Exploring environmental literacy components in promoting sustainable behavior : A Case study of Rural primary schools in Moutse, Sekhukhune district, Limpopo

by

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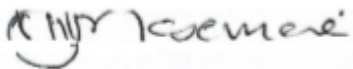
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June 2020

DECLARATIONS

I declare that "Exploring Environmental Literacy Components in Promoting Sustainable Behaviour: A Case Study of Rural Primary Schools in Moutse, Sekhukhune District Limpopo", is my own work, and that all sources that I have used and quoted have been acknowledged by means of complete references.

I also declare that I submitted the dissertation to originality checking software and that it falls within the accepted requirements for originality.

I further declare that I have not previously submitted this work, or part of it, for examination at UNISA for another qualification or at any higher education institution.

Date

Kgaogelo Johanna Masemene   3 June 2020

DEDICATION

This work is dedicated to my family and friends for the unwavering support they have shown throughout this challenging journey, it is through you that I have made it. A further gratitude is extended to my recently departed 106 years old grandmother Mokgatše a'Mautlana, who had a wish for me to be a graduate from an early age. I wish you were still here to witness me actualising your dream.

ACKNOWLEDGEMENT

ABSTRACT

Environmental Education (EE) in formal education was introduced because of environmental degradation globally, with the aim of developing an environmentally literate citizenry. However, the ultimate goal of EE, that of developing an environmentally literate citizenry, remains a dream while the planet continues to deteriorate. This study explored the environmental literacy level of both teachers and leaners, with a focus on rural primary schools. The study examined the effectiveness of the components of knowledge, attitude and skills in developing environmental literacy in schools. The study further explored how these components promote practices and lifestyle changes towards sustainable behaviour. A qualitative multiple case study design, guided by the interpretivist paradigm, was employed to conveniently sample three cases consisting of 3 teachers and 18 learners. Data was generated through observations, document analysis, as well as face to face and focus group interviews from purposefully sampled Grade 7 educators and learners. The findings revealed both nominal and functional environmental literacy levels amongst teachers and learners. These findings are attributed to a lack of teacher's expertise in teaching EE content for the development of environmental literacy, the content integration approach of EE in the Department of Basic Education's Continuous Assessment Policy System (CAPS) curriculum, the focus of the CAPS curriculum on mostly, the knowledge component of EE and a lack of a framework on how EE content should be taught. Lastly, the findings can also be attributed to the rural context in which the study took place, which poses challenges to sustainability lifestyles and practices. The study recommends reorientation of the curriculum to include environmental science as a subject in an integrated curriculum. The findings also recommend the inclusion of environmental policy in schools to guide lifestyle and practices towards sustainable behaviour.

Keywords: *Environmental Education, Environmental Literacy, Sustainable Development, Sustainable Behaviour, Self-Efficacy.*

SENGWALWAKOPANA

Thutotikologo lefapheng la thuto e hlamilwe ka lebaka la go tlhagala ga tikologo lefaseng ka bophara ka maikemišetšo a go aga setšhaba seo se rutegilego mabapi le tša tikologo. Efeela maikemišetšo a magolo a thutotikologo e sa ntše e le toro mola seemo sa tikologo lefaseng ka bophara se tšwela pele le go hlagala. Maikemišetšo a sengwalwa se ke go nyakišiša maemo a thutotikologo ya barutiši le barutwana, go lebeletšwe kudu dikolo tša fasana tša dinaga magaeng. Sengwalwa se nyakišiša dikarolo tše tharo tša maemo a thutotikologo, e lego tsebo, maikutlo le bokgoni, le gore di hlohleletša bjang thutotikologo, ga mmogo le netefatšo ya maitshwaro le bophelo bjoo bo hlohleletšago tlhokomelo ya tikologo. Qualitative multiple case study design yeo e hlahlilwego ke intepretive paradigm e somišitswe go kgetha dikheisi tše tharo, moo barutiši ba bararo le barutwana ba lesome seswai ba tšerego dinyakišišong tše. Dintlha tša dinyakišišo di kgobokeditšwe ka go tšea temogo ya tikologo le diphaphoši tša dikolo, tshekatsheko ya melaotheo le dipoledišano magareng ga barutiši le barutwana ba mphato wa bo šupa. Dinyakišišo di humana seemo sa fase le sa magareng dithutong tša maemo a tikologo dikolong. Seemo se sa thuto ya tikologo se fegwa godimo ga tlhokego ya bokgoni le tsebo ya barutiši go ruta dithuto tša tikologo, molaotheo wa dithuto sekolong o lebeletše feela lefapha la tsebo, mola o sa bontšhe gore tsebo yeo e swanetše e rutwe bjang. Gape go humanega gore maemo a bophelo dinaga magaeng a fa mathata netefatšatšong ya bophelo le maitshwaro ao a hloleletšago tlhokomelo ya tikologo. Thuto ye e šišinya mpshafatšo ya lenaneothuto le kelo ka go tsenya thuto ya mahlale a tikologo go lenaneothuto le kelo yeo e kopanego. Dinyakišišo di šišinya gape go akaretša leano la tikologo dikolong go hlahla mokgwa wa bophelo le setlwaedi go mekgwa ya tsheketšo.

Mantšu a bohlokwa : *Environmental Education, Environmental Literacy, Sustainable Development, Sustainable Behaviour, Self-Efficacy.*

MAWANWA A THODISISO

Pfundo ya zwa mupo kha pfunzo dzi funzwaho zwikoloni yo vha hone nga murahu ha u vhona uri mupo u khou tshinyala nga zwivhuhulu u mona na ḽifhasi ḽothe, tshipikwa

hu u bveledza vhadzulapo vho funzeaho kha zwa mupo. Fhedzi ha, zwi kha ḓi tou vha muḽoro musi ḽifhasi ḽi tshi khou bvelaphanda na u tshinyala.

Ngudo/pfunzo iyi yo kona u bveledza vhadzulapo vho funzeaho siani ḽa zwa mupo kha vhoṱhe, vhadededzi na vhagudiswa. Ngudo iyi yosedzesa kha zwikolo zwa murole wa fhasi kha vhupoha mahayani. Ngudo iyi yo ṱolisisa zwiitisi zwihulwane zwo ṱu ṱuwedzaho vhuvha iyi tevhelaho savhuvha na vhukoni ha u bveledzisa pfuzo ya mupo zwikoloni.

Maitele mandzhi a ṱhoḓisiso o rangelwaphanḓa nga vhasedzulusi vhane vha ṱoḓou ḓivhesa shango samusi ḽo ḓisendeka kana u ṱuṱuwendzwa nga vhupfiwa ha muthu ene muṋe, vho vha hone u itela u sumbhedza milandu miraru ine ya khou kwana vhadededzi vhararu na vhagudiswa vha fumalo.

Ngudo iyi yo bvelaphanda na u ṱoḓisisa uri zwiitisi izwi zwi ṱuṱuwendza hani zwithu zwine zwa tshinyadza mupo na u shandukisa matshilele na u tikedza vhudifari. Ngudo i sengulusahao mafhungo o fhambanaho nga vhunzhi, yo rangwa phanḓa nga vhaṱo ḓisisi vhane vha na divhithela ḽa u pfesesa zwine zwa khou itea dzangoni nga vhuphara, vho vha vho runwa u leludza kha u tia ṱhoḓisiso ya tsedzuluso tharu.

Mafhungo o kuvhanganywaho o wanuluswa nga u tou sedza fhedzi, nga u sengulusa manwalwa, u vhudzisa vhathu vho tou livhana navho zwifhaṱuwo, na nga u fara nyambedzano thwi na vhadededzi vha murole wa gireidi ya sumbe na vhagudiswa vhahone.

Tsedzuluso dzo wana zwauri ngudo/pfunzo ya zwa mupo a i khou tou dzhieleswa nṱha na u vhonala zwavhu ḓikha vhadededzi na vhagudiswa. Mawanwa a tsedzuluso a khou tou ombedzela uri vhagudisi a vha na vhukoni ha u funza vhana divhamupo kha silabasi ya CAPS. Zwi tou vha khagala u ri zwikolo zwa mahayani zwi na thaidzo nnzhi dza u londota mupo na vhudifari.

Ngudo I khou themendela u shandukiswa ha kufunzele na u katelwa ha ngudo ya mufhe sat hero ine ya vha na u ṱumekanya vhupo hoṱhe ha ngudo ya bwa mufhe. Mawanwa a khou ita na u themendela uri hu une na u fatelwa ha ndayotelwa ya mufhe zwikoloni u itela u eletshedza kutshilele na maitele uri hu vhe na vhuḓifani bavhuḓi kha mufhe.

MAIPFI A NDEME: *Environmental Education, Environmental Literacy, Sustainable Development, Sustainable Behaviour, Self-Efficacy*

LIST OF ACRONYMS AND ABBREVIATIONS

C2005	Curriculum 2005
CAPS	Continuous Assessment Policy System
DBE	Department of Basic Education
DHET	Department of Higher Education
DSD	Decade for Sustainable Development
EE	Environmental Education
EEPI	Environmental Education Policy Initiative
EEASA	Environmental Education Association of Southern Africa
ESD	Education for Sustainable Development
IUCN	International Union for Conservation of Nature
MESA	Mainstreaming Environments and Sustainability in African University Partnership
NAAE	North American Environmental Association for Environmental Education
NCS	National Curriculum Statement
RNSC	Revised National Curriculum Statement
SA	South Africa
SADC	Southern African Development Community
SDG	Sustainable Development Goals
UNEP	United Nations Environmental Programmes
UNESCO	International Union for Conservation of Nature and Natural Resources Conference
UNICED	United Nations Conference on Environment and Development
UNISA	University of South Africa

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CHAPTER 1

ORIENTATION OF THE STUDY

1.1 INTRODUCTION

In this chapter, I present an overview of the study, providing discussions on the rationale and the purpose of the study to give insights into, and reasons for undertaking the study. I also discuss the problem statement and significance of the study which guided the research main question, sub-questions, aim and objectives of the study. The chapter further provides discussions on the methodology employed in the study, the study's limitations and delimitations. Ethical considerations and theory guiding the study are also introduced in this chapter. The concepts guiding the study are clarified in order to locate them within the context of the study. Lastly, the chapters making up this dissertation are outlined.

1.2 THE PROBLEM STATEMENT

South Africa, like any other countries in the world, is facing environmental degradation because of natural and human activities that have consequences on the interrelated social, economic and the natural environment (Department of Environmental Affairs and Tourism [DEAT], 1998:36; Le Grange, 2002:83; Darkoh, 2009: 1). The world is experiencing extensive population growth, increasing consumption patterns, inequality, poverty, loss of biodiversity, land degradation, high rate of waste generation and climate change. The list is endless and varies between developing and developed countries and between rural and urban regions. (UNESCO, 1978:11; UNESCO, 2008:9; Hollweg, Taylor, Bybee, Marcinkowski, McBeth, & Zoido, 2011:1; Leicht, Heis & Buyn, 2018:7).

According to (Roth 1992:10), The environmental degradation could be attributed to the failure of educational systems to provide citizens with the basic understanding and skills needed to make informed decisions on people's interactions and their relationship with the natural environment. It became increasingly urgent that the world demands a committed and coordinated response to environmental degradation, by

raising awareness and education to build a nation's capacity to address this crisis in order for the current and future generations to survive (UNESCO, 1978:11).

Efforts have been made globally to introduce and integrate EE into both formal and informal education with the aim of developing an environmentally literate citizenry, that are able to sustain their resources for future generations. Despite the efforts made, the world is still experiencing an environmental crisis and EE is not achieving its goal of developing environmental literacy. Environmental literacy of teachers, and a well-structured EE curriculum, are fundamental to the development of environmental literacy of learners in schools (Yavetz, Goldman & Pe'er, 2009:394; Elster, 2019:15). However, the literature has revealed constraints to developing the environmental literacy of both teachers and learners globally. The literature highlights a lack of teacher training and development in both pre- and in-service training interventions, curriculum inadequacies, a lack of learning and a lack of teaching materials (Yavetz, Goldman & Pe'er, 2009:394; Kidman & Casinader, 2019:6; Kaya & Elster, 2019:15).

Similarly, in South Africa, development of environmental literacy is still a major challenge in both rural and urban schools, with the overarching problem attributed to teachers' lack of EE content knowledge and skill in integrative pedagogy, the absence of a framework in the school curriculum and a lack of resources in schools (Loubser, Swanepoel & Chacko, 2000:317; Hebe, 2009:95; Tlhagale, 2011:8).

Moreover, schools in rural communities experience a lack of resources as a result of poverty, unemployment and the high level of illiteracy which limits developmental possibilities that might be achieved through education. Communities mostly depend on the land and livestock farming for their daily survival (NMF, 2005:26). These rural conditions have implications for bringing about a balance between sustainable lifestyles and socio-economic conditions (NMF, 2005:26; Tlhagale, 2011:2; Saiti et al., 2014:187). Therefore, the development of environmental literacy in rural schools is important in strengthening capabilities and competencies for rural communities to adopt behaviours and practices that will encounter environmental challenges communities are facing.

1.3 RATIONALE OF THE STUDY

This study explored the environmental literacy of both teachers and leaners in rural primary schools, necessary to promote behavioural changes towards the sustainable use and conservation of resources.

As mentioned in section 1.2, Education, formal, informal and non-formal, was identified as one of the powerful tools available to address the environmental crisis the world is facing (UNESCO, 1977:12; UNESCO 2006:9; Hollweg et al., 2011:6). This led to the introduction of environmental education (EE) in all sectors of formal education, more than five decades ago, by the International Union for Conservation of Nature and Natural Resources Conference (UNESCO), and the International Union of Conservation of Nature (IUCN). The ultimate aim of EE is to develop the environmental literacy essential to achieve a sustainable future for all, with the objective to encourage behavioural change (UNESCO, 1977:27 UNESCO, 2008:10; Evers, 2012:3; Hollweg et al., 2011:1).

Over the past three decades, South Africa has also embarked on meeting its international obligation to develop environmentally literate citizenry by introducing and integrating EE into school curricula in both rural and urban regions across the country. The aim of introducing EE into schools is to infuse the principles and practices of social and environmental justice and human rights into schools (DBE 2011:5). However, rural schools still endure inequality in terms of human and material resources, and in terms of poor performance (Gwanya, 2010:4; Saiti, Kyle, Sinnes & Nampota, 2014:187; Tsakeni, 2017:82). Rural areas in the country are still characterised by underdevelopment and poverty, including the challenges of unsustainable use of natural resources, lack of access to social and economic infrastructure, lack of water sources for both household and agricultural development, illiteracy, low skill levels and migratory labour practices, to name the few (Hemson, Meyer & Maphunye, 2004:5; Nelson Mandela Foundation [NMF], 2005:26; Saiti et al., 2014:187).

It was against this backdrop that this study was conducted in the rural areas of the Sekhukhune District, Moutse in the Limpopo Province, South Africa. Land degradation

and deforestation pose an environmental threat in many areas of the province, especially in the rural areas. The Sekhukhune District is one of the areas in Limpopo most affected by land degradation as a result of extensive deforestation, resulting in poverty, conflict between conservation and development needs and the unsustainable use of biodiversity (Greening Business Plan, 2009:17). Moutse in Sekhukhune is still characterised by underdevelopment, poverty and dense population, and people in most of the communities are illiterate, unemployed and depend on natural resources, including livestock farming, the selling of firewood and agricultural activities for their livelihood (Matheba, 2010:11).

To address issues of deforestation, the Limpopo government initiated several programmes, including an economic and environmental sustainability programmes (Greening Business Plan, 2009; Matheba, 2010:11). The aim of this programmes was to green schools, offices and public open spaces by collaborating with the private sector and local municipalities to donate trees to schools and households (Greening Business Plan, 2009). Sekhukhune was one of the districts selected, given its socio-economic challenges. However, the projects were not sustained due to corruption and lack of funding from donors (Matheba, 2010:11). This led to the economic and environmental sustainability remaining a dream in the area (Matheba, 2010:11). Given the above situation in the area, it was important to explore the effectiveness of EE in achieving its goal of developing the environmental literacy of both teachers and learners in rural primary schools of Moutse, and to determine how their progression level of environmental literacy promoted behavioural change towards the sustainable use and conservation of resources.

1.4 PURPOSE OF THE STUDY

As mentioned in section 1.3, the main goal of EE is to develop environmental literacy in schools. This goal is still a challenge globally, despite EE being introduced into formal education more than five decades ago. The pre- and in-service training of teachers and an enabling curriculum are identified as two of the key priorities for effective implementation of EE for the development of environmental literacy of learners and environmental change in schools (UNESCO, 1994:1; Yavetz, Goldman & Pe'er, 2009:394). However, teachers seem to lack proper training and development

on the delivery of an integrated EE content curriculum (Swanepoel, Loubser & Chacko, 2001:318; Mokhele 2011:78; Kidman & Casinader, 2019: 1).

The literature reveals that the environmental literacy of both teachers or learners in schools is evaluated and assessed. However, the literature reveals fewer studies on exploring the development of the environmental literacy of both teachers and learners in rural areas. As mentioned in section 1.3, rural communities mostly depend on natural resources for their daily survival because of their socio-economic status and lack of resources. This poses an environmental threat to most communities (Saiti et al., 2014:187; NMF, 2005:26). A lack of training and development of teachers on EE content, a lack of EE curriculum content knowledge among teachers and lack of resources begs the question of how effective is the development of environmental literacy in rural primary schools is?

The above discussions raised my interest to conduct this study to answer the following main research question and sub questions:

1.5 RESEARCH QUESTION AND SUB QUESTIONS

As mentioned in section 1.4, the study intended to answer the following main research question:

How effective are the environmental literacy components of knowledge, attitude and skills at promoting sustainable behaviour of both teachers and learners in rural primary schools?

The following sub-questions assisted me to answer the main research question and guided data generation, analysis and presentation process:

- Which environmental content knowledge is taught and learnt in rural primary schools?
- Which pedagogical approaches are used to teach integrated EE content in rural primary schools?
- How effective is the acquired EE knowledge in developing a positive attitude towards sustainable practices and lifestyle?
- How effective are the skills acquired in supporting the making decisions to take action towards solving environmental problems?

- How effective are these components knowledge, attitude and skills at promoting sustainable behaviour?

1.6 AIMS AND OBJECTIVES

The aim of the study was to explore the environmental literacy of both teachers and learners in schools in rural areas. In order to do so, I examined the environmental literacy components of knowledge, attitude and skills and their effectiveness at promoting sustainable behaviour of both teachers and learners, with an intent to achieve the following objectives:

- To explore EE content knowledge taught and learned in primary schools;
- To explore pedagogical approaches used to teach integrated EE content in rural primary schools;
- To explore the effectiveness of the acquired EE knowledge in developing positive attitude towards sustainable lifestyle and practices in schools;
- To explore the effectiveness of acquired skills to make decisions in order to take action towards solving environmental problems;
- To explore the effectiveness of environmental literacy components (i.e. knowledge, attitude and skills) at promoting sustainable behaviour.

1.7 SIGNIFICANCE OF THE STUDY

Developing environmental literacy for sustainability is a global concern, with some of the responsibilities for doing so having been bestowed upon schools. The ultimate aim of EE is to develop an environmental literate citizenry who are able to make decisions and choices to sustain and conserve resources (Roth, 1968:2). Therefore, it is important to explore whether EE is achieving its goal of developing the environmental literacy necessary to promote behavioural change towards conservation and sustainable use of resources.

By exploring environmental literacy levels and behavioural changes in schools, this study contributes to both the sociological and psychological body of research, and is significant for the following reasons:

- The study provides feedback to the Department of Basic Education (DBE), and to relevant stakeholders about the environmental literacy level of both teachers and learners, which will further highlight hindrances rural schools are faced with when promoting sustainable behaviour;

- The study also provides feedback to curriculum developers and policymakers on the effectiveness of EE content curriculum in achieving the goal of developing environmental literacy in schools;

- The study further highlights the need to improve, and support, effective pre- and in-service training of teachers towards the development of environmental literacy in schools; and

- Lastly, the study provides the basis for future studies on the evaluation of policies and frameworks guiding EE implementation.

1.8 RESEARCH METHODOLOGY

Research methodology is the process that shows how data is obtained and analysed. Research methodology includes the research approach, research design, research methods and data analysis (Creswell, 2014:37).

1.8.1 RESEARCH APPROACH

Due to the explorative nature of the study, I employed a qualitative approach to my research. The approach allowed for the exploration of insightful information in order to gain an understanding of the effectiveness of developing environmental literacy in rural primary schools. The approach further allowed me to purposefully and conveniently sample appropriate cases and experienced participants who provided rich and relevant data to help answer the research question (Creswell, 2014:37).

1.8.2 RESEARCH DESIGN

I employed the multiple case study research design with an interpretivist worldview. The design allowed me to conduct the study in the participants' natural settings, to interact with the participants in order to get in-depth information from them, and to understand and interpret their experiences and perceptions of effectively developing environmental literacy in rural primary school (Stake, 1995:3; Merriam, 1998:32; Yin, 2009:18).

1.8.3 RESEARCH METHODS

The research design and approach allowed for the use of multiple data collection methods, including observations, document analysis, face to face interviews with educators and focus group interview with leaners. The multiple data collection methods further allowed for the generation of data from different sources, which is important for the credibility and for the triangulation of data (Creswell, 2014: 342; McMillan & Schumacher, 2010:6).

1.8.4 DATA ANALYSIS

A qualitative content analysis method was used to analyse collected data. Pre-determined themes, drawn from the environmental literacy components, which are the focal point of the research question, guided the coding of generated data. Sub-themes and categories were inductively developed, guided by the research questions. The constant comparative method further guided the analysis, the discussions and findings of the study, in order to respond to the main research question (Grbich, 2012: 190; Neuendorf, 2019: 2015).

1.9 DELIMITATIONS

The study employed a qualitative approach and convenient sampling for both the sites and the participants. Therefore, the findings cannot be generalised to the state of environmental literacy at all primary schools in the Moutse area. Interpretation of the

findings was limited to only the sampled Grade 7 teachers and learners of schools that took part in the study.

1.10 ETHICAL CONSIDERATIONS

I adhered to, and complied with, the DBE, school and university policies and guidelines that require ethical approval and clearance before the commencement of the study, during the process of the study and after the completion of the study, in order to ensure that the study was ethically sound. I also took into account the principle of "respect for a person" by considering the beliefs and values of participants, including their right to agree or refuse to take part in the study (Pillay, 2014:196). In holding to the principle of beneficence, I further ensured anonymity and confidentiality of sites and participants by using pseudonyms during and after the research process.

1.11 THEORETICAL FRAMEWORK

The study employed Self-Efficacy Theory that originate from Social Cognitive Theory by (Bandura, 1997). Self-Efficacy is the key element in social cognitive theory. It influences an individual's attainment of courses of action, performance and endurances during the particular process a person is undertaking. Self-Efficacy Theory holds the belief that one's capability to organise and execute the courses of action required in producing a given attainment rely on an individual's belief in that action. One's belief in a particular action affects the selection of activities, the individual's efforts, the level of persistence, the endurances and the level of achievement (Bandura, 1997).

Self-efficacious persons develop perceived response efficacy, which gives them the belief that the desired behaviour will be successful in addressing the event that affects their lives. Self-efficacious persons are able to address obstacles that prevent them from engaging in the desired behaviour (Almarshad, 2017:93). In the context of this study, environmentally literate educators and learners will be aware of their impacts on the natural environment. They will develop a belief that taking action and adopting sustainable practices and lifestyles will address environmental problems, despite the challenges they might come across.

1.12   DEFINITION OF KEY CONCEPTS

This section provides clarification of the key concepts guiding the study so as to bring an understanding of these concepts and to locate them within the context of the study

1.12.1 Environmental Education

Environmental Education is the process of recognising values and clarifying concepts in order to develop skills and attitudes necessary to understand and appreciate the inter-relatedness of humans, their culture, and their biophysical surroundings. EE also entails practice in decision-making and self-formulation of a code of behaviour about issues concerning environmental quality (IUCN, 1970).

In the context of this study, EE is defined as the teaching and learning that provides programmes, processes and pathways that guides what is to be taught, how it should be taught, where and when it should be taught in order to develop competencies for environmental literacy in schools.

1.12.2 Subject Content Knowledge

Subject content knowledge means the knowledge of the subject with its organising structures (Gudmundsdottir & Shulman, 1989). It refers to teacher's knowledge of EE content and concepts and its interrelatedness with other subjects in the curriculum.

1.12.3 Pedagogical Content Knowledge

Pedagogical content knowledge is specialised knowledge which teachers possess in order to transform content knowledge into teachable form (Gudmundsdottir & Shulman, 1989). It refers to EE principles and approaches guiding EE teaching and learning, and enhancing learning opportunities to develop environmental literacy in school.

1.12.4 Environmental Literacy

Environmental literacy is a person's capacity to perceive and interpret the state of an environmental system and the appropriate actions that need to be taken in order to manage, restore and improve those systems (Roth, 1992). In the context of this study, environmental literacy is defined as the ability to put the acquired knowledge,

attitude and skills into actions aimed at improving practices and lifestyle necessary for conservation and sustainable use of resources.

1.12.5 Education for Sustainable Development

Is an education that encourage change in knowledge, values, and attitude and skills to encourage more sustainable and just society for all, with the aim to empower and equip current and future generations to meet their needs using a balanced and integrated economic, social and environmental dimensions of sustainable development (UNESCO, 2006).

1.12.6 Sustainable Behaviour

Sustainable behaviour can be defined as "a series of considered, effective and estimated activities intended at compliant accountability for preservation and protection of cultural and physical assets" (Hassan, Othman & Yaacob, 2018). In this study, it involves adopting lifestyle and practices for sustainable future.

1.12.7 Sustainable Development

Development, which meets the needs of the present without compromising the ability of future generations to meet their own needs (UNCED, 1992).

1.12.8 Self-Efficacy

Self-efficacy is defined as person's belief about their capabilities to produce designated levels of performance that exercise influence over events that affect their lives (Bandura, 1997). In the context of this study, self-efficacy is defined as teacher's belief in their capabilities to develop environmental literacy in schools, to improve lifestyle and practices that promote sustainable behaviour despite challenges they might encounter.

1.13   OUTLINE OF THE DISSERTATION CHAPTERS

The dissertation is comprised of five chapters, outlined as follows:

1.13.1 Chapter 1: Orientation of the study

This is an introductory chapter that provides the framework for the study. In this chapter, the researcher provides the background, problem statement, significance and aim of the study, research questions and objectives. It further provides for the definition of concepts and outlines chapters for this study.

1.13.2 Chapter 2: Literature review

This chapter provides a review of the literature and the theoretical framework that guided the study. The chapter starts by providing a brief background to the study and an introduction to EE in formal education, reviewed literature on environmental literacy and its development in schools internationally, regionally and nationally. The chapter further covers the reviewed literature on the principles of education for sustainable development and how they guide the promotion for sustainable behaviour in schools. Lastly, the chapter highlights the importance of self-efficacy in developing environmental literacy in schools.

1.13.3 Chapter 3: Research design and methods

This chapter provides a description and discussion of methodological approaches and design used in the study. The chapter further deals with the methods used for data generation and highlights the ethical issues taken into consideration during the study.

1.13.4 Chapter 4: Data presentation, analysis and interpretation

This chapter provide a presentation and interpretation of the data generated from observations, interviews and data analysis.

1.13.5 Chapter 5: Summary of findings, conclusions, and recommendations

This chapter provides a summary of the findings of this study, aligned with the research question. The chapter further provides the theoretical and practical contributions made by the study and gives recommendations related to the findings and for further studies on gaps identified by the study.

1.16 CONCLUSION

In this chapter, I provided a brief background of the introduction of EE in formal education, globally, with its objective of developing environmental literate citizenry. I highlighted challenges the world faces in effectively developing environmental literacy

in schools. The rationale, purpose of the study, the problem statement and significance of the study, which guided the research main question, sub-questions, aim and objectives of the study, were discussed. The chapter also outlined the methodology employed in the study, as well as the study's limitations and delimitations. Ethical considerations and the theory underpinning the study were introduced and the concepts guiding the study were clarified to locate the guiding concepts within the context of the study. Lastly, the dissertation chapters were outlined.

CHAPTER 2

LITERATURE REVIEW

2.1   INTRODUCTION

The reviewed literature guiding the study, focusing on the background of environmental education (EE) and environmental literacy of both teachers and learners in promoting sustainable behaviour, is presented in this chapter. Firstly, the historical background and the introduction of EE, and the international influences of EE's integration into formal education are reviewed, followed by a review of EE guidelines for the professional development of teachers in South Africa.

In this chapter I also reviewed literature on the components of environmental literacy, namely, knowledge, attitude and skills required for effectively developing the environmental literacy of both teachers and learners, internationally, regionally (Africa) and locally (South Africa). I further reviewed literature with regard to the principles of Educations for Sustainable development and how they guide the promotion of sustainable behaviour in schools. Lastly, the Self-Efficacy Theory, which is the theoretical framework guiding the study, was reviewed.

2.2   LINK BETWEEN ENVIRONMENTAL EDUCATION AND ENVIRONMENTAL LITERACY

As outlined in the previous chapter, the main aim of the study was to explore the environmental literacy components of knowledge, attitude and skills in effectively developing environmental literacy among teachers and learners in rural primary schools. The study further explored how teachers' and learners' competencies in environmental literacy influences their lifestyle and practices towards sustainable behaviour. One cannot talk about environmental literacy without bringing EE into context. Environmental literacy is rooted in EE and is regarded as an objective of EE (Roth, 1992:16).

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EE provides teaching and learning programmes, processes and pathways that guide what is to be taught, how it should be taught, where and when it should be taught so as to develop the competencies required for learners to become environmentally literate. In order to develop environmental literacy, implementation of EE programmeS must be effective and the implementation progress should be evaluated using appropriate tools (Athman & Monroe 2001:37; King & Frazen 2017:3).

I deemed It necessary to provide the historical background regarding the introduction of EE and its significance to environmental literacy. The link between EE and environmental literacy forms the focal point of this study, as the study examined how EE content is taught and learned in schools in order to develop environmental literacy. According to (Hollweg et al., 2011:1) the current conceptualisation of EE and environmental literacy has its roots in the educational movements of the late 19th and 20th centuries which were related to nature conservation and outdoor education. Furthermore, the goal of EE to achieve a sustainable society and to produce an environmentally literate citizenry shows the link between EE and environmental literacy (UNESCO, 1977:24; Hollweg et al., 2011:1).

2.3 HISTORICAL BACKGROUND OF ENVIRONMENTAL EDUCATION

EE developed out of concern for environmental degradation, mainly as a result of human behaviour globally, back in the previous century (UNESCO, 1977:11; Kaya & Elster, 2019:2; Dhull & Verma, 2017:1547). EE was brought in as an educational intervention to protect and conserve the natural environment by transforming human practices through behavioural change (Hungerford, Volk & Ramsey, 1992:18). EE was further identified as education that will provide for appropriate knowledge, attitude and skills competencies necessary for desired behavioural change in both formal and non-formal education (UNESCO, 1977:11)

The need for, and importance of, incorporating EE into both formal and non-formal education was developed as a result of an international call, promoted through national and international summits, conferences and treaties from the 20th and 21st centuries. The following section provide for some of the international conferences, treaties and programmes which contributed to the evolution of the EE concept and its link to environmental literacy and sustainability.

In the 20th century some of the conferences include International Working Meeting on EE in the School Curriculum held in USA IN 1970, United Nations Conference on the Human Environment held in Stockholm in 1972; The International Workshop on EE held in Belgrade, which produced the Belgrade Charter in 1975; The first Intergovernmental Conference on EE held in Tbilisi Georgia in 1977; World Conservation Strategy that stressed the importance of conservation through sustainable development held in 1980; The Educational Congress on EE and Training held in Moscow in 1987. Also in 1987 the World Conservation Strategy expanded the publication "Our Common Future"; In 1991, "Caring for the Earth", a strategy for sustainable living was published by ICUN in partnership with UNEP and WWF; the United Nations Conference of Environment and Development held in Rio-de-Janeiro, Brazil, which produced Rio Declaration in 1992; The Global Forum on EE, Education on Sustainable Development, New Delhi, India.

In the 21st century some of the conferences include, World Summit on Sustainable Development WSSD 2002; The fourth International Conference of EE held in India in 2007; World Conference on Education for Sustainable Development in Nagoya, Japan in 2014; Millennium Summit which developed Millennium Development Goals in 2000 with a deadline for 2015; Decade for sustainable development 2005-2014 and 2030 Agenda for Sustainable Development Goals held in 2015.

2.4 DEFINITION OF THE CONCEPT ENVIRONMENTAL EDUCATION

The above mentioned conferences treaties and programmes indicate how EE continue to evolve, and has contributed towards defining and providing different frameworks of the concept EE and continue to nature the development of environmental literacy, conservation and sustainable use of resources (Roth, 1992:21; Hollweg et al., 2011:2). These different frameworks to define the concept EE is further supported by statement made by Chacko (2000:21) that "there is no single adequate definition of EE" and EE is a contested field as it continuously evolves. UNESCO provided for what might be described as "the classic" definition of EE that this study adopts as:

> "the process of recognising values and clarifying concepts in order to develop skills and attitudes necessary to understand and appreciate the inter-relatedness among man, his culture, and his biophysical surroundings EE also

entails practice in decision-making and self-formulation of a code of behaviour about issues concerning environmental quality'' (UNESCO, 1970:11).

This study draws on the above definition and is also guided by the definition of EE adopted by Belgrade Charter (1975) and the Tbilisi Declaration (1977). The Belgrade Charter provides a working definition of EE as follows:

"an integral part of the education process, aimed at practical problems of an interdisciplinary character, that build a sense of value, and contributes to public wellbeing. Its focus should be mainly on the initiative of the learners and their involvement in actions and guided by both the immediate and future subjects of concern" (UNESCO, 1975:4)

The Charter further provides a definition of an environmental literate person as someone

"who is environmentally competent in the cognitive, affective domain and psychomotor domains, and is characterised by value systems in which one acts consistently in a manner compatible with the balance between quality of life and quality of the environment (UNESCO, 1975:4)

The Tbilisi Declaration provides a definition of EE as follows:

"as a process aimed at developing a world's population that is aware of and concerned about the total environment and its associated problems, and has attitude, motivation and knowledge commitment and skills to work individually and collectively towards solution of current problems and the future ones" (UNESCO, 1977:26).

The Tbilisi Declaration further made explicit the goals and objectives of EE, as outlined below:

- 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. (UNESCO, 1977:26).

The objectives include the following:

- Awareness: to help individuals and social groups acquire an awareness of and sensitivity to the total environment and its allied problems;
- Knowledge: to help individuals and social groups acquire basic understanding of the total environment, its associated problems and humanity's critically responsible presence and role in it;
- Attitude: To help individuals and social groups acquire social values, strong feelings of concern for the environment and the motivation for actively participating in its protection and improvement;
- Skills: to help individuals and social groups acquire the skills for solving environmental problems. Evaluation ability: to help individuals and social groups evaluate environmental measures and education programmes in terms of ecological, political, economic social, aesthetic and education factors;
- Participation: To help individuals and social groups develop a sense of responsibility and urgency regarding environmental problems to ensure appropriate action to solve those problems (UNESCO, 1977:27).

The main research question posed in this study is guided by the above definitions of EE, goals and objectives set out in the Tbilisi Declaration, by exploring components of environmental literacy in fostering sustainable behaviour. I also included the principle of sustainability by exploring the extent to which the acquired environmental literacy competencies foster continued, lifelong and enduring sustainable behavioural lifestyles. Therefore, the study also draws from the principle of sustainable development, which is defined as:

> "Development which meets the needs of the present without compromising the ability of future generations to meet their own needs" (UNESCO, 1987:24).

For the purpose of this study, I drew from the above definitions of EE, guided by the purpose of the study and provided a definition of EE as:

> "a holistic process of developing key competencies, including the knowledge, attitude and skills necessary to promote lifestyles and practices towards lifelong behavioural changes".

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The following section deals with the historical background of EE in a South African context in order to present an overview of the progress of EE in the country to date, towards developing environmental literacy in schools.

2.5 ENVIRONMENTAL EDUCATION IN SOUTH AFRICA

It is believed that EE first reached South Africa in the 1970s, prompted by the Stockholm (1972); Belgrade Charter (1975) and the Tbilisi Declaration (1977) (Irwin 1990:2). The Environmental Education Association of Southern Africa (EEASA) was established in South Africa in 1982, by group of environmentalists and environmental educators, as a multi-disciplinary approach concerned with the promotion of quality education processes which would led to changes of attitude and behaviour towards the environment (Irwin 1990:3)

In 1992 a growing commitment to EE led to the development of the Environmental Education Policy Initiative (EEPI). The EEPI was started as an inclusive process of gathering and developing EE policies for formal education in South Africa (Clacherty, 1993:3). The significant outcome for this process was the inclusion of EE in a White Paper on Education and Training (1995), as one of the key principles for education and training policy in South Africa (Janse van Rensburg & Lotz-Sisitka, 1998: 9).

South Africa developed institutional policies and legal frameworks that are in line with the international guidelines and declarations on EE. These policies and frameworks are guided by Section 24 of the Constitution of the Republic of South Africa (Act 108 of 1996), that provides for the introduction, integration and implementation of EE in formal and non-formal education. One of the underlying and key principles for education and training in formal education is found in the White Paper on Education and Training (1995), that had broader implications for the restructuring of education and training system and school curricular reorganisation (Le Grange, 2002:84). The principle advocates for:

> "EE, that is interdisciplinary, integrated and active approach to learning, must be a vital element of all levels and programmesmes of education and training system, in order to create environmentally literate and active citizens, and ensure that all South Africans, present and future, enjoy a descent quality of life

through the sustainable use of resources" (Department of Environmental Affairs and Tourism [DEAT] 1997:4).

The principle further played a key role in restructuring and transforming the South African school curricular system since 1994, in order to deal with political and economic redress (Mudaly & Ismail, 2016:67). Curriculum 2005 (C2005) was introduced in 2005 underpinned by outcome-based education approach. The C2005 curriculum was revised to National Curriculum Statement (NCS) and later to the Revised National Curriculum Statement (RNCS) (Mudaly & Ismail, 2016:67). The curriculum statements were repealed due to implementation challenges, including highly complex language used in curriculum statements, lack of teacher training and poor in-service training of teachers, as well as the ability of teachers to use existing support materials (Ismail & Mudaly, 2016:68).

The current curriculum statement, known as the Curriculum Assessment Policy Statement (CAPS) was introduced in 2012 and upholds the principle of a healthy environment, human rights, social justice and inclusivity (Department of Basic Education [DBE], 2011:5). The CAPS is underpinned by the performance model and focuses on enhancing the three aspects of teaching and learning that addresses what content knowledge is taught, how to teach and assess the content knowledge (Fundisa for Change, 2013:2; Ismail & Mudaly, 2016:68).

The CAPS guides this study's research sub-questions, which explore the EE content knowledge taught and learned in rural primary schools and the pedagogical approach adopted to teach the content in order to develop environmental literacy. This study analysed the EE content coverage and pedagogical approaches adopted for the effective development of environmental literacy in schools. It is also important to provide the background of EE in higher education in order to explore how teachers are trained to support an integrated EE curriculum effective for development of environmental literacy in schools.

2.6 BACKGROUND OF ENVIRONMENTAL EDUCATION IN HIGHER EDUCATION

Restructuring and transforming school curricula for the development for environmental literacy requires that the teachers themselves be environmentally literate to effectively provide guidance to students in order to engage in opportunities that develop their environmental literacy (Kidman & Casinader, 2018:2). Therefore, school curricula, and teachers that teach EE content for sustainability and environmental literacy, are fundamental to teaching and learning in schools (Songqwaru, 2012:20).

This implies that the restructuring of the curriculum to include new content and approaches should also inform the restructuring of teacher pre-service courses in tertiary education so that teacher training is in line with the curriculum in order to meet the integrated system that education demands. The importance of the training of educators for effective implementation for EE is highlighted in the Tbilisi Declaration, which posits that environmental specialists and teachers involved in EE teaching and decision making should be provided with the training necessary to develop knowledge and skills (UNESCO, 1977:245).

In response to Tbilisi Declaration on restructuring of teacher training institutions, UNEP's Environmental and Education Training Unit, in partnership with the African Association of Universities, as well as other partners, including SADC, supports the mainstreaming of environment and sustainability in Africa's universities. The Environmental and Education Training Unit aims to support the quality of training and policy relevance of universities and other institutions of higher learning in Africa, by making environment and sustainability a key topic across curricula, research and community engagement activities in universities (Mainstreaming Environment and Sustainability in Africa [MESA], 2008:10).

Since 1990 there have been various conferences and declarations on EE and Education for Sustainable Development (ESD) in higher education in support of the mainstreaming of the environment and sustainability in African universities initiative which among others includes: Talloires Declaration (1990); Halifax Declaration (1991);

Koyoto Declaration (1993); CRE Copernius Charter (1994); Thessaloniki Declaration (1997); Luneberg Declaration (2001); Global Higher Education for Sustainability Partnership (2002); Mainstreaming Environment and Sustainability in Africa (MESA 2004); UN Decade for Sustainable Development (2005); Ahmedabad Declaration (2007).

Despite the initiatives, declarations, and conferences on the introduction of EE and ESD in higher education, higher institution of learning still experienced challenges in incorporating EE in their programmes. UNEP conducted a study on MESA universities' partnership during the period 2004-2014. The baseline findings of the report were among others that in most African universities environment is still mainly taught as a separate course, or as a fringe aspect of a limited number of disciplines such as ecology, hydrology, climatology or geography with the main emphasis being on science. Few teacher education faculties, law faculties, engineering faculties and humanities have integrated environment and sustainability issues. Only around 5% of the universities had a special institutional framework involved to address the interdisciplinary nature of environment and sustainability issues (MESA, 2008:20)

South Africa is one of the 70 MESA university partners and supports the mainstreaming of environment and sustainability in South African universities so as to improve the implementation of EE in higher education. EE was initially pioneered at the tertiary level in South Africa by the then University of Bophuthatswana (now part of North West University) in the early 1980s, for both undergraduate and postgraduate qualifications. EE was also pioneered in five colleges of education where a three-year teacher education course in EE was offered (Irwin, 1990:5). However, EE in these institutions was only theoretically taught.

Rhodes University currently offers the most comprehensive programmes, where EE forms an integral part of all teacher education, with interdisciplinary cooperation between academic departments. Rhodes University is still the hub of EE teaching and research in South Africa and established a Master's degree in EE in the 1990s. This university was one of the first MESA participants to transform its curriculum framework to take into account social transformation and integration of scholastic and community-based knowledge into the context of sustainability practice in Africa (MESA, 2008:43). The university also offers the Rhodes/Goldfields participatory introductory certificate

courses in EE for South African educators working in schools, as well as people involved in community development, conservation and people working as municipal managers. The university further offers an advanced certificate in EE, a full qualification for educators who already have a three-year teacher qualification and who want to specialise in EE (MESA, 2008:43).

Unfortunately, in the past, EE and EE related projects receives support and cooperation from only a few provincial departments and EE departments at universities in the country, for example, the University of Bophuthatswana (now part of North West University), Natal Education Department (now the KwaZulu-Natal Department of Education) and Rhodes University. No support or cooperation was given by other provinces or other education institutions. There was resistance to EE in most of the provincial education departments. Most provincial education departments either declined to embrace EE or avoided EE, while conservation agencies and the private sector, set their own internally controlled and often racially exclusive outdoor education programmes (Irwin, 1990:6).

The above discussion indicates that only few teachers from the above-mentioned institutions have been trained to teach EE in South African schools. The methods used for teacher were not action-oriented as EE training was offered as a theoretical subject. This has resulted in EE having a relatively slow start in South Africa, as in many countries in Africa, with limited recognition and public financial support. This statement is supported by some scholars who argue that, although EE has been introduced in schools, teachers still experience challenges in implementing the subject because most teachers are not qualified to teach EE. (Loubser, Swanepoel & Chacko, 2001; Fundisa for Change, 2011; Singleton, 2016)

This state of affairs led to South Africa to become one of the 70 MESA university partners in Africa, which supports the mainstreaming of environment and sustainability in order to improve EE delivery in higher education. South African universities, together with universities in 50 other African countries, have revised and reoriented their courses, at both undergraduate and postgraduate level, towards the achievement of environmental and sustainable development. This process is still in its infancy as more time is required to make substantive and systemic changes. New courses and

research programmes were also initiated to effect more systematic change. (MESA, 2008:22).

