do. It is for this reason that a curriculum EE is required for optimal implementation in the FET band.

Songqwaru's view can be observed in the following section on abilities. The reader should note that these Life Sciences abilities have been modified by the researcher to attempt to accommodate Environmental Education in Life Sciences' teaching and learning for the sake of this study, however they still reflect their biological identity.

Life Sciences empowers FET learners with the following abilities: Biological knowledge that helps learners to understand all the components of its nature and structure. In other words, what is means, its intention, its content structure, as well as its importance; assessment and dialogue abilities to get a sense of biological and other environmental matters; the thoughts and skills of science for sceptical biological investigations; it also enhances environmental awareness, which includes the recognition of the value of "Bio-Tech and L/Sc" for human beings (Department of Basic Education 2011a: 8); Life Sciences promote acknowledgement of the undesirable effect of people on their natural habitat; It also enhances the recognition of the presence of different plants and animals on the continent, that they should be taken care of to prevent these species from disappearing; also helps an understanding of the meaning of a "responsible citizenry" who knows how to use the environment so that it does not jeopardise the living chances of others; and lastly an appreciation of the role played by biologists (Department of Basic Education 2011a: 8).

Furthermore, Life Sciences (Department of Basic Education 2011a: 8) seek: An understanding of science for answering environmental questions; to empower learners for involvement that enhances responsibility towards the natural environment; to develop skills for exploration and rethinking; the ability to make the whole from parts, and to share views; understanding the relationship between L/Sc and EE (Department of Basic Education 2011a: 12); and to recognise the impact of morality regarding the use of environmental resources (Department of Basic Education 2011a: 12).

Studies have revealed that learners' interest has declined in science resulting in withdrawal from Life Sciences as a compulsory subject, due to the context and content that do not satisfy their interests and relevance (Kidman 2008, 2010). If that is the case, can EE still be taught through Life Sciences?, denying it its "monolithic approach (Stand alone subject)" (Sukarjita et al. 2015: 253).

Life Sciences aim for skills (see Annexure C 3) that can be acquired during the assessment of learners. These include cognitive skills, such as scientific language acquisition; conceptual understanding; application of acquired knowledge; “analysis, evaluation and synthesis of scientific knowledge, concepts and ideas” (Department of Basic Education 2011: 14); and linking science with indigenous knowledge. The practical skills include following directions, using apparatus, observing, recording, measuring, and interpretation” (Department of Basic Education 2011a: 15-16). “Well designed assessments must show evidence that by the end of the year; all of the skills have been assessed at a grade-appropriate level” (Department of Basic Education 2011a: 18). Though Life Sciences has many skills to be assessed, there is little time and a small amount of skills to be assessed due to less practical work prescribed to be done in the two strands accommodating EE.

Life Sciences is structured into four major topics called “strands” (Department of Basic Education 2011a: 9) (see 3.4.3.3). Two of the four strands contain environmental content, and they are, “Environmental studies; and Diversity, change and continuity” (Department of Basic Education 2011a: 10).

The concept ‘content progression’ of the knowledge strands has been unpacked (see Annexure C 2). Environmental Studies is dealt with in two grades in the FET band, Grade 10 and Grade 11. Grade 11 content is then assessed (examined) in Grade 12.

In Grade 10, the Environmental Studies strand deals with one topic only, biosphere to ecosystems. “This section is structured to introduce learners to some of the interactions (ecology) that occur in nature and to the terminology and concepts (environment, ecology, biosphere, biomes, ecosystem and so on) that describe them” (Department of Basic Education 2011a: 33). They are then used in Grade 11, where applicable. “This enables learners to contextualise the meaning of these terms and concepts within the familiar contexts of their local area as well as Southern Africa as a whole” (Department of Basic Education 2011a: 33). This implies that they assist learners to relate their meanings to what they see happening in their own environment; for example, the negative impact people have on the environment. This is a problem for the teacher who does not have a guideline or prescription of where and when to apply them, especially new teachers. This further disadvantages learners who are supposed to be guided by these teachers.

Environmental Studies in Grade 11 comprises two topics, namely, “population ecology” (Department of Basic Education 2011a: 49), which was introduced in Grade 10 above, and “human impact on the environment” (Department of Basic Education 2011a: 51), already mentioned under the discussion on Grade 10 above. These sections strive to enable learners to investigate the relationship between people and their natural habitats; that is, how they use the resources, the effect of industrialisation on the atmosphere, and the impact of an increase in their numbers on the need for food. With these topics, learners are motivated to evaluate the impacts and come up with appropriate solutions. The topic of “human impact on the environment” (Department of Basic Education 2011a: 51) is completed in Grade 12.

“Diversity, change and continuity” in Grade 10 contains environmental content on “biodiversity and classification”; and the “history of life on earth” (Department of Basic Education 2011a: 35-36). The strand highlights different forms of organisms “from bacteria” as the smallest, to larger ones (Department of Basic Education 2011: 35). It also reflects “changes in life forms are related to climate changes as well as movements of continents and oceans over long periods of time” (Department of Basic Education 2011: 35). The topic on “biodiversity and classification of organisms” (Department of Basic Education 2011a: 39-41) is expanded in Grade 11. This section unpacks the existence of organisms, from the smallest size classified as “micro-organisms” to the larger size called “macroscopic plants and animals (Department of Basic Education 2011a: 39). The emphasis is on the groupings of organisms in accordance with visible characteristics. The smallest organisms include “viruses, bacteria, protista, fungi” (Department of Basic Education 2011a: 39), while the larger group includes “porifera, cnidaria, platyhelminthes, annelida, arthropoda, chordata” (Department of Basic Education 2011a: 41). The topics also describe the positive and negative contributions of the organisms to the ecological, economic and medicinal functioning of the environment. Positive contributions include medicinally “for vaccination, as drugs and medicines” (Department of Basic Education 2011a: 39); economically “for traditional technology for beer and wine making”, “seeds as food, seed banks, and endemic species” (Department of Basic Education 2011a: 39-40); and ecologically “Protista and F Bryophytes and Angiosperms plants have a decreasing dependence on water for reproduction” (Department of Basic Education 2011a: 40). The negative effects include diseases caused by “viruses, bacteria, protists and fungi”

(Department of Basic Education 2011: 39). The section also deals with “some evolutionary development in plant and animal phyla” (Department of Basic Education 2011: 39). In Grade 12 the content is about “evolution by natural selection” (Department of Basic Education 2011a: 61), and “human evolution in Africa”, with more biological content than environmental (Department of Basic Education 2011a: 63).

Although the two strands are supposed to deal with environmental problems and how to solve them, they focus more on biological content, which deals more with the classifications, location nutrition, structural characteristics and life cycles of living things, rather than the relationships with and impact of them on the natural environment. In other words, Life Sciences responds to its mandate of teaching about living things and less on the relationship with the natural environment. For instance, as mentioned above, the “Environmental Studies strand” in Grade 10 introduces “terminology and concepts”, which are only “contextualised” in Grade 11 (Department of Basic Education 2011a: 33), the topic, “Human impact on the environment” (Department of Basic Education 2011a: 51) is completed in Grade 12, which is a “build-up of knowledge acquired during the Senior Phase” (Department of Basic Education 2011a: 33).

The time allocated for EE content in Life Sciences is negligible. This confirms what the participants said during the interviews; that there is little EE content in Life Sciences when compared to biological content. For a Grade 10 class, the time allocated for “Environmental Studies” (Department of Basic Education 2011a: 33) in the Life Sciences curriculum is nine weeks (Department of Basic Education 2011: 34) and six weeks (Department of Basic Education 2011a: 35-36) for “Diversity, change and continuity” (Department of Basic Education 2011a: 35). Sixteen and a half weeks are allocated for “Environmental Studies” (Department of Basic Education 2011a: 46-52) in Grade 11, and eight weeks for “Diversity, change and continuity” (Department of Basic Education 2011a: 39-41), which is better than in Grade 10. In Grade 12, there is no allocation for Environmental Studies; it only examines Grade 11 work (as mentioned above), and seven and a half weeks are allocated for “Diversity, change and continuity” (Department of Basic Education 2011a: 57, 61-63). The time prescribed includes teaching and learning, formal and informal activities, as well as practical activities.

Although “the teachers have the freedom to expand concepts and to design and organise learning experiences according to their local circumstances...” (Department of Basic Education 2011a: 10), the time to do that is minimal. The curriculum has been developed in such a way that there are more topics to be covered within the little time available. For instance, “Thirty-two weeks of teaching out of forty weeks in Grades 10 and 11, and twenty-seven and half in Grade 12, which include disruptions due to other school activities” (Department of Basic Education 2011: 19), as well as other external forces, are not enough for the quality teaching of EE. It also puts pressure on the teacher who has do practical work. As a result, a teacher sacrifices his/her time, or rushes over topics, or even leaves some for the learners to study themselves. This practice affects especially EE topics, which are the last in curriculum, and teachers concentrate on those topics that are more subject-specific.

Both formal and informal assessments are important. Weightings for examinations are “120 out of 300 in Grade 10” (Department of Basic Education 2011: 71), “150 in Grade 11” (Department of Basic Education 2011: 72), and “66 out of 300 in Grade 12” (Department of Basic Education 2011: 73). This discrepancy must be understood in the context of a paragraph above in which the amount of environmental content and how it progresses across the FET band is highlighted. Though EE strands are given a high weighting in the end-of-year examination, with little time available (as already alluded to), there are ineffective “practical demonstrations, less discussions, no learner teacher conferences” (Department of Basic Education 2011: 66) which are expected by the curriculum and are appropriate for environmental content. Also, there could be the misuse of the privilege provided to a Life Sciences teacher of deviating from the prescribed weighting, which can disadvantage EE strands. A study by De Villiers (2011) for FET band revealed that themes under Diversity, change and continuity strand are more difficult to learn, particularly six evolution themes in Grade 12 which are EE topics, yet many researchers feel that EE should still be taught through Life Sciences.

This section analysed Life Sciences CAPS for the FET band in order to examine its relation to EE. Life Sciences contains environmental content in two strands, namely, “Environmental studies” and “Diversity, change and continuity” (Department of Basic Education 2011: 10). Though these strands are given reasonable weightings in the examination, more content is of a Life Sciences nature than environmental. This is confirmed by how content is progressed across the FET band (as alluded to in the fourth paragraph above this).

Teaching EE through Life Sciences is a serious challenge because teaching Life Sciences on its own is a challenge due to a lack of teachers' subject knowledge, poor pedagogy, and assessment practice (Songqwaru 2012). Many professional programmes have been conducted to develop and support teachers with the incorporation of EE such as loss of biodiversity content in the curriculum; however, very little progress has been registered "in ensuring that environmental issues are consistently and coherently implemented in the school curriculum" (Lotz-Sisitka 2011; Tshiningayamwe 2016: 38).

To teach science alone is complicated, that is why many teachers are not comfortable to do it (Forbes & Zint 2011; Mosely, Desjean-Perrotta, & Utley 2010) (see 3.3.2.3). therefore, to teach EE through science requires advance methods In their study, Sukarjita et al. used a model that environment. It is the behaviour of how an individual live and work together with environmental problems. The model is called MOTORIC, an acronym for "Motivation, Observation, Talking, Orientation, Reinforcement, Implementation and Confirmation" (2015: 154). The model focuses on

Three approaches, namely, character, context and multimedia. Character approach learning focuses on the attitudes of the learner towards the environment. It is the behaviour of how an individual live and work together with everything surrounding him (Rohman 2012). Contextual approach is a emphasises a link between what the learners learn and the environment they find themselves in by means of application (Komalasari 2011), while multimedia approach is based on learning by means of audio-visual technology (Sukarjita et al. 2015). The findings for this study was that integration of EE into Science by means of MOTORIC learning model "increases learners' knowledge about the environment" because the teacher provokes interest by means of questions (Motivation); learners make direct observation of environmental problems outside the classroom and indirect observation by means of multimedia; group discussion (Talking) increases the number of environmental solutions; the teacher directs the conclusion (Orientation); teacher provided with EE knowledge and enhancement of learner attitude (Reinforcement); fostering learners' positive attitudes towards preservation and protection of the environment (Implemetation); learners reminded to display positive attitudes towards the environment (Confirmation) (Sukarjita et al. 2015:155 & 158).

This model like others, requires careful planning and more time to accommodate two subjects at a time without compromising their aims and identity. This puts pressure on teachers who are already overloaded.

In many occasions, teachers teach Science topics under the headings of EE for the sake of relevance to environmental content, ignoring the nature of EE of approaching environmental issues from the “scientific, social, political, economic and ethical “perspectives (Makinster 2010: 252). This becomes difficult for the learners to get a holistic picture of the environment and to address the EE problems holistically so.

According to Songqwaru (2012 :144), “An environmental focus is different in the different subjects because each subject has its own epistemological basis”. This is a challenge for the teachers who must demonstrate a clear understanding of those differences in order to teach EE content.

On that note, Mokhele (2011) maintains that integrating EE in other subjects in South Africa is just but a dream that cannot be realised. Her argument is that, one of the serious obstacles is that the South African higher education system has not trained teachers to teach in an integrated approach. Even worse, there are no national and provincial documents to empower and guide teachers in implementing this approach.

It is for these reasons and others already mentioned in the preceding paragraphs, that EE should not be taught through Life Sciences but rather be accorded its status as an elective subject in the school curriculum.

The next section analyses Geography CAPS for the FET band.

(ii) Geography CAPS

Geography is “the study of human and physical environments” (Department of Basic Education 2011b: 8). The term Environmental Education is not visible in the Geography CAPS document, which makes it impossible for Geography teachers to perceive that the subject actually contains environmental concerns. The CAPS document only contains the terms “environment” (Department of Basic Education 2011b: 8). The other weakness of the document is that it does not contain a glossary section with a definition of the term ‘Environmental Education’.

According to Kahraman (2016: 123), “the function of Geography is to provide individuals with the data on the operational mechanism of the nature and the activities of humans who benefit from this”, but does not prescribe to EE. Geography aims at producing a learner who will be able to: describe and clarify geographical processes such as water cycle, erosion, development, climate change and so forth; show the interaction between people and the natural environment; display knowledge about places, meaning their proximity and size, as well as other physical features; do exercises on geographical language, numbers and graphical representation; encourage the employment of technology; pledge for sustainability; acknowledge the gap between the affluent and the poor; show sensitivity towards others; and make sound decisions and actions when dealing with “social and environmental issues” (Department of Basic Education 2011b: 8).

These aims are relevant to teaching EE because in order to deal with environmental problems, a learner needs to have a conceptual and visual understanding of the “human and physical environments” (Department of Basic Education 2011b: 8). Geography empowers learners to understand that any negative impact on the environment will in turn affect the health and wealth of human beings. It therefore advocates the wise and safe utilisation of the environment and its elements by using appropriate technology that will not jeopardise the value of the natural environment, as we are in the era of the Fourth Industrial Revolution in South Africa. This is the focus of EE. Geography highlights a sensitivity to both the environment and people in order to reduce the gap between the affluent and the poor.

Geography aims to develop the determined skills (Department of Basic Education 2011b). These subject skills are employable for EE: Oral and visual presentations: These enable the learner to talk about issues, to calculate and represent the risks or impacts they observe, in the form of “text, pictures, graphs tables, diagrams and maps”, which have the ability to draw attention to the problem prevailing, for instance, drought (Department of Basic Education (2011b: 9); field/practical/research activities: the nature of Geography and EE is practical. They capacitate the learners with investigative strategies. A learner is empowered to recognise an environmental problem, and analyse and assess it. Learners also develop skills of sound deductions or conclusion; taking a position on something, and problem-solving (Department of Basic Education (2011b); teamwork skills: As EE, Geography develops intrapersonal and interpersonal skills. These are acquired, especially during practical activities.

Geography CAPS contributes to the general aims of the school curriculum by “equipping learners with knowledge, skills” (Department of Basic Education 2011b: 4), “attitudes and values” (Department of Basic Education 2011b: 9) “that are meaningful to their own lives” (Department of Basic Education 2011b: 4) in the environment they live in. All these could be employable to address environmental crises: learners are prepared to express concern and take precautionary measures to cater for the equitable use of resources so as so avoid the two extreme environments of the wealthy on one side and the poorest of the poor on the other. FET learners are also equipped to indicate the importance of sound decisions when using the natural environment and associated resources. Geography prepares learners to put their acquired knowledge and skills into practice; for instance, to weigh the pressure they put on environmental resources for their basic needs. The other value is that of the recognition that other citizens are also entitled to an environment in which they feel secure and to a share in the distribution of resources (Department of Basic Education 2011b: 9), which incorporates a sense of sustainability. As Geography emphasises the interdependence between the natural environment and people, infringing on the rights of others means the same to the natural environment.

From the above, one can say that Geography CAPS put more emphasis on the “skills, attitudes and values that are meaningful to learners own lives” in their environment (Department of Basic Education 2011b: 8-9) than the NATED 550 curricula (Dube 2012). This is fitting, considering the interdependence between people and the natural environment.

Table 5.2 below presents the time distribution in Geography CAPS in the FET band. All Geography topics reflect environmental issues, although others focus on the specifics of Geography. Geography CAPS has topics distributed as follows (see 3.4.3.3):

Table 5.2: Structure in relation to EE

Term	Grade 10	Grade 11	Grade 12	Time allocated
1	1. The atmosphere	1. The atmosphere	1. Climate and weather 2. Geomorphology	36 Hours
2	2. Geomorphology	2. Geomorphology	3. Rural and Urban Settlement	36 Hours
3	3. Population	3. Development Geography	4. Economic Geography of South Africa	36 Hours
4	4. Water resources	4. Resources and Sustainability	5. Revision	24 Hours

Department of Basic Education (2011b:11-14, 21-26, 30-37, 41-48)

The structure presented in Table 5.2 above is unpacked (see Annexure C 4) to reflect environmental elements**.**

Looking at the topics mentioned above in Table 5.2, and Annexure C 4, there are more environmental issues in the Geography CAPS than general and specific Geography issues. Attempts have been made to use Geography as a strategy to teach EE in the FET band because "it helps learners to acquire the awareness of the earth, natural resources and their value, natural mechanisms, to investigate human and economic activities together with the interaction between man and nature" (Kahraman 2016: 121). However, the problem is challenges faced by the teachers (see 22nd paragraph of 5.2.2.2 a). The topic "The atmosphere" addresses climate crises (Department of Basic Education 2011b: 13); while "Geomorphology addresses issues of earthquakes, volcanoes, mass movements and human responses, drainage systems, fluvial processes, catchment and river management". Geography also deals with the effects of "settlement issues", which is a South African crisis; the "Population section expresses the pressure put on the environment by population explosion, and the economic demand of HIV and AIDS"; and "Development Geography" attends to "trade and development issues and challenges" (Department of Basic Education 2011b: 13). Geography CAPS deal with the impact of "economic development such as agriculture, mining and industrialisation" (Department of Basic Education 2011b: 13) on the environment. It also addresses the use of "resources such as water and energy" (Department of Basic Education 2011b: 14).

However, with the worsening environmental conditions in South Africa, there is an urgent need to employ EE to address these problems. South Africa is the biggest polluter on the continent, and while it experiences floods, on the other hand, there is a shortage of safe drinking water and energy and severe poverty, on the other hand.

Geography alone cannot win this battle, especially as it is not compulsory in the FET band.

The other issue is that Geography is structured in such a way that the teaching approach is fact or topic based. “As far as its principles are concerned, geography does not develop techniques and methods as to how to sort out environmental Problems” (Kahraman 2016: 123). This is exacerbated by the fact that the Geography CAPS document does not provide guidelines on how to incorporate environmental themes. Another challenge relates to “teachers’ inadequate knowledge of the concept ‘environment’ and limited familiarity with appropriate pedagogical approaches” (Ferreira & Molala 2017: 11).

Assessment: As explained above, most of the topics have environmental content and so has their assessment. There are two examination papers for Geography CAPS; paper 1 of 225 marks and paper 2 of 75 marks; the year mark is 100, adding up to a total assessment of 400 marks (see Annexure C 5). Geographical skills and techniques are integrated into all the assessments. The intention is to evaluate learners in all their capabilities (Department of Basic Education 2011b); that is, theoretically and practically, and “in familiar or unfamiliar contexts to enhance the interest and enthusiasm of learners” (Department of Basic Education 2011b: 51). New situations are more interesting than familiar ones, and therefore promote vibrant learning. This type of assessment accommodates EE.

In addition to challenges faced by the teachers (see 22nd paragraph of 5.2.2.2 a) and those mentioned by Ferreira and Molala (2017: 11), it requires special capabilities to teach Geography which include, inquiry strategy; knowledge of how to conduct outdoor activities; geographical skills such as, “map work and visual skills, world knowledge and global issues; citizenship and cross-curricular approaches” (Catling, Willy & Butler 2013). Inability to demonstrate these capabilities by teachers has resulted in the underperformance of Geography in the FET band in South Africa. Without these capabilities, a Geography teacher struggles to teach EE through Geography. These problems are also regional. Investigation on how the Geography teachers implement enquiry strategy for learning revealed that teachers face limitations in terms of integrating environmental learning into the Geography curriculum (Simasiku 2012). In their study of the implementation of Environmental Education in Geography (Grades 8 -10) in Namibia, Loubser and Simalumba (2016: 57), found that “educators do not understand the kind of skills and attitudes that learners need to acquire in order to

contribute to the health of the environment". They confuse skills with activities such as tree planting.

Monde (2011) and Kalimaposo and Muyela (2014) discovered that most educators in high school in Zambia lacked knowledge of EE and how to teach it. In Zimbabwe, Mukoni's study (2013) revealed that EE was simply 'greening' curriculum based on acquision of knowledge of EE without practical action.

That is why this study recommends a stand-alone EE curriculum in the FET band to avoid fragmentation of EE; also, for EE perform its rightful mandate as determined by its nature and UNESCO's goals and objectives for EE (see 1.4.2.2; 2.2.1.3 i).

After analysing the Geography CAPS document, the following section analyses the Life Orientation CAPS document.

(iii) Life Orientation CAPS

"Life orientation is the study that addresses skills, knowledge and values about the environment and responsible citizenship among others" (Department of Basic Education 2011c: 8). This definition aligns with the general aims of FET CAPS and accommodates both the physical and social environments. The subject is offered to all learners in the FET band. As seen above, the definition of Life Orientation (LO) contains the term "environment" (Department of Basic Education 2011c: 8).

Life orientation's aims that link to EE can be described as follows: To empower learners to form holistic relationships with others and the natural environment. Total maturity of a learner enables himself/herself to appreciate others as part of the environment; LO prepares learners to be accountable for decisions made so that they improve the health of the environment, which will translate into their own good health. Failure to do this is a vicious cycle. As the Constitution dictates, LO teaches the learners to respect the rights of others. For instance, by practising sustainable development, you are respecting the right of access of others to available basic resources. The "acquisition of knowledge, skills and values for sound decisions" (Department of Basic Education 2011c: 9); LO aims to provide a smooth progression of a learner from the school to the workplace by providing career guidance; hence, the proposal of this study for an EE curriculum in the FET band so that a learner can decide whether he/she will follow an EE career to assist with future recommendations and solutions for environmental problems. It aims for active participation in problem solving

regarding the country's environmental problems, especially those related to "climate change" and "causing ill-health" (Department of Basic Education 2011c: 11).

LO equips learners with "expertise, attitudes and values such as decision-making; respect for rights; empathy; interpersonal relationships; communication; negotiation; ability to access information; problem-solving" (Department of Basic Education 2011c: 25). LO empowers learners to be accountable for their decisions and actions on social and environmental issues. A harmonious relationship with others can translate into a similar relationship with the natural environment, indicating a feeling of affinity. LO activities promote the sharing of opinions and the reaching of consensus about social and environmental problems; for example, how to solve a problem of the shortage of water locally. LO also equips learners with the value of respect, as mentioned in the previous paragraph.

The structure of LO in relation to EE: of the six topics, only one topic deals with environmental content, namely, "Social and environmental responsibility" (Department of Basic Education 2011c: 8) (see 3.4.3.3).. This is reinforced by topics on "Democracy and human rights"; and "Careers and career choices" (Department of Basic Education 2011c: 8).

"Social and environmental responsibility" (Department of Basic Education 2011c: 8):

This topic equips learners with social skills, such as communication, temperament control, creation of a win-win environment, interpersonal relations, as well as responsibility and problem-solving skills. These enable them to participate in solving problems affecting their community. Problems include those that affect both the environment and the wellbeing of people. These include "social problems such as drug abuse, the use of toxic chemicals in food production, wrong farming methods, the impact of degradation on society and the environment, pollution, erosion, change in climate and weather, radiation, floods, fires, depletion of resources such as seafood" (Department of Basic Education 2011c: 18).

Teaching learners about "human rights" (Department of Basic Education 2011c: 10): learners become aware of the need to protect and take care of the natural environment, which is provides in the basic needs of the present and future generations.

LO prepares learners to make the right choices of “subjects and careers” (Department of Basic Education 2011c: 10). With the current environmental conditions, such as floods in KwaZulu-Natal and the scarcity of safe drinking water and energy all over the country, learners are encouraged to choose tertiary courses in EE, Environmental Studies and Environmental Management.

LO is given “66 hours” in “Grades 10 and 11” (Department of Basic Education 2011: 9), and “56 hours in Grade 12” (Department of Basic Education 2011c: 9) (see Annexure C6), with the topic of “Social and environmental responsibility” receiving only “four hours” in “Grade 10”, and “three hours” in “Grades 11 and 12” (Department of Basic Education 2011c: 9), with more time allocated to “Physical Education” (33 hours) (Department of Basic Education 2011c: 9), and half of it to “careers and career choices” (11 hours) (Department of Basic Education 2011c: 9). In other words, LO does not do justice to the environment and the environmental problems of the country. Hence, the suggestion for an EE curriculum in the FET band, which will ensure the optimal integration of environmental content.

There are parallels between EE and LO regarding socially and environmentally responsible behaviour, as indicated below:

Table 5.3: Parallels between Environmental Education and Life Orientation regarding social and environmental responsibility

Parallels between EE and LO	**Support reference from an EE perspective**	**Support reference from a Department of Basic Education perspective**
Holistic approach of teaching	Gough & Gough (2010: 342); Nwachuku et al. (2014: 843).	Department of Basic Education CAPS (2011: 8).
Problem-solving as a general aim of NCS curriculum	Ulutus & Köksalan (2017: 298).	Department of Basic Education CAPS (2011: 5).
“Social and environmental responsibility” as one of the topics of LO	Laska & Brush (2019: 168)	Department of Basic Education CAPS (2011: 9, 14).
“Social and environmental justice”.	Laska & Brush (2019: 168)	Department of Basic Education CAPS (2011: 15).
“Human rights”	Anton & Shelton (2011: 1).	Department of Basic Education CAPS (2011: 8).
Concentrate on “skills knowledge, and values”	Tomaszewski 2013 : 5).	Department of Basic Education CAPS (2011: 8, 25).
“The need for life-long learning”	Blum (2012: 8); Stevenson & Stirling (2010: 232).	Department of Basic Education CAPS (2011: 10).
Focus on ”knowledge in local context”	(Sheya 2014)	Department of Basic Education CAPS (2011: 4).

