LIST OF ABBREVIATIONS

ANC	African National Congress
CO	Critical Outcome
EE	Environmental Education
EEASA	Environmental Education Association of South Africa
EEP	Environmental Education Programme
EEPI	Environmental Education Programme Initiative
ELMS	Environment and Land Management Sector
IUCN	International Union for Conservation of Nature & Natural Resources
KZN	KwaZulu-Natal
RDP	Reconstruction and Development Programme
REEP	Regional Environmental Programme
SADC	Southern African Development Community
SANPARKS	South African National Parks
SD	Sustainable Development
SL	Sustainable Living
TV	Television
UN	United Nations
UNCED	United Nations Commission on Environment Development
UNEP	United Nations Environment Programme
UNESCO	United Nations, Educational, Social and Cultural Organisation
UNISA	University of South Africa
WESSA	Wildlife and Environment Society of South Africa
WCS	World Conservation Strategy
WSSD	World Summit on Sustainable Development

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CHAPTER 1
BACKGROUND TO THE STUDY

1.1 INTRODUCTION

This chapter provides background to the study by presenting the global and local environmental crisis, problem statement, aims and objectives of the study. Motivation, significance and delimitations of the study are also outlined briefly. This chapter concludes by outlining the structure of the thesis. Numerous environmental problems pose a threat to environmental sustainability and many of which emanate from human activities. Bonnet, (2009: 9) state that 'environmental predicament is a crisis not simple of our physical survival, but of our spiritual survival- that is, our understanding of what we are and how we should relate to the world around us'. He further states that it is a 'crisis that is much of human feeling as it is of the intellect; it is a crisis of our whole mode of sensibility.' The causes and solutions to these crisis rest upon human capacity to think and act appropriately.

1.2 THE GLOBAL ENVIRONMENTAL CRISIS

All over the world experts are concerned that the natural environment is being damaged by human activities and that the earth's ability to sustain life is being undermined (Rudd and Vormedal, 2006: 8). Scholars such as Cloud, (2005: 4), Loubser, (2005: 3) and Kanyimba (2009: 5) identify a wide range of environmental problems impacting global environment. These problems seems to be diverse and include critical issues such as: population growth and associated problems of urban sprawls and high energy consumption, continued decline in biodiversity through land clearing, water and land pollution, and depletion of ozone layer, desertification, poverty, global warming and climate change, and disposal of hazard waste. Most countries, especially the developing ones experience rapid population growth and face the urgent need to improve their living standards. For instance, the world's population size registered 7.0 billion people in 2011 and 7.3 billion people in 2015 and is expected to have reached 9.4 billion people by 2050, (https://en.wikipedia.org/wiki/world-population, accessed on 8 October 2015). The danger is that when population growth escalates, humans' exploitation of natural resources to meet their present needs also escalates and this leads to the degradation of natural resources needed for the current and future generation. It is likely that human utilises resources faster than they can generate them, as a results causing a disproportionate negative

impact on natural resources. Since the end of the Second World War 'there has been accelerating increase in the consumption of both renewable and nonrenewable resources, (Reid, 1995: 4). In both the developing and developed countries the demand for renewable and non-renewable natural resources exacerbates the environmental crisis (Subramanian, 2002: V). The population growth and the high rates of per capita resource use are key factors in determining the environmental crisis (Tyller-Miller, 2002: 11- 12).

Biodiversity supports human health in many ways including being major source of food and medicine. However, the world is none the less rapidly losing its biodiversity wealth due to uncontrolled exploitation and fragmentation of natural habitats largely due to rapid population growth and agricultural expansion. Biodiversity means the variety of species (plants and animals) that live within a particular ecosystem (Cardinale, Duffy, Gonzalez, Hooper, Perrings, Venail and Naeem, 2012: 2). A change in biodiversity status affects the functioning of the ecosystem. Increasing rate of deforestation, overgrazing, soil erosion and desertification threaten biodiversity. Many plant and animal species are threatened with extinction owing to the spread of diseases, the destruction and degradation of their habitats and direct exploitation. Loubser, (2005: 3) estimates the rate of extinction to be 1000 to 10000 times greater before human intervention. He further suggests that by 1992, the extinction rate has increased over 40 000 a year. This is an indication that many species are threatened and are subjected to extinction. Climate change also contributes to biodiversity degradation.

Africa is warming faster than the global average and is likely to warm by an average of 3^0C-4^0C this century (UNEP, 2013: 14). Climate change is becoming a considerable global health and economic challenge. Pathogens breed well in moist, warm temperatures and spread diseases in human and livestock faster.

Land is central to life as it is the resource base from which ecosystems-services such as food, clothes and medicines are derived, however it is subject to degradation. 'Land degradation posits severe consequences for agricultural production, nutrition and human health' (UNEP, 2013: 23). It may be aggravated by the excessive application of agrochemicals which includes pesticides, insecticides, fertilizers, fungicides, herbicides and avicides. Land degradation due to inappropriate land use practices resulting in loss of vegetation cover and adversely affects land production potential.

Another crisis is the demand for energy which continues to grow, especially in the developed and developing nations. Rudd and Vormedal, (2006: 9) state that the United States of America contains about five percent of the global population, but accounts for only twenty five percent of global energy consumption whereas China and India look likely to increase world energy consumption greatly in the coming years. There is also an increased demand for water and food consumption which forces people to overexploit soil and water resources in order to satisfy their basic needs. The environmental crises presented above are detrimental to the environment and to the survival of all living organisms including human life. The present situation is unsustainable in the long term and we need to find ways in which we can meet our current needs in a manner that do not reduce the quality of the environment nor reduce the capacity of future generations to meet their own. Creation of a sustainable future is an essential response to the current state of the world's ecosystem (Cloud, 2005: 9). Environmental education has been perceived as one of the responses to the crisis the world is facing today. Environmental education is regarded as a key response to the current environmental crisis. As an attempt to address these crises, the global community, spearheaded by the United Nations Educational, Scientific and Cultural Organisation (UNESCO), the United Nations Environment Programme (UNEP) and Non-Governmental Organisations (NGO's) have convened a series of International Conference and workshops in the quest for solutions. The proceedings and declarations of these conferences indicated that education is an essential tool for empowering people to be able to solve environmental problems, protect and maintain environment and live sustainable livelihood. These conferences will be discussed in details at a later stage, in chapter 2. The following section, discusses environmental problems as they occur in South African context.

1.3 ENVIRONMENTAL CRISIS IN SOUTH AFRICA

The 21st century which also falls under the 3rd millennium is characterised by the serious environmental crisis. South Africa, like all other countries of the world, is confronted by the same nexus of environmental crisis. The ultimate drivers of these crisis are rapid population growth, high consumption, pollution, waste disposal, climate change, pressure exerted on natural resources and industrialization (Loubser, 2005:1) & the (South African State of Environment, 2012/13). Le Roux (2000: 27) also links these crises to social and cultural changes associated with modern way of living and modern world views. The current

environmental situation has been worsened by the need for economic growth and job creation as well as self-sufficiency. Our population is growing in an alarming rate and exerts greater demand on food, energy, land and water. As a result people engage themselves in unsustainable ways of resource utilisation in an attempt to improve the quality of their lives and match the rising standard of living.

Furthermore, South Africa is a water-scarce country and it is regarded as the 30th driest country in the world (the Water Wheel, February, 2010: 8). Therefore, people depend mostly on rivers, dams and underground water for their water supply. The uMkhanyakude, uThungulu and Zululand Districts Municipalities are experiencing dangerously low water levels at all major dams and reservoirs. The average water consumption for the districts had risen, even after the residents had been warned that water cuts could be implemented if the dams' levels do not normalise, (*Zululand Observer*, 8 October 2010). The other provinces such as Eastern Cape, Western Cape and Mpumalanga are mostly affected. This excerpt indicates that the country is experiencing severe drought since most provinces are affected. The problem of water scarcity is exacerbated by the water wastage, illegal connections and leaking taps and pipes (Mbokazi 2009: 2).

Lack of electricity supply in some South African households poses considerable health problem especially in rural areas. Indoor air pollution predominates in the rural and low and middle-income urban areas where solid fuels are used on daily basis. Wood and animal's dung are often burnt on open fires or in traditional stoves for cooking and heating. Outdoor air pollution is a challenge in South Africa, the transport being the major contributor to the air pollution especially in big cities like Durban, Johannesburg, Pretoria and Cape Town.

1.4 SOUTH AFRICAN GOVERNMENT RESPONSE

South African Government positively responded to environmental crisis in several ways. An earlier government, apartheid regime made an attempt to curb environmental crisis in South Africa, however, it was twined with the objective of excluding Blacks from meaningful political participation as well as skewed distribution of access to natural, economic and physical resources as well as service delivery (DEAT, 1996: 8). Their main focus was the conservation of natural resources hence the promulgation of Conservation Act (Conservation Act, 73 of

1989). Nature conservation areas were developed through forced removals and exclusions of communities from the management and benefits of conservation. Therefore, for many Black South Africans, issues surrounding environment and sustainability had a very negative implication given the fact that they often been used to trample their human rights. The Election of a new, Democratic Government in 1994, opened new avenues for all the South Africans in terms of resource redistribution and environmental management. It is for this reason that, environment is embodied in the constitution of South Africa. The Bill of Rights emphasises the right of every citizen to live in a safe, healthy environment (Constitution of the Republic of South Africa, Act 108 of 1996). This right assumes the responsibility to promote sustainable living and the conservation as well as preservation of the natural environment. It also realises the responsibility to protect, conserve and enhance the environment and natural and heritage assets and resources. It envisages the responsibility to prevent pollution, litter and to ensure that our schools, homes, streets and other public places are kept neat and tidy. The new government mandated the Department of Environmental Affairs (DEA) to formulate, coordinate and to monitor the implementation of national environmental policies, programmes and legislation (http://www.gov.za/about-SA/environment, accessed on 11 October 2015). The following are the policies and legislation within which the department operates: the National Environmental Management Act (NEMA), Act 107 of 1998; National Environmental Management: Biodiversity Act 10 of 2004; National Environmental Management: Protected Areas Act 57 of 2003; National Environmental Management: Air Quality Act39 of 2004; the White Paper on National Climate Change Response 2011; the White Paper on Integrated Pollution and Waste Management of 2000 and the White Paper on Conservation and Sustainable use of Biodiversity of 1997.

Environmental education emerged as early as the 1960s, however it gained its full impetus in 1989 when an attempt was made to include Environmental Education in the formal curricular. This attempt by government was proclaimed in a 1989, White Paper on Environmental Education. In 1992 the Environmental Education Policy Initiative (EEPI) was started as a more inclusive process of gathering and developing environmental education policy options for formal education in South Africa (Le Grange, 2002:2). South Africa has made good progress in incorporating environmental education as a cross-curricular phase organizer in Curriculum 2005 (C2005). Curriculum 2005 was later revised into Revised National Curriculum Statement (RNCS and NCS). Environmental interest was manifested explicitly in critical outcomes and

specific learning outcomes. It was also highlighted in the role and features of learning areas and in core knowledge foci of the Social Sciences, Natural Sciences and Economic Management Sciences (Schudel, 2014: 100). Topics such as biodiversity and sustainable use of resources were included. In 2011, RNCS and NCS were revised and became Continuous Assessment Policy Statement (CAPS) and environmental interest is still evident in the curriculum aims. Furthermore, in the CAPS, environment is integral to the curriculum in the form of specific content knowledge in environmental concepts such as the notion of sustainability, environmental issues such as pollution and climate change and concepts such as ecology and biodiversity which are foundational to understanding the biophysical dimensions of environmental issues and risks (Schudel, 2014: 101).

1.5 PROBLEM STATEMENT

Schools and communities of uMkhanyakude District Municipality are facing challenges about large production and disposal of solid waste. In schools lot of waste is generated through littering which degrades the environment (Msezane and Mudau, 2014: 367). Tons and tons of solid waste are produced and disposed in undesignated areas, each year. The disposal of solid waste on school premises and open sites creates unpleasant sights and health hazard to children and other members of the community. Tons of solid waste produced in our schools is an indication that there is high consumption of resources such as food, paper, ink and other resource materials. High consumption of for example, foodstuffs also leads to obesity and health problems such as diabetes, high cholesterol, high blood pressure and other diseases. Modern societies use unsustainable energy for most of their activities. These activities include transporting people and goods and providing power for lighting, heating, cooling, cooking and communicating. Most of South Africa's energy is derived from fossil fuels such as coal and oil (http://nationalgeographic.org/encyclopedia/non-renewable-energy/, accessed 12 November 2015). Most people are using these resources much faster than they are replenished. The burning of these fossil fuels increases the greenhouse effect thus warming the earth. The electricity which is a basic need is derived from the burning of coal resulting in pollution of air. In most schools in uMkhanyakude district, lights are left switched on during the day and even if there is no one at school. They also leave some appliances such as TVs, computers and photocopiers plugged on. This increases the consumption of energy, thus exerting greater pressure on our natural resources and thereby increasing pollution of air. Water wastage is the order of the day

in these schools. Learners wash hand on the running taps and some leave water gushing out. Leaking taps and pipes are not timeously repaired.

Based on the above preceding scenario the problem statement of the current study can be stated as follows:

Despite the fact that Environmental Education is incorporated into all subjects in South African schools' curriculum and taught from primary to secondary school levels, some secondary schools in uMkhanyakude are still pursuing unsustainable ways of living. The focus of this study is, therefore, to evaluate the role played by environmental education in promoting sustainable living in secondary schools.

1.6 SIGNIFICANCE OF THE STUDY

A lot of research has been conducted, in the implementation and inclusion of Environmental Education into curriculum and researchers such as McNamara, (2008); Sterling, (2003); Hebe, (2009); Jaspar, (2008); Moore, (2005) and Crowell, (2011), have made tremendous contributions to this effect. Some researchers who have made their contributions on the promotion of sustainability in Higher Education (Universities), include Clugston and Calder, (1999); Fien, (2002); Stephens, Hemandez, Roman and Shephard, (2008); Kanyimba, (2009); Corcoran and Walls, (2004) and Lozano, Lukman, Lozano, Huisingh, and Lambrechts, (2013). On further search of literature on the role of EE in promoting sustainability in secondary schools, most studies found are international studies, conducted by Hargreaves and Goodson, (2006); Rajakorpi and Rajakorpi, (2001); Said, Yahaya and Ahmadun, (2007); Higgs and McMillan, (2007); Henderson and Tilbury, (2004), and Alexandar and Poyyamoli, (2014). There is very little, done on the role of EE in promoting sustainable living or sustainability in secondary schools in South Africa. The researcher believes that, this study will contribute to the body of knowledge on how environmental education contribute to the promotion of sustainable living in secondary schools. The findings and recommendations will be forwarded to the Department of Basic Education since in the researcher's view it may contribute to the policy development especially the policy on education and sustainability.

1.7 RESEARCH SETTING

UMkhanyakude District Municipality (UDM) is located along in the north coast of KwaZulu-Natal and extends over 12818 km^2. It is bound by Indian Ocean to the East, Mozambique to the North, Swaziland to the Northwest and uThungulu District to the South and Zululand District to West. Its seat is Mkuze. UMkhanyakude is named after the famous (Acacia Xanthophioea) yellow- barked fever tree, literally meaning "seen from afar" or "shows light from afar". The name reflects both the uniqueness of its people and their hospitality, as well as the biodiversity and conservation history that the region is very proud of. It has a population of 614 045 people who speak IsiZulu and are distributed unevenly amongst five municipalities (http://www.municipalities.co.za, accessed 25 December 2015).

Figure 1.1. Map of South Africa showing the location of the KwaZulu-Natal Province

Fig 1.2 Map Showing Umkhanyakude Municipality

UMkhanyakude consists of many areas of outstanding natural beauty such as Isimangaliso Wetland Park formerly known as Greater St Lucia Wetland Park, which encompasses the entire coastline, Sodwana Bay and Kosi Bay. The Game parks include Hluhluwe-UMfolozi, Ndumo and Tembe Elephant Park. Umkhanyakude district is derived from the following municipalities, Umhlabuyalingana, Jozini, Big Five False Bay, Mtubatuba and Hlabisa (www.municipalities.co.za, accessed 25 December 2015). UMkhanyakude is one of the two most deprived districts in South Africa. It is characterised by high rate of unemployment, lack of access to pipe water and electricity, female-headed households with high number of children and low education levels. UDM is one of the four District Municipalities in KwaZulu-Natal that were selected as the Presidential Nodes for the implementation of the Integrated

Sustainable Rural Development Programme. The programme sought to redirect public funding to priority areas for poverty alleviation (uMkhanyakude District Municipality (UDM), 2003: 1). The following socio-economic factors of UDM will be highlighted briefly.

1.7.1 Education

The study area, is characterised by low formal education levels. According to the Statistics South Africa (2011) 31% of the population over 20 years received primary education and 28 % secondary education while 20% of the population received any tertiary or higher education and 21% received no schooling at all (http://www.localgovernment.co.za/districts/view/21/uMkhanyakude-District-Municipality#demographic, accessed, 25 December 2015). Low formal education levels in the area affect the level of income received by the community and is a reflection of the standard of living (UDM, 2012: 32).

1.7.2 Water supply

Inadequate access to water contributes to disease and sickness thus increasing the population's vulnerability to disease and reducing productivity. Access to water is not only an indicator to the standard of living but also the level of health. The Statistics South Africa (2011) indicates that 65% of households do not have access to water (UDM, 2012: 35).

1.7.3 Sanitation

Sanitation in the UDM area is poor with 32% of household having no access to toilet facilities. Close to 15% of households have access to flush toilets and 28% of households access the basic (VIP) toilets (UDM, 2012:35). Most of the remaining households make use of pit toilets with ventilation and some use toilets without ventilation.

1.7.4 Waste removal

UDM has a poor waste management system, more than 70% of household make of own dumping (UDM, 2012: 37). This is a measure environment health hazard as it attracts insects

and rodents leaving children vulnerable to diseases. Proper waste management is pivotal for environmental sanitation and sustainability.

1.7.5 Energy usage

Most household use wood for both cooking and heating and very few household have access to electricity (UDM, 2012: 38). The use of fire wood and animal dug increase vulnerability to air pollution. The UDM should aim to provide electricity for development for household and community.

1.7.6 Employment and income

The UDM population is largely composed of unskilled population with low education levels this results in high rate of unemployment. UDM household income is on average worse off than all other districts in KZN. Based on 2001 data from Statistics South Africa, shows the monthly annual income of less than R400 a month. This indicates a very poor state of living of the people of UDM (UDM, 2012: 47-50).

1.8 EE AS A PATHWAY TO SUSTAINABLE LIVING

The World Conservation Strategy amplified the role of education in bringing about changes in social values. Caring for the Earth: A strategy for sustainable living claimed that education has a vital role to play in ensuring that people learn, accept and live by the principle that 'living sustainable depends on accepting a duty to seek harmony with other people and with nature (IUCN, UNEP & WWF, 1991:8). Agenda 21, chapter 36, also suggests that education is critical for promoting sustainable development and improving the capacity of the people to address environment and development issues. It further suggests that 'education is critical for achieving environmental and ethical awareness, values and attitudes, skills and behaviour consistent with sustainable development and for effective public participation on decision-making' (UNCED, 1992: 4). In this study environmental education is viewed as a pathway and a vehicle for achieving sustainability. The ultimate aim of environmental education is that of developing caring and committed attitude that will foster the desire to act responsible in the environment. This will mean that learners at schools need to understand the complexity of the world in which

they live and to have the knowledge, critical thinking skills, values and capacity to participate in decision making about environment and development issues. Therefore, 'providing meaningful learning opportunities to develop knowledge, values, attitudes and skills to act remain pertinent for addressing contemporary environmental problems' (Crowell, 2011: 49).

The Belgrade Charter (1975), declares that "Environmental education is a process aimed at developing a world population that is aware of and concerned about the total environment and its associated problem, and which has the knowledge, attitudes, motivations, commitments and skills to work individually and collectively towards solutions of current problems and the prevention of new ones." This declaration states it clearly that environmental literacy is a prerequisite for any citizen to demonstrate responsible environmental behaviour. While environmental education can provide a basic environmental literacy, fundamental changes will be needed in order to assist society in becoming more sustainable (Crowell, 2011: 47). In order to affirm sustainability education one need to accept the proposal of Agenda 21 to "reorient education towards sustainable development." A shift from environmental education to education for sustainability requires a pedagogy which do not only encourages learners to become more knowledgeable and interested in environment but which can also enable them to become actively involved in the resolution and prevention of environmental problems, both individually and as part of a group. This necessitates the use of diversity teaching and learning styles which ranges from: individually to whole class; passive to active learning, competitive to cooperative learning and disciplinary to cross-curricular learning. Also including games and simulations, fieldwork, issue investigation, case study and action research (Fien and Tilbury, 1996: 51). Herremas and Reid (2002: 1) argue that educators have a responsibility to become good environmental citizens, not only as consumers but also as providers of environmentally responsible goods and services. Scotts (2002) in Jickling & Wals (2008: 16) affirms the responsibility of the school and educators to help learners understand why the idea of sustainable development ought to be of interest to them and to help learners gain plural perspectives on issues from a range of cultural stances and to provide opportunities for an active consideration of issues through appropriate pedagogies which, for example, might begin from learners' and teachers' different interest, helping pupils understand what they are learning and its significance. The school should also encourage pupils to continue to think about what to do, individually and socially, and to keep their own and other people's options open (Scotts, 2002 in Jickling & Wals 2008: 16). Scotts is of the opinion that the onus rest with educators to

influence learners gain knowledge, form positive attitudes about the environment and take action to protect, restore or improve the environment.

1.9 RESEARCH QUESTION

Emanating from the problem statement mentioned above, the study endevours to find answers to the following main and sub-questions.

The main question of the study is stated as follows:

- What is the role of environmental education in promoting sustainable living in secondary schools, in uMkhanyakude district, KwaZulu-Natal?

The sub-questions of the current study are stated as follows:

- How effective is Environmental Education in promoting sustainable living in secondary schools?
- What is the level of environmental awareness of educators, administrative clerks and learners at school adequate?
- How does environmental education improve knowledge, attitude and behaviour?
- What factors enabled and or constrained environmental education in promoting sustainable living in secondary schools?

The research questions stated above are followed by the formulation of the research hypothesis.

1.10 HYPOTHESIS AND NULL HYPOTHESIS

The research hypothesis of this study is formulated to operationalise the study as follows:

Environmental education is effective in promoting sustainable living in secondary schools in uMkhanyakude district.

The null hypothesis of this study is formulated as follows:

Environmental education is ineffective in promoting sustainable living in secondary schools.

1.11 MOTIVATION OF THE STUDY

The study was triggered by the observation that even though Environmental Education has been pursued at all levels of education, there is still very little or no change in the current unsustainable trajectory of human activities. The current unsuitable trajectory leads to environmental degradation and necessitates a need for transforming the ways people think and respond to their environment. Maintaining our environment is important for sustaining our health, economies and society. The way we utilise and manage our resources are essential for a healthier environment. Creation of a sustainable future is an essential response to the current state of the world's ecosystem. Sustainability also seeks to promote stewardship of the environment and encourage everyone to assume the responsibility of being a custodian for the environment (Cloud, 2005: 4). Therefore sustainable living must be the guiding principle for the entire world's population. To adopt a new patter will require a significant change in the attitudes and practices of many people and it must be adopted at all levels, individuals, communities, nations and the world (IUCN, UNEP & WWF, 1991: 5). For the people to achieve the sustainable use of our resources, communities must learn to adapt their present patterns of consumptions and lifestyles. They must be conservative in actions that could affect the environment and they must study the effects of such actions carefully and learn from their mistakes. Learners and community members of all age groups should learn to love, care and preserve their environment. For the reasons mentioned above, the study aims at evaluating the role of environmental education in promoting sustainable living in secondary schools and hoped that the study will bring about changes in the current predicament of unsustainable practices to the ones which are more sustainable.

1.12 AIMS OF THE STUDY

In view of the research question and the hypothesis formulated for this study, the aim of the study was stated as follows:

To evaluate the role of environmental education in promoting sustainable living in secondary school under uMkhanyakude District in KwaZulu-Natal.

The other aims of the study are the following:

- To determine the effectiveness of environmental education in promoting sustainable living in secondary schools.
- To determine the adequacy of educators, administrative clerks and learners' environmental knowledge.
- To offer recommendations on how environmental education can be implemented to promote sustainable living in secondary schools.

1.13 RESEARCH METHODS

In order to answer the research questions formulated in section 1.9 above, the research study employed both quantitative and qualitative research methods, referred to as mixed methods (Creswell and Plano Clark, 2007: 13; Bergman, 2008: 4 and de Vos, *et.al,* 2011: 434). The research study was approached as an exploratory study (de Vos, *et.al,* 2011: 95) since the researcher had observed unsustainable practices in secondary schools and wish to gain an insight into the role of environmental education in promoting sustainable living. The study is also descriptive (de Vos, *et.al,* 2011: 96) as it attempts to explain and describe what is happening in secondary schools in uMkhanyakude district.

1.14 DELIMITATIONS OF THE STUDY

Punch (2006: 69) defines delimitations of the study as defining or drawing the boundaries of the study. This definition specifies researchers' demarcation lines around which the study is designed. This study will be limited to evaluating the role of environmental education in promoting sustainable living in secondary schools in uMkhanyakude district, KwaZulu-Natal.

1.15 THE STRUCTURE OF THE STUDY

Chapter 2 will review literature with focus on historical development of environmental education and sustainability. Chapter 3 discusses the influence of research paradigms to Environmental Education and sustainability. Chapter 4 discusses the research design and methods of research employed in this study. Chapter 5 presents and discusses the findings of

the investigation. Chapter 6 discusses the results, limitations, conclusions and recommendations for the study.

1.16 SUMMARY

This chapter presented an orientation and background to the study. It began by setting the scene, presenting the significance of the study, problem statement, research question and research aims. It also presented research methods as well as the structure of the study.

CHAPTER 2
HISTORICAL DEVELOPMENT OF ENVIRONMENTAL EDUCATION AND SUSTAINABILITY

2.1 INTRODUCTION

This chapter will review literature with focus on the historical development of environmental education and its development to education for sustainable living. The historical development of environmental education will be revealed through the discussion of the United Nations Conferences and Workshops. These Conferences and Workshops will be discussed under the following subheadings, namely: background of the Conference, objectives of the Conference, recommendations of the Conference and interpretation for the study. This provides an insight into which these conferences have shaped the field of environmental education. At the end of the discussion of all these Conferences, a conclusion will be drawn. The chapter further discusses how EE promote sustainable living and how it fosters environmental literacy and how environmental literate citizen should behave towards environment. The last section of this chapter will discuss the measurements of environmental sustainability.

2.2 HISTORICAL DEVELOPMENT OF EE: AN AFRICAN PERSPECTIVE

The historical perspectives of environmental education are important because:

- Environmental history can profoundly inform the public understanding of contemporary environmental issues by putting those issues in a broader historical context,
- It gives us an understanding of where we are coming from, where we are and where we are going to and
- It helps us plan for the future activities (Cronon, 1993: 5).

Historical perspective encourages us to question our own assumptions and attitudes as well as "facts of life", and hence to reflect on our own value systems and ways of reasoning (Loubser, 2005: 35). The earliest origins of environmental education can be traced back to ancient Africa. Africans (Nguni people) had their own ways of improving and preserving their environment.

In their homes family members had clearly defined roles; men were hunters and headed cattle and females gathered wood and water, cook and look after the family. Young children were taught through storytelling, how to protect, preserve and conserve environment. They were taught that when a person urinates in water, that person would undergo gender exchange. Traditional healers were taught that when digging the roots of trees for medicinal use (umuthi), they must replant the tree. Africans are also driven by the spirit of "Ubuntu." The concept of Ubuntu means "I am because you are" (EASA, http://www.env.sustaindeve/env.awareness, accessed 28 September 2014). It also describes an attitude, a way of life which encourages respect, recognition, compassion, generosity, brotherhood or sisterhood and altruism.

The love, care and protection of environment in South Africa can be traced back as early as 1883, it was steered by NGOs such as Natal Game Protection Association (www.wessa.gov.za, accessed 13 October, 2010). In 1926 Wildlife and Environment Society of South Africa (WESSA) was established with the aim of creating a powerful focus for the public opinion to force the government of the day to create a National Parks Board, currently known as South African National Parks (SANPARKS). It also aimed at ensuring the proclamation of Kruger National and advocating the formation of other National parks in South Africa, for example Mkuze Game Reserve in 1964 (http://www.wessa.org.za/who-we-are/our-history.htm, accessed 13 October 2014).

The Wildlife and Environment Society of South Africa (WESSA) has been in the fore front of promoting public participation in caring for the earth through its existence. In 1972, it established the first conservation magazine for young people called "Toktokkie", presently known as EnviroKids. In 1980, WESSA produced the Environmental Strategy for South Africa. This was the first country in Africa to produce its environmental strategy. It also established the Wildlife Clubs Science and later known as Eco-Schools project. WESSA was instrumental in bringing about a meeting in 1996 of all of the Wildlife Societies of southern and eastern Africa and in formation of the Alliance of Wildlife Societies of Africa (http://www.wessa.org.za/who-we-are/our-history.htm, accessed 13 October 2014). In 1981, WESSA National Head Office, in Howick, KwaZulu-Natal was selected to establish the Regional Environmental Office (REO). The aim of Regional Environmental Office was to promote EE throughout the region. Another powerful NGO formed in 1982, is Environmental Education Association of South Africa (EEASA). The EEASA was formed at the first

conference held in 1982, in Treverton College, Mooi River, KwaZulu-Natal. The purpose of EEASA was to support the implementation of environmental Education in South Africa. The association regularly publishes the Southern African Journal of Environmental Education and Environmental Education Bulletin (http://www.wessa.og.za, accessed 13 October 2014.

In 1993, the Southern African Development Community (SADC), Environment and Land Management Sector (ELMS) initiated a programme to support Environmental Education process in the Southern African. A series of workshops involving environmental education practitioners in the region were held. The first workshop was held in Windhoek, Namibia in 1992 and the second in Howick, South Africa in 1996 (http://www.wessa.og.za, accessed 13 October 2014). The SADC Regional Environmental Education Programme (REEP) was aimed at working to enable environmental education practitioners in the SADC region to strengthen environmental education processes for equitable and sustainable environmental management choices (http://www.enviropaedia.com/topic/default.php?topic_id=86, accessed 28 September 2014. This has been achieved through enhanced and strengthened environmental education, policy, networking, resource materials, training capacity, research and evaluation. The SADC REEP has also partnered with other regional and national environmental education initiatives and also aligned with regional EE and education for sustainable development (SD) processes.

2.3 HISTORY OF EE: THE SOUTH AFRICAN PERSPECTIVE

Before 1972, the South African government was mainly concerned with the conservation and preservation of natural resources. Its conservation plan included the establishment of National Parks, control of soil erosion and reclamation of agricultural land. In 1972, a Cabinet Committee on Environmental Conservation recommended a National Policy on Environmental Conservation which was later published in White Paper in 1980. Four years, after the publication of this policy, in 1984, the Council for Environment was established. The Council then appointed a Committee for Environmental Education. The aims of the Committee for Environmental Education were to:

- Lead the promotion of environmental education in the formal, non- formal and informal education sectors.

- Develop an environmental awareness and to motivate people to accept responsibility for the environment and to develop in them the expertise and values necessary to find solutions to environmental problems.

The Council further suggested that Environmental Education be taught across the curriculum and not become a new independent subject (Council for the Environment, 1986:2).

The United Nations' Conferences namely, Stockholm (1972), Belgrade Workshop (1975) and Tbilisi Conference (1977) made significant contributions to the development of Environmental Education in South Africa. The Government in its first act on Education and Training, White Paper of 1985, advocates that Environmental Education involving an interdisciplinary, integrated and active approach to learning, must be a vital element of all levels and programmes of education and training systems in order to create environmental literate and active citizens. It also advocates that all South Africans present and future enjoy a decent quality of life through the sustainable utilization of resources (White Paper 1985: 18). In 1992 the Environmental Education Policy Initiative (EEPI) was formed to develop an environmental education curriculum policy. The EEPI became the Environmental Education Curriculum Initiative (EECI). The New Government, Government of National Unity, led by the African National Congress (ANC) became into power in 1994, and the new acts and policies pertaining to environmental management and environmental education were proclaimed, for example, the Bill of Rights, Reconstruction and Development Programme (RDP) and the National Environmental Management Act (NEMA).

The Reconstruction and Development Programme (RDP) of 1994 drafted by the ANC and adopted by the Government of National Unity. The RDP advocated the following in relation to Environmental Education:

- The development of programmes that rekindle peoples' love of their land,
- To increase environment consciousness amongst youth,
- To coordinate Environment Education policy at all levels and
- To empower communities to act on environmental issues and
- To promote environmental ethics (RDP, 1994:2).

The second one is the Bill of Rights enshrined in the Constitution of the Republic of South Africa, 1996 (Act 108 of 1996: 11). The act guarantees its citizens the right to environment that is not harmful to their health or wellbeing and to have the environment protected for the benefit of the present and future generations, through reasonable legislative and other measures. These measures include prevention of pollution and ecological degradation, promoting conservation and securing ecological sustainable development and the use of natural resources while promoting justifiable economic and social development. The third act is the National Environmental Management Act (NEMA), of 1998. The aim of this act is to improve environmental management through sustainable development. The act also promotes empowerment through environmental education, raising of environmental awareness, sharing of knowledge and other experiences (RNCS, 2004:6). The fourth is the policy on education, Outcome Based Education, also referred to as Curriculum 2005; National Curriculum Statement and Revised National Curriculum Statement. Environmental Education was incorporated into all learning areas when Outcomes Based Education was introduced in South Africa in 2000. It was then further intensified in the National Curriculum Statement (NCS) and Revised National Curriculum Statement (RNCS). The RNCS recognises the importance of Environmental Education by making the environment part of one of its underlying principles (Mbokazi, 2009: 17). The principles of the National Curriculum Statement are linked to the principles of environmental education for equitable and sustainable society. They both recognise the relationship between human rights, inclusivity, and a healthy environment and social justice. This is manifested in the RNCS Critical Outcomes, CO6 and CO7. The two outcomes support environmental learning. Critical outcome 6 advocates that people use Science and Technology effectively and critically, showing responsibility towards the environment and health of others. CO7 links with the Tbilisi principles for Environmental Education. It states that EE should emphasise the complexity of environmental problems and thus to develop critical thinking and problem solving skills (Le Roux, 2001:374).

The following section discusses the development of Environmental Education on an international perspective.

2.4 THE HISTORICAL DEVELOPMENT OF EE: THE INTERNATIONAL PERSPECTIVE

The history of environmental education is inextricable bound up with social, economic and political, as well as ecological considerations. The concept has evolved both internationally and locally in South Africa, from a relatively simple understanding of people- environment relationships to a sophisticated interpretations of humanity's interaction with all aspects of the environment, global and local, biophysical and social (Loubser, 2005:35). The origin of modern environmental education dates back from the 19th century in Europe (Irwin, 1984: 1). According to Irwin this was a time when the Industrial Revolution had caused a wide-spread alienation of man from nature and the disruption of the continent's formerly homogeneous cultural milieu. The pioneer sociologist, Frederick Le Play, (1806-1882), considered the study of botany to be a significant aid in understanding the nature of society. The term 'ecology' was first coined by the philosopher-biologist, Ernst Haekelin in 1874 (Irwin, 1984: 1). The writers such as John Ruskin, William Morris, Hebert Spencer, Thoreau, John Muir, George Perkins Marsh, and Theodore Roosevelt played a pioneering role in the documentation of natural phenomena and man's impact on them (Ibid). Patrick Geddes, (1854- 1933), a Scottish professor of botany and student of Le Play, a sociologist, dedicated himself to the improvement of both the environment and education. He is regarded as the founding father of modern environmental education (Irwin, 1984: 2).

During the first half of the 20th century, much achievement on environmental education was made in both Europe and America. The term conservation gained popularity during the years of World War II in several European countries and in USSR. In many countries, the late forties and fifties saw the setting up of National Parks system with Nature Conservancy Councils (NCC) to run them (Irwin, 1984: 1). This was also supported by the establishment of private bodies and organisations in America, Europe and Britain *(Ibid*).

Soon after the 2nd World War, the United Nations Educational Scientific and Cultural Organisation (UNESCO) was established on 16 November 1945 in London. UNESCO was initially concerned only with education in a developmental context, but gradually through its contact with bodies such as International Union for the Conservation of Natural Resources (IUCN), it became part of the process of developing environmental education (Loubser, 2005:

2). IUCN was the first international organisation concerned with conservation [environment] established in 1949. This was followed by the World Wildlife Fund (WWF), which was established in 1961. The IUCN was primarily concerned with the world's diminishing natural resources and wildlife whereas the WWF was established to raise funds for wildlife conservation (Loubser, 2005: 2). These organisations were associated with relatively limiting concepts and terms such as ''conservation awareness'', ''environmental awareness'' and ''conservation education."

The concept EE gained popularity in 1970 as it was first formalised and defined by the International Union for the Conservation of Nature and Natural Resources (IUCN). The union defined Environmental Education as a 'process of recognising values and classifying concepts in order to develop skills and attitudes necessary to understand and appreciate the inter-relatedness among man, his culture and his biophysical surroundings' (IUCN, 1971: 2). Environmental education also entails 'practice in decision-making and self-formulating of a code of behaviour about issues concerning environmental quality' (IUCN, 1971: 2). Environmental education intends acquiring necessary knowledge about environmental issues and developing skills and positive attitude towards the maintenance and improvement of the environment.

In June 1972, United Nations Environment Programme (UNEP) was founded as a result of the United Nations Conference on the Human Environment. UNEP is an agency of the UN that coordinates United Nations environmental activities, assisting developing countries in implementing environmentally sound policies and practices (http://en.wikipedia.org/wiki/United-NationsEnvironment..., accessed 18 June 2013).

Since then a series of International Conferences and Workshops were held. These Conferences and workshops will be discussed in sections 2.4.1 to 2.4.12, under the following sub-headings, namely, background, objectives, and recommendations of the Conference. This will give us clear understanding of the development and evolution of environmental education into education for sustainability.

2.4.1 The Stockholm Conference (1972)

2.4.1.1 Background

Public concern over the environmental crisis had begun to stimulate the World to take action on the local and national level to address these concerns. The Conference on Human Environment was initiated by the United Nations (UN) to be held in Stockholm, Sweden from 5 to 16 June, 1972 (Palmer, 1998:7). The Conference was attended by representatives from 113 developed and developing countries from the west and the former Soviet Union and most of its allies from the eastern bloc did not attend, 19 Inter-governmental Agencies and more than 400 Inter-governmental and Non-governmental Organisations (NGOs). It was the first time that the world's rich and poor nations had come together in a forum to discuss matters of environmental concern (Loubser, 2005:39). The Conference was characterised by a conflict of interest between the wealthy industrialized countries and the poor. This was the beginning of modern political and public awareness of global environmental problems.

2.4.1.2 Objectives of the Stockholm Conference

The Stockholm Conference developed numerous aims and objectives of the conference including, to address the challenges of preserving and enhancing human environment, and to inspire and guide the world's population in the preservation and enhancement of the human environment, and to produce a sustained improvement in living conditions for all. It also involve solving environmental problems without ignoring social, economic and developmental policy factors, (http://www.are.admin.ch/themen/nachhalting/00266/00540/00, accessed on 5 June 2012).

The conference was focused on human environment since human activities had caused irreversible damage on the environment and on natural resources. Suzuki, (1993: 4) posits that a great change in our stewardship of the earth and the life on it is required, if vast human misery is to be avoided and our global home on this planet is not to be irretrievably mutilated. The current study is in line with the aims of the Stockholm conference as it demands a radical transformation in learners' behaviour and life styles to one that promote environmental care and sustainable living. Schleicher, (1989) cited in Fien and Tilbury, (1996: 8) writes about the

need for a new "ecological ethic, and ecologically oriented value system' based upon 'fundamental change(s) in human attitudes and actions towards ourselves and the environment". The recommendations of the conference follow.

2.4.1.3 Recommendations of the Stockholm Conference

The Stockholm Conference produced a Declaration of 26 principles and an Action Plan of 109 recommendations to achieve environmental sustainability. The Conference also recommended the establishment of the United Nations Environment Programme (UNEP) which together with UNESCO founded International Environmental Education Programme (IEEP). The IEEP was then launched at an International Workshop on environmental education held in Belgrade in 1975 (refer to section 3.4.2 below). The Swedish Prime minister, Olof Palme, in his opening address stated that "People were no longer satisfied only with declarations. They demanded firm action and concrete results. (www.unep.org/geo/geo3/pdfs/chapter1.pdf, accessed 5 June 2013). As a result the Stockholm Conference produced 109 recommendations to achieve environmental sustainability, many of which remained unfulfilled and then serve as targets to achieve sustainable living amongst community members of all ages. Recommendation 96 called for the development of environmental education as one of the most critical elements of an all-out attack on the world's environmental crisis (UNESCO-UNEP, 1976: 2). It was envisaged that environmental education would instill new knowledge and skills, values and attitudes in a drive towards a better quality of environment and in return a higher quality of life for present and future generations living within the same environment.

The Stockholm Conference articulated the right of people to live in an environment of a quality that permits a life of dignity and well-being. This means that the environment should benefit all humans and provide the means for raising the quality of life for everyone. This study is aligned to the call of the Stockholm Conference as it strives to promote sustainable living amongst school children in secondary schools. It must be noted that many of the major environmental milestones from 1970s to date originated from the Stockholm Conference. Many national legislations on environment were established following Stockholm conference, for example, 31 major National laws were passed compare to 4 laws from 1956-1960; 10 during 1960-1965 and 18 during 1966-1970 in countries of Organisation for Economic Cooperation and Development (UNEP, 2000: 3).