In South African, the Department of Higher Education (DHET) provided a policy framework to regulate and monitor the teacher education qualification programmes offered by all higher institutions (Department of Higher Education [DHET], 2015:9). According to the framework EE, as an area of specialisation, should be introduced at the postgraduate level (DHET, 2015:44). Because universities have autonomy in deciding what is to be taught, the MESA baseline report provided some universities with information on the inclusion of EE into the curriculum. The University of Cape Town (UCT) has restructured its environmental law curriculum by reforming the LLB and LLM curricula to include principles of environmental law, natural resource law, pollution and land use planning law (MESA, 2008:40).

The University of South Africa (UNISA) also restructured its curriculum by offering EE as a module in both its undergraduate and postgraduate qualifications, including the establishment of Bachelor level courses in environmental management, environmental science, conservation, agricultural science and technologies. The institution also integrated themes of environment and sustainability into some of it qualifications, including environmental economics, environmental law and environmental health (UNISA, 2018)

The following section introduces the concept of environmental literacy and discusses its components in promoting environmental literacy and sustainable behaviour.

2.7   THE CONCEPT ENVIRONMENTAL LITERACY AND ITS COMPONENTS

The focus of this study is on environmental literacy and its components in the promotion of sustainable behaviour among both teachers and learners. It is important to provide a background to, and the origin of, the concept of environmental literacy and how it is linked to EE and sustainability. It is further important to explore the type of knowledge, the attitude and skills necessary to develop the sort of environmental literacy which will influence the behaviour of teachers and learners towards the natural environment. Absence or existence of environmental literacy can be best reflected by observable behaviour (Roth, 1992:14).

The first reference to the concept "environmental literacy" appeared in an article by Charles E Roth in 1968, as a response to media references to environmental illiterates who were polluting the environment (Roth, 1968:7). After the inception of its use, the term was used in speeches, refined as a key goal statements for EE and crept into the vocabulary of environmental educators (Roth, 1992:7).

According to Roth, the use of the term literacy in an environmental context was questioned, since the term had been associated with anything to do with reading, writing and knowledge in a particular field of study (Roth, 1968:7; McBride, Brewer, Berkowitz & Borrie 2013:1). The use of the concept of environmental literacy was clarified in a manner that suggested that literacy, in modern thinking, involves a particular way of thinking, acting, valuing and making meaning. In an environmental context, literacy involves being educated about the environment, resulting in a person being environmental literate. This notion guides Roth's definition of environmental literacy as:

> "the person's capacity to perceive and interpret the state of environmental system and the appropriate actions to manage, restore and improve those systems" (Roth, 1968:27)

Roth further declared environmental literacy as the primary goal of EE in order to foster productive and responsible citizens of this planet and our society" (Roth, 1992:7).

The concept environmental literacy continued to evolve and be defined by different scholars, who developed frameworks which defines its objectives, including Harvey (1977), who was the first to realise that environmental literacy developed over time; Simmons (1995) added ecological knowledge and knowledge of environmental issues to her framework which aligns to Roth's believe that environmental literacy builds on the ecological paradigm. Hungerford and Volk (1990) also developed a framework which defines knowledge, attitude, skills and behaviour as organised into the entry, ownership and empowerment levels. Similarly, Roth (1992) developed a framework of environmental literacy continuum of competencies that included three levels of environmental literacy, namely, the nominal, functional and operational levels to determine degree of proficiency in environmental literacy components. Roth further highlighted the importance of behaviour, and echoed that the presence of environmental literacy must be defined in terms of observable behaviour. Hollweg et

al. (2011) developed environmental assessment framework to provide consistency in assessing.

The focus of this study is on the progress and competencies of teachers and learners in developing environmental literacy. The study looks at how the knowledge, attitude and skills acquired promotes lifestyle changes and practices towards lifelong behavioural modification or change. Therefore, the study adopted Roth's definition of environmental literacy, and define environmental literacy as the ability to put the acquired knowledge, attitude and skills into actions aimed at improving practices and lifestyle necessary for conservation and sustainable use of resources.

The study draws from the psychological and social dimension of learning by exploring competencies in knowledge, attitude and skills that lead to motivating decisions aimed at behavioural change within the social learning context. The study adopted the framework of Hollweg et al. (2011) to present the process of developing environmental literacy and to determine the degree in which teachers and learners have acquired competencies for becoming environmentally literate. This framework outlines the type of knowledge, affective components, competencies and behaviour required by an individual or a group in an enabling social, personal and physical environment to develop environmental literacy, and support a more sustainable approach to resource use.

According to the framework, environmental literacy consists of knowledge and understanding of wide range of environmental concepts, problems and issues, a set of cognitive and affective dispositions, a set of cognitive skills and abilities and the appropriate behavioural strategies to apply such knowledge and understanding in order to make sound and effective decision in a range of environmental context. (Hollweg et al., 2011). In the context of this study, guided by Theory of Self Efficacy, environmental literacy components knowledge, attitude, skills and enabling environments, plays a fundamental role of building capacity to develop environmental literacy however, one needs to have the required competencies to be environmentally literate and still have the Self-Efficacy belief to successfully perform sustainable practices which are core competencies for sustainable behaviour (Leicht, Heiss & Byun, 2018:43). Therefore, Self-Efficacy plays a central role of actualising environmental literate competencies to take actions towards behavioural change.

The framework further highlights the importance of responsible environmental behaviour and view environmental literacy competencies as a means to an end to responsible environmental behaviour. However, this study holds the belief that environmental literate competencies should promote lifestyle and practices that promote sustainable behaviour believed to address the three pillars of sustainability necessary to strengthen holistic behavioural change needed to promote environmental literacy (Grossman 2012:9). The study therefore adopted the sustainability practices including energy conservation, waste reduction, water conservation, sustainable school grounds, sustainable transportation and sustainable purchasing from Pathway to Sustainability from the Green Point Echo School Projects (2019), to guide observation, and to examine conduct and practices that promote sustainable behaviour in schools.

Knowledge

- Knowledge and understanding of ecological systems and processes
- EE concepts and content
- Social, cultural. Environmental and political systems

Attitude

- Sensitivity
- Care and concern
- Perception
- Personal responsibility
- Confidence
- Motivation

Skills

- Identify environmental issues
- Ask relevant questions about environmental issues
- Analyse environmental issues
- Investigate environmental issues
- Evaluate and make personal judgement about environmental issues
- Create and evaluate plans at various scales to solve environmental problems
- Take actions to solve environmental problems

Personal, social and physical

Self-efficacy

Sustainable practices

- Energy conservation
- Waste reduction
- Water conservation
- Sustainable school grounds
- Sustainable transportation
- Sustainable purchasing

FIGURE 2.1 Environmental Literacy Framework, Sources (Hollweg et al., 2011; Pathway to Sustainability; Green Point Echo School Projects 2019), own modified

The environmental literacy components are drawn from the goals and objectives of the Tbilisi Declaration, as outlined previously, which played a key role in guiding the goals and objectives of EE. These goals and objectives are set out as qualities to define an environmentally literate person. According to Roth, guided by the Tbilisi Declaration, an environmentally literate person has:

- An awareness and sensitivity to the environment;
- A variety of experiences and a basic understanding of environmentally associated problems;
- Acquired set of values and feelings of concern for the environment, and the motivation in actively participating in environmental improvement and protection.
- Acquired skills for identifying and solving environmental problems;
- Opportunities to be actively involved at all levels in working towards resolution of environmental problems (Roth, 1968:15).

From the definitions of environmental literacy provided, I provide for the quality of an environmentally literate person

> "as an individual who is competent across all components of environmental literacy, who has belief and is motivated to instigate change towards a more sustainable behavioural lifestyle".

According to Roth (1992:23), an environmentally literate person with the above-mentioned qualities should be able to demonstrate some observable behaviours of what they have learned. An individual's environmental competencies, ranging from inability to sophisticated competencies of understanding, skills and actions, are determined by stages of accomplishment of three levels of environmental literacy, including the following:

Nominal level of environmental literacy

Nominal level of environmental literacy is at the lower end of the environmental literacy scale, and requires a person to have a rudimentary knowledge of natural systems and how humans interact with these systems. It further requires a person to develop

environmental awareness and sensitivity, with an increased respect for nature and a concern for how human interact with nature (Roth, 1992:26).

Functional level of environmental literacy

The functional environmental literate level is the middle level and requires a broader knowledge and an increasingly broader understanding of human environmental interactions. This level of literacy also requires more awareness and concern about negative human interactions, more developed skills to analyse, evaluate and communicate feelings about environmental problems, and more willingness to take actions to solve those problems (Roth, 1992:26).

Operational environmental literacy

An operationally environmentally literate person has moved beyond functional literacy, in both the breadth and depth of understanding and skills required to evaluate the impact and consequences of actions. This individual demonstrates a strong and ongoing sense of investment in, and responsibility for, preventing and remediating, and routinely take actions that work to sustain and enhance a healthy environment (Roth, 1992:26). Roth further provides for the stages of development and description levels that the EL components progresses through in developing environmental literate competencies, including:

- Awareness: Perception around particular environmental issues, which could be emotional cognitive or both.
- Concern: Perception of real or potential negative consequences of a set of human or nature interactions, and a feeling that some changes need to occur.
- Understanding: Acquisition of thinking and decision making skills and their use in processing acquired information.
- Action: Application of understanding to individual or corporate behavioural changes perceived as responsible way that reduces or eliminate negative consequences (Roth, 1992:25-27).

Environmental literacy is a continuum of competencies of understanding, skills and action, ranging from zero to sophisticated literacy. A person becomes environmentally literate when all components come together in order to take an action (Roth, 1992:25-27). This study employed the above levels of environmental literacy and stages in

order to explore whether the environmental literacy of participants develops and improves over time, towards the desired behavioural change.

2.8 KNOWLEDGE TOWARDS ENVIRONMENTAL LITERACY

Knowledge competency is regarded as a fundamental component in developing the environmental literacy of both teachers and learners (Hollweg et al., 2011:1; Fundisa for Change, 2013:13). Knowledge competency also forms one of the Tbilisi Declaration goals and objectives required in order to provide individuals and communities with knowledge and a total understanding of the environment and its associated problems (UNESCO, 1977:27).

According to Shulman (2002:6) knowledge is an issue of social justice, as it empowers people to engage in, and make, informed decisions when taking responsible actions. Therefore, the acquisition of appropriate and specialised knowledge should be the aim of every education initiative, including EE. Students need both appropriate and specialised knowledge in order to acquire knowledge competencies.

The focus of the study is on the teachers and learner's knowledge competencies and understanding of EE content and the transferring of acquired knowledge into actions, underlying effective teaching and learning towards environmental literacy. The importance of knowledge of an intention to act is highlighted in the work of Hines, Hungerford and Tomera, who developed a model of responsible environmental behaviour. According to the model, knowledge is a prerequisite to take action towards dealing with environmental problems (Hines, Hungerford & Tomera, 1987). A person should possess knowledge of the existence of environmental issues, should possess knowledge of courses of action that can be taken and should possess knowledge on how solve those problems (Hines et al., 1987).

EE content is integrated across all subjects in the CAPS curriculum. This study explores participants' EE knowledge and their understanding of its interconnected nature to other subjects. It further focuses on how this knowledge that is taught and learned, and how the knowledge is presented so as to effectively develop environmental literacy in schools. The knowledge domain is guided by Shulman (2002), who states that the knowledge qualified teacher have is drawn from seven domains, namely, content knowledge, general pedagogical knowledge, curriculum knowledge, pedagogical content knowledge, knowledge of learners, knowledge of

educational contexts and knowledge of educational ends. The DHET (2011:12), further stipulates the knowledge competencies teachers should to acquire, including disciplinary, pedagogical, practical, fundamental and situational knowledge.

Teachers are expected to possess knowledge and understanding of the subject content, obtained from both pre- and in-service training, in order for them to become expert in the subjects that they are teaching to effectively improve the quality of teaching and learning in schools. Similarly, UNESCO (1977:34) further posit that the quality of teaching and learning can be improved through systematically building a knowledge foundation by teachers through pre- and in-service training. However, several studies cited in the literature have exposed an inadequate or lack of teacher's knowledge as a barrier to developing environmental literacy in schools globally (Goldman & Pe'er, 2009; Hollweg et al., 2011; Ever 2012).

These barriers are attributed to teachers' lack of background discipline knowledge and lack of conceptual knowledge as a result of poor grasp of content knowledge, as well as the fact that teachers are unable to integrate and link content across curricula as a result of lack of curricular content knowledge (Fundisa for Change, 2013: 15; Songqwaru 2012: 18). This study draws from the above-mentioned domains of knowledge and focuses on exploring subject content knowledge and pedagogical knowledge, which are essential in the teaching and learning process in schools (Fundisa for Change, 2013:2; Richardson, Byrne & Liang, 2017:4).

Competencies in EE content knowledge should foster a positive attitude towards sustainable practices and lifestyles, as well as motivate and build confidence to take action in solving those problems. The following section discusses attitude towards the development of environmental literacy.

2.9 ATTITUDE TOWARDS ENVIRONMENTAL LITERACY

One of the Tbilisi Declaration objectives is to help individuals and social groups acquire social values, strong feelings of concern for the environment and the motivation for actively participating in the protection and improvement of the environment. This study explored how the acquired knowledge influences teacher's and learner's positive attitude towards the natural environment.

According to Pe'er, Goldman and Yavetz (2007:47), attitude is both a psychological and social factor which involves a set of emotions, beliefs and behaviour towards a particular person, thing or event. Attitude is as a result of experiences and has a powerful influence on behaviour. In an EE context, attitude is defined as

> "general feelings towards ecology and the environment, feeling of concern about environmental issues, and feelings towards acting to remedy those environmental problems" (Pe'er et al., 2007:47).

Although knowledge is fundamental to the development of environmental literacy, transforming the knowledge into intention to act is key to the development environmental literacy and promotes behavioural change (Hines et al., 1987). Other scholars have also weighed in on the intention to act towards responsible environmental behaviour, including Azjen, who developed the Theory of Planned Behaviour (TPB). According to the TPB, influences and motivational factors determine a person's decision to follow or adopt a particular behaviour. However, attitude underlies the whole process of intention to take action. Attitude is regarded as a salient behavioural belief and involves a person's behavioural evaluation, which determines the decision on whether to engage in that behaviour or not (Azjen, 1991). Azjen, further brought in access to the necessary resources and opportunities required to perform a particular behaviour successfully as a determinant to developing attitude towards taking action.

Hollweg et al. (2011) also provided for the dispositions that are important determinants of behaviour related to environmental literacy. These dispositions include attitude of care and concern, personal responsibilities, self-efficacy and intentions. These dispositions promote perceived values that influence the willingness of an individual to recognise, choose and motivate participation in environmental-related matters.

I was guided by the above components of attitude to explore how acquired knowledge persuades the positive attitude required to develop environmental literacy by exploring teacher's and learners' perceptions of care and concern towards the natural environment, taking responsibility and accounting for identified environmental problems. I further explored the participants' intentions to act on identified problems, as well as explore how the actions were motivated and encouraged. The study was undertaken in a rural context, where access to the resources required to persuade a

positive attitude might be a challenge. I explored support in terms of availability of, and access to, the resources required in persuading attitudes towards conservation and the sustainable use of natural resources.

The above discussion highlights the importance of appropriate knowledge that could arouse a feeling of concern for the environment, care and responsibility, as well as motivation, both intrinsic and extrinsic, in taking actions towards solving environmental problems. The intention to act towards solving environmental problems requires the appropriate development of the set of skills required in order to act towards achieving the desired goal. The following section discusses a set of skills appropriate in developing environmental literacy.

2.10   SKILLS TOWARDS ENVIRONMENTAL LITERACY

Acquiring a set of appropriate skills is one of the Tbilisi Declaration's objectives to help social groups and individuals to solve environmental problems (UNESCO, 1977:27). This study explores teachers' and learners ' acquired skills and their competencies in applying those skills in order to take actions to solve environmental problems. The ability for learners to acquire appropriate skills depends on their teachers' knowledge of the subject content matter and their teachers' pedagogical knowledge relevant to environmental literacy (Yeen-Ju, Mai, Kian, Jing, Wen & Haw 2014:411; Kidman & Casinader, 2018:1).

When people develop the ability to apply the acquired skills in a particular field, the ability to take such action is regarded as action competency (Kimaryo, 2011:50; Hedefalk, Almqvist & Lidar, 2014:2). The concept of action competency involves knowledge about different action possibilities, skills to discuss and investigate the different action possibilities and confidence to act (Jansen & Schnack, 1997:166; Hedefalk, Almqvist & Lidar, 2014:2). Levels of action competency refers to practical competency which involves knowing how to perform a particular task; foundational competency, which involves being able to demonstrate what you are doing; and reflective competency, which involves where learners can reflect on their actions and to apply their practices in different situations (Jansen & Schnack, 1997:166).

The study draws from the above-mentioned components of action competency and explores what skills are taught and learned in schools, how those skills are taught and

learned and how are the skills put into practice. The study explored teachers' and learner's ability to identify environmental problems, to evaluate and analyse those environmental problems and to provide solutions to the problems in order to improve their wellbeing and the wellbeing of the environment. The ability of persons to portray such skills and competencies is regarded as having characteristic of being environmentally literate (Hollweg et al., 2011:3).

This study further explored pedagogical approaches and practices in teaching EE content in order to develop such skills for environmental literacy. EE content is integrated across all subjects in the CAPS curriculum. It therefore requires expertise and specialised methods and approaches for its effective teaching and learning. Teaching and learning approaches to an integrated EE content curriculum, should focus on three aspects of the environment including education about environment, education for the environment and education through the environment. These three important aspects emphasises the importance of experience for the environment, concern for the environment and action taking as crucial in teaching and learning EE content (Palmer, 1998:244).

Action competency requires teaching and learning approaches that are active, participatory and learner centred. The traditional teacher centred approach to EE content has been criticised for leading to the acquisition of knowledge only, which does not provide active learning and different learning opportunities to learners (Serin, 2018:164). The learner centred approach provides for a teaching and learning setting in which learners play an active role to construct their skills and understanding of activities, content and material (Serin, 2018:165).

Action competency requires pedagogical approaches and methods that are inquiry- and project-based, involve outdoor and fieldwork experiences and provide for interactive, experiential, transformative and real-world learning that encourages critical thinking, reasoning and problem-solving opportunities (Juntunen, 2015:4; Serin, 2018:165; Kidman & Casiander, 2018:9).

It is evident that the above discussed environmental literacy components do not develop in isolation. However, they are interrelated and develop progressively in a literacy continuum through continuous learning to develop environmental literacy. Persons are either not environmentally literate or illiterate; their competencies are

placed within the environmental literacy continuum and develop over time towards the desired objective (Roth, 1992:27; Hollweg et al., 2011:4). The following section discusses how the above components promote conducts and practices towards sustainable behaviour.

2.11 ENVIRONMENTAL LITERACY COMPONENTS IN PROMOTING SUSTAINABLE BEHAVIOUR

One of the Tbilisi Declaration goals is to create new patterns of behaviour in individuals, groups and society as a whole, towards the environment. Environmental literacy is key in promoting an individual's behavioural change towards a more sustainable lifestyle (Ever, 2012:15). An environmentally literate person possesses competencies to analyse environmental issues, which would enable individuals to behave pro-environmentally (Wong, Afandi, Ramachandran & Chan, 2018:128)

This section explores how the three components of environmental literacy knowledge, attitude and skills promote sustainable practices and lifestyle that eventually changes the behaviour of individuals towards conservation and sustainable use of resources. The study draws on the concept of sustainable development and explores how environmental literacy competencies modify and change teachers' and learners' lifestyles and practices towards behavioural change. The principle of EE has always included the fundamental elements of sustainable development, with its objective to provide solutions to current and future environmental problems (Sauvé, 1996:8). The concept sustainable development was introduced by the World Commission of Environment and Development (WCED) in 1987 and has been made popular since the Rio Declaration of 1992. The concept is defined the as:

> "Development which meets the needs of the present without compromising the ability of future generations to meet their own needs" (UNICED, 1992).

The concept was further developed in 2002. The UN declared 2005-2014 a Decade for Education for Sustainable Development (DESD), with the aim of integrating the values inherent in sustainable development into all forms of learning. This is done in order to encourage a change in behaviour that allows for a more sustainable and just society for all (UNESCO, 2005a). In 2015, the UN further adopted 17 Sustainable Development Goals (SDGs) that replaced Millennium Development Goals and which

form the cornerstone of Agenda 2030 "Transforming our World", with the basic vision of the "World where everyone has the opportunity to benefit from education and learn the values and cultures that contributes to sustainable development, behaviour and lifestyle required for a sustainable future, and for positive societal transformation" (UNESCO, 2015-16:3).

I drew on the SDG vision of values, behaviour and lifestyle to explore teachers' and learners' continued and lifelong lifestyles and practices. Several theories and models were developed on pro-environmental and responsible environmental behaviour that guides several bodies of research. These theories include, but not limited to, the behavioural change model, the theory of responsible environmentally behaviour, the responsible actioned theory, the theory of planned behaviour and the environmental citizenship model.

Kollmus and Agyeman (2002:240) developed the pro environmental behaviour model and define it as behaviour that consciously seeks to minimise the negative impact of one's action on the natural and built environment. It involves those actions that are directly related to environmental improvement. This theory was adopted by several scholars, including Raselimo (2007), protecting and improving the environment; Chwala & Cushing (2007), conservation and eco management behaviour; (Erdoğan, Kostova & Marcinkowski 2009); behaviour to benefit the environment the most and Almarshad (2017), logical base of understanding behaviour.

According to Jensen and Schnack (2006:325), the concept "pro environmental behaviour" appears to be too narrow. Jensen et al., (2006), advocates for an "action competency" approach towards solving environmental problems. They emphasises the importance of activity-based teaching which is action oriented and argues that it is the action that should be directed towards change, which will lead to a change in one's lifestyle but not necessarily to behavioural change. Blake (1999), further points out that limitations exist within most PEB models, as they do not consider personal, social, and organisational barriers, while assuming that people are rational and systematically use their knowledge.

I agree with Jensen that pro environmental behaviour appears to be narrow since it focuses only on actions that are directly related to environmental improvement. The concept does not address, or bring balance to, the social, economic and environmental

complexities that the world is facing today (UNESCO, 2018:14). I, however, I align with the notion of the need for behavioural change through supporting, adopting and implementing practices of sustainability that involves social, economic and moral responsibility (Almashad, 2017:90).

I hold the belief that the ability to take action is informed by decisions through the acquisition of an appropriate set of knowledge dispositions and an appropriate set of skills. Furthermore, one's confidence, motivation and enabling environments supporting the action, which will influence lifestyle changing that will reflect their new behaviour. The study does not only look at behaviours that are pro towards the environment but it also looks at the holistic behaviour that address the three pillars of sustainability, that calls for a just society and for economic viability and environmental integrity (UNESCO, 2015-16:15).

These pillars are derived from the need for economic development, with its social and economic objectives, to take conservation into account by considering resource limitations and ecosystem carrying capacity (Purvis, Mao & Robinson, 2018:5). Understanding the interconnectedness of these three pillars is one of the goals of sustainable development and must be equally addressed in order to achieve more sustainable outcomes globally, individually and collectively, towards sustainable behaviour change (Geiger & Grossman, 2018:4).

What might be regarded as sustainable behaviour today, might be regarded as unsustainable behaviour in the future Therefore, sustainability should be actionable, practical, future oriented, lifelong, enduring and consumption lifestyle changing for sustainable future (Almashad, 2017:90). The study further explores factors, both internal and external, that promote or impede such behaviour change in a rural school context. The study employed the Self-Efficacy theory that provides a framework for the exploration of intrinsic factors that motivate or discourage participants' intentions to adopt practices and lifestyles towards sustainable behavioural change.

The environmental literacy competent means that persons or communities should adopt lifestyles and practices that promote sustainable behaviour. I adopted the Pathway to Sustainability from the Green Point Echo School Projects (2019), to observe and examine conduct and practices that promote sustainable behaviour in

schools. The guide provided for a framework to determine the following practices that are currently considered sustainable:

- Energy conservation;
- Waste reduction;
- Water conservation;
- Sustainable school grounds;
- Sustainable transportation;
- Sustainable Purchasing.

The above discussion guided me in my exploration of environmental literacy components and how they promote sustainable behaviour. This brought about an insight into what constitutes an environmentally literate person, lifestyles and practices towards desired sustainable lifestyle. The following section provides a discussion of literature from global, regional and local perspectives so as to explore the successes of, and challenges facing, developing a school's environmental literacy programmes for sustainable behaviour, globally.

2.12 ENVIRONMENTAL LITERACY TOWARDS SUSTAINABLE BEHAVIOUR:

2.12.1 Global Perspective

This study was informed by several bodies of literature on environmental literacy and behavioural change in schools internationally, regionally and locally. I have sampled literature from Australia, Malaysia, Iran, Turkey and Bulgaria, based on its relevancy to the environmental literacy of teachers and learners and behavioural change. The reviewed literature assisted me to gain an idea of the successes and challenges faced in these countries in effectively developing environmental literacy programmes towards sustainable behaviour globally. The literature reviewed further assisted me in identifying gaps in the literature so as to ensure that the study contributes towards the identified gaps, Lastly, the literature reviewed allowed me to align the findings from literature with the findings obtained from this study.

Internationally, Cutter and Smith (2001), gauged the environmental literacy of primary school teachers, with the purpose to present a detailed discussion and analysis of their knowledge and beliefs about environmental concepts and education. Their findings

revealed that primary school teachers are variably committed and lack content knowledge of environmental concepts and EE. Teachers seem to dismiss the importance of content knowledge and rather focus on attitudes towards EE, resulting in an inadequate level of environmental literacy in schools that does not realise the goal of developing environmental literate citizenry.

Erdoğan, Kostova and Marcinkoski (2009) analysed components of environmental literacy in the elementary science education curriculum in Turkey and Bulgaria. The study's objective was to analyse the extent to which science education objectives in elementary schools addresses the six basic components of environmental literacy. The findings revealed that not all environmental literacy components are considered in both countries. Components relating to knowledge are highly considered, while action and behaviour are ignored and are not integrated into the curriculum. This situation resulted in low levels of responsible behaviour towards the environment. The study recommended that consideration be given to an investigation of other factors, including the state of environmental literacy as a possession of schoolchildren at the end of each grade; the diversification of learning environments and the efficacy of their use; and, teacher professional competencies to involve students in successful professional learning.

Wong et al. (2018) conducted a study on conceptualising environmental literacy and factors affecting pro-environmental behaviour among primary school learners in Malaysia. Their findings reveal a gap between what is taught and what is practiced in schools. Their study further revealed that the holistic approach to EE is superficial, although EE content is infused in the textbooks, both in primary and secondary schools. The study further criticised environmental literacy frameworks as valueless in their ability to guide environmental literacy-related assessment plans. The study recommended that EE programmes be assessed systematically and regularly in order to take into account all factors that encompass environmental literacy, as well as factors that lead to the achievement of the desired goal, that of pro-environmental behaviour.

Kidman and Casiander (2019) also explored the environmental literacy of teachers through inquiry-based practices in Australia. The focus of their study was on the influence of the environmental literacy of teachers in developing the environmental

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literacy of learners. They used the Australian Science Curriculum as a base from which students could develop their environmental literacy. Their findings revealed that the curriculum was inadequate, did not include content descriptors relating to all sustainability organising ideas and that the notion of critically inquiry-based practices and progressive pedagogies were not explicit.

The study recommended the use of progressive pedagogies that may address some of inadequacies of Australian curriculum.

2.12.2 Regional perspective: Africa

A study by Simel (2012), undertaken regionally, compared environmental literacy between eco-schools and ordinary schools in Kenya, with the objective of determining any difference in in terms of learner's knowledge, awareness and environmentally responsible behaviour. The findings revealed that eco-schools still organise activities that do not change people's attitudes and behaviour and, therefore, these schools fail to promote critical thinking and action competency. The study recommended an approach in EE that move from simple accumulation of knowledge to taking actions.

Kira and Kafanabo (2016), conducted a study to determine the knowledge level of the certificate of secondary education geography teachers when teaching the concepts of meteorology, environmental education and climate change in Mogororo Tanzania. The findings of the study revealed that although teachers could demonstrate ability to present the causes, extent and effects of pollution and wastes including most of the concepts of the elements of weather and the use of power, there was a disparity between the intended curriculum and the implemented one because of the observed teachers' misconceptions, inability to link various environmental concepts or to contextualize examples and questions they ask. The study recommended a well planned environmental education for both pre-service and in-service teachers specifically synchronized with the secondary school curriculum.

Atuguba (2016) also assessed the environmental literacy of pre-service teachers in a college of education in Ghana, with the objective of assessing the teachers' preparedness to teach EE at the basic levels. The findings of this study reveal that teachers lack sufficient environmental knowledge to qualify them to be environmentally literate.

Velempini (2017) conducted a study entitled "Infusion or Confusion: A Meta- analysis of EE in the 21st Century Curriculum of Botswana. The purpose of the study was to examine the success of the integration of EE into secondary schools of Botswana in order to achieve effective environmental literacy. The findings study revealed that, although EE was integrated in social studies and science subjects, its implementation was in the state of confusion due to ineffective professional development of teachers and neglect of professional authorities. Velempini's study found that teachers rarely included EE into their teaching because students were not tested on it. The study recommended that teacher's value towards EE, subject's flexibility, integration and child centred learning should be enhanced as strategies for halting for confusion of its infusion in the curriculum.

Gbadamosi (2018) conducted a study entitled "Fostering Environmental Literacy amongst Primary School Pupils: Implications for Teacher's Education in Nigeria". The purpose of the study was to investigate the improvement of the environmental literacy (knowledge and practices) of primary pupils taught through service learning and educational trips. The findings revealed that there is a need for teacher development on the use of service learning and educational trips in promoting environmental literacy in social science. The study recommended the total reorientation of teachers on the use of participatory community based strategies in teaching and learning environmental issues and problems in social studies.

2.12.3 Local perspective: South Africa

Loubser, Swanepoel and Chacko (2001), in their study, highlighted the importance of teachers' environmental literacy in South Africa. They developed an instrument to measure the environmental literacy of teachers in order to determine whether teachers themselves demonstrate the level of environmental literacy required to develop the environmental literacy of learners. The findings revealed that teacher training institutions do not make a significant difference in the environmental literacy of teachers, in general. The study recommended the need for the development of pre- and in-service on EE for teachers in order to develop their environmental literacy.

Paden (2008), conducted a study entitled "Education for Sustainable Development: Knowledge and Environment in South African Schools", with the purpose of exploring disciplinary knowledge, as foundational in teacher education and schooling, in order

to develop an environmentally literate and responsible citizenry. The findings of Paden's study revealed diminishing disciplinary knowledge, which is given the same weight as everyday knowledge. The study recommended a re-recognition of disciplinary knowledge in both the natural and the social sciences as a foundation for the meaningful engagement with environmental issues.

Similar findings in South Africa were revealed by a study undertaken by Hebe (2009), who evaluated the environmental literacy of currently serving teachers in the towns of Mokwassie and Wolmaransstad in South Africa. The findings revealed that the environmental literacy of educators varies from educator to educator and is influenced by various factors. The study recommended meaningful ongoing educator training and support and more research in the area of educator environmental literacy, as well as investigations into classroom practices so as to determine the level of implementation of EE.

It is evident from the above literature that the development of environmental literacy is still a major challenge globally despite EE being introduced and integrated in formal education more than five decades ago. Literature highlight the inappropriate approaches to teaching environmental literacy components, where the knowledge component is emphasised, while less focus is given to attitudes and skills. The literature also reveals a lack of support for teacher training, development and curricular content as underlying barriers to developing environmental literacy. The literature further highlights the need for more research to explore in depth the challenges schools are facing in the development of environmental literacy globally. Therefore, this study identified the following gaps that this study intends to fill:

Firstly, the above literature focusses on the development of the environmental literacy of either teachers or learners with less focus in rural areas. Moreover, the focus of the literature leans more towards predicting, evaluating, measuring and assessing environmental literacy in schools. This leaves a gap for explorative studies on environmental literacy in schools which will provide in-depth detail of account on challenges schools are facing in developing environmental literacy of both teachers and learners, with the focus in rural areas. Secondly, the focus of the studies is on some of environmental literacy components in promoting responsible environmental behaviour, which focus on behaviour towards the natural environment. This also left a

gap in literature to explore the development of sustainable behaviour in schools which focus on the three pillars of sustainability (environment, society and economy) necessary to strengthen holistic behavioural change needed to promote environmental literacy (Grossman 2012:9).

2.13 THEORETICAL FRAMEWORK GUIDING THE STUDY

The theoretical framework is the lens through which a study is framed, and the foundation from which all knowledge is constructed. The theoretical framework serves as a structure and support for the rationale for the study, the problem statement, the purpose, significance, and research question. It provides a ground base for literature review and more importantly, the methods of data collection and the analysis of data obtained from the study. (Grant & Osanloo, 2014:12).

The study aimed to explore environmental literacy components with the aim of promoting sustainable behaviour. By exploring the educational and behavioural aspects, the study is underpinned by both the social and the psychological dimensions of learning. Social and psychological theories are often regarded as rival conceptions of human behaviour. Therefore, a full understanding of behavioural change requires an integrated system of socio-cultural and psychological mechanisms to instil behavioural effects (Sneddon, Hudson & Parker, 2005:4)

The study employed the lens of the Self-Efficacy Theory that originates out of the Social Cognitive Theory by Bandura (1997). The Social Cognitive Theory holds the belief that people can learn through observing others, be motivated to obtain information, skills, beliefs and strategies through an interrelationship between a person, the environment and behaviour (Dermici & Ozyurek, 2017:117). This study was conducted in a school context, where EE learning takes place through interaction between teachers, learners and communities. Therefore, teacher's learners and communities should observe, motivate and learn from each other.

The Self-Efficacy Theory is a key element in Bandura's (1997) Social Cognitive Theory. Bandura (1977), defines the Self-Efficacy as people's beliefs about their capabilities to produce designated level of performance that exercise influence over events that affects their lives. The Self-Efficacy Theory deals with individual's attainment of courses of action, performance and endurances during the particular process or engagement. The theory also holds a belief that one's capability to organise

and execute the courses of actions required in producing a given attainment relies on an individual's belief in that action. One's belief in a particular action affects the selection of activities, the individual's efforts, the level of persistence, the endurances and the level of achievement. The Self-Efficacy theory further holds the conviction that a given desired behaviour will lead to the expected outcome (Bandura 1977).

The Self-Efficacy Theory was found to be relevant to guide this study as it forms a link between environmental literacy and encourage behavioural change. An environmentally literate person has the confidence, and is motivated, to take actions towards solving environmental problems, which will be reflected in their behavioural change. People with a strong sense of self-efficacy approaches perceive difficult tasks as challenges to be mastered, rather than a threat to be avoided. Self-efficacious persons develop a perceived response efficacy, which grants them the belief that the desired behaviour will be successful in addressing an event that affects their lives, and that, they will be able to address obstacles that prevent them from engaging in the desired behaviour (Almashard, 2017:93).

In the context of this study, environmentally literate educators and learners will be aware of the impacts they have on the natural environment. They will have a belief that taking action and adopting sustainable practices and lifestyles will address those problems, despite the challenges they might encounter. I have adopted the following model diagram to present process of developing Self-Efficacy towards behavioural change:
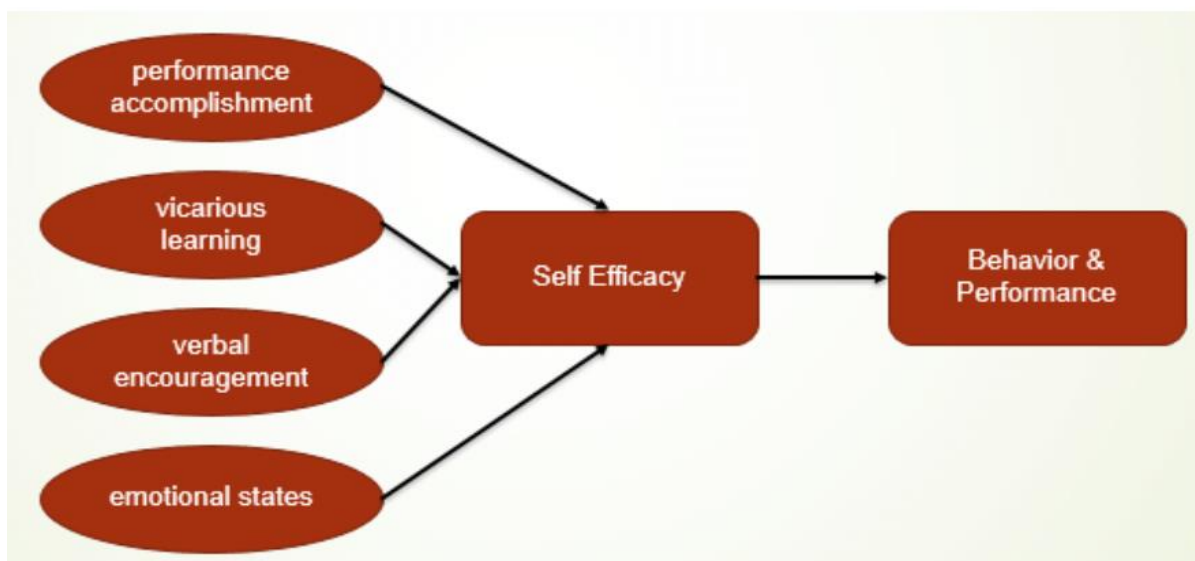
FIGURE 2.2 Process of developing Self-Efficacy, Source: (Bandura 1997)

According to the above model, Self-Efficacy is developed from four main sources of influence, including mastery experience, which has been found to exert a strong hold on self-efficacy belief. These processes form one's experiences in a specific area or field, one's skills and one's practical procedures on how to apply the skills (Kastadinova, 2013:27). Behavioural change is a complex process and people need to have a strong sense of capability and competency towards such change. Individuals need expertise and experience in information that helps them learn a behaviour and to choose and practice behavioural actions in a non-threatening environment. Sustainable behaviour is likely to flourish where there are fewer barriers (Almashard, 2017:9).

Vicarious experience provides a social model of Self-Efficacy, which involves seeing people similar to one self-succeed, raising the belief that one has the capabilities required to master the activities. EE learning for the development of environmental literacy and behavioural change requires collaborative efforts, teamwork and support to overcome the challenges faced during the process.

Social persuasion, in the form of verbal encouragement or incentives, will encourage people to try harder to succeed and to be motivated to perform a desired behaviour. Sustainable behaviour can be encouraged and motivated through support and incentives to engage in sustainable practices. One's belief in self-efficacy contributes to the motivation process and desire for behavioural change (Kastadinova, 2013:28). If teachers are not well equipped with the knowledge, expertise and experience required to teach EE content, they are unlikely to develop confidence and be motivated to teach the content required to develop the environmental literacy of learners and the learners will, therefore, not have the desire to engage in sustainable practices (Dermici & Teksöz, 2017:117).

2.14 CONCLUSION

This chapter discussed the literature that provided framework guiding the study. The chapter reviewed the background to, and introduction of, EE into the formal education sector, including schools and higher institutions of learning. The literature dealing with the concept of environmental literacy and its components was also reviewed, with specific reference to how environmental literacy and its components contribute to the development of sustainable behaviour globally. The reviewed literature indicated that

EE is not achieving its purported goal of developing environmental literacy for behavioural change. The literature revealed different findings, however, the overarching findings are the lack of training and development of teachers to effectively teach EE content towards the development of environmental literacy. The study further discussed the Self-Efficacy theory guiding the study. The theory provided for the importance of teacher's expertise, confidence and motivation towards their belief in developing the expected environmental literacy in schools.

CHAPTER 3

RESEARCH DESIGN AND METHODS

3.1   INTRODUCTION

This chapter outlines the plan developed for generating and analysing data. In this chapter, I present the procedures of inquiry, including research approach, research paradigm and design, as well as the methods used for collecting the data necessary to answer research main question. The chapter further discussed the population sampling and the profiles of both participating groups and sites. Lastly the chapter deals with how the issues of ethics were considered when generating and analysing data, before ending with a summary for the chapter. The following section discusses the plan and procedures for data collection and analysis.

3.2   RESEARCH APPROACH

The research approach for the purpose of this study, is guided by Creswell (2014), which means plans and procedures for research, and includes qualitative, quantitative and a mixed method approach. These approaches are distinctive in nature. Their differences are based on the type of problem they help to solve, which guides methods employed for the collection, analysis and interpretation of the data (Creswell, 2014:32). The approaches are further guided by the main research question and sub questions guiding the study.

Due to the explorative nature of my study, I employed a qualitative inquiry approach. The literature defines qualitative research as an approach that provides an in-depth insight into information and an understanding of the meaning of an individual or a group with respect to a particular social or human problem. This approach is guided by explorative questions and procedures, data collected in the participants' natural setting and data analysed inductively, building from particular to general themes, as well as making interpretations of the meaning of data (Creswell, 2014:32; Denzin & Lincoln, 2011:6).

I was further guided by the following characteristics of the qualitative approach that deemed the qualitative method appropriate for this study:

- It is humanistic in nature, it focuses on the personal, subjective and experiential basis of knowledge and practice;

- It is a holistic approach: by seeking to situate the meaning of a particular behaviour and the way of doing things in a given context;

- It is an interpretative approach: by making sense of what I see and hear in a specific context;

- It is a flexible approach: by being explicit on how the personal history and biography shape the questions asked, the framing of the research and the presentation of data;

- It is naturalistic in nature: by studying things, people and events in a natural, none experimental setting (Kielmann, Cataldo & Seeley, 2012:10; Soiferman, 2010:7; Creswell, 2014:233).

The above description and characteristics of qualitative approach align with the purpose of this study, and the research question that requires in-depth information and understanding on the progress of developing environmental literacy, and the effectiveness of the environmental literacy components in promoting sustainable lifestyle and practices in rural schools. McMillan and Schumacher (2003:43) further stipulate that a researcher using a qualitative approach should attempt to give a detailed description of the situation, events, people, interactions, observed behaviour and the views of people about their experiences, attitudes, beliefs and thoughts. The methodology allowed me to explore, through the use of multiple methods, environmental literacy components of knowledge, attitude and skills, and to observe participants' practices and lifestyles that promote sustainable behaviour in participating schools.

The methodology also allowed me to be involved in data generation, to be onsite and interact fully with participants in their own natural setting. The methodology further allowed me to directly have participant's experiences, perception and their interpretation on teaching and learning EE content in their own context. The approach also afforded me an opportunity to directly observe participants' conduct and practices against sustainable indicators (Merriam, 1998:17). I further explored CAPS and the school's EE policy. By analysing these documents, I was able to explored how the integrated EE content and pedagogical approaches in the curriculum, as well as sustainable practices in environmental policy, are guided.

Multiple methods for generating data were also employed as one of the advantages of a qualitative method, including observations, documents analysis, face to face interviews and focus group interviews. The use of multiple data collection methods allowed for the generation of data from different sources, which is important for the credibility of the study. The multiple methods approach further made provision for triangulation of the data in order to ascertain the validity of inferences obtained from multiple data sources (Hadi & Closs, 2015:7). Although a qualitative approach allows for flexibility and takes the researcher's subjectivity into account, researchers also need to consider some limitations which the qualitative method might pose, including:

- Its biasness in the design, observations and analysis of the study;
- Sources or subjects may not be equally credible and may affect the outcome of the study;
- The study group does not represent the larger population;
- The population studied could be altered by the presence of the researcher (Merriam, 1998:68).

In order to eliminate the above limitations, the use of multiple data collection methods and case study design provided for variety of data to provide rich, in-depth data and enabled credibility and validity of the study.

3.3   RESEARCH PARADIGM

A paradigm, which is also known as worldview, is a way of describing a worldview that is informed by philosophical assumptions about the nature of social reality (ontology), a way of knowing (epistemology), ethics and value systems (axiology), and methodology (Rehman & Alharthi 2016:2). Paradigms are the beliefs that guide actions and are classified according to four philosophically distinct categories in order to address different research approaches. These categories are positivist, interpretivist, postmodernism and transformative (Guba, Lynham & Lincoln, 2011:97; Creswell, 2014:35; Lather, 1986:259). The exploratory nature of the study and the research design aligned with the interpretivist paradigm.