The similarities between EE and LO emphasise the education of a learner as a whole; hence, a learner who is “socially, intellectually, emotionally, spiritually, morally, and physically” developed is capable of dealing with societal and environmental issues such as poverty, gangsterism, and littering (Department of Basic Education 2011c: 8). These are made possible by the “skills, knowledge and values” acquired (Department of Basic Education 2011c: 8). This relationship between knowledge, values and skills, especially within the local context, is echoed by Lotz-Sisitka’s (2013:30) idea of ‘learning as connection’, an opinion that links well with EE curriculum as contextual based (Ferreira 2013).

As little time is allocated for the topic dealing with environmental issues in LO, it is a challenge for teachers to practice a holistic approach. The focus is more on physical development, which is also left to learners during physical education activities.

LO is “examined” internally (Department of Basic Education 2011c: 25). Hence, it is considered as an worthless subject by learners in comparison to subjects that are examined externally. The fact that the topic of “Social and environmental responsibility” weighs less (Department of Basic Education 2011c: 9) makes LO the worst carrier-subject of environmental issues when compared to Life Sciences and Geography (analysed above). As already implied in the paragraph above, LO could be called Physical Education in schools as it focuses more on physical activities. While it attempted to be holistic by covering a number of fields, as reflected by topics such as “development of self in society”; “democracy and human rights”; “career pathing”; “study skills and physical education” (Department of Basic Education 2011c: 9), the inclusion of content on EE appears to have happened as an afterthought.

My findings are supported by a number of researchers. Many findings revealed that LO curriculum implementation does not meet the expectations of learners (Adewumi 2012; Ferguson 2015; Ferreira & Schulze 2014; Matshoba & Rooth 2014; Mosia 2011; Mthatyana & Vincent 2015; Swarts 2016; Swarts, Rens and de Sousa 2018).

Swarts (2016: 239) argues that, “although CAPS expect LO teachers to contextualise social and environmental issues with the learners’ living environments”, there are no clear guidelines to perform this mandate.

The fact that most teachers did not receive training in both LO and EE (Swarts 2015) makes them to follow the recall method whereby there is a ‘pure reproduction of the

content of the textbook" (Van den Berg & Schulze 2016: 61). An analysis on 'Social and environmental responsibility' by Swarts, Rens and de Sousa (2018: 70) found that teachers are not well capacitated with the "necessary pedagogical skills to assist their learners to engage critically with local realities in their living environment when dealing with the themes poverty and HIV/AIDS". In addition to lack of training for the teachers, Fataar and Feldman (2016) blames it on CAPS for being test-oriented, without a focus on practical skills of "analysis", synthesis and "application" required for environmental solutions (Matshoba & Rooth 2014: 60). Swarts (2015: 105) says LO is theory-driven".

Realising that LO as a compulsory subject does not add the anticipated value to the curriculum, Swarts (2015: 105) and Swarts, Rens and de Sousa (2018: 74) call for a reconsideration of teaching strategies for 'social and environmental responsibility' topic by curriculum developers and teachers in the Department of Basic Education. They also plead with academics, for a more radical "research on content and context to (re) connect social and environmental responsibility with learners' live environments".

The next section analyses Physical Science CAPS to determine the amount of EE content it contains. This will indicate whether the researcher should pursue the position of an independent EE curriculum framework.

(iv) Physical Science CAPS

"Physical Science is the study that investigates physical and chemical phenomena" (Department of Basic Education (2011d: 8). Like Geography, the subject focuses on the interaction between the natural environment and people (see 5.2.2.2 ii). It uses a holistic approach inclusive of "science, technology and Indigenous Knowledge System (IKS)" (Department of Basic Education 2011d: 8). IKS provides a basis for the understanding of environmental issues from a scientific perspective. "Indigenous knowledge is the knowledge that communities have held, used or are still using; passed through generations and been a source" for progress in the scientific sphere (Department of Basic Education 2011d: 8). This definition of Physical Science contains environmental content or reflects environmental concerns and how they can be solved. However, the current socio-economic and environmental conditions of severe climate, poverty, HIV-AIDS and others, requires modern natural science (Physical Science and Life Sciences) type of education curriculum which is not available at the moment. According to Gilmanshina, Sagitova and Gilmanshin (2018: 691), this type of curriculum should "satisfy the need for the systemic development of environmental

thinking in the structure of environmental competence of learners for sustainable development of society".

As was the case with Life Sciences, Geography and LO, Physical Science has specific aims. The following aims are explained in relation to their applicability to EE:

- To foster environmental awareness in learners, so that they can recognise environmental issues in their surroundings.
- Learners are capacitated with research skills that enable them to execute the first aim stated above.
- To empower learners to "apply scientific and technological knowledge" in dealing with economic, environmental and other societal problems (Department of Basic Education 2011d: 8).
- Like other subjects, Physical Science prepares the learner for a career and the workplace.

Physical Science also aims to equip learners with research skills, as mentioned in the second aim above. These skills include categorisation, which will enable learners to classify environmental risks; sharing ideas, which will assist learners in brainstorming contemporary economic developments that affect the natural environment with the intention to reach consensus; and "measuring" (Department of Basic Education 2011d: 8), where learners are able to weigh the impact on the natural environment by means of appropriate technologies. The nature of Physical Science demands the skill of producing an investigative framework that enables a learner to identify an environmental problem and make deductions. Other skills that relate Physical Science to EE include "formulating models, observing and comparing, interpreting, predicting and reflective skills" (Department of Basic Education 2011d: 8). For instance, a Physical Science learner is empowered to develop a structure or instrument that can save water; he/she is able to weigh different options of generating energy; and he/she is able to anticipate the outcomes for the natural environment.

Examples of environmental practical activities to fulfil the investigating skills of Physical Science include "purification and quality of water"; "exothermic and endothermic reactions", to "prove conservation of matter experimentally"; "conservation of energy"; "investigation of natural indicators for acids and bases"; and "decomposition reaction" (Department of Basic Education 2011d: 12).

As mentioned in 3.4.3.3 (v), Physical Science in the FET band consists of important themes. They are “Matter and materials; chemical systems; chemical change; mechanics; waves, sound and light; and electricity and magnetism” (Department of Basic Education 2011d: 8). Although Geography also deal with the relationship between people and the natural environment as reflected in the first paragraph above, these topics, the aims and skills above, do not show a strong emphasis on the nurturing of personal qualities required to use Physical Science for EE, this is echoed by Gilmanshina, Sagitova and Gilmanshin (2018: 691) when they encourage an emphasis on “motivation and interest; a high level of arbitrariness of conduct (volitional preparedness), i.e. the ability to engage in a task in environmental protection, to plan and control their actions; availability of environmental knowledge and skills (educational readiness); the development of qualities that ensure the ability to establish team relationships (communication readiness)”.

As with Geography, all the above topics have environmental content and concerns. For example, in matter and material, learners explore the impact of plastic; in chemical system they study about the hydro- and lithospheres with reference to water, mining, energy, resources, fertilisers and their negative effect on the natural environment; in chemical change they explore “physical and chemical change” (Department of Basic Education 2011d: 35), “reactions in aqueous solution” (Department of Basic Education 2011d: 46) and “acids and bases” (Department of Basic Education 2011d: 11); and in the theme “waves, sound and light” (Department of Basic Education 2011: 76) learners are able to deal with the “frequency, amplitude, period and speed waves as well as electromagnetic radiation” (Department of Basic Education 2011d: 10). The theme of “electricity and magnetism” teaches learners about the use of power and the environmental impact of various types of energy (Department of Basic Education 2011d: 10).

Physical Science in the FET band takes up “forty hours per term adding up to 160 hours per year” (Department of Basic Education 2011d: 13). This period covers teaching on “theory, practical” programmes and formal assessment (Department of Basic Education 2011d: 13). The document contains six topics, as stated above. As also indicated above, all the topics contain environmental content; however, there is more emphasis on the “Physical and chemical phenomena” (Department Of Basic Education 2011d: 8).

Regarding assessment, environmental concerns are assessed across all the topics prescribed (Department of Basic Education 2011d). Candidates write the FET band's two examination papers. The first and second session count 150 marks each. The examination therefore totals 300 marks, which are added to a year mark of 100 marks, adding up to a total of 400 marks (Department of Basic Education 2011d). As indicated above all topics contain environmental content that is examinable.

Environmental content in Physical Science caters for learning that enables learners to analyse the interaction between people and the natural environment; these learning experiences adopt a scientific approach. However, it is only when learners are able to combine environmental science experiences with investigative experiences and community action skills that EE occurs in its true sense.

Physical Science facilitates the study of the biophysical environment. Through Its investigative nature, Physical Science helps learners gain insight into what ecology is all about. This allows learners to understand environmental problems better. Knowledge of eco-systems is imperative for recognising the pressure put on the environment by economic needs, political selfishness and unethical decisions. The Physical Science CAPS, therefore, is an integral component and instrument for investigating the threats against the natural environment, as well as to provide scientific solutions with the assistance of relevant technologies. In this way, it capacitates learners to apply scientific strategies, apparatus and skills for the security and management of the environment and basic resources, thereby contributing towards a sustainable world and enhancing the environmental experiences of learners.

After analysing the CAPS documents of the four selected subjects, that is, Life Sciences, Physical Science, Geography and Life Orientation, it can be confirmed that EE is multi-dimensional. These subjects reflect that human beings' existence and living are influenced directly or indirectly by environmental problems, resulting from the interaction between these different dimensions. The multi-dimensional nature of EE therefore ensures the development of citizens who are informed, aware, active and capable of contributing towards sustainable living.

From the above analysis of the selected subjects, it is clear that every subject attempts to address environmental issues. Two out of the six topics in Life Sciences deal with EE, namely, "Environmental Studies" and "Diversity, change and continuity" (Depart ment of Basic Education 2011a: 10). All Geography topics contain environmental conc erns. They are "the atmosphere"; "Geomorphology"; "Settlements"; "Population";

“Development”; “Economy”; and “Resources” (Department of Basic Education 2011b: 13-14). Regarding the structure of LO in relation to EE, of the six topics, only one topic deals with environmental content, namely “Social and environmental responsibility” (Department of Basic Education 2011c: 8). This is supported by topics on “Democracy and human rights”; and “Careers and career choices” (Department of Basic Education 2011a: 8).

Themes that contain environmental content in Physical Science in the FET band are “Matter and materials; chemical systems; chemical change; mechanics; waves, sound and light; and electricity and magnetism” (Department of Basic Education 2011d: 8).

This shows that environmental content is explicitly included in the selected subjects. However, in most cases, little attention is paid to the EE content because teachers focus more on the specific prescribed content of their subjects.

The fact that an environmental focus is unique in the different subjects because each subject has its own philosophical basis, is a challenge for the teachers who must demonstrate a clear understanding of those differences in order to teach EE content.

Lastly, the South African higher education system has not trained teachers to teach in an integrated approach. Even worse, there are no national and provincial documents to empower and guide teachers in implementing this approach. Teachers are free to select the topics and appropriate content that are of interest to them and not necessarily relevant to EE. While an integrated approach has a great potential to capacitate teachers, it is also dangerous and doing injustice to EE. Teachers tend to do malicious compliance to this approach because they are not certain about what to include and what not to include in their specific subject lessons. In worst cases, it could also mean a complete side-lining of any EE content in some subject areas. It is for these reasons and others, that Department of Basic Education should reconsider Environmental Education curriculum for EE as an independent elective subject in the FET band.

After doing the document analysis, the following section analyses the individual semi-structured face-to-face interviews.

5.2.3 Face-to-face Interviews

Thematic analysis is used for the analysis of the data of the face-to-face interviews, as mentioned in section 5. 2 above (See Box 5.1) and Box 5.3 below.

The same procedures outlined for analysis of focus group interview (see 5.2.1) applied for face-to-face interviews below.

BOX 5.3

FACE-TO-FACE INTERVIEWS ANALYSIS: MAIN THEMES AND SUB-THEMES

- **Experience**
  - Teaching experience
  - Experience as principal/deputy principal/departmental head/teacher
- **Qualifications**
  - Tertiary qualifications
  - Major courses
- **Inclusion of EE topics in teaching**
- **Opinion about the condition of township's natural environment**
- **Meaning of Environmental Education**
  - Environmental awareness
  - Environmental management
  - Promoting aesthetic behaviour
- **Status of Environmental Education in subject**
  - Not enough/little attention
  - Enough in Geography
- **Need for Environmental Education curriculum framework in the FET band**
- **Envisaged proper Environmental Education curriculum in the FET band**
  - EE as an independent subject and a practical subject
  - EE infused into other subjects,
- **Anticipated contributions of Environmental Education curriculum framework to teaching and learning**

- Improving conceptual understanding of the environment
- Improving comprehension of the concept Environmental Education
- Assists in resolving prevailing environmental problems

- **Challenges to be addressed to successfully introduce proper EE curriculum framework**
  - Physical and human resources
  - Money/budget
  - Sites for practical
  - Learning-teaching support material (LTSM)
  - Teachers without EE training
  - No basic schooling/illiteracy among community o School curriculum
  - Overcrowded school curriculum
  - School curriculum developers without EE knowledge
  - Unlinking of topics/no proper content progression
  - Lack of practical approach
  - Neglect of EE by Department of Basic Education
  - Neglect of the environment by people
  - Lack of marketing for EE
- **Better support to teachers for execution of EE in the classroom**
  - Capacity building of teachers
  - Financial support by Departments
  - Introduction of EE in schools
  - Proper place of EE in secondary school curriculum
  - Practical approach of teaching EE
  - Collaboration between departments dealing with EE
  - Resuscitation of EE clubs
- **Anything else to share with the researcher**
  - General
  - Regarding the research topic

5.2.3.1 Principals

Teaching experience as on the day of the interview:

Question 1: Experience

How many years have you been teaching the grade/subject?

All four principals have vast teaching experience. The most experienced one has teaching experience of 32 years (Principal 3) and the least experienced 26 years (Principals 1 and 4).

Their teaching experience includes subjects like Mathematics, Mathematical Literacy, Geography, English, Physical Science, Biology (now Life Sciences), Afrikaans Home Language, Woodwork, Technical drawing and Technology.

Their experience as principals is as follows: Principal 1 has 12 years' experience, Principal 2 eight years, Principal 3 is the most experienced with 17 years, and Principal 4 has the least experience of six years.

Question 2: Qualifications

What are your tertiary qualifications and major courses?

Principal 1 is in possession of a Primary Teachers' Diploma (Senior Primary), a Higher Education Diploma and an Advanced Certificate in Education (ACE) in Leadership Management. Principal 2 is in possession of a Senior Primary Teachers' Diploma, a Bachelor of Arts, and a Bachelor of Education (Honours). Principal 3 holds a Bachelor of Science in Education, and an Honours degree in Business Administration. Principal 4 is in possession of a Higher Education Diploma.

- Major Courses (Subjects)

All the principals have majored or specialised in one or more of three of the four selected subjects for this study, which are Life Sciences, Physical Science and Geography.

For example, Principal 1 has specialised in Mathematics, Physical Science, Biology (Life Sciences) and English. Principal 2 has specialised in English and Geography, and Principal 3 has majored in Chemistry and Physics. Principal 4 has specialised in

Biology (Life Sciences) and Setswana (although he is an Afrikaner), and Wood and Metal work as additional subjects.

Question 3: Inclusion of EE topics in teaching

How long have you been including Environmental Education topics in your teaching?

All the four principals have included EE in the teaching of their subjects which include Mathematical Literacy; Geography; Tourism; Physical Science and Technology. Analysis here confirms document analysis that Geography and Physical Science are the prominent carriers of EE (see 5.2.2.2). Geography as an important vehicle for teaching EE is also confirmed by (Catling, Willy & Butler 2013; Dube 2012; Ferreira & Molala 2017; Kahraman 2016) and others.

Question 4: Opinion on the condition of your township's natural environment

What is your opinion on the condition of your township's natural environment?

All the principals said that their natural environment is in a poor state; for example, the serious scarcity of water in their area.

Question 5: Meaning of Environmental Education

What is your meaning of Environmental Education?

The principals' understanding is limited to environmental awareness and environmental Management but at a smaller scale. Environmental awareness refers to "the ability of an individual to understand the connection existing between human activities, the present state of the environmental quality and the willingness by the individual to take participate in environmental activities" (Du et al 2018: 287).

Question 6: Opinion on the status of Environmental Education in your subject

What is your opinion on the status of Environmental Education in your subject?

Three principals were of the opinion that EE content was not covered sufficiently in their subjects. One said it was not sufficient in Mathematical Literacy, but better than in Mathematics. He mentioned that Mathematical Literacy dealt with the national problem of water scarcity (which was a major crisis at the time of the interview).

Question 7: The need for an Environmental Education curriculum framework in the FET band

Is there a need for an Environmental Education curriculum framework in the FET band?

All the four principals said there was a need for an EE curriculum framework in the FET band. They are influenced by the cuurent situation of a very serious shortage of water in the area.

Question 8: Description of envisaged proper Environmental Education curriculum framework in the FET band

How would you describe your envisaged proper Environment Education curriculum framework in the FET band?

- EE as an independent subject

Three out of the four principals wanted EE to be introduced as an independent subject; that is, a stand-alone subject.

> ***Principal 1***: "I want it to be an independent subject, to be an elective subject as well, but not a core subject; to be an elective, it must stand alone."

By elective, he means it can be chosen to add to a particular stream, such as the Mathematics and Science Stream. This means that learners must decide to choose it, or not; however, it must be an independent subject, not integrated into other subjects. Principal 4 further suggested that he would prefer the introduction of EE from a younger stage, in the senior phase of GET band (Grade 7-9), and then continued into the FET band.

- EE Infused into other subjects

> ***Principal 3***: "Environmental Education should be spread across the other subjects, especially in subjects like Science because most of the things that we do in Science, Chemistry, are almost everywhere in the environment." He is having the same argument as the researchers advocating for interdisciplinary approach like Dube (2012); McKeown & Hopkins (2014); Songqwaru (2012) and others.

- EE as a practical subject

Principal 3 and Principal 4 further suggested that EE should be a practical subject if introduced as an independent subject.

> ***Principal 4***: "...and the subject itself should be a very practical subject where the learner will have excursions, going to do practical, doing investigations, say for instance, using the stream for checking pollution and all things. So it should be a very practical subject like Agricultural Management, or something like that."

Question 9: Anticipated contributions of an Environmental Education curriculum framework to teaching and learning

What do you see as the anticipated contribution of an Environmental Education curriculum framework to teaching and learning with regards to:

(a) Improving conceptual understanding of the environment?

(b) Resolving escalating environmental problems?

- Improving conceptual understanding of the environment?

All four principals agreed that the introduction of EE would help learners to understand the term environment better, and all things in the environment; it will improve the people's understanding of the concept Environmental Education.

> ***Principal 1***: "It is going to assist in understanding the broader concept of environmental issues. When you look at what is taking place in our townships, there are so many dumping sites where people really do not care about their environment. I think if that can be introduced and then we start it from at least in the FET band, I think many learners by the time they leave school they will be having the understanding, and secondly, when they have the understanding and knowledge, they will be able to escalate it to other members of the community."

- Resolving prevailing environmental problems?

All four principals were of the view that EE could assist in finding solutions to the prevailing environmental problems.

Both Principal 3 and Principal 4 opined that the knowledge of EE was important for dealing with the issue of energy.

Question 10: Challenges that need to be addressed successfully to introduce a proper Environmental Education curriculum framework in the FET band

What do you think are the challenges that need to be addressed to successfully introduce a proper Environmental Education curriculum framework in the FET band?

A number of challenges, which also relate to that expressed in literature, were provided:

- Physical resources
  o Money/budget

  All the principals stated that the budget was a problem because Learner Teacher Support Material (LTSM) and other equipment would have to be provided to schools for EE. The issue of lack of resources is a general obstacle for integration of EE in almost all countries including USA (see 3.3.1.3, 3.3.2.2, 3.4.2.3 and 3.4.3.3.

  o Sites for practical

  The principals were of the opinion that they did not have sites designated to do the practical lessons for EE; however, they said, “Practical can be done in the cheapest easiest way, on the smallest scale;, that it can be on the school premises because the expenses are low”. This shows that the principals are aware that Environmental Education is an outdoor education (see 2.2.1.3 ii).

- School Curriculum
  o Overcrowded Curriculum

  Principal 1 is of the opinion that the Education Department had the challenge of an already overcrowded school curriculum in the FET band. He concurs with the researchers supporting interdisciplinary approach as mentioned above.

  o School curriculum developers

Two of the principals were of the view that the curriculum developers of the department possessed inadequate comprehension of EE.

- Neglect of EE by the Department of Basic Education

> ***Principal 2***: "This particular subject was neglected to a certain extent; was neglected because nobody thought that we would find ourselves in this situation where we will be dealing with serious environmental issues, so knowing the Department, it will be telling you about the resources, the availability of money and so on."

The implication is that government does not have a vision regarding the natural environment, hence there are no school Environmental Education policies provincially and nationally in the Department of Basic Education.

- Neglect of the environment by people

Principal 2 also stated that people, or the community, had neglected the environment. "In actual fact the damage that is being done, caused by our neglect of the environment, is much more expensive. So should it have been introduced before, we could have taken care of the environment, then we could not have been spending this much."

Question 11: Better assistance for teachers' execution of Environmental Education in the classroom

How can we better assist teachers to execute Environmental Education in the classroom?

The responses on how to better support teachers are given below:

The three principals recommend capacity building of teachers, financial support by relevant government departments should provide financial support and Introduction of EE in the curriculum.

Question 12: **Anything else to share with the researcher**

Is there anything else to share with the researcher?

Principal 1 is inspired, principal 2 motivated to read more about EE, principal 3 expressed the need for EE in the curriculum framework as people did not respect the environment, and principal 4 supports him.

5.2.3.2 Deputy principals

Question 1: Experience

How many years have you been teaching the grade/subject?

Teaching experience as on the day of interview: Deputy principal 1 has been teaching Mathematics for 21 years, while deputy principal 2 has taught for 31 years. His subjects include Economics, Accounting, Business Studies and Setswana, and currently he teaches Tourism. Deputy principal 3 has taught English (First Additional), Business Economics and Guidance (which was later phased out). His total teaching experience spans 21 years. Deputy principal 4 taught Geography for 22 years in the FET band, and deputy principal 5 taught the Sciences for 15 years. This experience includes nine years of teaching and six years of being a Subject Advisor (Curriculum/SES for Biology, now called Life Sciences). Deputy principal 6 has 17 years' teaching experience, teaching Mathematics. Deputy principal 7 has taught for 25 years. This includes 21 years of offering History; he also taught Tourism for ten years. Like the principals above, the deputy principals are highly experienced in terms of teaching.

Their experience as deputy principals ranges between seven months and 12 years. Deputy principal 5 had been in this position for seven months at the time of interview; deputy principal 4 three years; deputy principal 1 three and a half years; deputy principal 3 six years; deputy principal 6 eight years; deputy principal 2 "more than ten years"; and deputy principal 7 12 years.

Question 2: Qualifications

What are your tertiary qualifications and major courses?

Deputy principal 1 is in possession of a BSc degree with Economics. Deputy principal 2 has a Secondary Teachers' Diploma (STD) and a Further Education Diploma, and is currently busy with a course at the University of South Africa. Deputy principal 3 has a University Diploma in Education (Secondary), an Advanced Certificate in Education (ACE) in Educational Planning, an ACE in English Education, and a Bachelors of Education (Honours). Deputy principal 4 has a Senior Primary Teachers' Diploma, an

ACE majoring in Geography and Computer Science, Financial Management for Non-Financial Managers, and is currently doing an Honours degree in Law and Policies in Education. Deputy principal 5 has a University Diploma in Education (Secondary), and an ACE in Physics and Chemistry. Deputy principal 6 has also done a University Diploma in Education Secondary, an ACE in Mathematics, a BED (Honours), an ACE

in Curriculum Development, and an ACE in School Leadership and Management. Deputy principal 7 did a University Diploma in Education (Secondary), a Further Diploma in Education Management, an ACE in School Leadership.

- Major Courses (Subjects)

Like the principals, five out of the seven deputy principals have majored in one or more of the selected subjects for document analysis.

Deputy principal 1 has majored in Mathematics, Accounting and Business Studies; 2 has majored in Economics and Setswana in STD, and in Accounting and Business Studies in a Further Education Diploma; 3 has majored in English, Business Studies and Guidance; 4 has majored in Geography and Computer Science; 5 has majored in Biology, Physics and Chemistry. He continued to do an ACE with Physics and Chemistry as majors. He has also started an ACE in Life Sciences; 6 has majored in Mathematics, Physics and Chemistry in his University Diploma in Education, Mathematics in an ACE; and Mathematics Education in a BED (Honours) and deputy principal 7 has majored in Setswana and History, and Education Management in an ACE.

Question 3: Inclusion of EE topics in teaching

How long have you been including Environmental Education topics in your teaching?

All the deputy principals included EE in their teaching, but I found out that because they did not have a qualification in, knowledge of, or a background in EE, they were not sure about the specific EE topics in their subjects.

Question 4: Opinion about the condition of your township's natural environment

What is your opinion about the condition of your township's natural environment?

All the deputy principals agreed that the natural environment in their area was poor and needed to be improved. The following examples were cited: No designated dumping sites for waste so residents are creating their own everywhere; drought - their area has been without water for the past five years; huge soil erosion when it rains; huge deforestation by people in informal settlements; ineffective drainage and sewage systems because of the reduced water pressure; Informal settlements without proper infrastructure.

As a researcher in this area I confirm this state of the natural environment.

Question 5: Meaning of Environmental Education

What is your understanding of the meaning of Environmental Education?

Like the principals, all the seven deputy principals defined EE from the awareness and management perspectives.

Deputy principal 7: "Education that would make people aware of their environment and its importance, indicating to them the importance of taking care of our environment since human life depends on the environment, the air we breathe, which contains oxygen that we need is from our environment, the fauna and flora, that is, plants and animals are found in the environment, and we depend on plants and animals to eat. If the environment is not kept safe for both plants and animals, it means human beings won't be able to survive."

Question 6: Opinion onthe status of Environmental Education in your subject

What is your opinion on the status of Environmental Education in your subject?

All seven deputy principals were of the view that EE content was not adequately addressed in their subjects. However, this might be the case because they seemed to be lacking knowledge of and background on EE, as highlighted in the first paragraph of section 3.2 above.

Question 7: Need for an Environmental Education curriculum framework in the FET band

Is there a need for an Environmental Education curriculum framework in the FET band?

Six of the seven deputy principals were of the view that there was a need for an EE curriculum framework in the FET band. One deputy principal, that is, deputy principal was worried about the introduction approach of EE in the curriculum.

Question 8: Description of an envisaged proper Environmental Education curriculum framework in the FET band

How would you describe your envisaged proper Environmental Education curriculum framework in the FET band?

The deputy principals, like the principals, had different views on their envisaged curriculum framework. These are briefly stated below: Three deputy principals suggested that EE be introduced *as a subject on its own* (monolithic approach) (see 5.2.2.2 i), as informed by the current environmental situation; two deputy principals wanted EE to *be spread across other subjects* (integrated approach) (Sukarjita et al. 2015); while two deputy principals were of the view that EE could be either introduced as a subject on its own (monolithic approach) (see 5.2.2.2 i), or spread across other subjects (Sukarjita et al. 2015).