The Belgrade workshop was organised to verify progress made towards the recommendations articulated at the Stockholm Conference.

2.4.2 The Balgrade Workshop (1975)

2.4.2.1 Background

The Belgrade International Workshop on Environmental Education was held in Belgrade, Yugoslavia from 13 to 22 October 1975. The Workshop was attended by around 100 educational specialists from sixty four countries of the five UNESCO regions namely Africa, Arab States, Asia, Europe-North America and Latin America. Participants represented all levels of formal and non-formal education i.e. primary and secondary schools, colleges and universities, youth and adult education and training as well as major international organisations concerned with environmental education both government and non-government (UNESCO, 1975: 5).

2.4.2.2 Objectives of the Belgrade Workshop

The objectives of the Belgrade Workshop mostly related to environmental education included the following:

- to promote environmental education,
- to review and discuss the trends and emerging issues in an environmental education,
- to frame the global pattern of environmental education for all ages, in and out of school (http://www.gdrc.org/uem/ee/belgrade.html, accessed on 7 November 2010) and
- to conduct awareness programmes in all countries.

In the context of this study, objectives of the IEEP are essential for promoting education for sustainability. Governments have to ensure that all individuals have access to information about environmental problems at local, national and international levels. School curriculum and teaching material could be developed such that local environmental issues are identified and addressed (http://www.gdrc.org/uem/ee/belgrade.html, accessed on 7 November 2010). In

short the IEEP was primarily devoted to the conceptual and the methodological development of environmental education. Deliberations of the workshop are discussed in the next paragraph.

2.4.2.3 Recommendations of the Belgrade Workshop

A set of recommendations addressing appropriate target group for an international effort to promote environmental education were presented. These recommendations formed the "Belgrade Charter" – a global framework for environmental education which was the first intergovernmental statement which outlined the aims, objectives, key concepts and principles of environmental education. Some of these recommendations are stated as follows:

- Environmental education (EE), properly understood, should contribute to a comprehensive lifelong education, one responsive to changes in a rapidly changing world.
- EE should prepare the individual for life through an understanding of the major problems of the contemporary world and the provision of skills attributes needed to play a productive role towards improving life and protecting the environment with due regard to ethical values (http://www.gdrc.org/uem/ee/belgrade.html, accessed on 7 November 2010).

The Belgrade Workshop recommended that all countries need to develop policies and strategies for the integration or inclusion of environmental education into school and university or college curriculum. It afforded every person with opportunities to acquire the knowledge, values, attitudes, commitment and skills needed to protect and improve the environment. The present study reflects the recommendations of the Belgrade Workshop. The aims, objectives and the guiding principles, articulated in the Belgrade Charter are the pillars of this study. Schools are at the centre of concerns for sustainable living. Therefore, secondary schools must inculcate love, interest and positive attitude towards the achievement of sustainable living.

The Belgrade Workshop planned to hold a follow-up Conference with the crucial involvement of politicians. Tbilisi Conference followed the Belgrade workshop to reaffirm and formulate policy regarding environmental education.

2.4.3 The Tbilisi Conference (1977)

2.4.3.1 Background

One of the most important moments in the evolution of international sustainability declarations related to education was the Inter-governmental Conference on Environmental Education in Tbilisi (Wright, 2002: 106). This Conference was organised by the United Nations Education Scientific and Culture Organisation (UNESCO) in cooperation with the United Nations Environment Programmes (UNEP), and was held in Tbilisi, Georgia, USSR, from October 14-26, 1977. The plan to involve government representatives in environmental education policy formulation and debate was successful. Delegates from 66 member States of UN and numerous Non-Governmental Organisations (NGOs) have participated. In total 265 delegate and 65 representatives and observers took part in the Conference (http://www.gdrc.org/uem/ee/tbilisi.htlm, accessed on the 21st of May 2012).

2.4.3.2 Objectives of the Tbilisi Conference

The Tbilisi Conference aimed at defining Environmental Education (EE), formulating goals and objectives of Environmental Education, and integrating environmental education into the whole system of formal education at all levels to provide the necessary, knowledge, understanding, values and skills needed by the general public and many occupational groups for their participation in devising solutions to environmental questions (UNESCO-UNEP, 1978: 6). It also aimed at stressing the importance of environmental education as a means of creating awareness of the complex and urgent problems of environment as the basis for their solution and to defending and improving the human environment for the present and future generations (UNESCO-UNEP, 1978: 6). The study is in line with the objectives of the conference as it fosters environmental awareness and at the same time promotes sustainable living to secondary school learners. The UNCED (1992: 2) emphasises that education is critical for promoting sustainable development and achieving environmental and ethical awareness, values and attitudes, skills and behaviour consistent with sustainable development and for effective public participation in decision-making.

2.4.3.3 Recommendations of the Tbilisi Conference

The Tbilisi Conferences prepared recommendations for the wider application of EE informal and non-formal education. The first set of international recommendations to guide environmental education was developed in Tbilisi Conference in 1977. The Conference set the foundation from which the concepts environmental education, sustainable development, sustainability and education for sustainability were built from. The following are some of the recommendations stated in the Tbilisi Conference:

The Tbilisi Conference recommended [that]:

- Although biological and physical featured form the natural part of the human environment, the ethical, social, cultural and economic dimension must play part in determining the approach to better use of natural resources (Loubser and Ferreira, 1992:32).
- Education of the general public should be considered whether it involves specific occupational or social groups or the training of certain professionals and scientists,
- It further recommended that EE should be aimed at every level of the population including non-specialists, professionals whose activities may have significant impact on the social aspect of the environment,
- The involvement of universities in conducting research in EE,
- The incorporation of EE into the National Education System of countries and that the necessary strategies required for this work should not be based on experience alone but also on research and evaluation aimed at improving educational policies and decisions (UNESCO in Loubser, 2005: 33).

The following goals and objectives of environmental education were endorsed in the Tbilisi Conference in 1977. Ideas about environmental education continued to evolve during the 1970s and by 1977 when the world's first Intergovernmental Conference on Environmental Education was held in Tbilisi Georgia, there was emerging agreement that environmental education had the following main goals, namely:

A**wareness**: to help social groups and individuals acquire awareness and sensitivity to the total environment and its allied problems.

Knowledge: to help social groups and individuals gain a variety of experiences in and acquire a basic understanding of, the environment and its associated problems.

Attitudes: to help social groups and individuals acquire a set of values and feelings of concern for the environment and the motivation for actively participating in environmental improvement and protection.

Skills: to help individuals, groups and societies acquire the action competence or skills of environmental citizenship- in order to be able to identify and anticipate environmental problems and work with others to solve, minimise and prevent them.

Participation: to provide individuals, groups and societies with opportunities to be actively involved in exercising their skills of citizenship and be actively involved at all levels in working resolution of environmental problems (Schmieder, 1977: 28 and van Rooyen, 2006: 121-122). The teaching and learning strategies for environmental education need to emphasise more than knowledge and understanding, as important as they are as a foundation for learning. The clarification of environmental attitudes and commitments, the development of critical thinking skills and learning how to work collaboratively to improve human and environmental wellbeing are also important outcomes of environmental education.

Lebeloane, (1998: 54-55) classifies goals and objectives into goals and objectives focusing on knowledge, skills and values. The first two goals and objectives focus on learners gaining knowledge and acquiring critical thinking skills and the third one focuses on values and a feeling of concern for the environment. This means that educators should develop goals and objectives which foster awareness and provide learners with opportunities to practice skills and knowledge gained. They should also develop goals and objectives which endeavour to change the attitudes and behaviour of learners towards the environment so that they take care of and appreciate it. In the fifth goal and objective of the environment, it is evident that working for the environment requires collaborative efforts of all learners, educators, non-educators, individuals, groups, governments and the society at large.

The Conference also recommended that environmental education should be provided for all ages, at all levels and in both formal and non-formal education. After learners have gained basic understanding and knowledge about environment, they must be able to take action, work for the environment. Their actions can only be measured by the objectives. The deduction which can be made from the preceding paragraphs on aims, goals and objectives is that the goal of environmental education is to produce a world population that is aware of, and concerned about, the environment and its associated problems. Through environmental education learners gain understanding, knowledge about environmental issues and they can change their attitudes towards the environment and skillfully transfer their knowledge and understanding into action for the environment.

The Tbilisi, Conference also endorsed a set of guiding principles of environmental education. These environmental education principles were to be implemented at all levels, namely, local, national, regional and international and for all age groups both outside and inside the formal schooling system. These principles were published in a document called the **'Belgrade Charter'** and were stated as follows:

Environmental Education should…

- be a continuous, lifelong process, beginning at pre-school level and continuing through all formal and informal stages;
- examine major environmental issues from local, national, regional and international point of view so that students receive insights into environmental conditions in other geographical areas;
- enable learners to have a role in planning their learning experiences and provide an opportunity for making decisions and accepting their consequences;
- relate environmental sensitivity, knowledge, problem-solving skills and value clarification to every age, but with special emphasis on environmental sensitivity to the learner's own community in early years;
- help learners to discover the symptoms and real causes of environmental problems;
- emphasise the complexity of environmental problems and thus the need to develop critical thinking and problem- solving skills; and

- utilise diverse learning environments and a broad array of educational approaches to teaching/learning about and from the environment with due stress on practical activities and first-hand experience (UNESCO-UNEP, 1977: 27 and Loubser, 2005: 41).

In terms of this study, the principles of EE form the basic framework for sustainable living as for its interdisciplinary nature. The interdisciplinary nature of EE means that EE draws from biological, physical, ethical, social, cultural, political as well as economic dimensions. This is a holistic approach to environment. EE is said to be a lifelong learning process which should be offered at an early age of schooling from pre-school, to primary and to secondary and through to tertiary level. It encourages participation of learners in educational activities aimed at resolving environmental issues and crises. They also encourage learners to be proactive in investigating, analysing and solving environmental problems. The principles invite educators to use a variety of teaching methods especially those which stimulate critical thinking and problem solving skills. The Conference not only endorsed the aims, goals, objectives and guiding principles for environmental education but also described the characteristics of environmental education, as follows:

Environmental education…

- builds awareness of the interrelatedness of local, national and global environments, enabling students to understand the connectedness between everyday actions and the wider community;
- encourages problem-solving by searching for solutions to real environmental issues;
- examine issues of local to global significance in their political, cultural and socio-economic contexts, exploring the underlying values in a sensitive and open-minded manner;
- generates action by encouraging individuals to take responsibility for the care and shaping of their own environment;
- uses a variety of teaching and learning strategies and resources, including field studies, simulations, action research, information technology, personal experiences and co-operative learning methods;

- is student centred in the way that learners are allowed to contribute to the planning of their own learning experiences;
- is part of a lifelong learning process;
- is exemplary, in that school, teachers and learners have a responsibility to model the behaviour they are promoting;
- emphasises the complexity of environmental problems and stimulates critical thinking to address environmental and developmental issues in just and humane ways;
- Focuses on values education and the fostering of an environmental attitude (UNESCO-UNEP, 1977: 14-15, Bornman, 1997: 54-55).

The above mentioned characteristics are based on the nature of environmental education as a life-long learning, interdisciplinary, holistic and interrelatedness. The Tbilisi Declaration (1977) on Human Environment states that environmental education, properly understood should constitute a comprehensive life-long education, one responsive to changes in a rapidly changing world. The recommendations that environmental education should be a life-long, integrated, active and inclusive in nature is of paramount important. The conference also recommended the investigation of the root causes of environmental problems. It should prepare the individual for life through an understanding of the major problems of the contemporary world and the provision of skills and attributes needed to play a productive role towards improving life and protecting the environment with due regards to ethical values. By adopting a holistic approach, rooted in a broad interdisciplinary base, it recreates an overall perspective which acknowledges the fact that natural environment and manmade environment are profoundly interdependent, (UNESCO-UNEP, 1977: 15). Environmental education is described as learner-centred which means that learners are involved in decision-making of what they ought to learn. It requires that learners and educators model the behaviour, skills and knowledge they have acquired as they become environmentally literate. The recommendations of the Tbilisi conference have been acknowledged world worldwide, however, not all countries responded to recommendations with enthusiasm. Three years later, these developments were supported by the publication in 1980 of the breaking IUCN/UNEP/-sponsored World Conservation Strategy (Loubser: 2005: 40). The World Conservation Strategy is discussed in section 2.4.4 below.

2.4.4 World Conservation Strategy (WCS), 1980

2.4.4.1 Background

The World Conservation Strategy (WCS) was launched in Gland, Switzerland in 1980 by IUCN, UNEP and World Wildlife Fund (WWF). However it must be noted that this is not a Conference but it is just a publication. It is included because the term "sustainable development" was used in this document for the first time in a key international forum. The concept "sustainable development" was first given currency by the WCS and later reinforced by the Brundtland Report (Fien, Schreuder, Stevenson and Tilbury, 2002; 2).

2.4.4.2 Objectives of the WCS

The main objective of the WCS was to advance the achievement of sustainable development through the conservation of natural resources. This entails protecting essential ecological processes, life support systems and genetic diversity through the sustainable utilisation of natural resources (Fien et al. 2002: 2). These objectives provide both intellectual framework and practical guidance for the conservation actions necessary. The strategy had to seek ways of promoting conservation globally as a result it seeks global coordinated efforts backed by will and determination. In order to achieve these objectives global participation is essential. The concept "sustainability" first emerged in the early 1980s, but gained prominence in 1990s, when the World Conservation Union referred to 'education for "sustainable living". Other agencies have used concepts such as education for sustainability, education for sustainable development (UNESCO-UNEP, 1996) and education for sustainable future (UNESCO, 1997). The study is in line with the WCU as it seeks to evaluate the role of environmental education in promoting sustainable living in Secondary Schools learners. The concept of sustainable development as it emerged in the Strategy can be interpreted as development which aims at utilising available resources in such a way that it does not compromising the ability of future generations to meet their future need. Human survival depends on the survival of our natural resources. In order for us to build a sustainable future we need to ensure that our natural resources are protected and preserved.

2.4.4.3 The recommendations of the WCS

The conference prepared recommendations for the wider application of environmental education in formal and no-formal education. The World Conservation Strategy recommendations include inter alia:

- The use of firewood in a manner that it does not contribute to the pollution of environment and its consumption be limited to sustainable levels;
- Governments are encouraged to adopt a cross-sectoral conservation policy to commit themselves to achieving the objectives of conservation strategy;
- The Strategy recommends that Governments review legislation concerning living resource;
- The Strategy also seeks the greater public participation in planning and decision making concerning living resource use and
- Environmental education programmes and campaigns to build support for conservation.
- All member States had to set target dates for meeting the requirements and carrying out the responsibilities as stated in the World Conservation Strategy (WCS, 1980: vii).

In the context of this study, WCS contributed to the development of environmental education. The WCS stressed the importance of resource conservation through 'sustainable development' and the idea that conservation and development are mutually inter-dependent (Palmer, 1998:15). The strategy introduced 'development' as an important means of achieving conservation, such that it was mutually dependent and hence introduced the concept of 'sustainable development' (UNESCO, 2004: 122). The strategy emphasised the conservation of natural resources and provided policy guidance on how to achieve it. It also identified the actions to be taken to improve conservation efficiency and to integrate conservation and development. The World Conservation Strategy included a chapter on environmental education containing the following message: "Ultimately, the behaviour of entire societies towards the biosphere must be transformed if the achievement of conservation objectives is to be assured…the long term task of environmental education [is] to foster or reinforce attitudes and behaviour, compatible with a new ethic" (Palmer and Neal, 1994:13). Attitudes, behaviour, culture and environmental ethic were emphasised. These are core-concepts of this study as they

endeavour to reinforce positive attitudes and behaviour relevant to the promotion of sustainable living. This study seeks to change the way learners see and perceive their environment. This means that people have to change their present unsustainable ways and adapt to sustainable ways of living in harmony with their [surroundings] environments. Therefore, the task of environmental education is to foster positive attitudes and responsible behaviours compatible with sustainable living to people of all age groups. Ten years later, a follow-up conference to check the progress of the recommendations made in Tbilisi Conference was set up in Moscow (refer to section hereunder).

2.4.5 Moscow Conference (1987)

2.4.5.1 Background

The International Congress on Environmental Education and Training was organised jointly in Moscow, USSR, by UNESCO and UNEP from 17-21 August 1987. The Conference was attended by 300 participants and observers including experts and representatives of 15 International and National Non-Governmental Organisations (UNESCO-UNEP, 1987: 1). These participants were coming from developed and developing countries which were having different views about many issues pertaining to environmental protection and sustainable development.

2.4.5.2 Objectives of the Moscow Conference

The Moscow Conference was a follow-up to the Tbilisi Conference. It reiterated the findings of the Tbilisi Conference and specified objectives and requirements for environmental education and training in the future years. Some of these objectives include the following:

- Review progress and trends in EE since the Tbilisi Conference;
- Review the state of the of Environment and its educational and training implications;
- Review relations between intergovernmental environmental scientific programmes and EE and Training and;
- Present a draft international strategy for EE and Training through the 1990s and
- Strengthening the international system to exchange information.

Three Commissions were set up to address the above mentioned issues. The first commission had to consider environmental education and training of teaching personnel for school and out of school activities and priorities for their development in the 1990s. The second commission looked at environmental education and training in general university education and priorities for the development in the 1990s while the 3rd Commission considered specialised environmental training and priorities for its development in the 1990s. The Congress also held five symposia which considered the following (1) the role of EE, (2) EE contribution in the perspective of socio-economic development, (3) the role of the media and new communication systems in the promotion of environmental education and information, (4) the role of biosphere reserves and other protected areas in the dissemination of ecological knowledge, and (5) national experiences and the contribution of NGOs in the development of environmental education and training (Connect-UNESCO-UNEP, 1987).

2.4.5.3 Recommendations of Moscow Conference

The Congress reiterated the need for environmental education at all levels of education The Congress also came out with the following recommendations:

- creating banks of EE curricula, textbooks, teaching aids and such items at all levels, from the local to the international, in the form of resource centres, clearinghouses or documentation centres (Fien et. al, 2002: 3),
- Strengthening the international system to exchange information,
- Conduct research and experimentation on content and methods of environmental education and training,
- Development of curricula and teaching materials for the general education, and
- Conduct training quality environmental education personnel (UNESCO-UNEP, 1988:13, Loubser and Ferreira, 1992:33).

In the same year as the Moscow Congress, the ideas detailed in the World Conservation Strategy were endorsed by the publication of ‘Our Common Future’ referred to as ‘Brundtland Report’ (WCED, 1987). The report called for a massive long-term campaign of awareness–raising on environmental issues and the importance of sustainable development. The assumption was that if the public was better informed, then attitudes would change and people would take a

responsibility for the environment and take necessary actions and decisions (UNESCO–UNEP, 1998: 125) to improve and solve environmental problems.

The term 'sustainable development gained momentum and was widely used during and after the WCED report, that is, 'Our Common Future/Brundtland Report'. The report outlined a path for global sustainable development and served as a key role in introducing sustainability and put it into practice. The aim of this study is to promote sustainable living among the secondary school learners through the teaching of environmental education. This is in line with the aim of the Commission to raise the level of understanding and commitment to all individuals at all levels. Many Governments world-wide like the South African, Norwegian, U.S and European Union governments, to name a few, responded positively by developing their policies and programmes to promote sustainable development in their countries. However, one must acknowledge that in general, the actions undertaken to date have proved insufficient to counteract the steady deterioration in the quality of the environment, (http://www.unescodoc.unesco.org/image/0008/000805/080583eo.pdf, accessed on 12 November 2012).

Debates and discussions arising from the WCED Report and publications such as "Our Common Future" led to the World Conference on Education for All, Jomtien Conference.

2.4.6 The Jomtien Conference (1990)

2.4.6.1 Background

This is the World's Conference on Education for All, held in Jomtien, Thailand from the 5th - 9th March 1990. The event brought together representatives of governments, international agencies; non-governmental organisations; professional associations and prominent people in the field of education. These participants were coming from the North (developed) and the South (developing) countries. Participants from poor countries (South) were concerned with measures to eradicate poverty whereas those from industrialised countries were mainly concerned with measures to improve the environment and sustainable development.

2.4.6.2 Objectives of the Jomtien Conference

The conference for Education for all, aimed ensuring that basic education and functional literacy for all is achieved, to meet the basic learning needs of all children, youth, and adults. It aimed at redefining the vision and scope of basic education (Torres, 1999: 18). It made environmental and development concepts, including those of population, into all educational programmes, with analyses of the causes of the major problems and involving school children at local and regional studies on environmental health, including safe drinking water, sanitation, food and the environmental and economic impacts of resource use (UNESCO, 2004: 77).

The Jomtien Conference marked the beginning of a broader vision of basic education to include, as well as literacy and numeracy, the general knowledge, skills, values and attitudes that people require to survive, develop their capabilities, live and work in dignity, improve the quality of their lives, make informed decisions and continue learning (UNESCO, 2004: 90). The present study acknowledges that education is the primary agent of transformation towards sustainable living. The study also aims to evaluate the role of environmental education in promoting sustainable living amongst secondary scholars and the public in general.

2.4.6.3 Recommendations of the Jomtien Conference

The Conference recommended the enforcement of primary education and drastically reduction of illiteracy by the year 2000. The Conference also adopted the Worlds Declaration on Education for All. The World Declaration on Education for All stressed that education is a fundamental human right and required countries to strengthen their effort to improve education in order to ensure that all the basic learning needs for all were met (http://en.wikipedia.org./wiki/Education For All, accessed on 3 July 2011). The conference also developed the Framework for Action to Meet the Basic Learning Needs which established six goals for the year 2000.

For the purpose of this study, it is worthwhile to elaborate on two goals for this Conference, relevant to environmental education namely, goal 1 and 5. The goal number 1, deals with access to basic education which is central for promoting sustainable living and the only way to improve the capacity of people to address environmental problems. Education is widely recognised as a

major priority in ensuring improvement, in the quality of life, the eradication of poverty and environmental protection.

The goal number 5 deals with enhancing the environment for learning and calls for countries to integrate environmental education into their curriculum. South Africa has positively responded to this call by integrating environmental education into her curriculum from General Education and Training to Further Education and Training bands. Another conference relevant to the study is the Conference on Environment and Development (UNCED), the Rio de Janeiro Conference.

2.4.7 The Rio de Janeiro Conference (1992)

2.4.7.1 Background

This was the United Nations Conference on Environment and Development (UNCED), the Earth Summit held in Rio de Janeiro, Brazil in 1992. The Summit was attended by 120 heads of States and governments together with delegates from over 170 countries from the Southern bloc (India, Africa, and etc.) and Northern bloc (USA, European Union) and many others. The industrialised (Northern) countries came to solve the issues of climate, forest and endangered species whereas the poor (Southern) countries came to address the issues of poverty. So they came with conflicting interests. They also pointed to the excessive impacts on global resources by the mass-consumption lifestyle of many people in the North and the way that this undermines global sustainability (Fien, Schreuder, Stevenson and Tilbury, 2002: 1).

2.4.7.2 Objectives of the Rio Conference

The Rio Conference stated its objectives as reaffirming the Declaration of the United Nations Conference on the Human Environment adopted at Stockholm in 1972, and to seek to build upon UN Conferences on Human environment and establish a new equitable global partnership through the creation of new levels of cooperation among states, key sectors of society and people (http://www.un-documents.net/rio-dec.htm, accessed on 3 April 2012). The conference also aimed at changing consumption patterns and promoting sustainable human settlement development and integrating environment and development in decision – making (UNCED, 1992:9).

In the context of the study these objectives are essential for the implementation of declarations made in present and past conferences. The UN Conference on Human environment adopted the Rio Declaration. The conferences also looked at establishing new partnerships of all community members at all levels ranging from children to adult, educated and non-educated. This is a good way of ensuring that environmental awareness programmes are cascaded and carried out.

2.4.7.3 Recommendations of the Rio Conference

The UNCED opened the eyes of the world to issues of environment and development. Heads of States and governments from around the world pledged their support for the principles involved. The recommendations of UNCED conference are contained in Agenda 21 and Rio Declaration. Agenda 21 is a major programme setting out what nations should do to achieve sustainable development in the 21st century (Palmer, 1998: 17). Environmental education is discussed throughout the document with more emphasis on chapter 36 which deals with promoting education, public awareness and training. The publication of Agenda 21 signaled the introduction of sustainable development discourse as well Education for Sustainable Development into school curricula throughout the world (Kopnina, 2011: 3). A second important document signed, is the Rio Declaration comprising of 27 principles for sustainability. The Rio Declaration on Environment and Development set out a blue-print for a sustainable future whilst Agenda 21 provides a guiding programme for its interpretation (Palmer, 1998: 18). To list a few, the following are some of the recommendations:

- Human beings are at the centre of concerns for sustainable development.
- The right to development must be fulfilled so as to equitable meet developmental and environmental needs of present and future generation,
- All States and all people shall cooperate in the essential task of eradicating poverty as an indispensable requirement for sustainable development,
- To achieve sustainable development and a higher quality of life for all people, states should reduce and eliminate unsustainable patterns of production and consumption and promote appropriate demographic policies.
- The environment and natural resource s of people under oppression, domination and occupation shall be protected, (UNCED, 1992: 3-7).

One of the important recommendations of the conference was that:

Government should strive to update or prepare strategies aimed at integrating environment and development as a cross-cutting issue into education at all levels (Palmer, 1998:18). It also encouraged the setting up of environmental education programmes in various countries based on their particular needs and situations. South Africa positively responded to this proposal by integrating environmental education into all learning areas in the primary and secondary education. The challenge is still with higher education and non-formal education but Universities have developed courses or modules on Environmental Education like the University of South Africa, Pretoria University and Rand Afrikaans University.

A follow up Conference was convened in Thessaloniki to celebrate achievements of the Tbilisi and the Rio Conferences.

2.4.8 International Conference on Population and Development (ICPD), 1994

2.4.8.1 Background

This conference was staged in Cairo, Egypt, from September 5-13, 1994. The International Conference on Population and Development (ICPD) attracted 13 thousand participants categorized as follows: 182 UN members, one or two ministers and composed of Diplomats, civil servant, experts and representative of Non-Governmental Organisations (NGO). Also present were 700 officials from intergovernmental organisations and 3800 people from the media (Cliquet and Thienpont, 1995: 1). This conference emanated from the results of three years of preparatory in all sorts of central, and regional UN bodies and services. The theme of the conference was: World population, sustainable economic growth and sustainable development. ICPD was not the first conference on population and development. The first conference was held in 1954 in Rome and every 10 years thereafter. Therefore ICPD of 1994 is the fifth one since 1954 (http://rhealitycheck.og/article/2010/01/11/international-con...accessed 25 August 2012.

2.4.8.2 Objectives of the ICPD Conference

- The ICPD sought to ensure that population, environmental and poverty eradication factors are integrated in sustainable development policies, plans and programmes.
- The ICPD also sought to reduce both unsustainable consumption and production patterns as well as negative impact of demographic factors on the environment in order to meet the needs of current generations without compromising the ability of future generations to meet their own needs (http://www.icd.ca/Cairo/program/pO300.html, accessed on 2 June 2012).
- The ICPD also sought to raise the quality of life for all people through appropriate population and development policies and programmes aimed at achieving poverty eradication, sustained economic growth in the context sustainable development and sustainable patterns of consumption and production, human resource development and the guarantee of human rights.
- The ICPD sought to achieve universal access to quality education, with particular priority being given to primary and technical education and job training, to combat illiteracy and to eliminate gender disparities in access to retention in, and support for, education.

The Population growth trend in many less developed and well developed countries results in overconsumption of renewable and non-renewable resources. Scientific knowledge of the crucial issues involved in the mutual relations between population growth, economic development and pressures on the environment can only help to solve the problems if it serves as a basis for policy making (Cliquet and Thienpont, 1995: 160). Issues such as the empowerment of women, reproductive health care as well as family planning were well presented, however the conference did not adequately address the issue of the relationship between population growth and the environment, the need to reduce overconsumption and to change environmentally unsound production processes in the industrial countries. Education was adequately addressed and implementation plans were evident in many countries. South Africa envisaged eradicating illiteracy by 2014. Programmes such as Masifundisane (Lets Learn), Adult Education & Training (AET) and Early Childhood Development (ECD) are in place. The study is in line with the ICPD as it seeks to reduce unsustainable consumption and actions in secondary schools which will in turn reduce it in their communities. The study seeks

to promote sustainable living amongst secondary school learners thereby improving the quality of life of the whole community.

2.4.8.3 Recommendations of the ICPD

The Cairo Conference was a very important event and a considerable progress was achieved. The conference drew up the following recommendation:

- The ICPD called for the universal primary education and closing the gender gap in secondary education. It was thought that educating girls and women is closely associated with better health, lower infant mortality, lower fertility, higher economic growth and environmental literacy.
- The ICPD agreed to strengthen the primary health care by making it universally available to all.
- It also agreed that involving women fully in policy and decision-making processes including all aspects of economic, political and cultural life and is essential for achieving sustainable development. It also called for all women and men to receive the education required to meet their basic human needs including skill development and preparation for employment The ICPD agreed that integrated strategies for ensuring economic and environmental progress are essential for individual, national, and global futures (http://www.iwhc.org/index.php.option-com-content&task), accessed 25 August 2013.
- The right to development must be fulfilled so as to equitable meet the population, development and environmental needs of present and future generations,

The Conference recognised human rights, health, equality and environmental protection, economic and social justice as a means of ensuring a better quality of life and sustainable future for all. This Conference embraced the notion that economic, social, and environmental progress is critical and interrelated elements of an effort to improve the quality of lives for the present and future generation and achieve sustainable development.

2.4.9 The Thessaloniki Conference (1997)

2.4.9.1 Background

In December of 1997, an International Conference was held in Thessaloniki, Greece, to celebrate the 20th anniversary of the Tbilisi Doctrine and to reorient education for sustainability in the 21st century (UNESCO, 1997: 20). The International Conference on Environment and society: Education and Public Awareness for Sustainability was organised by UNESCO. It brought together representatives from the United Nations (UN) systems, governments, non-governmental organisations (NGOs), experts and other interested parties to discuss the issue of education for Sustainability. In this Conference, very little was said about environmental education instead it was suggested that environmental education be referred to as education for the environment and the sustainability (UNESCO, 1997: 2). According to (UNESCO, 1997:23) the goal of education is to make people wiser, more knowledgeable, better informed, ethical, responsible, critical and capable of continuing to learn. Education is also the means for disseminating knowledge and developing skills, for bringing about desired changes in behaviour, values, and life styles for promoting public awareness about the state of the environment.

2.4.9.2 Objectives of the Thessaloniki Conference

The objectives of the Thessaloniki Conference were stated as seeking to highlight the role of education and public awareness for sustainability, planning to develop strategies to promote sustainability, and developing action plans to implement sustainability in formal education (UNESCO, 1997: 2).

A number of good Declarations had been made and empty promises made. Now it was time to put plans into action in formal education. The Thessaloniki Conference was duly concerned with sustainable living which is the key concept of this study. The big issue here was to evaluate the role of education in promoting education and sustainable living. The present study also wants to evaluate the role of environmental education in promoting sustainable living amongst secondary school learners. Recommendations were also made in this conference and are discussed in the following paragraph.

2.4.9.3 Recommendations of the Thessaloniki Conference

The Conference discussed the concept of education for sustainability, along with terms such as education for sustainable living, education for sustainable development and education for a sustainable future. The Conference adopted a number of declarations known as the Declaration of Thessaloniki. The Thessaloniki Declaration laid foundation for education for sustainability, for example, declaration 10 of Thessaloniki Conference described the concept of sustainability as encompasses not only the environment but also poverty, population, health, food, security, democracy, human rights, and peace. Sustainability is, in the final analysis, a moral and ethical imperative in which cultural diversity and traditional knowledge need to be respected. The Declaration 11 stated that EE addresses the entire range of global issues and was recognised by UN Conferences as Education for Sustainability (UNESCO, 1997: 2).The Declaration 12 states that all subject areas, including the Humanities and Social Sciences, need to address issues related to environment and sustainable development (UNESCO, 1997: 2). This means that addressing sustainability requires a holistic, interdisciplinary approach which brings together the different disciplines and institutions. The following are some of the recommendations articulated by this conference. The Conference recommended that:

- Governments and leaders give education the necessary means to fulfill its role in achieving a sustainable future.
- To develop action plans for formal education for environment and sustainability with concrete targets and strategies.
- Schools be encouraged and supported to adjust their curricular to meet the needs for a sustainable future.
- All actors to reinvest a portion of the savings from the greening process into strengthening of environmental education, information, public awareness and training programmes.

A lot has been done in the 90's, by the United Nations (UN) and UNESCO, that is, the vision of education and public awareness has been further developed and enriched by major UN Conferences such as conference on Education for All (1990), Environment and Development (1992), Population Education and Development (1993) and Environment and Society, Education and Public Awareness for sustainability (1997). In order to successfully implement

all the recommendations and declarations made in the previous UN Conferences, it was essential to set up targets and indicators as contained in the Millennium Declaration. A follow up conference was necessary to further evaluate the progress made to the Thessaloniki conference, the New York, Millennium Conference is briefly discussed below.

2.4.10 The New York Millennium Summit (2000)

2.4.10.1 Background

The New York Millennium Summit was held in the United Nations Headquarters in New York City on 6-8 September 2000. The Summit ratified the United Nations Millennium Declaration. The Millennium Declaration was the response to a series of UN led conferences in the 1990's, focusing on issues such as education, environment and development, sustainable development, children, nutrition, human rights, freedom and basic standard of living. The Millennium Development Goals were developed to put the above mentioned ideas into action by setting targets and indicators for achieving them. The Millennium Development Goals (MDGs) are international development goals that United Nations member states and international organisations agreed to achieve by 2015.

2.4.10.2 Objectives of the New York Millennium Conference

The New York Millennium Summit stated numerous objectives for this study, some of which include encouraging development by improving social and economic conditions in the world's poorest countries; increasing basic standards of living as well as improving nutrition, health care and education. In the interpretation of these objectives for the study, it is important to note that a willingness to change one's lifestyle or pattern of consumption is essential but insufficient in itself to bring about social change (UNESCO, 1997: 43). It is also important to note that improving social and economic conditions and increase basic standards of living is a collaborative effort amongst nations. No single government or individual may successfully improve living conditions on its own.

2.4.10.3 Recommendations of the New York Millennium Conference

The Summit adopted eight Millennium Development Goals. The two most important Millennium Development Goals relevant to this study are Goal 2 and Goal 7, highlighted in paragraphs to follow:

Goal 2: Achieve universal primary education:
It is envisaged that by 2015 all children, both girls and boys will be able to complete a full course of primary schooling. This means that attendance in primary education should be compulsory to all schools. For example, education from grade R to grade nine or 15 years of age is compulsory in South Africa. If all children are educated or literate, it is likely that they will be environmentally literate. It is essential to educate youth within a framework of sustainable development to overcome the inequities that perpetuate wide spread global misery (Asmal, 2002: 1).

Goal 7: Ensure environmental sustainability
Goal seven addresses 'sustainable development' which aims to meet the needs of the present without compromising the needs of the future generations. This goal promotes the management, conservation and preservation of the environment and natural resources. In order to achieve this goal each member state had to consider the integration of the principles of sustainable development into their countries' policies and programmes. Countries were also expected to reduce loss of biodiversity by 2010. They were also expected to half the proportion of population without sustainable access to safe drinking water and basic sanitation. (http://en.wikipedia.org/wiki/Millennium-Development-Goals, visited on 4 June 2011).

The above mentioned goals emphasise that governments in all countries should integrate the principles of sustainable developments into their policies and develop action plans for the implementation of these policies. In South Africa, for example, these principles are contained in the Reconstruction and Development Programme (1994), the Constitution of the Republic of South Africa (1996), the White Paper on Education and Training (1995), policy document for the General Education and Training (GET) band of formal education provisioning in South Africa (1997) and the National Environmental Management Act (1999) although these were all adopted before the 6-8 September 2000 New York conference. They are also included in the

Revised National Curriculum Statement of 2001. This is also reflected in the National Qualification Framework (NQF) which states 12 critical cross-field outcomes of which 3 refer to the environment. Critical outcomes 2, 6 and 7 provide for the opportunity through which policy on environmental education could be translated into practice (Le Roux and Maila, 2004: 2).

For the purpose of this study, understanding the Millennium Development Goals is a critical step in achieving sustainable living. The study attempts to focus on achieving sustainability among secondary learners by reinforcing continuous improvement of the school grounds. Schools have to develop their environmental policies and action plans for effective implementation of environmental education and education for sustainability. The issue of sustainability was further discussed at the Summit on Sustainable Development, to be discussed hereunder.

2.4.11 World Summit on Sustainable Development (WSSD 2002)

2.4.11.1 Background

The World Summit on Sustainable Development (WSSD) took place from 26 August to 4 September 2002 at the Sandton Convention Centre in Johannesburg, South Africa. It was attended by the heads of States and governments, National delegates, NGOs and business leaders from all over the world. The traditional division between Northern bloc and Southern bloc in key issues such as trade and development finance were evident. However negotiations on biodiversity were principally a North-South debate but for the first time there was agreement on issues of sustainable development.

2.4.11.2 Objectives of the WSSD Conference

The Summit sough a number of objectives to be achieved in this conference, however in this study the emphasis is on the one to reaffirm Governments commitments towards sustainable development, (WSSD, 2002:1). The WSSD insisted on each member state to reinvigorate political commitment to persue the principles of sustainable development. It also wanted to produce clear, unambiguous implementation plans which would enable the world to accomplish

the principles of the United Nations' Decade of Education for Sustainable Development. Shallcross and Wilkinson, (1994: v) state that young people may demonstrate a high degree of environmental awareness and positive environmental values, there is generally a failure for these perception and values to be reflected in their actions, even at a shallow environmental level.

2.4.11.3 Recommendations of the WSSD Conference

The Summit adopted the Johannesburg Declaration and also agreed upon the Implementation Plan of Sustainable Development Programme. The Summit also endorsed the establishment of the United Nations Decade of Education for Sustainable Development (DESD), 2005-2014, proposed by the Japanese Government and the Japanese Non- Governmental Organisations. The WSSD outlined four principles for achieving Sustainable Human Development, namely, recognition of challenge; collective responsibility; acting with determination; and the indivisibility of human (http://enwikipedia.org/wiki/johannesburg-Declaration, accessed 4 June 2011).

In the context of this study, these principles assist us recognise the challenges facing our environment. These principles call for individuals to accept the responsibility for their actions and take appropriate actions to solve, improve and preserve environment. Achieving sustainability is not an individual responsibility but a collective responsibility of individuals of all ages and of all levels of education. It is a collective responsibility even amongst governments; no government can solve its problems alone but needs the intervention of other countries.

The Summit did not make new commitments and innovative thinking. A lot could have been achieved for example, setting sustainable targets with firm timeframes. Governments failed to provide guidance from a sustainable development perspective on how the opportunities offered by globalisation could be maximised or how its challenges could be overcome (La Vina, Hoff and De Rose, 2002: ii).

However, it is disappointing to note that the Summit failed to reach the consensus on fundamental issues necessary to move the world towards sustainable development and to make

new commitments, goals and targets of achieving sustainable development. Most of the achievements reaffirmed existing efforts and approaches that are already incorporated into the UN Millennium Declaration Goals and other previous agreements.

Not only the above mentioned conferences had been held but several other important conferences and workshops had been held trying to interpret, respond to and implement recommendations and agreements reached in major conferences. This leads to the third World Summit on Sustainable Development referred to as Rio+20.

2.4.12 World Summit on Sustainable Development (WSSD) 2012

2.4.12.1 Background

This is the 3rd International Conference on Sustainable Development which was held in Rio de Janeiro, Brazil from 20 -22 June 2012. The Summit was a 20 year follow-up to the United Nations Conference on Environment and Development (UNCED) held in Rio de Janeiro in 1992 (refer to paragraph 2.4.7). It is also the 10th anniversary of the 2nd World Summit on Sustainable Development (WSSD) held in Johannesburg in 2002. This Summit is also referred to as "Rio+20" or "Rio Earth Summit, 2012". The Summit attracted 192 UN member States including 57 Heads of State and 31 Heads of Governments, private sector, NGO's and other groups. This was the biggest UN Conference ever and major step forward in achieving a sustainable future, "the future we want."

2.4.12.2 Objectives of the WSSD

The Summit formulated the following objectives:

- To renew and redirect global political commitment for sustainable development – economic growth, social improvement and environmental protection;
- Assessing the progress to date and remaining gaps in implementation of the outcomes of the major Summits on Sustainable Developments (2.4.7 and 2.4.11),
- Addressing new and emerging challenges (European Economic and Social Committee, Net 469, 2012: 3).

The WSSD sought to secure affirmation on commitments made at past Earth Summits and set the global environmental agenda by assessing progress towards the goals set forth in agenda 21 and implementation gaps therein, and discussing new and emerging issues. The Summit also focused on poverty eradication and sustainable development and an institutional framework for sustainable development (http://www.uncsd2012.org/index.php?page=view&type=13&nr=289 &menu=27#sthash.vjpN8yKs.dpuf, accessed 23 August 2013).

For the interpretation of the study commitments and will are essential for achieving sustainability. In order to live a sustainable life, each one must be willing and committed to changing one's lifestyle and adapt to new situations.