The interpretivist research paradigm is described as a paradigm in which knowledge is generated through direct interaction with information-rich participants and an interpretation of their experiences as presented by them in their own setting (McMillan

& Schumacher, 2010:6). Interpretivists believe that reality consists of people's subjective experience of the world they live in, and access to reality is through social constructs, such as language, consciousness, experience and shared meaning that people assign to them (Thanh & Thanh, 2015:25).

The interpretivist paradigm allowed me to directly interact with participants who had relevant experience and rich information on environmental-related matters in their respective schools. The paradigm is underpinned by techniques that allowed for observations of events, and shared meaning, through interviews designed to collect rich information about the phenomenon of the study, and to interpret this data so as to make meaning of that information by drawing inferences or by judging the match between the information and some abstract pattern (McMillan & Schumacher, 2010:6). I used multiple methods, which allowed personal interaction with participants to mine rich and embedded information on their environmental knowledge and understanding, as well as their attitudes and skills.

The ontological stance of the interpretivists is relativism, with the view that reality is subjective and differs from person to person, is individually constructed from persons with rich meaning of the phenomenon under study (Scotland, 2012:11). I individually constructed knowledge and meaning using language and the participants with different views and perceptions about teaching EE content for the development of environmental literacy. The epistemological assumption is that knowledge, meaning and reality are subjectively constructed and interpreted between me and participants, and is shaped by an individual's experiences (Scotland, 2012:11). This construction took place through my interaction with the knowledge embedded and experienced by participants using methods that build in-depth information on the environmental literacy components and I interpreted its meaning based on this context.

Using a number of data collection methods, including observations and interviews that allowed me direct interactions with teachers and learners, helped me to explore the environmental literacy of the participants by listening to, making meaning of and interpreting the teachers' knowledge, understanding, perceptions and attitudes towards EE.

Guba and Lincoln (2005:204), holds the belief that the interpretative paradigm involves interpreting and understanding human actions. This notion further helped me to

interpret and understand the participants' actions, which reflected their behaviour towards sustainable lifestyle and practices.

3.4 RESEARCH DESIGN

Research design implies the exploring and investigating strategies used in an inquiry. Research designs include the ethnography, case study, grounded theory and phenomenology designs (Creswell, 2014:32). The explorative nature and qualitative approach of this study allowed me to employ the case study design. A case study is an empirically bounded inquiry launched to explore, using multiple source of evidence, any phenomenon in the data which is of interest in the real life context, with the aim of further investigating the in-depth phenomenon in question (Stake, 1995:3; Merriam 1998:32; Yin, 2009:18).

A case study is the best approach as it offers a means of investigating complex social units in order to bring understanding to the phenomenon of interest. Case studies take place in the real-life situations, therefore, they provide a rich and holistic account of the phenomenon under study (Merriam, 1998:32).

Yin (2009:18) categorised case studies as explanatory, exploratory or descriptive. I employed an explorative case study design, guided by the research question and the purpose of the study (Baxter & Jack, 2008:546). The design choice is further motivated by the fact that an exploratory case study is conducted in a real-life context, and sets out to produce an in-depth account through the multiple data collection methods employed in a naturalistic setting. Employing a case study, therefore allowed me to conduct the study in the participants' natural setting (the school), to interact with the participants in order to get an in-depth understanding and interpretation of their experiences, and to obtain perceptions of the teaching of EE content and integrated pedagogical approaches.

Explorative case studies are also distinguished based on their intent of analysis, which includes the single instrumental case study, the collective or multiple case study and the intrinsic case study approaches (Yin, 2009:18). According to Yin (2009:18) and Creswell (2014:42) a case can also be single bounded, where the researcher focusses on an issue or concern and selects one bounded case to present that issue or multiple case studies with literal or theoretical replication can be employed. The multiple case study approach can further be used to present several programmes from several

research sites or multiple programmes from within a single site. This will allow for exploration of similarities and differences between cases (Yin, 2009:53). In a multiple case study with literal replications, cases are selected to present the same issue or concern for investigation so as to obtain similar results. With theoretical replications, the cases are selected to explore in order to confirm or disapprove the patterns identified in the initial cases.

I employed multiple case studies with literal replication (in three schools) to present an issue or concern (environmental literacy of both teachers and learners). I found the use of a multiple case study approach suitable for this inquiry in order to obtain richer details on the cases and a holistic perspective of the development of environmental literacy in the selected cases (Yin, 2009:53). The multiple case study approach further allowed for exploration of differences and similarities between cases, in order to make a comparison of the findings and to undertake data triangulation to enhance the credibility of the findings (Baxter & Jack, 2008:548; Yin, 2009:53). Moreover, the evidence obtained from the multiple case study approach is considered more compelling and the overall study is, therefore, regarded more robust (Merriam, 1998).

Although case studies are a distinctive approach in exploring a phenomenon of interest, they also have their limitations (Yin, 2009:14). A concern about the case study approach is that it lacks rigor. This is due the fact that case studies are considered unscientific and researchers have not been systematic in their data collection or have allowed bias to creep into their findings. Case studies provide information through different techniques and in a narrative form. This could result in case studies being lengthy and resources, such as time and money, could be a contextual factor.

The case study approach is also prone to unusual problems regarding ethics (Guba & Lincoln, 1981:378). An unethical case writer could report selectively on anything they wish to illustrate, which could result in the biasness of the researcher. Another limitation of the case study approach is a lack of generalisability. According to Neal, Thapa and Boyce (2006:4), it is difficult to generalise from one case to another and they count this as a limitation of the method.

I considered the above identified limitations by including ethics guiding the use of multiple case study design, as discussed later in this chapter, in order to minimise the limitations of the approach. Contrary to Neal, Thapa and Boyce (2006), argument

regarding the case study approach's lack of generalisability, the aim of this study was not to make generalisations of the findings to the entire population. The aim of this study was to obtain an in-depth insight into the development of the environmental literacy of both teachers and learners in participating schools.

3.4   RESEARCH METHODS

The research approach, design and paradigm allowed me to employ a multiple methods approach to collecting data from multiple sources, including observations, document analysis, face to face interview and focus group interviews. I found the use of these methods appropriate to collect the in-depth and rich data necessary to answer the research questions. The use of multiple methods also strengthened the credibility of the study, allowed for data triangulation for better understanding, and promoted the consistency of data during analysis. (McMillan & Schumacher, 2010:6; Guba & Lincoln, 2011:97; Creswell, 2014: 342).

3.5   POPULATION AND SAMPLING

Population and sampling involve the identification of a population and a selection of participants and sites from the population for the study. Population and sampling include four aspects, namely, the setting (where the research will take place); the actors (who will be observed or interviewed); the events (what participants will be observed or interviewed doing) and the process (the evolving nature of the events undertaken by participants within the setting) (Creswell, 2014:342). In this section, the setting of the research, as well as the criteria for identifying and selecting the population are discussed, including the process used to select the cases.

3.5.1 Population

A population is a complete set of elements (persons or objects) that possess some common characteristics defined by the sampling criteria established by the researcher. (McMillan & Schumacher, 2010:325). The population for this study included rural public primary schools in Moutse, in the Sekhukhune District of Limpopo in South Africa. I identified Moutse as my study area based on my experience of challenges in effectively implementing EE in one of the schools in the area. The area consists of three education circuits, Moutse East, Moutse Central and Moutse West. The Moutse

East circuit has 19 primary schools, 19 principals, 266 educators and 8000 learners. The Moutse West circuit has 17 schools, 17 principals, 139 educators and 6870 learners. The Moutse Central circuit has 21 primary schools, 21 principals, 280 educators and 8500 learners. The total population for the purposes of this study is 24169 including principals, teachers and learners.

3.5.2 Sampling

Sampling involves the act, process or technique of selecting a suitable sample, or a representative part of a population for the purposes of determining parameters or characteristics of the whole population, in order to draw conclusions about the population from the sample (Gentles, Charles, Ploeg & McKibbon, 2015:1778). Sampling is further defined as the selection of information-rich cases for an in-depth study. Informants are sampled based on their personal experience and their knowledge of the topic under study (McMillian & Schumacher, 2010:325).

The study was conducted in the Sekhukhune District of Moutse, in Limpopo South Africa. Moutse is in the rural area of Dennilton and is comprised of three education circuits, including Moutse East, Mouse Central and Moutse West. The three primary schools, one in each circuit, were conveniently sampled. Convenience sampling is when members of the targeted population which meet certain criteria, including easy accessibility, geographical proximity, availability at a given time or willingness to participate, are included for the purpose of the study (Etikan, Musa & Alkassim, 2016:2).

Cases were sampled based on their geographical proximity to each other that gave me an easy access and efficiency in terms of time and travelling costs. Since the aim of the study was to explore the environmental literacy components of both teachers and learners in public and rural primary schools, the cases were appropriate to realise the aim of the study by providing rich and relevant data that helped answer the research question. The assumption associated with convenience sampling is that the population under study is homogenous as possess similar attributes or characteristics (Omona 2013:179). Convenience sampling further allowed me to sample homogenous cases that are public primary schools from grade R - 7 in the rural areas and are all quintile one category. Homogeneity of cases further provided for the credibility of the study.

3.5.3 Profile of the sampled schools

Three public primary schools were sampled, one each in Moutse East, Central and West, situated in rural area of the Sekhukhune District. The selection of number of cases was guided by Creswell (2014) who recommends that a qualitative researcher should at least examine three to five cases in a case study in order to achieve data saturation. I felt that three cases would be sufficient to generate the rich and in-depth saturated data necessary to answer the research question. The sampling of three cases further guided me to use the parallel case sampling design so as to compare the findings from each case against the findings from the others (Omona, 2013:176). Sampling of schools was further guided by their close proximity, since each school was between 6 to 8 kilometres away from the other. Pseudonyms referencing schools Case 1, Case 2 and Case 3 were used to protect the identity of schools in order to ensure the anonymity and confidentiality of generated data (Gentles et al., 2015:1779). Below are the profiles of each of the selected cases:

Case 1

School A is a quintile 1 category school situated in Moutse Central. It caters for grades R - 7 learners with an enrolment of 502 learners, 14 educators, 1 principal, 1 deputy principal, and 1 head of department for each of the foundation, intermediate and senior phases. The language of teaching and learning is English, while the surrounding communities are predominantly Sepedi and IsiNdebele speaking. The school has two classes for foundation phase and one class from grades 4 to 7. Eight educators rotate between both the intermediate and the senior phases.

Case 2

School B is also a quintile 1 school, which is situated in Moutse West. It caters for grades R - 7 learners with an enrolment of 480 learners, 11 educators, 1 principal and 1 head of department in foundation phase, intermediate phase and senior phase. The language of teaching and learning is English. The surrounding community is predominantly Sepedi speaking. The school has one class for each grade and 5 senior phase teachers who rotate in both the intermediate and senior phases.

Case 3

School C is also a quintile 1 school which is situated in Moutse East. It also caters for grades R - 7 learners with an enrolment of 520 learners, 1 principal, 1 deputy principal, 2 heads of department for Foundation, Intermediate and Senior phases. The language of teaching and learning is English and the surrounding community is predominately IsiZulu/IsiNdebele and Sepedi speaking. The school has 9 educators who rotate in both the intermediate and senior phases.

Participants sampling

Participants of the study include grade 7 educators and learners sampled purposefully. Yin (2011:311); McMillian & Schumacher (2014:350), define purposeful sampling (also called judgemental sampling) as the selection of participants or sources of data to be used in the study based on their anticipated richness and relevance of information in relation to the studies' research question. Palinkas, Green, Wisdom and Hoagwood (2013:3), highlighted the fact that purposeful sampling is used in qualitative research in order to obtain insights into the practices of participants who exist within a specific location, context and time.

My choice of purposeful sampling is in line with the aim of the study, which is to explore the effectiveness of environmental literary components in developing the environmental literacy of both teachers and learners, while the participants were perceived to hold the rich and relevant information necessary to answer the research question. Furthermore, the sampling approach allowed me to obtain insights into the practice of the participants through the analysis of different methods employed by the participants towards sustainable practises and lifestyles that promote conservation and sustainable use of resources in a rural context.

Only educators eligible to teach the natural science, social science and technology subjects were sampled. Although EE integrates across all subjects in the CAPS curriculum, the subjects mentioned were further found to have an embedded coverage of EE content, as demonstrated in environmental content in the curriculum document of Department of Environmental Affairs (DEA 2010) and CAPS curriculum (DBE 2011). Moreover, the subjects identified are science related. According to Burchett (2015:10), science is recognised as having an impact on the social, economic, political and

technological aspects of a nation, as well as on human welfare. As a result, EE studies and science education are intertwined.

Karimzadegan and Meiboudi (2012:406) further categorised the objectives of science into four distinct fields, namely, hygienic science, biological science, physical science and geographical and technological sciences. In this study, natural science includes hygienic, biological and physical sciences, while social science includes geographical science and technology includes the technological aspects of science. Therefore, educators teaching these subjects should have a more in-depth knowledge of EE in order to be able to answer the research question. The three subjects were allocated to educators in schools in such a way that school A was allocated natural science, school B was allocated technology and school C was allocated social science. I was fortunate that educator teaching natural science in school A was the Principal, while in school B the educator teaching technology was the Head of Department and in school C the educator teaching social science was a post level 1 teacher. This gave me varied in-depth information on effectively teaching and supporting EE content for environmental literacy from both a managerial and an educator's point of view.

Teacher qualifications, experience and expertise, availability of resources and support plays an important role in providing quality education to learners. Therefore, the sampled teachers were perceived to be qualified to teach EE content and had the required experience and expertise in their subject to effectively integrate and teach EE content for development of environmental literacy, using appropriate methods and assessments.

Grade 7 learners, who are regarded as middle school learners Hungerford, Volk and Ramsey (1994:13), were also purposefully sampled. Hungerford et al. (1994:13) provides for characteristics of middle school level learners that guided the decision about sampling approach. These characteristics include the fact that middle school level represents the transition between the childhood and early adolescence stages, and the intellectual characteristics of the learners are represented by the progression from concrete to operational thinking. Learners at this level are egocentric, as they gain the realisation that personal history affects a person's behaviours and that future depends on the choices made in the present. Learners at this stage of development

develop the capacity to examine the logic and consistency of their beliefs, which guides their behaviour (Hungerford et al.1994:13).

Learners with these characteristics are perceived to have an in-depth knowledge and understanding of the EE related content and beliefs that guides lifestyles and practices towards conservation and sustainable use of resources. Their level of thinking should allow them to analyse and investigate environmental problems and suggest solutions to these problems. Therefore, learners at this stage of development are envisaged to have acquired the required knowledge and understanding of EE content since they have been in the school system for a period of six years, and they have learned about EE themes since Grade R. Therefore, data obtained from learner participants would help to answer the research questions.

TABLE 3.1 Participants Profile**,** Source : *Researcher*

School pseudonyms	Educator's pseudonyms	Lerner's pseudonyms	Educator's subjects	Educator's qualifications	Educator's Designation
School A	E 1: Mr Rebone	C1, L 1-6	Natural Science, English	Teacher's Diploma, BA Honours	Principal
School B	E 2: Mr Morwathebe	C2,L1-6	Technology, EMS	Teacher's Diploma, BA in Mathematics	Head of Department
School C	E 3: Ms Mathebe	C3,L1-6	Social Science and Technology	Teacher's Diploma, BA Honours in Social Science Advanced Certificate in EE.	PL 1 Educator

3.7 DATA COLLECTION METHODS

This section provides a discussion of methods used to collect data. Data collection in qualitative studies involves four basic types of data, namely, qualitative observations, qualitative interviews, qualitative documents and qualitative audio and visual material (Creswell, 2014:239; McMillian & Schumacher, 2010:326). I employed observations, document analysis, face to face interviews and focus group interviews, guided by the nature of the study and my belief that data collected using these methods would assist me to answer the research question. The use of these multiple sources of data further assisted in the triangulation of the data. The data collection process was categorised into four stages based on the methods.

3.7.1 Stage 1: Observations

I have used observations as the first phase of data collection in order to get first-hand experience of the population under study. Marshal and Rossman (1998:79) and Creswell (2014:239) defined observations as a systematic description of events, behaviour and artefacts in the social setting for the study. Observations further allowed me to describe the content using five senses, including watching, hearing, smelling, touching and tasting (Begum, 2015:89; Sapsford & Jubb, 2006:57). It is a useful technique in understanding what people do, their roles, actions and behaviour (Walshe, Ewing & Griffiths, 2012:1039).

This study intended to explore the components of environmental literacy and how they promote sustainable behaviour. Observations helped me to understand the roles and actions which schools play in promoting sustainable behaviour. Observations are participatory and non-participatory. In participatory observations, the researcher joins the group as a participating member to obtain first hand perspectives of the group (Ross, 2014:1). In non-participant observation, the researcher enters the social system to observe events, activities and interactions, with the aim of gaining a direct understanding of the phenomenon being studied in its natural context, without altering the conditions (Griffiths, 2012:65). My role in this study was that of a non-participant with the intent of observing the process without interfering with school's activities. Non-participant observation can further be overt or covert in approach. In the former, the participants are aware and understand the roles and the intentions of the observer,

while in the latter, the participants are unaware that they are being studied by the observer, either by using hidden cameras or by an observer pretending not to study the participants (Liu & Maitlis, 2010:2).

Although my role was non-participatory, it was overt in approach. People within area observed were aware of the processes and the intentions of the observation. Method of data recording was also disclosed to participants and permission was sought for recording and taking of pictures if necessary. Observations also helped me to observe the body language and gestures of the participants, which provided important information that cannot be given verbally (Liu & Maitlis, 2012:3). An observation schedule and tool were developed to guide the observation process as to what to observe and when to carry out the observations (Creswell, 2014:239).

The observation tool provided categories, activities and items to be observed, and provided for comments on the observations to be made. Both field and classroom observations were carried out. Field observation was helpful in identifying sustainability indicators and projects, such as school gardens, integrated waste management systems, water sources, such as tap water, borehole water and water harvesting, environmental and sustainability posters and signage and any other EE projects at the school. The tool further assisted me to observe the conduct of the participants towards the natural environment, such as littering, water wastage, burning of waste and the clearing of land.

In classroom observation, the type of bulbs used, posters on environmental and sustainability, waste disposal, EE teaching and learning materials in the classroom were observed. Teaching and learning approaches and set up of the lesson were also observed on whether EE themes are well integrated in the subjects observed. The type of lessons was also observed to determine the lesson type, and aims hoped to be achieved. Lastly types of assessments given to learners were also observed.

What is key to observations was the taking of detailed field and classroom notes to record what was observed. The observation schedule questions were guided by the research question and collaborated with other methods in order to validate the

participant's subjective responses during the interview. The observations were recorded on observation tool during the processes and were later organised according to themes.

3.7.2 Document Analysis.

Document analysis involves a non-interactive way of generating written data (McMillan & Schumacher 2010:420) It involves the study of written documents, either to understand their content or to explore their meaning for a particular purpose (Vos, Delport, Fouché & Strydom, 2011:94). The documents analysed could be public documents, including newspapers, minutes of meetings, agenda or reports; or they could be private documents, including emails, personal letters, journals, diaries; or they could be objects and symbols that hold particular social meaning and values (Creswell, 2014:240; McMillian & Schumacher, 2010:361). I employed document analysis in order to clarify issues that could not be clarified by both observations and interviews and also to confirm the findings obtained from both observations and interviews (Hebe, 20015:223).

Two documents, CAPS curriculum and the school's environmental policy, were analysed. The purpose of analysing the CAPS document was to explore the EE content covered and pedagogical framework that the curriculum provided. The school's environmental policy was analysed in order to obtain an insight into the guidelines and framework provided for implementing EE projects and programmes in schools. The school's policy document was also analysed to get a sense of the code of conduct prescribed with respect practices and behaviours regarding the sustainability and conservation of resources.

Unfortunately, all sampled schools had no environmental policy guiding environmental and sustainability practices. I therefore requested any policies that are EE, sustainability and conservation related such as water and electricity saving policies, transport policy, waste management policy, green policy etc.

In school A, a feeding scheme policy was provided, however, its contents were not in line with the information required to answer the research question. In school B, the Head of Department mentioned that they did not know of such policy. However, the Head of Department undertook to form a committee to oversee EE-related

programmes. The Principal of school C principal mentioned that the school is guided by a green policy, with school garden programmes, however, he did not have a copy of the policy in his possession. Therefore, only the CAPS curriculum documents for Natural Science, Social Science and Technology were analysed. A document analysis schedule and tools were developed in order to provide a framework for the analysis process and to record analysis findings.

3.7.3 Stage 3: Interviews

Interviews are used as a research strategy to gather information about the participants' experiences, views and beliefs concerning a specific research question or phenomenon of interest. Interviews are a conversation between an interviewer and a person or a group which are believed to have rich information on the phenomenon under study (Kvale, 1996; Denzin & Lincoln, 2000:645; Ryan, Coughlan & Cronin, 2009:309; Punch & Oancea, 2014). Interviews further involves the use of spoken words through series of predetermined questions, and can be used to collaborate information gathered through other methods (Ryan et al., 2009:309).

Interviews take a variety of forms and the most common approaches involve and individual, face to face verbal interchange, a face to face group interchange, mailed or self-administered questionnaires and telephone conversation (Ryan, Coughlan & Cronin, 2009:309). Given the explorative nature of the research questions, I employed a qualitative interview, which is good way of exploring people's perceptions, meanings, definitions of situations and construction of reality (Punch & Oancea, 2014:182).

Interviews are either structured, unstructured or semi structured, depending on the purpose of the study (Creswell, 2014:239). For the purposes of this study, I employed a semi-structured interview approach. Semi structured interviews are said to offer a more flexible approach to the interview process and are an effective way of exploring in-depth data that provides different perspectives and beliefs of participants (Punch & Oancea, 2014:182).

Semi structured face to face interviews with one Grade 7 educator from each school were conducted in the belief that these educators possess an in-depth knowledge and understanding of the phenomenon being studies, and are experienced in environmental-related matters.

The face to face interview approach further offered me an opportunity to interpret none verbal cues by observing the participant's body language, facial expression and eye contact (Ryan, Coughlan & Cronin, 2009:309).

Qualitative interviews take place in a natural setting. This allowed me to conduct interviews in the respective schools and allowed for free personal interaction between me and participants. Qualitative interviews, therefore, afforded me an opportunity to explore the in-depth environmental knowledge and understanding of individual educators and how these educators impart their knowledge to learners. The semi structured approach to the interviews further allowed me to develop an interview schedule in advance, which guided the interviews. I was able to design open-ended questions that helped me answer the research questions. The interview schedule further helped me to avoid dichotomous questions, with answers such as "yes" or "no", which would have limited participant's responses (McMillian & Schumacher, 2014:383).

The use of open-ended questions allowed me to collect data verbally, through spoken words, and non-verbally, by observing the participant's body language, verbal cues and facial expressions (McMillian & Schumacher, 2014:383). Moreover, the semi structured approach allowed some flexibility during the interview process which gave participants an opportunity to freely state their views, ideas, experiences and perceptions, without being constrained and limited to a particular response. Flexibility during the processes also assisted me to probe and elicit more meaning on the responses given by the participants, allowed me to ask follow up questions and afforded me an opportunity to ask for clarity and more descriptions of any spontaneous issues raised during the interview.

Data was collected using audio recording tool, and I used hand written notes to record nonverbal communication. This approach supported by McMillian and Schumacher (2014:386), who state that the use of an audio recorder does not eliminate the need for taking notes to help formulate questions and probes, and to record non-verbal communication. The recorded data helped me capture the entire verbal interaction and to check for the validity of the data. Recorded data was transcribed verbatim and was later organised into themes. The interview tool was developed to guide the interview processes. Interview questions were categorised according to research sub-

question to ensure that the main research question is answered. The same interview tool was used in all the schools to ensure the consistency and credibility of the data collected for the study.

3.7.4 Stage 4: Focus Group Interview

Focus group interviews were conducted with a group of six learners from each participating school in order to confirm and complement data collected from the observation data analysis process and from the face to face interview process. Rabiee, (2004:6) defines focus group interviews as a technique involving the use of in-depth interviews in which the participants are purposefully sampled, based on their knowledge of the phenomenon under study. Focus group interviews are useful in generating a rich understanding of a participant's experiences and beliefs, with the goal of eliciting perceptions, feelings, attitudes and ideas the participants have about a selected topic (Gill, Stewart, Treasure & Chadwick 2008:2; Creswell, 2014:239; McMillian & Schumacher 2014:389).

I chose the focus group interview approach with the Grade 7 leaners based on some of the characteristics that accommodate learners, including the fact that a focus group interview is an informal discussion that creates a normal conversation among selected individuals about specific information relevant to the situation at hand. This allowed an easy atmosphere to develop, where the learners felt comfortable with each other and freely participate in the interview. Focus group interviews involve a small homogenous group of between 6-12 members. Six learners were conveniently sampled based on their availability and willingness to participate in the study, from the same school and grade to make up each focus group. The participants, therefore, knew each other and could relate to, guide, remind and challenge each other on topics of discussion. Focus group interviews can further generate a large amount of data in a short space of time. This was helpful in generating more data while paying attention to the learners' concentration span, before they lost interest in the proceedings (Vaughn, Schumm & Sinagub, 1996:4).

My role in the focus group interview was that of a moderator. It was my responsibility to create an environment in which participants felt free and one in which they encourage each other to engage, exchange feelings, views and opinions about the topic under discussion. This allowed me to probe and ask for clarity in order to obtain

rich information about participants' perceptions, feelings and attitudes towards learning environmental themes and doing environmental projects. My role was to further develop a moderator's plan to guide the process.

A moderator's guide includes an introduction, warm up questions, clarification of terms, easy and non-threatening questions, more difficult questions, wrap up, member check and closing statements. (Vaughn et al., 1996:41). The moderator's guide was developed to ensure the logical sequence of the interview process and to ensure that all areas of interest were addressed. However, according (Gibson, 2012:1; Heary & Hennesy, 2002:4) materials used for adults cannot be used in the same manner for children. Some of the features of the interview need to be considered, mainly because of the cognitive, linguistic and psychological differences between children and adults. Therefore, the content and length of the questions were modified to suit the comprehension, understanding and concentration span of the learners.

The focus group interviews took place over three days, one day for each school. The duration for each interview was one hour, including a leg stretch break of 15 minutes. I was guided by Heary and Hennesy (2002:3); Gibson (2012:2), who advocate for interviews lasting no more than 45 minutes for children under the age of 10 years and 1 hour for children older, based on their psychological and cognitive strength.

Focus group interviews also have their own limitations, including the fact that they may be difficult to manage, there is often poor attendance and they could result unexpected conflicts, power struggles, and other group dynamics which may inhibit discussions and that shy persons may be intimidated by more assertive persons (Vaughn, et al., 1996:5). It was my role as moderator to encourage attendance and maximise the participation of all members of the group, guide the process and attend to issues of concern in order to manage conflicts.

3.8 ETHICAL CONSIDERATION

Qualitative research is more likely to be personally intrusive, therefore, ethical guidelines, including policies regarding informed consent, confidentiality, anonymity, privacy and caring should be adhered to, in order to avoid ethical issues (McMillian & Schumacher, 2014:362). Qualitative data is also subject to biasness of the people involved in both collecting the data and providing the data. Biasness and misinterpretation of data leads to distortions of real-life situations, which can affect the

reliability and credibility of the study (Smith & Noble, 2014:3; Merriam, 1998:103). There is a difference in power between the researcher and the participants, especially if the participants are children, which could result in the exploitation of participants by the researcher. This can be prevented by upholding the three core principles of ethics, namely, respect for persons, beneficence and justice (Pillay, 2014:196).

I adhered to, and complied with, the DBE's, the schools' and the university's policies and guidelines which that require ethical approval and clearance be obtained before the commencement of the study, during the study process and after the completion of the study so as to ensure that the study was ethically sound. I have also taken into account the principle of "respect for a person" by taking into account the beliefs and values of the participants, including their right to agree or refuse to take part in the study (Pillay, 2014:196). In holding to the principle of beneficence, I further ensured the anonymity and confidentiality of sites and participants by using pseudonyms during the research process. (Orb, Eisenhauer & Wynaden, 2000:94). I also held to the principle of justice by recognising the vulnerability of learners and their contribution to the study, as outlined in (Orb et al., 2000:94).

Interviews were held during breaks and after schools contact hours. Small finger lunches were provided as a token of appreciation to participants for taking their time to participate and to save time allocated for interview process. Compensation of participants in any form is controversial and is seen as coercive or exerting undue pressure on potential participant's decision to take part in the study. Compensation can override the principle of freely given and informed consent (Morrow, 2009:4). Therefore, it was made clear that the token should not be mistaken as payment, rather an appreciation of time and effort to the study. The following section discuss ethical consideration during data collecting.

3.8.1 Ethical consideration during observation

Observation process starts with gaining entry by getting permission from gate keepers (Merriam, 1996:91; Creswell, 2014: 239; Mack, 2005: 13). I wrote a letter to the gatekeepers, the school principal and governing body of each school, to request permission to conduct the observation in schools. In the letter I made clear the purpose of the observations, what was to be observed and my role during observation process in order to promote trustworthiness of the process among the gatekeepers.

The letter of approval from Limpopo Department of Education and the university to conduct the study was also presented to the gate keepers. Although my role was no-participatory in the observation process, people in the area observed were made aware of the process so as not to invade their privacy. I maintained confidentiality and anonymity by using pseudonyms when identifying schools during the entire research process.

3.8.2 Ethical consideration during face to face interview

Preliminary meetings were held with educators in all the participating schools to inform them of the general purpose of the study. Meetings and the interview schedule were planned in such a way that they did not disrupt proceedings at the schools. Therefore, free periods and times allocated by schools were scheduled for the interviews. The purpose of the interview, the date, venue and duration were clearly stipulated.

To adhere for the principle of "respect for persons", educators were requested to participate in the study and agreed to their participation by completing a consent form (Pillay, 2014:196). I also took into consideration the principle of beneficence by considering the beliefs and values of the educators, including their right to agree or refuse to participate in the study, and their right to withdraw from participation in the study (Pillay, 2014:196). Data was hand written and recorded using recording tool, and permission to use a recording tool was sought from educators in order to ensure the trustworthiness of the process. (McMillian & Schumacher, 2014:362). Recorded data were transcribed verbatim and organised so as to create themes of the data.

In order to maintain confidentiality, the pseudonyms T1, T2 and T3 were used to protect the educator's identity throughout the research process. Educators were also made aware that their participation in the research would remain confidential during and after the research process, and that their identity will not be revealed to anyone at any time. I further assured the educators that I would, at all costs, avoid acts that would violate the terms of the consent form that they signed and their privacy.

3.8.9 Ethical consideration during focus group interview

Focus group interviews were held with Grade 7 learners in the age group of 12-14 years. The learners were under the age of 18 and were, therefore, regarded as minors and vulnerable when taking decisions on their own. This is supported Pillay

(2014:196), who believes that there is a difference in power between the participants and researcher in the research context which could result in the exploitation of children. Therefore, if participants are under the legal age of consent, permission of parents or legal guardian is required, without the researcher putting any pressure on them.

Meetings about the participation of the learners were held with their parents and guardians in order to seek permission from parents and guardians for the participation of learners in the study. Parents and guardians completed assent forms which allowed their children, the learners, to take part in the study. Parents and guardians were further informed about the right of the learner to accept or reject participation in the study and the right to withdraw from the study anytime they wanted to.

I have also referred to the learners as Learner C1, L1-6; C2, L1-6 and C3, L1-6, so as to identify them during the entire interview and analysis process in order to protect their identity. This was also done to maintain the confidentiality of participating learners. Parents were equally informed that the identity of their children would be kept confidential and that their participation would not be disclosed, even after the study is completed.

3.9 DATA ANALYSIS AND INTERPRETATION

Qualitative data analysis involves searching, evaluating, recognising, coding, mapping, exploring and describing patterns, trends, themes and categories in the raw data, in order to interpret them and provide their underlying meanings (Ngulube 2015:1). Analysing data on its own does not provide findings. Data analysis goes hand in hand with interpretation. Data interpretation involves explaining and making sense of the data (Ngulube, 2015:1).

The study employed qualitative content analysis to manually analyse, present and interpret collected data. The use of qualitative content analysis is informed by the ability of this approach to explore and categorise large amount of textual information in order to ascertain the trends and pattern of the words used, their relationship, similarities, differences, contexts and discourses of communication (Grbich, 2013: 190). Qualitative content analysis further allows for the use of pre-determined themes and has a greater potential for the revising and refinement of those themes and for the

emergence of sub-themes and categories, based on the actual findings (Bryman, 2004:22; Grbich, 2013: 190; Neoendorf, 2019: 2015).

This approach enabled me to deductively use predetermined themes that are informed by the environmental literacy components that form the focal point of the research question, while maintaining the flexibility to identify and accommodate divergent sub themes as the data unfolds (Neoendorf, 2019:215).

Qualitative content analysis involves three approaches based on the degree of involvement of inductive reasoning, namely, conventional, directed and summative content analysis. The study employed the conventional qualitative content analysis approach in which coding categories are derived directly and inductively from the raw data (Zhang & Wildenum, 2009:3). Sub-themes and categories were inductively developed, guided by the research questions (Vaismoradi, Turunen & Bondas, 2013:401; Ngulube, 2015:18). A predetermined analysis scheme was developed to guide me in planning and focusing on the most relevant data, and to further maintain consistency and data cohesion during the process (Norris, White & Moules, 2017:2).

I was also mindful of the disadvantages of qualitative content analysis. According to Grbich (2013); Vaismoradi, Turunen & Bonda, (2013:400); Neoendorf (2019: 215), content analysis concentrates on assessments on the basis of frequency analysis, neglecting the particular quality of text that is important to reconstruct text. Qualitative content analysis further lacks the ability to show different possibilities of interpretation of multiple connotations, and is regarded as a superficial analysis, without respecting the latent content of the text. However, I felt that the use predetermined themes would guide the process to focus on the most relevant, significant and meaningful data, and the inductive approach to development of sub-themes and categories provided for a greater potential for saturation and refinement of new data, as well as to explore the meaning underlying the physical message (Ngulube, 2015:14).

Data analysis started simultaneously with data collection by writing memos and notes during data collection process. This is advised by Miles, Huberman and Saldana (2014:5); McMillian and Schumacher (2014:364), that data analysis should be conducted concurrent with data collection because the processes are interactive and occur in overlapping cycles. In the preparatory stage of the analysis, data was transcribed, coded and categorised into meaningful chunks. Data was then presented

by providing descriptions of the key findings under each theme, guided by sub-themes and categories, for all data collected from the individual face to face interviews, the focus group interviews, from observations and from document analysis.

3.10 PILOTING THE STUDY

The study was piloted in order to test and assess the feasibility of processes and the methods selected before undertaking the main study (Doody & Doody, 2015:1074). The pilot cases were conveniently selected based on their geographical proximity, ease of access and a similar population to the population of the main study (Yin, 2009:92). The pilot study was conducted in three rural primary schools in the Winterveld District. The district was chosen based on its lose proximity to my workplace and because its characteristics closely matched the characteristics of the main study districts. The findings of the pilot study highlighted the fact that the interview questions were not aligned with the CAPS curriculum. Interviews questions and the observation tool were further not aligned with subject work schedules from which the EE topics are allocated for each quarter. The pilot study, therefore, helped me to restructure the interview questions and the observation tool in order to align them to the EE content covered in CAPS in the first quarter of the school year.

As a novice researcher, the pilot study was helpful because it gave me experience of conducting a study. I was able to identify, and correct, my weaknesses in time management during interviews, in interacting with participants, in making follow up questions, in probing and in understanding the nonverbal cues of the participants. I further familiarised myself with the data collecting methods and tools by multitasking in terms of listening, taking notes, observing and taking notes. More importantly, the pilot study assisted me to identify ethical issues that could hamper the main study and provided me with guidance in addressing them.

A report was written on the findings of the pilot study which was explicit about the lesson learned in order to make amendments in the main study, as emphasised by (Yin, 2009:94). However, the report was not published because of lack of resources. Thabane, Ma, Chu, Cheng, Ismalia, Rios, Robson, Thabane, Giangregorio and Goldsmith (2010:6) argues that researchers have an ethical obligation to attempt to publish the results of every research endeavour they undertake. Doody and Doody (2015), on the other hand, argues that pilot studies are not suitable for publication as

they are not primarily intended to generate results, but are intended to establish whether the sampling frame and techniques are effective, and to identify problems which might occur using the proposed methods.

RIGOUR AND TRUSTWORTHINESS OF THE STUDY

Rigour involves establishing the trustworthiness of data used in the study (Hadi & Closs 2016:3). In order for a qualitative study to be trusted, it needs to present insights and conclusions that ring true to readers (Merriam, 1998:164). In this study, trustworthiness was ensured during observations and interviews by disclosing the purpose of the study and ethical issues to participants. Trustworthiness It was also insured during data analysis by member checking. Member checking is used to determine the accuracy of qualitative findings by taking the final report back to the participants to determine whether the report is accurate and reflects what transpired (Creswell, 2014:251). Lincoln and Guba (2011:311), have proposed four alternative methods for assessing the trustworthiness in qualitative research including credibility, dependability, conformability and transferability to answer the most asked question "to what an extent can I trust the findings of a qualitative case study" (Merriam, 1998:166).

3.10.1 Credibility

According to Lincoln and Guba (2011:311), credibility is one of the most important factors in establishing trustworthiness. Credibility determines whether the process of data collection and analysis provides findings that are plausible (Zach, 2006:7). The key factors that ensure credibility of the study are completeness of data collection, multiple analytical perspectives and member checking in order to confirm conclusion drawn (Yin, 2009:94). Credibility of this study was ensured through the triangulation of data obtained from different collection methods, and from the research design employed. Triangulation involves verification of the process of the study so as to ensure that the findings of the study are not contradictory (Mohammed, 2016:92).

I ensured credibility of the study by employing multiple case study design and multiple data collection methods, namely, observations, document analysis and interviews. The use of multiple cases, which included three sites, was sufficient to provide saturated data. Furthermore, data collected from multiple methods provided sufficient data that complemented and collaborated the data obtained from different sources. I further used the cross-comparative method of data analysis in order to compare the

consistency of findings obtained from observations, document analysis and interviews across cases. Lastly, credibility of the study was ensured by member checking so as to verify data obtained from the participants (McMillian & Schumacher, 2010:330).

Dependability

According to Shenton (2004:10), in order to address dependability, the processes followed in the study should be reported in detail. This enables future researchers to repeat the study or to gain similar results. I clarified the main concepts guiding the study so as to bring a common understanding to the readers. I further provided full details on methods and procedures used for data collection and analysis. Data collected from interviews were transcribed verbatim and were evaluated against the observation findings. The interview records and transcripts were safely stored in my cloud storage account.

3.10.2 Transferability

According to Merriam (1998:173), transferability is concerned with an extent to which the findings of the study can be applied to other situations. Transferability addresses the question of whether the findings are context-relevant or subject to non-comparability based on situational uniqueness (Zach, 2006:4). A description of cases in a rural context, as well as the effective development of environmental literacy for sustainability, are presented. Transcripts of raw data from observations with direct quotes from interviews are provided which illustrate how sub-themes and categories were developed. This provides a base to other researchers interested in conducting similar or related studies.

3.10.3 Confirmability

According to Shenton (2004:11), confirmability helps to ensure that the study's findings are as a result of the experiences of the participants, rather than the characteristics of and preferences of the researcher. Conformability involves the accuracy and objectivity of collected data (Lincoln and Guba, 2011:311). In this study, conformability was attained by presentation of the raw data and direct quotations, and by transcribing recorded data verbatim, which presented the true feelings and experiences of participants. Conformability was further obtained by member checking which was done

by taking the final report to the participants so as to ensure that what is reported truly reflect what transpired during interviews.

3.11 CONCLUSION

The chapter discussed methodology of the study. It provided the discussion of research approach, which was qualitative, guided by the nature of the study and the research questions. It also provided for research design, multiple case study with the purpose of exploring in-depth information on developing environmental literacy in rural areas. Based on its explorative nature, interpretative paradigm was employed to analyse and interpreted collected data. Population and sampling, research methods including observations, document analysis and interviews were also outlined and how they were tested before conducting the main study. Lastly, ethical consideration governing permission to conduct the study, data collection and analysis were also discussed. The following chapter provides presentation, analyses and interpretation of collected data.

CHAPTER 4

DATA PRESENTATION, ANALYSIS AND INTERPRETATION

4.1   INTRODUCTION

This chapter deals with the presentation, analysis and interpretation of data. Firstly, data was collected from observations, document analysis and interviews, and was summarised into meaningful and relevant data. Secondly, data was presented and interpreted so as to compare and consolidate the findings that would help to answer the following primary question of the study:

How effective are the environmental literacy components of knowledge, attitude and skills at promoting sustainable behaviour of both teachers and learners in rural primary schools?

Furthermore, data is presented by providing a description of the key findings under each theme, guided by sub-themes and categories, for all data collected from observations, document analysis, individual face to face and focus group interview. Appropriate use of verbatim quotes and schematic presentations of data are used to illustrate, describe, justify and facilitate the descriptions. Analysis of the data was presented using categories derived from the themes and sub-themes. Below is the schematic representation of the coding process which guided the presentation of data, as well as tabular presentation of the participant codes.

THEME 1: KNOWEDGE

1.1 Subtheme 1
- Expertise and Specialisation.

1.1.1 Categories

- C1A: Experience
- C1B: EE concepts and content.
- C1C: Content interrelatedness.
- C1D: Knowledge of ecological concepts and processes.

1.2 Subtheme 2

- Pedagogical Content Knowledge.

1.1.2 Category

- C1E Integrative approach

THEME 2: ATTITUDE

2.1 Subtheme
- Value, respect and commitment.

2.1.1 Categories

- C2A: Appreciation
- C2B: Perception
- C2C: Motivation and Confidence.
- C2D: Development and Support.

THEME 3: SKILLS

3.1 Subtheme

- Inquiry based practices

3.1.1 Categories C3

- C3A: Identifying environmental problems.
- C3B: Solutions to environmental problems.
- C3C: Assessments and practices.

THEME 4: SUSTAINABLE BEHAVIOUR

4.1 Subtheme 1

- Sustainable Practices

4.1.1 Categories

- C4A: Resources conservation and management.
- C4B: Holistic Benefits
- C4C: Policy Systems

4.2 Subtheme 2

4.2.1 Barriers and challenges

- C4D Constrains

CODING PROCESS

THEMES, SUBTHEMES AND CATEGORIES

FIGURE 4.1 Face to face interview coding process**,** *Source: Researcher*

Figure 4.1 provides a presentation of how the sub-themes and categories were developed from main themes. Themes and sub-themes are chronologically numbered according to research questions. Category names are abbreviated as C and labelled numerically as C1, C2, C3 etc. Category aspects are further labelled alphabetically as C1A, C1B, C1C following the main categories.

The following table presents the participants' codes used during data analysis

TABLE 4.1 Face to face participants coding, *Source: Researcher*

CASES AND PARTICIPANTS	CODES
Case 1	C1
Case 2	C2
Case 3	C3
Teacher 1	T1
Teacher 2	T2
Teacher 3	T3

As shown in the Table 4.1, the cases are presented and coded as C and labelled numerically as C1, C2 and C3. Teacher participants were also coded as T and labelled numerically as T1, T2 and T3. Observation data is presented first, followed by document analysis and lastly, face to face and focus group interviews.

4.2   OBSERVATION

The following section presents field, classroom and lesson observation analysis and interpretations. Three categories emerged from the collected data that guide data presentation, namely, EE content knowledge, care and motivation, and maintenance and management of resources. The findings across the three cases are presented in a tabular form below, followed by the researcher's interpretation and summary of observations. C1, C2 and C3 codes are used to present observations findings of each case.