- EE as a practical subject

One deputy principal agrees with the principals that it should be a practical subject (see **2.2.1.3 ii)**:

Deputy principal 5: “What maybe should be included should be things like projects where learners have to conduct research on environmental issues, to make sure that they are able to find problems that are there within their community… projects that will also become awareness campaigns to the community at large, and also the learners themselves to be aware of the importance of taking care of the environment – why should they take care of the environment and so forth.”

Question 9: Anticipated contributions of an Environmental Education curriculum framework to teaching and learning

What do you see as the anticipated contributions of an Environmental Education curriculum framework to teaching and learning with regards to:

(a) Improving conceptual understanding of the environment?

(b) Resolving escalating environmental problems?

- Improving conceptual understanding of the environment

All seven deputy principals agreed that the introduction of EE would improve the understanding of the concepts Environmental Education and environment, and related concepts such as environmental management. Two deputy principals also were of the view that the understanding of the concepts would make communities more practical in their approach to environmental problems.

It means learners will be able to understand that the concept environment does not only refer to the bio-physical setting, but it is a system of physical, "social, economic, political" and cultural aspects (Makinster 2010: 237)

- Resolving prevailing environmental problems

All seven deputy principals held strong views that the introduction of EE in the FET band would assist in finding solutions to escalating environmental problems. For instance, deputy principal 4 said:

Deputy principal 4: "The number of people who are aware will be more than now. We have very few people who are aware, who are conscious about the environmental issues. The more we have Environmental Education as a curriculum framework, the broader scope of people who will be conscious and aware of the environment. So arriving at an informed solution will come from a bigger population and a bigger group of people who would have been working systematically towards a solution."

The environmental problems mentioned included the effects of industrialisation causing climate change, especially global warming; water, air and land pollution; water conservation and preservation; waste management; and the effect of mining on the environment. According to them, if everyone were aware of the environment and its problems, then society would drive towards positive possible solutions.

Question 10: Challenges that need to be addressed successfully to introduce a proper Environmental Education curriculum framework in the FET band

What do you think are the challenges that need to be addressed to successfully introduce a proper Environmental Education curriculum framework in the FET band?

In addition to financial constraints and overcrowded curriculum already presented by the principals, the deputy principals echoed the challenge of teachers without EE training. This is the most common and serious challenge that is identified by all researchers concerned by integration of EE in the curriculum (see chapter 3 and 5).

Deputy principal 6: "The existing challenge might be personnel; not having more teachers or those teachers who have specialised in Environmental Education."

- Neglect of EE by the Department of Basic Education (DBE)

  Deputy principal 1 said the DBE lacked vision; that it was not proactive. Deputy principal 2 opined that the problem was with the authorities who were not approving the introduction of an EE curriculum framework. Deputy principal 4 blamed the DBE for focusing on Science and Technology in order to redress the apartheid imbalances or backlogs and thus ignoring other subjects. He suggested that the history of South Africa could be one of the reasons why EE was not taken into cognisance. According to deputy principal 6, the failure to have EE as a subject has prevented learners from knowing about these opportunities or career paths.

The concerns of the deputy principals are true, as mentioned above, the Department of Basic Education (DBE) in particular, does not have proper systems in place except referral to the constitution of the country (see **1.2**) that promote the incorporation of EE in the FET curriculum. Even the White Paper on Education and Training of 1995 is no longer relevant (see 1.4.3).

- Unlinking of topics/proper content progression

  Deputy principal 5 has identified discontinuity of content between consecutive grades. This confuses the learners and disable them more in attempting to integrate EE across the subjects across the grades.

- No basic schooling/Illiteracy of community: makes it difficult to deal with all aspects of the environment, especially the impact of culture on the environment.
- Lack of marketing for EE

Two deputy principals thought that the lack of marketing or advocacy for EE by higher education institutions and the DBE presented a challenge. Deputy principal 6 argued as follows:

Deputy principals 6: "Our country, or maybe our system, is saying too little about it. So we can increase mechanisms of communicating about environmental issues and avoid mixing them."

Whlie I agree on DBE as already reflected above, I do not agree with the deputy principals on higher education institutions, many researchers conducting studies on the integration of EE in schools are lecturers at at diferrent levels at the universities, such as, Lotz-Sisitka, O'Donoghue, Lebeloane, Jita, Loubser, the list is long.

Question 11: Better support for teachers' execution of Environmental Education in the classroom

How can we better support teachers to execute Environmental Education in the classroom?

The deputy principals concur with the suggestions of the principals as outlined above, and add a need for practical approach.

- Practical approach of teaching EE

Four deputy principals were of the view that a practical approach to EE teaching would provide better support to teachers. They mentioned excursions, and daily practicals in the school, as well as at home for learners. For instance:

Deputy principal 5: "This approach will assist educators to get learners involved in conducting research on finding solutions to a particular problem in their environment or in a particular habitat'.

The implication is that this would expose learners to the skills of critical thinking, investigation, analysis, synthesis, observation and reporting and evaluation.

Question 12: Anything else to share with the researcher

Is there anything else to share with the researcher?

Deputy principal 1 said EE should start at home. Deputy principal 2 expressed the wish that the researcher could succeed in what she wished to achieve with the study. Deputy principal 3 repeated that EE should be part of the school curriculum, but he also thought that History should be done by all learners. Deputy principal 4 said he wanted to start an environmental team for the community, which would include all stakeholders – dealing with pollution, soil erosion, protection of vegetation, littering and recycling. Deputy principal 5 expressed the wish that the DBE could reform school curricula in order to accommodate EE as an independent subject. Deputy principal 6 was of the view that environmental topics should be included in the subjects in the current situation. Deputy principal 7 opined that EE was a relevant and important topic for the current water shortage in the country.

This section dealt with the analysis of the deputy principals' responses. The following section will dealing with an analysis of the responses of the departmental heads.

5.2.3.3 Departmental Heads

Five departmental heads were interviewed. Two did not turn up, as they had promised.

Question 1: Experience

How many years have you been teaching the grade/subject?

Teaching experience as on the day of interview: departmental head 1 has 20 years of teaching experience and has taught Mathematics to date. Departmental head 2 has been teaching for 23 years. His teaching experience includes the teaching of Life Sciences in the past and Physical Science for the last four years. Departmental head 3 is in the twenty-second year of teaching Mathematics, English, Art and Culture, Physical Science and Mathematical Literacy. Departmental head 4 has nine years teaching experience. His experience includes teaching Physical Science, Mathematics and Natural Science. Acting departmental head 5 has been teaching Mathematics for 12 years.

Their experience as departmental heads ranges between two and 17 years:

Departmental head 1 has a total of 17 years' experience of managing the Mathematics Department, while departmental head 2 has 17 years' experience of managing the Sciences and History/Social Studies. Departmental head 3 has been managing the Mathematics and Sciences Department for four years now, while departmental head 4 has been managing the Mathematics and Sciences Department for eight years. The acting departmental head 5 has been managing Mathematics, Information Technology and Engineering Graphics for two years.

The analysis above indicates that the departmental heads manage one or more of the selected subjects for the document analysis of this study; that is, their departments include Life Sciences, Physical Science and Geography.

Question 2: Qualifications

What are your tertiary qualifications and major courses?

Departmental head 1 is in possession of a University Diploma in Education (Secondary), a Higher Education Diploma (HED), and an Advanced Certificate in Education (ACE) in Mathematics. Departmental head 2 holds a Bachelor's degree in Science and Education, while departmental head 3 has a Secondary Teachers' Diploma (STD), an ACE in Natural Sciences and in Mathematical Literacy, a Bachelor's of Education (Honours), and is registered for a Master of Education in Natural Sciences. Departmental head 4 holds a HED, while the acting departmental head 5 is in possession of a Bachelor of Arts degree, and a HED.

- Major courses (Subjects)

All the departmental heads have majored in one or more courses/subjects they are managing in their different departments at their schools. Departmental head 1 majored in Physics and Chemistry, and departmental head 2 majored in Biology and Physical Science. Departmental head 3 majored in English and Fine Arts in STD, Physics and Chemistry in ACE, Mathematical Literacy in the second ACE, and is registered for a Master's of Education in Natural Sciences. The majors of departmental head 4 are Mathematics and Physical Science, with Biology as his ancillary subject, while the acting departmental head 5 majored in Mathematics, Afrikaans and Psychology.

Question 3: Inclusion of EE topics in teaching

How long have you been including Environmental Education topics in your teaching?

Departmental head 1 has frequently included EE in his teaching of Mathematics for the past 20 years. 2 has included EE in his teaching for 23 years, Life Sciences for 16 years, and four years ago in Physical Science. Departmental head 3 in Physical Science, especially in Chemistry in the FET band. 4 for about 20 years. He supported this by saying:

> ***Departmental head 4:*** "…because even in Mathematics there are some questions that are related to EE. For example, in calculus topics there are some questions, which are related or based on EE. Also in statistics topics. In Natural Sciences, we are also dealing with biodiversity."

Some studies confirm that "it will be easier for learners to understand the environment because they will be helped by mathematics calculation; and through the context of environment, the learners can develop their mathematic's competence, such as: analysing, representing modelling, and interpreting data" (Habibi 2014: 1).

Question 4: Opinion on the condition of your township's natural environment

What is your opinion on the condition of your township's natural environment?

All the five departmental heads agreed that their natural environment was in a bad state. Examples given include the burning of random objects, the scarcity of water, the cutting down of trees by people in informal settlements, largescale littering, the dysfunctional sewage system, and farming techniques that were not environmentally friendly. Both the principals and deputy principals mentioned the scarcity of water.

Question 5: Meaning of Environmental Education

What is your understanding of Environmental Education?

The understanding of EE by the five departmental heads was the same as that of the principals and deputy principals. It reflected the two parts, namely, environmental awareness and environmental management. In all the definitions or understanding, 'awareness' and 'care' of the environment were key words.

Question 6: Opinion on the status of Environmental Education in Subject

What is your opinion on the status of Environmental Education in your subject?

Two departmental heads said there was no EE content in their subject, Mathematics. Acting departmental head 5 opined that although this topic was not included in Mathematics, Mathematics could play a role in the planning of how to keep the environment healthy by calculating and analysing the impact of humans on the environment (see reference to literature in the last paragraph of question 3 above).

Three departmental heads indicated that there was little EE content in their subject, Physical Science. It could be because of the lack of knowledge of EE.

Question 7: Need for an Environmental Education curriculum framework in the FET band

Is there a need for an Environmental Education curriculum framework in the FET band?

All five departmental heads were of the view that there was a need for an EE curriculum framework in the FET band:

Departmental head 2: "The amount of destruction that is taking place and the lack of interest in our environment demands that something be done at the level of formal education to make sure that in years to come we are able to protect the environment and sustain our existence here on planet earth."

The response here, reflects the understanding of the concept EE, as that of Stapp of 1969 (see **2.2.1.3 i) that is limited to the natural environment without considering the social, political, economic and cultural dimension.**

Question 8: Description of envisaged proper Environmental Education curriculum framework in the FET band?

How would you describe your envisaged proper Environment Education curriculum framework in the FET band?

Their envisaged EE curricula are the same as those of the principals and deputy principals.

Question 9: Anticipated contributions of the Environmental Education curriculum framework to teaching and learning

What do you see as the anticipated contributions of the Environmental Education curriculum framework to teaching and learning with regards to:

(a) Improving conceptual understanding of the environment?

(b) Resolving escalating environmental problems?

- Improving conceptual understanding of the environment?

All five departmental heads said that the introduction of EE would improve the understanding of the concept environment:

> ***Acting departmental head 5:*** "Introducing it makes one aware of your environment; it will help them to take care of it and to understand what happens in the environment, natural or not natural."

This confirms that the understanding of this departmental head of the environment refers to the biophysical one.

- Finding solution to escalating environmental problems?

All five departmental heads agreed that the introduction of EE would help to reduce prevailing environmental problems. Examples presented include climate change, the sewage system, water conservation and preservation, reducing soil erosion by stopping or reducing the cutting off vegetation, and stopping air, water and land pollution.

Again, like principals and deputy principals, they are concerned about bio-physical problems, no mention of social problems, such as drug and substance abuse, gansterism and crime that are happening in the area.

Question 10: Challenges that need to be addressed successfully to introduce a proper Environmental Education curriculum framework in the FET band

What do you think are the challenges that need to be addressed to successfully introduce a proper Environmental Education curriculum framework in the FET band?

The departmental heads presented the same challenges as those of the principals and deputy principals.

Question 11: Better support for teachers' execution of Environmental Education in the classroom

How can we better support teachers to execute Environmental Education in the classroom?

Departmental heads presented the same programmes and resources as those of the principals and deputy principals, for support of the teachers for integration of EE in their lessons.

Question 12: Anything else to share with the researcher

Is there anything else to share with the researcher?

Departmental head 1 found the interview educative and recommended that EE be introduced as a subject on its own. Departmental head 2 suggested the supply of textbooks on environmental issues to deal with issues of culture and religion, which contribute to environmental problems. Departmental head 3 promised to donate a book on EE to the researcher, based on how poor communities pollute the environment when compared to rich people. Departmental head 4 indicated that there was a need to inform policymakers that more time should be given to environmental topics in existing subjects and maybe they would realise the need for an EE curriculum framework. Departmental head 5 was concerned about the time allocated to the subjects, which made it difficult to attend to environmental content.

The responses of the departmental heads did not differ much from those of the principals and deputy principals; however, they did not come up with more information when compared to the deputy principals.

The next section analyses the teachers' responses.

5.2.3.4 Teachers

Question 1: Experience

How many years have you been teaching the grade/subject?

Nineteen teachers were interviewed. Some majored in one or more of the selected subjects for the document analysis and others in additional subjects. The latter group was suggested by the focus group, who indicated that there were other subjects that also contained topics on EE or environmental content.

The teaching experience of the 19 teachers ranged from one to 24 years. Teacher 1 taught Mathematics for 12 years, 2 was teaching Economics for the fourth year. Teacher 3 assisted with Business Studies and Life Orientation for 12 years, and this was the fourteenth year of teaching of English and Mathematics for teacher 4. 5 has taught Life Sciences for nine years, 6 was in his fourth year of teaching Physical Science. Teacher 7 has taught for 23 years – Afrikaans, Geography and Life Orientation into the curriculum. Teacher 8 has five years' teaching experience, which includes Life Orientation in the FET band. Teacher 9 taught Accounting and Afrikaans for 19 years, Life Orientation from 2016 to date. Teacher 10 started teaching in 2005 – Mathematics, Physical Science, Mathematical Literacy, and then Natural Sciences. 11 is in the fourth year of teaching Life Orientation, while Teacher 12 has been teaching Biology/Life Sciences for 15 years. Teacher 13 teaches Life Sciences, Physical Science and Mathematics – this is her fifth year of teaching. Teacher 14 has five years of teaching Life Orientation and English, and 15 has one year of teaching Physical Science. He is a novice. Teacher 16 has been teaching Biology/Life Sciences for 24 years, 17 has taught Geography for one year. Teacher 18 has taught Geography for 24 years, 19 has taught Life Sciences for four years.

This analysis indicates that 15 of the 19 teachers teach the four subjects selected for the document analysis.

Question 2: Qualifications

What are your tertiary qualifications and major courses?

Teacher 1 is in possession of a Bachelor of Arts degree, while 2 studied a Bachelor of Commerce Accounting. 3 did a Bachelor of Education degree and 4 is in possession

of a Bachelor of Arts degree and a Higher Diploma in Education. 5 is in possession of a Bachelor of Education (Honours) degree, 6 holds a B Technical N4 and N5 in Instrumentation Engineering, and a BSc degree. 7 has a Senior Primary Teachers' Diploma (SPTD), an ACE in Education Management, and a BTech in Management, while 8 is in possession of a Bachelor of Commerce in Industrial Psychology and Labour Relations. 9 holds a University Diploma in Education, and an ACE 10 has an University Diploma in Education (Secondary), an ACE in Curriculum, and an ACE in Physical Science. 11 has a Bachelor of Social Sciences degree and a Postgraduate Certificate in Education (PGCE), while 12 is in possession of a University Diploma in Education, and a certificate from Northwest University. 13 holds a Bachelor's degree in Natural Sciences, and 14 has an honours degree in Education and currently is doing a Master's degree. Teacher 15 is in possession of a BSc in Chemistry and Computer Science, while 16 is in possession of a Secondary Teachers' Diploma. 17 has a Bachelor's degree in Education, and 18 is in possession of a University Diploma in Education (Secondary). Teacher 19 has a BSc, a HED and a Diploma in Remedial Studies.

- Major Courses (Subjects)

Teacher 1 majored in Mathematics and Remedial Education, while 2 majored in Accounting and Business Management. 3 majored in Economics and Business Management and 4 in Arabic and Psychology. 5 majored in Biology and Life Orientation, 6 did a BTech N4 and N5 in Instrumentation, and majored in Physics and Electronics in his BSc degree. 7 specialised in Geography, Afrikaans, Sesotho, as well as Statistical Studies. She also majored in Geography in her ACE. 8 majored in Business Studies and Life Orientation, while 9 majored in Accounting, Afrikaans and Business Studies. 10 majored in Mathematics, Physics and Chemistry, and also Physical Science in ACE. 11's majors were Psychology, Criminology, Industrial Psychology and Sociology, including Life Orientation and English in ACE. 12 did Biology, English, Mathematics and Physical Science, while 13 did Mathematics, Chemistry, Life Sciences and Computer Science as majors. 14 majored in English and Life Orientation and 15 in Chemistry and Computer Science. 16 majored in Biology and Geography, while 17 majored in Biology and Geography. Teacher 18's majors were Geography and History, while 19's were Life Orientation and Animal Sciences.

Question 3: Inclusion of EE topics in teaching

How long have you been including Environmental Education topics in your teaching?

All 19 teachers included EE content in their teaching over their years of teaching. Teacher 4 indicated that there was not much EE, but some in Life Orientation.

The teacher confirmed document analysis which reflected that there is only one out of six topics that deals with EE, yet LO is a compulsory subject (see 5.2.2.2 iii).

The teachers mentioned the following specific topics or EE content in their subjects: Environmental Studies; scarcity of water; climate change; socio-economic issues; crime; poverty; health; pollution; water preservation; use of electricity; veld fires; forest protection; littering; pollution; recycling; conservation of resources; and sustainability.

These are global environmental problems that for decades, many researchers and institutions in education and related fields have written about in attempting to come up with approaches, models and curriculum frameworks, that would solve them (Driver et al. 2012; Lotz-Sisitka 2011; Shava & Schudel 2013; Sukarjita 2015; Tshiningayamwe 2016; UNESCO 2014). However, very little progress has been registered in implementing them in the school curriculum (Lotz-Sisitka 2011).

Question 4: Opinion on the condition of your township's natural environment.

What is your opinion on the condition of your township's natural environment?

The 19 teachers are more observant than SMT members with environmental problems in the area. Examples included pollution, littering and illegal dumping, exhausting natural resources without rehabilitating the land, water scarcity, health hazards, donga erosion, destruction of the vegetation, dysfunctional sewage systems, keeping of livestock in township yards, and the uncontrolled burning of refuse. I have also observed these problems during my monitoring and support to schools. Water scarcity has affected the ablution facilities of the schools I am servising to an extend that I often grant permission for earlier knocking of time.

Question 5: Understanding of Environmental Education

What is your understanding of Environmental Education?

As stated by the principals, deputy principals and departmental heads, the teachers also understood the concept Environmental Education from two perspectives, namely, environmental awareness and environmental management.

Question 6: Opinion on the status of Environmental Education in Subject

What is your opinion on the status of Environmental Education in your subject?

Sixteen teachers indicated that there were not enough EE topics in their subjects. They further indicated that there was minimal time for EE; it was also allocated for the last term in Life Sciences. The findings indicated that EE was less in Mathematics and Mathematical Literacy. This was also indicated during the analysis of the data provided by the principals, deputy principals and departmental heads.

Three teachers agreed that there was enough EE content in their subjects. Analysis has shown that Economics deals with a topic on taxation to reduce pollution. Business Studies deals with environmental sustainability as a key focus area.

Teacher 15 indicated that there was ample EE content in Natural Sciences (GET band), but not enough in Physical Science. This reflected lack of conceptual understanding of EE content.

Question 7: Need for an Environmental Education curriculum framework in the FET band

Is there a need for an Environmental Education curriculum framework in the FET band?

All 19 teachers said there was a need for an Environmental Education curriculum framework in the FET band.

Question 8: Description of envisaged proper Environmental Education curriculum framework in the FET band?

How would you describe your envisaged proper Environment Education curriculum framework in the FET band?

Like the SMT above, thirteen teachers suggested that EE should be a subject on its own, five teachers said that EE should be incorporated in other subjects, and three teachers suggested a practical approach.

Question 9: Anticipated contributions of the Environmental Education curriculum framework to teaching and learning

What do you see as the anticipated contributions of the Environmental Education curriculum framework to teaching and learning with regards to:

(a) Improving conceptual understanding of the environment?

(b) Resolving escalating environmental problems?

- Improving conceptual understanding of the environment

Eighteen out of the 19 teachers said that the introduction of an EE curriculum framework would improve the conceptual understanding of the term environment. Only one teacher did not have a clear opinion on this question.

- Resolving prevailing environmental problems

All 19 teachers were of the view that the introduction of the EE curriculum framework in the FET band would provide the knowledge required for finding solutions to escalating environmental problems.

Question 10: Challenges that need to be addressed successfully to introduce a proper Environmental Education curriculum framework in the FET band

What do you think are the challenges that need to be addressed to successfully introduce a proper Environmental Education curriculum framework in the FET band?

Challenges presented by teachers cover all those given by SMT.

Question 11: Better support for teachers' execution of Environmental Education in the classroom

How can we better support teachers to execute Environmental Education in the classroom?

Their presentations are the same as those of SMT.

Question 12: Anything else to share with the researcher

Is there anything else to share with the researcher?

Four teachers had nothing further to say or share, while 15 teachers had the following to share with the researcher:

Teacher 7 suggested that if EE could be taught from Grade 1 to 12, learners. 10 expressed concern about destruction of vegetation and shortage of water, and a need for books containing EE content. 11 feels EE was being undermined. 12 was concerned about the health aspect of the environment and suggested the introduction of by-laws by local government. 13 thanked the researcher for the topic under study because the environment was neglected and EE was considered unimportant. Teacher 14 suggested DBE advocacy regarding the importance of EE. Teachers 16 and 17 acknowldged the importance of the study. Teacher 18 thanked the researcher for the opportunity to talk about EE, while teacher 19 said it was a good topic that needed attention in schools because it reflected a global problem.

The responses of the principals, deputy principals, departmental heads and teachers yielded recommendations regarding the Environmental Education framework in the FET band.

The following section will analyse the data provided by the former college lecturer for Environmental Education, who is currently a SES and FET Curriculum Coordinator.

5.2.3.5 SES/Former College Environmental Education Lecturer

Question 1: Experience

How many years have you been teaching the grade/subject before becoming a Senior Education Specialist?

The former college Environmental Education lecturer taught EE as a subject for about 13 years, teaching student teachers for both primary and secondary school qualifications.

As a SES, this is his fifteenth year, but not for any teachable subject. He is a SES for Educational Development and Support (EDS).

Question 2: Qualifications

What are your tertiary qualifications and major courses?

The former college Environmental Education lecturer is in possession of a Bachelor of Arts degree in Education, an Honours degree in Environmental Education, and Master's degree in Leadership and Management.

- Major courses (Subjects)

The former college Environmental Education Lecturer majored in Geography and Environmental Education.

Question 3: Inclusion of EE topics in teaching

How long have you been including Environmental Education topics in your teaching?

He taught EE for 13 years at a College of Education, as indicated above in question. He also included EE in Geography teaching at school, when he was a teacher, before becoming a college lecturer.

Question 4: Opinion about the condition of your township's natural environment

What is your opinion on the condition of your township's natural environment?

He expressed the view that the current state of the natural environment was depressing.

Question 5: Understanding of Environmental Education

What is your understanding of Environmental Education?

He defined EE as "education trying to foster or promoting aesthetic behaviour, a positive attitude and making sure that people are aware that they are part of the environment."

This definition contains an important objective of EE, 'attitudes' (see **2.2.1.3 i). Attitude enables the learner to work with others in solving environmental problems (see** 5.2.2.2 iv).

Question 6: Opinion about the status of Environmental Education in Subject

What is your opinion about the status of Environmental Education in your subject?

He said there was enough EE content in Physical Science and Geography. Document analysis confirmed this **(**see 5.2.2.2 ii and iv).

Question 7: Need for an Environmental Education curriculum framework in the FET band

Is there a need for an Environmental Education curriculum framework in the FET band?

He opined that there was a need for an EE curriculum framework, but he emphasised that it should be infused in Life Orientation.

Question 8: Description of the envisaged proper Environmental Education curriculum framework in the FET band?

How would you describe your envisaged proper Environment Education curriculum framework in the FET band?

His position was that EE must be infused in other subjects, especially Life Orientation. This is unfortunate because a review on Life Orientation is underway. It was introduced in 2011 as a compulsory subject in the NCS but it has been under scrutiny because of the lack of impact it has had regarding the objectives it was supposed to fulfil.

Question 9: Anticipated contributions of the Environmental Education curriculum framework to teaching and learning

What do you see as the anticipated contributions of the Environmental Education curriculum framework to teaching and learning with regards to:

9.1 Improving conceptual understanding of the environment?

9.2 Resolving escalating environmental problems?

- Improving conceptual understanding of the environment

He agrees with the previous participants that EE will improve our understanding of the environment.

- Resolving prevailing environmental problems

He mentioned an important issue of employment through recycling project.

Question 10: Challenges that need to be addressed successfully to introduce a proper Environmental Education curriculum framework in FET band

What do you think are the challenges that need to be addressed to successfully introduce a proper Environmental Education curriculum framework in the FET band?

His identified challenges include, lack of a vigorous mission by government and lack collaboration between departments. The fact that there are no specific EE policies for DBE makes this opinion a fact.

Question 11: Better support for teachers' implementation of Environmental Education in the classroom

How can we better support teachers to implement Environmental Education in the classroom?

He thinks collaboration between departments and resuscitation of environmental clubs will enhance implementation of EE.

Question 12: Anything else to share with the researcher

Is there anything else to share with the researcher?

The former EE lecturer expressed the wish that the findings of this thesis could be shared with the Minister of Basic Education and the Minister of Environmental Affairs so that steps could be taken to reverse the impact of the escalating environmental crisis.

5.2.3.6 FET Curriculum Coordinator

Question 1: Experience

How many years have you been teaching the grade/subject before becoming the Subject Advisor and FET Curriculum Co-ordinator?

The FET Curriculum Coordinator has taught Biology in Grades 10, 11 and 12 for 15 years. She was a Subject Advisor for Physical Science for nine years, from 1996. She was then promoted to the position of FET Curriculum Coordinator for all subjects in the FET band in 2004, to date, making it her fifteenth year of managing this band, and her thirtieth year in the education system.

Question 2: Qualifications

What are your tertiary qualifications and major courses?