2.4.12.3 Recommendations of the WSSD

The Summit recommended that 'fundamental changes in the way societies consume and produce are indispensable for achieving global sustainable development" (http://en.wikipedia.org/wiki/United-Nations, Conference on Sustainable Development, accessed on 8 December 2012). This study supports the recommendation that seeks fundamental changes in the way societies interact with their environment. It is through education that societies would change their attitudes and live in a sustainable way, since the ultimate aim of education is the attainment of responsible attitude towards the environment and sustainable development. However, it is regrettable to note that the document produced in this Summit was also non-binding as this would further create some gaps in the implementation of sustainable development Programmes. A deal was made in Rio Summit (1992) that developed countries would financially assist developing countries to pay attention to sustainable agendas. However, developed countries failed to honour this obligation because they signed a non-binding document. The same mistake is repeated here, the document signed is not binding.

To conclude this section on historical development of environmental education, it is worth mentioning that this section provided an overview of international developments in the history of environmental education and promotion of sustainable living over the past years. It is important to note that Education for Sustainable Development is an evolving concept that has grown and developed in the years since the Stockholm conference in 1972. The Stockholm Declaration offered 24 principles to achieve environmental sustainability. Principle 19 stated

clearly the need for environmental education at all levels of education, that is, from primary school level to higher education in the university. The Intergovernmental Conference on Environmental Education is an unforgettable moment in the evolution of international sustainability. The Tbilisi Conference echoed the sentiments of the Stockholm Conference by stating that environmental should be provided to people of all ages all levels of academic aptitude and must be delivered in both formal and non-formal environments. The conference discussed the need for environmental education and the principles of environmental education (Wright, 2002: 107). Other Conferences, which dealt with the core aspects of sustainability included the following: Moscow (1987), Rio de Janeiro (1992), World Summit on Sustainable Development (2002) and Rio+20 (2012). Each major UN Summit also added to the conceptual framework of Education for Sustainable Living as it stressed the need for social and human development along with economic development and environmental concern; recognised the critical importance of sustainable livelihoods; sought to sustain the environment and natural resources on which all people depend and identified the role of education as critical to achieving sustainable goals (Fien, Schreuder, Stevenson and Tilbury, 2002: 14). All of these UN conferences and documents produced over the past decades have drawn attention to the critical role of environmental education and advanced the evolution of Education for Sustainable Development from an international perspective. Major global Conferences and workshops on the themes of environment, development and education have been reviewed. The aims, outcomes and recommendations or Declarations were highlighted to elucidate the development of Environmental education. It is, however, encouraging to note that most countries are realising the urgent need of promoting sustainable living in all communities. Most countries like South Africa, China, Japan, United Kingdom and many more are trying hard to implement these recommendations set during these Conference and are still seeking best ways of achieving these recommendations and what are the most successful ways of approaching environmental education in practice.

2.5 ENVIRONMENTAL EDUCATION PROMOTING SUSTAINABLE LIVING

In this section, literature regarding environmental education, sustainable living and sustainability issues is examined.

2.5.1 Environmental education (EE)

The concept of environmental education has evolved markedly over the course of the past few decades. The original focus was on the study of nature or the natural environment, including flora, fauna, soil and water. Its strategy was to develop an appreciation of nature and its aim was preservation (Enabling Environmental Education, 1999: 3). In the 1960s this goal changed to conservation and wise use of natural resources. The term environmental education gained popularity in the 1970s and was emphasised in the Belgrade Charter of 1975 and Tbilisi Principles of 1977. Environmental Education initiatives had been shaped by 1992 Rio conference and the Principles developed for the Non-Governmental Organisation Forum (NGOF) at UNCED.

The concept 'Environmental Education' (EE) is a concept which originated 40 years ago. Since then the concept of EE has been interpreted in a variety of different ways. In the 1960s and 1970s the focus on environmental education was largely on the transmission of knowledge and information, facts about environmental issues (education about) and experiences in nature (education in/through). Recently, environmental education includes, along with knowledge, facts and experiences, an orientation to action, that is, education for the environment. The universally acceptable definition was developed in 1971 by an International Union for Conservation of Nature (IUCN) where environmental education was defined as the 'process of recognizing values and clarifying concepts in order to develop skills and attitudes necessary to understand and appreciate the interrelatedness among people their culture and their biophysical surroundings. Environmental education also entails practice in decisions making and self-formulation of a code of behaviour about issues concerning environmental quality' (Falk, Heimlich and Foutz, 2009: 6). Janse van Rensburg and Lotz-Sizitka, (1998: 10) describe environmental education as a 'process which solves environmental issues and problems, prevents further environmental degradation and explores alternative ways of living sustainably'. They further described EE as process through which we might enable ourselves and future generations to respond to environmental issues in ways that may foster change towards sustainable community life in a healthy environment. On the other hand, Tselane and Mosidi, (1998: 18) view EE as a 'process or approach, which develops correct attitudes, values, behaviour and skills which will enable people to live in harmony with the natural resources and maintain a good quality of life considering that there are still generations to come'. Loubser

(2005: 36) elucidates this statement by describing what environmental educators regard as the essential elements of the concept, namely:

- The interrelatedness of people, their culture and their biophysical surroundings,
- That people hold values and attitudes, which inter alia, related to the environment and to behaviour towards the environment,
- That 'skills', including decision-making and the formulation of ethical standard, are an integral part of environmental education (Loubser, 2005: 36).

In the context of this study environmental education is taken as a process that seeks to develop awareness, knowledge, skills and positive behaviour towards the environment. The emphasis is on the action to be taken to maintain, solve, improve and restore the environment.

2.5.1.1 Education about the environment

Education ***about*** the environment is the most common form of environmental education. It refers to the knowledge and form of environmental education in which teaching of concepts that generate knowledge and understanding of the environment is maintained. Education about the environment has the purpose of developing knowledge and understanding about values and attitudes (Neal & Palmer, 1994:29). Education about the environment consists mainly of transmitting information. It regards a leaner as someone who needs to be filled up with values and attitudes. Methods associated with this form of environmental education include, show and tell, question and answer, and talk and chalk.

2.5.1.2 Education in or through the environment

Education ***in*** the environment uses learners' experiences in the environment as a medium for education and uses the environment as a resource for learning (Neal & Palmer, 1994: 19). They further state that education in/through the environment uses environment as a resource for the development of skills; for direct experience; enquiry and investigation. Education in/through the environment is a resource which enables the development of a great deal of knowledge and understanding as well as skills of investigation and communication (Neal & Palmer, 1994; 29). It also provides the learners with an appreciation of the environment through direct contact with

the environment. It leads to the development of skills which help in problem-solving and decision-making. This form of EE is effective, when it employs methods like experiential learning, fieldwork, habitat study and solitaire.

2.5.1.3 Education for the environment

Lebeloane, (1998: 38) views environmental education as the study of factors including the ecosystem, mental and physical health, cities and population pressures. It intends to promote among citizens, awareness and understanding of the environment, our relationship to it and the concern and responsible action necessary to assure our survival and to improve the quality of life. Fien cited in van Rooyen, (2006: 129) proposes the following as the essential element of education for the environment: Education for the environment…

1) Emphasises the development of a critical environmental consciousness based upon a holistic view of the environment as a totality of the interdependent relationship between natural and social systems; a historical perspective on current and future environmental issues; and study of the causes and effects of environmental problems, and alternative solutions to them, through an examination of (a) the relationships between ideology, economy and technology, and (b) the linkages between local, regional, national and global economies and governments.
2) Accentuates the development of problem-solving and critical thinking skills. This is achieved through a variety of interdisciplinary, practical learning experiences which focus on real-world problems and involve the study of a wide range of sources and types of information.
3) Stresses the development of an understanding, attitudes and skills of political literacy which promote participation in a variety of forms of social actions to help improve and maintain environmental quality.
4) Emphasises the development of an environmental ethic based upon sensitivity and concern for environmental quality.
5) Requires teaching strategies and methods that are consistent with its goals.

Education ***for*** the environment aims to engage learners in the exploration and resolution of environmental issues in order to foster the values of the new environmental paradigm. It also

promotes lifestyles that are compatible with the sustainable and equitable use of resources. Learners are actively involved in identifying, investigating and solving environmental problems and to improve their environment. Education for the environment is aimed at helping learners gain experience in applying their acquired awareness, knowledge, action skills and environmental ethics. Therefore, education for the environment seeks to engage pupils in the active resolution of environmental issues and questions (van Rooyen, 2006: 12). This means that environmental education seeks to develop the necessary knowledge, understanding, values, skills and commitment to allow people to be proactive in securing a healthy and properly functioning environment that is sustainable. Methods used in education for the environment approach include problem solving and issue-based methods.

A deduction which may be made from the preceding section is that 'environmental education' is a process that seeks to develop awareness, knowledge and understanding of concepts, values, skills, responsibly behaviour and commitment to solve and improve existing environmental problems. In the light of the above statement environmental education as stated in the Brundtland Commission, (1987) should be included in and should run throughout the other disciplines of the formal education curriculum at all levels - to foster a sense of responsibility, for the state of the environment and to teach learners how to monitor, protect and improve it. It should also be included and incorporated the formal and non-formal education curriculum for example in the adult basic education, in-service training and community -based projects, magazines, radio stations and televisions.

2.5.2 Sustainability for Sustainable Living

The concept of sustainability is complex and it goes far beyond sustainable development. Gadotti argues that sustainability is the dream of living well (Gadotti, 2010: 204). Gadotti further states that "sustainability is opposed to everything that suggest unbalanced, competition, conflict, greed, individualism, domination, destruction, expropriation and undue and unbalanced material acquisition, regarding change and social transformation of society or environment. So in the most generous and widest way, sustainability means a new egalitarian way, a free, fair, inclusive and solidarity way to get people together in order to build their social living world at the same time that they handle, manage or transform the natural sustainable environments where they live and on which they depend to live and be together" (Gadotti, 2010:

204). Sustainability is expressed as meeting present ecological, societal, and economical needs without compromising these factors for future generations. The concept 'sustainability' has been combined with other terms such as development, economy, societies, living, communities and use. For the purpose of this study the two important combinations will be 'sustainable development' and 'sustainable living.' Sustainable development has been defined and interpreted in diverse ways by different organisations and coalitions (Togo. & Lotz-Sisitka, 2013: 673). According to Fien, Schreuder, Stevenson & Tilbury (2002: 2) the term '**sustainable development'** was first given currency by the World Conservation Strategy (IUCN, UNEP, WWF 1980) and later reinforced by the Brundtland Report (World Commission on Environment and Development 1987). The Brundtland Report (1987), defined sustainable development as the development that meets the needs of the present without compromising the ability of future generations to meet their own needs. Such development thus aims to improve the quality of human life while living within our ecological means and carrying capacity. As such sustainable development conserves land, water, plant and animal, genetic resources, is environmentally non-degrading, economically viable and socially acceptable.

The concept of 'sustainable development' has been criticised as ambiguous and open to a wide range of interpretations many of which are contradictory (Le Roux, 2001:152). The confusion has been caused because sustainable development, sustainable growth and sustainable use have been used interchangeable as if their meanings were the same. '**Sustainable growth'** is a contradiction because nothing physical can grow indefinitely. 'Sustainable use' is applicable only to renewable resources (Le Roux, 2001:152). 'Sustainable development' according to Le Roux, (2001: 152), focuses on the needs of human beings and has been criticised by Loubser, (2005: 114) as being anthropocentric. He contends that all living organisms need to be saved and protected not only for our benefits or for our future generations but for their own survival. Sustainable development is used in this study to mean improving the quality of human life while living within the carrying capacity of supporting ecosystem. A '**sustainable economy**' is the product of sustainable development. It maintains its natural resource base. It can continue to develop by adapting and through improvements in knowledge, organization, technical efficiency and wisdom (Le Roux, 2001: 152).

Turner and O'Riadan cited in Huckle, (1991: 47) distinguish between sustainable growth and sustainable development in the following manner.

Table: 2.1: Sustainable growth & sustainable Development (Palmer, 1998: 92)

SUSTAINABLE GROWTH	SUSTAINABLE DEVELOPMENT
- techno centrist	- eco centrist
- essentially a technical concept	- a broader concept embracing ethical norms
- bound by formalistic rules of existing institutions	- requires new institutions to deliver
- social reform	- social revolution
- conservation of several goals within an overall materials policing including waste recycling/reduction	- conservation the sole basis for defining a criterion on which to judge policy/ alternative allocation of resources
- requires a modified economics	- requires a new economics
- 'the greening of capitalism'	- 'the greening of socialism'
- is managed and politically Ambiguous	- is politically treacherous such that it changes the status quo
- core is reforming social system to ensure reproduction of conditions of production	- core is changing social systems to ensure popular control of live hood or the conditions of production

It is important to note that the distinction between the two modes of sustainability is not clear and various intermediate positions are possible. The two modes of sustainability can be understood by first understanding the concepts of 'green capitalism' and 'green socialism'. The 'green' capitalism is associated with sustainable growth and the 'green' socialism with sustainable development (Huckle, 1991:49). The proponents of green capitalism and their allies in government are currently seeking sustainable growth via new products, technologies and institution (Huckle, 1991: 49). The green capitalists maintain that there is no inevitable conflict between profit and environmental excellence. They claim that they generate wealth with less energy and materials are generally cleaner, and so lay the foundation for future 'green growth' (Huckle, 1991:49). The 'green' capitalists hope that they will protect, improve and solve environmental problems through technological innovations such as biotechnology for example solar cookers. On the other hand, the 'green socialists' maintain that the 'green' capitalism cannot deliver sustainability with justice or equity. They further claim that sustainable development requires planned production for use rather than production for profit or exchange and ecological crisis therefore provides further justification for socialism (Huckle, 1991: 50). The theory and practice of sustainable development evolved in the South as a response to the

failures of conventional capitalist and socialist development (Ibid). Therefore, sustainable development is an alternative to both capitalists and socialists.

The concept **'sustainable living'** was developed in an effort to move away from the term sustainable development (IUCN, 1991). It was proposed that government, industry, families and individuals need to live by a new world ethics of sustainability (Fien, 1993a: 10). The ethics comprise eight core values that Fien, (1993a:11) places in two categories, namely, ecological sustainability (people and nature) and social justice (people and people). He categorises them as follows:

Table 2.2: A new world ethics of sustainability: Core Values (Adapted from Fien 1993)

ECOLOGICAL SUSTAINABILITY	SOCIAL JUSTICE
Interdependence;	Basic human need;
Biodiversity	Human Rights;
Living light on earth and	Participation and
Interspecies equity.	Intergenerational equity

These values are contested. Those who favour ecological sustainability criticise values associated with social justice as being anthropocentric (see above). Those who take up ecosocialist positions emphasise issues related to social justice (Loubser, 2005: 115). It must be emphasised that both categories are equally important and should not be perceived as a separate category, but must be viewed as a whole. For the purpose of this study a holistic approach is adopted in viewing ecological sustainability and social justice. Sustainably living must be the new pattern for all- children or adults and educated or non-educated. Fien, Schreuder, Stevenson & Tilbury, (2002: 4) define sustainable living as a kind of development that provides real improvements in the quality of human life and at the same time conserves the vitality and diversity of the Earth. The goal is development that meets these needs in a sustainable way. Living sustainably depends on a duty to seek harmony with other people and with nature. The guiding rules are that people must share with each other and care for the earth. The emphasis on that human must take no more from nature than nature can replenish. This is turn means adopting lifestyles and development paths that respect and work within natures limits (Fien *et a*l., 2002: 4). Therefore, 'sustainable living' can be described as living within the optimum carrying capacities defined by present ecological, societal and economic factors. It is

a lifestyle that attempts to reduce an individual's or society's use of the earth's natural resources and his or her own resources. "Practitioners of sustainable living often attempt to reduce their carbon footprint by altering methods of transportation, energy consumption and diet.

Proponents of sustainable living aim to conduct their lives in manners that are consistent with sustainability, in natural balance and respectful of humanity's symbiotic relationship with the earth's natural ecology and cycles" (http://en.wikipedia.org/wiki/Sustainable living), accessed on 21 May 2011. Sustainable living should be the priority of all individuals and communities at all levels- local, national and international level. That is, all individuals must strive to live in a sustainable way and use their resources in a manner that will not jeopardise the lives of the future generations. This could be achieved by the introduction of a 'lifelong learning' process called education for sustainability.

2.5.3 Education for Sustainability (Efs)

The concept 'education for sustainability (EFS)' means a lifelong learning process that leads to an informed and involved citizenry having the creative problem- solving skills, scientific and social literacy, and commitment to engage in responsible individuals and cooperative actions (Enabling Environmental Education, 1999: 5). These actions will help ensure an environmentally sound and economically prospective future. Education aims to improve the quality of life for the present as well as future generations. It also encourages individuals and communities to take action solving and improving environmental problems. The concept 'education for sustainability' has evolved from environmental education and it does not endevour to change the name of environmental education. Education for sustainability complements a number of other fields such as environmental education, global education, economics education, development education, multicultural education, conservation education and others.

Fien, (1995: 26), Cheah, Khar Thoe, Sarmiento, and Wahyudi (2006: 2) argue that education for sustainability is a process which increases people's awareness of the economic, political, social, cultural, technological and environmental forces which foster or impede sustainable development. It also assists with the development of people's awareness, competence, attitudes and values, enabling them to be effectively involved in sustainable development at local,

national, and international level, towards more equitable or sustainable future. Fien cited in Cheah *et al,* (2006: 2) states that 'education is critical for promoting sustainable development and improving the capacity of the people to address environ-goals in the light of contemporary thinking on the role of environmental education in promoting a sustainable environment.' Therefore, it is assumed that education for sustainability is intended to foster awareness, knowledge, attitudes, values, skills and motivation needed for sustainable future.

For the purpose of this study education for sustainability is 'approached as the process which enables understanding of ecological sustainability and economical sustainability. It instills love, enthusiasm and commitment to address environmental issues, alleviate poverty and improve the quality of life in general.' Education for sustainability is a lifelong, interdisciplinary, and participatory approach which fosters awareness of environmental issues as they occur at local, national and international levels (Fien in Chea et al, 2006: 2). This is a clear indication that education for sustainability is a continuous learning process aimed at improving and uplifting the standard of living now and in the future. It is designed to motivate, equip, and involve individuals and groups in reflecting on how they currently live and work, in making informed decisions and creating ways to work towards a more sustainable world (Ogunyemi, 2005: 95). It encompassing a vision of education that seeks to empower people of all ages to assume responsibility for creating a sustainable livelihood. Sustainability also seek to promote stewardship of the environment, encouraging everyone to assume the responsibility of being a custodian for the environment. Schools have to transform their thinking and their immediate environment and create a sustainable livelihood for themselves and for the broader community.

2.5.4 Principles of Education for Sustainability

The Australian Government, Common Wealth, (2009: 9) in a document called Living Sustainably outlines the following principles of education for sustainability.

Transformation and Change

Education for sustainability is not simple about providing information but involves equipping people with the skills, capacity and motivation to plan and manage change towards

sustainability within an organisation, industry, (school) or community (Australian Government, 2009: 9).

Education for all and lifelong learning

Education for sustainability is driven by a broad understanding of education and learning that includes people of all ages and backgrounds and at all stages of life and takes place within all possible learning spaces, formal and informal, in schools, work places, home and communities (Australian Government, 2009: 9).

System thinking

Education for sustainability aims to equip people to understand connections between environment, economic, social and political systems (Australian Government, 2009: 9).

Envisioning a better future

Education for sustainability engages people in developing a shared vision for sustainable future (Australian Government, 2009: 9).

Participation

Education for sustainability recognises participation as critical for engaging groups and individuals in sustainability (Australian Government, 2009: 9).

Critical thinking and reflection

Education for sustainability values the capacity of individuals and groups to reflect on personal experience and world views and challenge accepted of interpreting and engaging with the world (Australian Government, 2009: 9).

Partnership for change

Education for sustainability focuses on the use of genuine partnerships to build networks and relations, and improve communication between different sectors of society (Australian Government, 2009: 9).

2.6 LITERACY, ENVIRONMENTAL LITERACY & ACTIVE CITIZENSHIP

2.6.1 Literacy

One needs to first explain the concept "literacy" before attempting to define environmental literacy. According to Roth, (1992: 12) the concept 'literacy 'has evolved over the last century. Originally, it referred to the ability to read and write. In recent years it has evolved to include the concepts of internalising information in order to make daily decisions based on real-life experiences and relates to notions such as adult literacy, visual literacy computer literacy and cultural literacy (EETAP, 1967: 1). Roth further contends that some dictionaries generally give only two definitions of literacy: (1) able to read and write and (2) well educated, having or showing extensive knowledge, learning or culture.

It is essentially from the second definition of the term that the extended scope of the term has been created (Roth, 1992:12). UNESCO, (2002: 4) extends Roth's definition as follows: Literacy is more than the ability to read, write and do arithmetic. It comprises other skills needed for an individual's full autonomy and capacity to function effectively in a given society. It can range from reading instructions for fertilizers or medical prescriptions, knowing which bus to catch, keeping account for a small business or operating a computer. Cardwell, (2005: 117) avers that literacy is the continuous acquisition of knowledge, understanding and skills that allow individuals to participate in decisions of contemporary issues, gather valid information when needed and make informed personal and public decisions. In these definitions literacy is perceived as a particular way of thinking, acting and valuing the environment. It is clear that literacy is not about reading and writing but is rather about the way we think, perceive and interact with the environment.

Literacy has been discussed in this study, because a literate person displays the qualities of a responsible citizen who is knowledgeable, skillful and possesses pro-environmental behaviour and,

- Has a sense of place and understanding of the distribution of resources in space
- Has a sense of time and understanding that all events have a history and consequences,
- Has an understanding of the fact that humans are social beings,
- Has skills to interact individually and cooperatively to achieve social and political goals, and
- Has skills to derive goods and services from the environment to meet basic needs and desires (Roth, 1992:16).

These qualities are also relevant to environmental literate person. Environmental literacy has emerged as one of many other important literacies for example computer literacy, adult literacy and cultural literacy. Environmental literacy will be discussed in the section to follow.

2.6.2 Environmental Literacy

The term 'environmental literacy' has been used since the late 1960s. It however continues to lack a precise definition (Disinger & Roth, 1992: 1). Chowdhury, (2010: 3) concurs with this statement by stating that there is no universally acceptable definition of the term even after 40 years. Numerous authors have contributed in the body of knowledge of environmental literacy and define it as follows. Roth, (1992: 17) defines environmental literacy as the capacity to perceive and interpret the relative health of environmental systems and to take appropriate action to maintain, restore, or improve the health of those systems. He is also of the opinion that environmental literacy should be defined in terms of observable behaviour. That is, people should be able to demonstrate in some observable form what they have learned – their knowledge of key concepts, skills acquired, disposition toward issues, and the like. Dashefsky, (1993) in Daudi, (2008: 79) defined environmental literacy as referring to the basic level of understanding an individual should possess to make intelligent about managing the natural environment. The present author agrees with Dashefsky, (1993) when he says that being environmentally literate means that one is not only interested in understanding environmental problems but is also willing to help resolve them in a responsible way. This means that learning

about the environment is not sufficient; it must be complemented with learning for the environment.

Chacko, Loubser and Swanepoel, (2002: 282) echoed Roth, (1992) and Dashefsky, (1993) by defining environmental literacy as the ability to be aware of one's environment. They further define it as something that enriches one with the knowledge to realise the imbalances and threats the environment faces and enable one to form positive attitudes toward it with the aim of developing skills to resolve and prevent environmental problems and urge to protect and improve the environment for the present and future generations by active participation. On the other side Joseph, (2005: 3) states that environmental literacy is the capability for the contextual and detailed understanding of an environmental problem in order to enable analysis, evaluation, and ultimate sound and informed decisions making at citizen's level. This means that environmental literate citizens have the knowledge, tools and sensitivity to properly address an environmental problem in their professional capacity and to routinely include the environment as one of the considerations in their work and daily living.

For the purpose of this study the researcher agrees with Elder, (2003: 14 – 15) when he defines environmental literacy as an individual's capacity to understand broadly how people and society relate to each other and to natural systems, and how they might do so sustainably; and to act in those insights in daily life. He also asserts that environmentally literate citizenry is an overarching aim of environmental education. It is clear from all these definitions that the two major tenets of being environmentally literate are the ability to understand environmental problems and to address those problems in a responsible manner. In reviewing various definitions of environmental literacy, it can be deduced that environmental literacy is in accordance with the five categories of goals and objectives of environmental education namely awareness, knowledge, attitude, skills and participation. According to Roth, (1992: 17), Disinger and Roth, (1992: 166-167), Chacko, *et al*. (2001: 319) and Chacko, *et al.*, (2002: 282) environmental literacy is regarded as a continuum of competencies ranging from no (zero) competency to very high competency that can be functionally divided into three working levels-nominal, functional and operational environmental literacy. These competencies are briefly explained in sections to follow.

2.6.2.1 Nominal environmental literacy

Nominal level indicates the ability to recognise many of the basic terms used in communicating about the environment and to provide rough, if unsophisticated, working definitions of their meanings. Persons at the nominal level are developing an awareness and sensitivity towards the environment along with an attitude of respect for natural systems and concerned for the nature and magnitude of human impacts on them (Chacko, *et al*., 2001:319).

2.6.2.2 Functional environmental literacy

The functional level indicates a broader knowledge and understanding of the nature and interactions between human and social systems and other natural systems. People at this level are aware and concerned about the negative interaction between these systems in terms of at least one or more issues and have developed the skills to analyse, synthesise and evaluate information about them using primary and secondary sources (Chacko 2000: 44, Chacko, *et al*., 2001: 319). They evaluate selected problems on the basis of sound evidence, personal values and ethics. They communicate their findings and feelings to others. Functional environmental literacy implies narrowly focused issue application in matters affecting the environment (Chacko 2000: 44 and Chacko et. 2001: 319). Effective action on environmental issues cannot be fully taken at this level and it requires the operational level.

2.6.2.3 Operational environmental literacy

The operational level is the progress beyond functional literacy in both the breadth and depth of understandings and skills which routinely evaluate the impacts and consequences of actions; gathering and synthesising pertinent information, choosing among alternatives and advocating action positions and taking actions that work to sustain or enhance a healthy environment (Chacko *et al.* 2001:319). Operational environmental literacy implies broad application in daily life. Environmentally literate citizen is thought as someone in highest level of competency that is the operational level. The person is able to make informed decisions and take appropriate actions to solve any environmental issue. Environmentally illiterate citizen can be regarded as someone with the lowest or zero level of competency that is nominal level.

The researcher adopts the definitions of the three levels of environmental literacy as discussed by Chacko et al. (2001: 319).

- Nominal environmental literacy which indicates the ability to recognise many of the basic terms used in communicating about the environment and to provide their meanings.
- Functional environmental literacy indicating a broader knowledge and understanding of the nature and interaction between human social systems and other natural systems.
- Operational environmental literacy indicating the progress beyond functional literacy in both the breadth and depth of understandings and skills. It entails learners, educators and non-educators at school taking actions to resolve environmental issues.

2.6.3 Environmental literate citizen

Chacko, Loubser and Swanepoel, (2001: 318) describe the environmentally literate citizen as someone who:

- Has a sound knowledge about environment;
- Is able to understand, appreciate and enjoy the world, to make personal choices, to contribute to his local environment and effectively care for the planet and work to improve it;
- Is aware of the environment and its resources, has some understanding of renewable resources, has feelings for the interrelationship in nature;
- Is sensitive towards environmental problems;
- Has positive attitudes and values toward environment;
- Gathers information as environmental problems arise;
- Investigates environmental issues, finds solutions to basic environmental problems;
- Explores ethical issues involved in environmental protection and management.

For the purpose of this study an environmentally literate citizen can be described as someone who has full understanding of the environment with its problems and who is willing to take action in favour of the environment. This indicates that environmental literate citizen possesses

knowledge, affection, skills and willingness to participate in maintaining, improving and solving environmental problems. Moseley (2000) cited in Wood-Arendt, (2003: 1) states that the goal of environmental literacy is the acquisition of life-sustaining, responsible environmental action skills. This means that environmental literacy seeks to change human behaviour so that humanity can create a sustainable and environmental friendly quality of life. However people need a wide range of skills that can help them understand, assess and use environmental health information (Environmental Health Perspective, 2007: 496).

The level of environmental literacy of a person is not the same for every individual. People are at different levels of environmental literacy. Some are totally ignorant or unaware and others have deep, thorough understanding and concern. The level of environmental literacy of a person may be shaped by a number of aspects namely, the personal learning process of that person and by the socio-economic, political, cultural, historical and ecological circumstances which surrounds that person (Chowdhury, 2010: 3) He also contends that in addition to the personal learning process, individual attributes for example age and intelligence, also determines the level of environmental literacy. The level of environmental literacy can be determined by observable behaviour (Roth, 1992: 15; Chacko, Loubser and Swanepoel, 2001: 319). Environmental literacy must never stop, and it has to be promoted and encouraged at all levels and sectors. People must be assisted to progress from the lowest level (nominal level) to the highest level (operational level) of environmental literacy.

2.7 EDUCATION PROMOTING SUSTAINABLE LIVING

Education for Sustainable Development has come to be seen as process of learning how to make decisions that consider the long-term future for the economy, ecology and equality of all communities. Building capacity for such future-oriented thinking is a key task of education (http://www.sustainability_edu.au.about_sustainable, accessed, 12 December 2015). Promoting sustainable living in school requires that individuals have the knowledge, skills, values, capacity and motivation to respond to the complex sustainability issues they encounter in their daily lives. Promotion of sustainable living entails a learning and change process to people, communities and organisations. Its aim is to engage leaners in thinking critical and creatively about the future as well as considering the system changes that are needed to improve the quality of life across the globe (UNESCO, 2002: 9). Education for Sustainable Living aims

at tackling the underlying causes of unsustainable trends. It implies providing information, raising awareness and building individual capacity and motivation to innovate and implement solutions. EFS focuses on building capacity to re-orient the way people live and work makes it an essential element in shifting towards sustainability (Australian Government, 2009: 10). Education not only informs people, it transforms them. This implies that education is the primary agent of transformation towards sustainable living. The new vision of education will help learners better understand the world in which they live, addressing the complexity and interconnectedness of problems such as poverty, wasteful consumption, environmental degradation, population growth, gender inequality and violation of human rights that threatens our future (UNESCO, 2002: 10).

2.8 CREATING SUSTAINABLE SCHOOLS

A holistic approach to decision-making is required for a school to be sustainable. The starting point is the development of the vision for the school in terms of sustainability. Envisioning a better future creates a link between where we are now and where we want to be in the future. Most schools, presently are living in a way that is unsuitable however, some are working towards sustainable way of living especially the Eco-Schools. Sustainable schools should possess the following attitudes, behaviour and values:

- Integrating environmental, social and economic goals in policies and activities;
- Recognizing local and international dimensions;
- Appropriately value, appreciating and restoring nature;
- Conserving biodiversity and restoring nature;
- Commit to basic practices and
- Commit to continuous improvement (UNESCO, 2002: 9,).

Sustainable schools must promote and uphold the four inter-related principles of sustainable living as contemplated by UNESCO (2002).

- Conservation- to ensure that natural systems can continue to provide life support systems for all living things, including the resources that sustain the economy system;

- Peace and equity- to encourage people to live cooperatively and in harmony with each other and have their basic needs satisfied in a fair and equitable way;
- Appropriate development- to ensure that people can support themselves in a long-term;
- Democracy - ensures that people have a fair and equal say over how natural, social and economic systems should be managed (Fien, 2001: 5; UNESCO, 2002: 9).

For a school to turn to be a sustainable school, it must foster a new way of living, that is, sustainable living, and alter learners' behaviour from contemporary, unsustainable ways to the new and more responsible behavioural patterns. It is believed that educational programmes are effective in promoting such a change, they develop competences (knowledge, skills, attitude, and values) important for behavioural change and "so they will bring positive environmental outcomes in the future" https://www.rwlnetwork.org/media/67161/ proenvironmental_ behavior_models.pdf, accessed 29 January 2015. In order to succeed in fostering this behavioural change, educators need to:

- Plan an ethic for living sustainably based upon principles of social justice, peace and ecological integrity at the centre of the society concern
- Encourage a meeting of discipline, a linking of knowledge and expertise to create understanding that are more integrated and contextualized;
- Encourage life-long learning- starting at the beginning of life and grounded in life that is based on a passion for a traditional transformation of the moral character of society;
- Value aesthetic, the creative use of the imagination, an openness to risk and flexibility and a willingness to explore new options;
- Encourage commitment to the value for peace in such a way as to promote the creation of a new life styles and living patterns (UNESCO, 2002: 10-11).

Sustainable Schools develop and use sustainability programmes effectively to tap into learners' energy and creativity to address complex issues while giving a deeper meaning imperative to the demands of curriculum and assessment. Sustainability programmes are put into action through investigations of local issues and needs and engage learners in both academics and the world around them. Learners whose learning is connected to the real world problems and solutions will understand and care for the complex systems of life that support them and sustain their communities and the planet. While integrating sustainable programmes into curriculum,

educators can help learners reach a deeper understanding of the knowledge and skills necessary to be of real service to their schools and communities.

Sustainable school is a school which lives in accordance with the principles of sustainability. Sustainable school tries to reduce environmental impacts by preparing young children for a life time of sustainable living through its teaching and day-to-day operational practices. Sustainable school thrives to live and work towards producing high quality results without compromising the future generations. The school community has to realise that they need to adjust their lifestyles and habits to ensure that they take the very best care of their school and its resources (International Institute for Sustainable Development, 2011: 13). A sustainable school provide its learners and staff with concrete opportunities contribute to sustainable living while demonstrating good practices to other stakeholders (International Institute for Sustainable Development, 2011: 13).

2.9 MEASURING ENVIRONMENTAL SUSTAINABILITY

With the rising public awareness of the need to live a sustainable life, governments and business are under increasing pressure to minimise their environmental footprint and promote sustainable development (ISO 14001, 2011: 2). Attempts have been made to develop instruments to help organisations identify, manage and control the activities that have an environmental impact. These popular instruments include Sustainable School Indicators (SSI), Environmental Management system (EMS)-ISO 14001, Sustainable Reporting (SR), Environmental Audit (EA) and Environmental Footprint (EF). The study embraces Sustainable School Indicators and Environmental Management System. The study will discuss sustainable school indicators and environmental management system in detail.

2.9.1 Indicators of sustainability

Having discussed sustainability, education for sustainability and Sustainable Schools however, the question remains: How would a person know, whether one is pursuing a sustainable livehood? Many researchers have suggested various types of non-monetary measures to indicate to what extent environmental states and function, material flows, or societal activities can be regarded as sustainable (Azar, Holmberg and Lindgren, 1996: 89). Indicators may be

considered as the starting point for reflection. Reid, Nickel, and Scott, (2006: 22) state that indicators are becoming one of the most commonly applied and promoted evaluation strategies in sustainable development (SD) and education for sustainable development (ESD). An indicator may be defined as "something that helps one understand where he is, which way he is going to and how far he is from, where he wants to be. Its purpose is to show how well a system is working" (http://www.sustainablemeasures.com/node/92), accessed 20 August 2015). An indicator helps to determine the nature and the extent of a problem as well as the direction to follow in addressing such problem. "Sustainability indicator is about measuring our stock of social and human, natural and economic and capital and ensuring that the resources inherited by the future generations allow for the same or greater levels of well-being enjoyed by [all] today." (http://www.environment.gov.au/topics/sustainable-communities/measuring-sustainability/sustainability-indicators, accessed, 20 August 2015). Mogensen and Schnack, (2010: 69) argue that "Indicators must not be seen as a mechanism that aims to prescribe and test the 'correct' content (knowledge, skills and values in ESD, but rather be formed in ways that stimulate and qualify students to become future citizens, who can make sound judgement, thinking critically and independently, and who can and will play an active role" in solving environmental problems and improving environment. The literature reveals a variety of indicators (Mogensen and Mayer, (2005); Loubser, (2005); Australian Government, (2009); Reid, Nikel and Scott (2006); Kalaitzidis, (2010) and Australian Government, (2009), that can be categorised into three domains, namely the economic domain, the social and the environmental domain.

Many countries (like United Kingdom, Sweden and Australia) have adopted the "Sustainable School Programme" as a policy goal. Sustainable schools make use of "Sustainable Indicators" to evaluate and identify areas for improvement in key areas of ESD. Reid et al. (2006: 18) note that Sustainable Development indicators describe the actual state and future trends in relation to sustainability. Kalaitzidis, (2010) identifies three categories of sustainable school indicators, namely, pedagogical indicators, social and organizational indicators and environmental-economic-technical indicators.

In the current study, the following sustainable living indicators which served as a frame of reference and elements of environmental education programme, initiated for this study, were developed in consultation with the participants.

Table: 2.3 Sustainable Living Indicators (Designed for the Study)

THEME	SUSTAINABILITY INDICATORS
1. Environmental awareness	• Is aware of its surroundings and takes the responsibility to protect and improve it. • Keeps the school and local community informed of their local and regional issues. • Raises awareness amongst educators, learners and no-educators of monthly water/energy consumption by publishing monthly consumption statistics and their bills.
2. Sustainable use of transport	Sustainable school …. • Encourage walking or cycling to and from school • Encourage travelling by group transport/ car pool or public transport, • Improve the health and fitness of educators, learners and administrative staff through promotion of walking and cycling
3. Sustainable use of water	Sustainable school… • Uses water wisely and sparingly, • Harvests rain water • Repairs leaking taps as immediately observed.
4. Sustainable use of energy	Sustainable school … • Switches off lights during the day especially when there is no one in the room or when leaving the room • Switches off computers when leaving the room, • Reduces the kilowatt hours used per annum.
5. Waste management	Sustainable school ... • Is actively involved in recycling paper, plastic, cans, organic food, toners and inks. • Places collecting bins in all corners of the school. • Uses own drinking cups for drinking water
6. Greening the School grounds	Sustainable school … • uses school ground as centre piece for teaching and learning, • school grounds contain local indigenous vegetation • Increased the variety of habitats in the school ground.
7. Sustainable Purchasing and consumption	Sustainable school … • Purchases environmental friendly, ozone friendly, less packaged and local products. • The school also determine the items to be sold in the school tuck-shop and published them in the purchasing policy or environmental education policy. • Reduces school expenditure.
8. Displays environmental behaviour and positive attitude	Sustainable school … • Is committed to respecting, loving and caring for biodiversity.

2.9.2 Environmental Management System (EMS)

Barrow (2006:201) describes EMS as a management tool designed to help an organization or institution improve its awareness of and control over environmental impacts. Obasi and Ogwuche (2015: 3) add that EMS tool works by creating internal rules and organisational structures and importantly, by fostering new behavioural norms within an organisation (school). According to the Waste Water Handbook (2004: 10) EMS is a set of management process and procedures that allows an organisation to analyse, control and reduce the environmental impact of its activities, products and activities and operate with greater efficiency and control. EMS encourages an organisation to continuously improve its environmental performance.
The study adopts a repeating cyclic environmental management systems.

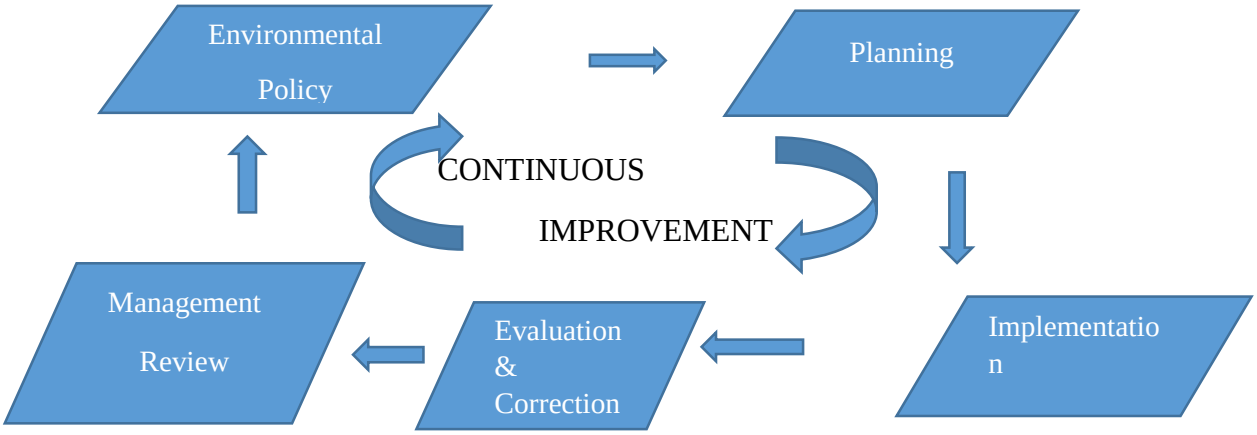

Fig. 2.1. The Continuous Improvement Plan, (with modifications), Barrow (2006: 199, Fig. 8.2)

An Environmental Management System (EMS) includes defining roles and responsibilities of each member of the committee, class and educator. It also involves the identification and prioritisation of environmental impacts and setting out measurable objectives and targets to be achieved. Identified and prioritised activities are implemented, monitored and measured the progress in order to ensure continual improvement (Barrow, 2006: 199).

The school has to first develop and commits to an environmental policy, then uses its policy as a basis for establishing a plan. In the plan, objectives and targets for improving environmental performance are formulated. The school then evaluates its environmental performance to establish whether objectives and targets were met. Should the objective not met, corrective

measures are to be taken. The School Management Team (SMT) revisit the environmental policy and a new set of objects and targets are formulated. The revised plan is then implemented. According to Barrow (2006), and Raath, Stone and Van Heerden, (2009) EMS benefits the school by 'providing insight into the impact of the school on the environment, show how the school can reduce its impact on the environment and maximise the efficient use of resources such as water, paper, ink and toner. It helps reduce school expenditure and create behavioural changes in the culture of the school. EMS also build awareness of environmental concern', among educators, non-educators and learners, (Raath, Stone and Van Heerden, 2009: 3).