4.2.1 Theme: Knowledge

4.2.1.1 Sub theme: EE content knowledge

TABLE 4.2 Lesson Observation, *Source, Researcher*

LESSON OBSERVATION	C1	C2	C3
Knowledge and understanding of environmental issue.	Participants demonstrated some basic knowledge and understanding of environmental content.	No environmental content was covered in the lesson presented.	More knowledge and understanding of EE matters
Appropriate pedagogical approaches and learning opportunities	The pedagogic approach was teacher centred. Learning opportunities were limited to listening.	The approach was teacher centred. Learning opportunities were limited to listening	The pedagogical approach was more on teacher than on learners. There were references made to TV recycling programmes during the lesson
Appropriate assessment strategies	Learners were assessed through question and answers and written work.	Assessment was through question and answers	Learners were assessed on question and answers.
Demonstration of action skill	Learners did not engage in any practical activities during the lesson.	The lesson did not include any practical activities	No practical activities were done during the lesson

The lesson observation findings revealed some uniformity across cases. In all the cases, the learning approach was teacher centred, however, C3 seems to have used different learning opportunities compared to C1 and C2. Assessment strategies were limited to question and answer methods and there was no demonstration of action skills observed during observation. The findings suggest that traditional teaching approaches that limits learner's EE learning opportunities and the translation of knowledge into skills are still used in schools. (Athman & Monroe 2001:37; Tsakeni 2017:85)

4.2.1.2　　　Subtheme:　Appreciation

Category:　　*Care and motivation*

TABLE 4.3 Lesson Observation Data Presentation, *Source: Researcher*

CLASSROOM OBSERVATION	C1	C2	C3
Classroom tidiness	Classroom was tidy with some littering on the floor. A box was used as a rubbish bin	There was some littering on the floor. There was no rubbish bin in the class	Classroom was tidy with some littering on the floor. There was one rubbish bin in the class
Indications of EE projects in the classroom	No indication of EE projects in the classroom	No indication of EE projects in the class	No indication of EE projects in the class
Ecological sound atmosphere	No indication of pot plants or garden corner in the classroom	No indication of pot plants or garden corner in the classroom	No indication of pot plants or garden corner in the classroom
	No indication of EE posters and notices. Classroom rules does not include sustainability practices.	No indication of EE content posters and notices. Classroom rules does not include sustainability practices.	No indication of EE content posters and notices. Classroom rules does not include sustainability practices.

Classroom observation also revealed limited sustainability practices across cases. The use of an old card box in C1 and the lack of a rubbish bin in C2 indicate poor management of waste. Although the C3 classroom had a waste bin, waste separation was not practiced. The absence of EE projects in class suggest that learners are not involved in practical assessment to any great extent and, therefore, knowledge gained is not translated into skills. The absence of a garden corner or pot plants in the classroom suggest that the natural environment in not incorporated into the classroom. Lastly, the absence of EE posters and sustainable practices codes of conduct suggest that learners are not reminded of the EE content they have learnt, and are not motivated to conduct themselves in an environmentally friendly manner. The findings from the classroom observations suggest that EE content learning in the class across all cases remains abstract with little opportunities created to enhance rich, meaningful and authentic learning.

4.2.1.3   Sub Theme: Sustainable Practices

Category: Maintenance and management of resources

TABLE 4.4 Field observation Data Presentation, *Source: Researcher*

FIELD OBSERVATION	C1	C2	C3
Tree plantation and sustainable food gardening	There are some tree plantations. There is no sustainable food gardening	There are some few tree plantations and unmaintained shrubs. There is no sustainable food gardening	There is a lot of tree plantation including indigenous and medicinal trees, shrubs and flowers that attracts insects and birds. There is a fully functioning food garden.
Disposal of waste	Littering of paper strewn were prevalent around the premises and outside; there are 6 still bins around the school; in classrooms old boxes are used as rubbish bins; paper and plastic waste are burned in a pit; old books are piled in the shack and old tables and chairs are dumped at the corner of the school yard	Littering of paper strewn were prevalent in the school; there is one rubbish bin in the school; waste papers are put in a hole and burned; tins collected from feeding scheme are piled in the school yard corner; old desks and books are piled in the school yard.	Littering of paper strewn were prevalent around school premises; there are rubbish bins around the school however, waste is not separated; paper and plastic waste are burned in a pit; old books are packed in the staffroom; old tables and chairs are packed in the shack
Any change of landscape i.e. cleared ground for sporting activities or paved ground, water runoffs.	Most of the land is cleared, no water channel there are indications of water run offs.	More land is cleared in the front, sports grounds are paved; no water channel and there are indications of water run offs.	Most of the land is covered with vegetation; sports grounds are paved; there are water channels to direct water to plantation.

Integrated Waste Management Systems	Papers and tins are put in the same bin; food waste is separated from other waste; there is no indication of recycling programmes on site	Food waste is put in the buckets; there is no indication of separation of other waste materials; there is no indication of recycling programmes on site.	Papers and tins are put in the same bin; food waste is separated from other waste; there is no indication of recycling programmes on site.
Type of water source available, ablution facilities water saving programmes and maintenance.	Borehole water source and pit toilet facilities are used and are placed close to each other. There is no indication of water harvesting. There is indication of tap leaks and water spillages; some learner's drinks from the taps.	Borehole water source and pit toilet facilities are used with one tap that leaks; waste pit is placed close to borehole water; there is no indication of water harvesting. Some learners drinks from the tap.	Borehole water source and pit toilet facilities are used; taps are automated and locked with no indication of leaks and spillages; there is no indication of water harvesting; water saving methods of irrigation are used.
Any energy saving programmes	Some lights are left on during the day, there is no other supplementing energy sources. No energy saving bulbs used	No energy saving bulbs used. There is a solar panel used in the kitchen. Older incandescent light bulbs are used	Energy saving bulbs are used
Indication of EE projects and conservation reminders	There are no indication of EE projects and conservation signs to caution learners	There are no indication of EE projects and conservation signs to caution learners	There is organic compost project on site. No indication of conservation signs to caution learners

The field observation findings vary across cases. The findings from C1 and C2 suggest a lack of knowledge and understanding of ecological processes and foresightedness of their practices. This statement is based on the positioning of water borehole, pit toilet and waste pit in close proximity to each other, which could contaminate the ground water source and pose health risks. Findings further revealed limited resource maintenance and management, which reflects unsustainable practices in both C1 and C2. The findings from C3 revealed more sustainable practices, however, C3 had some challenges with waste management.

In summary, findings are interpreted in terms of the environmental literacy components of knowledge; attitude and skills, and learners' competency in these components should be reflected by sustainable practices, in each case.

In terms of knowledge, C1 and C2 seemed to demonstrate a basic knowledge of EE processes and sustainability practices. The findings revealed poor waste, water and energy source management. This denotes a lack of economic and sustainability knowledge about the benefits of conserving and managing resources. Practices such as littering, burning, and burying of waste also tell of lack of participants' knowledge about the negative impact of these practices on the natural environment. Similarly, the findings from C3 highlight waste management challenges. However, participants in C3 did put some of their waste to good use and preserved nature by developing natural vegetation and landscaping. (DEAT, 2008:2).

A lack, or limited number, of waste bins in the classroom and in school, and lack of recycling programmes onsite promote a culture of littering, which reflects a lack of care, respect and value for the natural environment. The absence of EE posters in the classroom and around the premises across cases, and exclusion of sustainability ethics in the classroom code of conduct, suggests the absence of EE content language and motivation of learners to conduct themselves in a more environmentally friendly manner.

Traditional teaching methods and fewer learning opportunities limits the translation of knowledge into action skills. The findings reveal a lack of the practical and cognitive skills required to engage in sustainability practices in C1 and C2. The observation findings from C3 suggest some sustainability practices, however, there were no

practical activities undertaken during the lessons and learners were assessed using the question and answer method. Based on the above analysis and interpretation, observations findings place C1 and C2 at a nominal continuum level with respect to environmental literacy which is at the lower end of environmental literacy continuum. Persons at this level are able to recognise the basic terms used to communicate about the environment, and are able to provide rough working definitions and their meanings (Roth, 1990:26). This level requires a person to have rudimentary knowledge of natural systems and how humans interact with them. This level further requires a person to develop an environmental awareness and sensitivity with an increased respect for nature and a concern for how humans interact with nature. Roth (1990:26) calls this level the awareness stage of environmental literacy.

The findings from C3 locate this case on the functional continuum level of environmental literacy. This is the functional environmental literacy level which is the middle level, requiring individuals at this level to demonstrate a broader knowledge and an increased understanding of human environmental interactions; more awareness and concern about negative human interactions; more developed skills in which to analyse, evaluate and communicate feelings about environmental problems and to be more willing to take actions to solve those problems. Roth (1990:26) calls this level the understanding stage of environmental literacy.

4.3   DOCUMENT ANALYSIS

Documents that was analysed include the CAPS curriculum and school's EE policy. CAPS curriculum analysis was intended to explore the provisions of the curriculum on the concept EE and its content, and how CAPS guides the approach to, and implementation of the curriculum. The analysis of a school's EE policy was undertaken with the intention to explore how this policy provides a framework for the planning and coordinating of EE programmes and sustainability practices, and how the policy complemented the CAPS curriculum in striving to achieve environmental literacy in schools. It was unfortunate that the EE policy was not available in all cases, as indicated in Chapter 3.

4.3.1 CAPS Curriculum Analysis

CAPS curriculum for Natural Science, Social Science and Technology for Grade 7-9 were analysed. The findings of the analysis across the grades reveals that the concept

EE is not mentioned however, its content is variably integrated in all curricular subjects analysed. Furthermore, curricular suggest both theoretical and practical assessment activities teachers can use to assess learners including but not limited to reading, investigating, illustrating, scenarios, case studies, projects etc. (DBE 2011:19). The following tables present the above mentioned subjects integrated EE content.

EE Content Coverage for Natural Science, Social Science and Technology Grade 7

TABLE 4. 5. CAPS Analysis, Source: Researcher

NATURAL SCIENCE	SOCIAL SCIENCE	TECHNOLOGY
EE CONTENT AND CONCEPTS COVERED	EE CONTENT AND CONCEPTS COVERED	EE CONTENT AND CONCEPTS COVERED
The biosphere: The concept of the biosphere, Requirements for sustaining life. Biodiversity: Classification of living things, Diversity of animals, Diversity of plants. Properties of materials: Physical properties of materials, Impact on the environment. Sources of energy: Renewable and no renewable sources of energy.	Floods: Effects of floods – including injury and loss of life; disease; displacement of people; soil erosion; damage to fields, buildings and infrastructure. Natural resources: Natural resources on earth including water, air, forests, soil, animal and marine life, Management of resources: Concept of conservation including reasons for conservation. Water in South Africa: Who uses South Africa's water (pie graph of water users), Availability of	Structure Impact of technology: Class discussion: how designers consider the needs of society in terms of technology while considering the impact on society and on the environment. One of the design ideas must involve disguising the tower so that it blends in with the Environment, avoiding visual pollution. Impact of and bias in technology Case study: Recycling scrap metals. Learners tabulate a record of the waste produced by the school, e.g. empty cans, paper, Plastic, etc. Learners suggest a viable strategy to raise funds by recycling.

Separating mixtures: Sorting and recycling materials.

Potential and Kinetic: Law of conservation of energy.

Energy transfer to surroundings: Useful and wasted' energy, Conserving electricity in the home.

Relationship of the Sun to the Earth: Solar energy and the Earth's seasons, Solar energy and life on

Earth, Stored solar energy.

Historical development of astronomy

Early indigenous knowledge | water and requirement in South Africa, River health and the care of catchment areas,

Disappearing wetlands and why conservation is necessary – case study, Responsible use of water resources - agricultural, industrial and domestic users.

South Africa's climate: How each of the above factors influence temperature and rainfall in selected places. | Processing food: emergency food

List the ingredients of a meal that will be nutritious as well as tasty, and which can be prepared under conditions likely to be found in a refugee camp.

Properties of materials

Learners investigate materials and building techniques used by indigenous people for constructing housing in rural South Africa. Materials used in such construction is typically readily available, appropriate and environmentally friendly. |
| PEDAGOGICAL CONTENT | PEDAGOGICAL CONTENT | PEDAGOGICAL CONTENT |
| This content and the associated concepts must be integrated with the aims and skills for Natural Sciences | This content and the associated concepts must be integrated with the geographical aims and skills.

The concept that is central to this topic is conservation, or the preservation and careful management of the environment and natural resources. | It is compulsory to cover the given scope in the term indicated. The sequence of the work within the term must be adhered to.

Skills |

	Learners should read and write regularly.	
SKILLS	**SKILLS**	**SKILLS**
Describing Investigating Identifying Grouping Drawing Sorting Listing Observing	Develop observation, interviewing and recording skills through fieldwork Draw maps, sketches, simple illustrations, graphs, and flow charts	Investigating, drawing, designing, making and presenting should improve progressively from term to term.

It should be noted from Table 4.5 that the curricula across all subjects are not explicit on the pedagogical methods and skills teachers should use in order to teach the integrated EE content. This is based on the following statement: "This content and the associated concepts must be integrated with the aims and skills" across all subjects (DBE, 2011:22)

It seems that it is left up to the teachers' expertise and experience, and their interpretation, to effectively integrate EE content into the subjects that they are teaching and for teachers to come up with creative and innovative approaches to develop learning opportunities for effective implementation of EE. This results in teachers making autonomous decisions on which EE content to teach and how to teach it. Therefore, teacher training and development should complement the curricula in order to fully develop their diverse integrative and interdisciplinary pedagogical skills and strategies so as to effectively implement EE content.

The findings further denote that, although EE content is integrated across all curricular subjects, the concept of EE is not used or made familiar in schools. Perhaps this is as a result of the fact that EE, since its inception, was not accepted as a concept in its own right but rather integrated into the content of other subjects (De Sousa, Richter & Raath 2017:3).

Recognition of EE as a concept is important in order to draw attention to its focus and to work towards achieving its goals. Some educators associate EE content with the content of particular curricula subjects and, therefore, do not feel obligated to teach the content.

Although CAPS suggests inquiry-based learning opportunities and suggests that learners undertake practical tasks regularly, as indicated in the table, its major assessment objective is knowledge based. This argument is based on the fact that the objective of CAPS's continuous statement made as a part of the assessment guideline is to "check on learner's knowledge that they can" (DBE, 2011:62).

The focus of CAPS on knowledge assessment suggests that EE implementation is not action oriented. Although knowledge is fundamental to developing environmental literacy, CAPS should also make provision and present guidelines for the assessment of the skill competencies required to take action towards solving environmental problems.

The intention of an analysis of the school's EE policy was to explore how EE programmes and sustainability ideas are guided and translated into practice. It further intended to explore how curricular practical assessments are incorporated into the policy to develop appropriate skills for engaging in sustainability practices and adopt behaviour that sustain and protect the environment.

The principal in C1 shared general police files and the index included ground duty and waste management items. However, there were no polices outlining how school grounds should be kept and how waste should be managed. C2 the head of department, mentioned that they were not aware of such policy, they will organise a committee to develop the policy. C3 mentioned that their sustainability practices are guided by the Greenery booklet from Department of Agriculture and by the principal's indigenous knowledge of gardening. Unfortunately, they had no copy of the booklet to share with me.

Unavailability of EE policies suggests a lack of environmental ethics which guide and direct conservation, and sustainability of resources and translates sustainability ideas into practice, at the schools. This clearly shows that participants' actions towards the natural environment are not guided by, and motivated towards the development of, sustainable behaviour.

4.4.1 FACE TO FACE INTERVIEW DATA PRESENTATION

4.4.2 Theme 1:   Knowledge

4.4.1.1 Sub theme 1:   Expertise and specialisation

The theme focuses on exploring how the integrated EE content into subject content, as guided by the curriculum, is taught in rural primary schools. Two sub-themes emerged that guided the exploration of teachers' subject content, based on their subject specialisation and their expertise in effectively integrating EE content into their teaching, guided by their experiences, qualifications and training, both pre- and in-service training. The sub-themes guided the development of categories to explore teachers' experience, knowledge of EE concept, its content and interconnectedness with other subjects, knowledge of ecological concepts and processes and how the content is integrated into the teachers' subject content. For teachers to be able to develop the environmental literacy of learners, they should, themselves, possess appropriate knowledge of both the subject and the EE content, in order to effectively

develop learning opportunities which will develop the environmental literacy of learners (Ferreira & Molala 2017: 117; Kidman & Casinarder, 2018:1).

The following section discusses presentation and interpretation of participant's response.

C1A: Experience

Practical experience and expert guidance are important for teaching the EE component since they build the confidence and self-efficacy of teachers (Yildirm, Kişoğlu & Salman, 2018: 249). Similarly, Bandura's theory of Self-Efficacy described the four main sources of self-efficacy, including mastery of experiences, which is found to be the most effective source of self-efficacy (Bandura, 1997) Mastery involves an individual's previous experiences in a specific area in the form of knowledge, practices, procedures or practical experiences (Bandura, 1997). Teacher's experiences are explored in terms of their qualifications, the subjects they are teaching, including natural sciences, social science and technology, number of teaching years and qualification or training on EE content.

> *"T1: Natural science 8 years"*
> *"T2: Technology 5 but not more than 5 years"*
> *"T3: Geography measuring with social science from 2008"*

When participants were asked how they were allocated the subjects, the following responses were given:

> *"T1: Because I love the subject, I am available to teach it and I did biology in school"*

> *"T2: According to the requirements of the post, sometimes you find that there is no body who matches the requirements but have primary education, they just assume that each person can fit. The subject I did at the college I think Geography is related but I never taught it they just threw me in maths and technology"*

> *"T3: Because is my favourite subject"*

When participants were asked how they were supported in teaching EE content, they gave the following responses:

> *"T1: So far, no workshop or in-service training have been conducted, I don't want to lie"*

"T2: No, not about EE content, but with CAPS yes it was for two days but they did not focus on EE content but on how our subjects must be taught"

"T3: Some of us went for training include the principal for gardening"

The participants' responses show that they had not less than ten years of teaching experience and no less than five years' experience in the subject they were teaching. T1, a principal, had 8 years of teaching Natural Science, T2, a Head of Department, had 5 or more years in teaching Technology and T3 had been teaching for 11 years.

The allocation of subjects, according to some participants, was based on their interest and availability to teach the subject. In the case of C3 (T3), the subject was allocated to the teacher based on the teacher's interest and qualifications. In terms of qualifications or training on EE content, the responses of T1 and T2 show that their pre-service training did not include EE and that they had not been trained or workshopped on any EE or EE content. This is supported by revised policy on the minimum for DHET (2015:44), which shows that EE is now included in Bachelor of Education in Honours level.

T3 had undertaken a postgraduate course that included environmental studies. The similarities of participants' responses show that they all have adequate teaching experience. The differences in participants' responses revolves around the allocation of subjects, where T1 and T2 were allocated the subject based on their interest and availability, while T3 was allocated the subject based on qualifications and expertise. Differences in responses are further based on EE qualifications and training. T1 and T2 had no EE-related qualification and had received no training on EE content, while T3 has a postgraduate qualification which included environmental studies. However, none of the teachers had received adequate in-service training on EE content.

C1B: EE concept and content

The participants' knowledge of subject and EE content is guided by CAPS. Knowledge forms the basis for developing the other aspects of EE and constitutes one of the principles that underpins the CAPS curriculum (Songqwaru, 2012:32)

The findings reveal that T2 and T3 seems not to be aware of the concept EE, as a teaching and learning process towards the social, political and economic aspects of

the natural environment. However, they had the knowledge of environmental content as an isolation to the concept EE. Similarly, CAPS does not make mention of EE as a distinct concept, although EE content is interrelated across other subjects, as supported by T2. However, teachers' background, pre-service and in-service training on EE content is important in order to understand EE as a concept, a specialised and distinctive approach and for EE to be given its academic value in the teaching and learning process, in order to achieve the desired goals and objectives.

What is your understanding of the concept EE and its content?

> *"T2: In technology, I think each and every product that we used to solve technological problems, we must also think about its impact on the environment"*

> *"T2: CAPS is not extensive in teaching EE in technology"*

> *"T3: When I am teaching technology, I am teaching recycling, how can we save the natural environment and how can we maintain it to become sustainable*"

T1's responses, however, indicate the concept EE as an education process however with the focus on biophysical environment and excluded the social, economic and technological dimensions.

> *"T1: EE is an education about the space in which are living"*

The fact that this participant considers EE as education about the space in which one lives, seems to be objective by considering only the biophysical aspect and not an awareness of the holistic nature if EE, including the social, economic political dimensions of EE.

Educators need to have a good knowledge base of EE that will allow them to identify environmental problems and make informed decisions by taking action to solving these problems (Verna & Dhull, 2017:1548) Therefore, the EE knowledge base should be action-oriented in order to develop the environmental literacy of the learners.

Participants seemed to have varying knowledge of EE content and how they apply that knowledge in their different contexts.

> *"T1: Yes, we don't have knowledge and understanding so that is where the integration of knowledge, values and skills come. If we have our education in a way that is able to*

integrate these because if we have knowledge, and do not know how to apply it in a real-life situation, it is as good as you don't have it"

"T2: Because there are steps that when solving these technological problems, and from those steps you find that the one for EE content is not that much". "Because my focus is on the learners to be able to solve problems that are related to technology so that is bit out of EE"""

With respect to the responses from C1 and C2, T1 and T2, although the participants were aware of the EE concepts, their response indicate that they do have knowledge of EE content. However, they are not able to apply this knowledge to their real-life situations. The focus of teachers on EE knowledge is not surprising because acquisition of knowledge forms the basis in CAPS. However, suggestions for skills and values for identifying and solving environmental problems are also provided by CAPS (DBE, 2011:5).

Contrary to the above, in C3, the T3 participant seemed to have knowledge of EE content and how to apply it in the real-life situations. However, some of the statements were contradictory within themselves and to what was observed in the classroom. This was revealed when the participant mentioned that: "learners are doing projects practically by making their own mats while on the other hand saying 6 former school governing body members are using collected plastics to pleat mats for dust".

"T3: Yes, there are periods of when they are doing their projects practically, they make their own mats, some they are doing aprons, trousers and shoes, you see these shoes of mine they are done my children"

"T3: We have 6 mothers who were our school governing body members they are using plastics collected to pleat some mats for us to avoid the dust"

Although there is some contradiction in her statements, and the fact that there was no indication of the projects in classroom during observation, the learners have progressed to Grade 9, the participant had an idea of how to apply the acquired knowledge to real-world situations.

C1C: Content interrelatedness

When participants were asked about how the subjects they were teaching are linked to EE content, the following responses were given:

"T1: Because when we look at the natural science, it has an environmental content, when look at technology we talk about materials and their composition, like social science, the geographical part of it they talk about air pollution.

"T2: They talk about recycling and safety, and the products of students are making must be aesthetic.

"T2: They talk about recycling and safety, and the products of students are making must be aesthetic.

The above responses suggest that participants were aware of EE content in the subjects that they are teaching and that they were able to link EE content to their subject content.

C1D: Ecological content knowledge and processes

EE educators should be able to communicate and apply major concepts in ecology, have sufficient ecological knowledge to investigate, evaluate and find solutions to environmental problems, and apply knowledge of key ecological foundations so as to provide solutions to environmental problems (Kimaryo, 2014:53). Key ecological content and processes were guided by topics presented in the CAPS curriculum.

Participants seem to have had knowledge of ecological concepts and processes to varying degrees and they were able to identify human and other factors that affect ecological processes.

"T2: Like we have mentioned that we are burning waste, it means that sometimes we are not aware that we are damaging the ozone layer

"T1: If the intervention of the human kind in the natural phenomena is not well taken of you will find that there are other natural things that are getting extinct and which are very important to life itself.

"T1: Natural resources or environment is there for provision of life as we live not only human beings but there is interaction of all living organisms"

Given the above responses, in the case of T2 and T1, although these participants had knowledge of ecological concepts, the T2 responses are generic "there are some things", "interaction of living things". This demonstrates adequate knowledge of concepts and processes, however, not adequate enough to evaluate and investigate solutions to solve ecological problems.

"T3: When we go to water, we got some microorganism, there is an ecosystem and somewhere somehow it breaks the chain of ecosystem"

"T3: Normally, I try to teach them how to save the resources, when we burning up the papers there is a lot of carbon dioxide that is going into the atmosphere and is going to form the global warming and causes the acid rain. The acid rain is not healthy for our plants. Even we as human being we are inhaling lot of oxygen and are exhaling carbon dioxide and if our atmosphere is full carbon dioxide people are going to struggle to have healthy environment"

The participants' responses show embedded ecological content knowledge and processes. The participants were able to identify ecological problems and provide solutions to them.

Sub theme 2:   **Pedagogical content knowledge**

C2A: *Integrative approach*

Pedagogical content is the teacher's knowledge of the subject matter and the principles of approaches guiding the teaching and learning process and further enhancing other learning opportunities (Zhou, 2015:191; Richardson, Byrne & Liang 2016:6). An analysis of EE pedagogy is also drawn from the CAPS curriculum and other theories which guide the approaches to teaching EE content within other subjects. Although there is no uniform approach to teaching EE content, CAPS provides guidance on how teachers should integrate EE and subject content. However, it takes a teacher with expert knowledge of EE themes to teach and be creative, innovative and skilful in linking the EE content to the subject content.

The focus of the study is on the principles of an integrative approach to teaching EE topics within other subjects, with a focus on instructional strategies, transformative learning, real-world learning and learner centred approaches. Teachers were asked to describe the teaching approach or method that they use to teach their subject and EE content.

Although participants are aware of the interrelatedness of EE content and the subjects they taught, the integrative approach to teaching EE content seemed to be a challenge. These statements are drawn from the teachers' responses, as indicated below:

"T1: When we talk about minerals which are mined, they are natural resources then when we process them that is technological part. We make these resources to be suitable for the purpose we want them to be. So that's how they link".

"T1: The teaching of EE within the broader subjects denotes that it is not effective as it should be. Like I said, this study brought an opportunity for us to raise eyebrows that there were these other things that we were not careful of, the integration of all these subjects towards the common goal of EE. We will then sharpen our focus to make sure that as we are teaching, how contributory are our subjects EE".

When asked what could be the suggestion to effective integration of EE content into the subject content, he responded that

"T1: CAPS documents are encouraging an integrative approach, so we should plan in such a way that our planning will be integrative to EE.

Although T1 is aware of the integrative approach to teaching EE content and the interconnectedness between EE and subject content, the teacher admitted that practically applying this approach was a challenge. This gives an indication that EE content is not effectively integrated by the teacher when teaching his subject.

Similarly, in C2, although the teacher (T2) is aware of the interrelatedness of EE content and the subjects he teaches, he displayed a different perspective to the teaching approach:

"T2: It is just that I was perceiving this technology in a different way. I was not putting much emphasis on environmental content, I was putting much emphasis on solving technological problems related to technology not getting much into EE content"

"T2: There are many like in EMS that talks about the importance of recycling but learners just gain knowledge because it is bit difficult to recycle those at school, we used to give them trucks responsible for collecting tins, bottles and papers.

"T2: To recycling and EE centres, no we don't have them around we normally take learners to the zoo.

When asked what suggestions they make to improve teaching EE content in his subject the teacher suggested that

"T2: EE be a subject on its own so that we can learn and teach fully about it and like other subjects, have expects. The integrative approach does not yield enough results"

When asked how learners put the acquired knowledge into practice, participant's responses indicated that learner's knowledge is not put into practice.

> *"T1: Actually, honestly we are assessing knowledge, we are not putting much on the practical part. Yes, they are doing projects but mostly are knowledge based. Maybe because of the pressure of the content we are teaching at the end of the day we have objectives that we have to reach of the subject content I am teaching"*

> *"T2: Our activities are knowledge based"*

The above responses denote that EE content is given less attention compared to the subject content. These responses further give an indication that teachers choose what they can teach and how they teach and not what is outlined in the curriculum. This is because of the teachers' limited knowledge of EE content, the availability of resources and the pressure teachers are placed under to fulfil subject content objectives, as mentioned.

The response further denotes that the learning of EE content is abstract and out of learners' context, as learners are not able to have the real-world learning experiences required to enhance learning. An effective interdisciplinary approach to teaching and learning EE content requires teaching methods that are action oriented, participatory and learner centred. The use of different teaching and learning methods, including place-based, enquiry-based and cooperative methods, are important for developing appropriate knowledge and positive attitudes and for acquiring skills that are fundamental to developing environmental literacy (Kimaryo, 2014:53).

In Case 3, T3 seem to have a different approach as compared to T1 and 2. This is drawn from the following responses.

> *"T3: When I am going to teach EE content, we firstly go out with my learners and we pick up all papers, there are mothers who were school governing body members they knit some mats.*

> *"T3: I normally start with prior knowledge before I start the topic like when I am teaching them where you stay, when you are travelling what have you seen, some will say we have seen cattle grazing plastic. I try to show them the danger of plastics and the importance of picking up plastics and use them for something else"*

> *"T3: The other learning resources that we use are old magazines and textbook".*

"T3: We don't have internet I sometimes use my phone".

The above responses indicate that the teacher is aware of integrative approach to teaching EE within her subjects. She uses multiple learning approaches including cooperative and place based learning, by using learner's prior learning and the natural environment as teaching and learning source. She further used multiple instructional strategies in her approaches through the use of TV programmes, old magazines and textbooks, cell phone and fieldwork to enhance learning opportunities.

In summary, the overall findings on Theme 1 varies across cases and suggest that teachers have basic and adequate knowledge of EE content and an EE approach to teaching. From the analysis, it can be concluded that, in the cases C1 and C2, T1 and T2 are at nominal level of environmental literacy, and they still have a challenge with pedagogical content knowledge.

This statement is drawn from category C1A where the teachers' responses denote the fact that they are not experts in the subjects they are teaching and they were not trained to teach EE content within their subjects. Although the teachers were aware of the interrelatedness between EE content and the content of their subject, they seemed to lack the necessary curriculum content knowledge to understand the cross-curricula and interdisciplinary nature of EE content embedded in the subject content and its objectives. As stated in categories C1B, C1C and C2 the focus of the teachers was on the subject content, with less focus on EE content. It is also noted that the assessments teachers gave were knowledge based, as they had not been trained on the integrative approach to teaching, and were not familiar with inquiry-based assessment practices.

However, in C3, T3 seemed to have adequate knowledge on EE content and portrayed functional level of expertise, based on her qualification related to EE content, some training she had received on gardening and on her teaching approaches on EE content. When comparing the three cases, analysis shows the importance of pre- and in-service training to develop the teachers' EE content and pedagogical knowledge.

EE content knowledge is science based and requires a teacher's expertise in the field of science and scientific enquiry methods and approaches (DBE, 2011:8). Moreover, EE content as a science-based construct is contested, meaning that it is dynamic and exposed to change. Therefore, teachers need to be continuously developed to be on

par with its new changes and dynamics by attending pre- and in-service training, in order to effectively implement EE content curriculum (Pe'er et al., 2013:426). Furthermore, teachers should learn appropriate inquiry-based practices that will translate acquired knowledge into practice.

A lack of pre- and service training of teachers in EE content and pedagogical knowledge further affects the self-efficacy of teachers in effectively developing their environmental literacy, and the literacy of learners. Self-efficacy is understood to be more subject- and context-specific, and is related to subject-specific knowledge (Kidman & Casinader, 2018:1). Therefore, pre- and in-service training on EE content and pedagogy knowledge is necessary for producing the committed, confident and motivated teachers required to develop the environmental literacy of learners.

4.4.3 Theme 2:   Attitude

4.4.3.1   Sub theme: value, respect and commitment

The theme Attitude explores how teachers' EE knowledge induces positive attitudes towards the natural environment. It is believed that the development of EE and ecological knowledge and an awareness of environmental problems promote attitudes to appreciate in terms of valuing, respecting and showing concern for the natural environment. Attitude further promotes a willingness to commit to taking responsibility of taking actions that care and protect the environment (Hollweg et al., 2011; Veisi, Lacy, Mafakheri & Razaghi 2018:4).

 An analysis of participant's responses is drawn from one of CAPS objectives and from the principles of the Self-Efficacy Theory, which posit that the attitudes and values underpins investigations and the solving of problems that requires some practical ability. Self-efficacy is one of the fundamental factors of learning in terms of attitude (DBE, 2011:10; Bandura, 1977:4). The sub-themes value, respect, concern and commitment emerged and informed categories, including a teacher's perception towards EE content, an appreciation of the environment, confidence, motivation and support for effectively teaching EE content.

C2A: Appreciation

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Participants' responses show some appreciation for the natural environment, evidenced when they mentioned words such as care, concern, not harm and respect, willingness and a sense of personal responsibilities to attend to environmental problems. When they were asked how they approached EE content in the subjects they are teaching, they responded that:

> "T1: Care should be that now there should not be the total destruction to the environment"

> " T2: When we solve technological problems we must make sure that the material must not harm the atmosphere and the environment"

> "T2: We tech learners to recycle so that we can keep our environment clean"

> "T3: We pick up the papers to try to keep the environment clean"

Statements such as "our environment needs nobody than us, making sure that materials do not harm the environment" denotes an appreciation for the environment. Their responses further show some sense of value, care and concern for the environment, however do not announce actions in how they value, care and the practices of concern are carried out.

C2B: Perception

The participants' responses indicated some positive attitudes towards the natural environment and towards teaching EE content, evidenced when they mentioned words such as respect, care and the importance of the environment. When they were asked about the importance of teaching EE content in schools their responses included:

> "T1: EE in schools is important because it helps the learners to adjust themselves with the environment"

> "T2: It is important since well they are talking about this thing of global warming"

> "T3: Ehh…it is very much important because if you teach them even when they are adults enough they will teach other people, even if they are not around the school they will be able to make the environment sustainable"

The question intended to explore a teacher's perceptions towards teaching EE content in schools. Their responses show an awareness of the importance of EE in school. This resembles positive attitude towards teaching EE. Although the teachers showed

positive attitudes towards teaching EE schools, some of their responses, when asked how they integrate EE content in the subjects they are teaching, seem to indicate that EE content is used as a disciplinary or corrective measure with respect to the learners.

> *"T1: We have a problem with littering and now we have said that teachers must encourage their learners not to litter. Those who arrives late pick up the papers, it was worse but is gradually improving"*

> *"T2: Again the cleaning of the surrounding when learners arrive late, they pick up papers and take them to the back"*

> *"T3: When we have some functions in our surrounding, I am tasking other learners during the weekend to pick up waste and fill the waste bags".*

Although learners were given activities that show care for the environment, the context in which activities were done could be perceived as punishment by the learners and, therefore, would not develop positive attitude towards EE content. Furthermore, T3 extended environmental activities to the communities. However, it seemed to suggest that EE content is treated as co-curricular activities to support the academic curriculum. Although field work is part of inquiry-based learning, it should be carried out as part of a teaching and learning process, including all learners. Teachers should observe and write reports that contribute to the progression of the learners. This would further allow learners to share collective responsibility towards solving the identified environmental problems.

C2C: Motivation and Confidence

The participants are intrinsically motivated and confident in teaching. They however appeared not to be motivated to teach EE content as a result of the challenges mentioned. Motivation affects the way individuals act and the attainment of their goals. The participants' responses do not indicate any courses of action nor how they were encouraged and maintained. If a person is motivated to perform a particular task, motivation will guide the persistence and performance, build their confidence in teaching EE content and achieve the set goal (Small, Green, Larsen & Shenk, 2012: 3; Mbatha, 2015:6). Therefore, the predicaments mentioned by T1 are a barrier to motivation and confidence in effectively teaching EE content.

C2D: Development and Support

Teachers' development and support in terms of pre-service training, in-service training, the provision of resources, including allocation of time, collaboration and the geographical location seem to be a challenge in effectively developing environmental literacy in schools. Participants gave the following responses when asked whether their pre-service training included EE content and whether their skills had been developed in terms of in-service training on EE content:

> *"T1: Humm so far, answering from the principal's perspective, no workshop or in-service training have been conducted".*

> *"T2: No, my pre service training did not include EE content. I did Geography. As for the workshops or in service training, I have never attended any"*

> *"T3: My pre service include environmental science. I also attended a UNISA course for gardening it was related to technology and natural science, we got certificate for short skills".*

T1 and T2 seemed to have not received any training and development on EE content, while T3 is professionally qualified to teach EE content, and has received some workshop in gardening. However, the course attended by T3 was related to natural science and technology. The above responses show a lack of professional development in EE content, which is fundamental to developing environmental literacy. Lack of pre- and in-service training of teachers seems to suggest that teachers are not competent to teach EE content, based on their inadequate knowledge of what to teach and how to teach it.

When asked about the support provided by other institutions including NGOs, Provincial departments for effectively implementing EE in school, the following responses were given:

> *"T1: Support is less or none than expected. There are people who are remunerated by municipality to give hand to the schools although it is not effective"*

When asked how him as a principal support his staff in effectively implementing EE content, his response was:

> *"T1: They are not supported although it is important to get teachers to be workshopped and supported so that we get their confidence and motivation raised".*

> *"T2: No nothing"*

When asked how he as a head of department support teacher ineffectively implementing EE is response was

> *"T2: No we are not because we don't have that expertise. Sometimes I don't know about these EE issues".*

> *"T3: People from Loskop they normally come like you doing some practical and they normally bring some trees"*

> *"T3: Municipality, no I don't think so, they are not involved"*

> *"T3: Even the department is not involved".*

When participants were asked about support in terms of resources for teaching and learning EE content, the following responses were given:

> *"T1: For resources we are using textbooks provided by the department. In terms of internet for teaching and learning we don't. I have a router to access emails.*

> *"T2: We are using textbook. And internet no we don't have it"*

> *"T3: We use textbooks and old magazines. We don't have access to internet I only use my phone.*

From the above given responses, schools seem not to be getting sufficient support in terms of resources. T1, as a principal and T2, as a head of department, emphasised their inability to support teachers due to a lack of expertise and support that they are getting from the provincial departments and other stakeholders. This becomes a barrier to developing environmental literacy of both teachers and learners. EE content is inquiry-based and best supported by good information, including advanced textbooks, magazines, campaigns, fieldwork, access to internet and many more sources of content (Bonney, Dickson, Kelling, Phillips, Rosenburg & Shirk, 2009:8). Access to EE resources provides teachers with strategies and approaches that broaden their teaching experiences, while enhancing learning opportunities for learners to develop environmental literacy.

Positive attitudes are foundational to environmental literacy and sustainable practices (Ever 2012). Positive attitudes affect one's self-efficacy as this has an impact on an individual's choices of learning activities, effort and persistence in achieving the desired goals. Self-efficacy can further affect one's motivation, based on one's judgement of one's own capabilities to perform the given task (Bandura, 1977).

Theme 3:   **Skills**

4.4.3.2   Subthemes: Inquiry based practices

The theme addresses the question of how the acquired knowledge provides the skills required for solving environmental problems. Analysis and interpretation of this category was also informed by CAPS and the theory guiding the study. Participants' cognitive and practical skills were explored based on their ability to identify environmental problems, and their ability to make informed decisions on taking action towards solving those problems. The Self-Efficacy Theory holds the belief that positive attitudes boost one's confidence in performing a particular skill (Bandura, 1977:4).

C3A: Identifying environmental problems

When participants were asked about environmental problems in their schools, the following reposes were given:

> *"T1: Trees and some plants which are distracted when deforestation takes for settlement place and firewood is in a way is decreasing oxygen which we need the most"*

> *"T1: I have acknowledged that we have a problem with littering children are littering around"*

> *"T1: We practice air pollution everyday by burning the weeds"*

In C2, T2 was able to identify the problems, however, T2 could not suggest solutions to the problem.

> *"T2: The burning of waste like for instance we clean the yard and in two days the waste gets blown away so the best way is to burn them so we can't do anything our hands are tight"*

> *In C3, T3 identified the following problems:*

> *"T3: We have a problem with pampers littering in the community and animals are eating them and are damaging the animals"*

> *"T3: Waste is our big problem; we try to collect papers for recycling but others we just bury or burn them"*

From above responses, it can be seen that participants were able to identify environmental problems and were aware of their actions that harm the environment. Waste and littering seem to be a problem across all cases.

C3B: Solutions to environmental problems

An analysis on this category explored the participants' suggestions and actions towards solving identified problems. When asked how they suggested that the problems could be solved, the following responses were given:

> *"T1: After chopping the trees for firewood the environment in which the trees are being chopped must be given time to recover"*

> *"T1: Instead of burning the weeds, we can bury them in the soil to develop the compost"*

> *"T2: With recycling practically we failed because there are financial disadvantages instead of benefits"*

> *"T2: So our hands are tight"*

> *"T3: "I just encourage learners to pick up papers and not litter in the rivers and other papers we take them for recycling or give them to communities, we are not sure whether communities are going to use them or not".*

Solutions to problems are action-based. The statements provided by T1 seem not be action oriented but rather suggestions to problems identified. This was noted from T1's use of words such as "we can, must be given". The responses given by T2 are an indication that T2 was not doing anything with problems identified for economic reasons. Statements such as "our hands are tight; we try" gives an indication that teachers lack appropriate skills in addressing environmental problems.

Although T3 seemed to be managing the waste by recycling to some degree, by encouraging learners, the school seemed to practice a "not in my backyard" immediate solution which would still create another problem for the communities.

C3C: Assessment practices

Assessment practices are analysed to determine teacher's skills in effectively transferring acquired knowledge into practice. When participants were asked how they assess environmental content knowledge, they gave the following responses:

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"T1: Actually, honestly, we are assessing knowledge. We are not putting much on practical part. Yes, they are doing projects but mostly is knowledge based. Because we have the pressure of the content subjects we are teaching because at the end of the day we have objectives we have to reach"

"T2: Like now I have given learners something called mini pad, its written assessment. I don't think EE content is much covered. There is this EE content question in every mini pad that covers 5 marks"

When asked about practical assessment, T2 response was:

"no we don't have practical assessments our assessments are mostly assessing knowledge"

"T3: Yes, there are periods when they are doing projects practically. I group them and make their own mats, aprons, trousers and shoes".

"T3: There are six mothers that were school governing body members that they pleat mats with the plastics we have collected to trap dust".

Participants T1 and T2 responses suggest that their focus on EE content in on one domain of learning, the knowledge strand. Although knowledge is fundamental in developing environmental literacy, it is also action oriented, and should consider skills and its application (Ever, 2012:15). CAPS curriculum is also knowledge driven, however, suggests multiple assessment practices on how knowledge acquired should be put into practice by suggesting activities to develop skills to identify, critically analyse, synthesise and evaluate environmental problems and taking actions to solve those problems (DBE 2011:48).

T3 seemed to be using a multiple participatory assessment practice to develop multiple skills. Participatory assessment methods are seen to be a good approach to teaching EE content, as learners participate in the learning process and develop various skills (Kimaryo, 2014:130). T3's statements further denote that activities were not fully learner centred, and that some projects were done by school governing body members. Although EE requires a collaborative effort from all stakeholder, learners should be fully involved in EE projects so as to turn the knowledge acquired into skills.

In summary, although participants were able to identify some of the environmental problems and were able suggest some solutions to these problems. They seemed to lack the appropriate skills required to take action to solve those problems. Most of their

responses were suggestion based and not action based. Environmental literacy is action oriented, therefore, an environmentally literate person should be able to take appropriate action to maintain, restore and improve the health of the environment (Roth, 1992:27).

Furthermore, participants gave an indication that they lacked inquiry-based teaching skills. This argument is drawn from the participant's statements that their assessments were knowledge based. Environmentally literate teachers should be inquiry-based teaching literate in order to be able to create learning opportunities that allow learners to use their critical thinking to search information, and to take action towards solving environmental problems in order to change the world (Kidman, 2018:2). Inquiry-based competency is developed as a result of the self-efficacy perception of teachers. The self-efficacy perception of teachers is important in motivating innovative teaching methods and perceiving challenges as opportunities for learning to develop the inquiry- based skills required to investigate, analyse and solve environmental problems (Sen & Vekli 2016:516).

4.4.4 Theme 4:   Sustainable Behaviour

4.4.4.1   Subtheme 1: Sustainable practices

Sustainable practices and efforts are analysed to determine how the participants' environmental knowledge, attitude and skills promoted the sustainable use and conservation of resources. The analysis considered the dimensions of sustainability, including the environment where resource management is analysed holistically, by looking at economic and societal benefits of the programmes and policies guiding environmental ethics in schools. Barriers and challenges which hamper effective development of environmental literacy were analysed under category 'constrains'. Analysis of this category was underpinned by the theory guiding the study which is based on the premise that self-efficacy can motivate behaviour and promote willingness of participants to engage in practices that will sustain the environment (Kostadinova, 2013:25).