The FET Curriculum Coordinator is in possession of a BSc in Dietetics, a Higher Diploma in Education, and a Bachelor of Education (BED).

- Major Courses

The FET Curriculum Coordinator majored in Dietetics, Physiology and Biochemistry. She also majored in Curriculum in her BED.

Question 3: Inclusion of EE topics in teaching

How long have you been including Environmental Education topics in your teaching before becoming the Subject Advisor and FET Curriculum Coordinator?

She included EE in Biology (Life Sciences) and Physical Science for her entire teaching career of 15 years because she is passionate about it.

Question 4: Opinion on the condition of your town's natural environment

What is your opinion on the condition of your town's natural environment?

The FET Curriculum Coordinator confirmed the view of the other participants that the natural environment was in a poor state. As stated by the other participants, littering was visible everywhere, and on the day of the interview she mentioned that a notice had been issued by the Municipality that the e-coli count in the tap water stood at 16.

Question 5: Understanding of Environmental Education

What is your understanding of Environmental Education?

The FET Curriculum Coordinator's understanding of the concept EE was in line with the definitions by well-known sources such as Stapp's and UNESCO's (see **2.2.1.3).**

Question 6: Opinion on the status of Environmental Education in the FET subjects curricula that you are coordinating

What is your opinion on the status of Environmental Education in the FET subjects curricula that you are coordinating?

The FET Curriculum Coordinator agreed with other participants that Geography contained a sizeable amount of EE content. Other subjects like Agricultural Science, Life Sciences, Physical Science and Life Orientation also had some EE content.

But, her concern was implementation, "So being a Physical Science Educator myself I think of the topics that are being addressed in Grades 10, 11 and 12; I know they are there, but I want to be honest and say that when teaching that, we focus on it as pure content".

Question 7: A need for an Environmental Education curriculum framework in the FET band

Is there a need for an Environmental Education curriculum framework in the FET band?

The FET Curriculum Coordinator definitely thought that there was a need for an EE curriculum framework in the FET band. This was informed by both her personal point of view as a South African and her global view of the planet.

Question 8: Description of envisaged proper Environmental Education curriculum framework in the FET band?

How would you describe your envisaged proper Environment Education curriculum framework in the FET band?

She confirmed those of the previous participants such as 'EE as an independent subject' and practical approach for EE, to develop knowledge, problem-solving skills, investigation, and a positive attitude.

Question 9: Anticipated contributions of the Environmental Education curriculum framework to teaching and learning

What do you see as the anticipated contributions of the Environmental Education curriculum framework to teaching and learning with regards to:

9.1 Improving conceptual understanding of the environment?

9.2 Resolving escalating environmental problems?

She asserted what other participants said.

Question 10: Challenges that need to be addressed successfully to introduce a proper Environmental Education curriculum framework in the FET band

What do you think are the challenges that need to be addressed to successfully introduce a proper Environmental Education curriculum framework in the FET band?

Like the former EE lecturer, in addition to challenges already presented, she identified lack of political will for integration of EE.

Question 11: Better support for teachers' execution of Environmental Education in the classroom

How can we better support teachers to execute Environmental Education in the classroom?

In addition to those already presented by the other participants, she suggested the development and implementation of an EE policy and code of conduct in terms of caring for the environment.

Question 12: Anything else to share with the researcher

Is there anything else to share with the researcher?

The FET Curriculum Coordinator thanked the researcher for having shown interest in her contribution. She was excited that the researcher had embarked on a study like this as there was an enormous need for it. She wished the researcher well, saying that she would like to see her dream exploding and being realised.

5. 3 SUMMARY

Lichtman's guidelines of analysis were adapted to be used for the analysis of the interview data. The data was grouped into main themes and sub-themes. For the focus group interviews, the first set of main themes was classified into family background; second set, education and experience; third set interest/hobbies; and fourth set, interest in the study. Three of the participants were born and grew up in a township, three in a village, one in a mining area but was exposed to the *veld*, and three on a farm. Nine out of ten participants had majored in one or more of the selected subjects of the study; that is, Life Sciences, Physical Science, Geography and Life Orientation. One did not major in the selected subjects but taught Life Sciences. Their teaching experience ranged from four to 27 years. The participants' interests include farming, sport, reading, excursions and church. Most of the ten participants love the natural environment. The interest in the study by the participants was expressed in terms of their career paths (three participants) and support for the introduction of EE curriculum in the FET band (five participants). The participants expressed concerns about visible environmental problems, such as the scarcity of water in their area.

Lichtman's guidelines of analysis were adapted to be used for the analysis of the the CAPS documents. Document analysis data revealed that the aim and purpose of CAPS, specific aims and skills of the selected subjects. CAPS principles are also reflected in the objectives of the United Nations Decade of Education for Sustainable Development. The analysis revealed that regarding the four selected subjects, in Life Sciences CAPS, strands 3 and 4 of the four strands dealt with environmental content; all the Geography CAPS topics have environmental content; there are parallels between EE and Life Orientation regarding 'socially and environmental responsible behaviour', the only one out of six topics in LO; and, lastly, all the Physical Science topics have environmental content.

Adapted Lichtman's guidelines of analysis were aso used here. The face-to-face interviews' analyses were based on different levels of participants separately; that is, the principals, deputy principals, departmental heads and teachers separately. Like the focus group interviews, they were also categorised into main and sub-themes. Themes were drawn from interview questions, and in some cases I used in vivo codes to table the data that used the language of the participants. Analysis of these interviews also answered the sub-questions of the study. The principals, deputy principals and

departmental heads have vast teaching experience. The experience of participants ranged from one to 32 years. All the interviewees are professionally qualified teachers. They majored in one or more of the selected subjects of the study, and others in other subjects taught at schools, which according to them, contained environmental content. All 37 participants included EE in their teaching, to a lesser or greater degree. The participants' opinions on the state of their natural environment was that it was in a poor state, most referring to the serious scarcity of water in the area. The participants' understanding of the concept EE comprised both environmental awareness and management. All the participants were of the opinion that there was not enough EE content in their subjects. My observation is that they lack knowledge of EE, even the Geography teachers. All the participants said there was a need for an EE curriculum framework in the FET band. Most were of the opinion that EE should be an independent subject. A few also suggested a practical approach.

The participants agreed that the introduction of EE would help learners to understand the term environment better and find solutions to prevailing environmental problems. The challenges to be addressed in order to successfully introduce an EE curriculum framework in FET band were stated as follows: the shortage of physical and human resources; the shortage of sites for practical work and the lack of a practical approach for the teaching of EE content; an overcrowded school curriculum; curriculum developers with inadequate EE knowledge; teachers without EE training or knowledge; community illiteracy; lack of marketing for EE; neglect of the environment by people in general; and the lack of proper content progression across grades.

Views on how to better support teachers to implement EE in the classroom included capacity building of teachers; financial support by government departments; the introduction of EE in schools; a practical approach of teaching EE; and reconsidering the place of EE topics in other subjects, for example, the EE topics should be the first in order to be given enough time to deal with them.

Regarding the title of the thesis, the analysis reflected the following:

- The deteriorating state of the natural environmental affected the socio-economic status of society.
- Understanding of the concept Environmental Education.
- The participants were not confident about the status of EE in their subjects, which stemmed from how they understood the concept or field EE.

- The participants' degree of understanding of the concept EE and its status in their subjects pushed their need for an EE curriculum framework in the FET band.
- They envisaged a proper EE curriculum framework in the FET band as having EE as an elective independent subject.
- They were positive that the introduction of EE would improve understanding of the environment and its problems, and thereby provide solutions.
- There are challenges to be addressed to successfully introduce a proper EE curriculum framework in the FET band, and how to currently better support the implementation of EE across other subjects.

CHAPTER 6

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

6.1 INTRODUCTION

In Chapter 5 the data were analysed by means of thematic method. That were data collected through focus group and face-to-face interviews, and the CAPS documents of the four selected subjects for the study; that is, Life Sciences, Physical Science, Geography and Life Orientation. The data were analysed by categorising information into main themes and sub-themes. Regarding the CAPS documents, the analysis was based on environmental content regarding the following: the aims and purpose; definition, subject specific aims, content and skills, time allocation and assessment.

This chapter provides a brief summary and conclusion of the study, before presenting suggestions in response to the findings of the study. It also outlines the challenges the researcher experienced during the process, which resulted in some alterations in planning.

6.2 SUMMARY OF THE STUDY

A summary is an important component of the study to provide the reader with the overview of the researcher's work. This section provides a synopsis of the literature and empirical findings of the study.

6.2.1 Key scholarly review findings

The environmental situation is worsening. This is observable locally and globally, with climate change, and energy and water problems commonplace. However, it is believed that education could be the best tool to deal with environmental crises, according to Conde and Sanchez (2010: 478), "Integration of Environmental Education into the school curriculum is still a topic of concern". With this opinion in mind, and influenced by the observation of how the natural environment is busy

deteriorating, the focus of this study was therefore on a curriculum framework for Environmental Education, which would find its place in the school curriculum, for its optimal implementation.
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Section 1.2 presents EE as a major vehicle for developing awareness and sensitivity about major problems of the environment. EE emanated from various developments by consecutive international fora. These developments included, inter alia, the evolution of the concept EE (Barakatt 2011); as well as conferences and summits that contributed to an enhanced understanding of EE and related issues such as Tblisi conference (Hanneman 2013). These provided a platform for arguments on environmental issues, and valuable blueprints for institutions, including schools, for integration of EE in many countries including India, United States of America, South Africa and Zimbabwe.

In South Africa, the first Environmental Education conference was held at Treverton School in Mooi River in 1982 (EEASA 2019), and fundamental documents are the constitution, White Paper on Education and Training of 1995 and ANC RDP document (Mobokazi 2009; Mosala, Venter & Bain 2017).

Section 1.3 points out that although the importance of EE has been acknowledged at different levels (conferences, summits, commissions, reports, official education documents, as mentioned in section 1.1 of the study), EE had always been scattered over various school subjects in the South African FET schools’ curriculum. These subjects include Life Sciences, Geography, Physical Sciences and Life Orientation, and often it is incorporated simply as sub-themes or topics. Curricula have changed from NATED 550 to CAPS, but the status of EE remains the same; that is, infused into other subjects (Abdullah et al. 2011; Hassan & Ismail 2011; Makhoba 2009; Makokotlela 2009).

The literature review in section 1.4.2, and Chapter 2 and Chapter 3, revealed a need for an EE curriculum in schools. Operational concepts of the study were clarified in Chapter 2. These were Environmental Education, Further Education and Training band, and curriculum framework. There is a continuous debate on the definition of the concept EE, but Stapp's definitions serve as reference for most researchers.

Section 2.2.1.2 discussed the concept education on the basis of its etymological meaning; its narrower (NCERT 2014), broader(Reutzel 2014). and real education meaning (Kumar & Ahmad 2007-2008).; as well as from a conservative (Jones 2014) and liberal perspective (Schneider 2013). After examining different definitions, this research arrived at a workable definition of the concept (see 2.2.1.2).

The desire for a definition of EE has existed for at least two decades (Barakatt 2011). The definition of the term had attracted competition among researchers, authors, environmentalists, EE teachers, the media, artists, leaders, and other members or institutions of global societies.

It is acknowledged that the term EE emerged from earlier attempts, such as "nature study" (Nature study n.d), "conservation study" (Carter & Simmons 2010: 11) and "outdoor education" (Hursen & Islek 2017) (see 2.2.1.3 ii).

Increasing environmental crises stimulated concurrent movements alongside EE (see 2.2.1.3 iii). These include the Resource-Use movement, which ensured that humans used the resources in the most efficient way possible (Upland Software 2015); progressive education as "child-centred, nature-based education" Garte 2017: 8); and population education, which means "the factual knowledge about population dynamics required to understand the nature and magnitude of the burden imposed by population growth" (Saviashok 2011: 1).

There has been a continuing contestation about the definition of the concept Environmental Education even after the Belgrade charter (see 2.2.1.3 iv). Debate about the definition of EE has forced some researchers to move away from conducting studies on the concept Environmental Education to Education for Sustainable Development or to deal with the two concepts simultaneously. This has further brought a confusion about the identity of EE and its status in the curriculum.

The journey of defining the concepts from environment to education led to this working definition of EE for the study:

> Environmental Education is a learning process that increases learners' knowledge and awareness about the environment and associated challenges, develops the necessary skills and expertise to address the challenges, and fosters attitudes, motivations, and commitments to make informed decisions and take responsible action (Erhabor & Don 2016: 5368; Karama 2016: 3).

The concept of curriculum framework was clarified in section 2.2.2 of this study. starting with the definition of framework, then curriculum, and then curriculum framework). Curriculum frameworks can be envisaged from different perspectives, such as specified/intended, implemented/enacted, achieved/learned, hidden, null, and electronic curriculum frameworks. It was advised that teachers not only grasp the official, but also the hidden and null curricula (UNESCO 2009-2014). In this context, curriculum is defined as follows:

> …the sum of all the activities, the educational foundations and contents, their sequencing in relation to the amount of time available for the learning experiences and opportunities, the characteristics of the teaching institutions, the characteristics of the learning experiences, in particular from the point of view of the approaches to be used, the resources for learning and teaching, evaluation and teacher profile (Harvey 2009:1).

Section 2.2.3 of the study defined the Further Education and Training (FET) band of schools. While internationally, mainstream schools are classified into primary and secondary, in South Africa, schools are further divided into bands (Department of Basic Eduaction 2011e: vii).. These bands are categorised according to grades: Grade R to 9 is called the GET (General Education and Training) band; and Grade 10 to 12 is referred to as the FET band (Department of Education 2010). FET schools therefore refer to secondary schools composed of both the GET band (Grade 8 and 9) and the FET band (Grade 10 to 12).

In Chapter 3, the study reviewed the historical, global situation of EE with reference to the Stockholm Conference of 1972; 1975 Belgrade Charter; the Tbilisi Principles of 1977; the Brundtland Report of 1987; the Rio Summit of 1992; the Johannesburg Summit of 2002; Rio+20 of 2012 and some Conference of the Parties (COP) (see

section 3.2.1 to 3.2.8.10) . The aims of these efforts focused on, among others, the redefinition of EE and guiding principles for EE frameworks. For example, the Tbilisi Conference helped to integrate into the national education curricula and promote interdisciplinary and problem-solving strategies in curricula and education materials.

3.3 discusses Environmental Education curriculum frameworks in India and United States of America as the two international examples; followed by Zimabwe as an example of SADC and South Africa as both a member of SADC and the country where the study is conducted. The examples reviewed here are not necessarily the best in the world, but they were selected for various reasons. United States of America was selected to determine whether as an economic giant, it has made any progress regarding the incorporation of EE as an independent subject. India is one of the few countries that show an interest in curriculum containing environmental issues. Zimbabwe was selected as a representative of a SADC country with historically the best education system when compared to South Africa. South Africa is the country where this study was conducted and has made good progress regarding education for sustainable development in the SADC region. Further empirical research was done to confirm the status of EE in CAPS in the FET band in South Africa. Analysis was done on some subjects containing EE content, and findings have shown that it is either inadequate or the focus is on the individual subject's identity or the subject is not compulsory resulting in denying learners knowledge of EE.

Although a number of initiatives were taken including conferences; documentations and even media to integrate EE in the school curriculum, the review reflected barriers impeding EE incorporation and the implementation thereof in the four selected countries. The common challenges included the lack of infrastructure, financial constraints (Chhokar 2010); lack of EE national policies and inadequate clarity on guidelines (Farlex 2011); the lack of LTSM for EE (Newsday 2017); external factors such as the "politicisation of the education system" (Little 2010: 18; Ministry of Human Resource Development 2016: 33); changes of curriculum, inadequate teacher training, the lack of research studies in EE (Almeida and Cutter-Mackenzie 2011), and resistance to change by stakeholders (including teachers). Overall, there has been little progress regarding the framework for integration in secondary schools in the four countries under study. In fact, all the four countries incorporate EE through other subjects like the Sciences, Social Sciences, Mathematics, Languages and so forth. USA is prominent with the implementation of EE programs. But this is not mandatory and those states opting to implement must develop and implement plans.

Examples of curriculum frameworks that can be used as general ways of integrating EE were also discussed. Therefore the conclusion is, because they also focus on one aspect, they do not differ from the current situation of teaching EE across other subjects in a fragmented approach. In other words, they do not meet the requirements of teaching Environmental Education in the secondary schools, FET band in South Africa. The study therefore strongly recommends for EE curriculum that gives it an independent status.

6.2.2 **Key empirical findings**

6.2.2.1 Focus group interviews

As mentioned in section 1.5.3.4, the unstructured interviews were used to obtain information concerning 'participants' personal feelings, attitudes, beliefs and perceptions in relation to the phenomenon'. These were informal and open-ended interviews, which were used at the beginning of the empirical research to determine both the participants' background and interest in the study and topic. They allowed the participants to use their own language and go into more details than in the structured interviews; hence, the researcher obtained a fuller picture of their experiences. This section presented the key findings.

(i) Love of the natural environment/nature

Most of the ten participants love the natural environment in one way or the other.

(ii) Submission of inputs regarding the EE Curriculum in the FET band

Five out of ten participants supported the introduction of an EE curriculum in the FET band.

(iii) Awareness of local environmental problems

The participants expressed concerns about visible environmental problems, such as the scarcity of water in the area, which is also a national crisis.

6.2.2.2 Document analysis

Document analysis of the data in section 5.2.2 revealed that the aim and purpose of CAPS provide an approach for the incorporation of EE (Department of Basic Education 2011a). This is done by ensuring that learners "acquire knowledge, skills and values

that are meaningful to their own lives; and participation in society as citizens" (Department of Basic Education 2011a: 4). This encourages active participation of learners in solving environmental problems they come across in their daily lives in their communities. CAPS principles also stress "environmental and social justice", as prescribed "in the Constitution" (Department of Basic Education 2011a: 5). This principle mandates citizens to respect the natural environment, and to be sensitive in the way they utilise it so that it can support those who come after them.

The analysis revealed that regarding the four selected subjects, in Life Sciences CAPS, strands 3 and 4 of the four strands deal with environmental issues; all the Geography CAPS topics have environmental content; there are parallels between EE and Life Orientation regarding socially and environmentally responsible behaviour (one out of the six topics in LO); and lastly, all the Physical Science topics have environmental content.

6.2.2.3 Face-to-face interviews

Only key findings are summarised here because chapter five has provided a detailed analysis.

(i) Inclusion of EE topics in teaching

The participants included EE topics in their teaching because their subjects contained EE topics/content.

(ii) Opinion about the condition of your township's natural environment

All the participants agreed that their local area was in a poor state, and the scarcity of water and the shortage of electricity worsened the situation; hence, the need for an EE curriculum framework in the FET band.

(iii) Understanding of Environmental Education

Participants' understanding limited to environmental awareness and management.

(iv) Opinions on the place of EE in their subject

All the participants, except the former college Environmental Education lecturer, had a view that there was not sufficient EE content in their subjects.

(v) Need for an EE curriculum framework in the FET band

All participants believe that EE should be introduced into the FET band.

(vi) Envisaged proper Environmental Education curriculum framework in the FET band

Most participants felt that EE should be a separate elective subject.

(vii) Anticipated contributions of EE curriculum framework to teaching and learning

All participants believe that understanding the concept envirtonment will assist them to solve associated environmental problems.

(viii) Challenges that need to be addressed to successfully introduce a proper Environmental Education curriculum framework in the FET band

Many problems to be tackled in order to integrate an EE curriculum framework in the FET band included physical and human challenges.

(ix) Views on how to better support teachers to implement EE in the classroom

The participants emphasised the support of the department for proper and adequate physical and human resources, as well as reconsideration of the place of EE in the curriculum.

6.3 CONCLUSIONS AND RECOMMENDATIONS

6.3.1 Introduction

This section draws conclusions and makes recommendations. But it starts by checking whether it has achieved the aim and objectives of the study.

The intention of the study was to investigate and subsequently suggest a curriculum framework for EE in the FET band – a curriculum that would give EE a proper place in the school curriculum in order to address crucial environmental problems affecting the

environment, both its biotic and abiotic components. To attain the intention of the study, an attempt was made to respond to the following questions:

6.3.1.1 What is Environmental Education?

This question was answered in section **2.2.1.3**, and was attempted by the participants during the face-to-face interviews (section 5.2.3). Their responses showed conceptual difficulty. As a result, they were unable to explicitly pick up EE themes in their subjects, except those clearly named by the textbook, resulting in their inability to incorporate them in their classroom activities, let alone interdisciplinary integration.

6.3.1.2 How are curricula for Environmental Education structured in the school curricula of the selected countries?

Chapter 3 addressed this question. All the selected countries, India, United States of America, Zimbabwe and South Africa, do not have a separate EE curriculum framework in the secondary schools. Environmental topics are still infused into other subjects like the Sciences, and Social Studies/Geography.

6.3.1.3 What are the challenges facing Environmental Education in schools globally, and more specifically, in the FET band?

The common challenges included the lack of infrastructure, financial constraints (Chhokar 2010); lack of EE national policies and inadequate clarity on guidelines (Farlex 2011); the lack of LTSM for EE (Newsday 2017); external factors such as the "politicisation of the education system" (Little 2010: 18; Ministry of Human Resource Development 2016: 33); changes of curriculum, inadequate teacher training, the lack of research studies in EE (Almeida and Cutter-Mackenzie 2011), and resistance to change by stakeholders (including teachers).

The data collected and analysed from the CAPS documents and face-to-face interviews in Chapter 4 confirmed the presentation in section 3.3.1.3, 3.3.2.3, 3.4.2.3 and 3.4.3.3 that there are challenges facing the EE curriculum framework and implementation in the FET band. Hence, which curriculum framework for Environmental Education in the FET band can be proposed to respond to the identified challenges?

6.3.2 Conclusions

The following conclusions are discussed below:

6.3.2.1 Related literature

Although a number of developments regarding EE have taken place, little has been done about its place as a stand-alone subject. This includes South Africa, where EE has been integrated across other subjects.

The literature review indicated that there was a need for a curriculum framework for EE in the FET band (Dube 2012; Jickling & Wals 2008; Kumar & Kumar 2007; Kumler 2010; Makhoba 2009; Munikwa 2011; Nkambwe & Essilfie 2012; Songqwaru 2012). However, the debate focused on whether it should be an independent subject or to continue infusing it into other subjects (Abdulla, Halim & Shahal 2011; Hassan & Ismail 2011; Stevenson 2007; Swarts et al. 2015; Verma & Dull 2017).

6.3.2.2 Document analysis

The aim and purpose of CAPS provides an approach for the incorporation of EE. In short, it provides an opportunity for learners to “acquire knowledge, skills and values that are meaningful to their own lives; and participation in society as citizens” (Department of Basic Education 2011a: 4). CAPS principles also stress “environmental and social justice”, as prescribed “in the Constitution” (Department of Basic Education 2011a: 5). The analysis revealed that the four selected subjects all contained environmental topics, but to differing degrees; most of them contained fewer, while Geography contains more topics. In the Life Sciences CAPS, strands 3 and 4 of the four strands dealt with environmental issues; all the Geography CAPS topics had environmental content; there were parallels between EE Education and Life Orientation regarding socially and environmentally responsible behaviour; and lastly, all the Physical Science topics contained environmental content.

6.3.2.3 Inclusion of EE topics in teaching

Although the participants included EE topics in their teaching because their subjects contained EE topics/content, they could not confidently differentiate between their specific subject content and EE content when it was not explicitly named. Most teachers did not understand what EE is, that is why they were unable to recognise environmental sections or themes in their subjects.

The FET Curriculum Coordinator confirmed the view of the other participants that the natural environment was in a poor state. As the other participants stated, littering was visible everywhere, and on the day of the interview she mentioned that a notice had been issued by the Municipality that the e-coli count in the tap water stood at 16.

6.3.2.4 Opinion about the condition of your township's natural environment

All the participants agreed that their local area was in a poor state, and the scarcity of water and the shortage of electricity worsened the situation; hence, the need for an EE curriculum framework in the FET band.

6.3.2.5 Your meaning of Environmental Education

The participants' understanding was limited to two parts of the concept: making learners aware of environmental problems and how to manage this natural environment. In other words, taking care of the environment. They did not include information on how other aspects, such as moral values, affect the environment.

6.3.2.6 Opinions on the place of EE in their subject

All the participants, except the former college Environmental Education lecturer, concluded that there was not sufficient EE content in their subjects. My deduction is that they lacked knowledge of EE, even the Geography teachers.

6.3.2.7 Need for an Environmental Education curriculum framework in the FET band

Environmental problems, and the fact that EE does not come out clearly when taught through other subjects, led to all the participants concluding that there was a need for an Environmental Education curriculum framework in the FET band.

6.3.2.8 Description of envisaged proper Environmental Education curriculum framework in the FET band

The stance of most the participants was that EE should be an independent subject (See 6.2.1.11 and Annexure D). The participants' proposal supports researchers who advocate for EE as a stand-alone subject (Abdulla et al 2011; Hassan & Ismail 2011; Stevenson 2007; Swarts et al. 2015; Verma & Dhull 2017). Some participants were of the view that it should follow a practical approach. This is also the position of the researcher, as advised by observation and experience of the deteriorating

environment, as well as the treatment afforded to EE topics in other subjects (as revealed by literature). Even those subjects, such as Geography, with a large amount of EE content, have a problem with implementation because most teachers have not been trained in EE. The researcher therefore proposes that EE in the FET band should be an independent elective subject.

6.3.2.9 Anticipated contributions of EE curriculum framework to teaching and learning with regards to:

(a) Improving conceptual understanding of the environment

All the participants agreed that the introduction of EE would help learners to understand the term better. Their understanding of the term would enable them to understand the real observable environment.

(b) Finding solutions to environmental problems

All the participants believed that the understanding of the term environment would translate into an understanding the real thing or situation. Their interaction with the environment would enhance their capacity to handle prevailing environmental crises. Their understanding of the concept environment and how it would assist in finding solutions to environmental problems reflected their reference to the physical environment.

6.3.2.10 Challenges that need to be addressed to successfully introduce a proper Environmental Education curriculum framework in the FET band

The participants stated that the following challenges hampered the introduction of a proper EE curriculum framework in the FET band:

- A conceptual barrier regarding the definition of EE.
- Physical and human resources:
    - Money/budget.
    - Learning-Teaching Support Material (LTSM).
    - Sites for practical work.
    - Teachers without EE training.
    - No basic/elementary schooling/illiteracy of community.
- School curriculum
    - Overcrowded school curriculum.

    - School curriculum developers and advisors without EE training.
    - Unlinking of topics/proper content progression.
    - Lack of a practical approach.
- Neglect of EE by the Department of Basic Education.
- Lack of marketing for EE.
- Neglect of the environment by people.
- Mission for EE as a nation.
- Lack of collaboration between state departments.
- No recruitment of people with EE expertise.
- Difficulty in identifying and implementing EE content in their subjects.

These challenges impeded the successful integration of EE across other subjects. Proposals on how to overcome these challenges are included under the section on recommendations on a curriculum framework for EE in the next section.