2.9.3 Models for Environmental Management Systems (EMS)

There are more than one model or conceptual framework for an EMS. The most commonly used models are ISO14001 and EMAS international standards. According to Van Rooyen and Naidoo (2008: 743-744) and Clarke and Kouri (2009: 975), the ISO 14001 standard and EMAS are the most popular frameworks used to assist organisations manage environmental performance. Both are crafted from a continuous improvement philosophy based on Deming cycle (Plan-Do-Check-Act).

2.9.4 ISO 14001 Standard

ISO 14001 is an International voluntary environmental management system standard which was approved internationally by representatives of industry, trade associations, governments and nongovernmental organisations (NGOs) in October 1996 (Kolk 2000: 114). It is part of the ISO 14000 series which covers standards in the field of environmental management tools and systems (Lebeloane, 2004: 14). The ISO 14001:2004 standard comprises of a set of environmental management requirements for Environmental Management System (EMS). The ISO 14001:2004: an effective environmental management system which provides an organisation's top management with a roadmap which allows them to manage environmental issues effectively by prevention and identification areas for cost savings in energy consumption, raw material usage and waste disposal (ISO 14001, 2004: 3). The model is designed to help systematically identify, control and monitor environmental issues as they occur. Its purpose is to help all kinds of organisations (like schools and companies) to protect

the environment, prevent pollution and improve their overall environmental performance. The ISO 14001 fosters environmental responsible behaviour and thereby promoting sustainable living within the school or organisation. It enables the schools or organisations to utilise and manage its resources sustainable, preventing and improving any environmental impact.

2.9.5 Eco-Management and Audit Scheme (EMAS)

EMAS is a voluntary instrument that acknowledges organisations that improve their environmental performance on a continuous basis. It aims at promoting continuous environmental performance, improvements in industrial activities and encouraging the adoption of policies, programmes and management systems, the auditing of such systems and the provision of information to the public (Hillary, 1995: 294). It represents an effective tool in improving the organisation environmental performance and only, as a consequence, its competitiveness. The main aim of EMAS is to 'recognise and reward organisations that go beyond minimum legal compliance and continuously improve their environmental performances' (Barrow, 2006: 194). It calls for maintenance of an effective environmental management system which ensures that environmental policy is available, objectives, targets and programmes are set to improve environmental performance and the promulgation of such to ensure continuous improvement as whole. Thereby encouraging organisations to adopt a proactive approach to environmental management and to improve their performance (Barrow, 2006: 194).

2.10 EMS IN THE SCHOOL CONTEXT

EMS is a broad field at school, it is aimed at improving the quality of life of the school community by adopting the most sustainable procedures. It is a method for ensuring that an organization uses the fewest natural resources possible. According to Hens (2006: 2) schools are organisations that, like profit-driven organisations consumes resources and cause pollution. Fraser (2014: 9) agrees with Hans' idea by stating that 'a school impacts upon the environment with three of the key impacts being the litter it produces, the waste it generates and the energy it consume'. EMS can be of great assistance in managing these impacts within the school. EMS can help a school to plan, to take action and show how it can comply with regulations and management of its resources. EMS can be broadly defined as 'a decision-making process that

regulates the impact of human activities on the environment and it can significantly reduce waste and harmful impacts which is fundamental to the principle of sustainability' (Fraser, 2014: 9).

2.11 IMPLEMENTATION OF EMS IN SCHOOLS

The implementation of EMS not only influences the attitude of the learners towards the environment, but also impacts their social behaviour, since environment consciousness leads to a general societal accountable attitude (Hens, 2006: 2). School implementing EMS guarantee its sustainability. The starting point for EMS implementation is the appointment of Eco-Coordinator and selection of Eco-Team (willing staff members). EMS should integrate environmental management into the day to day operations of the school as well as strategic decisions by providing a systematic approach to managing its activities. The implementation of EMS in schools involves the whole school community and development of options for the optimal management of resources promoting sustainability by means of curriculum and management (Raath, Stones and Van Heerden, 2004: 6). It is a holistic and integrated way of addressing environmental problems within an organisation and can be a valuable 'tool to improve school environmental performance and promote sustainable learning' (Ferreira, Lopes and Morais, 2006: 974). The implementation of EMS in schools to ensure sustainable living involves the model adapted from the Waste Water Handbook (2004: 10-11), also see figure 2.1. All EMS are cyclical and interactive management processes designed to achieve continual environmental improvements (Barrow, 2006:4). The process of EMS is continuous, ongoing improvement with the cycle of objectives and targets set, checks are conducted and the results published.

2.12 SUMMARY

This chapter defined and clarified some important concepts of the study. Looking at these definitions it is clear that there has been a paradigm shift of environmental education from conservation to environmental education and to education for sustainable living. Prior to the 1960s the emphasis was on conservation and wise use of natural resources. This school of thought has gradually changed overtime and the attention has shifted to environmental literacy which is the major aim of environmental education. According to Disinger and Roth, (1992:

165) the creation of an environmentally literate citizenry is an important aim of environmental education. It is further noted that environmental literacy is a prerequisite to maintain and improve the quality of the environment. Therefore, the development and fostering of environmental literacy need to be a key objective of any general education programme (Roth 1992: 2). It is hoped that the present study will foster environmental literate characteristics to learners, educators and non-educators who will be able to make sound decisions to improve the quality of life and the quality of the environment.

CHAPTER 3
THE INFLUENCE OF PARADIGMS IN PROMOTING SUSTAINABLE LIVING

3.1 INTRODUCTION

This chapter focuses on the role played by paradigms in promoting sustainable living in secondary school learners. It unfolds, by defining the concept "paradigm" as perceived by different authors. There are numerous paradigms used to guide research, however, the study identifies four paradigms playing a pivotal role in the promotion of sustainable living, namely behaviourism, constructivism, social critical theory and positivism. These paradigms are selected because they are broad and encompass other paradigms and they are some of the most commonly used in social sciences and in education in general (Lebeloane, 1998: 69). Each paradigm is further discussed under the following sub-headings:

- introduction
- characteristic of a paradigm;
- Criticism of paradigm;
- implications of paradigms to the study;
- application of paradigm to the study and
- example of paradigm in practice.

Robottom and Hart, (1993: 51-52) posit that the appropriate form of environmental education research is the one which includes consideration of both human conscious and political action and thus can answer moral and social questions about education programmes. They add that, it is the one which is more consistent with the eco- philosophical view which encourages individuals to be autonomous, independent critical and creative thinkers. It also encourages people to take responsibility for their own actions and participating in the social and political reconstruction required to deal intelligently with social/ environmental issues within mutually interdependent and evolving social situation. Thus Fien, (2002: 147), adds that each of these identified paradigms has an appropriate role to play in educational research depending on the type of problem being investigated. For example, all three are used in environmental education research although the empirical-analytical paradigm has been the most dominant until recent years (Robottom and Hart in Fien, Schreuder, Stevenson & Tilbury, 2002: 147). However, in

recent years there has been a shift from behavioristic approaches which seek to change learners' behaviour through awareness and knowledge gaining to the one that asserts that knowledge is constructed through interactions in the social world. These new approaches promote critical thinking, problem-solving, development of metacognitive skills and information processing skills.

Paradigms are of paramount for any research study to be conducted. The current study strives to promote sustainable living by eliminating unsustainable lifestyles of youth and the community. Thus Schleicher, (1989) elaborates on the need for a new ecological ethic… an ecologically oriented value system based upon fundamental changes in human attitudes and actions towards ourselves and the environment (Fien, *et.al.* 2002: 8). The scope of such change in social values is linked to a particular paradigm one identifies with. This chapter also discusses the contribution of other researchers on the influence of paradigms to environmental education as well as sustainable living and concludes by briefly discussing evaluation research.

3.2 DEFINITION OF PARADIGM

Many authors such as Kuhn, (1970); Robottom (1990); Robottom & Hart (1993); Dill and Romiszowski, (1997), Lebeloane, (1998) Mertens, (2005); McGregor and Murnane, (2010); Denzin and Lincoln, (2013) to name a few have attempted to define the concept of paradigm. The concept 'paradigm' derives from the Greek word 'paradeigma', which means a pattern or a model of something (Sterling, 2003: 90). However, it was Kuhn (1962 and 1970) who made remarkable contributions to the concept of paradigm. The following are some of the definitions made by various authors:

Kuhn, (1970: 175) describes the concept 'paradigm' as a framework or constellation of beliefs, values and techniques shared by the members of a given community such as environmental education community and serves to define a proper way of asking questions, those puzzles that are defined as the tasks for research in normal science. The paradigm helps the members to identify problems which they see as important and also provide them with possible solutions. In interpreting Kuhn's definition of a paradigm, (1970) to environmental education, it could be stated that environmental education specialists (community) differ in their views about environmental education. Their different views are influenced about the paradigm they identify

themselves with. In environmental education a paradigm can be used to investigate environmental problems and to conduct research. Guba and Lincoln (1985) state that paradigm represent what we think about the world (but cannot prove). Our actions in the world, including the actions we take as enquirers, cannot occur without reference to those paradigms (as we think so we act). Whereas Van Manen, (1990: 27) describes the concept "paradigm" as comprising the fundamental assumptions about the general orientation to life, the view of knowledge and the sense of what it means to be human that direct particular modes of enquiry. Thus paradigm includes those theories about the nature of reality and knowledge, ways of discovering knowledge and making judgment about the validity and authenticity of findings. This definition gives an indication that a paradigm can be a framework people construct for looking more closely at environmental education and for doing research in environmental education.

Neuman, (2000: 81) refers to the concept "paradigm" as a general organising framework for theory and research that includes basic assumptions, key issues, models of quality research and methods for seeking answers. Neuman, (2000) concurs with van Manen, (1990) by defining the term "paradigm" as a framework people construct for conducting research to solve environmental issued identified by environmentalists in environmental education. Furthermore, McGregor and Murnane, (2010: 1) define the concept 'paradigm' as a set of assumptions, concepts, values and practices that constitutes a way of viewing reality for the community that shares them, especially in an intellectual discipline like environmental education. For the purpose of this study, 'paradigm' is defined as a set of assumptions, concepts and values shared by the members of the community in their quest for a sustainable livelihood.

3.3 BEHAVIOURISM PARADIGM

3.3.1 Introduction

Behaviourism focuses on the relationship between the actor (learner) and the surroundings (environment), thus emphasising the functional relationship between behaviour and changes in the environment (Ritzer, 2001:71). Behaviourists posit that human and animal behaviour can be explained in terms of external stimuli, responses, learned histories and reinforcement (Maree, 2013: 21). The behaviourist sought to change people's behaviour by making them aware of problems they are facing on daily basis. It is aimed at shaping human behaviour in a

particular desirable way through natural scientific methods (Hungerford and Volk, 1990: 12). According to this view, by observing peoples' behaviour one is able to formulate laws concerning such behaviour. This in turn enables people to predict and even control human behaviour (Loubser, 2005: 61)

3.3.2 The characteristics of behaviourism

Several authors discussed the characteristics of behaviourism starting back from its pioneers' Skinner Pavlov, Vygotsky and Thorndike, to current authors such as Ritzer, (2001), Le Roux, (2001), Sterling, (2003) and Maree, (2013).

- Behaviourism is characterised by a concern to 'fill up' people with information. Therefore, learners are often seen as 'empty 'vessels' to be filled through education, with experiences.
- It assumes that a learner is essentially passive, responding to environmental stimuli,
- It focuses on the functional relationship between behaviour and changes in the environment of the learner,
- Knowledge and awareness will lead to behaviour change,
- Behaviourism is concerned with observable behaviour and experience (Le Roux, 2001: 59).
- Behaviourism emphasises responsible environmental behaviour the nature of which is often determined by 'experts' (Sterling, 2003: 315).
- Behaviourists argue for integrative, i.e. corrective behaviour in the system to fit with larger systems (this may be in the family, in the classroom or in the environment, on integration into systems of belief, for example (Sterling, 2003: 331).
- Behaviourists posit that humans and animals behaviour can be explained in terms of external stimuli, responses, learned histories and reinforcement (Maree, 2013: 21). This explains that all human behaviour can, therefore, be understood in terms of cause and effect.

These characteristics will further be explained in the implications of behaviourism paradigm for sustainable living.

3.3.3 Criticism of behaviourism paradigm

Those who are not in favour of behaviourism argue that behaviourism:

- Has a short view of the learner;
- Educator is seen as remedial of ignorance and thereby also of ecological 'ills';
- Focuses on the individual and gives insufficient weight to social and economic conditions and forces which constrain action and to the possibility of social learning (Sterling, 2003: 315);

The dominant deficiency of behaviourist approach is that it does not encourage critical and systematic thinking required by environmentally responsible citizenry. Rather it seeks to integrate the individual into a deterministic pattern of thought or behaviour deemed desirable by the environmentalists (adapted from Sterling, 2003: 315; Loubser, 2005: 62).

3.3.4 Implications of behaviourism paradigm to the study

The aim of this study is to assess the role of environmental education in promoting sustainable living in secondary schools in uMkhanyakude District, whereas environmental education in terms of behaviourist approach emphasises:

- The development of environmentally responsible behaviour and active citizens, who live in harmony with one another and their surroundings.
- Environmentally responsible behaviour which leads to sustainable living,
- Helping learners become environmentally knowledgeable, skilled and dedicated citizens who are willing to work individually or collectively towards achieving and maintaining a dynamic equilibrium between- the quality of life and the quality of the environment (Loubser, 2005: 62) which is the cornerstone of sustainable living.

The study seeks to help learners become environmentally knowledgeable, skilled and dedicated to the total improvement of environment. Behaviourism is the best approach in cascading and delivering environmental awareness programmes in schools and communities. It is essential for the acquisition of skills and knowledge to identify, investigate and contribute to the resolution

of environmental issues and problems. It aims at changing peoples' unsustainable behaviour to a more sustainable ones. Behaviourist approach assumes that additional knowledge and awareness would on their own and immediately, change people's behaviour and that environmental problems would, therefore, be addressed and overcome (Loubser, 2005: 60). Hungerford and Volk, (1990: 18), contends that the real challenge of making a change in learner behaviour lies in willingness to do things differently than the way they did in the past. They argue that increased knowledge about the environment and its associated issues lead to favourable attitudes which in turn lead to action promoting better environmental quality.

'Behaviourists have developed an impressive array of technologies aimed at changing people's behaviour. These include stimulus control, contingency management, and provision of feedback, legislation and pricing' (Sattmann-Frese and Hill, 2008: 68). They describe stimulus control as an 'antecedent strategy focusing on stimuli that have the capacity to facilitate ecologically sustainable behaviour'. This includes the installation of devices which triggers sustainable action for example the optimal placement of signs to remind us to switch off the lights when leaving the room, the seat belt noise which remind us to fasten the seat belt when driving. A brief overview of behaviourist approach to change is provided in table 3.1 below.

Table 3.1 Behaviourist approach to change to sustainable living (adapted from (Sattmann-Frese & Hill, 2008: 68).

	Behaviourism
Focus	Scientific observable behavior
Theoretical framework	Stimulus-Response Psychology (Watson, 1914, 1925, 1928), Theory of operant conditioning (Skinner, 1948, 1953, 1971) Behaviour/environmental relationship) Skinner, 1971) Reinforcement schedules (Ferster & Skinner 1957)
Aims	Controlling unsustainable behavior
Assumed causes of our ecological crises	Inappropriate human behavior Short term satisfaction is being chosen over concern for long-term consequences
Assumption underlying strategies for change	Our culture needs to be redesigned to achieve environmentally appropriate behaviour (Skinner, 1971) Behaviour is not right or wrong- it simple reflect the contextual environment in which we behave
Central approach to change	We will change our behaviour in response to changes in the preceding stimuli Change occurs by modifying people's behaviour
Dominant change strategies	Persuasion by emphasising the benefits of changing (e.g. money)

Basis for change	Based on the notion of motivation
Expected emotional outcome	Feelings, emotions, and behavior can be manipulated by means of stimulus control

Another stimulus control device is the modeling of environmentally appropriate behaviour. It has achieved high levels of compliance, for example in promoting energy-conserving shower heads (Sattmann-Frese and Hill, 2008: 68). Contingency management focuses on activities that can act to reinforce a particular desired behavior. These reinforcement strategies include:

- Rewarding people for using public transport with tokens
- Providing incentives, for example, when buying more fuel-efficient cars, for buying environmental friendly products or proudly South African products.
- Paying people money for collecting aluminum cans, plastic, bottles and crap metals, and
- Providing consumer rebates for bottles, plastic returned to outlets.

Providing feedback is as effective as providing rewards for any acceptable environmental behaviour modelled. This can be achieved by publishing in a newspaper to provide people with feedback on their efforts to live sustainable for example by reducing energy consumption and waste production. People get satisfaction if they realise that their effort is recognized and they are likely to improve and lead a sustainable livelihood. The pricing of commodities represents a powerful way to manipulate behavior. By subsidising sustainable behaviour and placing disincentives on unsustainable behaviour, legislators are potentially able to manipulate the way in which we spend our money and behave ((Sattmann-Frese and Hill, 2008: 69).

Some strategies for behaviour change have been identified each focusing on a different set of behavioural determinants between antecedents and consequence strategies. Antecedent strategies are aimed at changing factors that precede behavior. 'The strategies raise problem awareness, inform about choice options and announce the like- hood of positive or negative consequences' (Steg and Vlek, 2009: 6). However consequence strategies are aimed at changing the consequences following behavior such as feedback, reward or penalties. They also discuss informational strategies which are aimed at changing prevalent motivations, perceptions, cognitions and norms whereas structural strategies aims at changing the circumstances under which behavioural choices are made (Steg and Vlek, 2009: 313).

- **Informational strategies**

Informational strategy can be used to increase actors' knowledge and increase their awareness of environmental problems and their environmental impacts of the behaviour and to increase their knowledge of behavioural alternatives and their pros and cons (Steg and Vlek, 2009: 313). It is envisaged that new knowledge, results in changes in attitude which in turn will affect behaviour. Persuasion is done to influence actors' attitude, strengthening their altruism and ecological values and strengthening their commitment to act pro-environmentally (Steg and Vlek, 2009: 313). Prompts are effective in changing behaviour.

- **Structural Strategies**

Structural activities aim at changing contextual factors such as the availability, the actual cost and benefits of behavioural factors as well. The costs and benefits of behavioural alternatives may be changed in various ways for example provision of recycling bins and organic products (Steg and Vlek, 2009: 313). It may also aims to provide reward for 'good' or penalties/punishment for 'bad' behaviour. According to Steg and Vlek, 2009: 313) rewards are more efficient in encouraging sustainable living practices or actions than are sanctions because rewards are associated with positive affect and attitude that support behavioural changes.

3.3.5 Application of behaviourist approach to the study

The aim of this study was to assess the role of environmental education in promoting sustainable living in secondary school learners. This means that the study follows a behaviourist approach because it attempts to change learners' behaviour, as it informs them about the environment through interpretation of natural environment. It portrays the behaviourist approach to education as it provides information, knowledge and awareness about environmental issues or problems. In the current study participants were involved in a series of environmental awareness programmes such as viewing the television, discussion of concepts such as pollution, loss of biodiversity, climate change, environmental friendly and recycling. These environmental interventions/ programmes are aimed at changing learners' behaviour. It is through behaviourism that learners gain knowledge and better understanding of environmental concepts and plays the biggest role in promoting sustainable living.

Ultimately, the behaviour of the entire society towards the biosphere must be transformed and achievement of conservation objectives is to be assured. A new ethic, embracing plants and animals as well as people, is required for human societies to live in harmony with the natural world on which they depend for survival and well-being (UNEP, 2002: 02). The task of environmental education is to foster or reinforce attitudes and behaviours compatible with this new ethic (IUCN, UNEP and WWF, 1980: 13). The promotion of sustainable living among secondary school learners reflects aspects of behaviourist approach within the education process since it provided access to environmental information and knowledge.

3.3.6 Example of Behaviourism in practice

CASE STUDY

'Recycling'

The environmental education teacher decides to try to change learners' behaviour with regard to littering and generation of rubbish. She sets up recycling banks at school for glass, paper and cans. All the classes compete with one another to see which class gather most of the material to be recycled. Paper is weighed, cans and bottles are counted. At the end of each month, the class which collected the most material is rewarded by being allowed to leave the school one hour earlier than normal time. In contrast, the name of the class which collected the least material is mentioned in front of the whole school at the end of the month, Thus the teacher hopes to change negative behaviour and reinforce positive one.

Behaviourism can be the effective way to transmit knowledge, skills and behaviours, motivate learners to learn and help them develop positive values. In the preceding case study, it can be deduced that behaviour can be molded through either positive reinforcement (through rewards) or negative reinforcement (through punishment). Learners tend to avoid behaviours that are punished and feel bad and repeat those that are rewarded and thus feel good (Didham, and Ofei-Manu, 2012: 27). Both reinforcements assume increase or decrease in the probability of the reoccurrence of the previous behaviour. Any behaviour change is an evidence that learning has occurred. In the case study above, all classes endevour to collect more material for recycling in order to be rewarded by leaving school one hour earlier and avoiding to be named as failures at the end of the month. The incentives serve as motivation. Motivating learners to adopt a pro-environmental lifestyle is an intricate matter, involving more than simple increasing knowledge about environment, and developing a positive attitude towards the environment.

3.4 CONSTRUCTIVISM PARADIGM

3.4.1 Introduction

Constructivism emphasises the importance of active construction of knowledge among children (Graham and Harris, 1994: 234). It is a theory that holds that learning takes place through active participation by the learner. In the current study learners were actively involved in solving environmental problems during programme implantation. Constructivist approaches to research have the intention of understanding the world of human experience (Mackenzie and Knipe, 2006: 5), suggesting that reality is socially constructed (Mertens, 2005: 12). This implies that constructivism is based on participation, empowerment and self-organisation. Sustainable living cannot be achieved by an individual but it is a collaborative, participative effort of all members of the community, be it a child or an adult, an environmental expert or non-expert.

The following section will discuss the characteristics of constructivism paradigm.

3.4.2 The characteristics of constructivism

Constructivism paradigm has the following characteristics:

- Constructivism is based on relative ontology (nature of reality), meaning that multiple, socially constructed realities ungoverned by any natural laws exist;
- Reality is not out there; it only exists within the context of a specific mental framework or constructs (Lebeloane, 1998: 84);
- Constructivism emphasises hands-on experiences (encounters) in learning
- Knowledge is subjective and is constructed through in the interaction of the researchers and the objects of enquiry;
- This approach emphasises active construction of knowledge among learners. Therefore, learners are seen as inherently active, self-regulating learners who construct knowledge in developmentally appropriate ways while interacting with a perceived world ;
- Constructivists perceive learning as a social situated activity that is enhanced in functional, meaningful and authentic context;

- Educators are seen as assisting performance and the construction of powerful knowledge, rather than as explicitly providing knowledge and information (Graham and Harris, 1994: 234).

'Environmental awareness and concern can additionally be fostered by linking learning to direct experiences in the environment and allowing learners to become captivated by the complexity and wonder of natural systems, or immersed in the values conflict over particular environmental issues (Fien and Tilbury (1996: 28).' These characteristics suggest that in the constructivist approach the child is powerful and active in the learning process. The teaching methods must be such that they promote active involvement in the learning process.

3.4.3 Criticism of constructivism

Constructivism seems to be the best approach compared to behaviourism and positivism approach, however there are some major criticism of this paradigm. Sterling, (2003: 317) and Blaikie, (1993) quoted in Sarantakos (2005: 41) criticise constructivism as follows:

- Constructivism highlights the critical role of the knower in the known, but can fall into the trap of relativism and lack theory and commitment to social change towards justice and sustainability;
- The constructivism approach suggests a deeper reformatory response, but one which education systems find hard to grasp, or to distinguish from 'good education' that they claim to be providing already (Sterling, 2003: 317).
- It fails to acknowledge the role of institutional structures, particularly division of interest and relations of power;
- This approach cannot address the factors and conditions that lead to meanings and interpretations, actions, rules, beliefs and the like;
- Constructivism is conservative in nature. It does not take into account structures of conflicts and hence the possible sources of change (Sarantakos, 2005: 41).

Constructivism is criticised for not taking into account the context of learning and the way in which culture and language shape learning. However it must be noted that constructivism is more open ended and recognises that meaning is socially constructed. It emphasises the holistic,

interdisciplinary approach to developing the knowledge and skills needed for achieving sustainable living as well as the necessary changes in values, behaviour and lifestyles.

3.4.4 Implications of constructivism paradigm to the study

According to Loubser, (2005: 65) a broad aim of environmental education within this paradigm is that the potential of the "whole" person should be actualized. This means that, the learner should be helped to become all what he or she wants to be. Constructivism seeks to actively engage learners in a meaningful projects and activities that promote exploration, experimentation, collaboration and reflection of what these learners are studying. It emphasises the learner as being the active learner playing pivotal role in mediating and controlling learning. Constructivism approach promotes ownership of the learning experience which Green, (1998: 25) suggests where ownership occurs, active learning and regard for learners and prior constructions follow quite naturally. Sterling, (2003: 312) assert that constructivist view emphasises the quality of learning and often, on building the individual's capacity to think critically, systematically and reflectively, rather than encouraging particular social or environmental outcomes. Sterling (2003: 312) further posits that interpretivism recognises the importance of the learning context and prior experience, disposition and uniqueness of the learner.

This approach views the teacher as a facilitator and he or she uses inquiry and experientially learning. In the constructivist approach the learner is actively learning through experiences in the environment which the teacher creates. The teacher guides and supports the learner through the learning process.

3.4.5 Application of the constructivism paradigm to the study

In the constructivist approach, active involvement in environmental activities and experiential learning by the child play an important role. Learners are involved in identifying, resolving, protecting and caring for the environment. In the constructivist approach to this study, participants were more likely to become concerned about the environment through actual experiences in nature. This is termed as education in/through the environment. The participants visited Isimangaliso Wetland Park where there were learning in/through nature. It is believed

that the study will develop a sense of connectedness to environment, and bond with nature by being in nature.

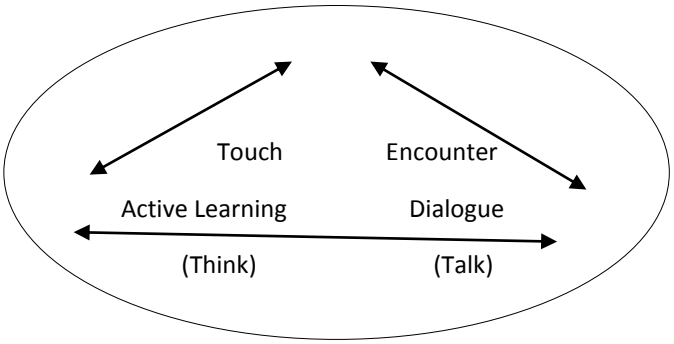

Fig. 3.1 Dialogue-Encounter-Reflection (Adapted from O'Donoghue & Janse van Rensburg 1995)

Dialogue-Encounter-Reflection (figure 3.1 above) highlights the importance of actual experiences with what is being studied and the value of reflecting on what learners come to encounter in their environment. (Le Roux, 2001: 62). Learning environmental education for and about the environment within constructivism help learners acquire knowledge, skills and develop attitudes through meaning and understanding through their senses (of touch, taste, smell, hearing and sight) in relation to the environment of which they are part (Van Matre, 1972: 9-11; Crab, 1985: 85 and Lebeloane, 1998: 85). A good example of constructivism approach in the school can be observed when learners are engaged in activities that explore different issues, contribute to an overall improvement in the school and the community environment for example: greening the school and recycling.

The aim of the study is to promote sustainable living among secondary school learners and their communities. Constructivism is a relevant approach to the study as it seeks learners to construct knowledge of how to identify and solve environmental problem such as litter problems. The study aims to promote sustainable living which can be achieved through social interaction. Constructivists instill critical thinking in learners and ensure that they take full responsibility for their actions. Critical thinking in this context refers to, amongst others, value judgements of scientific views and human behaviour. Achieving sustainable living requires active, knowledgeable, skillful and critical thinking citizen capable of solving and improving

environmental issues. In the current study participants were constructing knowledge as they check the water meter, record the readings, and checking leaking taps, pipes and greening the school. Participants participated actively in blended environmental interventions, demonstrating cooperative learning, problem solving and communication skills, which are developed through interaction and sharing of resources.

3.4.6 Example of constructivism in practice

The following case study is used to demonstrate how constructivism paradigm could be used to tackle environmental problem, in this case study: 'Litter'

Case Study

Litter: More than a Local issue

Litter has been with humans as long as we have existed. Early man simple discarded his or her waste products in the countryside with no concern to their eventual fate. Litter can be defined as something that has been disposed of improperly or without consent. To litter means to throw something on the ground around you in an untidy manner, as opposed to properly disposing of the item a waste receptacle. Litter ranges from small to large, from cigarette butts and gum wrappers to abandoned automobiles and appliances. Studies in Australia and the United States have shown that littering is most common in younger individuals (under age 30) and often occurs within 25 feet of a trash receptacle. Studies have also shown that "Litter begets litter", in other words people tend to litter where they see other litter has accumulated.

It wasn't until human converged together into cities that litter, and other forms of waste disposal became a health and sanitation issue. Throughout modern litter and other discarded waste products have contributed to many major health crises. This is due to the fact that litter can attract rodents and insects that carry disease. Litter is not only unhealthy for humans, it has serious negative impact on the environment. Litter trashes beaches, waterways and roadsides. Litter can be hazardous to both humans and wildlife. Those who accidentally come into contact with litter or ingest it can become entangled, injured or poisoned.

Globally, litter continues to be a healthy, safety, and environmental problem.

http://serc.carleton.edu/eet/litter-gps/case-study.html

A case study is read twice or more, depending on learners' level of understanding. This case study is presenting a learner with an over-arching problem: What is the economic importance of waste? How can we make cash out of waste? After presenting a problem, a constructivists teacher expose learners to a collection of resources to help them answer it, then allow time for learners to explore what they think, share their propositions with others and allow their hypothesis to be criticised (Armstrong, 2011: 13). Learners are actively engaged in the case

study with the hope of understanding the chronological order of events as they unfold on every day's live. They enquire systematically and publicly, using analytical criteria to test or disprove claims which are made about litter. They bring along their knowledge, understanding, experiences habits and preferences into their learning and they learn better by interacting with the environment through environment (Lebeloane, 1998: 90). They make use of Dialogue-Encounter-Reflection model as depicted in figure 3.1 above. It is through this exposure that these learners should see, smell, touch (encounter) and hear and talk (dialogue) about the perceived problem of 'litter' and collaboratively develop strategies of solving it. This means that learners are confronted with a problem, and are being given the opportunity to construct their specific views of the situation (Stauffacher, Walter, Lang, Wiek and Scholtz, 2006: 58)

3.5 SOCIAL CRITICAL THEORY

3.5.1 Introduction

Critical theory has different meanings for different people. This term is used as an umbrella term to describe any theory founded upon critique.

The proponents of critical theory were five Frankfurt School, Theorists namely Herbert, Marcuse, Theodor, Ardono, Marx Horkheimer, Walter Benjamin and Jurgen Habermas. According to critical theorist Horkheimer, (1982: 244) a theory is critical in so far as it seeks to 'liberate' human beings from the circumstances that enslave them. That has been echoed by Robottom, (1988: 23) when defining the concept 'critical research paradigm' as paradigm which uncover social relationships and interest they serve, to improve actors' understanding of the way their social lives are determined by conflicts and contradictions in their social order, and importantly, of the ways in which they can act to alleviate imposed constraints by changing that social order. Guba and Lincoln, (1994: 113) define critical social theory as the critique and transformation of the social, political, cultural, economic, and ethnic and gender structures that constrain and exploit human kind, by engagement in confrontations, and even conflicts. On the other hand, Le Roux, (2001: 69) states that critical theory is concerned with the social process in creating knowledge and critical intervention for change. Critical social theory is a school of thought that stresses the examination and critique of society and culture, drawing from

knowledge, across the social sciences and humanities, (http://en.wikipedia.org/wiki/critical-theory, accessed on 8 April 2012).

In the current study critical social theory is defined as the empowerment of people with knowledge, skills and attitudes necessary to identify and solve environmental problems as they emanate from the society. Critical social theory is relevant to the study as it stresses the empowerment of learners with knowledge, skills and attitudes necessary to promote sustainable living.

Critical social theory is essential to this study as it portrays the following characteristics:

3.5.2 The characteristics of social critical theory

The following are the characteristic of Social critical theory as discussed by many authors.

- Critical theory rejects the separation of facts and values and sets out to analyse society from the stand point of its emancipatory transformation,
- Critical theory observes that emancipatory transformation is necessary, since it shows an interest in improving the quality of human existence by setting human beings free from their way of thinking and replacing that with an 'improved' way of thinking of a particular community and society (Lebeloane, 1998: 78),
- Critical social theory is practical, action oriented and enlightening. It thereby catalyses social and political changes (Green, 1990: 6 and Lebeloane, 1998: 78).
- Critical Social theory is too materialist in its conception of the world, too rationalistic and too anthropocentric.
- Nature is socially constructed or mediated through cultural meanings, discourses and representations seems to take precedence over ecological realism, although the latter is acknowledged;
- Critical theory often suggests a re-visioning of education and society too radical for most educational systems to accept or find starting points for;
- Critical theory is helpful in highlighting the importance of empowerment in the light of structural injustice and the role of dominant ideology but itself often too ideological bound (Sterling, 2003: 317).

- This approach is associated with action research (AR) and Community problem solving (CPS) methodology.

What transpires in the preceding paragraph is that social critical theory seeks to improve the quality of life. Social critical theory helps people understand and make informed choices in their everyday situations. The emancipatory process leads to personal empowerment to take steps toward changing their own circumstances and the entire consumerism system (McGregor and Murnane, 2010: 426). Social critical theory is concerned with empowerment of the masses and social justice for all.

3.5.3 Criticism of social critical theory

Critical theories are cognitively acceptable only if they survive a more complicated process of evaluation, the central part of which is a demonstration that they are 'reflectively acceptable' (Geus, 1981: 55). Critical theory is helpful in highlighting the importance of empowerment but is itself often too ideological bound (Sterling, 2003: 317).

3.5.4 Implications of social critical theory to the study

Green, (1990: 6), Robottom and Hart, (1993: 20-24) and Lebeloane, (1998: 78-79) share the following common ideas on the implications for environmental education:

- Environmental education should, in the context of social critical theory, improve the quality of human existence through emancipation,
- This process should occur through practical action which is based on knowledge acquired from the underlying theory. That knowledge also serves to enlighten and catalyse social and political changes in an environment,
- Social critical theory encourages participants to be socially critical and adopt a research stance towards their own environmental education activities,
- Education for the environment should involve learners, educators and community agencies in collaborative investigations of real environmental issues in their local environments,

- Truth should therefore be whatever leads to the achievement of good, right, responsible results and that which empowers individuals,
- Inquiry in environmental education which is based on the critical theory should focus on that which uncovers meaning and causes contradictions which operate behind unquestioned interactions of people's daily lives,
- According to the social critical theory, environmental education should make the 'taken-for-granted 'assumptions about the environment transparent.

This approach should be known as education for the environment as it involves investigating real environmental issues and taking action for the protection and conservation of the environment. Social critical theory and environmental education seek to empower learners to participate in the resolution of environmental problems in their communities.

3.5.5 Application of social critical theory to the study

Environmental education is critical for promoting sustainable development, sustainable living and improving the capacity of people to address environmental and developmental issues. It is critical for achieving environmental and ethical awareness, values and attitudes, skills and behaviour consistent with sustainable living and for effective public participation in decision-making (UNCED, 1992: 2). Huckle, 1993: 43) argues that education for sustainability …must be grounded upon an appreciation of the root causes of environmental problems in the global economic system. Critical skills are necessary to think critically about the root causes of unsustainable lifestyles. Critical thinking helps learners identify, understand and critically evaluate complex issues about natural environment and make informed choices to participate in the resolution of environmental problems. Fien, *et al*, (2002: 10) allude that critical enquiry appears to be essential if people are to explore the complexity and implications of sustainability as well as the economic, political, social, cultural, technological and environmental forces that foster sustainable development. In the current study participants study the impact of waste management, the economic importance of waste management, importance of water and the effects of pollution to human and the benefits of biodiversity conservation.

3.5.6 Example of Social Critical Theory in Practice

The following is a case study to demonstrate how paradigm on social critical theory could be used to address environmental problem and how a dialectic stance of paradigms could be applied.

CASE STUDY

GREATEST CRISIS IN DECADES' FOR AFRICA'S ELEPHANTS

While South Africa has certainly been at the centre of Africa's rhino poaching crisis – with 2829 rhino repeatedly killed by poachers there since 2010 – its elephant populations have escaped largely unscathed. Elsewhere in the continent, the picture is bleak. Since 2011, when elephant poaching hit the highest levels on record in 10 years, the slaughter has continued unabated. Now between 25000 and 35000 elephants are reportedly being killed in Africa every year for their tusk.

Kruger National Park (KPN) has lately become a target for elephant poaching with 19 elephants killed since January and 12 of those in September and October 2015.

We are saddened by the latest developments in the Northern part of the park where the majority of the elephants were poached so far. We lost two elephants at the beginning of this year, then it silent for four months until July when three elephants were poached. This was followed by another two in August, September and then five this month; which brings the total number of elephants poached this year to 19", said General Manager: Communication & Marketing, William Mabasa.

South African National Parks (SANParks) expressed its shock at the first confirmed elephant poaching incident in the KPN in well over 10 years in May 2014 at Pafuri section of the Park. The KPN lost 2 elephants the whole of last year. "Given the situation in the rest of the continent pertaining to widespread poaching of elephants, we cannot allow this destabilisation of our keystone species to continue further. We are confident that the dedication and efforts which our rangers and partners in the security sector have displayed towards the fight against rhino will prevail over this latest problem", concluded Mabasa

South African National Parks: Communications & Marketing Department- Kruger National Park.

The case study could be read aloud once or twice before explained. Learners will explain the concept of 'poaching', how it happens and who are involved. They also discuss the root causes of poaching and the impact on environment. They must also discuss the economic importance of elephants and formulate strategies of saving them. They may close their discussion by looking at historical or cultural background of elephants and indigenous people. Social critical theory is concerned about uncovering meaning and root causes of contradictions of every day's human activities. "It also wishes to facilitate the integration of knowledge and purposeful action in the environment" (Lebeloane, 1998: 83). "Social critical theory is sensitive to historical change, this makes it appropriate for analysing theories of the end of work since theories are intrinsically linked with change…" It is for this reason that learners will be asked to discuss the cultural and historical background of the interaction of elephants and indigenous people.

3.6 POSITIVISM PARADIGM

3.6.1 Introduction

The paradigm of 'positivism' was first introduced by Auguste Come (1798-1857 in the 19th century (Babbie, 2011: 35). Fisher refers to 'positivism' paradigm as the power science and rational thought to comprehend and manipulate the world (Fisher, 2010 in Charumbira, 2013: 51). It may be viewed as an approach to social research that seeks to apply the natural science model of research as the point of departure for investigations of social phenomena explanations of the social world (Denscombe, 2008: 14). It involves the use of scientific methods of research such as experimenting, investigating, observing and testing of conclusions (Lebeloane, 1998: 70).

3.6.2 Characteristics of Positivism Paradigm

The following is the list of characteristics of positivism

- Positivism is scientific and the objects of the social sciences, namely people, are suitable for the implementation of scientific methods;
- Positivism concentrates on explaining human behaviour (www.mega.nu/ampp/176 krkpt.htm, accessed 17 November 2015).
- Positivist prefers working with an observable social reality;
- Positivists also believe that objective reality exists outside personal experiences with its own cause-and effects relationships (Neuman, 2006:82; Babbie & Mouton, 2008: 23).
- Positivists believe that everything is measurable and quantifiable,
- It is based on the assumption that there are universal laws that govern social events and uncovering the laws enables researches to describe, predict and control social phenomena (Tuli, 2010: 103).

3.6.3 Criticism of Positivism Paradigm

Positivism concentrates on the object of knowledge, abolishing the human actor doing the knowing, thereby attempting to hide the 'subject' of knowledge from critical examinations. The above statement indicates how positivism rejects human, as the knowledge creator and as part of the society under investigation.

3.6.4 Implications of Positivism paradigm to the study

The aim of environmental education is to foster environmental awareness and sensitivity, to acquire a readiness and responsibility to prevent and or solve environmental problems. Through positivism paradigm teachers raise environmentally conscious citizens who are committed to lead a sustainable way of living. Positivism entails learning about the environment. Learners should understand the prerequisite for human well-being, the necessity of environmental protection and learn to observe changes taking place in the environment and human well-being, to clarify the causes and consequences of the changes and enhance sustainable living (Jeronen, Jeronen and Raustia, 2009: 3). Helping learners become environmentally knowledgeable, skilled and dedicated citizens is essential in achieving sustainable living in schools as well as in their communities.

3.6.5 Application of Positivism Paradigm to the Study

As positivism claims to be working with an observable and measurable social reality, environmental education should provide learners and community at large with the following knowledge and skills.

- knowledge to acquire a basic understanding of the natural environment functions, how its functions ae affected by human activity and the natural environment (Lebeloane, 1998: 71);
- calculate the economic and social costs of cleaning polluted sites;
- inform the school community and the public about the impact of contaminated water on human health and environment;
- measure the water quality and air quality around the school;

- collect and compare energy and water use on school campus and analyse to find areas for improvement and
- observe school practices in relation to water, electricity, inks, paper, cleaning material and food purchasing.

Environmental education should offer our learners the opportunities to observe, measure and test knowledge, skills and experiences regarding environment. The following is a case study which will be used to display how positivism can be used to address the problem of the study.