C4A: Resources conversation and management

When participants were asked of the sustainability programmes they have in school to conserve and manage resources, they gave the following responses:

"T1: We had vegetable garden which have ceased because of water shortage"

"T1: The waste is not beneficial to school, we have organised people who are coming to collect our waste, remains of food from the feeding scheme, papers the children are littering around, we put them in a big collection bag and there are people who are coming to collect them and we are not getting too much out of it"

"T1: And in the classroom, waste is a challenge we don't practice separation it is not possible we only put one bin in a class and is not all the classes which are having bins"

"T1: For cooking for learners, we are using firewood because we still have to work on the electrification of the kitchen"

"T1: With water saving, we have the buckets in each class and we don't allow learners to continuously go to the compounds. We are using borehole water and no other sources"

With respect to water and energy saving programmes, the school seemed to have put some measures in place by installing solar energy and taps that automatically close, as mentioned.

"T1: We don't have any energy saving programmes like these globes I found them being used. Like I said the study is an eye opener that why I am saying we don't have these things and will have to learn how to implement them".

C2 also have challenges in some of sustainability practices.

"T2: Our vegetable garden was functional last year, this year we had some challenges and pressure of time.

"T2: On waste management, with recycling we have practically failed because we have to get transport and use our petrol and you find that we get less money and we find ourselves working at a loss. Like papers we just burn them.

With water and energy saving programmes, the school seem to have put some measures in place by installing solar energy and taps that automatically closes as mentioned.

"T2: With energy saving programmes, we have just installed solar, we were using firewood and they became scares. With water we try to use taps that automatically closes. We don't have problems with water, we are using borehole we have 5 jojo tanks we pump them every morning"

The participants' responses on not having water problems because they were using borehole water, indicates a lack of foresightedness on the depletion of natural resources (Bandura 2001:7).

C3 seemed to be involved in some sustainability practices, management and conservation of resources. When asked whether the school has a sustainable vegetable garden, she indicated that:

"T3: We do have a functioning vegetable garden. We went for a gardening course myself and the principal and we won R30 000 to improve our gardens. We normally do our compost, we normally put grasses in a heap for five weeks, then will take them on a row of our beds, and normally we put some grasses for moisture and it releases easily on the roots. For irrigation we use chattels to avoid water wastage"

On integrated waste management, T3's responses gave an indication that this school does practice waste management, however, the school has some challenges impeding the programmes. When asked how they manage their waste, she said:

"T3: Yes, I put the cans in a big bag and the bottles and separate them and task a truck that is collecting them and transfer them to Johannesburg and they give us little amount just to encourage us to clean the environment. Other papers we just burn them every day to avoid spreading"

When asked about energy and water maintenance and repair programmes that they have she said

"We have some reservoirs to channel the water when it is raining and we are using bore hole water they pump into the jojo tanks. We normally lock the taps to avoid learners closing and opening. We put buckets in each classroom to avoid learners going to the taps. We also have some tanks and when it is raining, we put some water we normally water the plants with that water. With electricity, we use it wisely by switching of the lights we use electricity saving bulbs 60 watts".

From above responses, participants T1 and T2 seem to engage in some of the sustainability practices including the use of solar and buckets in the classrooms. Their major problems seem to be waste management that they cannot do anything about except to bury, burn and give some away. This activity poses health risk to schools and community through air pollution, that have a greenhouse effect and contamination of ground water source which the community mostly depends on. Moreover,

dysfunctional vegetable gardens in C1 and C2 to support feeding scheme programmes result as a disadvantage to improvement of balanced food nutrition of learners and the development of learner's entrepreneurial skills.

However, in the case of C3, T3's responses gave an indication that some resource sustainability is practiced, although C3 also had problems with waste management. As a result, C3 engaged in practices that impacted negatively on the natural environment, including burning of waste.

C4B: Holistic benefits

This category intended to explore social and economic benefits of sustainability practice programmes in schools. When participants were asked how they benefitted from the sustainability practices in their schools, the following responses were given:

"T1: Integrative approach is important in terms of economics we are also developing learner's entrepreneur skills by selling some veggies like onions, carrots tomatoes"

"T1: With people that are collecting papers for recycling, we have no specific contract, they just give us some cleaning materials like mobs just to give something back

"T2: With recycling practically we failed because there are some financial disadvantages. The tins some learners take them and they go weigh them for their own benefit. Food waste is given to one of the community member to feed his pics"

"T2: Vegetable garden was helping with the feeding scheme programmes and some vegetables were sold to buy some seeds and fertilizers"

"T3: They just give us R200, just for fundraising"

Although schools were engaged with some form of the sustainability practice, their responses indicate that they were aware of the economic benefits of these practices. However, their schools do not benefit from them. EE is a holistic approach to learning and teaching, including social justice, environmental literacy and economics, as one of the pillars of the sustainability support structure (UNESCO, 2006:10). Sustainability practices should promote better health and reduce costs by being economically beneficial and rewarding in order to motivate and economically sustain those programmes and practices. Participants' responses show no collaborative efforts between schools, teachers, learners and recycling contractors in managing economic benefits of waste in schools.

C4C: Policy systems

This category explored the policy system and frameworks which guide sustainability practices and programmes to maintain sustainability and environmental ethics.

When the participants were asked about the policies guiding their sustainability practices and important environmental calendars days or programmes, their responses tell that they did not have any policies guiding their practices.

> "T1: For an example, we should be encouraging the classroom management and to say that teachers should have the classroom rules". As for the policy we really do not have any".

> "T2: Actually let me say we don't, we just have to develop EE policy so that we can follow and practice all these things"

> "T3: "No, we do not have policies, is just our school with innovative ideas and actually the principal he loves gardening"

Participants' responses gave an indication that they had no framework guiding their sustainability practices. When asked about observing and honouring important environmental calendar days and programmes, they gave the following responses:

> "T1: "We are aware of them but they are not observed, like I have said we still have a lot to be working on"

> "T2: Actually let me say we don't, we just have to develop EE policy so that we can follow and practice all these things"

> "T3: Yes, sometimes people from Loskop donate trees during Abor week and we come with the spat and overalls and teach learners how to dig holes and plant the seeds. "T3: And our principal buys some plants during Abor week. We are reusing the plastics and other materials. We have Templeman art and culture competitions they normally invite schools to take part in the projects and they knitted and recycled plastic materials"

In in the case of C1 and C2, the participants were aware of some of important environmental days, however, the schools did not have programmes and schedules to honour them. On the contrary, however, C3 collaborated with other stakeholder to observe and honour some of the important environmental days.

In summary, the analysis of this theme denotes that sustainability practices and programmes were not effectively implemented, especially in C1 and C2. In cases where sustainability practices were implemented, they were implemented as a result of inconvenience and not to sustain natural resources, i.e. switching from firewood to solar as a result of firewood scarcity. There further seemed to be no collaborative efforts between the schools and recycling companies.

Sustainable practices were implemented for convenience sake, where recycling companies collected waste and gave only a token of appreciation to the schools. Some learners collected tins from school and sold them for their own benefit. This kind of practice did not contribute to the teaching and learning process and was done on an ad hoc basis. The lack of collaborative efforts is as a result of a lack of policy to formalise and guide sustainable practices and principles, and further lack of curriculum knowledge of teachers on sustainable development and lifestyles.

Education for sustainability is a beneficial tool to advance environmental literacy through practices that model behaviour. (Ever, 2012:4). A belief in self-efficacy forms an important aspect in its ability to foster sustainable development through motivation (Dermici & Teksöz, 2017:117). High self-efficacious individuals tend to form more challenging goals, overcome difficulties and have high levels of motivation compared to less efficacious individuals (Bandura, 1977).

4.4.4.2   Subtheme 2: barriers and challenges

This subtheme explored challenges and barriers schools come across in developing the environmental literacy of the teachers and learners.

C4D: Constrains

Although participants were aware of teaching EE content within their subjects, they also highlighted some constraints in effectively developing their own environmental literacy and that of learners, across the cases. Constraints that were alluded in the participants' responses included training and support, waste management, pressure of time, availability of resources and their rural context.

The following responses training and support were given by participants when asked about constrains they encounter in developing their environmental literacy and their learners:

> T1: If the in service training were done correctly and effectively, teachers would be equipped with knowledge and skills on how to address environmental problems"

> "T2: Sometimes if there are in-service training they should not focus only on one group like social science, and other teachers like those teaching maths are left out, that is a challenge. So whenever there are workshops they must include everybody because EE content is included in all the subjects"

> "T2 further commented on the importance of availability of information and support that "we need more information to teach our learners and to do other things like you spoke of environmental awareness days. As long as we do not have information, will always have a problem"

> "T3: I also wish other educators know the importance of the environment for more team work because when someone introduces something some are negative because of the little knowledge".

T1 and T2's responses indicated that training and support on EE content, if provided, was for certain teachers for specific subjects, and not across all subjects. This become a challenge as EE should be integrated across all subjects.

Participants further mentioned a lack of resources, as a result of their rural situation, as a challenge to the practice of sustainability in their schools. In managing their waste, they mentioned the following challenges:

> "T1: The environment has nothing to do with rurality or urbanism, but as the same time if there are resources, we can be able to do as much as urban areas"

> "T2: Some of the things we cannot do them because of our rural context. Like recycling it is difficult for us to implement it because it's expensive"

> "T3: Waste is a problem it affects our herds of cattle, sheep and goats because they eat the plastics because of littering in the grounds, rivers and dams. We don't have good containers or dustbins; we just compromise because we are living in the rural areas. If our departments could supply us with equipment, we would do more".

Pressure of time was also indicated as a constraint for effectively teaching EE content across all cases.

> *"T1: Maybe because of the pressure of the content we are teaching because at the end of the day we have objectives that we have to reach of the subject content I am teaching"*

> *"T2: We had vegetable garden but because of pressure of time it ceased"*

> *"T3: Yes, not always, because of pressure of time there are some times when they are doing".*

The above responses bring to light barriers and challenges teachers' faces that hampers the development of their own environmental literacy and that of learners. Teachers seem to be lacking behind across all components of environmental literacy including knowledge, attitude and skills. Participants feel that they are under resources as a result of their rural environment, and under trained to effectively develop their environmental literacy and that of learners.

Participants mentioned pressure of time across the cases based on focusing on the syllabus of their subject content. This suggests that participants are intentionally excluding EE content from their subjects based on the premise that it does not form part of their subject content syllabus. This indicates a lack of teachers' curriculum knowledge content.

4.5 SUMMARY ON TEACHER'S FACE TO FACE INTERVIEW ANALYSIS AND PRESENTATION

The summary is presented according to the themes guided by research questions on environmental literacy components. The environmental literacy components are drawn from Charles Roth who divided environmental literacy into three working levels, namely, nominal, functional and operational environmental literacy (Roth, 1992:8).

I employed the three working levels as a framework for presenting a continuum of the participants' environmental literacy in which nominal level, which is at the lower end of environmental literacy, requires a person to have rudimentary knowledge of natural systems and how humans interact with them. The nominal level further requires a person to develop an environmental awareness and sensitivity with an increased respect to nature and a concern for how human interact with nature.

The functional environmental literate level, which is the middle level, requires a broader knowledge of, and an increased broader understanding of human environmental interaction; more awareness of, and concern for negative human interactions; more developed skills in order to analyse, evaluate and communicate feelings about environmental problems and be more willing to take action required to solve these problems.

An operational environmental literate level, which is the upper level. In this level the person has moved beyond functional literacy, in both the breadth and depth of understanding and skills required to evaluate the impacts and consequences of actions. The individual demonstrates a strong and ongoing sense of investment and responsibility for preventing and remediating behaviours, and routinely take action that works to sustain and enhance healthy environment.

On Theme 1 knowledge, T1 and T2 displayed a basic knowledge of EE content and its pedagogical approaches. This statement is based on the finding that participates had no training and development on EE content, however, they were aware of EE content interrelated into their subjects. They demonstrated basic knowledge of EE and ecological processes and how human and other factors impact on them, however, they lacked an integrative approach and expertise to effectively teach EE content. Furthermore, participants' knowledge of EE content was not transferred into the action required to solve environmental problems. This statement is based on participant'' responses that they assessed knowledge and focused less on practical assessments.

In C3, T3 displayed an adequate knowledge of EE content and a basic knowledge of pedagogical approaches. This participant had a qualification which included EE studies and had been to a workshop on gardening. She portrayed adequate ecological knowledge and knowledge of processes, as well as knowledge of how human and other factors affect these processes. She further suggested some solutions to identified problems and adequate action required to contribute to solving those problems. She possessed adequate knowledge of different approaches to teaching and created different learning opportunities for her leaners.

With respect to Theme 2, the participants portrayed some level of positive attitude towards natural environment. The findings revealed some sense of care, value and concern that gave some sense of appreciation to the environment. However, little

commitment to solving environmental problems was evident in the findings. In the case of C1 and C2, although the participants felt that they were confident and motivated to teach EE content, the findings did not reveal much of courses of actions taken towards solving environmental problems and how such actions were encouraged and maintained. The reason given by the participants was little support and development on EE content. In the case of C3, T3's responses revealed some courses of actions towards the solution of environmental problems and how they are encouraged and maintained, however, those actions were portrayed as co-curricular.

With respect to Theme 3, the findings revealed that, in the case of C1 and C2, the participants were able to identify and suggest some solutions to problems, however, they lacked appropriate skills in taking action to solve these problems. Most of their responses were suggestion based and not action based. The participants further seemed to lack place-based and inquiry-based skills to develop the inquiry-based learning opportunities required to develop the skills necessary to take action towards solving environmental problems. In the case of C3, the participant seemed to possess some knowledge of the skills required for different learning approaches and the techniques required to develop learning opportunities that promote some level of action towards solving environmental problems.

With respect to Theme 4, the findings reveal that C1 and C2 implemented some sustainable practices, however, the practices were implemented more out of convenience than on a conservative basis. This statement is based on participants' statement that their reason for switching to solar energy was as a result of the scarcity of firewood. There further seemed to be fewer economic benefits, fewer collaborative efforts and little commitment to working with different stakeholders to support and maintain these practices. This is attributed to barriers and challenges that schools face in effectively practicing sustainability.

Similarly, in C3, the findings revealed some challenges with respect to sustainability practices as a result of fewer collaborative efforts and little support from other stakeholders. However, the school was involved in more practices to conserve and maintain natural resources, although some of those practices were not learner centred. Furthermore, the findings revealed that there was no policy system,
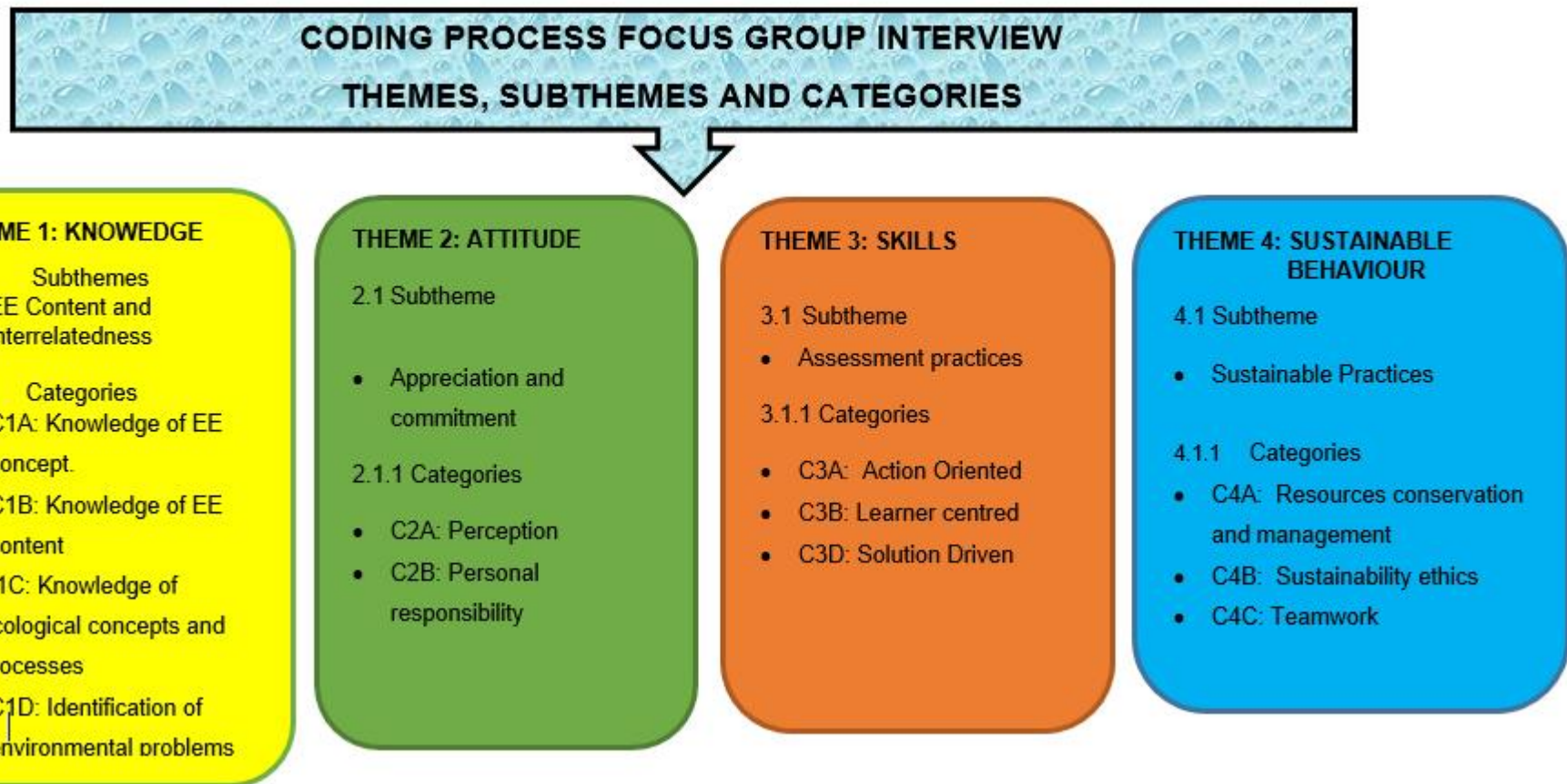
guidelines or any form of framework guiding environmental ethics across all three cases.

In summary, thane analysis and interpretation of the C1 and C2 face to face interviews reveal a gap in professional development, support and commitment required to effectively teach EE content for environmental literacy. There further seemed to be a gap in transforming acquired EE knowledge into action, which form basis of environmental literacy and sustainable practices. Therefore, the above findings locate both C1 and C2 participants at the nominal continuum level of environmental literacy which Roth (1992:26) translates into the awareness stage.

The C3 face to face interview findings reveal a gap in some pedagogical skills. However, T3 portrayed adequate EE content knowledge, which was transformed into some action towards sustainability practices. This finding place C3 on the functional continuum level of environmental literacy which Roth (1992:26) translates into the understanding stage of environmental literacy.

4.6 FOCUS GROUP INTERVIEW

The following section presents an analysis of the learner focus group interviews. The presentation is also guided by the research questions, as well as some of the themes, sub-themes and categories mentioned in the previous section. Below is the schematic representation of the coding process that guided the analysis of the learner focus group interviews

CODING PROCESS FOCUS GROUP INTERVIEW THEMES, SUBTHEMES AND CATEGORIES

THEME 1: KNOWEDGE

1.1   Subthemes
- EE Content and interrelatedness

1.1.1   Categories
- C1A: Knowledge of EE concept.
- C1B: Knowledge of EE content
- C1C: Knowledge of ecological concepts and processes
- C1D: Identification of environmental problems

THEME 2: ATTITUDE

2.1 Subtheme

- Appreciation and commitment

2.1.1 Categories

- C2A: Perception
- C2B: Personal responsibility

THEME 3: SKILLS

3.1 Subtheme
- Assessment practices

3.1.1 Categories

- C3A: Action Oriented
- C3B: Learner centred
- C3D: Solution Driven

THEME 4: SUSTAINABLE BEHAVIOUR

4.1 Subtheme

- Sustainable Practices

4.1.1   Categories

- C4A: Resources conservation and management
- C4B: Sustainability ethics
- C4C: Teamwork

FIGURE 4.2 Focus Group Interview Coding Process, *Source: Researcher*

The following table present participant's codes used during focus group interview data analysis:

TABLE 4.6: Focus Group Interview Codes. *Source, Researcher*

CASES AND PARTICIPANTS	CODES
Case 1	C1
Case 2	C2
Case 3	C3
Learner 1	L1
Learner 2	L2
Learner 3	L3
Learner 4	L4
Learner 5	L5
Learner 6	L6
All learners	AL

4.6.1 **Theme 1:   Knowledge**

4.6.1.1 Sub theme: EE content and its interrelatedness

The theme focus on to exploring learner's EE content knowledge learned in school. The development of subtheme and categories are guided by CAPS on content to be learned. Subtheme EE content and concepts is drawn from the theme and guides the development of three categories. The categories include knowledge of EE content and concepts, knowledge of ecological concepts and processes and learning opportunities on how EE content knowledge is acquired.

C1A: Knowledge of EE concept

When learners were asked if they have heard about the concept EE and what it involves, their responses across the cases was

"C1: AL: No we don't know that"

"C2: AL: No

"C3: L1: Yes, is about how to keep our environment clean and how to maintain it"

When learners were asked about what they know about the natural environment and from which subjects they have learned about the natural environment from, they gave the following responses:

"C1: L1: Is like where we live, L2: is like things that are on nature that you use".

"C3: L1: Environment is the totality surrounding of conditions; L2: The areas that we live in, atmosphere, temperatures, water, climate…

"C2: L1: We once heard about it in grade six; L2: They said is recycling; L3: If   you use a thing, they take it and recycle it again"

When asked where they have learned about the natural environment from they said

"L2: from natural science subject; L3: from technology; L1: Only natural science and technology".

"L5: We have learned it in grade six; L2: In Life skills; L1: Natural Science; L5: Only life skills and Natural Science".

"AL: We learn about if from Social science, Natural science, Technology and Life Orientation"

The above responses denote that C1 and C2 learners are not aware of EE as a concept and have different understanding of the natural environment. This is not surprising as teacher participant's responses denoted lack of knowledge of EE as a concept. Contrary, C3 learners seem to be aware of EE as a concept however view EE as the way of taking care of the environment not education about the environment.

Learners are further aware of integrated EE content into other subjects however only subjects including Natural Science, Social Science, Technology, life skills and Art and culture are mentioned. This gives an indication that learners are not aware of EE content in other subjects.

C1B: Knowledge of EE content

The EE content knowledge category is drawn from CAPS curriculum that guided questions content.

When participants were asked about EE themes they have learned they mentioned the following themes:

> *"C2: L2, L4, L1: We learned about water pollution, diseases caused by water and air pollution, littering and natural things that you can change into something manmade"*

> *"C3: L1, L4: We have learned about recycling, they process plastics, bottles and clothes. L3: We have learned about reuse, using something for another purpose like clothes that are torn to make purses, decorating shoes or disposable glass and plant in it. L4: We learned about pollution of water, land and atmosphere and their diseases"*

What can be picked up form above responses is varying degree of EE content across all cases. C1 and C2 participants seem to having limited knowledge of EE content as compared to C3 participants. C3 participants portrays emended knowledge and understanding of EE content and how to apply the knowledge.

C1C: Knowledge of ecological concepts and processes

Knowledge of ecological processes and processes are key in developing learner's knowledge and skill needed to take decisions for sustainable future (Hollweg et al.,2011:2). The following responses were given when participant's ecological knowledge was explored:

> *"C1 L1: We have learned about climate change; it is the heating of weather. L4: and this thing that they call a blanket, that protects us from the sun"*

> *"C2 L3: The atmosphere is how the weather changes or maybe is very hot or it just rain.*

> *"C3 L2: Ecosystem is where other things depend on each other, like humans depends on animals, animals depending on plants depending on sun and water. L1: Trees cleans carbon dioxide and gives us oxygen, they also help for protection of our soil and help animals with shelter.*

C1 and C2 findings suggest that participants have foundational knowledge of ecological concepts as compared to C3. Foundational level of ecological concepts is the major goal for EE however, deep understanding is needed for students to organise scientific ideas (Jordan, Hmelo Silver & Gray, 2009:40). C3 participant's responses seem to have in-depth knowledge and understanding and organised ideas than C1 and C2.

CID: Identification of environmental problems

Participants were aware and able to identify some of the environmental problems across cases. This was indicated by the following responses when asked what they have learned about, what is not good for the environment and people:

> *"C1 L2: With air pollution one can inhale dirty air and get sick, L3: removing trees and people will have no oxygen".*

> *"C2 L4: When people want to build houses, they cut trees, and when they want to make fire.*

> *"C3 L2: Putting waste in water pollute water and gives us some diseases like cholera and bilharzia; L1: when we make fire and chemical from the mines pollute the air and gives us diseases like TB; L3: Air pollution cause acid rain, form unnatural clouds and they come down and the rain has acid"*

Participants are able to identify environmental problems and their impacts on humans and the environment. C3 participants seem to be having more in-depth knowledge of environmental impact as compared to C1 and C2.

In summary, the overall findings for theme 1 reveals varying EE knowledge across cases. C1 and C2 responses reveals basic knowledge of EE content. This argument is based on fragmented participant's responses including "climate change is heating of weather, that thing they call blanket". These kind of response although they might seem concise, they lack elaborative in-depth knowledge and supporting facts to build foundation for environmental literacy.

Contrary, C3 findings denotes adequate embedded EE knowledge. Participant's responses show some deep knowledge and understanding of concepts and processes that are linked to make sensible statements

4.6.2 **Theme 2:   Attitude**

4.6.2.1 Sub theme: Appreciation and commitment

The theme explores how knowledge gained by learners persuades their appreciation of and care for the natural environment.

C2A: Perception

Participants show some sense of appreciation and are aware of the importance of the natural environment. This statement is drawn from their responses when they use words like "trees are important for our lives and animals; it is not a good thing to cut trees". However, appreciation of the environment is developed when learners engage in activities that allows them to interact, see, touch, and feel the natural aspects (Boca & Sisan, 2019:2).

Conversely, participants seem to hold different perceptions towards activities conducted to take care of the environment. Although picking up of papers is a good practice towards clean environment, learners seem to have different perception towards that. When they asked how they take care of their environment, the following responses were given:

> *"C1 L1: When we come late we pick up papers other children start laughing that we pick up papers.*
>
> *"L2: They think that we are mentally disturbed"*
>
> *"C3 L4: And we get punishment to pick up the papers"*

Learners portrays a negative perception towards picking up papers as a result of the figure of speech associated with the practice. This gives an indication that learners lack an in depth knowledge and understanding on how they view their actions towards the environment. Furthermore, positive attitude is promoted by actions learners take to protect the environment. The negative perception on picking up papers carry a negative connotation rather than a good practice of care and protection of the environment and therefore, discourages positive attitude. The practice is further exclusive and involve certain learners and therefore, does not have a collective effort of building environmental literacy for all.

C2B: Personal responsibility

The ability to act towards environmental problems depends on the person's commitment and responsibility of the consequences of their behaviour towards the natural environment. It further depends on motivation an individual gets to perform and maintain a particular course of action towards a desired goal or behaviour (Mart 2011:3). This category explores learner's personal responsibility and commitment to environmental problems identified and motivation in bringing solution to the problems. When participants were asked who is responsible for identified environmental problem, the following responses were given:

> *"C1 L2: Us we litter, we burn waste and we pollute water"*

> *"C2: L4: Is people we sell firewood; L3: Our grandmothers, they cut trees and us too"*

Participant are aware and acknowledges the consequences of human behaviour towards the natural environment. They further acknowledge that "it's us who should fix the environmental problems". Participants further suggested how problems identified could be fix. They gave the following suggestion:

> *"C1 L4: We can all pick the littered rubbish; L2: the school put containers for drinking water; L1: reuse materials and also do garden.*

> *"C2 L2: We should teach people that what they are doing is wrong; AL: We must also know that we are doing wrong; L5: We still collect firewood and we are wrong; L2: Its government and Eskom, they must provide electricity, people should draw water from borehole not drink dirty water from rivers".*

> *"C3 L1: We must plant more trees; L3: The government must organise trucks to collect papers; L2: They must give us dustbins".*

The above responses show some sense of commitment and taking responsibility of their actions. However, statements such as "we can, they must, we must" denotes that participant make suggestions to solution not actions of what they are engaged in. Participants further bring the aspect of collaborative efforts and support from different stakeholders. Statements such as "its government and Eskom, government must organise trucks" calls for help and support from government and other stakeholders. Although participants seem to be committed and take personal responsibility of their

actions, they seem to lack support and motivation that limits participants to take actions towards identified problems.

In summary, although participants appreciate, value and are aware of the importance of caring for the environment, they seem to lack adequate knowledge and understanding, motivation and support to build a positive attitude. Positive attitude is built by actions learners take, motivation and support to sustain and improve those actions. It has been noted that participants have a negative perception towards some of the activities they perform, lack motivation and support which are fundamental in persuading a positive attitude of developing environmental literacy.

4.6.3 Theme 3:   Skills

4.6.3.1 Sub theme: Assessment practices

The theme explores how the acquired knowledge provide necessary skills in solving environmental problems. CAPS provides for cognitive and practical skills that will enable learner to make informed decisions in solving environmental problems (DBE 2011:5). The subtheme assessment practice does not explore classroom written assessment methods learners do, but assessment practices that participants are engaged in. Categories action oriented, learners centred and solution driven were developed to explore learner's assessment practices and how are translated into actions.

C3A: Action oriented

Action oriented assessment practises are said to result from interdisciplinary learning that engages learners in inquiry based practices to build skills that investigate, critically analyse, creative and innovative thinking to make informed decision in solving environmental (Kidman & Casinader, 2019:2). When participants were asked about EE activities they do in school and in class they gave the following response:

> *"C1 AL: We learn about it in class and we write class works, homework and notes.*
>
> *L1: We used to go out and they show us how to plant plants"*
>
> *"C2 AL: We write about them in classwork"*

When participants were asked if they have done any projects the following responses were given:

> *"C2 AL: No, they once gave us a project in grade 3, L1: the other one in technology we are doing Jaws of Life"*

> *"C3 AL: In class and outside and we practice them at home, we have not done any projects.*

Participant's responses give an indication that learning mostly takes place only in the classroom and involves more written assessments than practical ones. The interdisciplinary nature of EE requires learning that encourages hands on activities and participation than traditional learning approach that is knowledge based (Ever, 2012:4). Although knowledge is fundamental for development of environmental literacy, capacity building in the form of field based, research based and effective assessment practices are important in order to transform knowledge into actions to solve environmental problems (Ever, 2012:17). CAPS further recommend skills development to investigate and solve problems that need learner's practical abilities (DBE, 2011: 10).

C3B: Learner centred

Principles of environmental learning requires pedagogical approaches that involves active and participatory learner centred than traditional passive teacher centred approach. It further requires learning opportunities that involves multiple EE intelligence to enhance the development of proper skills to solve environmental problems (Byrne, 2016:13). This category explores how learners are actively involved in assessment practices both in classrooms and field activities.

When participants were asked if they are involved in any environmental activities in school, they gave the following responses:

> *"C1: 1: With recycling some people come with trucks to collect papers to recycling; with gardening, volunteers come and help with seeding we sometimes help with watering"*

> *"C2: Mr Mabena is the one who looks after the garden but there are the boys who they call to come and help"*

> *"C3: AL: In class we sweep and pick up papers and we water the garden. The principal and the volunteers do the garden"*

The above responses give an indication that less inquiry based and outdoor learning opportunities are created that involve active and participatory practices. Although EE

learning require collaborative efforts from teachers, stakeholders and communities, the supporting efforts should provide guidance and not replace learner's engagement in EE projects and activities. My argument is drawn from participant's responses that "recycling is done by some people, volunteers for seeding". Learners seem to provide bare minimum efforts that would not build a strong base for development of skills to solve environmental problems.

C3C: Solution driven

The ultimate aim of EE and sustainability is to provide solution to environmental problems (Ever, 2012:17). This category intends to explore participants acquired skills in solving environmental problems.

When asked how they solve environmental problems they have identified or caused, they gave the following responses:

> *"C1 L1: Maybe we can encourage each other to use containers when drinking water, L4: we can reuse waste and do the garden"*

> *"C2: L5: We should ask teachers", L2: By not leaving water pumps opened".*

> *"C3: L2: We must recycle plastics so that animals do not eat them by using 3 Rs and put dustbins everywhere. L1: Government should organise trucks to collect waste, L3: When we make fire, we must plant more trees to take carbon dioxide, L2: we can also use solar to save electricity"*

Statements such as "maybe we can, we must, we should" denotes that participants suggest solutions to the problems identified. Although those suggestions are solution driven, they give no indication of participants' involvement in solving identified problems. Suggestions only cannot develop skills to solve environmental problems. Learners should be involved and participate in activities they have suggested.

4.6.4 Theme 4:   Sustainable Behaviour

4.6.4.1 Sub theme: Sustainable practices

The theme intends to explore participant's behaviour towards the natural environment. Participant's sustainable behaviour will be reflected by their practices and ethics that guides the practices and lifestyle towards the desired behaviour. The Self-Efficacy Theory advocates for one's belief to act in a particular situation (Bandura 1997). For

the context of this study, self-efficacy of participants is determined by the sustainable practices they engage in that will determine their behavioural choices and lifestyle.

The subtheme sustainability practices are developed to guide emerged categories that explores participants' involvement in management and conservation of resource, sustainability ethics that guide their conduct and teamwork towards achieving sustainable behaviour and life style.

C4A: Resources conservation and management

When asked if they have green or vegetable garden, participants across cases gave an indication that they do have vegetable gardens however, some of them are not functional.

> *"C1: L2: We have it, it was in the back, C2: AL: Yes, we have but is no more working.*

> *"C3: L1: Yes, there is vegetable garden. L2: We also make compost by digging hole and putting left over food and grass to make compost, L5: Our general worker sells the vegetables to teachers and our mothers".*

Waste seem to be a challenge across cases. On managing waste, the following responses were given:

> *"C1: L2: We throw some in the water, L4: other plastics and pampers nappies are eaten by animals,*

> *L2: we dig a whole and put papers and burn them. Others put them in the drum and burn them.*

> "*C2: L1: The old food for feeding scheme are given to people to feed their pics. L2: The tins are taken by other learners to sell them for recycling. Recycling people come to collect some waste for their companies'"*

> *"C3: L1: We make fertilisers with old food, grass and tins, L3: Other papers are given to other people for recycling and some we burn them.*

On conserving and managing water, the following responses were given*:*

> *"C1: AL: We drink water from the taps. Buckets are used by younger learners.*

> *"C3: L1: Like in our class we put water in the buckets we don't drink from the tap we will waste water"*

On conserving electricity, the following responses were given*:*

"C1: L2: We are not responsible for electricity"

"C3: L1: We can use solar energy to save electricity and turn off the electrical appliances when they are not in use.

It is noted from the above responses that conservation and management of resources is not effective and beneficial to C1 and C2. Recycling of waste is done by companies and individual learners and is not beneficial to the entire school. There are still unsustainable practices of burning waste and water wastage. Participants seem not to be involved in energy conservation. Contrary, C3 seem to be practicing some of the sustainability practices however, still have some challenges in managing of waste.

C4B: Sustainable ethics

This category seeks to explore the systems and processes put in place to guide and motivate participant's sustainable practices. The following questions were asked to explore how the schools guide and motivate sustainable behaviour:

When asked if the classroom rules include littering and saving resources the following responses were given:

"C1 AL: No

"C3: AL: Yes, girls have cleaning time table every day"

The above responses denote that there are no measures put in place to guide and motivate participants' practices towards the natural environment.

C4C: Teamwork

This category intent to explore collaborative efforts put to promote sustainable practices across all cases. When asked if they celebrate and honour important environmental awareness days like Abor day, the responses gave an indication that they do not recognise the days however are sometimes involved in activities rendered for those days. Responses given include:

"C1: AL: No we don't know Abor day. We once planted some trees but its long time.

"C3: AL: No we don't know Abor day we know spring day we pour each other with water",

"L1: Our principal plant trees and some trees are natural". People from Loskop once came and plant some trees"

When asked if they are involved in any Eco clubs, have taken an excursion for recycling, EE centres or participate in any environmental activities in communities they gave the following responses:

> *"C1 AL: We never went to recycling places, we went to the zoo and school matches.*

> *"C3 AL: No, but other learners that are in grade 9 went to Templeman for competitions. Us we do projects with papers we do flowers, bracelets and decorations for shoes, L1: We don't know eco clubs".*

The above responses give an indication that there is less collaboration on sustainability matters, less learning opportunities and institutions that support and promotes sustainability practices

4.7 SUMMARY ON LEARNER'S FOCUS GROUP INTERVIEW ANALYSIS AND INTERPRETATION

The environmental literacy of participants across all three cases was also guided by Roth's environmental literacy continuum levels, namely, nominal, functional and operational levels. The summary is presented according to the themes.

The findings locate C1 and C2 at the nominal continuum level of environmental literacy which Roth translates to the awareness stage (Roth, 1990:8). This statement is based on the conclusions each theme arrived at. Firstly, with respect to Theme 1, the findings revealed that the participants portrayed a basic level of environmental literacy because of some fragmented responses that indicated a lack in-depth knowledge and understanding of EE and of ecological concepts and processes.

However, the findings from C3 locate participants at functional continuum level of environmental literacy. Participants' responses reflected an in-depth knowledge and understanding of EE content and of ecological concepts and processes.

Secondly, Theme 2 revealed that, across all three cases, knowledge gained seemed not persuade of positive attitudes towards the natural environment. Although participants showed some sense of care and appreciation for the natural environment, the findings revealed some negative perceptions towards some of the activities aimed at taking care of the environment. Participants further seem to lack the necessary motivation and support to take action towards solving identified environmental problems.

Thirdly, Theme 3's findings revealed that C1 and C2 participants did not translate knowledge into action. Their responses revealed suggestions to solving environmental problems rather than actions taken to solve these problems. There further seemed to be limited learning opportunities and assessment practices that were action oriented and, as such, this limited the development of the skills required to participate in solving environmental problems. Although C3 participants did suggest solutions to environmental problems, they seemed to be involved in different learning practices, including projects, however, these practices were not inclusive of all learners.

Lastly, Theme 4's findings revealed that C1 and C2 participants implemented some sustainable practices, however, the practices were not inclusive of all learners and some of the practices were not learner centred. There further seemed to be little in the way of economic benefits, collaborative efforts or commitment of different stakeholders to support and maintain these practices.

Similarly, in C3, the findings revealed some challenges with respect to sustainability practices as a result of few collaborative efforts and support from other stakeholders. However, the school was involved in practices to conserve and maintain natural resources, although some of these practices were not learner centred.

The findings further reveal that there were no measures put in place, in the form of codes of conduct, to guide and motivate behaviour changes towards sustainable ethics.

4.8 CONCLUSION

This chapter presented the analysis and interpretation of the data collected through observations, document analysis, face to face interviews and focus group interviews. Data presentation was guided by the four themes drawn from the research questions which guided the development of the categories that emerged. Data was analysed and interpreted to report my understanding and my findings. In the next chapter, a discussion of findings, as well as the conclusions and recommendations are presented.

CHAPTER 5

SUMMARY OF FINDING

S, CONCLUSIONS, AND RECOMMENDATIONS

5.1 INTRODUCTION

This marks the concluding chapter for this study. It provides for summary of findings, conclusions, and recommendations. Firstly, I remind the reader by reflecting on research main and sub questions, which guides the discussion of findings. Secondly, the summary of the main findings is presented in line with the research sub-questions. The research findings are linked to the literature and the theory guiding the study so as to discuss the study's contribution to the body of knowledge, to make recommendations of the findings and to identify further studies on gaps that are identified. Lastly, the conclusions about the study are drawn.

5.2 REFLECTION ON MAIN RESEARCH QUESTION, SUB-QUESTIONS AND OBJECTIVES

The research sub-questions highlighted in Chapter 1, section 1.5, guide the discussions of the findings, with the purpose of answering the main research question. As stated in Chapter 1, the study intended to answer the following research question:

How effective are the environmental literacy components of knowledge, attitude and skills at promoting sustainable behaviour of both teachers and learners in rural primary schools?

As stated in section 1.5, the following sub-questions guided the discussion and the findings:

- Which environmental content knowledge is taught and learnt in rural primary schools?
- Which pedagogical approaches are used to teach integrated EE content in rural primary schools?
- How effective is the acquired EE knowledge in developing a positive attitude towards sustainable practices and lifestyle?

- How effective are the skills acquired in supporting the making decisions to take action towards solving environmental problems?
- How effective are these components knowledge, attitude and skills at promoting sustainable behaviour?

5.3 SUMMARY OF THE FINDINGS

5.3.1 Which EE content knowledge is taught and learnt in rural primary schools?

The findings on this question locate C1 and C2, both teachers and learners on nominal level of EE content knowledge and C3 both teachers and learners on functional level of EE content knowledge. These findings are attributed to factors including lack of teacher's training and development on EE content, lack of teacher's expertise to develop environmental literacy of learners, the content integrated approach of EE in the CAPS curriculum, basic knowledge and understanding of EE concept and content knowledge, and ecological concepts and process.

The lack of teachers' expertise in effectively teaching EE content was apparent as teachers had not been provided with an opportunity to develop the expertise required to effectively develop learner's environmental literacy, either through pre- nor in-service training. Moreover, it was revealed that C1 and C2 teachers obtained their teachers' qualifications prior to the introduction of EE in tertiary institution courses and, therefore, EE was a not part of their qualifications. Furthermore, teachers were not experts in the subjects that they are teaching. It was mentioned that subjects were allocated to them based on the premise that they held teacher qualification, and therefore, should be able to teach all primary education subjects.

On the other hand, the C3 teacher participant hold a postgraduate qualification which included environmental studies, and she taught social and natural science subjects which were allocated to her based on her subject specialty. The findings on lack of pre-service training in some of the teachers' qualification is supported by revised policy on the minimum requirements for teacher's education qualifications which outlines that, EE is included in Bachelor of Education from Honours level (DHET,2015:44). These findings show the importance of pre-service training with respect to EE content from the entry-level of teacher qualifications so that they are equipped with the

necessary competencies and skills to develop the environmental literacy of learners. The findings also highlight the importance of the in-service training of teachers in order to provide guidance and support in the continuously changing EE content and to improve their pedagogical skills. The findings further highlight the importance of the teachers' expertise in effectively developing environmental literacy in schools, rather than EE being treated as a general knowledge subject to be taught by every teacher.

The importance of teachers 'pre- and in-service training, expertise in EE is highlighted by several scholars as important to develop environmental literacy of teachers and those of learners in schools (Ferreira & Molala, 2017; Gbadamosi, 2018, Kidman & Casinader, 2018).

The findings also reveal that both teacher and learner participants are not familiar with the concept of EE. The participants portrayed some misconceptions about the EE concept by not being able to differentiate between EE as a concept and its content. Participants from C1 further regard EE as a single-dimensional aspect, focusing only on the biophysical environment and were not aware of its holistic nature, which is important if one's goal is to develop environmental literacy. These findings align with the findings of Mohammed (2016), that teachers focusing on one dimension of EE content have bearing on limiting learner's knowledge and understanding of other important dimensions of EE. These findings are not surprising as CAPS analysis findings reveal that EE as a concept does not emerge in the curriculum, however, its content is integrated across the CAPS curriculum.

The absence of EE as a guiding concept becomes a limiting factor for educators to be consistent in teaching EE content and to align EE content with its goals and objectives of developing environmental literacy and behavioural change. These findings were also confirmed by Hungerford and Volk (1990); Sousa, Richter, and Raath (2017:3); Dhull and Verma (2017:1550) that, since its inception, EE was not accepted as a concept in its own right, but was integrated into the content of other subjects. Not recognising EE as a guiding concept to its content, does not give EE the specialised and distinctive value it deserves in the teaching and learning process so as to achieve its desired goals and objectives. Furthermore, a special label, like environmental or sustainability education, serves to draw attention to EE's focus required in educational programmes (Athman & Monroe, 2001:13; Rosenburg, 2009:3).