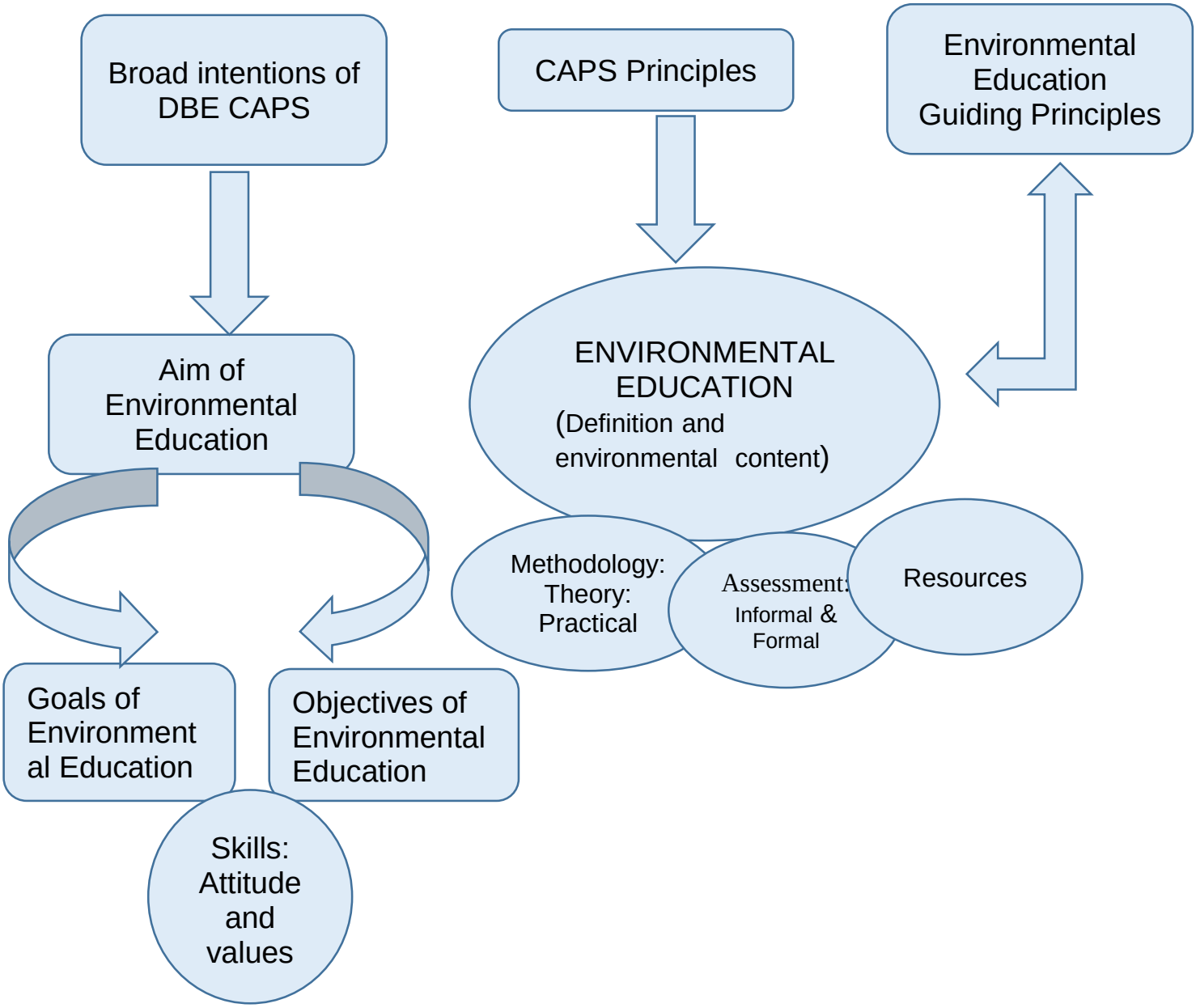
6.2.1.11 Better assistance for teachers' execution of Environmental Education in the classroom

The participants proposed that teachers should be supported as follows:

- Capacity building of teachers by means of training, in-service training, workshops, and seminars.
- Financial support by state departments for LTSM; practical work to be awarded a grant.
- Introduction of EE to afford it its status.
- The place of EE in the curriculum – topics not to be treated as secondary; for example, currently it is the last topic in Life Sciences and is therefore not getting sufficient time.
- Practical approach of teaching EE.
- Collaboration between state departments.
- Resuscitation of EE clubs.

These conclusions together with literature review in Chapter 3, face-to-face interviews (see 5.2.3) and CAPS document analysis (see 5.2.2) have motivated the researcher to propose a curriculum framework for Environmental Education in the FET band, for optimal implementation of EE?

A proposal for a curriculum framework for EE as an independent elective subject is therefore submitted below and is unpacked in Annexure D.



Curriculum Framework for Environmental Education in the FET band: an elective subject

This proposed EE curriculum framework for EE as an elective subject contains the following:

- [illegible]
- Specific EE guiding principles, as given in 4.2 of Annexure D, which respects it as an independent elective subject.
- "General aims of the South African curriculum (CAPS)" (Department of Basic

Education 2011b: 4) (1 of Annexure D) or broad intentions of DBE CAPs as reflected by 6.2.1.11 above, “ensure that children acquire and apply knowledge, and skills in ways that are meaningful to their own lives; provide access to higher education” and career-path EE teachers, environmentalist and EE managers, and risk assessment managers, among others (Department of Basic Education 2011b: 4).

- The general aims inform the aim of EE, as presented by section 4.3.1 of Annexure D, which strives to capacitate learners for responsible, effective participation in their natural environments.
- The goals and objectives of EE are derived from this aim, as stated in section 4.3.2 and 4.3.3 of Annexure D.
- The specific EE skills to be acquired as expected by the general aims of CAPS and the aim of EE above are stated in section 4.4 of Annexure D.
- The attitudes and values expected by the general aims of CAPS and the aim of EE above are presented (section 4.5 of Annexure D).
- A practical approach: the nature of EE is practical, and this view is also supported by some participants of this study (in Chapter 5). A practical approach will cover both informal and formal activities. These include assignments, projects, field trips or excursions, as well as tests and examinations.
- Assessment will be informal and formal, and include the tasks mentioned above.
- Environmental content will be taught and learnt in the form of theory and practical, as mentioned under practical approach and assessment above.

The main topics, which are unpacked in Annexure D, are:

Table 6.1 Main topics for the proposed adapted Curriculum Framework for Environmental Education in the FET band: elective subject

Grade 10	Grade 11	Grade 12
Biosphere to Ecosystems	Human impact on the environment in South Africa	**1. The communities' cultural and spiritual practices.**
		2. Investigation of environmental issue and participation empowerment
Human and Ecology	Humans and consumption	1. Climate and weather. 2. Using secondary and primary sources for obtaining issue Information.
History of life on earth	Resources	1. Political and economic dimensions of EE 2. Interpreting data from environmental issue Investigations.
	Pollution	1. Settlements 2. Issue resolution: skills and application.
	Waste	

- Resources should also include ICT resources.

I am therefore presenting this curriculum for further research knowing that my proposal will stir debate among researchers. My proposal is for a curriculum framework for EE as an elective independent subject in the FET band.

These recommendations should also form the basis of future research. Implications for future research are discussed in the following section.

6.3.3 Recommendations

This section deals with the recommendations for the framework in the South African FET band that can accommodate EE as an elective subject for its optimal implementation in the curriculum of the school. This includes recommendations on future research.

6.3.3.1 Implications on a curriculum framework for EE in the FET band

EE should be an active process "that increases learners' knowledge and awareness about the environment and associated challenges, develops the necessary skills and expertise to address the challenges, and fosters attitudes, motivations, and commitments to make informed decisions and take responsible action" (Erhabor & Don 2016: 5368; Karama 2016: 3). This process should enhance a high level of thinking, which would enable learners to take wise decisions and actions when solving

environmental issues. These should be taken with great consideration for the fact that the same environment belongs to the young people who come after us, and therefore their chances to benefit should not be jeopardised.

Subject Advisors (SESs/Curriculum Specialists) should be engaged in the design of the curricula and the teaching programmes of EE because they are appointed to monitor and support the work of teachers. As specialists, they are in a better position to provide guidance to the Department of Basic Education and subject teachers at school level.

Regarding the provision of physical resources and school curriculum, EE must be given equal treatment as the recently introduced subjects in the FET band. These are Agricultural Management Practice, Agricultural Technology, Technical Science and Technical Mathematics, which are afforded a special grant for the appointment of teachers, equipment, material and practical work (Department of Basic Education 2016).

In the FET band, EE could be a subject not dependent on other subjects. In CAPS, EE would be called an elective subject (Department of Basic Education 2012) where a learner would be able to choose it like other subjects. It means that EE may be taken as an elective subject, where the learner not offering Geography or Agricultural Science, will choose EE in the place of Geography or Agricultural Science. This will prevent a further overcrowding of the school curriculum, as generally argued. In this way, EE values are not undermined, or declared ineffective as a result of being engulfed by dominant subjects. This option of a curriculum framework protects EE from being marginalised, as is the situation currently.

Teachers trained in EE could teach this subject. The now defunct Colleges of Education used to offer EE as a course. Universities such as Northwest, UNISA, Stellenbosch and Rhodes University offer EE. These teachers have a qualification that they do not use it, as there is no EE in schools. Ongoing in-service training, workshops and seminars to introduce EE in the FET band could support these teachers.

EE should employ a practical approach. This will allow more exposure to the reality of environmental problems as learners will be able to see them first hand, and not only spoken about in the classroom. With the introduction of EE curriculum, rapport will be created between learners and the environment.

There should be collaboration between state departments when EE is integrated as an elective subject in the FET band. “A school alone with its educational practices is not feasible to provide pro-environmental consciousness and awareness that EE is seeking for, but also not to under-evaluate the potential of the school, despite critique on it, though there is much to improve in schooling in a field of Environmental Education” (Budvytyté 2011: 22). Thus, there should be collaboration between the school and other state departments. Collaboration with the Department of Environmental Affairs and of Water and Sanitation will assist with the knowledge, skills and expertise required for EE teachers.

These recommendations should also form the basis of future research. Implications for future research are discussed in the following section.

6.3.3.2 Curriculum Framework for Environmental Education in the FET band: an elective subject

Section 3.5.2 dealt with curriculum frameworks that are regarded as general ways for use in the incorporation of EE in the FET band.

Arguments on which framework to employ to incorporate EE in the curriculum will never stop. One strategy is the integration of EE in such a way that it is taught through related subjects like Chemistry and Physics (Abdulla et al.; Derman & Gurbuz 2018; Hassan & Ismail 2011; Stevenson 2007; Swarts et al. 2015). This is the common proposal by many researchers. In this approach, environmental knowledge is dealt with through other subjects, as mentioned above (Verma & Dhull 2017). According to Derman and Gurbuz (2018: 129), the sciences use EE “to solve many environmental problems”, such as natural disasters. However, Stevens (2007: 148) argues, “while Environmental Education should be multidisciplinary, school curricula are disciplined-based and emphasise abstract theoretical problems”. This is what almost all the participants in this research were concerned about. In other words, every teacher focuses on what is expected from his/her particular subject without paying much attention to the teaching-across nature of EE.

In addition to escalating environmental conditions, these are the reasons why the researcher of this study is opting for the second approach to a curriculum for EE in the FET band.

The second approach for the teaching of EE is to allow it an opportunity to stand on its own. Most participants of this study supported this choice. Although this is not a popular strategy, the introduction can assist in providing EE a favourable position in the FET band, so that it can assist in addressing environmental crises. As much as it is acknowledged that everything evolves from time to time, a change to approaches to EE must also be accommodated.

Scholars who suggest that EE can be “an independent subject” (Verma & Dhull 2017: 1548) would want to see those obstacles, which prevent it from being integrated in the school curriculum, dealt with. In addition, and overlapping with those of the interviewees, suggestions by researchers for the reform of EE should be related to the following:

- Evolution in EE to focus on real EE problems affecting the environment and all organisms.
- To empower learners with the necessary capacity to deal with contemporary environmental issues (Siddqui & Khan 2015).
- EE to be equally included in the school timetable.
- The introduction of EE as a stand-alone subject that can improve its quality and the way the learners weigh it as a subject (Siddqui & Khan 2015).
- Appointment of teachers with EE qualifications (Miles et al. 2006) and with enthusiasm (Teksoz, Sahin & Ertepinar 2010).
- “Pre-service and in-service training of teachers for the implementation of an EE curriculum” (Ozden 2008).

Whether an interdisciplinary or independent approach is adopted for the integration of EE, a practical way of teaching and learning is highly recommended (Derevenskaia 2014). Participants in this study also suggested this approach. According to Hassan and Ismail (2011), outdoor learning is the most effective method of teaching EE. But most schools take educational tours for leisure with little purpose and value for environmental excursions to natural ecosystems. Teachers are often not aware of the rich and cost-effective resources that are available in the local community such as an agricultural centre, landfill sites and so on. These excursions take learners closer to the natural environment. Learning outside the classroom also detaches learners from dependency on the teacher, whose approach is simply to transmit facts. Kostova (2008) also emphasises the independence of learners.

If the South African governments can attend to these suggestions, EE will be taught as a new subject in the FET band. The South African curriculum should keep pace with the changing environmental conditions and not wait for other countries to set the trend.

My experience and the review of literature on the treatment of EE have led this study to support those scholars who support an EE curriculum framework that stands alone: that is, making EE an elective independent subject in the FET band (see Annexure D).

Although there have been many developments globally, more should be done for a framework that will assist optimal implementation of EE in the FET band of secondary schools. This study aims to lay an antagonistic foundation for further research on this topic.

The topic was triggered by severe environmental crises, which include the scarcity of water and electricity, pollution, the effects of global warming, deterioration of the environment and loss of biodiversity, and high poverty levels. Without taking anything away from those researchers who recommended for the infusion of across other disciplines or subjects (Dube 2012; Songqwaru 2012; Swarts et al. 2015), I am submitting my suggestion of a curriculum that will assist in solving environmental problems.

Informed by environmental conditions, as indicated above, my proposal for a curriculum framework for EE in the FET band is influenced by those curriculum developers advocating for EE as a stand-alone subject – the argument being that the past has shown that the incorporation of themes in subjects like the Sciences and Mathematics (Verma & Dhull 2017) has shown little progress. The choice for a curriculum framework for EE as an independent elective subject in the FET band was motivated by some substantial advantages. These include respecting the identity of EE; ability of EE to perform its function without interference that distracts it. As an elective subject, EE will be given an opportunity to carry out its responsibility of teaching environmental content without having to depend on other subjects as its carriers, without affecting their position in the school curriculum.

The choice for the curriculum framework for EE as an independent elective subject in the FET band was also motivated by the participants' responses, which revealed the following during their interviews:

- All the participants said there was a need for an EE curriculum framework in the FET band. Most emphasised that EE should be an autonomous subject. A few suggested a practical approach.
- They observed that the natural environment was in a poor state, most referring to the serious scarcity of water in their area; hence, the need for EE.
- All the participants said that EE content in their subjects was insufficient. Others indicated the lack of time to focus on EE because of the placing of its topics; for example, EE topics were last in Life Sciences.
- The participants agreed that the introduction of EE would help learners to understand the environment better and find the means of dealing with the prevailing environmental conditions.
- The degree of understanding of the concept EE by the teachers themselves also motivated the need for an EE curriculum framework in the FET band.

In order to come up with a curriculum framework that I hope will attempt optimal implementation of EE in the FET band, reference and adaption were done to the old but currently relevant to the prevailing environmental conditions, and contemporary curricula frameworks for the proposed curriculum framework for EE in the South African FET band: an elective subject (see 6.2.1.11 and Annexure D). These sources included the CAPS documents for Geography, Life Sciences, Geography and Life Orientation. This proposed curriculum will take the format of other CAPS subjects as is mandatory; that is, the "general aims of the South African curriculum" (Department of Basic Education 2011b: 4) have been adapted to fit EE as an independent elective subject; CAPS principles; time allocation and weighting of topics; definition of EE; skills, attitudes and values to be acquired, which are prerequisites of both CAPS and EE; content topics/themes; and practical work and assessments (both informal and formal).

EE cannot be optimally implemented in the FET band without guiding principles. The proposed curriculum framework is also guided by the UNESCO's aim, goals and objectives of Environmental Education.

The revised EE curriculum prepared by Volk and Ramsey was also used as a source for the EE content. This document is still relevant and therefore recommended for the introduction of a curriculum that can deal with the current environmental problems. It should be noted that, the proposal for EE as an elective subject was influenced by the deteriorating environment which has not been assisted by an interdisciplinary

approach of teaching and learning for the past decades. Therefore, reference to any document, old and temporary, is guided by the worsening environmental conditions, not the document per se. If the condition is still prevalent, it will be included in this curriculum to be dealt with in order to improve the quality of the environment. Another reason is that, learners choose their streams, therefore, those without Geography, Life Sciences and Physical Sciences as their elective subjects will be given an opportunity to choose EE. A proposed curriculum framework for EE in the FET band: an elective subject (see 6.2.1.11 and Annexure D) is therefore my proposed curriculum framework, with assistance of these documents.

Learners would also have the opportunity to prepare their career pathing in the EE subject. Students specialising in EE or Environmental Management at tertiary institutions like UNISA, Rhodes University and Stellenbosch University would have a foundation in EE from the FET band, which is not the case now.

6.3.3.3 Implications for further studies

Although progress has been made regarding the integration of EE in formal education, especially at policy level, more research is required in order to determine a curriculum framework for optimal implementation of EE in the FET band of secondary schools. The aim of this study is to stimulate conversation concerning the need for more debate on the place of EE in the school curriculum in the FET band, in order to address the deteriorating state of the global environment, so as to prompt further research on this topic, “A curriculum framework for EE in the FET band: an elective subject”. This was triggered by evidence that in South Africa most researchers have focused on the infusion of EE into other subjects, such as Geography, Life Sciences, Life Orientation and Languages (Dube 2012; Songqwaru 2012; Swarts et al. 2015). As reflected by options 2 and 3 in section 6.1 above, infusion has not done EE any justice.

My experience, the literature review on the treatment of EE in school curricula (Verma & Dhull 2017), and the responses of this study’s participants (as collected in Chapter 5 and analysed in Chapter 6) persuaded this study to support those scholars advocating for a stand-alone EE curriculum framework: that is, to make EE an independent elective subject in the FET band. This curriculum framework will be favoured by, among others, the following substantial advantages: respect for the integrity of both the scope and sequence of the curriculum framework; and fewer

teachers would have to be trained in the content, skills and methodology associated with the curriculum framework because there are teachers with a qualification in EE (as mentioned above). For the same reason, the need for grappling with the problems associated with infusion would be reduced. Structural challenges facing EE would be overcome by gaining the opportunity to re-examine the priorities of education and therefore increasing the resources of time, technical material and financial support for EE (Budvytyté 2011).

As an elective subject, EE will be given the opportunity to meet its responsibility of teaching environmental content, without having to depend on other subjects. As an elective, it will be the ideal vehicle for influencing environmental content, without threatening other subjects' integrity. I hope that this will make people understand environmental issues better and resolve environmental problems more successfully.

This research can also serve as a future pilot project for the implementation of a curriculum framework for EE as an elective subject in the FET band.

6.4 Looking back

My reflections are based on the difficulty of accessing some schools; the methodology; limitations; and their influence on the research process.

6.4.1 Access to schools

My initial plan was to select secondary schools across the whole district, but due to the response from certain schools, a hip replacement operation that prevented me from reaching more schools and schools that were further away, and a lack of time due to my hectic work schedule, I ended up with four schools in my Circuit. As a Circuit Manager, you are a liaison officer between a large number of stakeholders, ranging from SGBs, parents, the community, departments, directorates and their sub-directorates, as well as NGOS. Your plan ends up being directed by all these clients. This leaves you with little time to yourself.

I applied to the Acting District Director of Education of the Dr Ruth Segomotsi Mompati District in June 2015 for a permission to conduct research (see Annexure A 1). I was only granted permission to conduct the research in September 2015 (see Annexure A 1).

I personally visited the principals of the schools and showed them the letter of permission to conduct research from the Acting Director of Education. I also explained the purpose of the research. I asked them to arrange for a meeting with their teachers for me to introduce myself, explain the purpose of my research, and request them to participate in my study. In the first Circuit, the first former Model C School postponed when I was already at the school, without prior notice. The principal of the second former Model C School telephonically informed me that I must contact the teachers to arrange for my meeting with them myself, as this is a private matter; this happened after he initially agreed to do it. In terms of protocol, I cannot use the school without the permission of the principal; that is why I requested him to make the arrangements for me.

The responses from these two schools discouraged me from the initial plan of using a sample comprising more former Model C schools in the whole district, adding to the others mentioned in the first paragraph above. I ended up including only one Model C school in my Circuit.

I did not experience any problems with access to the four secondary schools in my Circuit. The principals or delegated deputy principals were also accommodating regarding the venue arrangements.

6.4.2 Methodology

Initially I chose Critical Emancipatory Research as the methodology for my study. I do not have previous experience in using Critical Emancipatory Research methods but wanted to explore it. My focus group interviews were even based on it. My promoter discouraged me from using Critical Emancipatory Research for two reasons: both of us did not have any experience of Critical Emancipatory Research, and the promoter wanted me to produce my own work as Critical Emancipatory Research engages both the researcher and participants as co-researchers on an equal basis.

I then switched to qualitative research methods, which included document analysis and face-to-face interviews. This was also the first time I had used these methods. I used questionnaires for the collection of the data for my Master's degree in Education. My journey to a PhD has therefore included learning to use unstructured focus group and semi-structured face-to-face interviews, as well as document analysis methods, for the first time. I also got the opportunity to learn more about South Africa's new

curriculum, CAPS, and the challenges experienced by secondary school teachers in integrating EE content in the curriculum.

During the unstructured focus group interviews, one member of each of the two groups did not avail themselves due to urgent family responsibility issues, leaving each group with five members instead of six.

Document analysis of four subjects (i.e. Life Sciences, Physical Science, Geography and Life Orientation) was demanding, compared to researchers who focus on one subject only. CAPS is also a combination of curriculum and assessment.

The individual, semi-structured face-to-face interviews took long because the participants are FET teachers who also conduct morning, afternoon and Saturday classes. The interviews started in November 2016 and went on until October 2017 for school-based participants (principals, deputy principals, departmental heads and teachers). The follow-up interviews, for clarity and to address omissions, were done telephonically between October and December 2017. One sampled departmental head kept on postponing his interview, until he disappeared. The other one had a negative attitude; thus, he was left out, as this process is voluntary.

The data collection exercise was also affected by language. Some Afrikaans-speaking teachers only felt comfortable in their home language, Afrikaans. The Afrikaans-speaking SES was requested to translate the responses, as I am not fluent in Afrikaans.

In the interim, the SES for FET Life Sciences was transferred into the post of Deputy Principal leaving him with little time for the interview with me. Moreover, the former college Environmental Education lecturer was only available for the interview in October 2017 due to his work schedule as a SES. Furthermore, the appointment for an interview with the FET Curriculum Coordinator was postponed many times due to sick leave and a busy schedule. I only managed to interview her in April 2018.

6.4.3 Limitations

A major limitation was that of my hip replacement operation that no longer allowed me to drive long distances. My sample was therefore reduced to a Circuit level, from a District level.

The other major challenge related to my laptop crashing twice. The first crash was when I was busy with Chapter 3 and I had to restart the thesis, as I did not have a backup. The second crash happened after the face-to-face interviews. Unfortunately, the interviews were saved as annexures on the laptop, but not on a backup hard drive. Fortunately, the bulk of the thesis was saved on a hard drive, and fortunately, the annexures of the interviews were already printed out. Thus, hard copies are available, but not soft copies.

Other limitations included an extremely busy work schedule with little available time for postgraduate study, and the negative responses of the former Model C schools' principals, as mentioned in section 6.3.1 above.

Another limitation was that of changing the research methodology, from Critical Emancipatory Research to qualitative research.

The attitude of the two departmental heads, resulting in their non-availability, affected the interviews because they are the primary drivers of the curriculum.

The choice of four subjects for the document analysis and individual face-to-face interviews consumed more time and lengthened the research period. However, using these instruments assisted greatly in obtaining credible data on a curriculum framework for EE in the FET band and the implementation of EE content in other subjects.

6.4.4 My influence on the research process

My status as a PhD student seemed to intimidate some of the teacher participants even though I pleaded with them to look at me as a mere researcher interested in their contributions. It appeared as if they regarded me as a highly educated person who could possibly expose their shortcomings. I allowed one participant to be interviewed by the former college Environmental Education lecturer to ease the participant's anxiety.

6.5 CLOSING REMARKS

Much progress has been made at government level regarding EE. The third paragraph of section 1.2 presents EE as a major vehicle for developing awareness of and sensitivity about environmental crises. EE emanated from various developments by consecutive international fora. These developments included inter alia the evolution of

the concept EE; and the establishment of international organisations concerned with the environment such as IUCN; also, conferences and summits that contributed to an enhanced understanding of EE and related issues.

Section 1.2 also showed that those fora served as the basis for countries' other initiatives and valuable blueprints for reference for institutions, such as schools, for the integration of EE content in the curriculum. South Africa also kept pace with developments in EE. The first Environmental Education conference was held at Treverton School, Mooi River, in 1982. Progress was reflected by documents such as the Constitution of the Republic of South Africa and the ANC's RDP.

However, whilst the national curriculum in South Africa has changed from NATED 550 to Curriculum 2005, and later from the National Curriculum Statement to the Curriculum and Assessment Policy Statement (CAPS), none of these documents afforded EE the status of an independent subject in the FET band.

The aim of this study is to stimulate conversation concerning the need for more debate on the place of EE in the school curriculum in the FET band, in order to address the deteriorating state of the global environment. Other studies that will follow are challenged in advance to advocate for a curriculum framework for EE as an elective subject in the South African FET band. For too long, other subjects have engulfed EE

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ANNEXURES

ANNEXURE A: ETHICS DOCUMENTS

ANNEXURE A 1

PERMISSION TO CONDUCT THE STUDY

P.O. BOX 2050
VRYBURG
8600
07. 06. 2015

The Acting District Director
Dr Ruth Segomotsi Mompati District
Mini – Garona Building
Second Floor, Block D
Corner North and Molopo Street
Private Bag X 21
Vryburg
8600

Sir

I am asking for a permission to conduct a research at the two secondary schools in the district.

I am a postgraduate student registered for PhD in Curriculum Studies at the University of the Free State. The title of the thesis is “A curriculum framework for Environmental Education in the South African Further Education and Training band.”

I will comply with the ethical requirements expected of me.

I hope my request will be considered.

Yours Faithfully

.....

Bontle Beauty Tlhabanelo

ANNEXURE A 1: PERMISSION TO CONDUCT THE STUDY

Education and Sport Development
Department of Education and Sport Development
Departement van Onderwys en Sport Ontwikkeling
Lefapha la Thuto le Tlhabololo ya Metshameko
NORTH WEST PROVINCE

Mini – Garona Building
Second Floor, Block D
Corner North and Molopo treet
Private Bag x21
Vryburg 8600

Tel: +2753 928 0201
Fax: +2786 555 9860

E-mail: morakem@nwpg.gov.za

DR RUTH SEGOMOTSI MOMPATI DISTRICT

OFFICE OF THE DISTRICT DIRECTOR

15 September 2015
To : Mrs B.B Tlhabanelo
PHD Candidate

From: Rev M.A. Morake
Acting District Director

RE : REQUEST FOR PERMISSION TO CONDUCT RESEARCH

Your request dated 07.06.2015 was studied and the content therefore noted.