3.6.6 Example of Positivism in Practice

Case study

Living in Fear of Sasol's Pollution

Two kilometres down the road from Sasol's big Secunda plant, the Kleinspruit River reaches the township of Embalenhle. While the town of Secunda has the benefit of being upstream from Sasol, Embalenhle's 200 000 residents have this river flowing through their back yard. Like cattle farmer Chris Skosana, many residents keep cattle and goats that drink from this river; others use it for fishing, and on Sundays church groups baptise members here.

Sasol says that when the December 2013 incident occurred they immediately informed the department of environmental affairs and asked a large team of technicians and engineers to fix the problem. Sasol did not, however, warn the community, because "it was deemed not necessary, as the water quality was within legally acceptable levels", said Sasol spokesperson Alex Anderson. He said the municipality released additional water from dams upstream to dilute any chemicals released into the river. Nono Maseko heads up the African Community Dialogue in Embalenhle: "[Sasol] are trying to make people aware of the pollution but it is not that effective. They need to do more," he said. "Individuals who read the newspaper may know, but other vulnerable people don't know."

At a community dialogue that City Press attended late last year, people stood up one after the other to express their fears about what the presence of the giant Sasol plant was doing to their health. They asked not to be named for fear of antagonising the biggest industry, and employer, in town. "What hurts me most is that we black people were brought here, where this place is polluted. The rich white people are placed on the other side, where the pollution does not reach them. You can tell how serious this pollution is by the number of doctors in Embalenhle – they know there is a lot of money to be made," said a young man and local activist. "We never used to have these chest pains and [related health] issues. We have problems with our eyes and we don't know why. Even the children are suffering," said an elderly woman. Other women at the meeting agreed. "I have a 15-year-old child at home. She suffers from sinusitis. When she was growing up, this was never an issue," said another woman. "We buy medicines, but it makes no difference. What should we do? Our children are suffering. We are not too concerned about us older people – we can die at any time; the children are our main concern." A man added:

"When the time comes for young people to start working, Sasol will tell them they are not well and cannot work. But who made them sick in the first place? People now grow sick. A child grows to adulthood as a sick person." Sasol says it has spent R20 billion over the past 10 years improving environmental conditions, such as air quality, around their plants. They also say reports have found that they do not exceed national air quality standards. But with little information and growing fears, many people link their illness to Sasol. "When the community, who are the stakeholders, engage Sasol they are met with suspicions, as if they have malicious intentions, as if they just want to get money from them," one of the men explained.

"But that's not the case. People are getting very sick. They are not employable anywhere, not just at Sasol, because they are sick. They are forced to live on medication. Many use sleeping tablets and asthma pumps – their quality of life is degenerating." On the north side of Embalenhle, a massive construction project has been under way since 2014 to reline one of Sasol's pollution-control dams. The Halvepan Dam's hazard potential is listed on the government register as "significant", but despite the closest houses being barely 100m away, no one we spoke to had been informed about whether it posed a risk. Sasol said the dam was used to store "saline effluent containing calcium, magnesium, sodium, sulphates and chlorine", and that, as part of a proactive move, they had informed the department that the dam was "potentially contaminated land" and agreed to line it.

City Press, Susan Comrie, 17 March 2016

In the positivist approach this case study can be used to teach grade 10-12 learners and the following procedure could be followed:

Learners will be afforded the opportunity to read the case study repeatedly in order to acquire full understanding of how human activities impact on our health and natural environment. The teacher will further elucidate the case study in order to clarify certain issues and engage learners into the following activities:

- identify the type of pollution under investigation;
- measure the amount of pollutants in water;
- observe and identify the impact of water pollution on human health, plants as well as animals;
- identify the population size of Embalenhle Township, and
- conduct survey to find out the number of people affected and the number of people who could be affected by this.

The above stated case study reveals some of the characteristics of positivism paradigm which are namely, measurable, observable and testable. "Using the positivistic approach to teach a topic, only that which is measurable, observable and testable is acceptable". (Lebeloane, 1998:

75). Learners would conduct a research to quantify the number of people who are suffering from drinking contaminated water. They will also test for the water quality in the river and nearby rivers. The results of the investigation will be quantified and disseminated amongst learners, community members, health department and the municipality.

3.7 THE INFLUENCE OF THE PREVIOUS STUDIES

Several authors have conducted investigations and wrote papers that contribute to the development of environmental education and sustainability. In the early 1980s, Peterson and Hungerford (1981), in their studies attempted to identify formative experiences that contributed to the participants, environmental sensitivity. The results revealed a complex pathway to the development of environmental sensitivity that included not only affective component but also cognitive and behavioural components. Swart and Marcinkowski (2005) in Ernst and Theimer (2011: 579) concur, by saying that environmental sensitivity itself is viewed as an affective variable resulting from an interplay of outdoor experiences, favourable human interactions, and knowledge about the natural environment. Different strategies encouraged positive attitude towards environment and led to environmental action. Steg and Vlek (2009) in their paper discussed environmental psychology's merits and its potential to help promote environmental sustainability via behavioural changes. They provided a systematic perspective on assessing, understanding, and changing environmental behaviour. Their discussion was in line with Geller, (2002) when arguing that promoting behaviour change is more effective when one (1) carefully selects the behaviours to be changed to improve environmental quality (2) examines which factors cause those behaviours, (3) applies well-tuned interventions to change relevant behaviours and their antecedents and (4) systematically evaluates the effects of these interventions on the behaviours themselves, their antecedents, on environmental quality and human quality of life (Steg and Vlek, 2009: 309). They also discussed how environmental psychologists empirically studied these four issues, identified shortcomings and indicated major issues for future research (Steg and Vlek, 2009: 1). The study concluded by saying that individuals can contribute significantly to achieving long-term environmental sustainability by adopting pro-environmental behaviour patterns. In 2008, Daudi, from the Northern Illinois University in USA wrote a paper on how stakeholders can participate in the environmental education programme development as well as in the implementation process. Daudi, (2008) argues that should participants be actively involved in the planning and implementation

processes, this could lead to better and longer lasting results for sustainable management of environmental resources. Daudi claims that barriers to the implementation process emerge as a result of lack of commitment and involvement of all stakeholders in all stages that is from designing to implementing stage.

Mukoni (2013) conducted a study to appraise Environmental Education in secondary schools in Zimbabwe. The study aimed at establishing whether EE has any transformative impact on the behaviour of teachers and learners towards the environment through an assessment of their actions on schools and their surrounding communities. Transformative impact of EE was evaluated by employing system thinking theory and social critical theory. The study used questionnaire to gauge the learners and educators' actions, to find out if they developed pro-environmental behavior due environmental practices in schools. The results of the study revealed that what environmental education aims to achieve or intend to achieve, is never achieved. The author called this as the mere "greening" of the curriculum. The participants do not live what they preach. In other words Environmental education do not lead to transformation of learners, educators and communities. This has been shown by their limited action in solving environmental problems in the community's contexts. As the study was informed by social critical theory and system thinking theory, SCT allows for probing impacts of environmental education on the schools' and communities' environmental and sustainability problems. 'Critical perspective entails questioning appearances and taken for granted practices, probing assumptions and implication.' (Mukoni, 2013: 974). He makes examples of a taken for granted practices such as the supply of garbage bins, gardens, orchards which were probed to find out whether educators realised the importance of these in relation to what they teach in the classroom. He argues that establishment of a school garden, for example, should make meaning to all educators involved in EE, as a teacher for nutrition could use a garden to teach a topic on healthy foods and a science teacher to teach about an ecosystem. A school garden could be used as a place based pedagogical area to teach most sustainability concepts. SCT was chosen as it concerns itself with a critical understanding of and an informed commitment to the improvement of society. It seeks to empower learners to participate in the democratic transformation of the society (Mukoni, 2013: 975). He claimed to have used system theory to find out how the implementation of EE in schools has impacted on educators, learners, the school and the larger community. Vedak and Pandey (2010) quoted in Mukoni, (2013: 975) argue that system approach can offer a perspective more useful than an analytical approach

because the systems view allows for thinking in terms of connectedness, relationships and interactions. Ferreira (2001) in Mukoni (2013: 977) stresses the need to use action research when conducting audits, impact assessments as action taking methods that promote sustainability of the environment. Action research helps learners to cooperate with the community in solving environmental issues.

Another study, is by Alexandar and Poyyamoli (2014), in India on the effectiveness of environmental education for sustainable development based on active teaching and learning at high school level. The main objective of the study were to foster the acquisition and transfer of the necessary knowledge, skills, attitude and behavior with reference to the protection of the environment and sustainable development in selected high school. Four schools were sampled and a total of 240 learners were selected of which 60 leaners were selected based on their interest, motivation and commitment. Half of this number, 30 learners were in experimental and remaining 30 kept in control group for each school. The experimental group were engaged in various environmental education programmes for sustainable development. They employed various environmental education strategies including field based education, experiential learning theory, constructivist theory and problem based activities. Active learning involving the processing of knowledge requires a problem solving orientation, a critical approach and an evaluation of knowledge (Payyamoli and Alexandar, 2014: 3). Experiential learning theory suggests that students learn more effectively by 'doing' than by 'listening'. This involves engaging learners in environmental education activities or programmes or projects as it was done in the study with the experimental group. The post test results revealed that learners' knowledge, skills, attitude and behavior have significantly improved in manipulating water, air, and energy and food consumption. The results revealed that learners in the experimental group, showed better understanding of the environment than their counter part, the control group. The study took the position of behaviourism approach as it fostered the acquisition and transfer of knowledge, skills, attitude and behaviour in relation to environmental protection and sustainable living. As learners were involved in active sustainable development programmes, they were collaboratively involved in the construction of knowledge in identifying and solving environmental problems. The study also took a constructivist approach. Contributing to this body of knowledge is Mudau and Msezane (2014). They wrote a paper report on the exploration of environmental education as a stimulus in sustaining land resources which can be degraded by improper solid waste disposal. The data was collected using empirical qualitative case study

and through focused group interviews, guided questionnaires and observations of learners. Environmental education programmes were introduced to improve learner's knowledge and attitudes toward the environment. The extra mural activities (environmental education) aroused initiatives to reduce littering although the impact was minimal in eradicating unacceptable solid waste disposal in schools (Mudau, and Msezane, 2014: 1).

In concluding this section, on the influence of other studies, the author looks at the study conducted in United States' (U.S) public schools by Inverness Associate and reported by Chapman, (2014). Inverness Associates conducted a comprehensive survey of environmental education and sustainability among public schools in U.S. The survey sought to understand how schools' environmental education programmes develop environmental literacy among learners, the environmental knowledge, skills, attitudes and behaviours they need to become environmental stewards (Chapman, 2014: 2). The survey also sought to investigate the environmental education and sustainability programme as reflected in the schools' facilities and operations, curriculum, food programme, connections to informal science and environmental education organisations, and community practices (Chapman, 2014: 2). The results provided a detailed portrait of the success and challenges experienced by the public schools as they incorporate environmental education and sustainability practices. The results provided one of the first green school baseline evaluations for public school in the United States. The survey revealed that there was significant engagement with environmental education and sustainability in public schools in U.S. The survey also pointed out the key challenges that must be addressed to make further progress. It further revealed that many public schools need to adopt a more systematic approach to environmental education and sustainability (Chapman, 2014: 3).

It was evident from the studies discussed above that active teaching or learning approach significantly improved knowledge, attitude, skills and behavior towards environment. The attitude, behaviour, knowledge and practical skills attained during the active environmental programme must enable learners to continue learning even after they have left the school. These programmes promote sustainable living amongst learners in secondary schools.

3.8 THEORETICAL FRAMEWORK

Troudi (2010: 2) describes theoretical framework as the intellectual structure which guides the study and informs one's view of data, The author further argues that theoretical framework is a specially designed set of lenses that one use in order to see the world in a particular way (Troudi, 2010: 2). According to Mackenzie & Knipe (2006: 2) theoretical framework is referred to as the 'paradigm and influences the way knowledge is studied and interpreted'. They further define it, as the choice of paradigm that sets down the intent, motivation and expectations for the research. Each research study, regardless of a paradigm, subscribes to a theoretical framework that directs or position the study. Mertens (2005: 7) contends that a researcher's theoretical orientation has implications for every decision made in research process and the choice of methods. 'Without nominating a paradigm as the first step, there is no basis for subsequent choices regarding methodology, methods, literature or research design (Mackenzie and Knipe, 2006: 2). Therefore a theoretical framework is a cornerstone of any research study.

In the current study, a dialectic stance is embraced and assumed that all paradigms have a value contributions to make in order to afford a better understanding of what is being investigated (Greene and Caracelli, 2003 in Tashakkori and Teddlie, 2003: 22). This means that the study draws from multiple paradigms, ensuring better understanding of what is being investigated. Environmental education should be viewed holistically, from all angles and not from a single stance. Environmental education is multidisciplinary in nature and it, therefore, warrants a dialectic stance or multiple paradigms.

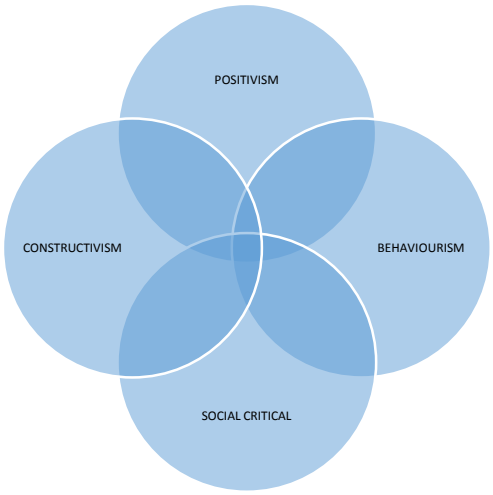

Figure 3.2 Dialectic stance

Therefore, there is no single paradigm that could fit well to investigate issues of environmental education and sustainability alone, however elements from a variety of paradigms are integrated and complement one another (Lebeloane, 1998:154). This is illustrated in figure 3.2 (dialectic stance) above.

3.9 EVALUATION RESEARCH

According to Rossi and Freeman (2002: 5) 'evaluation research is the systematic application of social research procedures for assessing the conceptualization, design, implementation and utility of social intervention programmes'. Evaluation research is also defined by Weinbach (2005: 2) as "the systematic use of research methods to make judgement about the effectiveness and the overall merit, worth, or value of some form of …practice''. Evaluation researchers conduct research to judge and improve the ways in which human services, policies and programmes are carried out. It also seek to enhance effectiveness in the public sphere and policy making. The term is somehow misleading in that there is no separate set of research methods exclusively employed for this research type. Evaluation research may be carried out for a particular purposes, namely gathering information for improving the design, development, formation and implementation of a programmes, describing the process of a programme as it is being developed or assessing the impact, outcome or worth of a programme (de Vos, Strydom, Fouche and Delport, 2011: 452). The evaluation of environmental education programmes applied in this study will be discussed in chapter 5.

3.10 SUMMARY

This chapter has explored a variety of paradigms namely behaviourism constructivism and social critical theory. Behaviourism seeks to change peoples' behaviour by focusing them on ways of resolving problems such as unsustainable consumption of natural resources. On the other, hand constructivism and social critical theory emphasise collaborative action of the whole society in solving and changing unsustainable actions into sustainable ones. Some of these paradigms are closely related such that it is difficult to differentiate between them, however, a thin line seems to exist and they are therefore discussed separately. The characteristics, implications, criticism and application of each paradigm to the study were discussed. The influence of the previous studies to current study and the theoretical framework

were presented and discussed. As the study is evaluating the role of environmental education in promoting sustainable living, it was necessary to close this chapter by briefly discussing evaluation research. In this study evaluation is done to judge whether and improve the way environmental education is offered in schools.

CHAPTER 4
EMPERICAL STUDY

4.1 INTRODUCTION

Chapter 2 and 3 reviewed literature with regard to the role of environmental education in promoting sustainable living in secondary school in uMkhanyakude District. In chapter two key concepts of environmental education and sustainability were discussed. It also provided historical background of the evolution of environmental education to sustainability. Chapter three discussed some identified paradigms that have an influence on the development of environmental education. This chapter describes the research methodology followed in order to address the research question and to prove the hypothesis of the study. It will present the research design, data collection methods, validity and reliability of data collection method, population of the study, sampling strategy as well as data analysis. It concludes by discussing ethical consideration.

4.2 RESEARCH DESIGN

McMillan & Schumacher, (2006: 9) define research as the systematic process of collecting and logically analysing data for the purpose of establishing novel facts, solving new or existing problems, providing new ideas or developing new theories usually using a scientific method. On the other hand, Leedy and Ormrod, (2013: 2) define research as the systematic process of collecting, analysing and interpreting data in order to increase understanding of a phenomenon. For the purpose of this study, the concept research is defined as a scientific, systematic and deliberate endevour undertaken to search for new or existing and knowledge. It is a process of collecting, analysing and interpreting information to a research question.

According to Durrheim, Painter & Terre Blanche (2006: 30) research design refers to the plan of action which serves as a strategic framework linking the research question and the execution of the research and ultimately providing answers to the research question. It is a detailed plan of action to be followed when conducting a research. Denscombe (2005: 30), adds that the plan indicates the different methods for collecting data. Maree, (2012: 70) also views research design as a ‘plan or strategy, which moves from the underlying philosophical assumptions to specify

the selection of respondents, the data gathering techniques and the data analysis techniques to be used.'

In the current study, research design is defined as a plan of action which guided the selection of respondents, collection and analysis of data on the role of environmental education in promoting sustainable living in secondary schools in uMkhanyakude District, KZN. The present study employed both quantitative and qualitative research designs.

4.3 THE MIXED METHODS APPROACH

The study employed a mixed methods approach by merging both quantitative and qualitative research methods. Creswell (2009: 204) posits that mixed method research entails the combination of both quantitative and qualitative research methods in a study. The data are collected concurrently, both quantitative and qualitative data are collected at the same time and the implementation is simultaneous. This type of mixed method study is known as concurrent triangulation method. According to McMillan & Schumacher, (2010: 403) concurrent triangulation occurs when 'the researcher simultaneously gathers both quantitative and qualitative data, merges them using both quantitative and qualitative data analysis methods and then interprets the results together to provide a better understanding of phenomenon of interest'. Quantitative research method is the primary method in this study whereas qualitative research method is used to provide supporting role to quantitative method. The mixed methods model was enticed in the current study because it enhances credibility of findings from a single method and provide more comprehensive picture of what is being studied (McMillan & Schumacher, 2010: 397). Using mixed methods may not always yield good results if the researcher lacks greater depth of knowledge. Recognising that many different terms are used for this approach, such as integrating, synthesis, multi-methods, mixed methodology and qualitative and quantitative methods (Creswell, 2009:205), but the current study preferred to treat them separately, as quantitative and qualitative research methods.

4.3.1 Quantitative Research Method

In the current study, quantitative research method was embraced. Durrheim, *et al*, (2006: 47), and Trumbull, (2005: 1) posit that in quantitative research, data is collected in the form of

numbers and use statistical types of data analysis. They further state that quantitative research emphasises objectivity in the measuring and describing phenomena. Therefore, quantitative research aims to measure something, for example, the percentage (of people who use environmental friendly materials). According to Creswell, (2006: 6) quantitative data includes closed- ended information such as that found on attitude, behaviour or performance instruments. A collection of this kind of data involves the use of closed-ended checklist or questionnaires. A questionnaire was used as a primary tool for collecting data. Despite the fact that a questionnaire collects quantitative data, in the current study, it also collected qualitative data through open-ended questions.

4.3.2 Qualitative Research Method

Qualitative research is different from quantitative research because it is concerned with finding answers to questions which begin with why, how, or what way? On the other hand quantitative research, ask questions such as how many, how long or what percentage? Trumbull, (2005: 101) describes qualitative research as multi-methods in focus, involving an interpretive, naturalistic approach to its subject matter. This explains that qualitative research studies things in their natural settings, attempting to make sense of, or, interpret phenomena in terms of the meaning people bring to them.

Hancock, (2002: 2) outlines the following features of qualitative research:

- It is concerned with the opinion, experiences and feelings of individuals producing subjective data.
- Qualitative research describes social phenomena as they occur naturally.
- Data are used to develop concepts and theories that help us to understand the social world.
- Qualitative data are collected through direct encounters with individuals, through one to one interviews or group interviews or by observation.
- The intensive and time consuming nature of data collection necessitates the use of small samples.

In qualitative research, researchers collect data in the form of written or spoken language or in the form of observations that are recorded in language and analyse the data by identifying and categorising themes (Durrheim, *et al*, 2006: 47). In the current study observation is employed as a qualitative data collection method. The qualitative approach of the questionnaire is manifested in the open-ended questions (refer to section C) of each questionnaire in which the respondents presented qualitative data. It was also demonstrated when the researcher presented and analysed the data of the questionnaire.

4.4 RESEARCH INSTRUMENTS

4.4.1 The Questionnaire

In the current study, a questionnaire is the primary source of data collection method. de Vos, Strydom, Fouche and Delport (2006: 166), defines a questionnaire as a set of questions on a form which is completed by the respondent in respect of a research project. In this study a questionnaire is defined as a set of questions and statements on a form used by researchers to collect data from respondents. There are different types of questionnaires available depending on how they are administered. However, in this study, hand delivered questionnaires were used. Questionnaires were delivered by hand and respondents were given an opportunity to complete them in their own time and return the following day. The questionnaire had two sets of questions namely closed-ended or structured questions, in sections A and B and open-ended or unstructured questions in section C. The researcher chose to use both sets of questions because they complement each other. In closed-ended questions respondents had to choose an answer from a number of alternatives. This was advantageous to the researcher because data obtained from closed-ended questions were ease to analyse than data obtained from open-ended questions. In the case of an open ended question, a question was asked and a space provided for an answer (a word or phrase). Open-ended questions were also included because it allowed respondents to give honest and detailed answers. Maree, (2007: 161) posits that in open-ended questions of the questionnaire respondents can answer complex questions adequately. The qualitative approach of the questionnaire was manifested in the open-ended section (section C of the questionnaire) in which the respondents presented qualitative data.

In the current study the following essential guidelines were used when designing a questionnaire.

- The questions in a questionnaire were kept as brief as possible and solicited only that information essential to the research study.
- Relevant questions in terms of knowledge, level of understanding and age were asked in a questionnaire.
- Double-barreled questions were avoided. All questions asked in questionnaires were limited to a single concept.
- All questions asked in the questionnaires were clear and unambiguous.
- Respondents sampled were thought to be competent enough to answer questions since learners and educators were familiar with concepts like biodiversity, recycling, pollution, waste management as addressed in Life Sciences, Geography and Agricultural Sciences subjects.

Using a questionnaire as a data collecting method has both advantages and disadvantages. It is pivotal that researchers consider advantages as well as disadvantages in order to select appropriate methods of gathering data.

4.4.1.1 Advantages of using a questionnaire

The following benefits of using a questionnaire were evident during the process of designing and administering a questionnaire.

- Respondents completed questionnaires independently, i.e. without the assistance or guidance of the researcher,
- Questionnaires were distributed to learners, educators and non- educators, simultaneously,
- It was ease to plan, compile and administer to schools,
- A questionnaire may be used to collect quantitative and qualitative information,
- The use of a questionnaire is the cheapest form of data collection methods
- Respondents had enough time to read the questionnaire over and over again before they attempted to answer questions (Chacko, 2000: 119-120).

Both open and closed questions were used in the questionnaire in order to complement each other. This also assisted the researcher to collect more different kinds of information in a single encounter with respondents. Like all other data collecting methods, a questionnaire has both advantages and disadvantages. The following paragraph discusses disadvantages of using a questionnaire.

4.4.1.2 Disadvantages of using a questionnaire

The researcher concurs with Chacko, (2000), Dawson, (2002) and de Vos, (2013) about the following disadvantages encountered when designing and administering a questionnaire.

- Probing and clarifying questions is limited in a questionnaire than in interview questions,
- Questions about attitudes are more difficult to compile (Chacko, 2000: 121).
- Researchers have no control over who answers a questionnaire,
- Response rate was often very low since respondents did not return all questionnaire and some were returned incomplete.
- It takes longer to complete than telephonic or personal interviews (adapted from Dawson, 2002).
- Open-ended questions were difficult to compose and answer; therefore, they should be avoided if possible.

At first, the response rate was very low because the researcher simple left the questionnaires with principals and gave respondents too much time to complete a questionnaire without proper guidance. The researcher then had to convene meetings to clarify and elaborate some difficulties and issues of concern. The researcher had to hand deliver questionnaires for the second time and to collect them the following day.

4.4.1.3 Triangulation, validity and trustworthy

According to Morrell and Carroll (2010: 77) and Rule and John (2011: 109) explain triangulation involving the use of multiple data sources and methods to help ensure that the data collected is accurate and a true presentation of what is being studied. It is done to clarify

meaning and to verify the repeatability of an observation or interpretation (Stake, 2005: 454). In this study triangulation was fostered through multiple data collection methods, including questionnaire in the quantitative approach and observation in the qualitative approach. The study also used multiple participants' involvement to collect multiple viewpoints from all the participants in the school about the same topic (Merriam, 2009: 216). Triangulation is the principal strategy to ensure trustworthiness and credibility within the study.

4.4.1.3.1Validity

Kvale (2009: 149) refers to validity as the strengths and soundness of a statement and whether a method investigates what it purports to investigate. Validity is defined as 'the ability of the instrument to measure what it was intended to measure' (Gray 2005: 191). In the current study, validity refers to the extent to which the instrument measures the role of environmental education in promoting sustainable living in secondary schools. The study elucidates the different categories of validity in order to unfold how they are perceived and operationalised in this study. These categories are content validity, face validity, construct validity and criterion validity.

(i) Content validity

According to MacMillan and Schumacher, (2010: 175) content validity is the extent to which a sample of questions in an instrument, such as in a questionnaire, is representative of the targeted task or domain. In this study, content validity refers to the extent to which the questions in a questionnaire represent environmental education and sustainable living. All the questions asked were relevant to the research question.

(ii) Face validity

Face validity is the extent to which, on the surface, an instrument looks like it's measuring a particular characteristic (Leedy and Ormrod, 2005: 92). Face validity refers to the appearance of a questionnaire or any other instrument for collecting data, whether it measures what it looks as if it measures the variables that it claims to measure (Leedy and Ormrod, 2005: 161). In the

current study, a questionnaire is well structured and it measures the concepts of environmental education and sustainability.

(iii) Criterion validity

Criterion validity involves multiple measurements and is established by comparing scores on an instrument with an external criterion known to, or believed to measure the concept or trait being studied (de Vos, *et.al*, 2006: 161). In this study criterion validity refers to the degree to which the questions on the questionnaire correlate with the criteria set for the study.

(iv) Construct validity

Construct validity is concerned with the meaning of what the instrument is measuring and how and why it operates the way it does (de Vos, *et.al*. 2006: 162). In this study construct validity refers to the extent to which the questionnaire measured the meaning of what it intended to measure in order to achieve the aims and objectives of the study.

4.4.1.3.2 Reliability

Throchim (2006: 1) describes reliability of the tool as consistency and accuracy of the actual measuring instrument or procedure. Joppe, (2000: 1) defines reliability as the extent to which results are consistent over time and accurate representation of a study and can be reproduced under a similar methodology. This definition implies that the results must be repeatable at any given time when the same study is repeated. Bergh and Theron, (2003: 37) concur with Joppe by defining reliability as a correlation coefficient to demonstrate the level of effectiveness and whether results can be similar, if the study could replicate under similar methodology. In other words, reliability is the extent to which a measuring instrument is repeatable and consistent (Maree, 2007: 215). There are a number of different types of reliability, namely: test-retest reliability, equivalent form reliability, split–half reliability and internal reliability. These will be discussed in paragraphs to follow.

(i) Test-retest reliability

Test-retest reliability of an instrument is determined by administering the instrument to the same subjects on two or more occasions (Maree, 2007: 215). The results of the first data collection are compared with the results of the second or third data collection by calculating a coefficient. In the context of this study a pre-test and post-test were conducted using the same questionnaire as a data collection instrument.

(ii) Equivalent reliability

This form of reliability is obtained by administering the instrument and, then on a second occasion, administering an equivalent instrument-measuring the same construct-to the same subjects. Comparing the two sets of scores by means of a correlation coefficient gives the degree of this type of reliability of the instrument (Maree, 2007:215). In the current study, equivalent form reliability is obtained by administering the questionnaires during pilot study and, then during investigation.

(iii) Internal consistency reliability

Internal consistency reliability is the extent to which all the items within a single instrument yield similar results (Leedy, *et a*l, 2005: 93). It measures the extent to which parts of a test or item measure a single construct. It is essential that the instruments used should be reliable in all respects. The reliability of the instrument influences the validity of that instrument. This means that if the instrument is not reliable, it cannot be valid. The questionnaires used were reliable in all respect, it produced same results even during pilot study.

4.4.2 QUALITATIVE OBSERVATION

Observation is a complex data collection tool which allows a researcher to play a number of roles and use a number of techniques including the own senses (Manolica, Bobalca and Ciobanu (2011: 40). Maree (2007: 83) defined observation as 'the systematic process of recording the behavioural patterns of participants, objects and occurrences without necessarily questioning or communicating with them.' The current study used complete observation as a data gathering

tool in the qualitative approach. In this case, the researcher is a non-participant observer looking at the situation from a distant (Maree, 2007: 85). The researcher had the opportunity to gather 'live' data from 'live' situation. Hui-chun and Cheng (2013: 52) posits that 'live' data on what is occurring cannot be obtained from any other sources and is usually the only available first-hand information, as documents and interview provided only second hand information. The researcher had the opportunity to look at what was taking place in site rather than an interview which is a second hand information.

The researcher observed activities, noted events and recorded them on an observation scheduled (refer to appendix 14). Observation like all other data collecting tools has both advantages and disadvantages.

4.4.2.1 Advantages of observation method

Barbie and Mouton (2007: 295) explain the following advantages of using observation as a data gathering technique;

- It allows the researcher to collects 'live' data from natural setting
- It forces the observer to familiarise himself or herself with the subject under investigation,
- It allows previously unnoticed or ignored aspect to be seen.
- People's action are probably more telling than their verbal accounts and observing these are valuable.

4.4.2.2 Disadvantages of observation method

The most important limitation of complete observation is that:

- The researcher does not become immersed in the situation and does not really understand what he or she observes.

4.4.2.3 Recording observation

Recording of data is the essential part of observation. Maree (2007: 85) suggests that in recoding observation one should capture two dimensions namely thick description of what took place and reflection about what happened for instance one's own thought or ideas about the meaning of what was observed. Notes were hand written at the time of observation and reflection done immediately after observation. The researcher made notes on what he observed and wrote some thoughts on what he felt are the interesting issues raised both about the setting itself and about the process involved in gathering data.

4.4.2.4 Trustworthiness

The researcher crystallised from observation information that can be compared with what has emerged from other data gathering strategies. The observation was also done over extended period of time to ensure the trustworthiness of his observation (Maree, 2012: 87).

4.5 POPULATION AND SAMPLING OF THE STUDY

Bless, Higson-Smith and Kagee (2006: 98) define population as the entire set of objects or people whom are the focus of the research and about which the research wants to determine some characteristics. UMkhanyakude Education District comprises of 150 secondary schools and 219 primary schools. The population of this study is 150 secondary schools of which 15, (10%), schools were sampled for this study. Bless, *et.al,* (2006: 98) define sample as a subset of the whole population which is actually investigated by a researcher and whose characteristics will be generalised to the entire population. The term 'sampling' is used in this study to refer to the manner in which respondents were selected from schools. Sampling is categorised into probability sampling and non-probability sampling. Probability sampling is based on the principle of randomness (Maree, 2007: 172). Random selection means that each element in the sampling frame has an equal and independent chance of being selected for the sample (Durrheim, Painter & Terre Blanche, 2009: 134). Nonprobability sampling refers to any kind of sampling where the selection of elements is not determined by the statistical principles of randomness (Durrheim, *et al,* 2009: 139). Nonprobability sampling includes quota sampling, snowball sampling, convenient sampling and purposive sampling. In the context of this study,

the non-probability, convenient and purposive sampling was applied as the means of selecting respondents from the identified schools. Convenient sampling occurs when a population element is selected for inclusion in the sample based on the ease access and willingness to participate. (www.limat.org/data/research/Research%20-methodology.pdf-India). On the other hand purposive sampling is the selection of a unit or segment according to the researcher's judgment about which respondents are appropriate to the study. Thus the study embraces convenience and purposive sampling because participants were easily accessible and the researcher believes that they possess certain knowledge and skills vital for the study as they were educators and learners of Life Sciences, Geography and Agricultural Sciences. Convenient sampling assisted the researcher recruit the respondent who were available, volunteers, enthusiastic and willing to partake in the research study. The following table indicates the sample size selected for this study.

Table 4.1 Sample size

UMKHANYAKUDE DISTRICT EDUCATION					
Name of Circuit	Number of Schools	Number of Educators	Number of Admin Clerks	Number of Learners	Total
Tshongwe	2	6	2	14	**22**
Lebombo	2	6	2	14	**22**
Sambane	2	6	2	14	**22**
Jozini	2	6	2	14	**22**
Manguzi	2	6	2	14	**22**
Hlabisa	1	3	1	7	**11**
Big Five	2	6	2	14	**22**
Mbazwane	2	6	2	14	**22**
Totals	**15**	**45**	**15**	**105**	**165**

In this study, the research sample comprises of fifteen Secondary Schools in eight circuits of uMkhanyakude Education District. In each identified secondary school, three (3) educators, one (1) administration clerk and seven (7) learners were conveniently sampled (see appendices 4-9). Respondents had to respond quantitatively and qualitatively through a questionnaire (appendices 10-12) and observation schedule (appendix 13), respectively. The qualitative approach of the questionnaire is demonstrated in section C where the respondents had to describe and explain the situation as it occurs in their schools. The collected mass of data are

summarised and presented in a way that communicates the most important features. Data analysis process will be discussed at a later stage in this chapter (see appendix 14).

4.6 DEVELOPMENT OF RESEARCH INSTRUMENTS

4.6.1 Questionnaire

The questionnaire was designed to collect data in relation to an evaluation of the role of environmental education in promoting sustainable living in secondary schools.

Three sets of questionnaires were developed, one for learners (see appendix 10), one for educators (see, appendix 11) and one for administration clerks (see appendix 12), for this study. Demographic factors of a population, for example gender and age were included in the questionnaires, because, the researcher wanted to have a clear understanding of the population under investigation. The contents of each questionnaire focused on the following aspects of environment and sustainability:

Section A:

1. Socio-economic aspect (Demographic factors)

In this section questions related to type of employment, income, source of water supply, source of light, type of toilet system, building material of the school and status of the school were developed to determine the poverty status of the school. This was a multiple choice questions. Questions in this section included questions on age and gender of respondents or participants.

Section B

In section B the respondents were required to indicate the extent to which they agree or disagree. The respondents weighed each item on a Likert scale from strongly agree (4), agree (3), disagree (2) or strongly disagree (1). In the current study the highest scale of 4 indicates the most desirable activity or more sustainable activity. Respondents had to indicate their choices by

make a tick on the space provided. Section B has three sub-sections namely environmental awareness, resource utilization and behaviour and attitude.

1. **Environmental awareness:** This section had eight questions which assessed the level of environmental awareness of the responded.

2. **Resource utilisation**: This section assessed the rate at which the resources were utilised and whether resources were sustainable or unsustainable utilised.

2.1 **Transport**: The questions in this sub-section assessed the mode of transport used by respondents in order to determine their contribution to the air pollution and global warming.

2.2 **Energy saving or conservation**: The questions were set to assess how respondents utilise energy in the school and seek ways to improve and save energy.

2.3 **School Grounds**. The questions asked were related to the school beautification by keeping the school green. They also emphasised the importance of school garden.

2.4 **Water Conservation/ water-wise**. The questions in this section were closely monitoring water wastage and encourage sustainable use of water. They emphasised water wise strategies.

2.5 **Purchasing and Consumption**. The questions on this section evaluate whether the respondents purchase environmental friendly products or ozone friendly products, biodegradable products and less packaged products.

2.6 **Waste management.** The questions on this section evaluate whether the respondents reduce, recycle or reuse waste.

2.7 **Environmental responsible behaviour**: This section is concerned with the attitude of respondents towards sustainability and sustainable use of resources.

Section C

In this section only two questions were asked. The study seek to find out if the respondents understand the concept under investigation, namely, ‘sustainable living’.

4.6.2 Observation schedule

The researcher observed, noted and recorded events and activities as they unfold in the observation schedule (see appendix 13). The study used unstructured observation schedule. In the current study observation was employed to obtain data regarding:

- physical setting - physical environment and its organization,
- human setting – about organization of people and their characteristics,
- the international setting – about planned/unplanned, formal and informal interaction and
- the programme setting – about the resources of an organisation (Morrison (1993) in Cohen, Mancon and Morrison, (2007 :305).

The observation schedule was comprised of the investigated aspects, activities observed and researcher's reflection. Investigated aspects include the following:

1. **Environmental awareness**: This section allowed the researcher to indicate any proof or sign of environmental awareness.
2. **Resource utilisation**: This section assessed the rate at which the resources were utilised and whether resources were sustainable or unsustainable utilised.

2.1 **Transport**: This sub-section assessed the mode of transport used by respondents in order to determine their contribution to the air pollution and global warming.

2.2 **Energy saving**: The aspect was designed to assess how respondents utilise energy in the school and seek ways to improve and save energy.

2.3 **School Grounds**. This category required that the researcher observes the school grounds. They also emphasised the importance of school garden.

2.4 **Water saving**. This section sought to find out whether water wise strategies or water wastage is at stake.

2.5 **Purchasing and Consumption**. This section evaluates whether the respondents purchase environmental friendly products or ozone friendly products, biodegradable products and less packaged products.

2.6 **Waste management**. This section sought to find out how waste is produced and managed in the school.

4.7 DATA COLLECTION PROCESSES

The research study evaluates the role of environmental education in promoting sustainable living in secondary schools. The data was collected by using questionnaires and observation schedule. Three sets of questionnaires were administered. Before collecting data from the schools certain procedures were to be followed. The process of collecting data, started by seeking permission from the Department of Basic Education in KwaZulu-Natal (see appendix 1). The permission was granted with conditions under which the study was to be conducted (refer to appendix 2). Permission was then sought from the District under which the study was to be conducted and then cascaded the information to its circuits and identified schools. The researcher also sought permission from the Principals of the identified schools (refer to appendix 3). The approval letter from the Department of Education was also brought to the school. After the principals understood the purpose of the study, they were requested to summon relevant educators, administration clerk and identified learners willing to participate in the study. Parents of learners conveniently selected were invited to meet the researcher at school. The purpose of the study and the research process were explained to all participants and parents. On agreeing, parents signed concession forms (see appendix 7) as a proof of granting permission.

The respondents were subjected to the same data collection tool in two phases. Phase one: Respondents were pre-tested, before the implementation of environmental education programmes to evaluate their current and previous knowledge, skills behaviour and attitudes towards various environmental issues especially focusing on air, water, biodiversity, conservation, transport, consumption, greening the school and waste management.

After pre-testing respondents were exposed to active environmental education programmes which included various teaching and learning strategies such as fieldwork, hands on exercise, visit to the nearest game reserve and viewing Television programmes such as Geographical Wild, 50/50 and other DVD on nature conservation and climate change. These programmes were concerned with wonders of life that offer many fascinating natural phenomena that provoke thought and stimulate curiosity. Learners are likely to understand the natural world if they work directly with natural phenomena, using their senses to observe, using instruments to extend the power of their senses.

Phase two: At the end of the implementation of environmental education programme, the respondents were post-tested using similar questionnaires that were used for the pre-test. Concurrently the respondents were subjected to observation.

4.8 DATA ANALYSIS

Hatch (2002: 148) defines data analysis as organizing and interrogating data in ways that allow researchers to see patterns, identifying themes, discover relationships, develop explanations, make interpretations, mount critiques, or generate theories. In this study, data analysis is defined as a process of organising and interrogating collected data in order to find answers to the research question. Throughout the data analysis process, researchers index and put collected data into as many categories as possible (Vassiljev, 2010:11). Data analysis in this study occurs within the quantitative approach and qualitative approach and often between the two approaches.

4.8.1 Qualitative approach

In the qualitative approach, the researcher needs to go through a process called content analysis. Content analysis is a systematic replicable technique for summarizing communicated material into fewer content categories following the explicit rules of analysis in order to ascertain its meaning (Stemler, 2001:1 and Erisen, 2015: 23). It enables the researcher to sift through large volume of data with relative ease in a systematic fashion (Erisen, 2015: 23). In the current study content analysis means analysing the contents of the observations and open-ended questions of the questionnaires, in order to identify the main themes that emerge from observations and the responses given by the respondents. The process of analysing content, according to Dawson (2002) involves the following steps:

- Identification of the main theme. The researcher needs to carefully go through the descriptive responses given by respondents to each question in order to understand the meaning they communicate.
- Assign codes to the main themes. The rese archer selects few responses to an open-ended question and identifies the main themes.

- Classification of responses under the main themes. At this stage the transcripts of all questionnaires and observations are visited and classified under different themes.
- Integration of themes and responses into the text of the report (adapted from Dawson, 2002: 34).

In discussing the main theme that emerged from the study, the researcher used verbatim responses to keep the feel of the response (Dawson, 2002:34).

4.8.2 Quantitative approach

In the quantitative approach data is analysed through manual or through the help of a computer. Data analysis in the quantitative approach involves methods like the frequencies of variables, differences between variables, statistical tests designed to estimate the significance of the results and the probability that they did not occur by chance. This is basically done by counting how often something appears in the data and comparing one measurement with others (Hancock, 2002: 16). In this study collected data from the structured questionnaires were translated into numerical codes, captured into SPSS version 16.00 software of a computer programme, where they were analysed in terms of percentages, mean scores and Chi-square statistics.