The findings further reveal the basic knowledge of ecological concepts and processes among C1 and C2 participants. It was noted that participants are aware of, and have some knowledge of, ecological concepts and processes, however, the knowledge is very generic and communicative, i.e. "there are some things that will be affected; there are some things that will be extinct." This becomes a limiting factor to educators who want to build strong base for EE, as ecological concepts and processes are two of the four key foundations of the levels of cognitive knowledge and skills within the broad scope of environmental literacy (Hollweg et al. 2011:18; Ireland:2013:28).

Observation findings also reveal an inadequate level of landscaping at the schools, including a lack of planting of indigenous trees and a lack of vegetable garden habitat areas required to incorporate ecological aspects in teaching EE content and to maximise outdoor learning opportunities. The absence of garden corners and flowers required to incorporate the ecological aspects into the classroom teaching and learning was also noticed. On the other hand, C3 showed embedded ecological knowledge and understanding of ecological processes. T3 made reference to how natural systems work, brought in some indigenous knowledge on ecological systems, and how these systems link to social and economic systems, and made suggestions to solve identified problems.

These findings bring to light the importance of EE knowledge as foundational in understanding how environmental and ecological systems work. This allows teachers and learners to be aware of the impact they have on the natural environment and to be adequately prepared to address environmental problems. These findings are also supported by Paden (2008); Hollweg et al. (2011); Ever (2012); McBride et al. (2013) on the notion that building ecological foundation through knowledge and understanding of ecological concepts is one of the key attributes of environmental literacy.

EE content knowledge is also highlighted as crucial in developing teacher's self-efficacy in developing their environmental literacy and those of learners (Dermici & Teksöz 2017:117). Furthermore, teacher's lack of development on EE knowledge are amongst other aspects affecting their development of self-efficacy (Yildirm, Kişoğlu & Salman, 2018:242). High Self-Efficacious educators act in a planned, determined way

and confident to provide effective teaching environment to ensure that learners gain relevant knowledge necessary to develop their environmental literacy (Yildirm, Kişoğlu & Salman, 2018:242).

5.3.2 Which pedagogical approaches are used to teach integrated EE content in schools?

The analysis of CAPS curriculum reveals that EE content is variably integrated across all subjects of the curriculum. However, CAPS is not explicit on the pedagogical approaches teachers should adopt to teach the integrated EE content. This is based on the statement drawn from CAPS document that: "This content and the associated concepts must be integrated with the aims and skills" across all subjects (DBE, 2011:24). This becomes a limiting factor for teachers with no background in EE pedagogical knowledge to effectively integrate EE content into their subject's content.

The findings also reveal that participants are aware of the integration of EE content in curriculum subjects, and that they are of the knowledge that CAPS encourages an integrative approach. However, they portrayed inadequate knowledge and skills to integrate EE content into their subject content. Participants made it clear that the integrative approach is a challenge to them. This was evident during lesson observations when it was observed that teachers still follow the teacher-centred traditional approach of teaching. This approach limits action based learning opportunities and the pedagogical approaches necessary for the development of environmental literacy.

These findings align with those of (Hollweg et al., 2011; Zhou, 2015; Richardson, Byrne & Liang, 2017). These authors highlighted the fact that teachers' development and training is a profound barrier to pedagogical and instructional approach to EE content. Environmental content knowledge is new to most teachers and they therefore struggle with translating environmental information into appropriate pedagogical strategies and processes (DEAT, 2008:1). Teachers' educational programmes should complement the curriculum integrative guideline by developing teachers' pedagogical content knowledge in a way that will frame EE teaching and learning programmes (DEAT, 2008:1).

The findings further reveal that EE content is treated as separate content and, therefore, is given less priority. This was revealed when teacher participants alluded

to the fact that they focus more on their subject content. Moreover, participants' statements, such as "I never thought EE form part of technology, Yes the content is there but is not much, I thought is for teachers who teaches natural science and social sciences" reveal that teachers do not feel obliged to teach EE content within their subjects as they associate the content with other curricular subject content. This indicates that teachers lack curricular content knowledge and understanding of the curricular material available for teaching integrated EE content in their subjects. These findings align with those of (Songqwaru, 2012; Fundisa for Change, 2013) on the importance of teacher's curriculum content knowledge to effectively teach EE content for development of environmental literacy.

5.3.3   How effective is the acquired EE knowledge in developing a positive attitude towards sustainable practices and lifestyle?

The categories perception, support, confidence and motivation, and personal responsibility emerged to explore this research sub-question. The findings reveal that participants are aware of the importance of teaching and learning EE content in school. They further take personal responsibility for the environmental problems identified in schools and communities. However, participants' perceptions and how they address some environmental problems do not induce a positive attitude and love for what they are doing. How teachers attend to environmental problems is perceived as disciplinary or corrective measures by the learners. This statement is drawn from the findings that learners who come late to school are the ones picking up litter. Learners also perceive the practice as punishment, rather than a good practice of care and a clean environment.

The practice is further not inclusive of all learners as only certain learners are involved. Although fieldwork is encouraged and is part of inquiry-based learning. fieldwork should be carried out as part of teaching and learning activities and should include all learners, with teachers observing and writing reports that contribute to learners' progression (Ever, 2012:27; Juntunen, 2015:28; Sen & Vekli, 2016:1). This will further allow learners to share collective responsibility towards the identified environmental problems.

The findings of this study also revealed that schools are not getting sufficient support in terms of resources best suited to support the development of environmental literacy

across cases. T1, as a principal of the school, and T2, as a Head of Department, expressed their frustrations about the lack of support from their immediate sphere of government, and their inability to support the teachers. Lack of EE content expertise and specialists, collaborative efforts and resources from their immediate spheres of government, including circuits, district and regional offices department, and other stakeholders, was mentioned as a challenge. EE content is inquiry-based and requires the best support with good sources of information, including advanced textbooks, magazines, campaigns, fieldwork, access to the internet and many more (Rosenburg, 2009:5).

The findings revealed that teachers are only using old magazines and some posters in C3 as a teaching and learning resource for teaching EE content, and that they have no access to the internet. We are moving into the Fourth Industrial Revolution where schools should be equipped with new technologies and the 21st-century skills that will aid the integrative approach of EE content (World Economic Forum [WEF],2019). With internet sources such as Google, YouTube, Blogs, podcasts, and others, teachers can access and create their own resources and supporting networks to enhance learning opportunities best suited to develop learner's environmental literacy.

The findings further revealed that participants show confidence and are motivated in teaching their subject content, however, they showed less self-efficacy in teaching EE content. This was evident as participants' responses indicated minimum courses on their actions towards addressing environmental problems, and there were no indications of how their actions are encouraged and maintained. Self-efficacy influences an individual's attainment of courses of action, performance, and endurance during the process (Bandura, 1997:2).

It is evident from the above findings that EE knowledge acquired in schools, is inadequate to persuade teacher's and learner's attitude towards developing environmental literacy. These findings align with those of other scholars, including Mbatha (2015:6), who emphasised the importance of teachers' confidence and motivation in developing environmental literacy. Small, Green, Larsen and Shenk (2012); Sen & Vekli (2016); Dermici & Teksöz (2017), further highlighted the importance of high self-efficacy in developing people's self-confidence in achieving set goals.

5.3.4 How effective is the skills acquired in making decisions to take actions towards solving environmental problems?

Categories that emerged to address this research question included identification and solutions to EE problems and EE assessment practices. The findings reveal that some participants can identify environmental problems and are aware of their actions that harm the natural environment, and that they can suggest solution to those problems. However, participants lack the appropriate skills required to take actions to solve those problems. These finding are drawn from T1 participant's response "we can, we might" that are suggestion based rather than action oriented. Participants further mentioned that they practically failed to solve environmental problems due to their economic status and their hands are tight. They just encourage learners to pick up papers. The importance of action-oriented learning is to develop learners' attitudes and confidence to translate acquired knowledge into the skills important to make informed decisions when solving identified problems. This statement aligns with Jensen and Schnack (1997), Smith (2007); Veisi, Lacy, Mafakheri and Razaghi (2018), that the overall objective EE which is to build students' ability to act out their competencies with relevance to environmental concerns, and that they should actively construct knowledge and information rather than passively appropriating it.

It was further noted that some teacher participants lacked the inquiry-based skills required to develop multiple participatory assessment practices that are learner-centred, and to develop various skills in solving environmental problems. It was noted during lesson observations that the traditional teacher-centred approach is mostly used and interactions are question and answer based. It was further noted that assessments are knowledge-based. Although the question and answer method is one of the assessment approaches used in teaching and learning, the integrative approach to EE content, which is learner centred, requires an inquiry-based teaching approach that develops the learners' cognitive skills necessary to actively construct knowledge and develop high order thinking, critical and problem solving skills to solve environmental problems (Juntunen, 2015:28; Kidman & Casinader, 2017:7; Kaya & Elster, 2019:15).

Observations findings corroborates with participants' responses that their assessments practices address only knowledge component. These findings align with

the findings of Kaya and Elster (2019) who revealed that environmental knowledge is highly emphasised in school curricula. The CAPS analysis findings also revealed that the curriculum is knowledge-based. CAPS frequently provides the instruction "Check the learner's knowledge that they can" in the assessment guideline (DBE, 2011:21). CAPS further suggests multiple assessment practices on how knowledge acquired should be put into practice by suggesting activities such as projects, research and others to develop skills to identify, critically analyse, synthesise and evaluate environmental problems, and taking actions to solve those problems (DBE, 2011:23). However, it is left to the teacher to apply their expertise on methods and approaches that integrate inquiry-based skills to effectively teach EE for the development of environmental literacy. These findings corroborate with those of Juntunen (2015); Sen & Vekli (2016) and Kidman & Casinader (2018) on the lack of teacher's inquiry-based competencies in developing environmental literacy of learners.

5.3.5 How effective are the environmental literacy components (i.e., knowledge, attitude and skills) at promoting sustainable behaviour?

Categories that emerged to explore this research question include resource conservation and management with the focus on natural surroundings, water, electricity and generated waste, holistic benefits, policy systems and constraints to the development of environmental literacy.

The findings reveal that sustainability practices and programmes are not effectively implemented, especially in cases C1 and C2. In terms of knowledge, C1 and C2 seemed to have basic knowledge of EE processes and sustainability practices. The findings reveal some poor waste, water, and energy source management that denotes a lack of economic and sustainability knowledge on the benefits of conserving and managing resources. Practices such as littering, burning, and burying of waste, placing of pit toilets close to water boreholes also tells of a lack of participants' foresightedness in anticipating the future impact of the consequences of their current actions towards the natural environment. These findings are supported by Bandura (2001:7), who highlight that foresightedness plays an important role in understanding the principles of ecologically sustainable development, by identifying and monitoring emerging problems, highlighting emerging threats and identifying new opportunities.

The findings from C3 revealed some waste management challenges. However, the findings also revealed several sustainability practices, including a proper functioning of vegetable garden and the maintenance of the school grounds, fully covered with indigenous trees and shrubs which attracts other forms of life, including birds and insects. Although there is no indication of water harvesting, as mentioned by T3, rainwater is channelled to irrigate plants. This maintenance of the school grounds is important in enhancing EE learning opportunities for environmental literacy (DET 2001:15).

Observation findings further revealed limited waste bins in the classroom and around school in cases C1 and C2. A lack of recycling programmes on site seems to promote a culture of littering and reflect lack of care, respect and value for the natural environment. Absence of EE related posters in the classroom and around the premises was also noticed, as well as the exclusion of sustainability ethics in the classroom codes of conduct. Posters play an integral role in presenting abstract learning into the classroom and surrounding through its visual content, and further consolidates the traditional verbal-linguistic learning methods (Hasturk, 2017:2).

The findings suggest that teaching and learning of EE continues to be abstract and its content may not reach all learners with different learning preferences. These findings corroborate with those of Osa and Musser (2004); Mohammed (2016) and Hasturk, (2017), on the importance of posters as an effective teaching and learning tool for EE content. Furthermore, the absence of code of conduct on sustainable practices suggests that teachers and learners are not motivated and encouraged to conduct themselves in a more environmentally friendly manner. The importance of ethics in the behaviour modification is emphasised by Ayeni and Franks (2014:2); Hunscomb and Johnston (2017:1), that one of the objectives of environmental literacy is to develop citizens that have ethical responsibilities about the environment and related issues.

It was very unfortunate that EE policies were not available across all cases. Unavailability of EE policies suggests a lack of environmental ethics in schools that guides and direct conservation and management of resources, and to translate sustainability ideas into practice. Policies further link curriculum content to sustainability practices, monitor and evaluate performance that enhances the development of environmental literacy (DET, 2001:20). This gives an indication that

participants' actions towards the natural environment are not stringently guided and motivated towards sustainable behaviour.

Interview findings further brought to light barriers and challenges teachers' faces which hampers the development of their own environmental literacy and that of learners, across cases. The overarching barrier is lack of teachers' pre-service and in-service training on EE content. The lack of teacher development has shown to have a bearing on their development and that of learner's knowledge, attitude and skills to engage in sustainable practices.

Participants further alluded their rural context as a major contributor to the lack of sustainability practices across all cases. Waste collection and management, access to recycling programmes and centres, access to EE centres, lack of proper drinking water and sanitation, lack of resources supporting EE content teaching and learning and lack of collaborative efforts from government and other key stakeholders were mentioned as a major problem across all cases as a result of their socio-economic status. These findings on the constrains that hamper the effectiveness of implementing EE to develop environmental literacy in rural areas are supported studies including (Hemson, Meyer & Maphunye, 2004, Nelson Mandela Foundation [NMF], 2005; Saiti et al., 2014)

5.4 LIMITATIONS OF THE STUDY

I have experienced several limitations during this study. These limitations include an environmental management plan, methodology, sampling methods and the coding process.

5.4.1 School Environmental Policy

I intended to analyse two documents, CAPS curriculum on EE content and pedagogical approaches, and the school environmental policy on how conservation and sustainable use of resources are guided and motivated. It was unfortunate that an EE policy was not available across all three cases. This limited the findings of the study on how schools are guided to conserve and sustain their resources, and to motivate sustainable practices and lifestyle towards sustainable behaviour.

5.4.2 Methodology

Another potential limitation could be the use of one methodology. The study employed a qualitative method appropriate for exploring and giving an in-depth account of data from participants. However, the interpretation of the findings is subjective to the participants' views. The method limits the statistical analysis for measuring and assessing the environmental literacy components. The use of mixed methods would have provided a more comprehensive finding by giving both empirical and non-empirical account on environmental literacy components.

5.4.3 Sampling

Sampling could also be a limiting factor because of limited resources, including time and travel costs. This resulted in three teachers who teach Social Science, Natural Science and Technology being sampled. Sampled subjects do not make 50% of the Senior Phase curriculum. EE is integrated across all seven subjects of the Senior Phase CAPS curriculum. This limited the findings of the study on how other excluded teachers might implement EE in their subjects and their contribution to environmental literacy.

5.5 CONTRIBUTION OF THE STUDY

This study will make the following contributions

- Provided an in-depth and detailed account of the effectiveness of knowledge, attitude and skills in developing environmental literacy of both teachers and learners in rural primary schools.
- The study also provided a detailed analysis of integrated EE content in CAPS curriculum, and how the curriculum provide guideline on pedagogical approaches for achieving EE goals
- The study highlights the need for EE pre service training in all teacher's qualification for development environmental literacy, and the in service training for continuous professional development of teachers on evolving EE content.
- The study also highlights the importance of teacher's expertise in teaching EE content to develop and improve environmental literacy in schools.
- The study further highlights the importance of introducing or integrating the concept EE or related study, as part of the curriculum in order to avoid its misconception, and to guide its content necessary to develop environmental literacy in schools.

- By analysing school's EE policies, the study intended to provide a detailed account on the effectiveness of policy in guiding conservation and sustainable use of resources in schools. Findings on absence of school EE policy across cases raise an alarm to DBE to mandate its inclusion into school policies.

5.6 RECOMMENDATIONS OF THE STUDY

From the above findings, teachers and learner's environmental literacy are found to be on the nominal level in C1 and C2 and functional level in C3. The study made the following recommendations categorised in curriculum reorientation, knowledge based curriculum, environmental education policy and teacher's development and support.

5.6.1 Curriculum reorientation

The findings of the study revealed that the content integrated approach of EE is not achieving EE goals of developing environmental literacy since its inception. The findings revealed the need for teacher's experience and expertise in environmental education related studies, and application of expert skills to effectively teach EE content for development of environmental literacy. Therefore, the findings call for the need for reorientation of the curriculum in the senior phase, to include Environmental Science as a subject in an interdisciplinary curriculum.

Environmental Science is integrative in nature as it provides an understanding of how physical, chemical, geological, biological, technological and social processes interact to shape the natural environment system, and how human activities impact on these systems (Edelson, 2007:3). The inclusion of Environmental Science as a subject will give EE content its distinctive role to guide content in the curriculum, to avoid misconception of EE a concept and its content, and the perception of EE content as an add on to the subject content as revealed in this study.

The inclusion of Environmental Science in Senior Phase curriculum will also allow the EE content to be taught by qualified and expert teachers in the field of EE studies. It has been revealed from the findings of the study that teacher's professional qualification and expertise in EE related field improves environmental literacy in schools. It will further allow EE content to be given support like other curricula subjects including in-service training for teachers and EE specialist. This recommendation was

drawn from the teacher's response that they only get developed in their subjects from subject specialist.

The inclusion of Environmental Science in the Senior Phase curriculum, will equip learners and teachers with the 21st century skills to promote the conservation and sustainable conducts and practices necessary to address the environmental crisis the world is facing. Inclusion of Environmental Science in the curriculum was proven effective in several countries including India, Slovenia, America and Zimbabwe in addressing fundamental conservation and sustainability aspects (Chikunda, 2007; Edelson, 2007 & Tsakeni, 2017).

5.6.2 Knowledge based Curriculum

Both observations and interviews findings revealed that assessments of EE content mostly address knowledge component and less practical skills. It was also revealed in CAPS analysis that CAPS guidance focus on knowledge component by frequently providing the instruction "Check the learner's knowledge that they can" in the assessment guideline (DBE, 2011:21). This call for the need of CAPS curriculum to support teacher's expertise by providing teaching and learning opportunities and guidelines in assessing practical application of knowledge required to develop skills to solve environmental problems, and for practical skills to contribute to learner's progression into the next grade.

5.6.3 Environmental Education policy

The study also recommend that DBE mandate the inclusion of EE policy in schools necessary to strengthen and support EE content in the curriculum, and further guide lifestyle and practices towards sustainable behaviour. This recommendation is informed by absence of EE policy across cases. EE policy is important in developing and enhancing environmental education programmes as part of the curriculum, to develop learner's knowledge on EE content and the application of knowledge to develop skills required in in solving environmental problems (NST [DET] 2001).

5.6.4 Teacher's professional development

The study also recommends building teacher's capacity on EE content by including EE and EE related studies in all teacher training institutions to develop teacher's EE competencies, and continued teacher's in service training to develop teacher's

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expertise in EE field of study, skill in teaching environmental and sustainability content and programmes, integrative approach and developing effective assessment practices necessary for the development of environmental literacy.

5.6.5 Support

The study recommends that EE specialist be appointed in every circuit to coordinate, facilitate and collaboration with different stakeholders for EE training, resources, information and services to strengthen and support the curriculum on EE content. EE development and sustainability content should further be extended to district personnel and school management teams for the development and implementation of policies guiding EE related programmes in schools.

Support should also be provided through available EE centres and clubs to collaborate with schools and other stakeholders to integrate environmental and sustainability programmes, and to provide practical learning opportunities to help in developing skills in solving environmental problems.

The study further recommend that DBE strengthen its support by involving and encouraging municipalities, nongovernmental organisation, businesses and other stakeholders to provide grants and donations to schools in running environmental and sustainability programmes especially in rural areas.

The study makes the following recommendations for further studies:

- Conduct mixed method approach study to have comprehensive finding on development and progress of environmental literacy in schools.
- Establishing support measures for development and progress of environmental literacy in rural schools.
- Monitoring and evaluation of EE programmes to determine their successes and failures, and suggestions of future programmes necessary to improve environmental literacy in schools.
- Integration of Environmental Education policy with school curriculum to support environmental and sustainability programmes.
- Inclusion of Environmental Science as a subject in an integrated school curriculum
- Analysis and evaluation of the framework for inclusion of EE and related subject in teacher's training institutions and qualification in South Africa.

5.6 CONCLUSION

It is evident from the findings that the curricular EE content integrated approach is not effective in implementing EE content for development of environmental literacy and improved sustainable practices globally. The study revealed that effective implementation of EE content for development of environmental literacy is still a challenge in schools. This study also contributes to the literature that revealed lack of teacher's professional development and support for effective implementation of EE for development of environmental literacy. Moreover, what has been highlighted by the findings of the study is the fact that challenges in developing environmental literacy in schools do not solely emanate from the teachers and the schools, but also from lack of, and inconsistent systems and policies guiding EE implementation and lack of support.

The findings revealed that the focus of CAPS is on assessing mostly the knowledge component, and lack of guidance in assessing the application of knowledge into practical skill necessary to solve environmental problems. Furthermore, schools do not have policy system and programmes including environmental education policy to guide and support the sustainability lifestyle and practices necessary for the development of environmental literacy. Taking actions in solving environmental problems is crucial in developing environmental literacy. It is therefore left to teacher's knowledge and expertise to develop activities that are inquiry and action based, for assessment of practical skill, which is a challenge because of teacher's lack of professional development and support in integrated EE content.

The findings reveal that in order to develop environmental literacy in schools, policy systems guiding its implementation should be clear to guide the content, and support should be given to practices necessary to develop environmental literacy and sustainable behaviour in schools. Environmental literacy in school can be improved by aligning EE content curriculum with teacher's professional development and strengthening of teacher's ongoing development and support to build teacher's expertise in EE content.

5.7 REFERENCES

Alderson, P. and Morrow, V., 2004. Ethics, social research and consulting with children and young people.

Almarshad, S.O., 2017. Adopting sustainable behaviour in institutions of higher education: A study on intentions of decision makers in the MENA region. *European Journal of Sustainable Development*, *6*(2),89-89.

Athman, J.A., and Monroe, M.C., 2001. Elements of Effective EE Programmes.

Atuguba, J.A., 2016. An Assessment of the Environmental Literacy of Pre-Service Teachers in Colleges of Education in Ghana.

Azjen, I., 1991. The theory of planned behaviour. *Organizational Behaviour & Human Decision Processes 50 (2).*

Bandura, A., 1977. Self-efficacy: Toward a unifying theory of behavioural change. Psychological Review, 84, 191-215.

Baxter, P. and Jack, S., 2008. Qualitative case study methodology: Study design and implementation for novice researchers. *The qualitative report*, *13*(4), 544-559.

Berg, S., 2004. Snowball sampling—I. *Encyclopedia of statistical sciences*, *12*.

Bierbaum, R. & Cowie, A., 2018. Integration: To solve complex environmental problems. *Scientific and Technical Advisory Panel to the Global Environment Facility. Washington, DC.*

Bloor, M. and Wood, F., 2011. Piloting in qualitative method. SAGE Publication London DOI: http://dx.doi.org./10.4135/9781849209403. [Accessed 8 May 2019].

Bonney, R., Cooper, C.B., Dickinson, J., Kelling, S., Phillips, T., Rosenberg, K.V. and Shirk, J., 2009. Citizen science: a developing tool for expanding science knowledge and scientific literacy. *BioScience*, *59*(11), 977-984.

Burchett, J.H., 2015. Environmental literacy and its implications for effective public policy formation.

Chacko, C., 2000. The nature and measurement of EL for sustainability: University of South Africa.

Chawla, L. and Cushing, D.F., 2007. Education for strategic environmental behavior. *Environmental education research*, *13*(4), 437-452.

Chikunda, C., 2007. Zimbabwe's better Environmental Science teaching programmes: A step towards education for sustainable development. *Southern African Journal of Environmental Education*, *24*,158-170.

Clacherty, A., 1993. The EE policy initiative: Reflections on the process. *Southern African Journal of EE*, *13*,3-6.

Cohen, L., Manion, L. & Morrison, K. 2011. Research in education. 7[th]ed. London: Routledge.

Cook, C.N., Inayatullah, S., Burgman, M.A., Sutherland, W.J. and Wintle, B.A. 2014. Strategic foresight: how planning for the unpredictable can improve environmental decision-making. *Trends in ecology & evolution*, *29*(9), 531-541.

Creswell, J., 2014. Research design: Qualitative, Quantitative and mixed method. Thousand Oaks, CA. SAGE.

Darkoh, M.B.K., 2009. An overview of environmental issues in Southern Africa. *African Journal of Ecology*, *47*, 93-98.

De Sousa, L.O., Richter, B.W. and Raath, S.P., 2017. Sustainable environmental management indicators in South African primary schools. *Sustainability*, *9*(5), 854.

De Vos, A.S., Delport, C.S.L., Fouché, C.B. and Strydom, H., 2011. *Research at grass roots: A primer for the social science and human professions*. Van Schaik Publishers.

De Young, R., 2000. New ways to promote Proenvironmental Behaviour: Expanding and evaluating motives for environmentally responsible behaviour. *Journal of social issues*, *56*(3), 509-526.

Demirci, F. and Ozyurek, C., 2018. Astronomy Teaching Self-Efficacy Belief Scale: The Validity and Reliability Study. *Journal of Education and Learning*, *7*(1), 258-271.

Demirci, S. and Teksöz, G., 2017. Self-Efficacy Beliefs on Integrating Sustainability into Profession and Daily Life: In the Words of University Students. *International Electronic Journal of EE*, *7*(2),116-133.

Denzin, K. and Lincoln S., 2011. The Sage Handbook of Qualitative Research. SAGE Publication, Inc.

Department of Basic Education (DBE). 2011c. National curriculum statement (NSC) Curriculum and assessment policy statement (CAPS) Senior Phase grade 7 Pretoria: Government Printer.

Department of Environmental Affairs and Tourism (DEAT). 2001. Environmental Content in the Curriculum (CAPS).

DET, N., 2001. Environmental education policy for schools. *New South Wales Department of Education and Training Curriculum Support Directorate*.

Dhull, P. and Verma, G., 2017. Environmental education in teacher education and challenges. *Environmental education*, *2*(5), 84-87.

Dilshad, M., Latif, M., 2013. Focus group interview as a tool for qualitative research: An analysis. Pakistan journal of social science. 33(1),191-198.

Doody, O. and Doody, C.M., 2015. Conducting a pilot study: Case study of a novice Willi

Edelson, D.C., 2007. Environmental Science for All? Considering Environmental Science for Inclusion in the High School Core Curriculum. *Science Educator*, *16*(1), 42-56.

Erdoğan, M., 2009. Fifth grade students' environmental literacy and the factors affecting students' environmentally responsible Behaviour *Unpublished doctoral dissertation, Middle East Technical University, Turkey*.

Erdoğan, M., 2009. Fifth grade students' environmental literacy and the factors affecting students' environmentally responsible behaviours. *Unpublished doctoral dissertation, Middle East Technical University, Turkey*.

Erdoğan, M., Kostova, Z. and Marcinkowski, T., 2009. Components of Environmental Literacy in Elementary Science Education Curriculum in Bulgaria and Turkey. *Eurasia Journal of Mathematics, Science & Technology Education*, *5*(1), 15-26.

Etikan, I., Musa, S.A. and Alkassim, R.S., 2016. Comparison of convenience sampling and purposive sampling. *American journal of theoretical and applied statistics*, *5*(1),1-4.

Ever, T., 2012. Wisconsin's plan to advance education for environmental literacy and sustainability in PK-12 schools. *Wisconsin Department of Public Instruction, Retrieved*, *8*(2018), 12-50.

Ferreira, J.G. and Molala, K.N., 2017. The assessment of environmental education concepts and skills in Grade 10 Geography. *The Independent Journal of Teaching and Learning*, *12*(2), 113-125.

Fouché, C.B. and Schurink, W., 2011. Qualitative research designs. *Research at grass roots: For the social sciences and human service professions*, *4*, 307-327.

Fundisa for Change Programmes 2013. Introductory core text: Environmental learning research center: Rodes University.

Gbadamosi, T.V., 2018. Effect of service learning and educational trips instructional strategies on primary school pupils 'environmental literacy in social studies in Oyo state, Nigeria. *People: International Journal of Social Sciences*, *4*(2).

Geiger, S.M., Grossman, P. and Schrader, U., (2019). Mindfulness and sustainability: correlation or causation? *Current opinion in psychology*, *28*, 23-27.

Gentles, J., Charles, C. and McKibbon, A., 2015. Sampling in qualitative research: Insight from an overview of methods literature.

Gephart, R., 1999, January. Paradigms and research methods. In *Research methods forum* 4 (1), 11.

Gibson, J.E., 2012. Interviews and focus groups with children: Methods that match children's developing competencies. *Journal of Family Theory & Review*, *4*(2), 148-159.

Gill, P., Stewart, K., Treasure, E. and Chadwick, B., 2008. Methods of data collection in qualitative research: interviews and focus groups. *British dental journal*, *204*(6), 291-295.

Goodwin, R.N., 2015. *College counseling dosage and postsecondary academic match expectations of at-risk students*. Michigan State University.

Grant, C. and Osanloo, A., 2014. Understanding, selecting, and integrating a theoretical framework in dissertation research: Creating the blue print for your house. December 2014.

Grbich, C., 2012. Qualitative data analysis: An introduction. Sage.

Greening business plan 27 Nov 2009, [online] Available at: http://www.dpw.limpopo.gov.za/docs/plans/greening%20business%20plan%2027%20nov%202009.pdf. [Accessed 6 June 2018].

Guba, E.G. and Lincoln, Y., 2005. S., (2005). Paradigmatic controversies, contradictions, and emerging confluences. *The landscape of qualitative research*, 255-286.

Gudmundsdóttir, S. and Shulman, L., 1989. Pedagogical knowledge in the Social Sciences. *Profesorado, Revista de Currículum y Formación del Profesorado*, *9*(2), 1-12.

Gw Gwanya, T.T., 2010. South Africa position paper on rural development: A model for the Comprehensive Rural Development Programmes. *Department of Rural Development and Land Reform*.

Hadi, M.A. and Closs, S.J., 2016. Applications of mixed-methods methodology in clinical pharmacy research. *International journal of clinical pharmacy*, *38*(3), 635-640.

Harvey, G., 1977. A conceptualization of environmental education. In *A report on the North American regional seminar on environmental education* 66-72. SMEAC Information Reference Centre Columbus, OH.

Hassan, N., Othman, S.N. and Yaacob, N.A., 2018. Determinants of theory of planned behaviour (TPB) model in measuring sustainable behaviour among students of public universities in Malaysia. *Journal of Information*, *3*(7),1-12.

Hasturk, G., 2017. A new approach to environment 52366. Key words: Poster Activities, Teacher Education, Environment, Environmental Education.

Hawkins, I.W., Balsam, A.L. and Graves, D., 2015. A qualitative study of the skills that enabled the pro-environmental Behaviours of registered dietitians. *Journal of hunger and environmental nutrition*, *10*(1), 60-71.

Heary, C.M., and Hennessy, E. 2002. The use of focus group interviews in paediatric health care research. *Journal of paediatric psychology*, *27*(1), 47-57.

Hebe, H., 2019. Locating the Position of EE in the South African School Curriculum: The Case of Grade R. *EURASIA: Journal of Mathematics, Science and Technology Education*, *15*(9).

Hebe, H.N., 2009*. An Evaluation of the Environmental Literacy of Educators*: A Case Study* (Doctoral dissertation, University of South Africa).

Hedefalk, M., Almqvist, J. and Lidar, M., 2014. Teaching for action competence. *Sage Open*, *4*(3), 2158244014543785.

Hemson, D., Meyer, M. and Maphunye, K., 2004. Rural development: The provision of basic infrastructure services.

Hines, J.M., Hungerford, H.R. and Tomera, A.N., 1987. Analysis and synthesis of research on responsible environmental BEHAVIOUR: A meta-analysis. *The Journal of environmental education, 18*(2),1-8

154

Hollweg, K.S., Taylor, J.R., Bybee, R.W., Marcinkowski, T.J., McBeth, W.C. and Zoido, P., 2011. Developing a framework for assessing environmental literacy. *Washington, DC: North American Association for Environmental Education*.

Human Sciences Research Council, Nelson Mandela Foundation, Education Policy Consortium (South Africa). and Education Policy Consortium (South Africa), 2005. *Emerging voices: A report on education in South African rural communities*. HSRC Press.

Hungerford, H., and Volk, T., 1990. Changing learners' behaviour through EE. The Journal of EE, 21 (3), 8 – 21.

Hungerford, H.R., Volk, T.L. and Ramsey, J.M., 1994. A prototype environmental education curriculum for the middle school. *Environmental Education Series (29)*.

Ireland, L., 2013. Environmental education framework: Pathways to environmental literacy in Alberta schools, supporting Alberta education's curriculum redesign. *Retrieved from Alberta Council for Environmental Education website: http://abcee. org/cms/wp-content/uploads/2010/10/Alberta-Environmental-Education-Framework-March-6. pdf*.

Irwin, P. and Lotz-Sisitka, H., 2005. A history of environmental education in South Africa. In: C. P. Loubser. (Ed.). Environmental education: Some South African perspectives. Pretoria: Van Schaik: 35-56.

Irwin, P., 1990. The concept of EE and the development of EE in South Africa. *Southern African journal of EE, 11*, 3-7.

IUCN, 1970. International working meeting on environmental education in the school curriculum.

Jackson, M. and Niblo, D., 2003. The role of qualitative methodology in cross-cultural research. *Qualitative Research Journal, 3*(1), 18-27.

Janse van Rensberg, E. andLotz, H., 1998. Enabling Environmental Education as a Cross-Curricular Concern in Outcomes-Based Learning Programmesmes. Howick: Share-Net.

Jensen, B.B. and Schnack, K., 2006. The action competence approach in environmental education: Reprinted from Environmental Education Research (1997) 3 (2), 163–178. *Environmental education research, 12*(3-4), 471-486.

Jordan, R., Gray, S., Demeter, M., Lui, L. and Hmelo-Silver, C.E., 2009. An assessment of students' understanding of ecosystem concepts: conflating ecological systems and cycles. *Applied EE and Communication*, *8*(1),40-48.

Joy A., Palmer 1998, Environmental Education in the 21st Century: Theory, Practice, Progress and Promise, Routledge, London. *Australian Journal of Environmental Education*, *15*,165-166.

Jupp, V. 2006. *The Sage dictionary of social research methods*. Sage.

Karimzadegan, H. and Meiboudia, H., 2012. Exploration of environmental literacy in science education curriculum in primary schools in Iran. *Procedia-Social and Behavioral Sciences*, (*46*), 404-409.

Kawulich, F., 2012. Selecting a research approach: Paradigm, methodology and methods.

Kaya, H.V. & Elster, D., 2019. A Critical Consideration of Environmental Literacy: Concepts, Context and Competencies. Sustainability 11(6), 1158.

Kidman, G. and Casinader, N., 2019. Developing Teachers' Environmental Literacy through Inquiry-based Practices. *Eurasia Journal of Mathematics, Science and Technology Education*, *15*(6), 1687.

Kielmann, K. Cataldo, F. and Seeley, J., 2012. Introduction to qualitative research methodology: a training manual. *United Kingdom: Department for International Development (DfID)*.

Kimaryo, L., 2011. Integrating environmental education in primary school education in Tanzania: teachers' perceptions and teaching practices.

King, J.A. & Frazen, R.L., 2017. Environmental Literacy in environmentally Themed Higher Education Courses. Journal of Sustainability Education.

Kira, E., and Kafanabo, E., 2016. Secondary school teachers' knowledge level of the concepts of environmental education in Morogoro, Tanzania. *Huria: Journal of the Open University of Tanzania*, *23*(1), 32-48.

Kollmuss, A. and Agyeman, J., 2002. Mind the gap: why do people act environmentally and what are the barriers to pro-environmental Behaviour? *EE research*, *8*(3),239-260.

Kostadinova, V.V., 2013. Environmental Literacy and self-efficacy: Influence on managerial practice in small and medium hotels: Copenhagen Business School.

Lather, P., 1986. Research as praxis. *Harvard educational review*, *56*(3), 257-278.

Le Grange, C., 2000. Towards a language of probability" for EE in South Africa, 22(2) 83-87. learning in South Africa's education system: Openings for the UN Decade on Education.

Leicht, A., Heiss, J. and Byun, W.J., 2018. *Issues and trends in Education for Sustainable Development* (Vol. 5). UNESCO Publishing.

Lincoln, Y.S., Lynham, S.A. and Guba, E.G., 2011. Paradigmatic controversies, contradictions, and emerging confluences, revisited. *The Sage handbook of qualitative research*, *4*, 97-128.

Liu, F., & Maitlis, S., 2010. Nonparticipant Observation. In Albert J. Mills, G. Durepos, and E. Wiebe (Eds.), Encyclopaedia of Case Study Research. Thousand Oaks, CA: SAGE Publications.

Lotz-Sisitka, H., 2004. *Positioning southern African environmental education in a changing context*. Howick, South Africa: Share-Net.

Loubser, C.P., Swanepoel, C.H. & Chacko, C.P.C. 2001. Concept formulation for environmental literacy. *South African Journal of Education*, *21*(4), 317-323.

Mack, N., 2005. Qualitative research methods: A data collector's field guide.

Marshal, C., Rossman B., 1998. Designing qualitative research.3$^{rd}_{ed}$ London: SAGE Publication

Matheba, F.T., 2010. Sustainability of Poverty Alleviation Projects: A Case study of Apel Area, Fetakgomo Municipality of Greater Sekhukhune District in Limpopo.

Maxwell, A.J., 2013. Qualitative Research Design: An Interactive Approach. 3$_{rd}$ edition. SAGE Publication, Icn.

Mbatha, S., 2015. The relationship between self-efficacy, motivation, and academic performance among students from various gender and generational groups (Doctoral dissertation, University of the Free State).

McBride, B.B., Brewer, C.A., Berkowitz, A.R. and Borrie, W.T., 2013. Environmental literacy, ecological literacy, ecoliteracy: What do we mean and how did we get here? *Ecosphere*, *4*(5),1-20.

McCuskey, D., and Conaway, W.J., 1995. The Interdisciplinary Approach, Conference "America's Schools and America's Future: Working for Understanding of the Schools".

McMillan, J.H. and Schumacher, S., 2010. Research in Education: Evidence-Based Inquiry, My Education Lab Series. *Pearson*.

Merriam, S. B., (1998). Qualitative research and case study applications in education. San Francisco, CA: Jossey-Bass.

Miles, M.B., Huberman, A.M. & Saldana, J. 2014. Qualitative Data Analysis, A Methods Sourcebook. Sage, London.

Mohammed, S., 2016. The implementation of EE in Muslim schools in Gauteng: A case study: University of South Africa.

Mokhele, M.L., 2011. Integrated environmental teaching in South Africa: An impossible dream? *Perspectives in Education*, *29*(4),78-86

Morrow, V., 2009. *The ethics of social research with children and families in young lives: Practical experiences*. Young Lives.

Motshegoa, M.P., 2006. The Policy and Practice of EE in South African Schools: University of Pretoria.

Mudaly, R., and Ismail, R., 2016. Professional Development in Environmental and Sustainability Education: Voices, Practices and Reflections of Science Teachers. *Southern African Journal of Environmental Education*, *32*(1), 66-86.

Mukoni, M., 2013. EE in Zimbabwean secondary schools: 'greening or transformative social change? *International Journal of Asian Social Science*, *3*(4), 971-991.

Neale, P., Thapa, S. & Boyce, C. 2006. *Preparing a case study: A guide for designing and conducting a case study for evaluation input*. Massachusetts: Pathfinder international.

NEEP-GET., 2005. A critical dialogues monograph. Building capacity for environmental.

Neuendorf, K.A., 2019. 18 Content analysis and thematic analysis. *Advanced Research Methods for Applied Psychology*, 211.

Neuman, S.P., 2011. Apparent multifractality and scale-dependent distribution of data sampled from self-affine processes. *Hydrological Processes*, *25*(11), 1837-1840.

Ngulube, P., 2015. Trends in research methodological procedures used in knowledge management studies. *African Journal of Library, Archives and Information Science*, *25*(2), 125-143.

Nowell, L.S., Norris, J.M., White, D.E. & Moules, N.J., 2017. Thematic analysis: Striving to meet the trustworthiness criteria. *International Journal of Qualitative Methods*, *16*(1),1609406917733847.

O'Donoghue, R. B., 2001. Environment and active learning. NEEP guidelines for facilitating and assessing active learning in OBE. Howick: Share-Net.

Omona, J., (2013). Sampling in qualitative research: Improving the quality of research outcomes in higher education. *Makerere Journal of Higher Education*, *4*(2),169-185.

Opie, C., 2004. Presenting data. *Doing education research: A guide to first time researchers. London: SAGE Publications*.

Orb, A., Eisenhauer, L. and Wynaden, D., 2001. Ethics in qualitative research. *Journal of nursing scholarship*, *33*(1), 93-96.

Orr, D. W., 1992. Ecological Literacy: Education and the Transition to a Palmer, J. (1998). EE in the 21st Century: Theory, Practice, Progress and Promise. London: Routledge.

Osa, J.O. and Musser, L.R., 2004. The Role of Posters in Teacher Education Programmes. *Education Libraries*, *27*(1), 16-21.

Osanloo, A. and Grant. C., 2016. Understanding, selecting, and integrating a theoretical framework in dissertation research: Creating the blueprint for your "house". *Administrative issues journal: connecting education, practice, and research*, *4*(2),7.

Paden, M., 2008. 4th International Conference on EE, Ahmedabad. *Journal of Education for Sustainable Development*, *2*(1), 13-15.

Palinkas, L.A., Horwitz, S.M., Green, C.A., Wisdom, J.P., Duan, N. & Hoagwood, K., 2015. Purposeful sampling for qualitative data collection and analysis in mixed method implementation research. *Administration and policy in mental health and mental health services research*, *42*(5), 533-544.

Pamela, B. and Jack, S., 2008. Qualitative case study methodology: Study design and implementation for novice researcher.

Patton, M.Q., 1990. *Qualitative evaluation and research methods*. SAGE Publications, Inc.

Pe'er, S., Goldman, D. and Yavetz, B., 2007. Environmental literacy in teacher training: Attitudes, knowledge, and environmental behaviour of beginning students. *The Journal of EE*, *39*(1),45-59.

Pillay, J., 2014. Ethical considerations in educational research involving children: Implications for educational researchers in South Africa. *South African journal of childhood education*, *4*(2),194-212.

Punch, K. and Oancea, A., 2014. Introduction research methods in education.2nd edition. SAGE Publication Ltd.

Purvis, B., Mao, Y. and Robinson, D., 2019. Three pillars of sustainability: in search of conceptual origins. *Sustainability science*, *14*(3),681-695.

Rabiee, F., 2004. Focus-group interview and data analysis. *Proceedings of the nutrition society*, *63*(4), 655-660.

Ramsey, J.M., Hungerford, H.R. and Volk, T.L., 1992. Environmental education in the K-12 curriculum: Finding a niche. *The Journal of environmental education*, *23*(2), 35-45.

Raselimo, M., 2007. Promoting environmentally responsible behaviour through indigenous knowledge: a challenge for implementation of education for sustainable development in Lesotho. *Lesotho Social Sciences Review*, *11*(1-2), 128-141.

Rehman, A.A. and Alharthi, K., 2016. An introduction to research paradigms. *International Journal of Educational Investigations*, *3*(8), 51-59.

Richardson, G.M., Byrne, L.L. and Liang, L.L., 2018. Making learning visible: Developing preservice teachers' pedagogical content knowledge and teaching efficacy beliefs in environmental education. *Applied Environmental Education & Communication*, *17*(1), 41-56.

Riordan, M. and Klein, E.J., 2010. EE in action: How expeditionary learning schools support classroom teachers in tackling issues of sustainability. *Teacher Education Quarterly*, *37*(4),119-137

Roberto, P. and Cherif, S., 1996. Environmental changes in perspective: The global response to challenges.

Ross, J. 2014. Participatory Observation.

Roth, C. E., 1992. Environmental literacy: its roots, evolution and directions in the 1990s. ERIC. *CSMEE Publications, ED*, *348*, 235.

RSA. 1995. White Paper on Education and Training. Pretoria: Government Printers.

RSA. 1996. Constitution of the Republic of South Africa Act 108. of 1996. Pretoria: Government Press

RSA. 1998. White paper on Environmental Management Policy for South Africa: Department of Environmental Affairs and Tourism.