Kindly be informed that permission has been granted as requested. In terms of your request the interviews will be conducted at Secondary Schools in the District.

All stakeholders indicated in your request are kindly urged to support and co-operate with you throughout the exercise.

We wish you luck in your studies

Yours sincerely

REV M.A. MORAKE

ACTING DISTRICT DIRECTOR

"Towards Excellence in Education and Sport Development"

ANNEXURE A 2

INFORMED CONSENT FOR FET CURRICULUM COORDINATOR

Consent Form: Area Office FET Curriculum Coordinator

I am doing a PhD research on **"Curriculum Framework for Environmental Education in the South African Further Education and Training band."** I assure you that your name will not be divulged to any party that is not part of this study. I also undertake to ensure that no physical or emotional harm will befall you as a result of your participation in the study. Your participation in the study is voluntary and you have the right to withdraw from the study if you so wish.

Your involvement in this study will help you gain more knowledge about a curriculum framework for Environmental Education.

May you please sign below to give consent to participate in the study.

I_____hereby consent to participate voluntarily in the abovementioned study.

_____ _____

Signature Date

ANNEXURE A 3

INFORMED CONSENT FOR SENIOR EDUCATION SPECIALIST/FORMER COLLEGE ENVIRONMENTAL EDUCATION LECTURER

Consent Form: Senior Education Specialist/Former College Environmental Education Lecturer

I am doing a PhD research on **"Curriculum Framework for Environmental Education in the South African Further Education and Training band."** I assure you that your name will not be divulged to any party that is not part of this study. I also undertake to ensure that no physical or emotional harm will befall you as a result of your participation in the study. Your participation in the study is voluntary and you have the right to withdraw from the study if you so wish.

Your involvement in this study will help you gain more knowledge about a curriculum framework for Environmental Education.

May you please sign below to give consent to participate in the study?

I_____hereby consent to participate voluntarily in the abovementioned study.

_____ _____

Signature Date

ANNEXURE A 4

INFORMED CONSENT FOR SCHOOL MANAGEMENT TEAMS (SMTs)

Consent Form: School Management Teams (SMTs)

I am doing a PhD research on **"Curriculum Framework for Environmental Education in the South African Further Education and Training band."**I am inviting School Management Teams who are willing to take part in the study. I assure School Management Teams who wish to take part that their names and those of their schools will not be divulged to any party that is not part of this study. I also undertake to ensure that no physical or emotional harm will befall you as a result of your participation in the study. School Management Teams' participation in the study is voluntary and have the right to withdraw from the study if so wish.

Your involvement in this study will help you gain more knowledge about a curriculum framework for Environmental Education.

May you sign below to give consent to participate in the study.

I_____hereby consent to participate voluntarily in the abovementioned study.

_____ _____

Signature Date

ANNEXURE A 5

INFORMED CONSENT FOR TEACHERS

Consent Form: Teachers

I am doing a PhD research on **"Curriculum Framework for Environmental Education in the South African Further Education and Training band."**I am inviting teachers who are willing to take part in the study. I teachers who wish to take part that their names and those of their schools will not be divulged to any party that is not part of this study. I also undertake to ensure that no physical or emotional harm will befall you as a result of your participation in the study. Teachers' participation in the study is voluntary and you have the right to withdraw from the study if so wish.

Your involvement in this study will help you gain more knowledge about a curriculum framework for Environmental Education.

May you sign below to give consent to participate in the study.

I_____hereby consent to participate voluntarily in the abovementioned study.

_____ _____

Signature Date

ANNEXURE B: RESEARCH INSTRUMENTS

ANNEXURE B 1

Focus-group interview schedule

Unstructured open-ended questions:

1. Tell us about yourself.
2. Why are you interested in this study?
3. What is your expectation regarding this study?
4. What is your opinion about the integration of Environmental Education in the FET band curriculum?

ANNEXURE B 2

Face-to face interview instrument
Face-to face interview instrument for Principals

Semi-structured interview using open-ended Questions

Title: A Curriculum Framework for Environmental Education in the South African Further Education and Training band

Brief Introduction

Before we begin I just would like to take this time to thank-you for participating in this research study. My name is B.B Tlhabanelo and I am a PhD student at the University of the Free Sate. As part of PhD program, I am required to carry out a research on a topic of my interest. The title of this study is **A Curriculum Framework for Environmental Education in the South African Further Education and Training band**. I am conducting this interview in order to better understand the design of a proper curriculum framework for Environmental Education in the South African Further Education and Training band. I will now ask you a total of 12 questions. I will ask you one question at a time giving you as much time as you need to respond. Feel free to take a few moments to gather your thoughts before you respond. I am genuinely very interested in your insight regarding curriculum framework for Environmental Education so please do not feel nervous. Let me assure you that the information you provide will be kept in strictest confidence. No one except my supervisor will see your answers. Your participation is completely voluntary, and you do not have to answer any of the questions you do not want to answer.
The interview will take about 30 to 40 minutes (or more, depending on the number of questions to be asked). I realize your time is valuable, and I will try to get through the questions as quickly as possible. Do you have any questions or concerns before we begin?

Lastly, you may refrain from answering any questions without consequence and withdraw from this study at any given time.

Background Information

1. How many years have you been teaching (grade/subject)?
2. What are your tertiary qualifications and major courses?
3. How long have you been including Environmental Education topics in your teaching?

Practice

4. What is your opinion about the condition of your township's natural environment?
5. What is your understanding of Environmental Education?
6. What is your opinion on the status of Environmental Education in your subject?
7. Is there a need for Environmental Education curriculum framework in the FET band?
8. How would you describe your envisaged proper Environmental Education curriculum framework in the FET band?

Opportunities and Challenges

9. What do you see as the anticipated contributions of Environmental Education curriculum framework to teaching and learning with regards to:

(a) Improving conceptual understanding of the environment?
(b) Resolving escalating environmental problems?

10. What do you think are the challenges that need to be addressed to successfully introduce a proper Environmental Education curriculum framework in the FET band?
11. How can we better support teachers to execute Environmental Education in the classroom?

Conclusion

12. Is there anything else you would like to

share? End of interview questions

Thank you for your time and contribution to this research. Once again, for confidentiality purposes your name will not be used in the written work and the information. I would like to thank you.

ANNEXURE B 3

Face-to face interview instrument Face-to face interview instrument for Deputy Principals

Semi-structured interview using open-ended Questions

Title: A Curriculum Framework for Environmental Education in the South African Further Education and Training band

Brief Introduction

Before we begin I just would like to take this time to thank-you for participating in this research study. My name is B.B Tlhabanelo and I am a PhD student at the University of the Free Sate. As part of PhD program, I am required to carry out a research on a topic of my interest. The title of this study is **A Curriculum Framework for Environmental Education in the South African Further Education and Training band**. I am conducting this interview in order to better understand the design of a proper curriculum framework for Environmental Education in the South African Further Education and Training band. I will now ask you a total of 12 questions. I will ask you one question at a time giving you as much time as you need to respond. Feel free to take a few moments to gather your thoughts before you respond. I am genuinely very interested in your insight regarding curriculum framework for Environmental Education so please do not feel nervous. Let me assure you that the information you provide will be kept in strictest confidence. No one except my supervisor will see your answers. Your participation is completely voluntary, and you do not have to answer any of the questions you do not want to answer.
The interview will take about 30 to 40 minutes (or more, depending on the number of questions to be asked). I realize your time is valuable, and I will try to get through the questions as quickly as possible. Do you have any questions or concerns before we begin?

Lastly, you may refrain from answering any questions without consequence and withdraw from this study at any given time.

Background Information

1. How many years have you been teaching (grade/subject)?
2. What are your tertiary qualifications and major courses?
3. How long have you been including Environmental Education topics in your teaching?

Practice

4. What is your opinion about the condition of your township's natural environment?
5. What is your understanding of Environmental Education?
6. What is your opinion on the status of Environmental Education in your subject?
7. Is there a need for Environmental Education curriculum framework in the FET band?
8. How would you describe your envisaged proper Environmental Education curriculum framework in the FET band?

Opportunities and Challenges

9. What do you see as the anticipated contributions of Environmental Education curriculum framework to teaching and learning with regards to:

(a) Improving conceptual understanding of the environment?
(b) Resolving escalating environmental problems?

10. What do you think are the challenges that need to be addressed to successfully introduce a proper Environmental Education curriculum framework in the FET band?
11. How can we better support teachers to execute Environmental Education in the classroom?

Conclusion

12. Is there anything else you would like to

share? End of interview questions

Thank you for your time and contribution to this research. Once again, for confidentiality purposes your name will not be used in the written work and the information. I would like to thank you.

ANNEXURE B 4

Face-to face interview instrument Face-to face interview instrument for Departmental Heads

Semi-structured interview using open-ended Questions

Title: A Curriculum Framework for Environmental Education in the South African Further Education and Training band

Brief Introduction

Before we begin I just would like to take this time to thank-you for participating in this research study. My name is B.B Tlhabanelo and I am a PhD student at the University of the Free Sate. As part of PhD program, I am required to carry out a research on a topic of my interest. The title of this study is **A Curriculum Framework for Environmental Education in the South African Further Education and Training band**. I am conducting this interview in order to better understand the design of a proper curriculum framework for Environmental Education in the South African Further Education and Training band. I will now ask you a total of 12 questions. I will ask you one question at a time giving you as much time as you need to respond. Feel free to take a few moments to gather your thoughts before you respond. I am genuinely very interested in your insight regarding curriculum framework for Environmental Education so please do not feel nervous. Let me assure you that the information you provide will be kept in strictest confidence. No one except my supervisor will see your answers. Your participation is completely voluntary, and you do not have to answer any of the questions you do not want to answer.
The interview will take about 30 to 40 minutes (or more, depending on the number of questions to be asked). I realize your time is valuable, and I will try to get through the questions as quickly as possible. Do you have any questions or concerns before we begin?

Lastly, you may refrain from answering any questions without consequence and withdraw from this study at any given time.

Background Information

1. How many years have you been teaching (grade/subject)?
2. What are your tertiary qualifications and major courses?
3. How long have you been including Environmental Education topics in your teaching?

Practice

4. What is your opinion about the condition of your township's natural environment?
5. What is your understanding of Environmental Education?
6. What is your opinion on the status of Environmental Education in your subject?
7. Is there a need for Environmental Education curriculum framework in the FET band?
8. How would you describe your envisaged proper Environmental Education curriculum framework in the FET band?

Opportunities and Challenges

9. What do you see as the anticipated contributions of Environmental Education curriculum framework to teaching and learning with regards to:

(a) Improving conceptual understanding of the environment?
(b) Resolving escalating environmental problems?

10. What do you think are the challenges that need to be addressed to successfully introduce a proper Environmental Education curriculum framework in the FET band?
11. How can we better support teachers to execute Environmental Education in the classroom?

Conclusion

12. Is there anything else you would like to

share? End of interview questions

Thank you for your time and contribution to this research. Once again, for confidentiality purposes your name will not be used in the written work and the information. I would like to thank you.

ANNEXURE B 5

Face-to face interview instrument Face-to face interview instrument for the teachers

Semi-structured interview using open-ended Questions

Title: A Curriculum Framework for Environmental Education in the South African Further Education and Training band

Brief Introduction

Before we begin I just would like to take this time to thank-you for participating in this research study. My name is B.B Tlhabanelo and I am a PhD student at the University of the Free Sate. As part of PhD program, I am required to carry out a research on a topic of my interest. The title of this study is **Curriculum Framework for Environmental Education in the South African Further Education and Training band**. I am conducting this interview in order to better understand the design of a proper curriculum framework for Environmental Education in the South African Further Education and Training band. I will now ask you a total of 12 questions. I will ask you one question at a time giving you as much time as you need to respond. Feel free to take a few moments to gather your thoughts before you respond. I am genuinely very interested in your insight regarding curriculum framework for Environmental Education so please do not feel nervous. Let me assure you that the information you provide will be kept in strictest confidence. No one except my supervisor will see your answers. Your participation is completely voluntary, and you do not have to answer any of the questions you do not want to answer.
The interview will take about 30 to 40 minutes (or more, depending on the number of questions to be asked). I realize your time is valuable, and I will try to get through the questions as quickly as possible. Do you have any questions or concerns before we begin?

Lastly, you may refrain from answering any questions without consequence and withdraw from this study at any given time.

Background Information

1. How many years have you been teaching (grade/subject)?
2. What are your tertiary qualifications and major courses?
3. How long have you been including Environmental Education topics in your teaching?

Practice

4. What is your opinion about the condition of your township's natural environment?
5. What is your understanding of Environmental Education?
6. What is your opinion on the status of Environmental Education in your subject?
7. Is there a need for Environmental Education curriculum framework in the FET band?
8. How would you describe your envisaged proper Environmental Education curriculum framework in the FET band?

Opportunities and Challenges

9. What do you see as the anticipated contributions of Environmental Education curriculum framework to teaching and learning with regards to:

(a) Improving conceptual understanding of the environment?
(b) Resolving escalating environmental problems?

10. What do you think are the challenges that need to be addressed to successfully introduce a proper Environmental Education curriculum framework in the FET band?
11. How can we better support teachers to execute Environmental Education in the classroom?

Conclusion

12. Is there anything else you would like to share?

End of interview questions

Thank you for your time and contribution to this research. Once again, for confidentiality purposes your name will not be used in the written work and the information. I would like to thank you.

ANNEXURE B 6

Face-to face interview instrument
Face-to face interview instrument for Senior Education Specialist/Former College Environmental Education Lecturer

Semi-structured interview using open-ended Questions

Title: A Curriculum Framework for Environmental Education in the South African Further Education and Training band

Brief Introduction

Before we begin I just would like to take this time to thank-you for participating in this research study. My name is B.B Tlhabanelo and I am a PhD student at the University of the Free Sate. As part of PhD program, I am required to carry out a research on a topic of my interest. The title of this study is **A Curriculum Framework for Environmental Education in the South African Further Education and Training band**. I am conducting this interview in order to better understand the design of a proper curriculum framework for Environmental Education in the South African Further Education and Training band. I will now ask you a total of 12 questions. I will ask you one question at a time giving you as much time as you need to respond. Feel free to take a few moments to gather your thoughts before you respond. I am genuinely very interested in your insight regarding curriculum framework for Environmental Education so please do not feel nervous. Let me assure you that the information you provide will be kept in strictest confidence. No one except my supervisor will see your answers. Your participation is completely voluntary, and you do not have to answer any of the questions you do not want to answer.
The interview will take about 30 to 40 minutes (or more, depending on the number of questions to be asked). I realize your time is valuable, and I will try to get through the questions as quickly as possible. Do you have any questions or concerns before we begin?

Lastly, you may refrain from answering any questions without consequence and withdraw from this study at any given time.

Background Information

1. How many years have you been teaching (grade/subject) before becoming a Senior Education Specialist?
2. What are your tertiary qualifications and major courses?
3. How long have you been including Environmental Education topics in your teaching?

Practice

4. What is your opinion about the condition of your township's natural environment?
5. What is your understanding of Environmental Education?
6. What is your opinion on the status of Environmental Education in your subject?
7. Is there a need for Environmental Education curriculum framework in the FET band?
8. How would you describe your envisaged proper Environmental Education curriculum framework in the FET band?

Opportunities and Challenges

9. What do you see as the anticipated contributions of Environmental Education curriculum framework to teaching and learning with regards to:

(a) Improving conceptual understanding of the environment?
(b) Resolving escalating environmental problems?

10. What do you think are the challenges that need to be addressed to successfully introduce a proper Environmental Education curriculum framework in the FET band?

11. How can we better support teachers to execute Environmental Education in the classroom?

Conclusion

12. Is there anything else you would like to

share? End of interview questions

Thank you for your time and contribution to this research. Once again, for confidentiality purposes your name will not be used in the written work and the information. I would like to thank you.

ANNEXURE B 7

Face-to face interview instrument Face-to face interview instrument for FET Curriculum Co-ordinator

Semi-structured interview using open-ended Questions

Title: Curriculum Framework for Environmental Education in the South African Further Education and Training band

Brief Introduction

Before we begin I just would like to take this time to thank-you for participating in this research study. My name is B.B Tlhabanelo and I am a PhD student at the University of the Free Sate. As part of PhD program, I am required to carry out a research on a topic of my interest. The title of this study is **A Curriculum Framework for Environmental Education in the South African Further Education and Training band**. I am conducting this interview in order to better understand the design of a proper curriculum framework for Environmental Education in the South African Further Education and Training band. I will now ask you a total of 12 questions. I will ask you one question at a time giving you as much time as you need to respond. Feel free to take a few moments to gather your thoughts before you respond. I am genuinely very interested in your insight regarding curriculum framework for Environmental Education so please do not feel nervous. Let me assure you that the information you provide will be kept in strictest confidence. No one except my supervisor will see your answers. Your participation is completely voluntary, and you do not have to answer any of the questions you do not want to answer.
The interview will take about 30 to 40 minutes (or more, depending on the number of questions to be asked). I realize your time is valuable, and I will try to get through the questions as quickly as possible. Do you have any questions or concerns before we begin?

Lastly, you may refrain from answering any questions without consequence and withdraw from this study at any given time.

Background Information

1. How many years have you been teaching (grade/subject) before becoming the Subject Advisor and FET Curriculum Co-ordinator?
2. What are your tertiary qualifications and major courses?
3. How long have you included Environmental Education topics in your teaching before becoming the Subject Advisor and FET Curriculum Coordinator?

Practice

4. What is your opinion about the state of your town's natural environment in your area?
5. What is your understanding of Environmental Education?
6. What is your opinion about the status of Environmental Education in the FET subjects curricula that you are coordinating?
7. Is there a need for Environmental Education curriculum framework in the FET band?
8. How would you describe your envisaged proper Environmental Education curriculum framework in the FET band?

Opportunities and Challenges

9. What do you see as the anticipated contributions of Environmental Education curriculum framework to teaching and learning with regards to:

(a) Improving conceptual understanding of the environment?
(b) Resolving escalating environmental problems?

10. What do you think are the challenges that need to be addressed to successfully introduce a proper Environmental Education curriculum framework in the FET band?

11. How can we better support teachers to execute Environmental Education in the classroom?

Conclusion

12. Is there anything else you would like to share?

End of interview questions

Thank you for your time and contribution to this research. Once again, for confidentiality purposes your name will not be used in the written work and the information. I would like to thank you.

ANNEXURE C: SAMPLE DOCUMENTS

ANNEXURE C 1

GENERAL AIMS OF THE SOUTH AFRICAN CURRICULUM: CURRICULUM AND ASSESSMENT POLICY STATEMENT (CAPS)

(a) The *National Curriculum Statement Grades R-12* gives expression to the knowledge, skills and values worth learning in South African schools. This curriculum aims to ensure that children acquire and apply knowledge and skills in ways that are meaningful to their own lives. In this regard, the curriculum promotes knowledge in local contexts, while being sensitive to global imperatives.

(b) The National Curriculum Statement Grades R-12 serves the purposes of:

- equipping learners, irrespective of their socio-economic background, race, gender, physical ability or intellectual ability, with the knowledge, skills and values necessary for self-fulfilment, and meaningful participation in society as citizens of a free country;
- providing access to higher education;
- facilitating the transition of learners from education institutions to the workplace; and
- providing employers with a sufficient profile of a learner's competences.

(c) The National Curriculum Statement Grades R-12 is based on the following principles:

- Social transformation: ensuring that the educational imbalances of the past are redressed, and that equal educational opportunities are provided for all sections of the population;
- Active and critical learning: encouraging an active and critical approach to learning, rather than rote and uncritical learning of given truths;
- High knowledge and high skills: the minimum standards of knowledge and skills to be achieved at each grade are specified and set high, achievable standards in all subjects;
- Progression: content and context of each grade shows progression from simple to complex;
- Human rights, inclusivity, environmental and social justice: infusing the principles and practices of social and environmental justice and human rights as defined in the Constitution of the Republic of South Africa. The National Curriculum Statement Grades R-12 is sensitive to issues of diversity such as poverty, inequality, race, gender, language, age, disability and other factors;
- Valuing indigenous knowledge systems: acknowledging the rich history and heritage of this country as important contributors to nurturing the values contained in the Constitution; and
- Credibility, quality and efficiency: providing an education that is comparable in quality, breadth and depth to those of other countries.

(d) The National Curriculum Statement Grades R-12 aims to produce learners that are able to:

- identify and solve problems and make decisions using critical and creative thinking;
- work effectively as individuals and with others as members of a team;
- organise and manage themselves and their activities responsibly and effectively;
- collect, analyse, organise and critically evaluate information;
- communicate effectively using visual, symbolic and/or language skills in various modes;
- use science and technology effectively and critically showing responsibility towards the environment and the health of others; and
- demonstrate an understanding of the world as a set of related systems by recognising that problem solving contexts do not exist in isolation.

(e) Inclusivity should become a central part of the organisation, planning and teaching at each school. This can only happen if all teachers have a sound understanding of how to recognise and address barriers to learning, and how to plan for diversity. The key to managing inclusivity is ensuring that barriers are identified and addressed by all the relevant support structures within the school community, including teachers, District-Based Support Teams, Institutional-Level Support Teams, parents and Special Schools as Resource Centres. To address barriers in the classroom, teachers should use various curriculum differentiation strategies such as those included in the Department of Basic Education's *Guidelines for Inclusive Teaching and Learning* (2010).

ANNEXURE C 2

LIFE SCIENCES: CONCEPT AND CONTENT PROGRESSION

Strands	Life at molecular, cellular, and tissue level	Life processes in plants and animals	Diversity, change and Continuity	Environmental studies
Grade 10	• Chemistry of life - Inorganic compounds - Organic compounds • Cell - unit of life • Cell division (mitosis) • Plant and animal tissues	• Support and transport systems in Plants • Support systems in animals • Transport system in Mammals	• Biodiversity and Classification • History of life on Earth	• Biosphere to ecosystems Grade
Grade 11		• Energy transformations to support life: Photosynthesis • Animal nutrition • Energy transformations: respiration • Gas exchange • Excretion	• Biodiversity - classification of microorganisms • Biodiversity - plants • Reproduction -plants • Biodiversity – animals	• Population ecology • Human impact on environment: current crises
Grade 12	• DNA code of Life • RNA and protein synthesis • Meiosis	• Reproduction in vertebrates • Human reproduction • Nervous system • Senses • Endocrine system • Homeostasis	• Darwinism and Natural Selection • Human evolution	• Human impact on environment: Current crises Grade 11

Department of Basic Education (2011a: 10)

ANNEXURE C 3

LIFE SCIENCES SPECIFIC AIMS

1. Specific Aim 1: Knowing Life Sciences

(Life Sciences concepts, processes, phenomena, mechanisms, principles, theories, laws, models, etcetera).

Specific Aim 1 involves knowing, understanding, and making meaning of sciences, thereby enabling learners to make many connections between the ideas and concepts. Making such connections makes it possible for learners to apply their knowledge in new and unfamiliar contexts. The process of acquiring a deep understanding of science is about more than just knowing a lot of facts. The scope of knowledge that learners should acquire includes knowledge of the process skills related to carrying out investigations.
The following cognitive (thinking) skills comprise the **range** of skills that all learners should develop by working through the curriculum in a school year. These skills indicate what should be assessed at **the appropriate grade level** in a variety of different kinds of assessments. Note that not every skill is assessed in every assessment, but that teachers must ensure that, by the end of the year, the assessments provide evidence that the range of different skills have been assessed for each learner.

1.1 Acquire Knowledge

In the process of acquiring knowledge learners must:
• **access** information from a variety of sources (teachers, reference books, textbooks, internet, experts, peers, parents, etc.);
• **select** key ideas;
• **recall** facts; and
• **describe** concepts, processes, phenomena, mechanisms, principles, theories, laws and models in Life Sciences.

Assessment: In order to assess these competences (or cognitive skills), teachers should use the following verbs in the tasks or assessments that they set: state, name, label, list, define, describe and any other verbs that indicate that learners'**knowledge** of the subject is being assessed.
URRICULUM AND ASSESSMENT POLICY STATEMENT (CAPS)

1.2 Understand and Make Connections Between Ideas and Concepts to Make Meaning of Life Sciences

In the process of making meaning and achieving understanding learners must:
• **build a conceptual framework** of science ideas;
• **organise** or **reorganise** knowledge to derive new meaning;
• **write** summaries;
• **develop** flow charts, diagrams and mind maps; and
• **recognise** patterns and trends.

Assessment: In order to assess these competencies (cognitive skills), teachers should use the following verbs in the tasks or assessments they set: explain, compare, rearrange, give an example of, illustrate, calculate, interpret, suggest area son, make a generalisation, interpret information or data, predict, select, differentiate or any other suitable verbs that indicate that learners' understanding of the subject is being assessed.

1.3 Apply Knowledge on Life Sciences in New and Unfamiliar Contexts
Learners must be able to:

• **use** information in a new way; and
• **apply** knowledge to new and unfamiliar contexts.

Assessment: In order to assess these competencies (cognitive skills), teachers should use the following verbs in the tasks or assessments that they set: demonstrate, interpret, predict, compare, differentiate, illustrate, solve and select as well as any other appropriate verbs that assess a learner's

ability to apply knowledge. The key is that learners must be able to apply knowledge in a context or situation for which they have not yet acquired specific knowledge, or use the knowledge in a new way.

1.4 Analyse, Evaluate and Synthesise Scientific Knowledge, Concepts and Ideas

In the process of learning science, learners must be able to:
• **analyse** information/data;
• **recognise** relationships between existing knowledge and new ideas**;**
• **critically** evaluate scientific information;
• **identify** assumptions; and
• **categorise** information.

Assessment: In order to assess these competencies (cognitive skills), teachers should use the following verbs in the tasks or assessments that they set: appraise, argue, judge, select, evaluate, defend (a point of view), compare, contrast, criticise (an argument or assumption) differentiate, distinguish, discuss or any other suitable verbs that indicate that analysis, evaluation and synthesis are being assessed.

2. Specific Aim 2: Investigating Phenomena in Life Sciences

Learners must be able to plan and carry out investigations as well as solve problems that require some practical ability. This ability is underpinned by an attitude of curiosity and an interest in wanting to find out how the natural world and living things in it work.
The following range of skills relates to **doing** practical work in Life Sciences. All seven skills will not apply to every activity equally. The skills are aligned to what learners would be doing in the normal course of carrying out an investigation. Teachers must select those skills that apply to and can be assessed in the context of specific activities.
By the end of the Grade 10 year, all seven skills must have been assessed at a **grade-appropriate** level.
Note: While **doing** practical investigations involves a specific range of skills, learners' knowledge on and understanding of science can, and should, be assessed within the context of the cognitive domains of Specific Aim 1.

Learners must be able to:

2.1 Follow Instructions

This is essential, especially in the lower grades and in large classes. Teachers cannot expect all learners to use unfamiliar equipment and to do so independently without giving them a clear set of instructions to follow. The amount of assistance required would indicate the level of performance in this regard. Adherence to safety rules should be part of this.