4.8.2.1 Wilcoxon Signed-Rank Test and Sign Test

The Wilcoxon signed- rank test was employed for this study. The test is a 'non-parametric test' which resembles the t-test when two variables are compared in a single sample, such as pre-test and post-test scores come from one group (Maree, 2007: 231).The Wilcoxon signed rank test is used in similar situations as the Mann-Whitney U-test, however they differ in that, the Mann-Whitney U-test tests two independent samples, whereas the Wilcoxon sign test tests two dependent samples. The Wilcoxon signed rank test pools all differences, ranks them and applies a negative sign to all the ranks where the difference between the two observations is negative (www.StatisticsSolution.com, accessed 25 January 2016). This is termed as, signed rank. The sign test was also used. The sign test has the null hypothesis that both samples are from the same population. It compared the two dependent observations and counts the number of negative and positive differences and it uses the standard normal distributed z-value to test of

significance and (www.StatisticsSolution.com, accessed 25 January 2016). The statistical analysis was done by means of SPSS 23.0 Statistical Package Programme for windows. The aim of using the Wilcoxon test was to determine whether two sets of data (pre and post data) were significantly different from each other, after the implementation of environmental education programme.

4.9 PILOT STUDY

The research instruments need to be piloted before administering them in the main study (Skosana, 2010: 123). Pilot study was conducted to one school with similar attributes to those under the study. Pilot study assisted the researcher in determining flows, limitations or other weaknesses within the questionnaire and observation schedule. New insights were derived from the errors pointed out during pilot study and were corrected prior to the actual study.

4.10 ROLE OF THE RESEARCHER

In the current study, the researcher played multiple roles as quantitative and qualitative researcher. As a quantitative researcher, the researcher measured and recorded objectives, closed-ended-data and then conducted statistical analysis on numerical data, while, as the qualitative researcher interprets subjective, open-ended data (Suleiman, 2010: 48). The role of the researcher was both investigative and developmental than that of intervention (Toddun, 2000: 110).

4.11 ETHICAL CONSIDERATION

Collecting data through any method mentioned above may involve some ethical issues in relation to the participants, the researcher and colleagues or people to whom to present the reports or findings. Ethics are concerned with beliefs about what is right or wrong from a moral perspective (MacMillan and Schumacher, 2010: 117). The following principles and guidelines are pivotal for any educational research.

- Full disclosure or deception - researchers should generally be open and honest with participants about all aspects of the study. This means that the researcher must make

full disclosure of the purpose of the research. In the present study the researcher explained the purpose of the study and how it will contribute to education in general, to all participants before the commencement of the study.

- Seeking consent - it is considered unethical to collect data without prior knowledge of the participants and their expressed willingness and informed consent. Consent for learners to participate was sought from the Department of Education, school principal, educators, learners as well as their parents (refer to appendix 1-8). It was also explained that they can terminate their participation at any time.
- No harm or risk to participants - research should never result in physical or mental discomfort, harm or injury to the participants. This includes revealing information that may result in embarrassment or danger to home life and school performance. In the current study questions seeking information which may cause discomfort, anxiety, harassment and dehumanizing were totally avoided.
- Maintaining confidentiality - the privacy of research participants must be protected at all times. It is unethical to share information about a respondent with others for purposes other than that of research. In the current study, research participants were assured that their names will not be revealed in any way and that the information provided will be kept anonymous.
- Provision of incentives - it is ethical to provide incentives to participants for sharing information because they are giving their time, however giving them before data collection is unethical. No incentives were given to the participants since the researcher had no budget for that however refreshments were served after the meetings.
- Sensitive information - certain types of information can be regarded as sensitive or confidential by some people and thus an invasion to their privacy, asking for such information may upset or embarrass a respondent. In this study personal or sensitive information was never asked because the researcher respects participants' privacy.

Participants were treated with great respect and a high standard of confidentiality was maintained at all times. This gave them satisfaction and confidence to participate in the study without fear and prejudice.

4.12 EE PROGRAMME PROMOTING SUSTAINABILITY

Sustainability requires teaching and learning strategies that enhance knowledge and understanding, promote ethical and critical reasoning, and motivate and equip young people to participate in community affairs (Fien, 2001: 23). The major aim of administering environmental education programmes was to foster the acquisition of knowledge, environmental responsible behaviours, attitude and environmental skills. The active EE programme covering environmental issues such as air, water, biodiversity conservation, waste management, sustainable purchasing and consumption were offered to participants. In this study a variety of instructional strategies and experiential approaches were employed to inspire environmental stewardship and responsible citizenship. Some of these instructional strategies included classroom teaching, class discussion, hands-on activities, field trips, nature walks and television programmes. Television programmes were used to raise various concepts of environmental awareness such as conservation of wild animals and natural resources. Hands on activities such as greening the school grounds and recycling were carried out with the assistance of agricultural sciences or life sciences classes. Some schools had no trees, or plant cover, the soil was just bare soil and it was susceptible to erosion. School had to decide whether they wish to pursue gardening project or planting of indigeneous and fruit trees. The schools which chose to pursue planting of trees were taught many techniques of propagation such as cutting, budding and grafting. The economic importance of plants was also discussed.

The study used the Plan-Do-Check-Act model (P-D-C-A) of Environmental Management System (EMS) as the model for implementation of environmental programmes designed for participants to analyse, control and reduce environmental impact (see figure 2.1).

Stage 1: Planning- In this phase participants met to discuss the impact of the school activities and the results of the pre-test. They identified environmental issues, prioritised them and set environmental goals and targets. The participants established the programmes which were later scrutinised and refined by the researcher. An action plan was established defining who, what and when the tasks would be accomplished and what resources are required.

Stage 2: Do – This stage is referred to as the implementation stage. The roles and responsibilities of participants were defined and communicated. We also requested learners

registered for agricultural sciences and Life sciences together with their educators to assist in some school activities. All the activities outlined in table 4.2 were carried out during this stage.

Stage 3: Checking and Corrective Action – During this stage the same questionnaire that was administered during the pre-test evaluation is re-administered as a post- test evaluation. This was done to check if there were any significant improvements in the knowledge, skill, and attitude of participants after the implementation of environmental programmes.

Stage 4: Management Review and Act – During this stage participants reflected about the whole programme and their experiences were communicate and cascaded to the whole school community and relevant authorities.

The following EE programme was designed for the purpose of this study.

Table 4.2 Environmental Education Programme (developed for the study)

Environmental programme	Instructional strategy
1. Environmental Awareness	• Viewing Television Programmes(DVDs) and • Classroom teaching including • Debates, symposium, discussions; • motivational speaker in the assembly, and • role play of environmental concepts such as pollution, loss of biodiversity, consumption, deforestation and climate change • School show
2. Biodiversity Conservation through nature connectedness	• Field trip to Isimangaliso Wetlands. • Outdoor education, backyard • This aroused participants' interest and curiosity about the ecosystems, food pyramid, habitat, • It is brain friendly exercise
3. Water, energy and environmental friendly products, purchasing and consumption	• Checking water licks, water bills and testing for water quality. • Identify (repair) broken water tanks for water harvesting, leaking taps and broken toilets • Checking energy consumption and calculating electricity bills and recommending energy efficient globes. • Comparing meter reading (for water & electricity separately) from the beginning to the end of the programme). • Identify unnecessary energy & water uses • Use environmental friendly products • Purchase recycled paper

4. Gardening or Greening the school grounds	Hands-on activities: • planning & planting vegetables garden • planting of flowers and fruit trees • (botanical garden)
5. Waste Management	Hands on activities: • pick-up waste, • sorting and classifying waste into paper, glass and plant and animal origin, • recycling, reusing and composting • generate cash by selling products made from waste, • Send waste paper to Mondi Paper Recycling, • Send bottles and aluminum cans to Richard's Bay Recycler

On completion of the programme, respondents were afforded the opportunity to express their feelings and experiences about their environment. They were also encouraged to report to the whole school.

4.13 BENEFITS OF ENVIRONMENTAL EDUCATION PROGRAMME

EEP afford learners with the opportunity to connect with nature, where we belong to. They realise that nature and learning about the environment is all around them and they are, themselves part of nature. Many learners have not experienced outdoor programmes (Chapman, 2014: 4) so this is their golden opportunity to explore nature and gain new experiences in nature. Learners gain knowledge and appreciation of the environment and understanding of the importance of conservation of school and local resources. They become naturally connected to nature, EEP and collaboratively constructing knowledge, developing love and interest in their environment.

4.14 CHALLENGES FACING EEP IMPLEMENTATION

As good as a programme may be, it poses some challenges which must be overcome. Some of these challenges includes inter alia the following:

Lack of funding is the main obstacle for the implementation of environmental education initiative in secondary schools. There is no budget for these initiatives from schools, government or Non-Governmental Organisations. The curriculum is over packed and EE adds a burden over and above the constellation of curriculum and is presented as fragmented pieces

of something. It requires time for the competing initiatives for which teachers are accountable and therefore lack support as there are no incentives for prolonged hours of programme implementation.

4.15 EVALUATION OF ENVIRONMENTAL EDUCATION PROGRAMME

Evaluation means a systematic assessment of the operations and or the outcomes of a programme or policy, compared to a set of explicit or implicit standards as a means of contributing to the improvement of the programme or policy (Weiss, 1998 in Thomson and Hoffman, 2003: 12). Evaluation then as used in the current study means assessing the worth or value of environmental education in promoting sustainable living. It can be used to mark the end of one cycle or it can also be used to mark the beginning of the next cycle if the results of the evaluation are used to learn about the effectiveness of environmental programme and inform future plans. In order for an educational programme to achieve a long-lasting effects, a change in terms of knowledge, skills, and behaviour has to take place. Without the evaluation of the effectiveness of the programme, one would not be able to determine what contributed to the success or failure of the overall initiative (Bettinger, Kuhar, Lehnhardt, Cox and Cress, 2010: 445). Evaluation of a programme allows us to judge whether programmes delivered intended or unexpected information (Bettinger, *et.al*. 2010: 448). There are two forms of assessment as perceived in the current study.

4.15.1 Formative evaluation

"Baseline assessment is usually used at the beginning of a phase or grade or learning experience to establish what learners already know, what they ca do or what they can value" (http://www.dbe.gov.za, accessed 10 January 2016). Formative assessment is developmental (http://www.dbe.gov.za, accessed 10 January 2016). It is embedded in the unit or instruction and serves as a road map to the learning. It takes place before or during the implementation period with the aim of improving the programme. Formative evaluation employs quantitative methods. In the current study, pre-test was administered as formative evaluation to judge or assess respondents' current knowledge and understanding, skills and attitude towards their environment with the aim of improving them. The questionnaires were used as data collection method in the quantitative approach.

4.15.2 Summative evaluation

Summative evaluation takes place during and following the programme implementation. 'It gives an overall picture of the achievement of a learner at a given time (http://www.dbe.gov.za, accessed 10 January 2016) for example at the end of the programme. In the current study it was done during the implementation stage as observation of the respondents continued and after the programme implementation, as a post-test with the aim of providing information about the effectiveness of the environmental education in promoting sustainable living. Summative evaluation assists the researcher to develop a better understanding of the process of change and finding out what works best and what does not and why? It also assist to gather knowledge to learn and improve future project design and implementation.

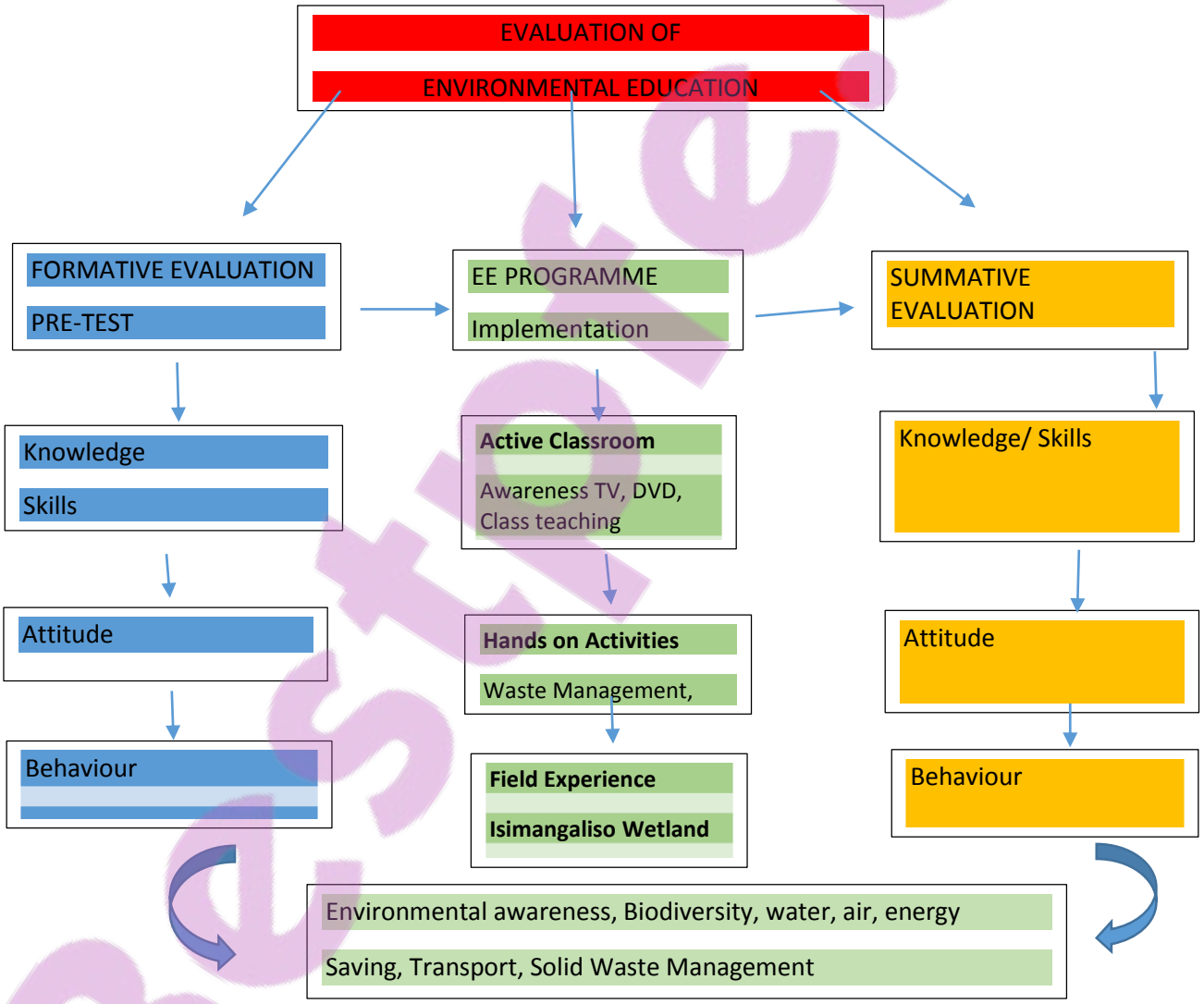

Figure 4.1 Schematic diagram of Evaluation of EE Programme (adapted from R Alexandar & Poyyamoli, 2014: 5)

4.16 SOURCES OF ERROR IN EVALUATION

Sources of error in evaluation means the characteristics of a research that compromise what can be learnt from it (Jull, 2003: 25). Error may be derived from a variety of sources and most of them are problematic than others.

4.16.1 Coverage for every potential target

Coverage refers to how much evaluation allows for every potential target member to be included in the study (Jull, 2003: 25). Not all secondary schools were covered in the study however 10% of the total secondary schools in the district were selected.

4.16.2 Timing

This type of errors occur when the evaluation happens too early or too late after the programme so that it impacts the outcomes of the assessment (Jull, 2003: 30). In the current study, the implementation of environmental programmes started very late after the pre-test was administered. Timing error could have happened since there was a delay in the implementation of EEP.

4.17 SUMMARY

The main focus of this chapter was on the research designs and methodology as applied in this study. The study employed both quantitative and qualitative methods hence mixed methods. In the quantitative method, a questionnaire was used and in the qualitative method a semi structured observation schedule was used as a data collecting tools. Qualitative approach as well as quantitative approach has its own merits and demerits and were outlined. The validity and reliability of the research instruments as well as the ethical consideration in relation to participants were discussed in details. Evaluation of environmental education programme in terms of formative and summative evaluation was considered. The next chapter focused on the presentation and the discussion of research results.

CHAPTER 5
PRESENTATION OF THE RESULTS

5.1 INTRODUCTION

This chapter presents the results and interpretations of the study. The presentation is divided into three, section, firstly it describes the demographic profile of the respondents and the school profile. Secondly, it presents the results of the questionnaire (section B), resource utilisation and thirdly, it presents the analysis and the interpretation of the qualitative as well as quantitative research.

5.2 QUANTITATIVE ANALYSIS: QUESTIONNAIRE

The questionnaire contains various questions on the role of environmental education in promoting sustainable living. The questions were answered by 105 learners (7 from each of 15 different schools), 45 educators (3 from each of 15 different schools) and 15 administrative staff (from each of 15 different schools). The same questionnaires were administered before (as a pre-test) and after (as a post-test) the implementation of Environmental education Programme. The main purpose of the analysis was to determine the role of environmental education in promoting sustainable living and to determine whether the responses to the questions pre and post Environmental Education Programme were significantly different. The respondents were required to state whether they strongly disagree' (coded 1), 'disagree' (coded 2), 'agree' (coded 3) or 'strongly agree' (coded 4). 'Agree' or 'strongly agree' indicates a correct or desirable answer or positive attitude whereas 'disagree' or 'strongly disagree' indicates an incorrect or undesirable answer or negative attitude towards the environment.

5.3 DEMOGRAPHIC FACTORS OF RESPONDENTS

The questionnaire requested general demographic information including gender and age of respondents and the following results were sought.

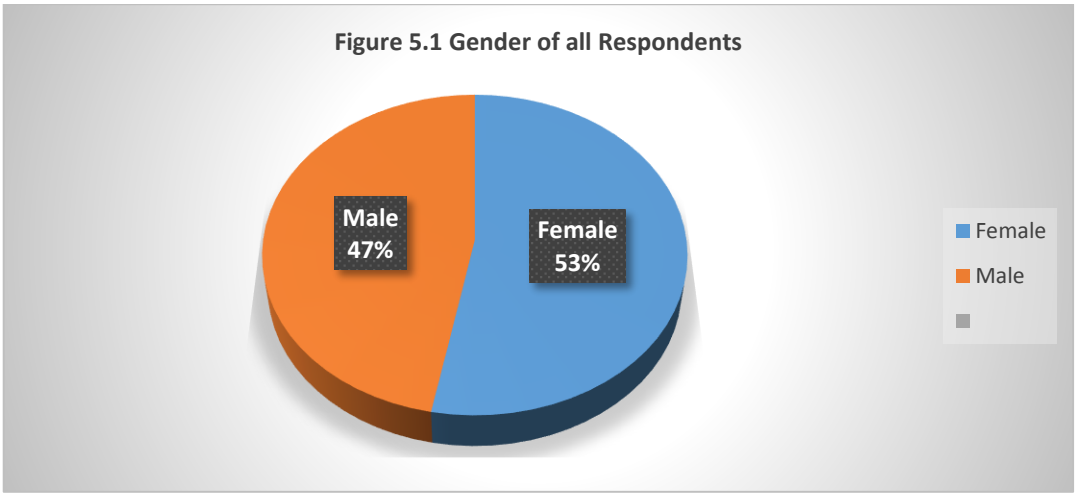

Figure 5.1Gender of all respondents

The information depicted in figure 5.1, gender of all respondents reflected that 87 respondents identified themselves as females (53%) and 77 respondents identified themselves as males (43%). This indicates that females were more participative than males.

Table 5.1 illustrates the different ages of learners, educators and administrative staff.

Table 5.1 – Age of all respondents

Age	Learner	Educator	Admin	
	Frequency	Frequency	Frequency	Totals
15 or younger	22	0	0	22
16-19	83	0	0	83
20-30	0	15	7	22
31-40	0	16	7	23
41 or older	0	14	1	15
Total	105	45	15	165

Table 5.2 above indicates that out of 165 respondents to the question about age range, 150 persons (90.9%) indicated that they were 35 years or less years older while persons (9.1%) indicated that they were above 35 years old. This shows that most of the respondents were youth. The youth is the relevant people to bank knowledge with and to cascade environmental and sustainable concepts to others including their parents at home.

5.4 SCHOOL PROFILE BY LEARNERS

The school profile is presented under the following sub-headings:

5.4.1 Household income

Table 5.2 – Household monthly income

Monthly income	Frequency	Percent
under 3999	73	70
4000-9999	18	17
>10000	14	13
Total	105	100

The mean monthly income for the families of respondents is R2000. The majority of learners (70%) indicated that their household monthly income is far less than R3999 and 17% of learners indicated that their household monthly income is between R4000 and R9999 and very few (13%) earn above R10000.

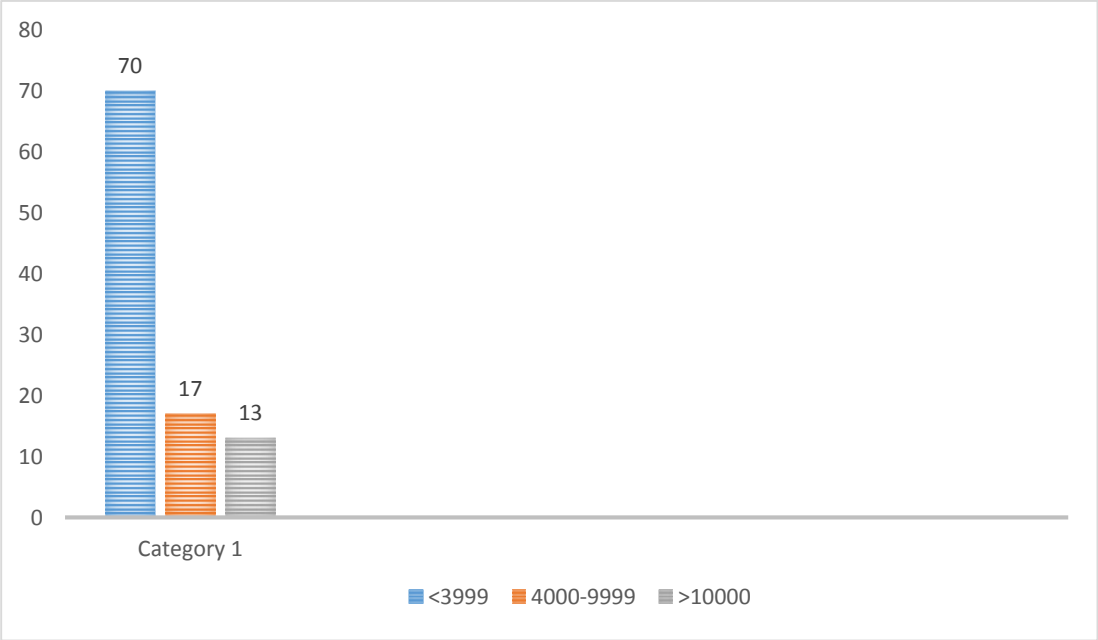

Figure 5.2 Household Monthly income

5.4.2 Source of income

Table 5.3 – Source of income

	Frequency	Percent
Agriculture	27	25.7
state grant	71	67.6
Employed	7	6.7
Total	105	100

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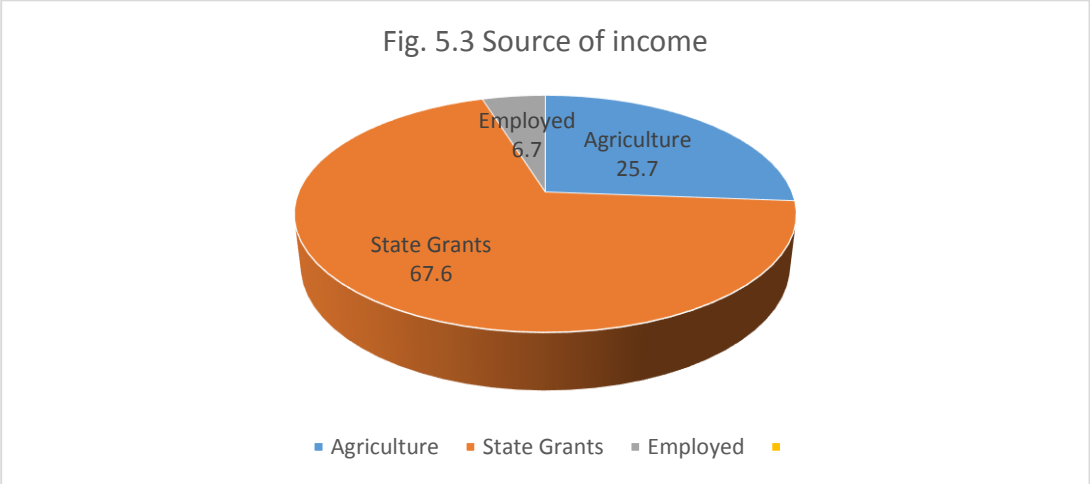


Figure 5.3 Source of income

The rate of poverty is very high in this area, nearly 68% depends on state grants and have no work. The 26% of respondents depend on subsistence farming. Nearly 7% is employed and earn between R5000 and R10 000. The level of education is also very low, this exacerbate the issue of poverty.

5.4.3 Water supply

Information on table 5.4 outlines the results of the questions on water supply at school.

Table 5.4 – Water supply at school

Supply	Number of schools	Percent
Tank	10	66.66
Borehole	1	6.67
pipe water	4	26.67
Total	15	100

The majority of schools (67%) have tanks to collect rain water. Harvesting rain water is one of the sustainable methods of saving water. Pipe water accounts for 27% and underground water accounts for approximately 7%. Water is a very scarce natural resource, it should be conserved and used sparingly.

5.4.4 Source of energy

Table 5.5 presents information on the sources of light the school have. A variety of sources were provided, namely, Generator, Nura (solar home system) and Eskom.

Table 5.5– Source of energy at school

Source	Number of schools	Percent
Generator or None	1	6.67
Nura (Solar home system)	1	6.67
Eskom	13	86
Total	15	100

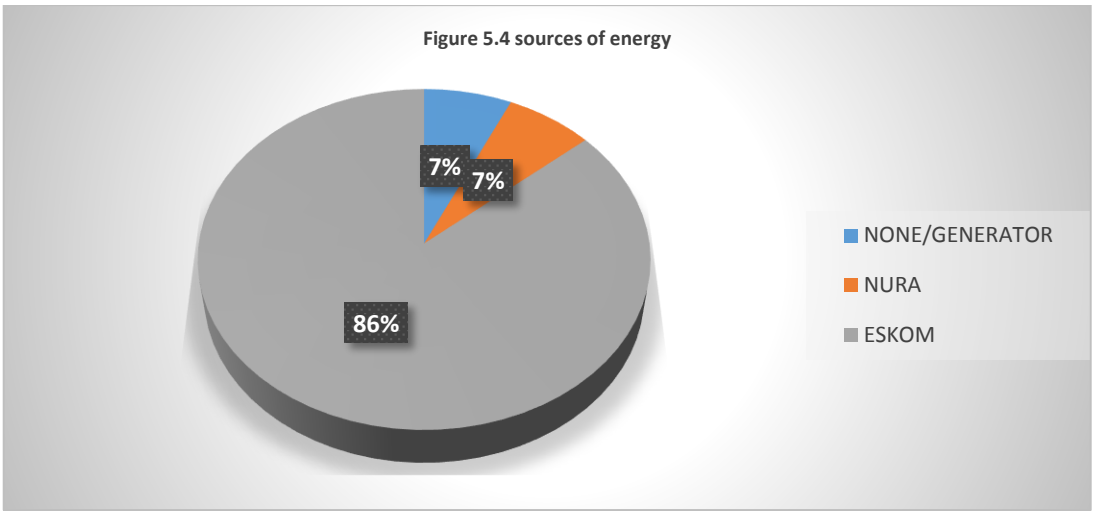


Figure 5.4 Energy source

The vast majority of schools (86%) have electricity supplied by Eskom as source of energy. Nura is another source of energy and very few schools (7%) utilises this source of energy and another 7% of schools use generator or have no electricity at all. Nura is a source of energy which is less polluting and less expensive as compared to other sources.

/

5.4.5 Toilet system

Table 5.6 presents the results of the question on type of toilet system the schools possession.

Table 5.6 – Toilet system at school

System	Number	Percent
Pit	14	93.33
Flush	1	6.67
Total	15	100

The vast majority of schools (93%) have the pit toilet system. Schools with flush toilets accounts for nearly 7%. This implies that water and sanitation is poor in schools under Umkhanyakude District.

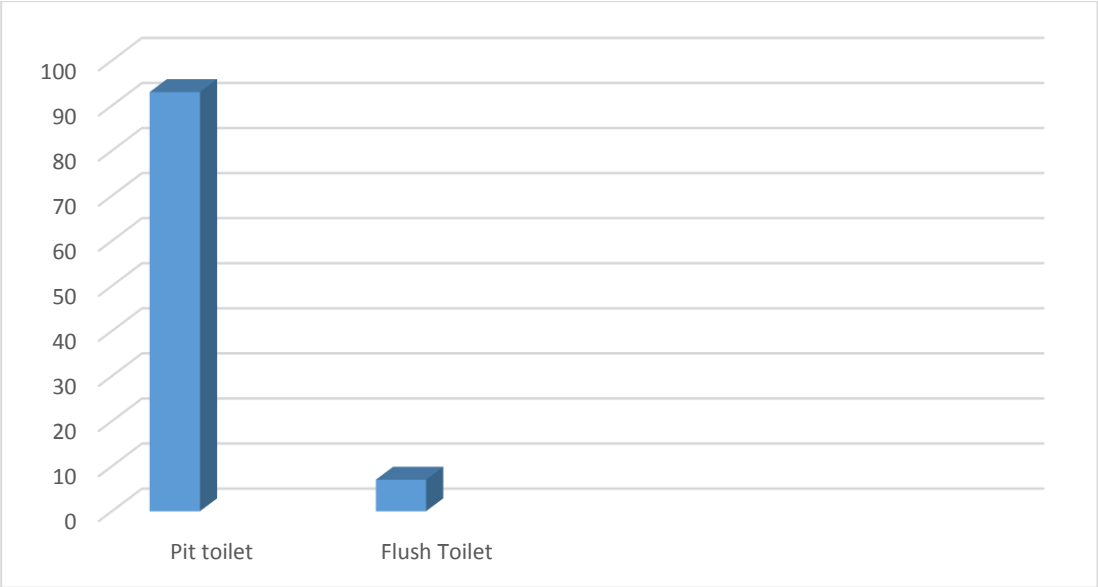


Figure 5.5 Type of toilet system

5.5 SCHOOL PROFILE: BY EDUCATOR

The questions in Section A of the questionnaires are part of the school profile. Educators had to account about how the school is constructed, the sources of water and electricity the status of the school and the type of toilets the schools possess. The results are tabled and graphical represented in section 5.4.1 below.

5.5.1 School construction

Table 5.7 – School construction

Construction	Frequency	Percent
Blocks & Asbestos	15	33.3
Blocks & Zinc	30	66.7
Mud & Zinc	0	0
Total	45	100

Two-thirds (67%) of the schools are constructed of blocks and zinc and one third (33%) is made up of blocks and asbestos. Schools constructed of asbestos expose learners and educators to health problems such as lung cancer and mesothelioma. If asbestos fibres are in a stable material

such as bonded in asbestos cement sheeting such as fibro and in good condition they pose little health risk. However, when the asbestos is broken, damaged or mishandled, fibres can become loose and airborne posing a risk to health (http://www.asbestos.com/asbestos, accessed 10 February 2013). Therefore, school roofed with asbestos should take drastic measures to ensure that asbestos is not damaged and if damaged what could be done. This must be included in a school environmental policy.

5.5.2 Status of the school

Table 5.8 illustrates the results of the questions on the status of the schools. Schools can be classified as section 20 or section 21, fee school or no fee school. These statuses can be combined as follows: section 21, no fee school or section 21, fee school; section 20, no fee school or section 20, fee school.

Table 5 8 – School fee status of the school

Status	Frequency	Percent
sec 21 no fee	39	86.7
Sec 21 fee	0	0
sec 20 no fee	6	13.3
Sec 20 fee	0	0
Total	45	100

All schools (100%) are “no fee” schools and 87% of them are section 21. The “no fee” schools do not charge school fees but receive grants from the government to pay for the services rendered at school. Since section 21 schools have the capacity to manage their school monies and procure goods on their own, they are encouraged to purchase goods which are environmental friendly, especially from the recycled materials. Only 13% of schools are “no fee”, section 20, which means that they do not have the capacity to manage their school allocations. All these schools are quintile 1 which means that they are from the underprivileged rural communities.

2.5.3 Services and bills for the schools: educators

The tables 5.9 to 5.15 illustrates the services rendered to schools and compare their annual bills. The questions were about water and electricity supply and their annual bills. The aim was to establish whether these resources are sustainable used and if not determine the causes of unsustainability and to recommend sustainable strategies.

2.5.4 Water supply and water bills

Table 5.9 – Water supply to school

Supply	Frequency	Percentage
rain water/Tank	30	66.66
Borehole/Ground water	3	6.67
Pipe water	12	26.67
Total	45	100

Table 5.9 depicts that only 27% of school have access to safe portable drinking water, 67% depends on rain water and 6% pump their water from the ground. South Africa is a water scarce country. She depends much on summer rainfall therefore, water must be used with great care.

Table 5.10 Water bill

Amount	**Pre-test**		**Post-test**	
	Frequency	**Percentage**	**Frequency**	**Percentage**
1000-6999	21	46.6	25	55.6
7000-9999	12	26.7	15	33.3
10000-15000	12	26.7	5	11.1
Total	45	100	45	100

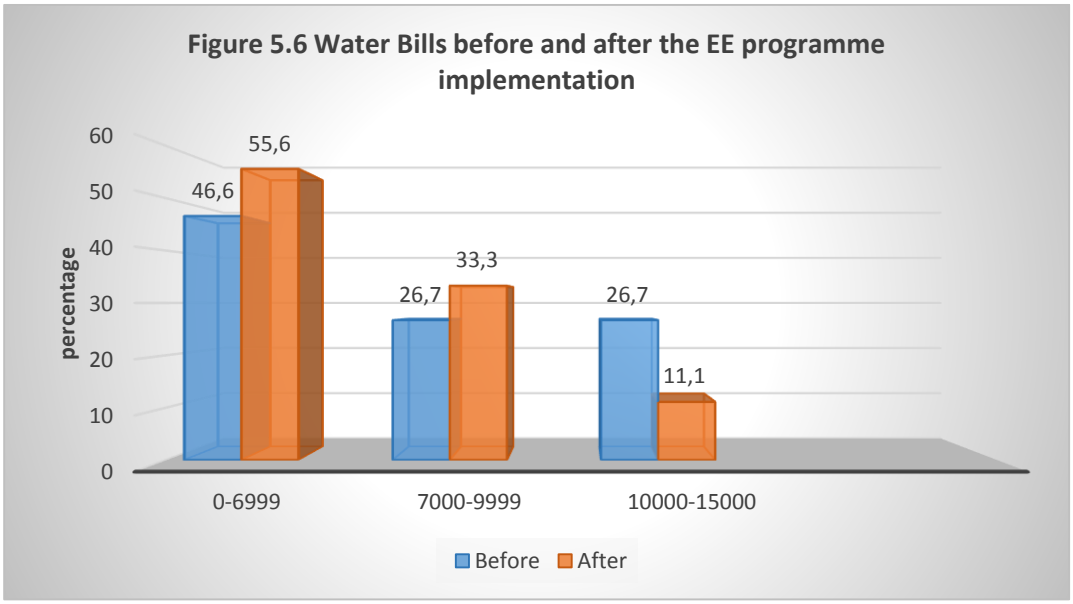
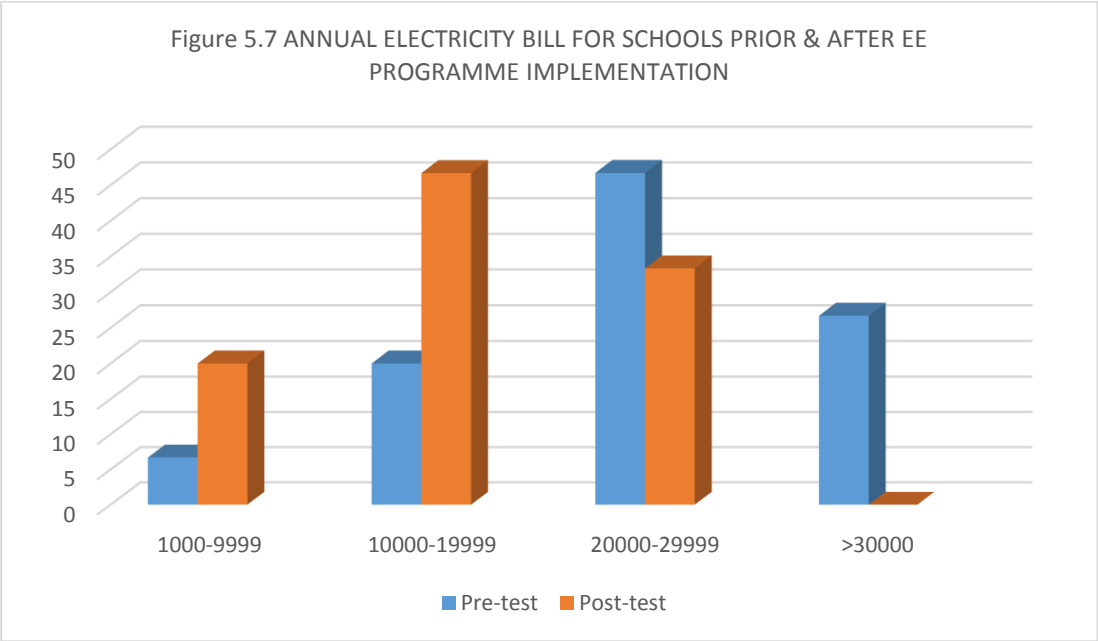


Table 5.10 and the bar graph, figure 5.7 reflect that 27% of schools pay between R10 000 and R15 000 per annum in the pre-test and 11% in the post-test. The highest paying schools decreased by 15% in the post-test. Another 27% of schools payed between R6 000 and R9 000 per annum in the pre-test and increased to 33.3% in the post-test. There were 47% lowest paying schools in the pre-test and that increased to 55.6% in the post test, which payed between R4 000 and R6 000. There results revealed significant water savings and money savings in general. Schools are advised to conduct audit in order to determine the current usage and then to consider how it could be improved. This should be stated in the school environmental policy.

There was a significant improvement between the pre-test and post-test results, The post-test results reveals a great number of school paying less money after EE programmes implementation. This indicates that the EE programmes implemented were effective in managing natural resources.

5.5.5 Annual electricity bills before and after EE Programme Implementation



Electricity supply for most of the schools is supplied by Eskom. Information on the bar graph, figure 5.7 reflects that 27% of schools, pay more than R30 000 for electricity in the pre-test and no school payed the same amount in the post-test per annum. The majority of schools in the pre-test (47%) payed between R20 000 and R29 999 per annum, whereas in the post-test, the majority of the schools paid between R10 000 and R19 999. The paying between 1 000 and R9 999 increased from 7% in the pre-test to 20% in the post-test.

5.5.6 Toilet system

Table 5.11 – Types of toilets

Type	Frequency	Percent
None/very poor state	3	6.7
Pit	41	91.1
Flush	1	2.2
Total	45	100

The vast majority of schools (91%) have pit toilets and 2% have flush toilets. Nearly 7% schools have the biggest challenge of toilets. These schools have no toilets or are in a very poor state to

count them. They are, therefore, regarded as not available. The school management team was alerted about this issue. It is comforting to note that these problems are being attended to by the school. Some of the new toilets and ablution are to their completion to date.

5.5.7 Water supply versus water bills

Table 5.12 – Water type versus water bill

Supply/bill	0.00-60000	7000-9000	10000-15000	Total
rain water	10	0	0	10
Borehole	1	0	0	1
Pipe	0	2	2	4
Total	11	2	2	15

There is a strong association between water supply and the water bill (chi-square = 42.321 with p-value = 0.000). Rain water is the cheapest source of water supply followed by borehole water and the pipe water supply being the most expensive one.

5.6 FINDINGS OF THE STUDY: QUESTIONNAIRE-SECTION B

5.6.1 Socio-economic-factors by learners

The demographic factors for the current study were collected from all participants. The findings reveal that the level of poverty is very high. This is evidenced by the fact that most of the families depend on government's social grants. The findings also depicted that most people are unemployed and could not support the education of their children. The household average income of the families was R2000, per month which is insufficient to cater for the family needs. Poverty as well as poor education are some of the major contributory factors to the unsustainable use of our resources. People over-utilise resources for their personal satisfaction and quest for better life, without considering their impact on environment and future generations. The findings also revealed that there is a correlation between services rendered to schools and bills paid for those services. This means that there was a strong association between water usage and water bills as well as electricity usage and electricity bills. Most schools payed high bills due to high consumption of these resources prior to the Environmental Education

Programme Implementation (EEP) however the post-test results exhibited a decrease in schools paying high bills. This is an indication that EEP was effective in promoting sustainable living in secondary schools.

In all cases the significance (P-value) is less than 0.001 which means that the improvement is significant at the 0.1% level of significance. The differences (Pre – Post) of the responses were computed per item, and the differences were all positive, meaning the respondents gave, on average, a higher rating Post than Pre.