Ryan, F., Coughlan, M. and Cronin, P., 2009. Interviewing in qualitative research: The one-to-one interview. *International Journal of Therapy and Rehabilitation*, *16*(6), 309-314.

Ryan, F., Coughlan, M. and Cronin, P., 2009. Interviewing in qualitative research: The one-to-one interview. *International Journal of Therapy and Rehabilitation*, *16*(6),309-314.

Saiti, A., Kyle Jr, W.C., Sinnes, A.T., Nampota, D.and Kazima, M. 2014. Developing relevant environmental education in a rural community in Malawi. *Revista Brasileira de Pesquisa em Educação em Ciências*, *14*(2), 185-198.

Sapsford, R., and Jubb, V., 2006. Data collection and analysis: Qualitative research and subjective impression in educational context: American journal of education research. 5(12),1228-1233.

Saribas, A., Tekzos, G., and Ertepinar H., 2014. The relationship between EL and self-efficacy belief towards environmental educators: Istanbul Aydin University.

Sauvé, L.z., 1996. EE and sustainable development: A further appraisal. *Canadian Journal of EE*, *1*, 7-34.

Scotland, J., 2012. Exploring the philosophical underpinnings of research: Relating ontology and epistemology to the methodology and methods of the scientific, interpretive, and critical research paradigms. *English language teaching*, *5*(9),9-16.

Sen, C. & Sezen Vekli, G., 2016. The Impact of Inquiry Based Instruction on Science Process Skills and Self-Efficacy Perceptions of Pre-Service Science Teachers at a University Level Biology Laboratory. *Universal Journal of Educational Research*, *4*(3),603-612.

Serin, H., 2018. A Comparison of Teacher-Centered and Student-Centered Approaches in Educational Settings. *International Journal of Social Sciences & Educational Studies*, *5*(1), 164-167.

Shenton, A.K., 2004. Strategies for ensuring trustworthiness in qualitative research projects. *Education for information*, *22*(2),63-75.

Shulman, L.S., 2002. Making differences: A table of learning. *Change: The Magazine of Higher Learning*, *34*(6), 36-44.

Simmons, D., 1995. Papers on the development of environmental education. North American Association for Environmental Education, Troy, Ohio, USA.

Singleton, J., 2016. Environmental Literacy and Sustainability Values: A Content Analysis of EE Standards. *Eco-thinking*.

Small, R.M., Larson, L.R., Green, G.T. and Shenk, A.M., 2012. Effects of an environmental educator training workshop on environmental knowledge, awareness, and teaching self-efficacy. *Illuminare*, *10*.

Smith, G.A., 2007. Place-based education: Breaking through the constraining regularities of public school. *Environmental Education Research*, *13*(2), 189-207.

Smith, J. & Noble, H., 2014. Bias in research. *Evidence-based nursing*, *17*(4),100-101.

Sneddon, A., Hudson, P.T.W., Parker, D., Lawrie, M., Vuijk, M. & Bryden, R. 2005. A Comprehensive Model for Human Behaviour in Industrial Environments. In *The XIIth European Congress on Work and Organizational Psychology*.

Soifaman, L.K., 2010. Compare and contrast inductive and deductive research approach: University of Manitoba.

Songqwaru, N.Z., 2012. Supporting environment and sustainability knowledge in the grade 10 life sciences curriculum and assessment policy context: A case study of the Fundisa for change teacher education and development Programmesme pilot project (Doctoral dissertation, Rhodes University).

Srbinovski, M., Erdogan, M. & Ismaili, M., 2010. Environmental literacy in the science education curriculum in Macedonia and Turkey. *Procedia-Social and Behavioural Sciences*, *2*(2), 4528-4532.

Stake, R. E., 1995. The art of case study research. Thousand Oaks, CA: SAGE Publications.

Stanley, M., and Polard, D., 2013. Relationship between knowledge, attitude and self-efficacy of nurses in the management of paediatric pain, 39(4), 161-177.

Taylor, N. and Vinjevold, P., 1999. Teaching and learning in South African schools. *Getting Learning Right. Johannesburg: Wits, Joint Education Trust. Using African Languages for Teacher Education*.

Thabane, L., Ma, J., Chu, R., Cheng, J., Ismaila, A., Rios, L.P., Robson, R., Thabane, M., Giangregorio, L. and Goldsmith, C.H., 2010. A tutorial on pilot studies: the what, why and how. *BMC medical research methodology*, *10*(1), 1.

Thanh, N.C. and Thanh, T.T., 2015. The interconnection between interpretivist paradigm and qualitative methods in education. *American Journal of Educational Science*, *1*(2), 24-27.

Tlhagale, M.P., 2004. EE as a Strategy towards Sustainable Living for Rural Communities. University of Pretoria.

Tsakeni, M., 2017. The promotion of sustainable environmental education by the Zimbabwe Ordinary level science syllabi. *Perspectives in Education*, *35*(1), 81-97.

UNESCO, 1978. Tbilisi Declaration (Final report of the Intergovernmental conference of EE: Tbilisi (USSR), 11-26 October 1977). Paris: UNESCO.

UNESCO, 2008. EFA-ESD dialogue: educating for a sustainable world. Education for Sustainable Development Policy Dialogue No. 1. UNESCO, Paris.

UNESCO, 2010. *Guidebook for planning education in emergencies and reconstruction.* UNESCO/IIEP.

UNESCO, 2016. Institute of Development Studies (Brighton, England) and International Social Science Council, *World social science report 2016: Challenging inequalities: Pathways to a just world*. UNESCO Publishing.

UNESCO, L.A., Heiss, J. & Byun, W.J. 2018. Issues and trends in education for sustainable development.

UNISA, 2018. Application for 2018 Academic year: https://www.unisa.ac.za › corporate › default › All-qualifications.

United Nations Environment Programmes, 2008. Mainstreaming environment and sustainability in African Universities Partnership (2004–2008 report).

Vaismoradi, M., Turunen, H. and Bondas, T., 2013. Content analysis and thematic analysis: Implications for conducting a qualitative descriptive study. *Nursing & health sciences*, *15*(3), 398-405.

Valois, R.F., Zullig, K.J. and Hunter, A.A., 2015. Association between adolescent suicide ideation, suicide attempts and emotional self-efficacy. *Journal of Child and Family Studies*, *24*(2), 237-248.

Vaughn, S., Schumm., H. & Sinagub, J., 1996. Focus group in education and Psychology. SAGE Publication, Icn.

Veisi, H., Lacy, M., Mafakheri, S. & Razaghi, F., 2019. Assessing environmental literacy of university students: A case study of Shahid Beheshti University in Iran. *Applied EE & Communication*, *18*(1), 25-42

Velempini, K., 2017. Infusion or confusion: A meta–analysis of EE in the 21st century curriculum of Botswana. *Africa Education Review*, *14*(1), 42-57.

Walshe, C., Ewing, G. and Griffiths, J., 2012. Using observation as a data collection method to help understand patient and professional roles and actions in palliative care settings. *Palliative medicine*, *26*(8), 1048-1054.

Weiss, E.B., 1992. United Nations conference on environment and development. *International Legal Materials*, *31*(4),.814-817.

Wong, C.A., Afandi, S.H.M., Ramachandran, S., Kunasekaran, P. and Chan, J.K.L., 2018. Conceptualizing environmental literacy and factors affecting pro-environmental behaviour. *International Journal of Business and Society*, *19*(S1), 128-139.

Yavetz, B., Goldman, D. and Pe'er, S., 2009. Environmental literacy of pre-service teachers in Israel: A comparison between students at the onset and end of their studies. *Environmental education research*, *15*(4), 393-415.

Yeen-Ju, H.T., Mai, N., Kian, N.T., Jing, K.W., Wen, L.K. & Haw, C.L., 2014. Developing creative and critical thinking skills in an authentic learning environment. *Journal of Technology (Sciences & Engineering)*, *68*(2), 1-12.

Yildirim, T., Kisoglu, M. & Salman, M. 2018. Analysis of Geography and Biology Teachers' Self-Efficacy in Environmental Education. *Review of International Geographical Education Online*, *8*(2), 240-254.

Yin, R.K., 2009. Case study research: Design and methods fourth edition. *Los Angeles and London: SAGE*.

Youngberg, C., 2015. Qualitative study of three outdoor EE programmes in Pasco and Hillsborough countries in Florida: Florida Gulf Coast University.

Zach, L., 2006. Using a multiple-case studies design to investigate the information-seeking behaviour of arts administrators. *Library trends*, *55*(1),4-21.

Zhang, Y. and Wildemuth, B.M., 2009. Qualitative analysis of content. *Applications of social research methods to questions in information and library science*, *308*, 319.

Zhou, G., 2015. Environmental pedagogical content knowledge: A conceptual framework for teacher knowledge and development. In *Educating science teachers for sustainability* Springer, Cham.

5.8 APPENDICES

APPENDIX A: ETHICAL CERTIFICATE

UNISA | university of south africa

UNISA COLLEGE OF EDUCATION ETHICS REVIEW COMMITTEE

Date: 2019/04/17

Ref: **2019/04/17/35541652/12/MC**

Name: Ms KJ Masemene

Student no: 35541652

Dear Ms Masemene

Decision: Ethics Approval from 2019/04/17 to 2022/04/17

Researcher(s): Name: Ms KJ Masemene
E-mail address: 35541652@mylife.unisa.ac.za
Telephone: +27 79 065 7822

Supervisor(s): Name: Mr SB Msezane
E-mail address: msezasb@unisa.ac.za
Telephone: +27 12 481 2888

Title of research:

Exploring Environmental literacy components; knowledge, attitude and skills in promoting sustainable behaviour. A case study of rural primary schools in Limpopo, Dennilton District

Qualification: M. Ed in Science and Technology Education

Thank you for the application for research ethics clearance by the UNISA College of Education Ethics Review Committee for the above mentioned research. Ethics approval is granted for the period 2019/04/14 to 2022/04/17.

The **medium risk** application was reviewed by the Ethics Review Committee on 2019/04/14 in compliance with the UNISA Policy on Research Ethics and the Standard Operating Procedure on Research Ethics Risk Assessment.

The proposed research may now commence with the provisions that:

1. The researcher(s) will ensure that the research project adheres to the values and principles expressed in the UNISA Policy on Research Ethics.

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PO Box 392 UNISA 0003 South Africa
Telephone +27 12 429 3111 Facsimile +27 12 429 4150

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2. Any adverse circumstance arising in the undertaking of the research project that is relevant to the ethicality of the study should be communicated in writing to the UNISA College of Education Ethics Review Committee.

3. The researcher(s) will conduct the study according to the methods and procedures set out in the approved application.

4. Any changes that can affect the study-related risks for the research participants, particularly in terms of assurances made with regards to the protection of participants' privacy and the confidentiality of the data, should be reported to the Committee in writing.

5. The researcher will ensure that the research project adheres to any applicable national legislation, professional codes of conduct, institutional guidelines and scientific standards relevant to the specific field of study. Adherence to the following South African legislation is important, if applicable: Protection of Personal Information Act, no 4 of 2013; Children's act no 38 of 2005 and the National Health Act, no 61 of 2003.

6. Only de-identified research data may be used for secondary research purposes in future on condition that the research objectives are similar to those of the original research. Secondary use of identifiable human research data requires additional ethics clearance.

7. No field work activities may continue after the expiry date **2022/04/17**. Submission of a completed research ethics progress report will constitute an application for renewal of Ethics Research Committee approval.

Note:

The reference number **2019/04/17/35541652/12/MC** should be clearly indicated on all forms of communication with the intended research participants, as well as with the Committee.

Kind regards,

Prof AT Motlhabane
CHAIRPERSON: CEDU RERC
motlhat@unisa.ac.za

Prof PM Sebate
ACTING EXECUTIVE DEAN
Sebatpm@unisa.ac.za

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APPENDIX B: PERMISSION TO CONDUCT A STUDY

LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF
EDUCATION
SEKHUKHUNE SOUTH DISTRICT

Enq: Zitha RP   Tel:015 633 2902   Date:26/03/2019

To: Masemene KJ

From: District Director
        Sekhukhune South District

SUBJECT: GRANTED PERMISSION TO CONDUCT RESEARCH

1. The above matter refers.

2. Kindly be informed that your application to conduct Research in the Department of Education, Sekhukhune South District concerning "Exploring Environmental literacy components knowledge, attitude and skills in promoting sustainable behaviour" in Department of Education Sekhukhune District, is approved.

3. Please note you should conduct your research in line with research ethics as prescribed by your institution and international norms and standards for research.

4. The district wishes you well in your research and awaits your findings with great interest.

Kadineng

DISTRICT DIRECTOR   26. 03. 2019
                                          DATE

APPENDIX C: REQUEST TO CONDUCT A STUDY IN SCHOOLS

UNISA | university of south africa

REQUEST FOR PERMISSION TO CONDUCT THE RESEARCH AT YOUR SCHOOL

Date: 1 April 2019

Title: Exploring Environmental literacy components: knowledge, attitude and skills in promoting sustainable behaviour. A case study of rural primary schools in Limpopo Sekhukhune District in Moutse.

DEAR PRINCIPAL AND SCHOOL GOVERNING BODY (SGB)

I Masemene Kgaogelo Johanna, am doing research under supervision of Meezana SB, a lecturer in the Department of Science and Technology, towards Master's degree in Environmental Education at the University of South Africa. We are inviting you to the study entitled "Exploring Environmental literacy components: knowledge, attitude and skills in promoting sustainable behaviour. A case study of rural primary schools in Limpopo, Sekhukhune District in Moutse".

The aim of the study is to explore environmental literacy components, by examining the type of environmental knowledge, attitude and skills acquired in schools and how effective are they in protecting the environment and solving environmental problems schools and communities are facing. Your school has been selected because I have an interest in finding out how Environmental Education is taught and learned in rural primary schools, to identify contextual factors that constrain the development of environmental literacy, and explore the support and motivation given to schools and teachers in addressing those challenges. The study will entail the following methods of collecting data: observations of sustainable indicators both in the field and classrooms, document analysis, face to face interview with grade 7 teachers and focus group interview with grade 7 learners.

The findings of the study will provide an insight to the Department of Basic Education on the effectiveness EE in achieving its goal of developing environmental literate citizenry. It will further highlight the opportunities and constrains of EE in developing environmental literacy, and provide a base for literature to evaluate the implementation of EE in rural schools and suggest further improvement and support. Although the study involves vulnerable learners under the age of 18, there will be no risk involved as the study does not involve personal, sensitive and harmful information.

 Participants will be provided with a written feedback of the study to ensure transparency. Confidentiality and anonymity will be maintained during data collection, analysis and reporting of the study.

Yours Sincerely

Masemene Kgaogelo Johanna

APPENDIX: D   CONSENT TO PARTICIPATE IN THE STUDY

UNISA | university of south africa

REQUEST TO CONDUCT THE RESEARCH AT YOUR SCHOOL

Date: 21 April 2019

The title: Exploring environmental literacy components in promoting sustainable behavior. A case of rural primary schools in Sekhukhune District in Moutse, Limpopo.

Dear Prospective participant (Educator)

I Masemene Kgaogelo, am undertaking research under the supervision of Mr Msezane SB, a lecturer in the Department of ABET and Youth Development. I am studying towards Master's Degree in Environmental Education at the University of South Africa (UNISA). We are inviting you to participate in the study of the title mentioned above.

This study intent to collect important information that will provide an insight on the effectiveness of environmental literacy components knowledge, attitude and skills in promoting sustainable behaviour in rural primary schools. It will further highlight successes and challenges and further suggest developments and improvements based on the findings of the study.

You are invited to the study based on the subject and grade you are teaching, and envisaged knowledge and experience on environmental education related matters. The expected number of schools to participate in the study is 3 and 3 teacher participants. I obtained your information from your school after given the permission to conduct the study.

You will be expected to participate in the face to face semi structured interview, and information provided will be audio recorded and hand written ad notes. Permission will be sought for audio recording. The study involves teachers and learners environmental literacy and therefore, information to be provided is not personal, sensitive and impose no harm to participants. The duration of the interview will be 1 hour with a break of 15 minutes per session. The interviews will be conducted during break times, in the

afternoon or any other time scheduled by the school to avoid disruption of teaching and learning. Therefore, there will be time inconvenience in terms of lunch breaks and using afternoon times.

Participating in the study is voluntary and you are under no obligation to consent to participate. Should you decide to participate in the study, you will be given this information sheet to keep and you will be asked to sign a consent form. There will be no reimbursement or any incentives for participating in this research. You are fre to withdraw your participation at any time without giving a reason.

Your participation in this study will remain confidential and anonymous during data collection, analysis reporting of data. Pseudonyms will be used to protect your identity and the identity of your school. Records that identifies you as a participant will be available only to people working on the study, unless you give permission to other people to see the records. Information collected for this study will be published however, participant's identity will remain anonymous and confidential. Hard copies of data collected will be kept by the researcher in a locked up safe for a period of five years for future research or academic purpose. Soft copies will be stored in a password protected computer. After five years, information on hard copy will be shredded off and information on soft copy will be permanently deleted from the computer.

The study have received written approval from the Research Ethics Review Committee of University of South Africa. A copy of approval letter can be obtained from the researcher if you so wish. If you would like to be informed about the final research findings, or have concern about how the research have been conducted, you can contact   me   on   this   number   079 065   7822   or   email   me   on kgaogeomasemene7@gmail.com. The findings will be available at least year after collection of data.

I thank you for taking time to read this information and looking forward for you to participate in the study.

Yours Sincerely

Masemene Kgaogelo Johanna

Researcher

APPENDIX E: REQUEST FOR PARENTAL CONSENT

UNISA | university of south africa

REQUEST FOR PARENTAL CONSENT FOR LEARNERS TO PARTICIPATE IN THE STUDY

Dear Parent

Your child MMASECHABA is invited to participate in the study entitled "Exploring Environmental literacy components; knowledge, attitude and skills in promoting sustainable behaviour. A case study of rural primary schools in Limpopo, Sekhukhune District in Moutse".

I am undertaking this study as part of my Masters research at the University of South Africa. The purpose of the study is to provide an insight on the effectiveness of environmental literacy components; knowledge, attitude and skills in building awareness and promoting sustainable behaviour in rural primary schools, and the possible benefit of the study includes further improvement and development of effective measures of promoting environmental literacy in rural primary schools.

I am asking permission for your child to participate in the study based on his/her grade and envisaged knowledge and experience in EE related matters. I expect to have other 18 learners participating in the study. If you allow your child to participate, I shall request him/her to participate in focus group interview. I will be audio recording the interview. I therefore request your permission to record information your child will be providing.

Any information that is obtained in connection with this study and can be identified with your child will remain confidential and will only be disclosed with your permission. Your child's responses will not be linked with his/her name, your name or the name of the school in any written or verbal report based on this study. Such report will be used for research purpose only.

There are no foreseeable risks to your child by participating in your study. Your child will receive no direct benefit from participating in the study however, the possible benefits to education could provide an insight on the effectiveness of environmental literacy components; knowledge, attitude and skills in building awareness and promoting sustainable behaviour in rural primary schools. It will further highlight the opportunities and contextual factors of EE in developing environmental literacy in rural primary schools, and suggest further development and improvement based on the findings of the study.

Neither you nor your child will receive any type of payment for participating in this study. Your child's participation is voluntary. He/she may decline to participate or to withdraw from participation at any time. Withdrawal of refusal to participate will not affect him/her in any way.

The study will take place during lunch breaks and after school hours or any other time scheduled by the school, prior the approval of the school and the class teacher. The will

APPENDIX F: ASSENT FORM TO PARTICIPATE IN A STUDY

UNISA | university of south africa

ASSENT FORM TO PARTICIPATE IN THE STUDY

Dear prospective learner

My name is Teacher Masemene and would to ask you if I can come and ask you and your friends questions about what you know and understand about the natural environment. I am trying to find more about what you and your friends know and understand about environmental education. I also want to learn some of the things from you.

I will ask you and your friends question in group interview. The duration of the interview will be 45 minutes including small break of 10 minutes. I have asked your parents' permission for you to take part in the study. If you do not want to take part in the study, it is also fine with me. Remember you can say yes or no and no one will be upset with you for not taking part or even if you change your mind and want to stop participating.

You are free to ask me any questions now or later when I visit your school. Please speak to mommy, daddy, aunt or any elder person you are staying with about taking part in the study before you sign this letter. If you want to participate with us in the study, sign the letter at the bottom. A copy of this letter will be given to your parents or guardians.

Regards

Teacher Masemene

Learner's Name	Yes I will take part	No I don't want to take part
Kabixe Uumile		
Name of the researcher		
Date 26/09/2019		
Witness		

APPENDIX G :   OBSERVATION GUIDE

OBSERVATION TOOL

Name of the school: ███████████ (Case 1)

Name of the observer: Masemene KJ

Date of Observation: 22 April 2019

NB: Responses will be indicated under comments.

DESCRIPTION	COMMENTS
1. Field Observation	
1.1 Littering	• Littering is prevalent around the premises and outside
1.2 Tree plantation and sustainable food gardening	• There are some few tree plantations. There is no sustainable food gardening
1.3 Disposal of waste	• There are 6 still bins around the school • In classrooms old boxes are used as rubbish bins • Paper and plastic waste are burned in a pit • Old books are piled in the shack • Old tables and chairs are dumped at the corner of the school yard
1.4 Integrated Waste Management Systems i.e. recycling programme, different bins to separate waste.	• Papers and tins are put in the same bin • Food waste is separated from other waste • There is no recycling program in site
1.5 Type of water source available i.e. piped water or bore hole.	• Borehole water source
1.6 Any water saving programme i.e. water harvesting	There is no indication of water harvesting. There is indication of taps leaking

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1.7	Any energy saving programme	Some lights are left on during the day, there is no other supplementing energy sources.
		No energy saving bulbs used
1.8	Any change of landscape i.e. cleared ground for sporting activities or paved ground	Most of the land is cleared
1.9	Any water channels to avoid runoffs	No water channel there are indications of eroded soil
1.10	Indication of EE projects	There are no indication of EE projects

2.	Classroom Observation	
2.1	The sitting set up in the classroom i.e. individual or group	Learners are seated in pairs in a row
2.2	Indications of EE projects in the classroom	No indication of EE projects in the classroom
2.3	Energy saving bulbs	No energy saving bulbs used
2.4	Any EE posters, notices and code of conduct	No indication of EE posters and notices.
2.5	Sustainable practices in classroom code of conduct	No indication of sustainable ethics in the classroom code of conduct

3.	Lesson Observation	
3.1	Knowledge and understanding of environmental issue.	Learners demonstrated some knowledge and understanding of environmental content.
3.2	Appropriate pedagogical and content approach	The pedagogic approach is teacher centred
3.3	Appropriate assessment strategies	Learners were assessed through question and answers and written work.

3.4	Demonstration of environmental awareness	Learners demonstrated some awareness on environmental content
3.5	Demonstration of action skill	Learners did not engage in any practical activities during the lesson.

APPENDIX H: DATA ANALYSIS SCHEDULE

DOCUMENT ANALYSIS TOOL

School: ███████ Senior Primary School (Case 1)

Type of Document: Environmental Education Policy

Document Analyser: Masemene KJ

Date of Analysis: 23 April 2019

Data to be analysed: CAPS Curriculum and Environmental Education Policy

1.1   Development, implementation and monitoring of the policy

    1.1.1   Who is involved in the development, implementation and review of the policy?

- The school does not have environmental education policy.

    1.1.2 What actions are taken to meet the aims and objective of the policy?

- Schools is guided by greener policy provided by Department of Agriculture

1.2   Curriculum

    1.2.1   How is environmental education content teaching and learning guided in the policy?

- The EE content is guided by CAPS curriculum

    1.2.2   What environmental education teaching and learning opportunities are available for learners?

- The greening policies guide school garden that provided opportunities for learners and school

1.3   Sustainable Waste Management Systems

    1.3.1   How is the school's waste managed and monitored?

- The greening policy guides waste management for the school

1.4   Water Sources

    1.4.1   What are school's water sources and how are they managed and monitored?

- Bore holed water source. The greening policy guides the management and monitoring of water in school.

1.5   Energy Sources and Usage

   1.5.1 What are the sources of energy and how are they managed and monitored?

- Electricity and firewood. The energy sources are guided by financial policy of the school.
- Safety on using electricity is guided by Safety policy

1.6   Transport

   1.6.1 What is the school's mode of transport?

- The mode of learners and teachers transport is guided by financial policy of the school

1.7   Purchasing Policy

   1.7.1 How are the school's suppliers contracted?

- There is no indication of purchasing policy.

1.8   The outdoor environment

   1.8.1 How the school's landscaping and maintenance?

- The school's landscaping is good and well maintained. There is no policy that guides the school landscaping and maintenance.

1.9   Healthy living

1.9.1. How do schools promote and maintain healthy living?

- There is a feeding scheme policy that guides the program

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APPENDIX I: **FACE TO FACE INTERVIEW GUIDE**

FACE TO FACE INTERVIEW GUIDE

NAME OF SCHOOL: ████

NAME OF INTERVIEWER: Masemene KJ

DATE OF INTERVIEW: 24 April 2019

The following questions will assist the researcher to explore educator's environmental literacy:

1.1.   What and how EE content knowledge is taught in schools?
- Which subjects do you teach and how long have you been teaching them?
- What is your understanding of the concept EE?
- How are the subjects you are teaching linked to EE?
- Describe the role of teaching EE content in school?

1.2.   What pedagogical approaches are used to teach EE content?
- How do you teach EE content within the subjects you are teaching?
- What guide your approaches?
- Explain how your approaches equip learners with appropriate EE knowledge and understanding of environmental issues?
- How your approaches develop learner's concern for the environment?

1.3.   How effective is the acquired EE content knowledge in persuading a positive attitude towards the natural environment?
- In your opinion, how important is teaching EE in schools?
- How relevant is EE content our rural context?
- How practical is teaching EE content in your school?
- How confident and motivated are you in teaching EE content?
- What support do you and the school get in effectively teaching EE content?

1.4. How effective is the skills acquired in taking actions towards sustainable practices and lifestyle?

- How your approaches in teaching EE involve learners?
- How do you assess EE content?
- What practical activities are your learners involved in?
- Which resource conservation programs are you iinvolved in?
- How often do you and your learners visit EE centeres?
- How do you manage your waste in the classroom and school's surrounding?
- How do you maintain your school grounds?
- What are the constrains for developing your environmental literacy and that of learners?

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FOCUS GROUP INTERVIEW

NAME OF INTERVIEWER: Masemene KJ

NAME OF THE SCHOOL: ████████████████

NUMBER OF PARTICIPANTS IN A GROUP: 06

DATE OF INTERVIEW: 25 April 2019
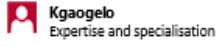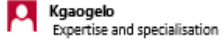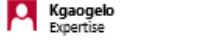
The following questions will explore environmental literacy of learners:

1. **Knowledge and understanding learnt**
   1.1.   What do you know about the concept Environmental Education?
   1.2.   From which subject have you learnt about content of Environmental Education?
   1.3.   Which Environmental Education themes have you learnt about e.g. pollution, deforestation, climate change, land degradation, ozone depletion etc.

2. **How acquired knowledge persuade positive attitude sustainable practices and lifestyle?**
   2.1.   What environmental activities do you do here at school?
   2.2.   Have you identified environmental problems in your school and around the community and if so, who is responsible for those problems?
   2.3.   Who should solve those problems and how?

3. **How effective are the skills acquired in making decisions to solve environmental problems?**
   3.1.   Where do you learn about environmental education?
   3.2.   Which environmental education programs are you involved in at schools?
   3.3.   What type of environmental education activities do you do?
   3.4.   What type of environmental education assessment do you do?

4. **How effective is the skill acquired in promoting sustainable behaviour**
   4.1.   Are you involved in school garden, if so what are your responsibilities?
   4.2.   Are you involved in water and energy saving, if so what are your responsibilities?

4.3. Are you involved in waste management programs and If so what are your responsibilities?

4.4. Are you celebrating important environmental education and awareness days e.g. Abor days, World Heritage day, Water week,

EDUCATOR'S FACD TO FACE INTERVIEW CASE 1.

Interviewer:	Ok, Alright. My interview is about the knowledge understanding that you are having towards the environmental education content and I am also and I am also going to look at your attitude towards the natural environment and the skills that you and the learners have acquired and how you promote sustainable behaviour at school. So those are the key points that this interview will focus on.
	So firstly, which subjects are you teaching, and how long have you been teaching them?
Teacher:	Huum... I am teaching social science, which is geography including history, from grade 7 to grade 9. I have started to teach this subject in 2006 humm... 2008 sorry, up do date.
Interviewer:	Ok, alright, Ok What, what ok.. what are your qualification?
Teacher:	Humm... I am measuring with social science as well as technology, as well as home language Sepedi.
Interviewer:	So how have they allocated you this social science?
Teacher:	At grade 9 I normally teach Geography as my favourite subject.
Interviewer:	So Geography is your favourite subject?
Teacher:	Yes, I like it. So when I go to grade 7 they gave me both which is history and social science.
Interviewer:	Is your specialisation on History or on Geography?
Teacher:	Is both
Interviewer:	Ok, O right. And how are the subjects you are teaching linked to Environmental Education content (EE)?
Teacher:	It link because when I am teaching technology I am doing recycling more especially in grade 9 and I am teaching grade 9 both social science and technology, including grade 7, grade 7 I am teaching technology as well as Geography and History.
Interviewer:	So the content that is covered in technology in grade 7 and 9 is only on recycling?
Teacher:	Nooo... is not only on recycling there is also the how can we save the natural resources, how can we maintain it to become sustainable, because nowadays we have a concern concerning the environment, hum... our People hum... due to technology the People eehh... eehh... there are some companies that are selling the pampers and those pampers, the mothers are improving that company by buying a lot of

Right margin annotations:
- Kgaogelo — Expertise and specialisation
- Kgaogelo — Expertise and specialisation
- Kgaogelo — Specialisation
- Kgaogelo — Expertise
- Kgaogelo — Content interrelatedness

pampers but we are struggling on the environment because they are just distributing all over, on the roads, on the sea, on the bushes then our animals are grazing the, then they are eating those things as they are salty you know. When they go and drink the water they start to expand inside the stomach and then they damaging our animals. When you go to the water, hum... we got some micro organisms, there is an ecosystem that is very much important , and somewhere somehow is breaking the chain of the ecosystem. Because when they are throwing the pampers and the plastics inside, they are littering the water and then that water is no more healthy, yes...

Interviewer: Ok, What is your role of teaching EE content in school? I heard that you are teaching it, and what are your other environmental education roles?

Teacher: You know at the committee, I am one of the steering committee at our village and our community at large, we try to organise the youth to try to picking up papers to make them, as I am a teacher for the environment and I am like that subject at school, I am doing practically at home by picking all papers, and there are some recycling with the papers, we just process it, putting inside the water so then we dump it and then we bolt it and then we put it dry and we put a poceline, then we collecting the dry seeds, you see the dry seeds, of any natural trees, then we are decorating then we form some bowls that can decorating in our house.

Interviewer: Ok, and then does that also applied here at school?

Teacher: Yes when I am doing the projects on the recycling I normally used to teach my learners, even in my class, even when you see my classroom on the table, there are some decorations, is done by the learners

Interviewer: So you also applying that at school?

Teacher: Exactly, and then we are collecting, I have a tank at home, when there are some functioning on our surrounding, I am tasking the other learners, I am around near the school, I am asking the learners during the weekend to pick up and to fill up those bags and then we transfer to Johannesburg where they are going to process those bottles.

Interviewer: Ok so you are collecting bottles and cans?

Teacher: Yes I put in a big bag of the can, the big of the bottles, and I separate them and I task a truck at home and there is my neighbour has a big truck that is collecting those... those they put it on the scale and they give us little amount just to encourage us to clean the environment. My aim is not to get that money just to pick up the littering things on the environment as our environment must be sustainable. Because the resources if they are damaged, the ecosystem is going to break the chain.

Kgaogelo
Identification of environmental problems

Kgaogelo
Awareness, value and concern for the environment

Kgaogelo
Knowledge of ecological concepts and processes

Kgaogelo
Personal responsibility, Community Outreach

Kgaogelo
Assessment Practices

Kgaogelo

Kgaogelo
Sustainability Practice (Integrated waste management)

Kgaogelo
Economic benefit

Kgaogelo
Knowledge of ecological processes

Interviewer: Then how do you do the separation and recycling here at school?

Teacher: Yes at the back when you go at the back, we have a bag for picking up papers, there are someone who is coming asking to contributing with us to taking those papers for recycling. And then If you go to the feeding scheme site at the back, we got a big bag where we put all the waste. Maybe we have some farewells and... and the fundraising, normally I just go with those learners, I task those who are the grade 9 learners those who are leading, just to come and help to pick up all the bottles, you see in that bottles, I put that bottles inside the bags, there is other truck that we organise to come and collect those bottles and then they will give money for that when we are raising fundraising in school.

Kgaogelo — Sustainability Practices (Integrated waste management)

Kgaogelo — Economic Benefits

Interviewer: So the school is benefiting?

Teacher: Yes is benefiting. That is why we are working in group we are a team work all the teachers are involved, then they are appreciate " Mam it's a good think we like your environment "

Kgaogelo — Collaboration

Interviewer: Alright huumm... How do you approach the EE content when you teach the social science, technology and other subjects you are teaching?

Teacher: Hummm (*Silence*)...

Interviewer: The methods that you are using ?

Teacher: The methods, then when I am going to teach the environmental content, firstly we go out with my learners, then we picking all papers, we put it on the bag of the same papers as you saw it at the back huumm... every plastic, any plastic they take they put it there. We have got 6 mothers which were one of the SGB members they are pleating some mats, to avoid the dust, you see that maths when you get inside the administration is done by those mothers. Those checkers we get from checkers, Pick n Pay and all staff, we just fold it fold it, wash it and fold it those grand mothers are knitting. You see that one we wrote it Welcome to Morwathebe?

Kgaogelo — Integrative approach

Kgaogelo — Action Oriented, Learner Cantered

Interviewer: I didn't see it, I didn't notice, Ok I will check it. You will take me out when we done and show me around.

Teacher: Yes I will show you. They are making some caps and then aprons and then all staffs with those plastics. So there is a needy to collect those plastics.

Interviewer: So then what is the...the method that you are using when you teach, when you teach environmental education content to learners?

Teacher: Ok firstly I am collecting them all those things to put it on that and then I get inside the class and I tell today that today that is the environment People, let us take our environment concern because it is very much

Kgaogelo — Instructional strategies, learning opportunities

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CODED SCRIPS FACE TO FACE INTERVIEW CASE 1

RESEARCH QUESTION: 1 WHAT ENVIRONMENTAL CONTENT KNOWLEDGE IS TAUGHT AND LEARNED IN RURAL PRIMARY SCHOOL?		
THEME	**CATEGORY**	**INTERVIEW QUESTION AND RESPONSES**
EE content knowledge and understanding	• Expertise and Specialisation	Q: Which subjects do you teach and how long have you been teaching them? A: Mathematics 10 years Natural Science, Technology not more than 5 years and EMS Q: How long have you been in the management position? A: More than 10 years Q: How were you allocated these subjects? A: According to the requirements of the post, sometimes you find that there is no body who matches the post requirements but have primary education, they just assume that each person can fit. The subjects that I did at the college, I think Geography is the one related but I never taught it, they just threw me on Maths and Technology and just developed myself.
	• Knowledge of environmental education content, Awareness	Q: What is your understanding of the concept EE and its content A:"In technology, I think each and every product that we use to solve technological problems, we must also think about its impact on the environment
	• Knowledge of ecological concepts and processes, content interrelatedness and Foresightedness • Relation about natural, social, economic and cultural content	Q: Which environmental education content are taught in Technology as a subject? A: They talk about recycling and safety and also about the products students are making must be aesthetic Q: How are the subjects you are teaching linked to environmental education? A: sometimes we taught learners about recycling, maybe how to recycle these materials sothat we keep our environment clean taking into consideration thing that may cause pollution, so we must teach these learners to comply with recycling and on the other hand they will be making money. Q: How does the knowledge taught help learners to change their attitude towards the natural environment?

		A: Like have mentioned recycling at school is expensive so some of the learners collect the tins and papers and sell them to recycling companies and do not do that for the school because they are benefiting A: like that of recycling, you know I used to ==ask learners about the things that can be recycled and we also discus about the importance of recycling a==nd that they will be making money on the other hand and that modified them to follow that thing of recycling. And also technology we used to talk about this word aesthetic. A: ==So infact I do not instruct them to use certain material they just come up with their own material,== they must be innovative but we advise them to use the material which will be safe not harm and the product should be easily usable. Q: What guides you in teaching EE content? A: For technology you find there are steps that you need to follow when solving technological problems and you find that environmental content is not extensive and eventually the product should not cause harm to the environment. CAPS is not that extensive in teaching EE content in technology Q: Do you have any water harvestation or conservation programs? A: ==No our water is borehole and we don't have water scarcity.== We have 5 jojo tanks we pump them in the morning and they don't take time to fill up
2. WHICH PEDAGOGICAL APPROACHES ARE USED TO TEACH ENVIRONMENTAL CONTENT?		
Pedagogical Content Knowledge	• Learner centred	Q: Which pedagogical approaches do you use to teach EE content A: It was just that maybe I was perceiving this technology In a different way not putting much effort on EE content because technology subject is about solving problems that are related to technology. What I am looking at is for learners to have knowledge of solving technological problems. Q: Are you aware of integrative approach of teaching EE content in your subjects or have any qualification or attended workshop about it? A: No I am not aware, at the college I did subject methods for the subjects I was measuring with. I have never attended EE workshop for new methods.
	• Learning opportunities	

3. How effective is the knowledge in persuading positive attitude towards the natural environment?	Value, Concern and respect and perception towards the natural environment	Q: How important is teaching EE content in school and how relevanti is in the rural context? A: Very important. Since well they are talking about this thing of global warming each and every year and they are talking about ozone layer being damaged. And it is very relevant to every citizen of the country
	Willingness, Personal responsibility and locus of control	Q: So di activities of burning waste based on lack or no resources doesn't it contributes to that global warming and how do you address that? A: Yes it is contributing but our hands are tight. For instance we clean the yard and we don't burn the waste after two days they get blown away by wind so best way is to burn them but on the other side we are contributing towards damaging the ozone layer. Q: Do you have any constrains in effectively implementing EE in school and if so how would you like them to be resolved? A: Like I said we should develop policies sothat they can guide us. Q: How practical is EE content in the rural areas? A: Not always, like recycling we need to get transport and we use petrol and when we come back they give us less money and we work at a loss. So if schools were using common transport it was going to be effective and beneficial. A: Even those companies that are collecting waste are far from our places that's why it gives us challenges if it wasn't for that we were going to do it because transport is excpensive.
	Confidence and Motivation	Q: How confident are you in teaching EE content? A: No I am not confident. Because I don't have the full knowledge of teaching environmental education and how to teach it. I focus on technology to solve technological problems. Motivation wona I do have although not much because we don't have resources that motivates us to teach EE content. If we can get some support and resources I think we will do much better like with other subjects.
	Support	Q: Have you done integrative approach in your pre service or attended any courses for EE content approaches? Or workshop on curricula like CAPS? A: No, not about environmental education. But with CAPS yes it was for 2 days and they didn't focus on EE content but on how our subjects must be taught.

APPENDIX L: FACE TO FACE TRANSCRIPTS CASE 2

FACE TO FACE INTERVIEW (TEACHER) RAMONOKANE CASE 2

Teacher: Huumm… in terms of technology hummm… I think each and every product that we use to solve a certain technological problem we must also think about the impact to the environment, the product is not going to harm maybe the atmosphere and even the materials that we use, we must use the material that will not harm the environment.

Kgaogelo
Interpretation, Knowledge of ecological concepts and processes,

Interviewer: Ok is the material, so is with the projects that you are doing?

Teacher: Any technological problems, or any technological projects that we make we must also think about the environment. We do not do a product for the sake of doing it but you must also think about how this product is going to affect the environment.

Kgaogelo
Awareness and knowledge of environmental issues

Interviewer: Ok good, alright I am happy. Ok how are the subjects you are teaching linked to environmental education?

Teacher: Hummm…the subjects, all the subjects, and OK hum… EMS, EMS hummm…sometimes we taught learners about recycling, maybe how to recycle these materials sothat we keep our environment clean taking into consideration thing that may cause pollution, so we must teach these learners to comply with recycling and on the other hand they will be making money.

Kgaogelo
Content interconnectedness, knowledge of ecological processes

Interviewer: So how do you approach environmental content when you teach technology, when you teach EMS, how is your approach?

Teacher: (Silence)

Interviewer: Hummm…how do you teach your recycling in the content of technology, how do you teach the impacts of projects or development within EMS?

Teacher: Hummm…like that of recycling, you know I used to ask learners about the things that can be recycled and we also discus about the importance of recycling and that they will be making money on the other hand and that modified them to follow that thing of

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recycling. And also technology we used to talk about this word aesthetic. Like when they make a product, it should be lookable. Like cellphone towers, for this term they are going to make a research about how to construct those structures and they must also bear in mind that the product that they are going to make it should be aesthetic. Jaa eye catching in other words.

Kgaogelo
Relationship between social, ecological; social and cultural asects.

Interviewer: And the materials to construct that material, what material are you using?

Teacher: So infact I do not instruct them to use certain material they just come up with their own material, they must be innovative but we advise them to use the material which will be safe not harm and the product should be easily usable.

Kgaogelo
Foresightedness

Interviewer: Usable in which sense, they should be able to use it again and again?

Teacher: Not exactly, hummm,… it should be…must not cause harm to the learners.

Kgaogelo
Instructional Strategies, knowledge of ecological processes

Interviewer: Lea tseba ka integrative approach teaching (Do you know of integrative approach teaching)?

Teacher: Integrative approach hummm or maybe integrating these certain subjects with other learning areas, yes I know it

Kgaogelo
Integrative teaching

Interviewer: My question on how do you approach EE content was based on how do you integrate EE content into other subjects like EMS maths, technology, all the subjects you are teaching.

Teacher: Ehh… Maths and EMS, we we hum we normally.. use because sometimes we give them scenarios in mathematics which is based on EMS and that's when this integration comes in

Kgaogelo
Instructional strategies, integrative approach

Interviewer: So in recycling or recyclable materials like you have just said learners should understand materials that you are doing projects with, hum how do you practice that recycling at school?

Teacher: Humm in fact humm practically we failed because the.. the amount, because last time we made a research about the money that we are going to get after recycling and they told us they are going to.. what have they said they said something I mean they said they charge the kilos, a ke sa gopola gabotse (I don't remember very well). Go ba le some disadvantages ba tbelete (there are some financial disadvantages) instead of benefiting

Kgaogelo
Integrated waste management, Challenges

Interviewer: Ok I hear you. So what do you do with the waste?

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Interviewer: Then how do you do the separation and recycling here at school?

Teacher: Yes at the back when you go at the back, we have a bag for picking up papers, there are someone who is coming asking to contributing with us to taking those papers for recycling. And then If you go to the feeding scheme site at the back, we got a big bag where we put all the waste. Maybe we have some farewells and... and the fundraising, normally I just go with those learners, I task those who are the grade 9 learners those who are leading, just to come and help to pick up all the bottles, you see in that bottles, I put that bottles inside the bags, there is other truck that we organise to come and collect those bottles and then they will give money for that when we are raising fundraising in school.

Kgaogelo
Sustainability Practices (Integrated waste management)

Kgaogelo
Economic Benefits

Interviewer: So the school is benefiting?

Teacher: Yes is benefiting. That is why we are working in group we are a team work all the teachers are involved, then they are appreciate " Mam it's a good think we like your environment "

Kgaogelo
Collaboration

Interviewer: Alright huumm... How do you approach the EE content when you teach the social science, technology and other subjects you are teaching?

Teacher: Hummm..(*Silence*)...

Interviewer: The methods that you are using ?

Teacher: The methods, then when I am going to teach the environmental content, firstly we go out with my learners, then we picking all papers, we put it on the bag of the same papers as you saw it at the back huumm,... every plastic, any plastic they take they put it there. We have got 6 mothers which were one of the SGB members they are pleating some mats, to avoid the dust, you see that maths when you get inside the administration is done by those mothers. Those checkers we get from checkers, Pick n Pay and all staff, we just fold it fold it, wash it and fold it those grand mothers are knitting. You see that one we wrote it Welcome to Morwathebe?