2.2 Handle Equipment or Apparatus

This should include having knowledge of the apparatus, that is, being able to name it and knowing what it is used for. The learner should be able to use different kinds of equipment. 'Handling equipment' is a generic skill and applies to any equipment used for many different kinds of investigations. Handling improvised equipment requires the same skills as would be required for handling standard laboratory equipment. The emphasis is on **using** equipment
appropriately and safely (and not on only memorising the names of apparatus).

2.5 Make Observations

A variety of observations are possible and observations can be recorded in different ways, such as:
• drawings;
• descriptions;
• grouping of materials or examples based on observable similarities and/or differences;
• measurements;

• comparing materials before and after treatment;CURRICULUM AND ASSMENPS)
• observing results of an experimental investigation which will involve
recording information in an appropriate way; and
• counting.

2.6 Record Information or Data

This should include recording observations or information as drawings, descriptions, in simple table format, as simple graphs, etc. The skill of 'recording' is transferable across a range of different scientific activities.

2.7 Measure

Learners should know **what** to measure, **how** to measure it and have a sense of the degree of accuracy that is required. A variety of things could be measured including (but not limited to) length, volume, temperature, weight or mass and numbers (counting). Measuring is a way of quantifying observations and in this process learners should learn to make estimations.

2.8 Interpret

Learners should be able to convert information from one form, in which it was recorded, into another, for instance converting a table into an appropriate graph.
Learners should be able to perform **appropriate** simple calculations, to analyse and extract information from tables
and graphs, apply knowledge of theory to practical situations, recognise patterns and/or trends, appreciate the limitations of experimental procedures as well as make deductions based on evidence.

2.9 Design/Plan Investigations or Experiments

Not all investigations are based on the 'classic' dependent-independent variables and controls. For example, an investigation could involve observing soil profiles or counting populations.
Designing an investigation is a different process to planning an investigation. In the design process options need tube considered in terms of the hypothesis and variables may have to be identified.
Skills include:
• identifying a problem;
• hypothesising;
• selecting apparatus or equipment and/or materials;
• identifying variables;
• suggesting ways of controlling variables;
• planning an experiment;
• suggesting ways of recording results; and
• understanding the need for replication or verification.
In Grades 10, 11 and 12, learners must be able to plan and/or design a simple investigation or experiment.

Note: Skills 2.1 - 2.6 (following instructions, handling equipment, making observations, recording information, measuring and interpreting information) are all required, in one form or another, to carry out an experiment or investigation. By separating seven different kinds of skills (2.1 - 2.7), these skills can apply to the **variety** of practical work that is appropriate for a particular grade in Life Sciences, including simple investigations or experiments.
This approach makes it easier to assess learners in a range of different circumstances and it enables a teacher to judge a learner's ability to **do** science. The skills are based on what learners will be doing actions during the normal course of doing practical work. However, there are some circumstances in which only some of these skills would apply and not every skill can be assessed in every practical task.

2. Specific Aim 3: Appreciating and Understanding the History, Importance and Applications of Life Sciences in Society

The third aim of Life Sciences is to enable learners to understand that school science can be relevant to their lives outside of the school and that it enriches their lives.

Learners must be exposed to the history of science and indigenous knowledge systems from other times and other cultures. Scientific knowledge and understanding have been developed over time by people who were curious and who persevered with their quest for knowledge. Our present understanding of science will change and improve as modern scientists make new discoveries.
The skills that can be developed in the process of achieving Specific Aim 3 are cognitive rather than practical. These are the same cognitive skills as the ones identified for Specific Aim1.
Since the knowledge that will be acquired in respect of Specific Aim 3 always relates to specific subject content, the content provides the context for learning about various aspects of science in society. Science should therefore be taught in an integrated way in order to both enhance the subject and to clarify the relationship between the subject and society i.e. indigenous knowledge systems that relate to a specific topic, related history of scientific discoveries and the applications of science in everyday life.

3.1 Understanding the History and Relevance of Some Scientific Discoveries

The subject content provides the context for learning about the history of scientific discoveries and their relevance for society. These aspects, the history and relevance, should be linked to and taught in conjunction with the topics and content that are related to a particular discovery or a particular scientist.

3.2 The Relationship Between Indigenous knowledge and Life Sciences

All knowledge stems from views on how the world works. One of the differences between modern science (and technology) and traditional, indigenous knowledge systems is that they have their origins in different world views.
Learners should understand the different cultural contexts in which indigenous knowledge systems were developed.
The examples of indigenous knowledge that are selected for study should, as far as possible, reflect different South African cultural groups. They should also link directly to specific areas in the Life Sciences subject content.

3.3 The Value and Application of Life Sciences Knowledge in the Industry in Respect of Career Opportunities and in Everyday Life

Knowledge of Life Sciences is applied in and relevant to various aspects of society. Examples should be relevant to the subject content that learners are dealing with at a particular time. There are career opportunities in the field of socio-biology and animal behaviour, plant pathology, game management, environmental impact studies, preservation of biodiversity, palaeontology, palaeoanthropology, agriculture, horticulture, environmental law, science journalism, biotechnology, genetic engineering, and many others. Moreover, although learners should be made aware of career choices, it is not necessary to discuss or teach these in great detail.

Skills: Whilst the kind of knowledge is different for Specific Aims 1 and 3, the content should be taught in an integrated way in order for learners to understand the history, relevance and applications of science more easily. Importantly, the skills that must be developed and assessed for Specific Aim 3 are the same as those of Specific Aim 1
Learners must be able to:
• **access** information;
• **select** key ideas;
• **recall** information;
• **describe** knowledge of natural sciences;
• **build a conceptual framework;**
• **organise** or **reorganise** knowledge;
• **write** summaries;
• **develop** flow charts and mind maps;
• **recognise** patterns and trends;
• **apply** knowledge in new contexts;
• **use** knowledge in a new way;
• **analyse** information/data;
• **critically evaluate** scientific information;

• **recognise** relationships between existing; knowledge and new ideas;
• **identify** assumptions; and
• **categorise** information.

Department of Basic Education (2011a: 13-18).

ANNEXURE C 4

OVERVIEW OF GEOGRAPHY CONTENT IN THE FET BAND

Term	Grade 10	Grade 11	Grade 12
1	**The atmosphere**	**The atmosphere**	**Climate and weather**
	• Composition and structure of the Atmosphere • Heating of the atmosphere • Moisture in the atmosphere • Reading and interpreting synoptic weather Maps	• The Earth's energy balance • Global air circulation • Africa's weather and climate • Drought and desertification	• Mid-latitude cyclones • Tropical cyclones • Subtropical anticyclones • Valley climates • Urban climates **Geomorphology** • Drainage systems in South Africa • Fluvial processes • Catchment and river Management
	Geographical skills and Techniques • Using atlases • Fieldwork and practical work	**Geographical skills and Techniques** • Aerial photographs and orthophoto maps	**Geographical skills and Techniques** • Mapwork techniques • Atlas work • Geographical Information Systems (GIS)

2	**Geomorphology** • The structure of the Earth • Plate tectonics • Folding and faulting • Earthquakes • Volcanoes	**Geomorphology** • Topography associated with horizontally layered rocks • Topography associated with inclined/tilted rock Strata • Topography associated with massive igneous Rocks • Slopes • Mass movements and human Responses	**Rural settlement** • Study of settlements • Rural settlements • Rural settlement issues **Urban settlement** • Urban settlements • Urban hierarchies • Urban structure and patterns • Urban settlement issues
	Geographical skills and Techniques • Using atlases • Mapwork skills • 1:50 000 topographic maps	**Geographical skills and Techniques** • Map techniques • Fieldwork	**Geographical skills and Techniques** • Geographical Information systems (GIS) • Mapwork techniques
3	**Population** • Population distribution and density • Population structure • Population growth • Population movements	**Development Geography** • The concept of development • Frameworks for development • Trade and development • Development issues and challenges	**Economic Geography of SA** • Structure of the economy • Agriculture • Mining • Secondary and tertiary sectors • Strategies for industrial development

	• HIV and AIDS	• Role of development aid	• Informal sector
	Geographical skills and Techniques	**Geographical skills and Techniques**	**Geographical skills and Techniques**
	• Using atlases	• Mapwork skills • Using atlases	• Map use and map skills • Mapwork techniques • Geographical Information Systems (GIS)
4	**Water resources**	**Resources and sustainability**	**Revision**
	• Water in the world • The world's oceans • Water management in South Africa • Floods	• Using resources • Soil and soil erosion • Conventional energy sources and their impact on the environment • Non-conventional energy sources • Energy management in South Africa	• Climate and weather • Geomorphology • Settlement Geography • Economic Geography of SA •
	Geographical skills and Techniques	**Geographical skills and Techniques**	**Geographical skills and Techniques**
	• Using atlases • Geographical Information Systems (GIS)	Geographical Information Systems (GIS)	Department of Basic Education (2011b: 13-14)

ANNEXURE C 5

GEOGRAPHY FORMAT OF EXAMINATION

Grade 10 Examination Outline		
	Paper 1	**Paper 2**
Mid year	**Marks: 140** **Time: 2 hours**	**Marks: 60** **Time: 1½ hours**
	Learners must answer **all** questions	**Question 1**
	Question 1	Multiple choice questions (10 marks)
	• Short objective type questions for 10 Marks to cover content on the Atmosphere and Geomorphology. • Atmosphere for 30 marks • Geomorphology for 30 marks	**Question 2** Map calculations (20 marks)
		Question 3
	Question 2 • Short objective type questions for 10 marks to cover content on the Atmosphere and Geomorphology. • Atmosphere for 30 marks • Geomorphology for 30 marks	Analysis and interpretation of a topographic map and a photograph, and application of theory (20marks) **Question 4** GIS (10 marks)
End of year	**Marks: 225** **Time: 3 hours**	**Marks: 75** **Time: 1½ hours**
	Learners must answer **any three** questions.	
	Section A	
	Question 1	**Question 1**
	Short objective type questions for 15 marks to cover content on the Atmosphere and Geomorphology. • Atmosphere for 30 marks • Geomorphology for 30 marks	Multiple choice questions (15 marks) **Question 2** Map calculations (20 marks)
	Question 2 Short objective type questions for 15 marks to cover content on the Atmosphere and Geomorphology. Atmosphere for 30 marks. Geomorphology for 30 marks. **Section B**	**Question 3** Analysis and interpretation of a topographic map and a photograph, and application of theory (25marks) **Question 4** GIS (15 marks)

	Question 3 Short objective type questions for 15 marks to cover content on Population and water resources. Population for 30 marks Water resources for 30 marks **Question 4** • Short objective type questions for 15 marks to cover content on population and water resources. • Population for 30 marks • Water resources for 30 marks	

Grade 11 Examination Outline

	Paper 1	Paper 2
Mid year	**Marks: 225** **Time: 3 hours** Learners must answer **all** questions **Question 1** • Short objective type questions for 15 marks to cover content on the Atmosphere and Geomorphology. • Atmosphere for 50 marks • Geomorphology for 50 marks Question 2 • Short objective type questions for 10 marks to cover content on the Atmosphere and Geomorphology. • Atmosphere for 50 marks • Geomorphology for 50 marks	**Marks: 75** **Time: 1½ hours** **Question 1** Multiple choice questions (15 marks) **Question 2** Map calculations (20 marks) Question 3 Analysis and interpretation of a topographic map and a photograph, and application of theory (25 marks) Question 4 GIS (15 marks)
End of year	**Marks: 225** **Time: 3 hours** Learners must answer any three questions. Section A **Question 1** • Short objective type questions for 15 marks to cover content on the Atmosphere and Geomorphology. • Atmosphere for 30 marks • Geomorphology for 30 marks **Question 2** • Short objective type questions for 15 marks to cover content on the Atmosphere and Geomorphology. • Atmosphere for 30 marks • Geomorphology for 30 marks Section B: Question 3 • Short objective type questions for 15 marks to cover content on Development and Resources and sustainability. • Development for 30 marks • Resources and sustainability for	**Marks: 75** Time: 1½ hours Question 1 Multiple choice questions (15 marks) Question 2 Map calculations (20 marks) **Question 3** Analysis and interpretation of a topographic map and a photograph, and application of theory (25 marks) **Question 4** GIS (15 marks)

	30 marks Question 4 • Short objective type questions for 15 marks to cover content on Development and Resources and sustainability. • Development for 30 marks • Resources and sustainability for 30 Marks	

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Grade 12 Examination Outline

Mid year	Paper 1	Paper 2
	Marks: 225 **Time: 3 hours** Learners must answer **all three** questions. **Section A:** **Question 1** • Short objective type questions for 15 marks to cover content on Climate and weather and Geomorphology. • Climate and weather for 30 marks • Geomorphology for 30 marks **Question 2** • Short objective type questions for 15 marks to cover content on Climate and weather and Geomorphology. • Climate and weather for 30 marks Geomorphology for 30 marks **Section B** **Question 3** • Short objective type questions for 15 marks to cover content on Rural and Urban settlement. • Rural settlement for 30 marks • Urban settlement for 30 marks	**Marks: 75** **Time: 1½ hours** **Question 1** Multiple choice questions (15 marks) **Question 2** Map calculations (20 marks) **Question 3** Analysis and interpretation of a topographic map and a photograph, and application of theory (25 marks) **Question 4** GIS (15 marks)
Trial and End of year	**Marks: 225** Time: 3 hours Learners must answer any three questions. Section A Question 1 • Short objective type questions for 15 to cover content on Climate and weather and Geomorphology. • Climate and weather for 30 marks • Geomorphology for 30 marks **Question 2** • Short objective type questions for 15 to cover content on Climate	**Marks: 75** Time: 1½ hours Question 1 Multiple choice questions (15 marks) Question 2 Map calculations (20 marks) Analysis and interpretation of a topographic map and a photograph, and application of theory (25 marks) Marks **Question 4** **GIS (15 marks)**

	and weather and Geomorphology. • Climate and weather for 30 marks • Geomorphology for 30 marks Section B Question 3 • Short objective type questions for 15 to cover content on Settlement and Economic	

Department of Basic Education (2011b: 56-58)

ANNEXURE C 6

LIFE ORIENTATION: OVERVIEW OF TOPICS

	Topic	**Grade 10**	**Grade 11**	**Grade 12**
1	Development of the self in society	Self awareness, self-esteem and self- development Power, power relations and gender roles. Value of participation in exercise programmes. Life roles: nature and responsibilities. Changes towards adulthood. Decision-making regarding sexuality. Recreation and emotional health.	Plan and achieve life goals: Problem-solving kills. Relationships and their influence on well-being. Healthy lifestyle choices: decision-making skills. Role of nutrition in health and physical activities. Gender roles and their effects on health and wellbeing.	Life skills required to Adapt to change as part of ongoing healthy lifestyle choices. Stress management. Conflict resolution. Human factors that cause ill-health. Action plan or lifelong Participation In physical activity.
2	Social and environmental responsibility	Contemporary social issues that impact negatively on local and global Communities Social skills and Responsibilities to participate in civic life.	Environmental issues that cause ill-health. Climate change. Participation in a community service addressing an Environmental issue.	Environments and services which promote safe and healthy living. Responsibilities of various levels of government. A personal mision statement for life.

3	Democracy and human rights	• Diversity, discrimination, Human rights and violations. • National and international Instruments and conventions. • Ethical traditions and/or religious laws and Indigenous belief systems of major religions. • Biases and unfair practices in sport.	• Democratic participation and democratic structures. • Role of sport in nation building. • Contributions of South Africa's diverse religions and belief systems to society.	• Responsible citizenship. • The role of the media in demoratic society. • Ideologies, belliefs and worldviews on construction of recreation and physical activity across cultures and genders.
4	Careers and career choices	• Subjects, career fields and study choices: decision-making skills • Socio-economic factors. • Diversity of jobs. • Opportunities within career fields. • Trends and demands in the job market. • The need for lifelong Learning.	• Requirements for admission to higher Education Institutions. • Options for financial assistance for further studies. • Competencies, abilities and ethics required for a career. • Personal expectations in relation to job or career of interest. • Knowledge about self in relation to the demands of the world of work and socioeconomic conditions.	• Commitment to a decision taken: locate appropriate work or study opportunities in various sources. • Reasons for and impact of unemployment and innovative solutions to counteract unemployment • Core elements of a job contract. • Refinement of portfolio of plans for life after school.
5	Study skills	• Study skills and study methods. • Process of assessment : Internal and external. • Annual study plan.	• Study styles and study strategies. • Examination writing skills. • Time-management and annual study plan. • Goal-setting skills.	• Reflection on own study and examination writing Skills. • Strategies to follow in order to succeed in Grade 12.
6	Physical Education	• Physical fitness: Programmes to promote well-being. • Skills in playground and/or community and/or indigenous games. • Environmentally Responsible outdoor recreational group or individual activities. • Skills in traditional and/or on-traditional sport. Safety issues.	• Improvement of current personal level of fitness and Health. • Umpiring and leadership skills in self-designed and modified games (teachers). • Various leadership roles in self-designed recreational group activity. • Umpiring and leadership skills in self-designed And modified sport (teach peers). Safety issues.	• Achievement of own personalfitness and health Goals. • Long-term engagement in Traditional and/or non-traditional sport or playground and/or community and /or indigenous games or relaxation and recreational activities. • Safety issues.

Department of Basic Education (2011c: 9).

ANNEXURE D

ADAPTED PROPOSED CURRICULUM FRAMEWORK FOR ENVIRONMENTAL EDUCATION IN THE SOUTH AFRICAN FURTHER EDUCATION AND TRAINING BAND: AN ELECTIVE SUBJECT

NB: <u>The information employed to present an example of a curriculum with EE as an elective subject in the FET band</u> has been borrowed from relevant sources containing environmental issues such as CAPS documents for Geography, Life Sciences, Physical Science, Life Orientation; and "EE Curriculum for the Middle school" revised by Harold R. Hungerford, Trudi L. Volk and John M. Ramsey, and edited by William J. Bluhm (UNESCO 1994). The introductory information presented by number 1 to 5 apply to any school subject in South Africa, which will also apply to EE if it can be introduced in the FET band.

1. Broad intentions of the DBE CAPS

(a) Equipment with "knowledge, skills and values" (Department of Basic Education 2011: 4).
(b) Meaningful attainment, application of information, and skills.
(c) Enhance local content.
(d) Responsive to worldwide environmental essentials.

2. Purpose of DBE CAPS:

(a) Learner capabilities profile.
(b) Opportunity for tertiary institutions.
(c) Adjustment from school to work environment.

3. CAPS Principles

Two CAPS principles that are suitable for EE are:

- "Human rights, Inclusivity, Environmental and Social justice" (Department of Basic Education 2003a: 5). This principle will help learners to show sensitivity and respect towards the environment, resources, and subsequently the rights of people.
- "Encourage active and critical learning" (Departmentment of Basic Education 2011a: 4). To handle environmental issues, participatory learning of sceptical minds is required.

These two principles are made achievable by other principles including "specified knowledge and skills to be achieved; progression from simple to complex content; Indigenous knowledge system (IKS); and provision of credible, quality and efficient education system" (Department of Basic Education 2011a: 4-5)

4.CAPS Curriculum capacitates learners with crucial skills:

- Problem-solving skill;
- Decision-making skill;
- Important innovative thinking skills;
- Successfully working alone;

- Team work;
- Responsible citizen;
- Self management;
- Gathering, analytical, and assesment skills;
- Skill of sharing opinions with self and others;
- “Effective use of Science and technology” (Department of Basic Education 2011a: 5); and
- Holistic understanding of environment as a totality.

5. Contact time for EE and other subjects

Subject	Time Allocation for week (Hours)
Home Language	4.5
First Additional Language	4.5
Mathematics/Mathematical Literacy	4.5
Life Orientation	2
Environmental Education	4
A Minimum of any two Subjects selected from Group B of National policy pertaining to the programme and promotion requirements of the National Curriculum Statement of Grade R-12, for example, Life Sciences and PhysicalScience /Tourism etc. Subject to the provisos stipulated in paragraph 28 of the said policy document.	8 (2 x 4h)
Total	27,5

6. What is Environmental Education?

“Environmental Education is a learning process that increases learners' knowledge and awareness about the environment and associated challenges, develops the necessary skills and expertise to address the challenges, and fosters attitudes, motivations, and commitments to make informed decisions and take responsible action” (Erhabor & Don 2016: 5368; Karama 2016: 3).

7. Environmental Education Principles

EE should:

- Reflect a holistic view of the environment.
- Be a “lifelong process” (Gurova & Pronkina 2013: 158).
- Be an elective subject in its approach.
- Foster willingness to actively partake in environmental initiatives.
- Examine environmental issues from the lowest to the highest level of the universe.
- Refer to environmental problems of the past to plan in the present in order to solve those still coming.
- Investigate all developments taking place from an environmental position.
- Foster an integrated approach across school grades and subjects, departments, and countries, in order to deal properly with environmental crises.

8. Aim and purpose of Environmental Education

8.1 Aim of Environmental Education in FET band

skills

The intention of Environmental Education is to increase “learners' knowledge, awareness and skills about the environment and associated challenges, develops the necessary

and expertise to address the challenges, and fosters attitudes, motivations, and commitments to make informed decisions and take responsible action" (Erhabor & Don 2016: 5368; Karama 2016: 3).

8.2 The purpose of Environmental Education

Guided by "Tbilisi goals and objectives" (The landscape of EE Tbilisi goals and objectives.n.d), Environmental Education in the FET band strives to:

- Advance learners' consciousness about the environment as an area affected by a number of peoples' developments as a result of their search to satisfy their needs, be it socially, politically, economically or even culturally;
- Assist learners to develop a positive behaviour and display of sensitivity towards the environment;
- Capacitate FET learners to handle the environment with the care it deserves while using it;
- Empower learners to recognise environmental problems;
- Encourage FET learners to take part in school and community activities or programs that intend to revamp and save the environment from destruction.

9. Environmental Education Skills

Environmental Education aims to develop the following special skills:

- Knowledge of environmental education approach and content;
- Acquisition and application of the following EE skills:

  o Proper engagement with others when dealing with environmental issues; o Objective judgement;
  o Ability to recognise potential environmental risks; o Gathering and organising EE information;
  o "Processing, interpreting analysing and evaluating data" (Department of Basic Education 2011a: 9);
  o Ability to take a position and defend it;
  o The skill of questioning evidence, the skill of making deductions or conclusions; o Recommending ways of handling EE problems;
  o Ability to work as an individual or team member, which prepares a learner for community or societal participation;
  o Ability to discuss, explain and account for own actions jeopardising the state of the environment;
- Recognition that technology has both advantages and disadvantages to the environment;
- Acknowledgement of the negative impacts by people on the environment and its resources;
- Recognition of different plants and animals and other resources in the country, and that they need to be saved from extinction;
- A level of academic and environmental literacy that enables them to read, talk about, write and think about environmental process, concepts and investigations.

4.4 Attitudes and Values

The environmental Education curriculum intends to enhance the following values and attitudes in learners in the FET band:

- An understanding of wise use of resources for the sake of being shared by all;

- The importance of making proper and sound decisions that will maintain the quality of the environment;
- Practising environmental education knowledge and skills in learners' environments;
- Respect for the environment that will translate into respect for the rights of citizens.
- A sense of responsible community member and citizenship.

Term	Grade 10	Grade 11	Grade 12
1	**Chapter 1** **Biosphere to Ecosystems** **1. The concept of the Biosphere** **2.** 1.1 The inter-connectedness with and components of the global ecosystem: the hydrosphere, lithosphere and atmosphere. 2. **Biomes** Terrestrial and aquatic biomes of Southern Africa and how climate, soils and vegetation influence the organism in each. The location of the different biomes in South Africa. **3. Environment** The concept of environment: In terms of human activities in and interactions with the natural environment. Abiotic and biotic factors: effects on the community. Ecosystems: Abiotic factors Physiographic factors, soil, light, temperature, water, atmosphere gases and wind. Biotic factors: Producers, consumers, and decomposers. Energy flow through ecosystems and relationships to trophic structure (food pyramids): trophic levels (herbivores, carnivores, omnivores and decomposers) and flow charts of nutrients, water, oxygen, carbon and nitrogen cycles. Ecotourism: economics, ethics and opportunities Investigations:	**Chapter 1** **Human Impact on the environment in South Africa** **1. The atmosphere and climate change:** Cabon dioxide emission; concept of 'carbon footprint' and the need to reduce it; deforestation; drought and floods; methane emissions; ozone depletion. **2. Water** 2.1 Availability: construction of dams, destruction of wetlands, poor farming practices, droughts and floods, exotic plantations and depletion of water table, boreholes and effects on aquifers, wastage and cost of water. 2.1 Quality of water: **(**a) Water for domestic use, industry, agriculture and mining, pollution, diseases. (b) The effect of mining on quality water (c) Thermal p[ollution. (d) The need for water purification and recycling. (e) Allien plants. **3 Food security** 3.1 Human exponential population growth. 3.2 Droughts and floods. 3.3 Poor farming practices; pest control, loss of topsoil and the need for fertilisers 3.4 Alien plants and reduction of agricultural land 3.5 Loss of wild varieties: impact on gene pools. 3.6 Wastage.	**Chapter 1** **1. The communities cultural and spiritual practices** 1.1 Environmentally friendly cultural practices. 1.2 Environmentally friendly spiritual practices. 1.3 Environmental Education code of ethics. 1.4 Quarterly Letsema campaign. **2. Issue Investigation and citizenship Action Training** 2.1. Environmental problems solving Human-environment interactions. Quality of life vs quality of the environment. Environmental problems and issues Characteristics of environmental problems. Characteristics of environmental issues: The role of human values in issues The relationship between beliefs and values Issues analysis- a way to understand the anatomy of issues Identifying the issue Identifying the players and their positions Identifying players' beliefs regarding the issue Analysing belief statements of underlying values Presenting example of issues which have been analysed. Applying issue analysis skills to discrete issues. **2.2 Identifying environment issues** 2.2.1 Identifying environmental issues a. Local issues. b. Regional issues. c. National issues.

	Field work practising investigative skills (study of one local ecosystem. One practical task practising investigative skills Assessment: One formal test and Informal tasks once a week acquiring the following skills of: knowing; understanding and making connections between ideas and concepts and to make meaning to EE; application of knowledge in new or unfamiliar contexts; analyse, evaluate and synthesise environmental knowledge, concepts and ideas; understanding the History and relevance of EE discoveries; value and apply EE knowledge in industries in respect of career opportunities and everyday life; understanding relationship between indigenous and EE.	**4 Loss of biodiversity** 4.1 Habitat destruction: farming methods, e.g. overgrazing and monoculture, mining, urbanisation, loss of grasslands and so on. 4.2 Poaching, e.g. for rhino horn, ivory and 'bush meat'. 4.3 Alien plant invasions: control using mechanical. 4.4 Indigenous knowledge systems and the sustainable use of the environment e.g rooibos, fynbos, African potato, 'makgabenyane', 'pitsana', 'lerumo la madi', 'nko ya thipa' and so on. **5. Solid waste Disposal** 5.1 Managing dumping Sites 5.2 The need for recycling. 5.3 The use of methane from dumping sites for heating and lighting. 5.4 Safe disposal of nuclear waste. • Investigations: o Field work (practical observation of one example of human influence on the environment in the local area. (Written report). o Analyse the solid waste generated in the classroom in one week. Estimate the percentage that could	d. International issues. 2.2.2 Identifying variables: Variables associated with environmental issues. Variables associated with human environmental behaviour. Variables associated with spirituality. Variables associated with human beliefs and values. Variables associated with socio-cultural implications. Variables associated with ecological implications. Formulating (writing) research question for issue investigation. Determining (inferring) cause and effect relationships between variables. Rules for writing research questions: Derive questions from environmental issues Ask questions which are important in an environmental and social sense Avoid questions that ask for yes or no responses Specify variables to be measured Specify the relationship between variables (when possible) Indicate a population or area to be investigated Practice in writing research questions. Evaluating written research question using rules as criteria.