5.6.2 Environmental awareness by learners

Tables 13a-c indicate the differences between the pre and post descriptive statistics for environmental awareness

Table 13a Environmental awareness frequency distributions and descriptive statistics

	Strongly Agree		**Agree**		**Disagree**		**Strongly Agree**	
Question	Pre	Post	Pre	Post	Pre	Post	Pre	Post
q2.1	28	66	34	32	30	5	13	2
q2.2	27	70	32	29	70	4	11	2
q2.3	29	76	29	28	32	0	15	1
q2.4	34	73	36	32	18	0	17	0
q2.5	32	66	32	38	26	1	15	0
q2.6	37	73	23	31	33	1	12	0
q2.7	40	73	30	30	21	2	14	0
q2.8	49	83	23	20	25	2	8	0

The average score for the post-test was 97.6% whereas the pre-test elicited 61%. In the pre-test learners had divided opinion, most questions elicited between 50% and 66%. In the post-test most participants agreed and showed great deal of knowledge and understanding of environmental education concepts. The sign test was performed to compare the pre- and post-test results and the following results were obtained. All respondents gave a higher average rating for the items in question 2 Post-test than Pre-test. In all questions in question 2 the mean Pre-scores were mostly below 3, and the mean Post-scores were all above 3.5. The post-test results revealed that there was a significant difference on learners' skills, knowledge and

understanding about environment compared to the pre-test results. All respondents gave a higher average rating for the items in question 2 Post than Pre.

Table 13b Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
Question 2 Average Pre	105	2.8476	.45069	2.00	3.88
Question 2 Average Post	105	3.6774	.25931	3.00	4.00

Table 13cTest Statistics[a]

	Question 2 Average Post - Question 2 Average Pre
Z	-10.149
Asymp. Sig. (2-tailed)	.000

The post-test results showed great increase in numbers of learners who celebrate environmental days and showed interest in watching EE programmes in Television (TV). The post-test results showed increased in numbers of learners who read environmental books. The post-test recorded high mean score (3.7) compared to pre-test score which recorded 2.8, with a p value of 0.00.

5.6.3 Transport

Table 5.14a-c outline the frequency distribution in relation to transport utilisation.

Table 5.14a Transport frequency distributions and descriptive statistics

Question	Strongly Agree		Agree		Disagree		Strongly disagree	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Q3.1.1	25	75	32	26	41	4	7	0
Q3.1.2	22	76	35	29	22	0	26	0

The pre-test reveals divided opinion (54%) in both questions namely q3.1.1 and 52% in q3.1.2. The post-test results improved drastically. The results for the post-test were 96%, q3.1.1 and 100%, q3.1.2, therefore the average results for the post test was 96% and the improvement was 44%. The sign test was performed to compare the pre- and post-test answers and the results

revealed that the mean scores were more than 3.5 in the post-test and less than 3 in the post-test and the p-value of .000 was obtained.

Table 5.14b Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Difference Q3.1.1 Post - Pre	105	.00	3.00	.9524	1.10402
Difference Q3.1.2 Post - Pre	105	.00	3.00	1.1238	1.09803
Valid N (listwise)	105				

Table 5.14c Test Statistics[a]

	Question 3.1 Average Post - Question 3.1 Average Pre
Z	-8.945
Asymp. Sig. (2-tailed)	.000

The scores were significantly higher in the post-test scores than in the pre-test scores at the 0.1% level of significance.

5.6.4 Energy saving by learners

The following tables depict the frequency distribution of learners in energy savings.

Table 5.15a- Energy savings frequency distributions and descriptive statistics

	Strongly agree		**Agree**		**Disagree**		**Strongly disagree**	
Question	**Pre**	**Post**	**Pre**	**Post**	**Pre**	**Post**	**Pre**	**Post**
3.2.1	32	67	30	36	35	1	7	0
3.2.2	47	83	30	21	19	0	8	0
3.2.3	43	73	35	30	19	1	7	0
3.2.4	56	83	16	20	27	1	5	0
3.2.5	30	77	32	27	24	0	17	0

The post-test results improved almost by 99% for example in the pre-test on q3.2.1 “turning off the lights when not in use”, 59% supported the statement. In the post test on the same question (q3.2.1), 98% supported the statement. In question 3.2.2, 73% supported the statement in the

pre-test and 100% in the post-test. On turning electric appliances off when not in use learners did very well in the post-test by scoring 99%. The post-test reveals that learners have changed their attitude and behaviour in relation to their energy management.

Table 5.15b Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
Question 3.2 Average Pre	105	3.0019	.47336	1.80	4.00
Question 3.2 Average Post	105	3.7257	.24692	3.00	4.00

Sign Test

5.15c Test Statistics[a]

	Question 3.2 Average Post - Question 3.2 Average Pre
Z	-9.644
Asymp. Sig. (2-tailed)	.000

A sign test was also conducted to test the differences between pre and post test scores. When the sign test was performed in question 3.2 the negative differences were nil, positive differences were 95 and 9 ties. The indication was that there was a significant improvement at the 0.1% level of significance. This revealed that there was significant increase in learners' understanding of energy saving skills, and attitude towards energy savings in general. There was great improvement in learners' energy savings skills.

5.6.5 Gardening and school grounds by learners

The tables 5.16a-c below show the descriptive statistics in relation to gardening and school ground by the learners.

Table 5.16a Descriptive statistic on gardening and school grounds by learners

Question	Strongly Agree		Agree		Disagree		Strongly Disagree	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
3.3.1	44	73	39	31	15	0	6	0
3.3.2	41	65	35	38	19	1	9	0
3.3.3	23	77	27	27	38	0	16	0
3.3.4	31	65	40	39	19	0	14	0
3.3.5	14	66	37	35	28	1	25	2
3.3.6	25	66	40	37	27	1	12	0

In all questions (3.3.1 to 3.3.6) in the post-test only 5 learner respondents did not supported some of the statements (q3.3.2, only 1 learner, q3.3.5 only 3 learners and q3.3.6 only 1 learner). The rest (100 learners) supported the statements.

Table 5.16b Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
Question 3.3 Average Pre	105	2.7857	.44621	1.67	3.83
Question 3.3 Average Post	105	3.6413	.24762	3.00	4.00

The mean average score is greater post (3.6) to (2.8) pre-test scores. This indicates significant improvement.

Table 16c Test Statistics [a]

	Question 3.3 Average Post - Question 3.3 Average Pre
Z	-10.000
Asymp. Sig. (2-tailed)	.000

The sign test was performed in all items in question 3.3.1 to 3.3.6 and the results revealed that the improvement was significant at the 0.1% level of significance. There was a significant increase in learners' knowledge, skills and attitudes on almost all issues related to school garden or greening the school ground. In table 16a, it is obvious that almost all learners in the post-test results performed very well compared to pre-test results. The environmental education programmed offered before post-test were effective in changing learners' behaviour and the way they think.

5.6.6 Water savings by learners

The behaviour of learners in relation to water usage is reflected in the following tables: 5.17a-c.

Table 5.17a Descriptive statistics of water-saving

QUESTION	Strongly agree		Agree		Disagree		Strongly disagree	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
3.4.1	43	72	35	30	19	2	7	0
3.4.2	48	81	26	22	16	1	14	0
3.4.3	40	78	30	26	21	0	13	0
3.4.4	32	72	29	31	32	1	11	0
3.4.5	37	69	37	35	20	0	10	0
3.4.6	19	64	38	35	25	3	22	2
3.4.7	30	69	32	34	24	1	18	0

Information depicted on table 17a-c reflects responsible behaviour amongst learner respondents in terms of water usage. In the pre-test learners showed good understanding of water issues for example in question 3.4.1 only 7 learners did not support the statement and 10 did not support statement in question 3.4.5. In the post-test learners did very well in all questions. A total of 8 learners did not support or did not agree with some statements for example q 3.4.1 only 2 learners, 3.4.2 only 1 learner, 3.4.4 only 1 learner, q3.4.6 only 3 and 1 learner in q3.4.7. The respondents reflected responsible behaviour in almost all questions. In one of the sampled school, it was observed that some of their taps in the ablution block were leaking. The school management team was alerted about this. It is estimated that one leaking tap can waste up to 200 litres of water a day and more than 2000 litres a month (www.dwarf.gov.za). Therefore fixing leaking pipes and taps promptly saves lot of water, The post-test results revealed that there was a significant increase in learners' knowledge on water saving issues for example and 97% of learners claimed to fix leaking taps promptly, 99% claimed to use cups when drinking water. Post-test results indicate that learners have attained positive attitude towards water and practise water wise strategies. The mean average score was more than 3.6 and 2.8, post to pre-test.

Table 17b Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
Question 3.4 Average Pre	105	2.8884	.55114	1.43	5.57
Question 3.4 Average Post	105	3.6680	.25715	3.00	4.00

Table 17c Test Statistics[a]

	Question 3.4 Average Post - Question 3.4 Average Pre
Z	-9.648
Asymp. Sig. (2-tailed)	.000

The mean scores for Question 3.4 were calculated and the results showed that the average pre-score was less than 3 and the post score was more than 3.5. The sign test was applied to compare the pre-scores and the post-score and in all cases the significance (P-value) is less than 0.001 which means that the improvement is significant at the 0.1% level of significance.

5.6.7 Purchasing and consumption by learners

Tables 5.18a-c present the results of a learner behaviour on purchasing and consumption by learners.

Table 5.18a Frequency distributions and descriptive statistics

Question	Strongly Agree		Agree		Disagree		Strongly Disagree	
	Pre-test	Post-test	Pre-test	Post-test	Pre-test	Post-test	Pre-test	Post-test
3.5.1	18	62	26	40	37	2	23	0
3.5.2	20	70	40	33	25	1	19	0
3.5.3	39	69	33	34	21	1	11	0
3.5.4	24	69	45	33	19	2	16	0
3.5.5	18	64	46	37	23	3	17	0
3.5.6	42	72	30	31	18	1	14	0
3.5.7	20	67	27	37	31	0	26	0
3.5.8	17	70	29	33	34	1	24	0

The average results of the pre-test are 56% whereas the average results of the post-test are 95%. The pre-test results revealed divided opinion amongst learners and lack of knowledge and understanding amongst learners. There was a significant increase in learners' knowledge, skills and attitude in almost all issues related to purchasing and consumption issues, after EEP implementation. The post-test results reflected that learners have improved their knowledge, skills and attitude towards the procurement, purchasing and consumption of goods.

Table 18b Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
Question 3.5 Average Pre	105	2.6226	.42812	1.63	3.50
Question 3.5 Average Post	105	3.6321	.27068	2.63	4.00

Table 18c Test Statistics[a]

	Question 3.5 Average Post - Question 3.5 Average Pre
Z	-10.050
Asymp. Sig. (2-tailed)	.000

The sign test was used to show differences between pre and post-test scores for purchasing and consumption. The average mean score in the pre-test was less than 3 and in the post score was more than 3.5. When the sign test was used to compare post and pre-test scores, there were nil negative differences, 2 ties and 103 positive differences. The improvement was significant at the 0.1% level of significance.

5.6.8 Waste management by learners

Tables 5.19a-c, present the results of questions on waste management by learners.

Table 5.19a Frequency distributions and descriptive statistics

Question	Strongly agree		Agree		Disagree		Strongly disagree	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
3.6.1	23	61	39	43	25	0	17	0
3.6.2	22	62	40	42	23	0	19	0
3.6.3	42	75	28	29	27	0	7	0

In the pre-test results, the learners' scores were satisfactory as the average result was 60%. The other 40% was not involved in waste management. In question 3.6.3, only 66% confirmed to dump papers in the dust bin. The post-test results revealed tremendous improvement in learners' knowledge, understanding and attitudes towards their environment. Frequency distribution indicated that learners showed responsible behaviour in relation to waste management. From question 3.6.1 to 3.6.3, learners obtained an average score of 99% in favour of waste management.

Table 19b Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
Question 3.6 Average Pre	105	2.7651	.62690	1.33	4.00
Question 3.6 Average Post	105	3.6254	.32586	2.67	4.00

Table 19c Test Statistics[a]

	Question 3.6 Average Post - Question 3.6 Average Pre
Z	-9.166
Asymp. Sig. (2-tailed)	.000

The sign test was used to indicate the differences between pre and post-test scores for the waste management. The results indicated that the mean scores for the post-test were more than 3.5 and less than 3.5 in the pre-test score. A sign test was used to compare the differences between pre and post-test score and the difference was significant at the 0.1% level of significance.

5.6.9 Behaviour and attitude of learners

Tables 5.20a-c indicate the frequency distribution statistics:

Table 5.20 Behaviour & attitude frequency distributions and descriptive statistics

Question	Strongly Agree		Agree		Disagree		Strongly Disagree	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
3.7.1	32	67	44	37	20	0	8	0
3.7.2	39	68	39	34	18	2	8	0
3.7.3	41	78	29	23	26	3	8	0
3.7.4	28	75	35	29	27	0	14	0
3.7.5	38	66	41	38	14	0	11	0
3.7.6	37	61	42	39	14	3	11	1
3.7.7	34	57	36	40	22	7	12	0
3.7.8	38	66	36	30	21	4	9	4

The pre-test results revealed that learners were environmentally responsible. The average score of learners who supported the statements from 3.7.1-3.7.8 is 70% and 30% did not support the statements. Those who did not support the statements showed a negative attitude towards their

environment. Significantly higher values were reported for post-test results, since an average of 97% were in favour of all questions.

Table 5.20b Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
Question 3.7 Average Pre	105	7.9111	1.28041	2.67	10.67
Question 3.7 Average Post	105	9.6222	.67156	7.67	10.67

Table 5.20c Test Statistics[a]

	Question 3.7 Average Post - Question 3.7 Average Pre
Z	-9.696
Asymp. Sig. (2-tailed)	.000

The sign test was used to compare the differences between pre and post-test score and the following results were obtained. The Asymp sig. 2-tailed level is .000, which shows that there is significant differences between pre and post-test scores in relation to positive behaviour and positive attitude towards environment. The improvement is significant at the 0.1% level of significance. Therefore, it is obvious that the environmental education intervention has resulted in a change in environmental behaviour.

5.7 EDUCATOR RESPONDENTS

5.7.1 Environmental awareness

For each of the questions on sustainable living the difference between the response, post and pre environmental education was calculated for each of the 45 respondents. A summary of the frequency distributions of these differences for each of the questions are shown below.

The behaviour of educator respondents related to environmental awareness is captured in tables 5.21a-c below.

Table 5.21a Environmental Awareness frequency distributions and descriptive statistics

Question	strongly agree		Agree		*Disagree*		strongly disagree	
	Pre	post	Pre	Post	*pre*	Post	Pre	post
Q2.1	22	33	5	11	9	1	9	0
Q2.2	18	23	13	22	7	0	7	0
Q2.3	15	24	17	19	8	2	5	0
Q2.4	13	23	22	21	5	0	5	1
Q2.5	19	33	19	12	4	0	3	0
Q2.6	21	33	12	10	7	2	5	0
Q2.7	15	28	19	17	6	0	5	0
Q2.8	29	40	10	5	5	0	1	0
Q2.9	26	35	10	10	3	0	6	0

Information depicted in table 5.21a thus reflects high claims of environmental awareness. Educator respondents displayed a great deal of knowledge, understanding, and skills in environmental issues raised here. The pre-test results showed that most of the respondents (74%) favoured question 1.1 to question 1.9. The respondents proved to be environmental aware, since the lowest score is 60% and the highest score being 86% in question 1.8 before the EE Programme implementation. The post-test results indicated that the respondents have gained more knowledge, understanding and skills about the environment. The average score of 98% supported the statements from question 1.1 to question 1.9. All educators (100%) agree that the planting of trees promote environmental sustainability however it was observed that some schools were without trees and ground cover. Thus the soil was bare and susceptible to erosion.

Table 5.21b Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
Q2Ave_Pre	45	3.0691	.55418	1.33	4.00
Q2Ave_Post	45	3.6321	.23430	3.11	4.00

The sign test was used, to determine the differences between post and pre-test scores, the results showed that the average mean scores were above 3.5, post and 3 pre-test and the p value is .000.

Table 5.21c Test statistics

	Q2Ave_Post - Q2Ave_Pre
Z	**-5.747**
Asymp. Sig. (2-tailed)	**.000**

5.7.2 Transport

Table 5.22a-c outline the frequency distribution and descriptive statistics of behaviours of educators in relation to transport utilisation.

Table 5.22a – Transport frequency distributions and descriptive statistics

Question	Strongly agree		Agree		Disagree		Strongly disagree	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Q3.1.1	16	23	16	20	4	2	9	0
Q3.1.2	8	20	12	23	21	2	4	0

The pre-test revealed that 32 educators (71%) were in favour of using public transport with the aim of limiting air pollution (q3.1.1) and 13 educators (29%) were not in favour of using public transport. The results of question 3.1.2 of the pre-test revealed that 20 educators (44%) preferred to travel by carpool than using own transport. The results of the post-test in question 3.1.1 and 3.1.2 showed that 43 educators (96%) preferred to travel by public transport and also preferred to travel by carpool than travelling by own car. Great improvement in educators' knowledge and understanding were recorded for example, 3.1.1 improved from 71% to 96% and in question 3.1.2 improved from 44% to 96%.

Table 5.22b Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
Q3.1Ave_Pre	45	2.7222	.62664	1.50	4.00
Q3.1Ave_Post	45	3.5111	.43287	2.50	4.00

Table 3.22c Test Statistics[a]

	Q3.1Ave_Post - Q3.1Ave_Pre
Z	-5.570
Asymp. Sig. (2-tailed)	.000

The sign test was performed to compare the differences between pre and post-test scores in relation to transport. The mean scores were calculated and recorded less than 3 in the pre-test scores and more than 3.5 in the post-test score. The sig 2 tailed level is .000 which shows that there is significance improvement between pre and post-test scores and the relationship is 33 positive, 0 negative and 12 ties. The improvement is significant at the 0.1% level of significance.

5.7.3 Energy savings

Table 5.23a-c outline the results of the behaviour of educators in relation to energy savings.

Table 5.23a Energy Savings Frequency distributions and descriptive statistics

Question	Strongly Agree		Agree		Disagree		Strongly Disagree	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
3.2.1	18	29	11	16	11	0	5	0
3.2.2	26	31	8	13	6	1	5	0
3.2.3	22	31	12	14	6	0	5	0
3.2.4	9	24	9	19	11	2	16	0
3.2.5	11	23	4	20	17	2	13	0

The results in the pre-test indicated that educators were not energy savers, an average of 58% educators saved energy and 42% were less concerned with energy saving. The post-test results increased significantly with an average of 98%, (question 3.2.4 from 40% to 96%, question 3.2.5 from 33% to 96% and from 64% to 100% in question 3.2.1. The mean scores of the pre and post-test results were calculated as follows:

Table 5.23b Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
Q3.2Ave_Pre	45	2.8578	.56023	1.40	3.80
Q3.2Ave_Post	45	3.6178	.27903	3.20	4.00

Table 5.23c Test Statistics[a]

	Q3.2Ave_Post - Q3.2Ave_Pre
Z	-6.085
Asymp. Sig. (2-tailed)	.000

A Sign Test was used to compare the differences between the pre and post-test scores. The mean scores were calculated and recorded as less than 3 in the pre-test scores and more than 3 and the ranks showed 39 positive differences and 6 ties. The asymp sig. 2-tailed level is .000 which showed that there was a significance improvement between the post and pre-test scores.

5.7.4 Garden and school grounds

The behaviour of educators in relation to dealings with gardening and school grounds is shown in tables 5.24a-c.

Table 5.24a Greening the school grounds frequency distributions and descriptive statistics

Question	Strongly Agree		Agree		Disagree		Strongly Disagree	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
3.3.1	30	35	8	10	2	0	5	0
3.3.2	23	28	13	17	4	0	5	0
3.3.3	7	21	9	23	15	1	14	0
3.3.4	19	26	9	19	8	0	9	0
3.3.5	20	22	15	23	6	0	4	0

The results of the pre-test favoured most of the statements in question 3 (3.3.1, 3.3.2, 3.3.4 and 3.3.5) with the exception of question 3.3.3, planting fruit trees within and around the school

premises. The post-test results improved significantly increasing from as low as 36% (3.3.3) in the pre-test to 98% in the post-test and 100% in all other questions.

Table 5.24b Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
Q3.3Ave_Pre	45	2.9333	.68091	1.40	4.00
Q3.3Ave_Post	45	3.5867	.27765	3.00	4.00

Table 5.24c Test Statistics[a]

	Q3.3Ave_Post - Q3.3Ave_Pre
Z	-5.918
Asymp. Sig. (2-tailed)	.000

The sign test was used to compare the differences between the pre and post-test and the results indicated that the mean scores were calculated and recorded in the pre-test scores as less than 3 and more than 3.5 in the post-test. The sig. 2-tailed level is .000 which shows that there was a significance improvement between the pre and post-test scores in relation to gardening and school grounds.The improvement is significant at the 0.1% level of significance.

5.7.5 Water savings

The environmental behaviours of educator participants with regards to water saving activities wre captured in tables 5.25a-c.

Table 5.25a Water savings frequency distributions and descriptive statistics

Question	Strongly Agree		Agree		Disagree		Strongly Disagree	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
3.4.1	32	36	3	9	1	0	9	0
3.4.2	32	33	7	10	0	0	6	2
3.4.3	28	29	10	15	4	1	3	0
3.4.4	23	27	11	14	5	4	6	0

The pre-test results revealed that educators have a good grasp of water concepts. The average score of 81% in the pre-test and an average of 92% in the post-test results were sought. The post-test results showed slightly differences. In question 3.4.2 to 3.4.4 scored more than 90% and 89% on q3.4.1. The pre-test results reveal that educators have a good grasp of water concepts. In question 3.4.1, thirty five (35) educators (78%) supported the statement of fixing leaking taps promptly to save water. The majority of educators (78%) agreed to switch off taps while brushing their teeth, 84% of educators confirmed to encourage learners to use cups or glasses to drink water (q3.4.3).

Table 5.25b Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
Q3.4Ave_Pre	45	3.1944	.61674	1.50	4.00
Q3.4Ave_Post	45	3.5722	.35604	2.75	4.00

Table 5.25c Test Statistics

	Q3.4Ave_Post - Q3.4Ave_Pre
Z	-5.295
Asymp. Sig. (2-tailed)	.000

A sign test was used to compare the statistical differences between pre and post-test scores with regard to water savings. The mean scores were calculated and recorded more 3.5, post-score and 3 pre-test score and the ranks indicated positive differences. The sig. 2-tailed level is .000 which showed that there was a significance improvement between the pre and post-test scores

in relation to gardening and school grounds.The improvement was significant at the 0.1% level of significance.

5.7.6 Purchasing and consumption

The tables, 5.26a-c outline the results for the purchasing and consumption behaviour and attitude of educators.

Table 5.26 Purchasing and consumption frequency distributions and descriptive

Question	Strongly Agree		Agree		Disagree		Strongly Disagree	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
3.5.1	13	22	16	20	10	3	6	0
3.5.2	9	17	18	24	7	4	11	0
3.5.3	25	33	11	11	5	1	4	0
3.5.4	16	25	22	19	4	1	3	0
3.5.5	19	29	18	13	2	3	6	0
3.5.6	7	16	18	29	12	0	8	0
3.5.7	8	25	11	19	16	1	10	0

The results of the pre-test indicated that 67% of the educator respondents are in favour of sustainable purchasing and consumption of resources. The lowest number, 19 educators (42%) was obtained in question 3.5.7 (using biodegradable products most of the time). Question 3.5.6 (preference to buy proudly South African products most of the time) was also poorly answered, only 25 educators (56%) favoured the statement. The post-test results showed good improvement in question 3.5.7 from 19 educators (42%) to 44 educators (98%) who supported the statement and question 3.5.6 increased from 55% to 100%. The average score of the post-test results was 96%. There was a significant increase of average score from 64% to 96% in the post-test.

Table 5.26b Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
Q3.5Ave_Pre	45	2.8095	.66589	1.00	4.00
Q3.5Ave_Post	45	3.6000	.60808	2.71	7.00

Table 5.26c Test Statistics[a]

	Q3.5Ave_Post - Q3.5Ave_Pre
Z	-5.918
Asymp. Sig. (2-tailed)	.000

The sign test was performed to test the statistic differences between pre and post-test scores with regarding to purchasing and consumption behaviours by educator, the results are outlined below. The average mean scores were calculated and recorded as more 3.5 and less than 3 in the pre-test scores and more than 3.5 and the ranks indicated positive differences. The sig. 2-tailed level is .000 which showed that there was a significance improvement between the pre and post-test scores in relation to gardening and school grounds.The improvement is significant at the 0.1% level of significance.

5.7.7 Waste management

The tables 5.27a-c depict the frequency distribution results of questions on waste management by educators.

Table 5.27a – Waste management frequency distributions and descriptive statistics

Question	Strongly Agree		Agree		Disagree		Strongly Disagree	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
3.6.1	13	24	13	21	11	0	8	0
3.6.2	13	25	11	18	11	2	10	0
3.6.3	12	19	15	25	12	1	6	0
3.6.4	15	24	13	20	8	1	9	0
3.6.5	21	27	10	16	5	2	9	0

The results of the pre-test revealed that educator respondents had divided opinion in almost all question. The average score of 60% was recorded. Half of the educators (50%) confirmed that they reduce the amount of goods they consumed and their involvement in recycling. The post-test results showed greater improvement in waste management compared to the pre-test. The average of 98% was secured from educators. This resulted of the post-test showed significant differences between pre and post.

Table 5.27b Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
Q3.6Ave_Pre	45	2.8267	.78925	1.00	4.00
Q3.6Ave_Post	45	3.5067	.34005	2.80	4.00

Table 5.27c Test Statistics[a]

	Q3.6Ave_Post - Q3.6Ave_Pre
Z	-5.659
Asymp. Sig. (2-tailed)	.000

The sign test was performed between pre and post-test scores and the average mean scores were calculated and recorded as more than 3.5 post and less than 3 in the pre-test scores. The ranks indicated positive differences. The sig. 2-tailed level is .000 which proved that there was a significance improvement between the pre and post-test scores with regard to waste management. The improvement is significant at the 0.1% level of significance.

5.7.8 Behaviour and attitude

The following tables 5.28a-c show the results of pre and post-tests of educators in relation to behaviour and attitude.

Table 5.28a Behaviour & Attitude frequency distributions and descriptive statistics

Question	Strongly Agree		Agree		Disagree		Strongly Disagree	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
3.7.1	21	25	13	20	5	0	6	0
3..7.2	18	21	13	24	8	0	6	0
3.7.3	20	26	16	19	3	0	6	0
3.7.4	26	31	9	14	5	0	5	0
3.7.5	29	34	8	11	2	0	6	0
3.7.6	22	31	9	13	6	1	8	0
3.7.7	27	32	7	13	5	0	6	0
3.7.8	25	33	10	11	6	1	4	0
3.7.9	19	27	7	18	10	0	9	0
3.7.10	15	29	17	15	8	1	5	0
3.7.11	16	27	16	16	8	2	5	0
3.7.12	17	28	13	16	9	1	6	0

The attitude and behaviour of educators before the EE programme intervention was good. The pre-test scores were higher with the exception of question 3.7.9 which scored (58%) and the average score in the pre-test was 71%. Some statements were more favourable than others, q3.7.3 with 80%, q3.7.4 and q3.7.8 with 78%. The post-test results improved significantly for example as from 58% (q3.7.9) in the pre-test to 100%, from 67% in q3.7.12 to 100%. The average results of the post-test was 99%. This emphasises the importance of Environmental Education Programme implementation in secondary schools.

Table 5.28b Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
Q3.7Ave_Pre	45	3.0574	.81414	1.00	4.00
Q3.7Ave_Post	45	3.6333	.26075	3.00	4.00

28c Test Table 5.Statistics

	Q3.7Ave_Post - Q3.7Ave_Pre
Z	-5.029
Asymp. Sig. (2-tailed)	.000

The average mean scores for both post and pre-test results were calculated and recorded as more than 3.5 and 3 respectively**.** As the sign test was used to compare the pre-test scores and the post-test scores, the ranks indicated a positive relationship. The sig. 2-tailed level is .000 which proved that there was a significance improvement between the pre and post-test scores with regard to waste management. The improvement is significant at the 0.1% level of significance.

5.8 THE ADMINISTRATIVE CLERK

5.8.1 Environmental awareness

The questions in the questionnaire were accustomed to non-educators (administration clerks). Table 5.29a-c outline the results obtained from the questions in the questionnaires.

Table 5.29a Environmental awareness: frequency distribution

Question	strongly agree		Agree		Disagree		strongly disagree	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
q1.1	3	11	3	3	4	0	4	1
q1.2	3	11	3	1	2	0	4	2
q1.3	1	12	5	1	3	0	5	1
q1.4	1	12	9	0	3	0	1	2
q1.5	1	13	6	0	0	0	7	1
q1.6	1	11	6	3	1	3	6	0
q1.7	2	11	3	3	1	0	8	1
q1.8	4	12	8	2		0	2	0
q1.9	1	10	5	3	1	0	7	1

It is clear from table 29a that the respondents in the pre-test results lack basic environmental information and knowledge. They were reluctant to read environmental magazines, books and

pamphlets (question 1.2) and even watching wild life animals on television (TV), question 1.3. Reading books and magazines and watching TV programmes about environment, increase knowledge about, and for the environment, Questions 1.5-1.7 and 1.9 show very low frequencies. The pre-test results had an average of 49%. This reveals that administration clerks lacked basic environmental understanding since less than 50% administration clerk respondents supported statements in question 1.1-1.9 in the pre-test. It is amasing that 71% in question 1.4 claimed to be aware of environmental problems and yet they are doing nothing to solve them. The results of the post-test revealed greater improvement. The average score in the post-test results was 86%. In the post, the number of administration clerks who celebrated environmental days (q1.1), who understand that deforestation contributes to the climate change (q1.6), control air pollution (q1.7) and involvement in solving environmental problems increased to 93%.

Table 5.29b Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
Q1Ave_Pre	15	2.4444	.71886	1.67	3.44
Q1Ave_Post	15	3.8444	.12458	3.56	4.00

Table 29c Test Statistics[a]

	Q1Ave_Post - Q1Ave_Pre
Exact Sig. (2-tailed)	.000[b]

The sign test and binomial distribution were used to compare the results of the pre-test and post-test, therefore the average mean scores recorded were above 2.4 for the pre-test and above 3.8 for the post-test scores and the p-value is less than .001, this signals a significant improvement after the EEP implementation. The difference was significant at 0.1% level of significance.

5.8.2 Energy savings

Tables 5.30a-c depict the frequency distribution, descriptive statistics as well as test statistics.

Table 5.30a Energy savings: Frequency distribution

Question	Strongly Agree		Agree		Disagree		Strongly Disagree	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
2.1	4	9	5	3	2	2	3	1
2.2	2	8	2	5	3	1	7	1
2.3	3	9	4	5	4	0	3	1
2.4	3	0	4	11	2	3	5	1
2.5	6	9	5	3	0	2	3	1

The average pre-test results revealed that half of the admin respondents (51%) supported the statements in question 2.1-2.5, however question 2.2 was poorly supported by 27%, q2.3 and 2.4 by 47%. The results indicated that the administration clerk respondents lacked knowledge and understanding of concepts related to energy savings. The post-test results showed the increase in respondents (89%) in favour of statements in question 2.1 to 2.5. Question 2.2 increased from 27% to 87% of administrative clerks who agreed to remove plugs from the sockets when not in use. Question 2.3 increased from 47% to 93%. In question 2.4, 73% of administration clerks agreed to set computer to go sleep automatically during break times. The post-test results reveals that the EE programme contributed to the improvement and knowledge gain of respondents.

Table 5.30b Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
Q2Ave_Pre	15	2.5067	.71661	1.60	4.00
Q2Ave_Post	15	3.4000	.30237	2.80	3.80

Table 5.30c Test Statistics[a]

	Q2Ave_Post - Q2Ave_Pre
Exact Sig. (2-tailed)	.007[b]

A sign test was used to compare the pre-test scores and the post-test scores in relation to energy savings. The post-test elicited a statistically significant median increase with regard to energy savings. This significant increase ranged from 2.5 in the pre-test score to 3.4 in the post-test scores and the p-value for the test is .007 and the improvement is significant at the 1% level of significance.

5.8.3 Water saving

Table 5.31a Frequency distributions and descriptive statistics

Question	Strongly Agree		Agree		Disagree		Strongly Disagree	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
3.1	9	14	3	0	1	1	2	0
3.2	4	14	3	0	4	1	4	0
3.3	7	10	5	4	1	1	2	0
3.4	3	14	2	0	5	0	5	0
3.5	5	8	1	6	5	1	4	0
3.6	3	5	4	9	4	0	4	0
3.7	1	14	4	0	6	1	4	0

Prior to the implementation of environmental education, the respondents lacked basic knowledge, skills and exhibited negative attitude toward the water concepts. They seemed not to care about water, for example in question 3.4 and 3.7, respondents accounted for 33%, and question 3.2 to 3.7 less than 50% supported the statement. The post-test results revealed great improvements in knowledge and understanding about water concepts. Most responded (93%) supported the statements from question 3.1 to 3.7. There was significant difference between the pre and post test results.

Table 5.31b Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
Q3Ave_Pre	15	2.7238	.77960	1.57	3.86
Q3Ave_Post	15	3.8095	.11664	3.57	4.00

Table 31c Test Statistics[a]

	Q3Ave_Post - Q3Ave_Pre
Exact Sig. (2-tailed)	.001[b]

The sign test was conducted to compare the pre-test scores with the post-test scores. There was a significant increase from pre-test (median 2.7) and post-test (median 3.8) and the p value for the test is < .001. The results also exhibited positive differences and the improvement is significant at the level of 0.1% level of significance.

5.8.4 Purchasing and consumption

Tables 5.32a-c outline the results of the administrative staff in relation to purchasing and consumption behaviour of administrative staff.

Table 5.32a Purchasing and consumption frequency distributions and descriptive statistics

Questions	Strongly Agree		Agree		Disagree		Strongly Disagree	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
4.1	0	0	5	14	6	0	4	1
4.2	5	11	7	3	0	0	3	0
4.3	5	14	4	0	4	0	2	0
4.4	1	3	1	11	4	0	9	0
4.5	2	3	5	11	2	0	6	0
4.6	1	5	3	9	5	0	6	0
4.7	1	1	2	12	4	0	8	1
4.8	1	14	5	0	2	0	7	0
4.9	2	11	2	3	8	0	3	0

The pre-test results indicated that administration clerks disagree with most of the statements, which are 4.1; 4.4; 4.6; 4.7; 4.8 and 4.9. Only 2 (13%) buy chlorine free paper, (q4.4), only 5 respondents (33%) supported the use of environmental friendly products (4.1) and 3 respondents (20%), purchased recycled paper (q4.7). Questions 4.2 and 4.3 gained support from the administration clerk respondents. The average score of the pre-test was 34%. The respondents showed irresponsible purchasing behaviours. It is clear that schools do not have policies with regard to purchasing and consumption. The post-test results increased from as little as 13% to 93%. The average percentage of post-test was 93%. There was a significant improvement of the post-test results.

Table 5.32b Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
Q4Ave_Pre	15	2.2593	.47821	1.56	3.44
Q4Ave_Post	15	3.5111	.17213	3.33	3.89

Table 32c Test Statistics[a]

	Figure 5.5 Type of toilet system
Exact Sig. (2-tailed)	.001[b]

The sign test was conducted to compare the pre-test scores with the post-test scores. There was a significant increase from pre-test (median 2.2) and post-test (median 3.5) and the p value for the test is < .001. The improvement is significant at the level of 0.1% level of significance.

5.8.5 Waste management

Tables 5.33a-c depict the results of questions on waste management by administrative clerks.

Table 5.33a Waste management: Frequency distributions

Question	Strongly Agree		Agree		Disagree		Strongly Disagree	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
5.1	3	11	6	3	2	0	4	0
5.2	4	10	3	2	5	1	3	2
5.3	8	11	5	1	0	2	2	1
5.4	4	11	7	1	2	1	2	2
5.5	0	0	4	10	6	4	5	1

The results of the pre-test indicate that the respondents have divided opinion and agree with regard to some questions or statements in the questionnaire.

- (87%) of the respondents supported the statement 'throw papers in the dust bin on the school yard' (q5.3)
- (73%) of the respondents supported the statement 'reuse old envelopes, plastic bags and bottles' (q5.4),

They have divided opinion slightly favouring agree (60%) on (q5.1), 'I try to reduce the amount of goods I consume' and they showed divided opinion (47%) on question 5.2 and disagree (29%) on question 5.5. The average results for the pre-test showed divided opinion 59% slightly favouring agree. The deduction to be made from these results is that administration clerks satisfactory managed waste despite the fact that they do not have waste management policies in their schools. The intervention programme increased the results of the administration clerks.

The results recorded 80% in questions 5.1 to 5.4, and 67% in question 5.5.

Table 5.33b Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
Q5Ave_Pre	15	2.7067	.58489	1.80	3.80
Q5Ave_Post	15	3.6800	.16562	3.40	4.00

Table 33c Test Statistics[a]

	Q5Ave_Post - Q5Ave_Pre
Exact Sig. (2-tailed)	.000[b]

There was a significant improvement between the pre and post-test results. The sign test was conducted to compare the pre-test scores with the post-test scores. There was a significant increase from pre-test (median 2.7) and post-test (median 3.7) and the p value for the test is < .000. The improvement is significant at the level of 0.1% level of significance. It showed positive relationship 86.6% which means that as one variable goes up or down so will the other one.

5.8.6 Behaviour and attitude change

The tables below depict the behaviour and attitude of administrative clerks in identified schools.

Table 5.34a Behaviour & attitude Frequency distributions

Question	Strongly agree		Agree		Disagree		Strongly disagree	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
6.1	3	13	6	1	2	1	4	0
6.2	2	12	6	2	1	1	6	0
6.3	4	14	7	0	1	1	3	0
6.4	4	10	8	2	2	2	1	1
6.5	5	10	5	2	1	2	4	0
6.6	3	8	6	6	3	1	3	0
6.7	5	12	6	1	0	1	4	1
6.8	9	8	2	6	1	0	2	1

The pre-test results showed positive attitude toward the environment, an average of 69% was obtained. Question 6.2, on “biodiversity” showed divided opinion (53%) and in questions 6.1 and 6.6, respondents (60%) showed divided opinion favouring agree. The post-test results increased significantly. The respondents (92%) agreed on all issues related to behaviour and attitude. The average score of the post-test results was 92%. The sign test was conducted to compare the pre-test scores with the post-test scores. There was a significant increase from pre-

test (median 2.9) and post-test (median above 3.8) and the p value for the test is < .000. The improvement is significant at the level of 0.1% level of significance. It showed positive relationship 86.6% which means that as one variable goes up or down so will the other one.

Table 34b Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
Q6Ave_Pre	15	2.9083	.73568	1.75	4.00
Q6Ave_Post	15	3.8917	.11443	3.63	4.00

Table 34c Test Statistics[a]

	Q6Ave_Post - Q6Ave_Pre
Exact Sig. (2-tailed)	.002[b]

5.9 QUALITATIVE ANALYSIS

The qualitative data was collected through open-ended questions of the questionnaire and observation and the qualitative analysis is discussed hereunder.

5.9.1 Open-ended questions

In the current study the findings of the open-ended questions of a questionnaire and observations conducted in the research sites form part of the qualitative study. The questionnaire of a learner and an educator had three sections, section A, B and C. Section C contained three open-ended questions. For the content analysis is employed for analysing content. Content analysis can be applicable for both quantitative and qualitative study. In the quantitative study in is based on frequency of occurrence and can be viewed as a way for counting interpretations of content (Krippendorf, 2004: 1). In the quantitative approach, the most crucial step is to identify word(s) and then to use preferable, computer software to test for the consistency of their usage. The current study employed content analysis in the qualitative approach. In qualitative research content analysis means a word frequency count that means that, the words or phrases that are mentioned the most often are the words that reflects the salient concerns in one's speech or in a document (Erisen, 2015: 23).

The data was analysed making use of words, sentences, phrases and paragraph from the narrative open-ended response of the questionnaire and observation schedule were reviewed to determine which concepts, themes and ideas that emerged from the data were to be coded. After thorough and repeated coding, the emergent themes were identified and sorted to bring content together. Identified code was compared to all other codes to identify similarities and differences. Upon further analysis and reflection of occurrences of codes in context from the questionnaires, three major theme emerged namely (1) environmental management, (2) environmental awareness. Each identified theme is presented in a narrative format and the anonymity of the respondents are preserved by not revealing their identities. Their responses in an open-ended questionnaire relate how they think about the concept of sustainable living and its relationship to education. The following findings were sought thematically, arranged and presented in no order of preferences or order of importance.

5.9.1.1 Environmental Management

The findings in this theme, in the pre-test revealed that there was a lack of knowledge and understanding about environmental concepts. This was evident when respondents were not willing to attempt open-ended questions of the questionnaire, very few attempted. After Environmental Education Programme initiative was implemented more than 80% attempted the open-ended questions. This was an indication that knowledge gain occurred. A knowledge gap existed between pre-test and post-tests results. The findings revealed that most respondents defined the concept of sustainable living as follows:

> *"Sustainable living can be defined as a way of protecting our environmental resources and taking care for our well-being"*
> *'Sustainable living means the well management of our environment'*
> *'Sustainable living means the management of our natural resources for future generations"*
> *'Sustainable living means living within our environment, taking care of and preserving our natural resources for both our benefits and for the benefits of the generation to follow'*

Most respondents viewed ‘sustainable living’ as the conservation or management of natural resources. The post-test results revealed that they understand the concept and they have not memorised it.

5.9.1.2 Environmental awareness

Environmental awareness is another theme which emerged from the responses of respondents. It also appears in the observation schedule as a pre identified theme. The responses were transcribed as verbatim (presented by respondents). The pre-test results revealed that the respondents lacked knowledge of the concept as most did not answer this section C on open-ended question. However in the post-test, respondents answered this section satisfactory.