Kgaogelo
Integrative approach

Kgaogelo
Action Oriented, Learner Cantered

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Teacher: Yes I will show you. They are making some caps and then aprons and then all staffs with those plastics. So there is a needy to collect those plastics.

Interviewer: So then what is the...the method that you are using when you teach, when you teach environmental education content to learners?

Teacher: Ok firstly I am collecting them all those things to put it on that and then I get inside the class and I tell today that today that is the environment People, let us take our environment concern because it is very much

Kgaogelo
Instructional strategies, learning opportunities

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RESEARCH QUESTION 1: WHAT ENVIRONMENTAL CONTENT KNOWLEDGE IS TAUGHT AND LEARNED IN RURAL PRIMARY SCHOOL?		
THEME	**CATEGORY**	**INTERVIEW QUESTION AND RESPONSES**
EE content knowledge and understanding	• Expertise and Specialisation	Q: Which subjects do you teach and how long have you been teaching them? A: Natural sciences, I think I have 8 …. Years, and technology, more or less 15 years and English hum…20... to 24 years Q: How were you allocated these subjects? A: Because I love the subject and I am available to teach it and I did biology in school.
	• Knowledge of environmental education content, Awareness	Q: Describe your role of teaching environmental education content in school. A: Jaa...environmental education in schools is very important, that's where the communities are bringing their learners to schools, and the purpose of schooling, is to train the mind, because the mind is the engine of the activities of the human kind, and therefore, if we train these learners correctly, and then they will then grew grow knowing how they will adjust themselves with the natural environment as they make their lives… Ja
	• Knowledge of ecological concepts and processes, content interrelatedness and Foresightedness • Relation about natural, social, economic and cultural content	Q: How are the subjects you are teaching linked to EE content? A: Jaa look, my understanding is, if you check natural science, we have natural phenomenon, which provided for by nature hence the name natural science and but then the tech is the intervention of the mankind on natural phenomenon to protect or to improve the natural environment in one way or the other so that now life keeps going because if… if ... the intervention of the human kind in the natural phenomenon is not well taken care of , then

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		so we gona have the problem in a sense that you find that there are other natural things that are getting extinct.

A: remember talking about the integration, what do learners do, when they interact with the soil in preparatory for cultivation of crops, they interact with the natural space and remember after having planted the crops, it is also the integrative in terms of economics then now we are also developing their entrepreneur skills , sometime they take some veggies like onions, like carrots, they sell them and they now know that gardening is not just gardening but it can as well be used for economic reasons.

A: It is very, very interrelated in a sense that people use language, concepts to think and therefore, as they are using the language to think, so the developing of English then is be a helpful to unpacking the concepts to learners, and then so that now they understand clearly what we are talking about so hum… it is helpful in the sense that now if they mastering the English and also the mastery of EE concepts it will be easy, yes they will be clearly conversant, otherwise its gona be… be a barrier. I say tech is human intervention on natural resources and jaa.

Q: How does technology consider the sustainability of natural resources?
A: Because now when we look at natural science, it has environmental content, when we look at technology we talk about materials, and in technology we going to recyclable materials, what are the composition of the material, whether are biodegradable or not, like the social science, the geographical part of it, it talks about air pollution and is very natural and remember say in social science, how do people socialise, we are then training the society to say if you practice this noble practices, then they will have a very good impact on our society.

A: After chopping the trees for fire woods then the environment in which the trees are being chopped has to be given time to recover, so that is how it should be encouraged. If the environmental education should be directed about such kind of situation to say people, if you have done this, It is important to leave it for some time to recover. |
| | | |

2. WHICH PEDAGOGICAL APPROACHES ARE USED TO TEACH ENVIRONMENTAL CONTENT?		
Pedagogical Content Knowledge	• Learner centred	Q: Then how do you approach the environmental content within the subject The approach if you would recall I said would be a heuristic... no no no... a discovery, when they discover that this is the problem, and it would then dictate the approach and then I am then saying if there is the discovery of saying this is the problem that we are living with, and we need to have the method, of addressing it, and like I said develop a sense of ownership to the school environment and extensively to their families, the communities and the entire society. A: the method of teaching with this content would be hum... we engage the learners to check the negative impact and the through heuristic method, Heuristic method it means as well, you engage them in such a way that now they discover facts on their own, and then if they discover these facts on their own.
	• Learning opportunities	It means that learners shall have discovered that this is not wanted in our environment and the approach would be corrective approach to the action which was wrongly done. So that's how I think it would be done so learners should be given chances to discover things and then if not, able to discover on their own, they should be alert. Q: Because environmental education is not a subject on its own, it's a content of the natural environment within other subjects, which is the integrative approach because the EE content is integrated in other subjects. So how effective is teaching the EE content?
	• Integrative Approach	A: All these methods and approaches and hum...I cannot talk of hum...effectiveness in a sense of ... of ... like being opened and like being proud or boastfully because we still have this environmental problems and then which denotes that environmental education, teaching of environmental education within broader subjects denotes that it is not effective as it should be, then I am just saying that your study hum...in a way has brought about hum... an opportunity for us to raise eyebrows to say that there were these other thing that we were not so careful of, hum... integration of all these subjects towards common goal of environmental education, is like we will then sharpen our focus to say let's make sure that now my subject, be maths, be technology , be what...as we are teaching, how contributory, can be my subject towards environmental education.

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RESEARCH QUESTION 3: HOW EFFECTIVE IS THE KNOWLEDGE IN PERSUADING POSITIVE ATTITUDE TOWARDS THE NATURAL ENVIRONMENT?		
Attitude	Value, Concern and respect and	Q: Describe your role of teaching environmental education content in school. A: Jaa…environmental education in schools is very important, purpose of schooling, is to train the mind, because the mind is the engine of the activities of the human kind, and therefore, if we train these learners correctly, and then they will then grew… grow knowing how they will adjust themselves with the natural environment as they make their lives… Ja…
	perception towards the natural environment	Q: So now how relevant is the environmental education content in rural context? A: The environment has got nothing to do with rurality or urbanism, if ever there is a need, for… for for…preservation, it should not be taken care of because is urban, or it should not be neglected because it is rural. That's why I was saying the question of rurality can be an excuse but at the same much the same as perhaps if there are resources we can we can… be able to do as much as the urban are doing. so that's why am saying even though we might be having challenges in the rural areas not having services of refuse collection but we still have to see means and ways of improvising and having it done. A: You will understand that hum… natural resources or environment Is there for provision of life. trees and some plants which are distracted when the deforestation is done is in a way decreasing the oxygen which we need the most so the technology, buildings is the technological aspect and as we come up with these strategies of improving the lives of the people, we are also tempering with the nature

	Willingness, Personal responsibility and locus of control	A: This is our environment and it needs nobody else from outside but ourselves. So if we own all of the campaigns that we gona be embarking upon, then it… it will be good and I think the approach is instilling the ownership of the environment to the people who are living in the environment and show how negatively it will impact on the problem. Sothat they deal with the problem, if the ownership is there, then … then they will be able to act and accordingly.

FACE-TO-FACE-INTERVIEW-CASE-1-EDUCATOR-(PRINCIPAL)¶

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Interviewer¶

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Mr·Masemola, ·We·are·going·to·continue·with·our·face·to·face·interview, ·the·date·is·26·April·2019· and· the· time· is· 8:41. · We· will· be· guided· by· all· these· questions· on· this· document.·As·per·the·document·we·are·having.·There·will·also·be·some·probing·here·and·there·and·some·elaborations·based·on·the·observations·and·document·analysis.¶

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Knowledge·and·Understanding¶

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Interviewer: → Mr·Masemola, ·which·subjects·do·you·teach, ·and·how·long·have·you·been·teaching·them?¶

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Teacher: → EEhh... · Natural·sciences, ·I·think·I·have·8·.... · Years, ·and·technology, ·more·or·less·15·years·and·English·hum...·20...·to·24·years¶

Interviewer:·Yoo,...24·years!·That's·a·good·experience.·From·the·experience·that·I·have·from·the·number·of·years·in·teaching, ·how·were·you·allocated·these· subjects, · especially· natural· science· that· you· are· currently· teaching?¶

Teacher: → Because·I·love·the·subject·and·I·am·available·to·teach·it·and·I·did·biology·in·school.¶

Interviewer:→Ok, · then· tell· me, · what· is· your· understanding· of· the· concept, · Environmental·Education·and·its·content?¶

Teacher: → Jaa,...Hum·Environmental·Education·to·me·hum...is·an·education·about·hum... · the·space·within·which·we·are·living·and·what·impacts·is·EE...· are·the·phenomenon·in·environment, ·what·is·it·that·which·is·to·be·taken·care·of, ·and·what·is·it·that·it·can·be·dangerous·to·us·in·the·environment·and·which·is·gona·make·living·a...·a...·better·in·that·same·environment¶

Interviewer:··Aaand,...How·does·the·subjects·you·are·teaching, ·the·English, ·the·technology· and· the· natural· science· Umm...· are· related· or· linked· to· environmental·education?¶

Teacher:·Jaa,...Humm,...I·think·English·basically·because·is...·is·a·language, ·and·we·teach·the·EE·content·through·the·language, ·and·English·is·the·medium·of·instruction, · "we...· gona... · gona· · call· it· LOL"· and· it· is· very, · very· interrelated·in·a·sense·that·people·use·language, ·concepts·to·think·and·therefore, ·as·they·are·using·the·language·to·think, ·so·the·developing·of

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Kgaogelo
Experience·and·Expertise¶

Kgaogelo
Proficiency·and·Expertise¶

Kgaogelo
Knowledge·of·concepts·¶

Kgaogelo
Value·ad·concern¶

English then is gona uhh... be a helpful to unpacking the concepts to learners, and then so that now they understand clearly what we are talking about so hum... it is helpful in the sense that now if they mastering the English and also the mastery of EE concepts it will be easy, yes they will be clearly conversant, otherwise its gona be... be a barrier.

Interviewer: In terms of natural science and technology, how are they linked with EE or environmental content?

Teacher: → Jaa Huum... look, my understanding is, if you check natural science, we have natural phenomenon, which provided for by nature hence the name natural science and huum... but then the tech is the intervention of the mankind on natural phenomenon to protect or to improve the natural environment in one way or the other so that now huum... life huumm... keeps going because if... if.... the intervention of the human kind in the natural phenomenon is not well taken care of, then so we gona have the problem in a sense that you find that there are other natural things that are getting extinct and which are very important to life itself, so the intervention of the mankind, humm...uh... in the natural space either for protection or improvement is very important, so the tech it bring about like if I may to give example hu...u...if u check the minerals that we are making bracelets, the watches, u name the... cars, , it has been the minerals that are dug or dugged from the grounds, and then which is natural product, and then we take these natural resources and then we process them, and when we process them that is technological part, we make this natural resource become suitable for the purpose we want to use them so that's how they link, so I say tech is human intervention on natural resources and Jaa... Jaa..

Interviewer: I hear you, it is well explained then does this tech when is develops or it improves the lives in the natural space, hum... does it consider the sustainability of these intervention because now it comes into the natural space as to develop like we have mining of natural resources to be mined, to be refined to be developed to suit our needs. so in the subjects how is it explained to fit into the natural space because that development because of improved growth rate, that leads to population being more than expected and improved daily lives and needs and more development to suit our daily lives so how do we balance the two..

Teacher: → Ja... Humm...you will understand that hum... natural resources or environment Is there for provision of life, but then, as we live not only human being not only as teachers but there is interaction in this environment in which we are living for all the living organism including the human being but eehh... coming to your question directly striking the balance, huu... look... will recall that while we bring some ways of addressing the problems that are there in nature, as human intervention, at the same time the strategies we are bringing are also causing the problems So and u need to understand that now we... like we need to in

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Teacher: Ja... Humm...you will understand that hum... natural resources or environment Is there for provision of life, but then, as we live not only human being not only as teachers but there is interaction in this environment in which we are living for all the living organism including the human being but eehh... coming to your question directly striking the balance, huy... look... will recall that while we bring some ways of addressing the problems that are there in nature, as human intervention, at the same time the strategies we are bringing are also causing the problems, So and u need to understand that now we... like we need to in-

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Kgaogelo — Content interconnectedness

Kgaogelo — Knowledge of ecological concepts

Kgaogelo — Knowledge of ecological processes

Kgaogelo — Content Interconnect

Kgaogelo — Content Interconnectedness

Kgaogelo — Awareness

DATA PRESENTATION CASE 3

RESEARCH QUESTION: 1 WHAT ENVIRONMENTAL CONTENT KNOWLEDGE IS TAUGHT AND LEARNED IN RURAL PRIMARY SCHOOL?		
THEME	CATEGORY	INTERVIEW QUESTION AND RESPONSES
EE content knowledge and understanding	• Expertise and Specialisation	Q: Which subjects do you teach and how long have you been teaching them? A: I am teaching social science which is Geography from 2008 to date. I measuring with Social Science, Technology as well as Sepedi Home language Q: How were you allocated these subjects? A: At grade 9 I normally teach geography because is my favourite subject. And in Grade 7 they gave me both which is Geography and History Q: Where does this interest of yours on the natural environment coming from? A: I started at UNISA approaching BA degree I finished somewhere on 2006, I go back and do post graduate certificate, including environmental studies due to that I told you that's my favourite subject A: normally I am trying to show them when I am teaching natural science, so in natural science I try to teach them how to save the resources and when we don't picking up those things when they are burning out there is a lot of carbon dioxide that is going into the atmosphere and is going to form the global warming and then it will cause the acid rain and the acid rain is not healthy to our plants and the plants have a lot of acid of which is not healthy for the plants to grow up. And even we as human beings we are inhaling lot of oxygen and we are exhaling carbon dioxide so if our atmosphere is fill up with carbon dioxide those People are going to struggle to get the healthy environment. So the information is integrated to their lesson.
	• Knowledge of environmental education content, Awareness	Q: How are the subjects you are teaching linked to EE content

1

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		A:" It link because when I am teaching technology I am doing recycling, how can we save the natural environment and how can we maintain it to become sustainable
	• Knowledge of ecological concepts and processes, content interrelatedness and Foresightedness • Relation about natural, social, economic and cultural content	Q: What is your role of teaching EE content here at school? A: As I am a teacher for the environment and I am like that subject at school, I am doing practically at home by picking all papers, and there are some recycling with the papers. My aim is not to get that money just to pick up the littering things on the environment as our environment must be sustainable. Because the resources if they are damaged, the ecosystem is going to break the chain. We got some micro-organisms, there is an ecosystem that is very much important, and somewhere somehow is breaking the chain of the ecosystem. A: Because when they are throwing the pampers and the plastics inside, they are littering the water and then that water is no more healthy, yes... A: Yes I put in a big bag of the can, the big of the bottles, and I separate them and I task a truck at home and there is my neighbour has a big truck that is collecting those... those they put it on the scale and they give us little amount just to encourage us to clean the environment. My aim is not to get that money just to pick up the littering things on the environment as our environment must be sustainable. A: And there are some youth development in our municipality I normally advice if there are some any fundraising that they are contributing and then they are giving the small companies the youth to start a small business Q: So you are making compost, how do you make your compost? A: Yes... EEhhh... we put ehhh... grasses, we normally put the grasses and a heap until... until... ehhh... for five weeks and is then that if is one equip then we will take it to on the raw of our beds normally we put some grasses for moisture and the moisture release easily on the roots.
2. WHICH PEDAGOGICAL APPROACHES ARE USED TO TEACH ENVIRONMENTAL CONTENT?	
1. Which pedagogical approaches are used to teach environmental content?	Pedagogical Content Knowledge	Q: How do you approach the EE content when you teach the social science, technology and other subjects you are teaching?

		A: The methods, then when I am going to teach the environmental content, firstly we go out with my learners, then we picking all papers, we put it on the bag of the same papers as you saw it at the back huumm… every plastic, any plastic they take they put it there.
		A: Ok firstly I am collecting them all those things to put it on that and then I get inside the class and I tell today that today that is the environment.
		Q: Ok, Alright. What is it that guides you with the methods you are using and the projects you are doing with learners, because I was not even aware that your shoes are made from plastic.
		A: There is some eehhh… some activities art and culture, I usually show them there are some shows on the TV on the periods of art and culture, I am so much interested in it.
		Q: Is CAPS curriculum saying anything or much in guiding you with the methods?
		A: Yes it says much, I am teaching them on the natural resources how can we save the natural resources but not littering the dams, rivers and all staff.

RESEARCH QUESTION 3: HOW EFFECTIVE IS THE KNOWLEDGE IN PERSUADING POSITIVE ATTITUDE TOWARDS THE NATURAL ENVIRONMENT?

2. How effective is the knowledge in persuading positive attitude towards the natural environment?	Value, Concern and respect and perception towards the natural environment	Q: So in your opinion, how important is teaching environmental education in schools and now that you are involved in communities how important is the environmental education?
		A: Ehh… is very much important, very because if you teach them if even if there were adult enough they will teach other People even if they are not around the school they know how to make the environment to be sustainable.
		A: People, let us take our environment concern because it is very much important because if you are not picking those plastics you are going to throw them in the dams we have got some animals we are staying in the rural places we have herds of cattle and sheep and goats and then when they are thirsty they go to the dam there is a dam near at the back. So if you are not picking up these papers, your grandmothers and mothers and fathers, they are going to inflict pain if they find their animal dead because of these plastics.
	Willingness, Personal responsibility and locus of control	A: Humm…I normally we go and attend the meetings on the community meetings just to encourage them People if you are not working, if you

3

APPENDIX N: FOCUS GROUP INTERVIEW CASE 1 TRANSCRIPTS

FOCUS GROUP INTERVIEW CASE 1

→ Ok tell me, what do you know about the natural environment, have you heard anything about the natural environment?

Learners: → Yess!

Interviewer: → Ok, what is it?

L1: → Its like where we live.

Interviewer: → What more do you think is the natural environment?

L2: → It is things that are on nature that you use.

Interviewer: → Where have you learned about this natural environment?

Learners: → At school.

Interviewer: → From which subjects?

L2: → Natural science

Interviewer: → And which other subject, is only from natural science?

L3: → And technology

Interviewer: → And which one?

Learners: → Only natural science and technology

Interviewer: → Ok! in other subjects you did not learn about the natural environment. So…When you are learning about the natural environment, have you ever heard about the word environmental education?

Learners: → Nooo!

Interviewer: → Nooo! Ok but what do you think environmental education could be?

L1: → I think it might be education wherein you learn about natural things, things like how, maybe let me make an example, like water, like how water turn into rain like when it evaporates.

Interviewer: → Ok, I agree with you. Are you with us (*calling on a passive learner*)

1

L2:   →   By making fire and that smoke…hum…¶

L1:   →   pollutes the air.¶

Interviewer: → So that smoke pollutes the air. So how does it pollute the air?¶

L4:   →   Rain… (*Silence*)¶

Interviewer: → Ok the smoke makes rain? Ok and what else?¶

L2:   →   Its gets into our…when we breath and breath it gets into our hearts and we start to have diseases for heart burn. ¶

L4:   →   Maybe it affecting our lungs ¶

Interviewer: → Owoo, it affects our lungs. And you were saying?¶

L1:   →   Like from water pollution, if we keep on littering its gona damage or maybe we not going to be able to drink our water.¶

Interviewer: → So tell me, ok let's focucs on air pollution and we going to come to water pollution. You have mentioned the smoke getting into our lungs and giving us diseases is there any other things that the air pollution does?¶

L1:   →   You see the thing that they call the blanket that protects us from the sun.¶

Interviewer: → I see it, what is it called?¶

Learners: → We don't know… ¶

Interviewer: → It's called ozone layer…ok continue.¶

L1:   →   I think the smoke goes up and damages the ozone layer and that thing, the ozone layer protects us from the sun. The smoke breaks the ozone layer and the sun become too hot. Like before ankere be go na le, ne go le gabotse (Like before there was, it was fine) it was warm and cool, now that the ozone layer is damaged, to burn us more than in the first time.¶

Kgaogelo
Identification of environmental problems¶

Kgaogelo
Knowledge of ecological concepts¶

Markup Area

Kgaogelo
Knowledge of ecological processes¶

3¶

¶

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Interviewer:→ Qok! they also makes us sick. I hear. So have you learned or heard about sustainability or sustaining resources?¶

Learners: → Noo, we don't understand it.¶

Interviewer:→ Ok not a problem we will come back to it. And tell me, have you heard or learned about recycling reusing and reducing and if so what is it?¶

Learners: → Yes…¶

L2:   →   To use something that is used before. ¶

Interviewer:→ Ok… and who can add. What else?¶

L3:   →   Uku sebenzinsa into e khe be sebenziza (To use something that was used before). ¶

L1:   →   Like maybe for an example, instead of littering or dumping in the rivers and somewhere else, we can use them and make something else or maybe you can use them to make the wheels of a wire car. ¶

Interviewer:→ So what do we recycle?¶

L3:   →   Old papers, card box ¶

Interviewer:→ So do you recycle?¶

Learners: → Noooo…¶

Interviewer:→ Ok then who recycles or what do you do with your waste here at school and at home?¶

L1:   →   Ok let me say its hard to hear this but let me say it, we dump them on the floor but is not just we just dump them sometimes we dump them by mistakes and when we pick them some other children start laughing that we are picking up the papers because they think that you are making yourself look better.¶

L2:   →   And others they think that we are crazy¶

Interviewer:→ So they don't know the importance of picking up papers. You teach them ok… so who recycles the waste?¶

Kgaogelo
Knowledge of ecological concepts¶

Kgaogelo
Sustainability Practice¶

Kgaogelo
Perception¶

CODED FOCUS GROUP TRANSCRIPTS CASE 1

FOCUS GROUP INTERVIEW DATA PRESENTATION CASE 1

RESEARCH QUESTION: 1 WHAT ENVIRONMENTAL CONTENT KNOWLEDGE IS TAUGHT AND LEARNED IN RURAL PRIMARY SCHOOL?		
THEME	CATEGORY	INTERVIEW QUESTION AND RESPONSES
EE CONTENT KNOWLEDGE	• Awareness • EE content knowledge • Knowledge of ecological processes	Q: Is it ok to cut trees? A: No because we will not get enough oxygen Q: Are you aware and observe environmental education days like Abor week, water week, and other environmental education awareness days? A: No Q: When you are learning about the natural environment, have you ever heard about the word environmental education? A: Nooo! Q: Ok but what do you think environmental education could be? A: I think it might be education wherein you learn about natural things, things like how, maybe let me make an example, like water, like how water turn into rain. Q: Ok, so which themes of environmental content have you learned about? A: Water pollution, and littering, diseases that are caused by water and air pollution, let me turn into technology, I learned that in like natural substances, you can change into something man made, Q: You have mentioned the smoke getting into our lungs and giving us diseases is there any other things that the air pollution does? A: I think the smoke goes up and damages the ozone layer and that thing, the ozone layer

1

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	• Holistic content knowledge	protects us from the sun. The smoke breaks the ozone layer and the sun become too hot. Q: Have you heard or learned about climate change? A: Yes how the weather changes and maybe it very hot, and it just rain, maybe today is rainy and cloudy and tomorrow to means like how much heat it has been getting, and it we more heat getting to the sky and we get more heat getting to the clouds it's gona be raining. A: It rains too much and other houses starts to fall and the shacks also gets flooded. Q: What cause this climate change? A: We don't know Q: have you learned or heard about biodiversity? A: No we don't know about it. Q: have learned or heard about ecosystem? A: Yes, It is when we depend on each other for different ways and in different areas. A: They break the plants, I don't understand it but at home we find the roots and leaves of the tree in the whole and when I pick them up you find they are eaten maybe by the ants and when I break It it breaks easily. Q: I hear. So have you learned or heard about sustainability or sustaining resources? A: Noo... we don't understand it. Q: Have you heard or learned about recycling reusing and reducing and if so what is it? A: Yes, to use something that is used before, to use something that was used before, instead

2

		of littering or dumping in the rivers and somewhere else, we can use them and make something else or maybe you can use them to make the wheels of a wire car.
	• Content Interrelatedness	Q: Have you heard anything about natural environment and if so, what is it? A: Is like where we live, things on nature that we use. Q: When you are learning about the natural environment, have you ever heard about the word environmental education? Q: From which subjects have you learned this natural environment? A: From natural science and technology.
ATTITUDE	• Perception	Q: What do you do with your waste here at school and at home? A: And when we pick them some other children start laughing that we are picking up the papers because they think that you are making yourself look better. A: And others they think that we are crazy. Q: Good, and how important are the trees?
	Appreciation and value for the environment	A: They are too much important.
SKILLS	• Identification of environmental problems and their impacts	Q: So her at school do you pollute water? A: Yes, We throw the papers in the water, When we are done with eating and that food still there, and we pour water and in the bucket and we pour water in the ground and an dirty start to get polluted and animals, bacteria and staff like that we get diarrhoea diseases and animals like mosquitos bites us. Q: And how do we pollute the land? A: When we dump plastics into the land, Dead animals, Rotten things

3

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		Q: If you look around the school are there any environmental problems that you have noticed?
		A: Water pollution. Putting papers into the water, Land pollution by littering, at home people makes fire, they burn waste, also here at school we burn waste, and the ones who cut trees.
	• Problem Solving	Q: If we are the ones who causes these problem, then how do we fix them?
		A: By picking the littered rubbish, Maybe we can encourage others to use containers when they drink water and maybe here at school somewhere where we put containers to drink water, reuse like a wire, even if you don't make a car you can use something else, We also have to do the garden,
	Assessment Practices	Q: So all these that we spoke about where do you learn them from?
		A: We learn about them in class, And in the TV show that talk about natural science and technology.
		Q: So how do you assist in the garden are you involved in seeding?
		A: By watering the garden. We are not involved in seeding.
SUSTAINABLE BEHAVOUR	• Sustainable Practices and lifestyle	Q: Who recycles the papers you are collecting?
		A: Some people. There is truck that comes to school and they collect the papers and take it to recycling.
		Q: Do you plant trees here at school and when do you plant them?
		A: Yes, Around September in Spring and maybe in Summer.
		Q: are you involved in saving resources like water or electricity?

4

FOCUS GROUP INTERVIEW CASE 2 TRANCRIPTS

Interviewer: So, ok, like, oh, I said, I'm K. J. Masemene. I'm a student you. I'm a student at UNISA in Pretoria. I'm somebody who came to check what you know about the environment. Oh, so, the first question is: what do you understand about the natural environment? When they talk about the natural environment, what are they talking about?

Learners: *(Hesitant)…we don't know*

Interviewer: You don't know?

Learners: Yes.

Interviewer: Are u hearing about this for the first time? Heh?

Learners: Yes.

Interviewer: You never heard anybody talking about the environment?

L1: I once heard about it?

Interviewer: Where?

L1: In Grade six.

Interviewer: What did they say environment is?

L2: They said that, it is like recycling.

Interviewer: And what else? What did they say recycling is?

L3: Is…is…if you used a thing, they will take it and recycle it again.

Interviewer: Where do they take it? They take that thing to where?

L4: I forgot.

Interviewer: They take it and recycle it?

Kgaogelo
Knowledge of ecological concepts

1

Interviewer: Which subjects? They were talking about recycling from which subjects?

L1: → → Life Skills

Interviewer: →And, what about you?

L5: → → Eh… I also learnt about it in Life Skills.

Interviewer: So, you said is Life Skills in Grade six. Here I was asking you about the subjects that taught you about the natural environment. You said is Life Skills. You?

L6: → → Life Skills.

Interviewer: →And you? Is it Life Skills?

Learners: → Yes.

Interviewer: Only Life Skills? And what about others? Are you not saying something? What about you my boy!

L1: Natural Sciences

> **Kgaogelo**
> Content Interrelatedness

Interviewer: And Natural Science, neh? They taught you about it, neh?

Learners: Yes.

Interviewer: What about Technology and other subjects? They didn't teach about it?

Learners: No.

> **Kgaogelo**
> Integrative approach

Interviewer: They didn't say anything about recycling?

Learners: No.

Interviewer: And then, Social Sciences?

Learners: No.

Interviewer: They didn't say anything about recycling?

Learners: No…

3

Interviewer: → → Oh! You did it with clay?

Learners: → → Yes.

Interviewer: → And your teachers, did they explain how using clay to make a cup and making houses with card boxes helps the environment?

Learners: → → No.

Interviewer: → → They did not elaborate or explain on that?

Interviewer: → Ok, they did not elaborate. Don't you do any outdoor activities about the environment? When you do these environmental activities, do you do them in your school grounds or classes?

Learners: → → In classrooms.

Interviewer: → → In classrooms?

Learners: → → Yes.

Interviewer: → When you learn about this water pollution, do you go to rivers to learn We use textbooks. We see them in textbooks.

Interviewer: → → Ok, in textbooks?

Learners: → → Yes.

Interviewer: → So, you don't normally go outside the school environment and look or observe?

Learners: → Yes … we once used to go outside in Grade 5. No…No..! We used to go out.

Interviewer: → → Go where?

L2: → We used to go at the school's backyard and did something …eh …it is what we call … it's called … compost.

Kgaogelo
Learning opportunities

Kgaogelo
Instructional strategies and learning opportunities

CODED FOCUS GROUP TRANSCRIPTS CASE 2

FOCUS GROUP INTERVIEW DATA PRESENTATION CASE 2

RESEARCH QUESTION: 1 WHAT ENVIRONMENTAL CONTENT KNOWLEDGE IS TAUGHT AND LEARNED IN RURAL PRIMARY SCHOOL?		
THEME	CATEGORY	INTERVIEW QUESTION AND RESPONSES
<mark>EE CONTENT KNOWLEDGE</mark>	• Awareness	Q: Are trees important? A: Yes, Give us oxygen and shadow, shelter, food.
	• EE content knowledge	Q: When they talk about the natural environment, what are they talking about? A: we don't know, They said that, it is like recycling, Is…is…if you used a thing, they will take it and recycle it again.
	• Content Interrelatedness	Q: Which subject teaches you about this natural environment? A: LO, Life Skills, Natural Sciences Q: What about Technology and other subjects? They didn't teach about it? A: No
	• Knowledge of ecological content and concepts	Q: Which terms did you learn about in Environmental content? A: In water, we have, we have a river. It must not be dirty because some people are using water for drinking and washing with water. It must not be made unclean. Q: What other types of pollutions did you learn about? A: Air pollution, We don't remember about the others.

1

	• Holistic content knowledge	Q: Have you ever learnt or heard about climate change? A: What? No. Q: Is it for the first time you hear about climate change? A: It is not for the first time, We learned about it here at school, They never explained it. Q: So, have you learnt or heard about deforestation? A: Yes, It is a place where we find many trees. There are some animals living there. The people come and cut trees, Then animals lose they place to stay, Food too, because some animals eat plants. Some of these animals will starve. Q: Have you ever learnt or heard about ozone depletion? A: No! no! no! Q: Have you ever learnt or heard about the term atmosphere? A: Yes, It is the sky. Q: Have you ever learnt about the importance of the atmosphere? A: No. Q: What is the atmosphere doing for us as people? Is it doing anything for us? A: We don't remember. Q: We were talking about water pollution. Give me another type of pollution A: Air pollution.

2

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ATTITUDE	• Perception	Q: What do you do with your waste here at school and at home?
		A: And when we pick them some other children start laughing that we are picking up the papers because they think that you are making yourself look better.
		A: And others they think that we are crazy.
		Q: Good, and how important are the trees?
	Appreciation and value for the environment	A: They are too much important.
		Q: Is it ok to cut trees?
		A: No because we will not get enough oxygen
SKILLS	• Identification of environmental problems and their impacts	Q: So her at school do you pollute water?
		A: Yes, We throw the papers in the water, When we are done with eating and that food still there, and we pour water and in the bucket and we pour water in the ground and an dirty start to get polluted and animals, bacteria and staff like that we get diarrhoea diseases and animals like mosquitos bites us.
		Q: And how do we pollute the land?
		A: When we dump plastics into the land, Dead animals, Rotten things

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		Q: If you look around the school are there any environmental problems that you have noticed?
		A: Water pollution. Putting papers into the water, Land pollution by littering, at home people makes fire, they burn waste, also here at school we burn waste, and the ones who cut trees.
	• Problem Solving	Q: If we are the ones who causes these problem, then how do we fix them?
		A: By picking the littered rubbish, Maybe we can encourage others to use containers when they drink water and maybe here at school somewhere where we put containers to drink water, reuse like a wire, even if you don't make a car you can use something else, We also have to do the garden,
		Q: So all these that we spoke about where do you learn them from?
	Assessment Practices	A: We learn about them in class, And in the TV show that talk about natural science and technology.
		Q: Do you any environmental education projects? No, we just cut pictures from old magazines and newspapers.
Sustainable behaviour	Sustainable practices and lifestyle	Q: How do you look after water?
		A: By not leaving the water pump open but water pump is broken the water just drip. Some leaners drink water from the water pump.
		Q: In the classroom, how do you manage drinking water?
		A: We ask permission and drink outside.
		Q: Are there any buckets in the classroom for drinking water?
		A: No, there were only for young learners.
		Q: How are you involved in saving electricity programs?
		A: We are not involves, we are not responsible for it?
		Q: Who is responsible?

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| | | A: Our caretaker.
Q: How do you manage waste at school?
A: We put them in a hole some they put them in a drum and we burn them. Sometimes they take them to recycling but long time ago. Food from feeding scheme is taken by other parents to feed their pigs.
Q: Are you involved in recycling or sorting of waste programs?
A: No
Q: Have you ever went to recycle centers or environmental education centers to see what they are doing?
A: No we only go to zoo and school matches.
Q: are you involved in school.
Q: Do you school garden and how are you involved in mending it?
A: No the garden is not working.
Q: Do you observe environmental education days like Abor day for planting trees?
A: No we don't. |
| | | |

APPENDIX: P FOCUS GROUP INTERVIEW CASE 3 TRANSCRIPTS

FOCUS·GROUP·INTERVIEW·CASE·3·TRANSCPRIPTS

Learners: → How to keep the animals safe

Interviewer: Ok he also said something let us give him a chance.

L5: → → How to clean the areas

Interviewer: How to clean the areas ok.

> **Kgaogelo**
> Value-to-natural-environment

L1: → → It also help our ecosystem

Interviewer: Wow, it helps with ecosystem, ok tell us what is an ecosystem before I come to you (*Recognising a learner*) Lets hear from Bonkinkosi

> **Kgaogelo**
> Knowledge-of-ecological-concepts

L3: → I don't remember

Interviewer: Let's help him!

L1: → → Animals that live around us,

Interviewer: Animals that live around us, Ok is it only animals?

Learners: → Noo!

Interviewer: Ok what else? Lerato

L2: → → Its where other thing depends on each other for survival

Interviewer: Ok good, for survival OK, so what are these other things?

Learners: → Human depending on animals and animals depending on the plants and the plants depending on the sun and water.

> **Kgaogelo**
> Knowledge-of-ecological-processes

Interviewer: Yoo! ok that's good, and how do the plants depend on the sun and water?

Learners: → The sun gives the plants energy, and it produce food and the plants gives us vitamin C and D.

Interviewer: So which foods gives us vitamin C?

L2: → Orange

Interviewer: So what kind of energy is the sun giving plants?

Learners: → The light energy

Interviewer: Ok the light energy, so nna kere letxatxi lea fixa kgane le bohlokwa? (I thought the sun is only hot, it is also important?)

Learners: → Yess! its very important is the main source of energy

> **Kgaogelo**
> Knowledge-of-ecological-processes

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Interviewer: Oh! ok I am learning. I was so behind. I am glad that you are learning this environmental education and I am also learning from you as well. So which themes of environmental education have you learned about? With themes I have heard you talking about ecosystem, I have heard you talking about energy, and what other words have you learned from environmental education? Let's go one at a time.

L2 → Recycling.

→ Recycling, what does that mean?

L5: → Is like using.

Interviewer: Ok like using. Using what? Or what are the teachers says is about, if you haven't seen, so bare ba dirang do ge ba recyle (What are they doing when they recycle?)

L3: → Recycle something that was used.

Interviewer: Ok

L5: → They process.

Interviewer: Ok they process what and how do they process?

L5: → → They use those things to make other things

Interviewer: So what are they processing. Something like?

Learners: → Like clothes, plastics, bottles, plastics to make flowers. Everything

Interviewer: Ok plastics to make flowers, can you make me one, can I bring plastics and you make me a flower, how?

Learners: → Yes even necklace

Interviewer: Have you made one?

L3: → → Yes and plastic mats

Interviewer: Ok and what other words?

L3: → Reuse, to use something for another purpose, like if I buy a glass and use it. I can use it again for something else.

Interviewer Ok reuse, what do we reuse?

Learners: → We reuse glasses, we take clothes that are torn we make new things such as purses, and maybe decoration for shoes.

L5: → I can reuse a plastic that was used by another person or take a disposable glass and plant in it.

Learners: → So we can reuse many things. I heard you talking about something you said recycle, reuse and what?

Learners: → Reduce...

Kgaogelo
Innovative and creative

Kgaogelo
Knowledge of environmental content

Learners: → So it will finish if wasted, this means we also have to sustain underground water.¶

Interviewer: → So do we sustain or save underground water. Ok what source of water are we using at home, tap or boreholed?¶

Learners: → Boreholed.¶

Interviewer: → So how do you save water?¶

L1: → Like in our class we put water in the bucket when we want water we don't drink to the tap we will waste water¶

L5: → We must build some tanks for putting that water inside ¶

L1: → Even when it rains we can take that tank sothat we water the plants.¶

L2: → even the water from the rain we can drink it but we must boil them before we drink.¶

L1: → Learners who do technology can learn to fix the taps.¶

Interviewer: → Mosa can you fix the tap?¶

L4: → Yes I can I can take the steel (*demonstrating*) bent it on the licking tap¶

Interviewer: → Alright, I am hearing good news. So tell me where do you learn about natural environment, Are you learning inside the classroom or outside?¶

L2: → Both in class and outside¶

Interviewer: → So in class how do you learn about this natural environment?¶

L3: → Like cleaning, and we take the papers in the class and we put it in the dustbin.¶

Interviewer: → When the teachers teaches you about the environment, where do they teach in class or outside?¶

Learners: → In class and we practices it at home, even our mothers when we go around picking up tins and papers and there is a truck that comes and collect them for processing and we use them after, and they give us money.¶

Interviewer: → So what kind of environmental activities do you do her at school whether in class or when you practice them at home? You have already spoken about some.¶

L3: → Here at school we plant the garden ¶

L4: → When we sweep we pick up the papers and put them in the dustbins¶

L5: → And we get a punishment to pick up the papers¶

L1: → I don't think is a punishment [*Argument*] because we enjoy it, if we don't pick up the papers they will harm us¶

Kgaogelo
Sustainability practice¶

Kgaogelo
Learning opportunities¶

Kgaogelo
Perception¶

Kgaogelo
Concern and respect for environment¶

Interviewer: → Hei madoda! (Oh man) I am learning. And other problems how do we solve them?

L1: → By putting the dustbin everywhere.

Interviewer: → So do you have dustbins in class?

Learners: → Yes.

Interviewer: → So after collecting the waste what do you do with them? Have you heard about separation of waste?

Learners: → Yes

L2: → There are thing that you cannot recycle them but you can reuse them and we separate them for reuse and recycling. The plastics must be in a plastic bag and the cans in a cans bag.

L4: → And you can also write reuse, reduce and recycle.

Interviewer: → You also mentioned the licking of the taps. How do we solve that one?

L3: → We must stop the taps if they are licking.

L1: → We must find somone who knows much about fixing the taps

Interviewer: → Someone spoke about the problem of fire, then how do we stop that problem?

L1: → We must stop burning papers and take them for recycling.

L3: → With waste food we must dick a whole and make fertilizers.

Interviewer: → And what about the grass that our workman clear or weeds what do we do with them?

Learners: → We also make fertilizers the same way with the food.

Interviewer: → So at home what do we do with the waste?

Learners: → Some of the waste we could reuse them but some we cannot.

L1: → We dick the whole and put the waste.

Interviewer: → So they don't pollute the soil?

Learners: → Yes they do but also help the soil.

Interviewer: → So who is responsible for solving those problems?

Learners: → Us! and we ask the volunteers.

Interviewer: → I saw the vegetable garden at the back who does the garden?

Learners: → The principal and the general workers. We water the garden in the morning and in the afternoon.

Interviewer: → So you do that during your practical period?

Comments (margin):
- Kgaogelo — Solution-driven
- Kgaogelo A few seconds ago — Sustainability practice
- Kgaogelo — Willingness and Personal responsibility
- Kgaogelo — Learner centered

CODED FOCUS GROUP TRANSCRIPTS CASE 3

FOCUS GROUP INTERVIEW DATA PRESENTATION CASE 3

RESEARCH QUESTION: 1 WHAT ENVIRONMENTAL CONTENT KNOWLEDGE IS TAUGHT AND LEARNED IN RURAL PRIMARY SCHOOL?		
THEME	CATEGORY	INTERVIEW QUESTION AND RESPONSES
<mark>EE CONTENT KNOWLEDGE</mark>	• Awareness	Q: Are trees important? A: Yes, Give us oxygen and shadow, shelter, food.
	• EE content knowledge	Q: When they talk about the natural environment, what are they talking about? A: we don't know, They said that, it is like recycling, Is...is...if you used a thing, they will take it and recycle it again.
	• Content Interrelatedness	Q: Which subject teaches you about this natural environment? A: LO, Life Skills, Natural Sciences Q: What about Technology and other subjects? They didn't teach about it? A: No
	• Knowledge of ecological content and concepts	Q: Which terms did you learn about in Environmental content? A: In water, we have, we have a river. It must not be dirty because some people are using water for drinking and washing with water. It must not be made unclean. Q: What other types of pollutions did you learn about? A: Air pollution, We don't remember about the others.

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	• Holistic content knowledge	Q: Have you ever learnt or heard about climate change? A: What? No. Q: Is it for the first time you hear about climate change? A: It is not for the first time, We learned about it here at school, They never explained it. Q: So, have you learnt or heard about deforestation? A: Yes, It is a place where we find many trees. There are some animals living there. The people come and cut trees, Then animals lose they place to stay, Food too, because some animals eat plants. Some of these animals will starve. Q: Have you ever learnt or heard about ozone depletion? A: No! no! no! Q: Have you ever learnt or heard about the term atmosphere? A: Yes, It is the sky. Q: Have you ever learnt about the importance of the atmosphere? A: No. Q: What is the atmosphere doing for us as people? Is it doing anything for us? A: We don't remember. Q: We were talking about water pollution. Give me another type of pollution A: Air pollution.

	Identifying and solving environmental problems	Q: Which subject teaches you about this natural environment? A: Natural Science and Social Science, sometimes LO. Q: If you look around the school are there any environmental problems that you have noticed? A: Yes, littering, cows are eating pampers, we are burning waste and wasting water. Q: Who are responsible for these problems? A: Us, the government must provide us with dustbins for waste.
	• Assessments Practices	Q: Where do you learn about environmental education? A: In the classroom. Q: Which EE activities do you do? A: We write classwork's and homeworks. Q: Are you involved in EE project if so how? A: No we are not involved.

RESEARCH QUESTION: 1 WHAT ENVIRONMENTAL CONTENT KNOWLEDGE IS TAUGHT AND LEARNED IN RURAL PRIMARY SCHOOL?		
THEME	CATEGORY	INTERVIEW QUESTION AND RESPONSES
ATTITUDE	• Perception	Q: What do you do with your waste here at school and at home? A: And when we pick them some other children start laughing that we are picking up the papers because they think that you are making yourself look better. A: And others they think that we are crazy. Q: Good, and how important are the trees?
	Appreciation and value for the environment	A: They are too much important. Q: Is it ok to cut trees? A: No because we will not get enough oxygen
SKILLS	• Identification of environmental problems and their impacts	Q: So her at school do you pollute water? A: Yes, We throw the papers in the water, When we are done with eating and that food still there, and we pour water and in the bucket and we pour water in the ground and an dirty start to get polluted and animals, bacteria and staff like that we get diarrhoea diseases and animals like mosquitos bites us. Q: And how do we pollute the land? A: When we dump plastics into the land, Dead animals, Rotten things Q: If you look around the school are there any environmental problems that you have noticed?

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