		○ be recycled or reused. ○ Visit a municipal landfill site, or a ○ local refuse dump. Observe ○ rehabilitation (or lack thereof) in ○ practice. ○ Assess the effectiveness of waste management. • Assessment: • One formal class test. • Evaluating written research question using rules as criteria. • One practical exam practising investigative skills. • Informal tasks once a week acquiring the following skills of knowing; understanding and making connections between ideas and concepts and meaning to EE; • application of knowledge in new or unfamiliar contexts; • analyse, evaluate and sunthesise • environmental knowledge, concepts and ideas; understanding the History and elevance of EE • discoveries; value and apply EE knowledge in industries in respect of career opportunities and • everyday life; understandingrelationship between indigenous and EE.	
2	**Chapter 2** **Human as an ecological factor** 1. Humans as a powerful ecological variable:	**Chapter 2** 1.**Humans: Their History of Resource Consumption** 1.1 Early humans and Gatherers	**Chapter 2** 1. Climate and weather 1.1 The features and impacts of : (a) Mid-latitude cyclones (b) Tropical cyclones.

	1.1 Tremendous adaptability - a very generalized niche. 1.2 Human willingness to compromise the environment for economic gain. 1.3 Human potential for environmental preservation/issue resolution. 2.Humans as an eruptive population: 2.1 History of the human population. 2.2 Humans and the J-curve phenomenon. 2.3 Current population numbers. 2.4 Doubling time in human population growth. 2.5 A question of carrying capacity. 2.6 Population management policies, trends and issues. 3 The pervasive ecological consequences of erupting human populations 3.1 Finite resources: (a) Humans and habitat. (b) Habitat destruction. (c) Waste removal in humans communities. (d) Poverty.	(a) Survival demands of the hunters and gatherers: • Hunters and gatherers as experts in survival Food usage: exploitable food resources • Mobility: the key to low levels of environmental impact (b) Other factors surrounding the hunters and gatherers: • Few material possessions • Low level of stress • Low population levels • Reasons for low population levels: high infant mortality, reduced conception due to breast feeding, 30year life expectancy 1.2 Agricultural societies (a) The domestication of plants and animals. (b) Small –scale farming. (c) True agriculture of past societies. (d) Agriculture-based urban societies. (e) Environment impact of agriculture based. 1.3 Industrial Societies (a) Industrial revolution. (b) Environmental impacts of industrial societies. 1.4 The relationship of population to resource use! Pollution and environmental degradation: (a) Human population growth indeveloping nations.	(c) Valley climate (d) Urban climates 1.2 Remedial measures **2 Using Secondary Sources for Obtaining Issue Information** 2.1 Secondary sources of issue-related information a. Using library sources □ Skill No.1: Using the Card Catalogue □ Skill No.2: Using the□Readers' Guide □ Skill No.3 using cross indexing b) Periodicals and newsletters with an environment focus. c) Environmental organizations. d) Governmental environment agencies e) Writing letters for Using local resource people for gaining information Choosing the appropriate source Specifying needed (desired) information Using correct style 2.2 Processing information from Secondary sources (a) Obtaining information from all sides of the issue. Identifying bias in Secondary source information. (b) Summarizing information from secondary sources. 2.3 Reporting secondary source information (a) Report form and style.

	(e) The relationship between human population and squatter camps. (f) Potential solution to urban problems. (g) Reasons for the possible increase in urban problems. 3.2 Humans as producers of food: (a) Humans agricultural systems. (b) Monobiotic agriculture. (c) Demands for commercial fertilizers, herbicides and pesticides. (d) Consequences of human food production: (c) Point and non-point pollution. (d) Groundwater contamination. (e) Soil erosion. (f) Soil compaction and salinisation. (g) Desertification. (h) Amplication of toxic chemicals in food chains. (i) Retrogression-succession in reverse. 4 Humans and Soil 4.1 Impact of overgrazing (a) Increased population in grazing communities. (b) Domestic animals and degradation of grasslands:	(b) Population and resource use/abuse • Cultural beliefs/values concerning resources consumption • Use of renewable resources • Use of non-renewable resources (c) Environmental degradation and resources consumption, and risks associated with the 'commons concept.' (d) Pollution and resource consumption: • Biodegradable pollutants • Non-biodegradable pollutants • Exposure to pollutants (Movement of pollutants in the environment; effects of pollutants on humans and other organisms) • Pollution control (In developing nations) (e)The interrelationships between opulation, resources use, technology and cultural beliefs and values. 2. Soils and Allied Problems 2.1 Human dependence on soils 2.2 Soil formation: (a) Weathering (Physical and chemical). (b) Categories of oils/characteristics (Loams, sandy soil and clay soil). 2.3 Soil Erosion (a) Natural erosion (wind (b) erosion and water erosion). (c) Erosion speeded up by humans. (d) Erosion around the world • Location of serious erosion problems • Factors associated with serious erosional problems (Cultivation of marginal lands and poor cultivation techniques). 2.4 The link between expanding human populations	(b) Citations of references. (c) Bibliography. 3. Using Primary Sources for Obtaining Issue Information 3.1 Surveys, questionnaires, and opinionnaires (survey instruments) (a) Definition of survey instruments. (b) Rules for producing survey instruments. (c) Models of survey instruments. 3.2 The interview as an Important research technique. 3.3 Selecting the appropriate population to be sampled. 5.5 Basic procedures to be used in sampling populations. 3.4 Data collection strategies 3.5 Developing and using survey instruments /interviews.

	• Declining plant species • Declining numbers of surviving plants • Invader weeds • Loss of entire ecosystems (d) Possible solutions. (e) Why solutions are difficult. 4.2 Impact of row crop production (a) Demands for more agricultural land. (b) Modification/destruction of habitat and existing ecosystem. (c) Loss of topsoil by erosion faster than replacement. (d) Loss of soil nutrients and replacement by commercial fertilizers. (e) Investigations: • Fieldwork practising investigative skills (study of one local ecosystem. • One practical task practising investigative skills Assessment: • One formal test and • Informal tasks once a week acquiring the following skills of: knowing; understanding and making connections between ideas and concepts and to make meaning to EE; application of knowledge in new or unfamiliar contexts; analyse, evaluate and synthesise environmental knowledge, concepts and ideas; understanding the History and relevance of EE discoveries; value and EE apply knowledge in	and soil erosion: (a) The increased demand for agricultural products. (b) Increased use of marginal agricultural products. (c) Conversionof natural ecosystems (e.g. forests, wetlands) to farmland. 2.5 Soil conservation strategies: (a) Minimum-tillage and no-till farming. (b) Contour farming. (c) Terracing. (d) Strip cropping. (e) Shelterbelts. (f) Maintaining soil fertility: • Animal manures • Green manures • Compost • Crop rotation 3. Water and Allied Problems 3.1 The world's water supply 3.2 Renewing the water supply (a) The water cycle. (b) The use of surface water. (c) The use of ground water/aquifers 3.3 Problems with water resources (a) Drought in arid and semi- arid countries. (b) Excess water and allied problem (c) Irrigation problems 3.4 Management strategies (a) Dams and reservoirs (b) Water diversion projects	

	industries in respect of career opportunities and everyday life; understanding relationship between indigenous knowledge and EE. Two Examination papers of 2 and half hours and 150 marks each	(c) Using ground water (e) Other strategies/potential benefits or problems 3.5 Water conservation (a) Importance of conservation of water ressources (b) Potential for (a) Specific strategies for water conservation: • Wasting less water in the home. • Wasting less water in industry. • Reducing irrigation losses. 4. Food Production and Hunger 4.1 The food that feeds the world (a) The plants that dominate food production. (b) The animals that provide most of the meat for those humans that can afford it. 4.2 Food chain energy losses when meat is produced for human consumption 4.3 Characteristics of major world agricultural systems (a) Subsistence farming- labour intensive. (b) Slash and burn agriculture – land intensive. (c) Nomadic herding – land intensive. (d) Industrialized agriculture –land, capital, and fossils fuel energy intensive. 4.4 World food problems (a) Population growth vs food Production.	

		(b) Nutritional problems • Malnutrition. • Under-nutrition. • Obesity. (b) Food storage/distribution problems. (c) Poverty. • Inability to buy food. • Inability to purchase land to grow food. (d) Environmental effects of producing more food. • Overfishing. • Overgrazing. • Soil erosion. • Salinisation/water logging. • Waterborne diseases. • Deforestation. • Extinct and endangered species. • Pollution. • Loss of genetic diversity. • Climatic changes. • Health risks from food additives. 4.5 The green revolution (a) Developing new hybrids.	

		(b) The potential for the green revolution. (c) Limitations of the green revolution. (d) The need for increased use of fertilizer and water. (e) Increased soil infertility where crop rotation is reduced. (f) The limits to increasing yields (diminishing returns) (g) Loss of genetic diversity in food producing plant varieties. 4.6 The use/cultivation of unconventional food plants (a) Plants with potential • The winged bean. • Cocoyam. • Ouinoa. (b) Cultural biases against new foods. 4.7 Increasing utilization of fish (a) Characteristics of the world fishery. (b) Overfishing. (c) Fish farming and Aquaculture. (d) Hopes for increasing fishery production. (e) Regulating overfishing. (f) Turning to new/ unconventional species.	

		(g) Constraints to increase yields. 4.8 Sustainable agriculture (a) Learning self- sufficiency in food production. (b) China as a world leader in sustainable agriculture. (d) Potential benefits of sustainable agriculture in the developed nations. (e) Reducing the enourmous waste of food in the developed nations. 4.9. Responsibilities of the individual for reducing world hunger investigatios: • Fieldwork practising investigative skills on: o Weathering; • Categories of soil; o Soil erosion • Water logging. • One practical task on observation and reporting on: • Agricultural systems • Practical task on recycling project. • Assessment: • One formal test and • Informal tasks once a week acquiring the following skills of : knowing; understanding and making connections between ideas	

		and concepts and to make meaning to EE; application of knowledge in new or unfamiliar contexts; analyse, evaluate and synthesise environmental knowledge, concepts and ideas; understanding the History and relevance of EE discoveries; value and apply EE knowledge in industries in respect of career opportunities and everyday life; understanding relationship between indigenous and EE. • Two Examination papers of 2 and half hours and 150 marks each.	
3	4.3 Human and the forest (a) Cutting and burning of forest for: • Agricultural land. • Building material and fuel. Consequences of Deforestation • Excessive erosion rate of soil. • Decreasing water absorption capacity of soil • Local climatic changes. • Loss of habitat for large percentage of plants and animals. • Desertification. 4.4 The relationship between expanding human populations and loss of forest land. Possible solutions. Why solutions are difficult. 4.5 Human and the world's wetland	**Chapter 3** **Resources** 1. Forest Resources 1.1 Importance of forest resources (a) Commercial Importance. (b) Ecological Importance. (c) Climate control. (d) Pollution control. 1.2 Short term vs long term benefits of forests e.g. economic values vs ecological values **1.3 The world's forests** **(a) Loss of forest since the** Agricultural Revolution-about-one-third of the world's forests. **(b) Current loss forests** • **Losses due to fuel nations.** Resources 1. Forest Resources 1.1 Importance of forest resources (a) Commercial Importance.	**Chapter 3** **1. Political and economic dimensions of EE** **1.1 Impacts of politics on the environment:** **(a) Corporative governance.** **(b) Expropriation of land without compensation.** **(c) Tribal clashes over land demarcations.** **(d) Benefits of kings and chiefs regarding land.** **1.2 Economic development :** **(a) Industrialisation** **(b) Improved technology for agriculture.** **(c) Contribution of agriculture to anti-biotics resistance.** **(d) Improved technology for mining.** **(e) Improved technology for fishing.** **(e) Improved technology for water and electricity preservation and conservation.** **(e) Preventative and remedial measures.** 2. Interpreting Data from Environmental Issue Investigations 2.1 Organising data in data tables. 2.2 Communicating data by graphing (a) Bargraphs (histograms) (b) Coordinate (line) graphs.

	(a) Types of wetlands • Swamps • Bags • Tidal marshlands • Flood plains/river bottoms • Ponds. (b) Importance of wetlands • Recharging area for groundwater reserves • Flood control • Fishing production from coastal wetlands • Life support system for migratory waterfowl • Habitat for many plant and animal species besides waterfowl. (c) The status of wetlands in South Africa • Wetlands already lost • Wetlands drained for agricultural purposes • Consequences of wetlands degradation 4.6 Humans and wildlife (a) Wildlife defined as any undomesticated land and animal found in naturally existing eco	(b) Ecological Importance. (c) Climate control. (d) Pollution control. 1.2 Short term vs long term benefits of forests e.g. economic values vs ecological values 1.3 The world's forests (a) Loss of forest since the Agricultural Revolution-about-one-third of the world's forests. (b) Current loss forests • Losses due to fuel wood crises in emerging nations. • Tropical deforestation o Clearing land to grow food o Cutting and gathering fuel wood o Commercial logging o Ranchers clearing forests to grow beef for export 1.5 Serious issues associated with forest management (a) Fuelwood conservation and supply. (b) Sustainable forest farms. (c) Public forests as private timber resource. 2. Plant and Animals Resources	(c) Pie charts. 2.3 Interpreting data-skill development sequence. (a) Making conclusions (b) Making inferences. (c) Making recommendations. 2.4 Applying data interpretation skills to issue-related data sets 3. The independent Investigation of a learners-selected environmental issue 3.1 Selecting an issue for investigation 3.2 Formulating research questions to guide the investigation 3.3 Collecting secondary information (a) Library search. (b) Containing appropriate agencies organisations. (c) Letters for information. 3.4 Collecting primary information (a) Develop appropriate survey instruments. (b) Identify the appropriate population for sampling.

	system (b) Ecological importance of wildlife • Maintaining the health and vigour of the earth's ecosystems • Numerous benefits to the ecosystems • Food production • Oxygen production • Filtration of toxic substances • Climate moderation • Waste decomposition • Recycling of nutrients • Control of crop and disease pests • Storage of a vast reservoir of genetic materials (c) Status of wildlife • Extinction rates • Extinctions caused by human activities (d) Impact of losses on humans • Potential food benefits for exploding human populations • Potential medical benefits • Health of existing ecosystems (e) Reasons for wildlife losses	2.1 Arguments for Preserving plant and animal species (a) Economic and human needs. (b) Wildfire and economic benefits. • Sport fishing • Sport hunting (c) Direct economic benefits • Food/spices/cooking oils • Medicines • Soap/scents • Oils/waxes • Insecticides • Fuel • Fiber and paper (d) Pollination as an essential activity. (e) Medicines in use today. (f) Aesthetic/recreational importance. (g) Ecological importance • Maintaining the health of the worlds ecosystems • Recycling nutrients • Pests and diseas--e control • Storehouse of genetic material	(c) Develop appropriate sampling procedures. (d) Administer the survey instrument. 3.5 Issue analysis/data interpretation (a) Organize the collected data into tables/graphs/prose. (b) Analyze information for participants, their beliefs and values. (c) Interpret the findings (data-based conclusions, inferences, and recommendations). 3.6 Communication of investigation and results (a) Produce written issue issue investigation and results. (b) Present issue investigation to class mates and other approriate groups.

	• Loss of habitat • Pollution of habitat • Killing for food, sport, profit • The pet trade • Predator and pest control • Introduction of alien species (f) Protecting wildlife • National Acts and policies • Wildlife refuges • Gene banks: zoos, botanical garden aquariums , etc • Preserving ecosystems (g) Critical considerations in regarding humans as an ecological variable. (h) Human reproductive potential. 4.7 Cultural limitations to human population control in various communities (a) Values • Social values • Political values • Religious values • Economic values (b) Individual beliefs and values concerning rights and responsibilities	(h) Ethical importance • The inherent right of an organism to survive • Human inability to understand their relationship with nature 2.2 Extinction/endangered species (a) Natural extinction and rates. (b) Human-caused extinction and rates. (c) 1975: 100 species per year. (d) 1985: 100 species per year. (e) Endangered species: • Loss of habitat • Commercial hunting • Predator and pest control • Pollution • The pet trade (f) Abuse by selected zoos. (g) Introduction of alien species. (h) Protecting species from extinction. • International law and treaties. • Wildlife refuges. • The role of zoos and related agencies. • Gene banks.	

	4.8 Unique human ability (a) Human ability to simplify ecosystems e.g monobiotic agricultural ecosystems. (b) Human ability to invent machines and process for modifying natural ecosystems or maintaining artificial ones. (c) Human ability to produce and use energy in the development and maintenance of human-made ecosystems e.g energy from coalfired electrical generating plants. 4.9 Humans and sustainable development (a) Definition of development. (b) Definition of sustainable development. (c) Dimensions of sustainable development: • Human needs, health and safety, including clean water and sanitation, food, energy and employment • Technological needs, the reorientation and management that reflect appropriate risks and impacts on human and ecological context • Economic needs, the revival and enhancement of economic growth • Ecological needs, the enhancement of preservation and conservation of abiotic and biotic resources, including biodiversity, pollution, abatement, and conservation of fuel wood	• Preservation of ecosystems. (i)The individual's responsibility for preserving plants and animals. 3. Pollution 3.1 Air Pollution (a) Sources of air pollution • Auto and truck transportation. (b) Coal and oil burning power plants. (c) Smelters, refineries, pulp and paper mills. (d) Major pollutants • Particulate matter. • Sulfur dioxide. • Carbon monoxide. • Nitrogen dioxide. • Ozone. • Lead. • Hydrocarbons. • Radon (e) Impact of air pollution on human health • Increased death rate. Chronic respiratory disease.	

	(d) Worldwide political context of sustainabe development (e) World-wide sustainabl development summits (f) Investigations: o Fieldwork practising investigative skills (study of one local ecosystem. o One practical task practising investigative skills • Assessment: o One formal test and o Informal tasks once a week acquiring the following skills of: knowing; understanding and making connections between ideas and concepts and to make meaning to EE; application of knowledge in new or unfamiliar contexts; analyse, evaluate and synthesise environmental knowledge, concepts and ideas; understanding the History and relevance of EE discoveries; value and apply EE knowledge in industries in respect of career opportunities and everyday life; understanding relationship between indigenous and EE.	• Acute respiratory disease. • Cancer • Heart disease (f) Acid precipitation (Acid rain) • Definition. • Sources of acid rain and transportation of acid rain pollutants. • Extent of the problem worldwide. • Effect on lakes/forests. • Reduction of crop yields. • Deterioration of buildings and statuary. • International dispute over acid rain. • Remedies for acid rain. (g) Indoors air pollution. o Radon gas. o Products of combustion: o Carbon monoxide o Nitrogen oxides o Particulates (smoke) (h)Stratospheric ozone depletion from the use of chlorofluorocarbons (CFC's) – a unique and dangerous form of air pollution air. 3.2 Water Pollution	

		(a) Sources of freshwater surface pollution. • Point sources. • Nonpoint sources • Soil erosion/ sedimentation o Construction Activities • Animal feedlot runoff Pesticides/fertilizer runoff o Street/parking lot runoff • Acid mine deposits (runoff) o Acid rain deposition • Thermal pollution of rivers and lakes from power plants. (b) Human disease traced to water pollution • Organismic diseases o From bacteria e.g typhoid fever, cholera, enteritis o From viruses e.g hepatitis, polio o From protozoans e.g amoebic dysentery o From parasites e.g schistosomiasis (c) Inorganic substances • From arsenic, e,g. Kidney, liver, nervous system damage. • From cadmium, e.g kidney damage, high blood pressure. • From lead, e.g. mental retardation, anaemia anaemia, birth defects.	

		• From mercury, e.g nervous system and kidney damage. (d) Synthetic organic substances • Benzene, e.g chromosome damage, leukaemia. • Carbon tetrachloride, e.g. cancer, liver and kidney damage. • Dioxin, e.g. cancer, cancer, genetic mutations. • PCB's, e.g. liver, kidney, pulmonary damage. • Vinyl chloride, e.g. liver, kidney and lung damage, cancer. (e) Oceanic pollution • Threats to the oceans' ecosystems. • Ocean dumping. • Ocean oil pollution. (f) Ground water pollution • Ground water as a vital source of drinking water. • Sources of ground water contamination. • Difficulty of detection and correction of ground water pollution. • The need for prevention of ground water pollution. (g) Wastewater treatment	

		• Proper sewage treatment. o Septic tanks o The sewage lagoon. o Alternative sewage treatment for the rural home owner. o Urban sewage treatment. o Disposal of sewage effluent and sludge. o Alternatives to large-scale treatment. • The individual's role o The safe disposal of household toxic chemicals. o Recycling waste oil. o The use of low-phosphate detergents. o Limited use of pesticides, bleaches, inorganic fertilizers. o Using less water. o Investigations: o One practical task on observation and reporting on pollution; Waste water; treatment; sewage treatment and Zoo. • Assessment: o One formal test and o Informal tasks once a week acquiring the following skills of: knowing; understanding; and making connection between ideas and concepts and to make to meaning to EE application of knowledge in new or	

		unfamiliar contexts analyse, evaluate and synthesise environmental knowledge, concepts and ideas; understanding the History and relevance of EE discoveries; value and apply EE knowledge in industries in respect of career opportunities and everyday life; understanding relationship between indigenous and EE.	
4	Chapter 3 History of life on earth 1. Life's history: Change throughout the history of life on earth 1.1 Changes in the composition of the atmosphere. 1.2 Changes in the climate. 1.3 Geological events (movements of continents) and their effect on the distribution of living organisms (biogeography). 2. Geological timescale. 3. Cambrian explosion. 4. Mass extinctions. 4.1 Fossil formation and methods of dating them. Key events: (a) Origins of the earliest forms of life (b) Soft-bodied animals in Namibia, Northern Cape. (c) Early land plants in Grahamstown area. (d) Forests of primitive plants such as Glossopteris.	3.3 Noise pollution (a) Sources and levels of noise in the environment. (b) Effects of noise on the human organism: • Hearing loss. • Stress and related health effects. • Effects on unborn children. • Effect on learning and work performance. • Sleep disruption. • Noise and safety. (c) Noise control • Municipal noise control. • Government effort at noise control. • Individual opportunities for noise control: Keeping radio / stereo volume low ○ Wearing ear protection when using noisy equipment. ○ Using sound absorbing materials in the home.	**Chapter 4** 1. Setlement Issues 1.1 Rural settlement. (a) Study of setlements. (b) Rural settlement. (c) Rural settlement issues. 1.2 Urban setlement. (a) Urban setlements. (b) Urban setlements hierarchies. (c) Urban structure and patterns. (d) Urban settlement issues. Issue Resolution: Skills and Application Citizenship responses issues and their effects (a) Environmentally negative responses. (b) Environmentally positive response. 12.2 Principles of environmental (citizenship) action. (a) The responsibility about issues. (b) The responsibility to be skilled in issue resolution. (c) The responsibility of Knowing the effect of actions.

	(e) Location of coal deposits in South Africa. (f) The coelacanth as a living fossil in KwaZulu-Natal coast. (g) Mammal-like reptiles found in Karoo. (h) Dinosaurs, as well as cone-bearing plants. (i) Early mammals. (j) Humans and pre-humans. 5 Understanding fossils 5.1 Fossil tourism • Investigations o Construct a timeline showing the history of life on Earth. It should show key events from the emergence of the earliest life forms to the present day to emphasises the long history of life. o Research 'missing link' between dinosaurs and birds. o Coelacanth as a example of a 'living' fossil found off the coast of South Africa. Written and verbal report. o Use meteorite impact theory and the volcanism evidence theory hypotheses and describe the evidence scientists have gathered in support of it. o Examine fossils at museum or fossil site or	o Supporting local ordinances designed to control noise. Chapter 4 Wastes 1. Solid waste disposal 1.1 Definition 1.2 Sources of solid waste in South Africa. 1.3 Sources of municipal waste. 1.4 Methods of municipal waste disposal. 1.5 Source reduction of waste. 2. Harzardous waste 2.1 Definition. 2.2 Sources of hazardous waste. 2.3 Hazardous waste disposal in the past. 2.4 Hazardous waste disposal today. 2.5 Issues surrounding hazardous waste disposal. 2.6 The individual's opportunity to help resolve hazardous waste problems.	(d) The responsibility to to consider potential negative and positive effects prior to taking an action. 12.3 The methods (modes) of citizenship action (a) Persuasion (persuasive action) (b) Consumerism (consumer action) (c) Political action. (d) Legal action. (e) Eco-management (some form of physical action) 2.4 Effectiveness of individual vs group action 2.5 Guidelines for decision- making -criteria to be considered: (a) Sufficient evidence to warrant action on the issue (b) Alternative actions which are available (c) Relative effectiveness of action(s) (d) Legal consequences of action (e) Social consequences of action (f) Economic consequences of action (g) Consideration of personal values in relation to the action (h) Consideration of beliefs and values of others involved in the issue (i) An understanding of the procedures necessary to

	study photographs. ○ Use plaster of Paris to construct a fossil. ○ Map the key fossil sites on a map of South Africa. • Assessment ○ One formal test. ○ One project. ○ One assignment. ○ End of year examination 2x 2:30 hours. Informal tasks once a week acquiring the following skills of: knowing; understanding; a nd making connections between ideas and concepts and to make meaning to EE; application of knowledge in new or unfamiliar contexts; analyse, evaluate and synthesise environmental knowledge, concepts and ideas; understanding the the History and relevance of EE discoveries; value and apply EE knowledge in industries in respect respect of career opportunities and everyday life; understanding relationship between indigenous and EE.	• Investigations: ○ Fieldwork practising investigative skills on: solid waste disposal; and hazardous waste disposal. • Assessment: ○ One formal test and ○ Informal tasks once a week acquiring the following skills of : knowing; understanding and making connections between ideas and concepts and to make meaning to EE; application of knowledge in new or unfamiliar contexts; analyse, evaluate and synthesise environmental knowledge, concepts and ideas; understanding the History and relevance of EE discoveries; value and apply EE knowledge in industries in respect of career opportunities and everyday life; understanding relationship between indigenous and EE.	take action (j) Ability to complete the action (k) Courage to take the action (l) Time needed to complete the action (m) Other resources needed to make the action effective (n) Ecological consequences of the action 2.6 Applying issue resolution skills (a) Producing a plan action. (b) Evaluating the plan of action .(using criteria in 1.5 above). (c) Carrying out the plan of action (optional). (d) Evaluating the effectiveness of action(s) taken.