> *‘Sustainable living means increasing environmental awareness for the benefit of all’*
> *‘Sustainable living means understanding and being aware of your surroundings including environmental issues’*
> *‘Sustainable living is a way of becoming aware of how human live and grow with others’*
> *‘Sustainable living is the interaction of human and the living and the non-living and the awareness of such interaction’*
> *‘Is the way of knowing your surrounding and creating better environment for all who live in it and others who are still coming’.*

Very few respondents who attempted this question had a feel for the environment. They claimed that a person who is living a sustainable livelihood should have knowledge about his environment and should be willing to take action to solve encountered environmental issues. The majority of respondents especially the learners avoided this section. Notwithstanding the research, the differences in knowledge, the research showed that the differences in awareness between the pre and post-test results were significant. The EEP implemented improved the results and the respondents showed more knowledge gained.

5.9.2 Observations

Observation is the gathering of primary data by the researcher's own direct involvement with relevant observed people. Observation yield information which people normally unwilling or unable to provide (Dawson, 2002: 17-18). The researcher also served as an unobtrusive observer during the visits to the schools. The researcher made observations and recorded what he deemed important under identified environmental themes as they appear in the observation schedule. A pre and post observation were conducted. Pre observation was conducted prior to the Environmental Education Programme (EEP) implementation and post observation was performed after EEP implementation. The following are the pre identified themes of observation:

5.9.2.1 Environmental awareness

Observation was conducted before and after the EEP implementation. During the pre-observation period the following were noted:

There were no environmental education books, magazine, pamphlets, posters, newsletters in schools. There were no pictures in the office, staffrooms or notice boards of environmental days' celebrations or any of this kind.

Six months after the EEP implementation, all schools (100%) had environmental magazines such as Water Wheel, Envirokids, Step by Step Stories of Change, Yes Stories of Change and a Year of Special Days. These documents are obtainable from WESSA or can be downloaded from their website. Some schools had celebrated environmental days such as "World Water Day" on 22nd of March, International Day for Biological Diversity, 22nd May and Arbor Week, 1-7 September. Respondents seemed to have gained understanding of some local environmental issues. The notice boards were used to inform the learner bodies about environmental issues within and outside the schools.

5.9.2.2 Transport

Prior and after EEP implementation, it was observed that most educators and administration clerks stay in schools cottages, very few were commuting to and from school. Those who were commuting used public transport as their mode of transport. Most learners (90%) walked to school, most of them walk long distances (3-7km) to schools. Very few (less than10%) use unauthorised transport, vans to travel to school. The majority of educators and administration clerks stay at school and are not commuting and very few own cars.

5.9.2.3 Energy savings

Thirteen schools had electricity supplied by Eskom and one supplied by Nura and the last had no electricity. Prior to EEP implementation, classroom were left open with electricity switched on day and night, computers and photocopier were switched on all the times even when not in use. The electricity bills were very high in most schools. After the EEP implementation, there was a significant change in the socio-economic situation of the school. Electricity was switched on when was really in need and no classrooms were left, lights on. Computers, printers and photocopier machine were switched off when not in use. At one instance when the observer arrived in the morning, in one of the schools, the computer was left switched on the whole night. Surprisingly the administration clerk apologised to the observer, instead of the school.

5.9.2.4 Garden and school grounds

Before the Environmental Education Programme (EEP) implementation observation with regard to the garden and school grounds was made. Out of fifteen school only one (7%) had a school garden. In most school, there are no trees within school premises, only five schools (35%) had large trees in their school yards. Outside the school premises one would see big trees. In five schools (35%) there were no ground cover, the soil was bare and susceptible to soil erosion. After the EEP implementation, school had made good progress in beautifying the school grounds. Six school (40%) had opted to start their school vegetable gardens, and eight (57%) had begun their flower (botanical) gardens and planted trees. The other school had already had a vegetable garden before the programme implementation.

5.9.2.5 Water utilisation

One school (7%) had a flush toilet and the rest (93%) had pit toilets, during the pre-observation, it was observed that the male toilet was heavily leaking. Learners drank water from the tap using their hands. After having their meal, each learner washed his/her plate from the tap leaving water gushing down the drain for the next learner to wash his or her plate. They also washed hand from the tap. Teachers were observed washing their cars using horse pipe. It was also noticed that the water bills were too high. Some schools had water tanks to harvest water however these tanks were dysfunctional, taps had been removed for apparently no reasons. During the post-observation, many changes with regard to water usage had been observed. There was significant improvements with how water is managed in these schools. Water was for washing hand were kept in a washing bucket, Drinking water was collected in bucket early in the morning and kept in class, learners used cups to drink from the bucket. Plates were washed simultaneously in a washing basin. In one of the sampled school, three educators were observed washing their cars using a bucket. This was evidence that the EEP was of great assistance to the whole school community.

5.9.2.6 Purchasing and consumption

Before the EEP implementation, schools purchased any type of paper, the choice was only determined by the price of a ream. The school shop sold fast foods like potatoes chips and muffins. After the programme implementation, during pre-observation it was noticed that in most schools they purchased recycled papers. Purchasing of potatoes chips and muffins dropped and the selling cheap snacks were forbbiden from the school premises of three schools. In one of the schools, a proudly South African and ozone friendly products were observed in the administration block.

5.9.2.7 Waste management

Prior to Environmental Education Programme (EEP) implementation, none of the 15th school practised recycling. In some schools, papers, bottles and aluminum cans were dumped in the waste bins and burnt in the waste pits. In other schools inks and toners cartridges were lying around, papers flying from the gate to the inside. At post-observations differences with regard

to waste management were observed. There were no papers lying around the school premises. Recycling was well organised in some of the schools. Categories of waste were created as follows: bin A: Papers, bin B. Bottles and bin C plastic. Schools showed better improvement with regard to waste management.

5.9.2.8 Behaviour and attitude

During post observation, some respondents were noticed dumping papers in the waste bin without being aware that someone was watching. During break time and after school, some were observed washing their cars using horse pipes however that changed after EEP implementation. After the EEP implementation some learners developed love and interest in the botanical and vegetable garden. Their bond with nature was observed when watering, weeding and nurturing their vegetation.

5.10 SUMMARY

This chapter presented the findings of the study. At first the findings revealed that participants lacked environmental knowledge however when environmental education was hands-on, they exhibited improvement in knowledge, skills and attitude. The following chapter presents the discussion and recommendations of the study.

CHAPTER 6
DISCUSSION OF THE RESULTS, REFLECTIONS, RECOMMENDATIONS AND CONCLUSION

6.1 INTRODUCTION

This chapter will focus on the discussion of the results of the study in order to ascertain whether environmental education is effective in promoting sustainable living. It will test the hypothesis and provide the contribution to new knowledge. It will also discuss the limitations and suggestion for future research and conclude by making recommendations for this study.

6.2 DISCUSSION OF THE RESULTS

The Belgrade charter defined the goal of environmental education as 'to develop a world population that is aware of and concerned about the environment and the associated problems and which has the knowledge, skills, attitude, motivation and commitment to work individually and collectively toward solutions of current problems and the prevention of new ones' (UNESCO-UNEP, 1976). The present study aims to evaluate the effectiveness of EE in promoting sustainable living in secondary schools in uMkhanyakude district in KZN. It aims to assess whether environmental education is successful in promoting sustainable living in secondary schools. The success of environmental education is expected to be manifested in knowledge of environmental concepts, environmental issues solving skills and environmental behaviour displayed by learners in all secondary schools. If unsuccessful, learners in secondary schools will not model such knowledge, skills, and environmental behaviour as envisaged by environmental education curriculum and will engage in unsustainable practices.

The findings obtained through this investigation revealed that the level of poverty is very high in uMkhanyakude District. This is evidenced by the fact that most of the families depend on government's social grants (table 5.4). The findings also depict that most people are unemployed and could not support the education of their children. The household average income of the families is less than R2000, per month which is insufficient to cater for family needs (refer to table 5.3). In case of the bills and services rendered to schools, the findings revealed that there was a correlation between services rendered to schools and bills paid for

those services. This means that there was a strong association between water usage and water bill as well as electricity usage and electricity bills. Most schools were paying high bills due to high consumption of water as well as electricity (figure 5.6 and figure 5.7).

Since the main goal of environmental education is to improve environmental literacy, evaluating the efficiency of an environmental education programme implies assessing the environmental literacy progression in the largest population (Spinola, 2015: 397). The current study links with this aim, as it evaluates the effectiveness of environmental education in promoting sustainable living in secondary schools. The fact that the current study, evaluates the effectiveness of environmental education in promoting sustainable, it involved the assessment of participants in two phases namely pre- and post-test. They were first subjected to pre-testing after which Environmental Education Programme intervention (EEP) was introduced. After the programme implementation, they were post-tested using the same instruments, i.e. the same questionnaire. Pre-testing provided a benchmark for determining growth in learning when the results of the post-test were compared. The post-test results either reveals the achievements or non-achievements attained during the involvement in environmental education programmes. In this evaluation approach, the study identified environmental awareness (knowledge), resource utilisation, attitude and behaviour as major components (Spinola, 2015: 397) of sustainable living.

The results obtained during the pre-testing revealed a shortfall in basic environmental knowledge, skills and attitudes of participants whereas the post-test results elicited a positive gain in terms of environmental knowledge, skills, attitude and behaviour toward the environment. The post-test revealed that participants have gained more basic conceptual knowledge, skills and positive attitude with regard to water usage, transport, school grounds, purchasing and consumption, waste management and energy usage. The following table depicts such differences or gains in general.

Table 6.1 Comparing pre- and post-test results

Component of sustainable living	Pre-Test Results (%)	Post-Test Results (%)
Environmental Awareness	61	98.5
Transport	89.5	97
School Grounds	61.3	95.6
Water Usage	66.7	98.3
Energy Usage	57	94.3
Purchase & Consumption	54	98
Waste Management	61	97
Attitude & Behaviour	71	98.6

Hands-on environmental education activities boosted participants' knowledge and skills required for sustainable living (Alexandar & Poyyamoli, 2014: 15). Meanwhile Jin and Bierma (2011: 84) suggest guided-enquiry learning as a process by which learners discover basic concepts through active investigation for learners to master facts and terms and concepts as the authors found that students appeared to perform slightly better on examinations and quiz question when the guided inquiry modules were applied. The present study involved participants collaboratively and systematically guided through, taking action, improving school grounds, recycling, undertaking fieldtrips to Isimangaliso Wetland Park and making right choices in purchasing and consumption. Kuhlthau, Maniotes and Caspiri (2015: 208), purport that guided inquiry provides participants with multiple opportunities to participate in social groups assessing social learning. Alexandar and Poyyamoli (2014: 15) emphasise the importance of field trips in the natural areas as a component for individual development and sustainable future. Undertaking environmental education programmes in the current study mainly influenced participants' environmental knowledge and encouraged positive attitude and behaviour. It has been realised that no group exhibited impressive scores in the pre-test with the exception of transport where all participants demonstrated high knowledge and understanding of the issue. The poor results with respect to several key environmental topics may reflect the fact that the actual time spent on EE in schools is inadequate (Negeu, Sagy, Garb, Salzberg and Tal, 2008: 13). It may also reflect that environmental topics are infused and presented in a fragmented and contested manner in Learning A or sujectsreas, than presenting environmental education as a subject on its own.

6.2.1 Environmental awareness

The finding of the pre-test in this section indicated that participants lacked basic knowledge about environmental concepts and environmental issues. There are statistical significant differences between pre and post-test results of different groups. The post-test results revealed great improvement of environmental knowledge. The lack of environmental knowledge, as indicated by the pre-test results may have originated from the participants' lack of interest in reading environmental books, magazines and watching environmental programmes in television (TV). The researcher observed that in almost all sampled school, there were neither environmental magazine, books radio nor televisions for viewing these programmes. During the environmental education programme implementation, environmental magazines such as Wildlife and Environment and Water Wheel were made available to participants and National Geographic Wild on Television was viewed. This aroused participants' interest and that is why they scored high (98.5%) in the post-test. This is clear evidence that environmental education is not currently providing learners with adequate knowledge and understanding of the key concepts that underlie sustainability (Fien, 2001: 13). According to Hungerford (1990: 266) there appear to be few effort that prepare future citizen to make environmental sound decision or to participate responsibly in environmental maintenance and remediation. As a result, only a few learners are being exposed to logically developed and well-planned Environmental Education Programmes. It is essential that schools create awareness of sustainable environmental practices and the awareness of the effects of present unsustainable practices on future generations.

6.2.2 Transport

The transport results were generally high in both pre- (89.5%) and post-test (97%), the reason may be that the majority of participants do not own their transport, they mostly use public transport. Therefore they contribute very little towards air pollution in relation to transport.

6.2.3 Gardening and school grounds

In the case of the school grounds, the pre-test results (61%) revealed that the school grounds were not taken care of whereas the post-test (95%) results revealed a significant improvements.

The school grounds or the school garden contribute to the aesthetic factor of the school. However very little has been done in the school grounds to improve it. The reason for significant improvement of the post-test results was the involvement of participants' in Environmental Education Programme which boosted the affective domain. The challenge lies in a willingness of the school to do things differently and engage their learners in activities that will support their development as well as the development of the school as a whole.

School gardening also make a great contribution to the nutrition of learners especially in nutrition feeding, participating schools. The study conducted by Ratcliffe, Merrigan, Rogers and Goldberg (2009), found that garden based learning has several positive impacts. Learners participating in the garden-based learning significantly increased their fruit intake and were more willing to taste the vegetable. Waliczek, Bradley and Zajicek (2001) assessed the effectiveness of the Project GREEN school garden programme on children's interpersonal relationships and attitudes towards the school. Participants were either categorised as experimental group, participating in the Project or in control group, the school garden improved interpersonal relationship among participants and increased their motivation of garden use throughout the curriculum. Gardening provided nutrition and balanced diet, thereby promoting good health. When schools are involved in gardening, they promote positive environment thus creating physical, emotional, academic and more effective schools. Schools were allowed to make their own choices with regard to beautification of their school grounds. Some schools chose vegetable gardening and others chose botanical garden. Those planting trees were encouraged to plant fruit trees which will provide learners with shade during hot days and fruit at the same time. It will also serves as a laboratory for agricultural sciences, life sciences, home economics and many more. The school garden programme enhanced interpersonal skills, leadership abilities, teamwork, motivation and problem solving skills which will enable them to solve local environment.

6.2.4 Water usage

The water usage exhibited significant improvement in the post-test results of all participants. They obtained an average of 98% after being involved in environmental education programmes. The programme involved identifying water wastage practices, calculating or measuring water usage and identifying water-wise strategies. A study by Crosara and Fehr, (2011) found that

after learners were involved in environmental education programmes, the water consumption reduced drastically per working day per person compared to previous reports. The current study also compared the previous water bills with the water bill after the programme implementation and the results exhibited a decrease in the number of schools who were paying less than R7000 per annum for water.

6.2.5 Energy usage

Energy usage also exhibited a significant improvement. The post-test results depicted a bright spot on energy serving, recording 94%. The results indicated an increase of 37% from its pre-score of 54%. The reduction technique involved simple actions such as switching lights off when there is no one in the room, removing appliances on plagues when not in use and switching off computers, printers and photocopiers when not in use. Consistency in practicing these techniques is the key to success. The programme designed to reduce energy usage involved determining from the count and power rating of all points of use and compared to the bill from energy utility. It also involved replacing high energy user bulbs with energy saver bulbs, preventing and reporting illegal connections and vandalism in schools.

6.2.6 Waste management

The average percentage of solid waste management in schools significantly improved from 57% in the pre-test to 94% in the post-test results. Their attitudes towards the segregation and various solid waste management practices by all participants had significantly improved in the case of post-test results. The offering of a combination of various environmental education activities increased participants' knowledge and understanding of waste concepts such as recycling, re-using and reduce. It also developed participants' skills in handling, sorting and classifying solid waste. Skills are important determinant of environmental conservation, protection (Alexandar & Poyyamoli, 2014: 14).

6.2.7 Purchasing and consumption

The purchasing and consumption of resources by groups significantly improved from the pre-results. The purchasing of environmental or ozone friendly, light packaged, biodegradable and

recycled products increased after the EEPI. The results of the post-test increased from 54% to 98%. Schools should commit themselves to adopt and facilitate the prudent and efficient use of resources and to encourage sustainable consumption. Schools especially section 21 schools (refer to section 5.1.5.2, table 5.8), has a responsibility to purchase goods and services of high environmental and ethical standards from local sources where practical and increase value for money by reducing, repairing, re-using and recycling. Through recycling schools generate funds and improve the school. On completion of EEP some schools had collected tones and tons of papers which were delivered to Richards Bay Recycling for cash.

6.2.8 Behaviour and attitude change

Environmental education should help learners develop a set of values and feelings of concern for the environment and the motivation to participate actively in environmental improvement and protection (Fien, *et al*, 1996: 14). After the participants attended the EE programme their attitudes and behaviour towards the environment significantly improved. The improvement was evident when the average score for all participants improved from 71% in the pre-test to 98.6% in the post-test. Litchfield and Foster (2009: 6-7) posit that one of the factors that influence behaviour change, along with a person's upbringing or social environment is his or her belief in the ability that he or she can bring about change. The EE programme instilled love and confidence in participants' ability to improve and solve environmental problems. "They became aware of very often irresponsible human behaviour towards the environment, worsening its quality, and threatening present and future generation" (Kostova and Vladimirova, 2010: 67). Undertaking practical work by cleaning and planting trees was extremely stimulating because "it helped learners understand they could not only study and talk about environment but they could be active and improve it" (Kostova and Vladimirova, 2010: 67).

6.3 TESTING OF HYPOTHESIS

The fundamental objective of this study was to test the preliminary statement that were formulated in chapter one, section 1.10.

- *Environmental Education is effective in promoting sustainable living in secondary schools.*

The table below, table 6.2, indicates the results of post-pre-test in all aspects of sustainable living investigated. It also denotes the differences between post-pre scores.

Table 6.2 Testing Hypothesis

Component of sustainable living	**Pre-Test Results (%)**	**Post-Test Results (%)**	**Differences**
Environmental Awareness	61	98.5	37.5
Transport	89.5	97	7.5
School Grounds	61.3	95.6	34.3
Water Usage	66.7	98.3	31.6
Energy Usage	57	94.3	37.3
Purchase & Consumption	54	98	44
Waste Management	61	97	36
Attitude & Behaviour	71	98.6	27.6
Total %	65	97	32

The results of the post-test show significant improvement of more than 30% and the findings depict only high positive ranks which support or confirm the hypothesis of this study. This indicate that the observed differences between pre- and post-test are statistically significant thus rejecting the null hypothesis that environmental education is ineffective in promoting sustainable living in secondary schools. After the Environmental Education Programme implementation, significant improvement with only high and positive ranks was achieved.

6.4 REFLECTIONS ON THE RESEARCH PROCESS

6.4.1 The effectiveness of Environmental Education Programme

The aim of this study was to evaluate the effectiveness of environmental education in promoting sustainable living in secondary school. Evaluation is a valuable tool, it can be used to inform curriculum designers about the need to refine or replace a particular programme. It is pivotal to

systematically measure the success or failure of a programme. To achieve this, one needs to monitor the changes that occur in participants' behaviour and quality of their life and to understand why the programme was a success or failure. Systematic evaluation not only reveals to what extent an intervention has been successful in changing behaviour and reducing environmental impact but also why was it not successful and how it could be improved. The current study hypothesised that environmental education is effective in promoting sustainable living in secondary school learners. In South African context Environmental Education has been infused in the curriculum of all learning areas. In that way learners should be possessing pro-environmental behaviour if this inclusion is working for our schools. The pre-test results, before EE programme initiative exhibited poor performances in most environmental issues raised in questionnaire but after the EE programme implementation the results were significantly improved in all spheres of environmental issues. The interpretation could be that EE when taught within a contested curriculum, becomes ineffective in promoting sustainable living. EE is hands-on, action-based and requires active involvement of all stakeholders to improve and solve environmental problems in the school. EE is not something to be learned by heart for examination purposes. This has been exhibited in the results of this study for example the post-test results were significantly very high compared to the low pre-test results.

Mzesane and Mudau (2014) in their study, noted that when participants were asked the role played by EE in their daily lives, the indication was that no change had occurred, not until they were actively involved in EEP initiative. They discovered that extra mural activities (environment activities) aroused initiatives to reduce littering although the impact was not adequate to end solid waste product disposal in the school. The EEP in the current study addressed cognitive, affective as well as behavioural domains and thus raised knowledge, skills, positive attitude and pro-environmental behaviours. This has made EEP to be more effective in fostering sustainable living in secondary school learners. In the current study, educators were asked whether they were prepared to provide learners with meaningful experience-based school learning activities that promote sustainable use of resources and 95.6% agreed with the statement after being exposed to EEP compared to 71% before the EEP. For this reason schools should not limit learning activities merely at classroom level however should foster alterative interactive and experiential, hands-on teaching approaches (Khar Thoe, Parahakaran, Febro, Weisheit and Lee, 2013:286; Alexandar, *et al*, 2014; 12), such as involving for example a visit

to the local Game Reserve, to study ecosystem, river clean-up, gardening, and testing water quality to facilitate meaningful learning beyond classroom activities.

6.4.2 Contribution to new knowledge

It is anticipated that this study will add to the limited body of research on the role of environmental education in promoting sustainable living in secondary schools. It will also assist the curriculum designers identify and recommend Environmental Education Programmes to be included in the curriculum for each grade in order to make EE more effective in schools. The new indicators of sustainability (see sub-section 2.9) and example of EE programmes for promoting sustainability (see sub-section 4.12) were designed for this study and could be used for further research and to design school environmental education curriculum.

6.4.3 Limitations and suggestions for future research

Like all other studies, the current study has some limitations. One of the limitations of the current study is the exclusion of control, the same research having a control and experimental groups may make the comparisons between the groups more genuinely. The research focused on secondary schools only, the same research focusing on both secondary and primary schools may results in a holistic view of environmental education. This research involved rural schools, the same research focusing on both rural and urban schools may results in specific recommendations since their environmental resources and environmental issues may differ. The Environmental Education intervention programme was implemented in a short period of time (Duvall and Zint 2007: 20), six months only, the same research if conducted for a longer period than this may yield different results and recommendations. The research did not involve community members. This would ensure that issues discussed at school are also engaged at home and in the community. Norton as cited in in Duvall and Zint (2007: 20) suggested that if schools wish to be successful in solving local environmental issues, they must think of themselves as agents of social change, which means involving community members around the schools and learners in their local communities. When parents and learners collaborate on solving their environmental issues, they foster greater sense of ownership and increase their willingness to be involved in creating a sustainable livelihood. Funding is one of the obstacles hampering the implementation of many environmental education programmes. Travelling to

participating schools, transporting learners to field trips, excursions and lunch provision was very expensive, as a result, some awesome programmes planned were discontinued.

6.5 CONCLUSION

The findings indicate that the attitude of educators is statistically different from that of learners and non-educators. The difference was found to be in favour of educators. When the mean scores were examined, it was evident that both educators and learners showed positive attitude towards their environment. This proves that education is the primary agent of transformation for achieving sustainable living among the society. Environmental education needs to foster the skills, values, behaviour and lifestyles compatible for living a sustainable livelihood.

In the quantitative part of a questionnaire respondents were asked if they were aware of their local environmental issues whereas in the qualitative approach they were observed in action. An average of 76% of all respondents indicated that they were aware of their local environmental issues, however observation exhibited that litter was the order of the day especially after breaks in most schools. This contradiction is an evidence that most of the concepts in environmental education are theorised and very little is done practically. Environmental education must help learners better understand the world in which they live, in addressing the complexity and interconnectedness of local problems and issues. It must equip them with knowledge and skills needed for a sustainable livelihood as well as changes in values, behaviour and lifestyles (UNESCO, 2004: 84).

The level of education of respondents has a contributory effect to the way they interact with one another and with their environment. Educators seem to be living more light than all other groups. Schools must strive to move towards becoming sustainable organizations by committing to identify, conserve and improve the environmental and heritage values of their site and by reducing their ecological footprint. This can be achieved by reducing waste, minimising energy, transport and water usage, increasing recycling and encouraging biodiversity in the school grounds (Cloud, 2005:11). Schools should prepare learners to transform the society for the future. UNESCO, (2004: 87) purports that schools should develop to the maximum the potential of all learners, so that they can achieve self-fulfillment and full self-expression with the collective achievement of a viable future. It is the responsibility of the

school to promote environmental ethic which has sustainable living at its core, through environmental education. The new ethic consisting of developing the target values of social responsibility, concern for others and harmony with nature is required. This new ethic which embraces plants and animals as well as people is required for human societies to live in harmony with the natural world on which they depend for survival and well-being (IUCN/UNEP/WWF, 1980: 13). The core task of environmental education is to foster or reinforce attitudes and behaviour compatible with this new ethic. Whereas the study aimed at evaluating the role of environmental education in promoting sustainable living in secondary school. Promoting sustainable living through education requires educators to place an ethic for living sustainably (based upon principles of social justice, democracy, peace and ecological integrity at the centre of society's concerns (UNESCO, 2004: 86-87). Schools therefore, have the responsibility of promoting sustainable living among its members and community at large.

6.6 RECOMMENDATIONS FOR THE STUDY

The following recommendations of the study are made:

6.6.1 Recommendation 1: Environmental Education should be taught as an independent school subject in all levels of formal education.

In South Africa, environmental education has been incorporated into all learning areas or subjects. Despite its incorporation into curriculum, schools still experience major challenges with regard to sustainable use of schools resources. This is because environmental education is presented in a fragmented manner, resulting in some issues not properly addressed. Very limited time is allocated to environmental issues and the curriculum of each subject is overloaded. Therefore very little will be achieved by environmental education in changing learners' behaviour, attitude and lifestyles.

For this reason, the study recommends that environmental education should be presented as an independent school subject in all levels of formal education. This would ensure that learners grasp a deeper understanding of environmental concepts and issues and to develop knowledge and skills necessary for solving problems.

6.6.2 Recommendation 2: Creation of a subject specialist positions for Environmental Education as an independent subject

The Department of Basic Education should create a Subject Specialist Positions for Environmental Education as an independent subject. The subject specialist would be responsible for managing and supporting the delivery of Environmental Education as an independent subject.

6.6.3 Recommendation 3: Appointment of a school Environmental Education Coordinator

All secondary schools in uMkhanyakude district should appoint one enthusiastic educator to act as an environmental coordinator. The coordinator should establish a working team which will assist with planning of all school environmental programmes.

6.6.4 Recommendation 4: Environmental Education Policy

Poor management of school resources for example water, electricity and paper, is the results of schools not having environmental education policy. The study recommends that schools formulate their environmental education policies which will guide and direct the school community on how to address environmental issues and change towards more sustainable living. The policy should include the management of the following school resources: water, energy, paper, ink and bottles, to name a few. The environmental education coordinator and the environmental education team should conduct environmental audit for example water and electricity audit.

6.6.5 Recommendation 5: Purchasing policy

The study recommends that schools formulate purchasing policy which would guide, direct and encourage the schools on purchasing of environmental friendly or ozone friendly products made from recycled materials and locally manufactured (Proudly South African products).

6.6.6 Recommendation 6: Environmental awareness programmes

It is clear from the findings that schools do not provide sufficient information to create awareness of sustaining resources. The study therefore recommends that schools should provide sufficient information to create awareness in the form of:

- Reading materials such as environmental magazines, pamphlets, newspapers and book.
- Television programmes such as 50/50, Focus and Geographic Wild.
- Observing and celebrating environmental days and events for example planting of trees during Arbor Days.
- The EE coordinator and EE Team should make presentations on environmental issues on regular basis in the morning assemble and staff meetings.
- Increase awareness of environmental issues and manage school resources and activities in an environmentally sustainable manner.

6.6.7 Recommendation 7: Recycle, re-use and reduce

Schools should consider recycling and reusing papers, cans, plastic bags, cartridges, bottles and envelopes. Provision of recycling bins at all corners of the school is essential. Recycling bins should be categorized and marked as bins for 'bottle' only, for 'paper' only and for 'cans' only. It is recommended that schools join clubs and enter competitions such as 'collect a can', and 'Eco-schools.' This would help the school to remain clean and at the same time generate cash from waste.

6.6.8 Recommendation 8: One School, one garden

The study recommends that each school should have a school garden. The school garden can serve many purposes at school for example, it can be used to provide nutrition, generate cash and can be used as a learning site. The school grounds are a very important resource which provides many learning opportunities. Indigenous plants and fruit trees must be planted in the school grounds as they protect the soil and the buildings from strong winds, provide fruit to learners and beautify the school.

6.6.9 Recommendation 9: Reduction of energy and water loss

It is recommended that schools implement the following strategies to reduce energy and water consumption:

- Turn equipment, computers and unnecessary lights off when not in use or at night to reduce energy usage.
- Install energy saving bulbs in all classrooms and offices.
- Schools should consider buying and using solar energy and borehole.
- Repair all leaking pipes and taps immediately to limit water loss.

6.6.10 Recommendation 10: Traveling by carpool or bus

It is recommended that educators and administrative staff travel by carpool or bus to and from work. Learners are also encouraged to travel by bus, bikes or walk to and from school. This would not only save their money but would also reduce carbon dioxide emission and at the same time promote healthy living.

6.6.11 Recommendation 11: Financial support for Environmental Education Programmes.

Environmental Education Programmes such as field trips, outdoor education, assembly speaker, curriculum material development and professional development have financial implications, school must include these in their school budget.

6.7 SUMMARY

This chapter presented the summary of findings, conclusions and recommendations of the role of EE in promoting sustainable living in secondary schools in Umkhanyakude district. From the presentation of the findings in chapter 5 and summary of the study in the present chapter, it was clear that there is a lack of environmental knowledge and understanding. The study emphasises increased environmental awareness and environmental information dissemination in the form of environmental books, magazines, pamphlets, newspapers, radio, television

programmes and bulletin boards. It is envisaged that school communities would practice responsible behaviour within and outside school. Recommendations to the Department of Education were also propounded. It is hoped that, the department will take them into consideration when planning their curriculum.

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APPENDICES

Appendix 1: Application for Permission to Conduct Research in KZN Schools

kzn education
Department:
Education
KWAZULU-NATAL

Application for Permission to Conduct Research in Kwa-Zulu Natal Department of Education Institutions

1. Applicants Details

Name Of Applicant(s): *Mbokazi Msawenkosi Sandile*

Tel No: *076 933 3271* Fax: *086 5189779* **Email:** *msmbokazi@gmail.com*

Address: P.O Box 1198, Esikhawini, 3887

2. Proposed Research Title: *An Evaluation of the Role of Environmental Education in Promoting Sustainable Living in Secondary School-UMkhanyakude District, KwaZulu-Natal*

3. Have you applied for permission to conduct this research or any other research within the KZN-DoE institutions?	**Yes**	✓ **No**

If "yes", please state reference Number: _____

4. Is the proposed research part of a tertiary qualification?	✓ **Yes**	**No**

If "yes"
Name of tertiary institution: *University of South Africa*

Faculty and or School: *Didactics*

Qualification: *Doctor of Education*

Name of Supervisor: *Prof. LDM Lebeloane* **Supervisors Signature:** _____
If" no", state purpose of research: _____
_____

5. Research Background:

Industrialization and rapid population growth, increased consumption and pressure on resources, industrialization, human ... These crises are strongly linked to social and cultural changes associated with the move away of traditional and modern world views (Le Roux, 2000:27). As our population continues to grow, the demand for food, energy, land and water forces the people to over exploit these resources in an attempt to improve the quality of their lives and arising standards. The production of solid waste in our schools and communities are escalating. Tons of waste are produced each year. This is an indication that there is a high consumption of food. High consumption of food leads to obesity and health problems such as diabetic, high cholesterol, high blood pressure, etc. Some disposed solid waste on open sites and not on designated areas for dumping. This creates unpleasant smell, sight and health hazard to children and other members of the community. The study will endevour to address all these environmental issues.

6. Methodology including sampling procedures and the people to be included in the sample:

Qualitative and Quantitative methods will be used. The research will be conducted in five circuits in the district. In each circuit two schools will be purposefully selected to participate. In each school only 3 learners, 1 educator and 1 senior educator will be purposively selected.

7. What is the main research question(s):

What is the Role of Environmental Education in Promoting Sustainable Living in Secondary Schools in the Umkhanyakude District, KwaZulu-Natal?

8. What contribution will the proposed study make to the education, health, safety, welfare of the learners and to the education system as a whole?

It is believed that the study will encourage individuals, learners, parents, educators and communities help transform from present day patterns of unsustainable living to ones which are sustainable. The study attempts to reduce overconsumption of food and resources thereby reducing health risk in children. The study will introduce school environmental policy which will promote recycling, re-use of disposed waste and greening the school grounds. Greening the school grounds include setting up of food gardens.

9. KZN Department of Education Districts from which sample will be drawn (please tick) – *Please attach the list of all schools*

Amajuba		**Umlazi**		**Sisonke**	
Othukela		**Pinetown**		**Ugu**	
Zululand		**Ilembe**		**Umgungundlovu**	
Umkhanyakude	**X**	**Empangeni**		**Umzinyathi**	

10. Research data collection instruments: *(Note: a list and only a brief description is required here - the actual instruments must be attached)***:**
The following instrument will be used:
Questionnaires *will be issued to selected people and a period of 30 days allowed for their completion.*

11. Procedure for obtaining consent of participants and where appropriate parents or guardians:
A written consent will be sought to the principal as well as the parents of the learners selected to participate. Parents will be requested to sign consent in order to confirm granting permission. Their names will not be mentioned anywhere in the research to ensure confidentiality.

12. Procedure to maintain confidentiality (if applicable):
The names of all participants will remain confidential. Participants will be labeled as Respondent 1, 2 or 3 etc. Their response will not be matched with the name of the participant or the school. The findings of a particular school will not be mentioned as for that school but schools will be referred to as school A, B, C or D.

13. Questions or issues with the potential to be intrusive, upsetting or incriminating to participants (if applicable):
The researcher will avoid questions that are upsetting or incriminating to participants.

14. Additional support available to participants in the event of disturbance resulting from intrusive questions or issues (if applicable):

The researcher will ensure that pre-counseling and post-counseling is conducted to all participants

15. Research Timelines :
04 February to 30 September 2013. Research to be conducted during break times and after school to ensure that teaching and learning is minimal disturbed.

16. Declaration
I *Msawenkosi Sandile Mbokazi* **declare that the above information is true and correct**

_____ 13/05/2012
Signature of Applicant **Date**

17. Agreement to provide and to grant the KwaZulu Natal Department of Education the right to publish a summary of the report.
I agree to provide the KwaZulu Natal Department of Education with a copy of any report or dissertation written on the basis of information gained through the research activities described in this application. I grant the KwaZulu Natal Department of Education the right to publish an edited summary of this report or dissertation using the print or electronic media.

MS MBOKAZI

_____ 13/05/2012
Signature of Applicant **Date**

Appendix 2: Approval Letter from the Department of Education

education

Department:
Education
PROVINCE OF KWAZULU-NATAL

Enquiries: Sibusiso Alwar | Tel: 033 341 8610 | Ref.:2/4/8/415

Mr Musawenkosi Sandile Mbokazi
P. O. Box 1198
ESIKHAWINI
3887

Dear Mr Mbokazi

PERMISSION TO CONDUCT RESEARCH IN THE KZN DoE INSTITUTIONS

Your application to conduct a pilot and research entitled: **The Role of Environmental Education in Promoting Sustainable Living in Secondary School - Umkhanyakude District, KwaZulu Natal,** in the KwaZulu-Natal Department of Education Institutions has been approved. The conditions of the approval are as follows:

1. The researcher will make all the arrangements concerning the research and interviews.
2. The researcher must ensure that Educator and learning programmes are not interrupted.
3. Interviews are not conducted during the time of writing examinations in schools.
4. Learners, Educators, Schools and Institutions are not identifiable in any way from the results of the research.
5. A copy of this letter is submitted to District Managers, Principals and Heads of Institutions where the intended research and interviews are to be conducted.
6. The period of investigation is limited to the period from 01 June 2013 to 30 June 2015.
7. Your research and interviews will be limited to the schools you have proposed and approved by the Head of Department. Please note that Principals, Educators, Departmental Officials and Learners are under no obligation to participate or assist you in your investigation.
8. Should you wish to extend the period of your survey at the school(s), please contact Mr. Alwar at the contact numbers below.
9. Upon completion of the research, a brief summary of the findings, recommendations or a full report / dissertation / thesis must be submitted to the research office of the Department. Please address it to The Director-Resources Planning, Private Bag X9137, Pietermaritzburg, 3200.
10. Please note that your research and interviews will be limited to the schools and institutions in the following District/s of the KwaZulu Natal Department of Education:
    Umkhanyakude District

Nkosinathi S.P. Sishi, PhD
Head of Department: Education

2/38

Appendix 3. A Letter to the Principal

PO Box 808
Jozini, 3969
Email:msmbokazi@gmail.com
Cell: 076 933 3271
20 March 2014

The Principal

_____

Umkhanyakude District

Dear Sir

REQUEST TO CONDUCT RESEARCH IN YOUR SCHOOL

I am a Doctoral student at the University of South Africa, conducting research in Secondary Schools in Umkhanyakude District. Your School is one of the ten schools sampled for this research study. I am, therefore, requesting your permission to conduct this investigation in your school. The Head of Department has granted me permission to conduct this study in identified schools, a copy of which is attached.

The title of my Thesis: **"An Evaluation of the Role of Environmental Education in Promoting Sustainable Living in Secondary schools in Umkhanyakude District, KwaZulu-Natal."**

The research study is for academic purposes only. The study aims to evaluate the role of environmental education in promoting sustainable living in secondary schools. It also aims to develop new strategies of promoting sustainability in Secondary schools. The results of this study will not only assist the researcher in obtaining his Doctoral degree but also the Department of Education as to how Environmental Education be incorporated into the curriculum for promoting sustainable living.

The research participants shall include seven (7) learners (from grades 10-12), three (3) educators (from Physical Sciences, Geography, Economics, Life Orientation, Agricultural Sciences, and Life Sciences) and one (1) non-educator staff member. The participants would be required to complete a questionnaire and return it to the researcher as soon as possible. Participation is voluntary and participants may withdraw at any time without reprisal.

It must also be stated that all ethical issues have been taken into consideration and will be communicated to every participant prior to their participation. Dates and times will be communicated to you shortly.

Your cooperation in this regard will be highly appreciated.

Yours Faithfully

M. S. Mbokazi

Appendix 4: Request Letter to the Educator

PO Box 808
Jozini, 3969

Email: msmbokazi@gmail.com

Cell: 076 933 3271

20 March 2014

The Educator

_____

Umkhanyakude District

Dear Sir/Madam

REQUEST TO PARTICIPATE IN RESEARCH STUDY

I am a Doctoral student at the University of South Africa, conducting research in Secondary Schools under Umkhanyakude District. I have great pleasure to invite you to participate in this research study whose particulars are as follows.

The title of my thesis is**: "An evaluation of the Role of Environmental Education in Promoting Sustainable Living in Secondary schools in Umkhanyakude District, KwaZulu-Natal."**

The research study is for academic purposes only. The study aims to evaluate the role of environmental education in promoting sustainable living in secondary schools. It also aims at developing strategies of promoting sustainable living in secondary schools. The results of this study will not only assist the researcher in obtaining his Doctoral degree, but also the Department of Education as to how Environmental Education will be incorporated into the curriculum for promoting sustainable living.

Participation is voluntary. You may withdraw from the study for any reason, at any time and no penalty or victimisations may be incurred as a result of your withdrawal. Your will not be paid for participating in this study, transport and refreshments may be provided if interviews are organised outside the school hours. You will be required to complete a questionnaire and return it to the researcher as soon as possible.

You will be informed of dates, times and venues in due course. Should you have any enquiries regarding this study, never hesitate to contact me at this number: 076 9333 271/082 200 8934 or my promoter, Prof Lebeloane at 012 429 4433/ 083 453 8148.

Your cooperation in this regard will be highly appreciated.

Yours Faithfully

M. S. Mbokazi

Appendix 5: A Letter to a Learner

PO Box 808

Jozini, 3969

Email: msmbokazi@gmail.com

Cell: 076 933 3271

20 March 2014

The Learner

Dear Sir/Madam

REQUEST TO PARTICIPATE IN RESEARCH STUDY

I am a Doctoral student at the University of South Africa, conducting research in Secondary Schools in Umkhanyakude District. I have great pleasure to invite you to participate in this research study whose particulars are as follows.

The title of my thesis: **"An Evaluation of the Role of Environmental Education in Promoting Sustainable Living in Secondary schools in Umkhanyakude District, KwaZulu-Natal."**

The research study is for academic purposes only. The study aims to evaluate the role of environmental education in promoting sustainable living in secondary schools. It also aims at developing strategies of promoting sustainable living in secondary schools. The results of this study will not only assist the researcher in obtaining his Doctoral degree, but also the Department of Education as to how Environmental Education be incorporated into curriculum to promote sustainable living.

Participation is voluntary. You may withdraw from the study for any reason, at any time and no penalty or victimisations may be incurred as a result of your withdrawal. Your will not be paid for participating in this study, transport and refreshments may be provided if interviews are organised outside the school hours. You will be required to complete a questionnaire and return it to the researcher as soon as possible.

You will be informed of dates, time and venues in due course. Should you have any enquiries regarding this study, never hesitate to contact me at this number: 076 9333 271/082 200 8934 or my promoter, Prof Lebeloane at 012 429 4433/ 083 453 8148.

Your cooperation in this regard will be highly appreciated.

Yours Faithfully

M. S. Mbokazi

Appendix 6: A Letter to a Parent

Box 808
Jozini, 3969

Email: msmbokazi@gmail.com

Cell: 076 933 3271

20 March 2014

The Parent

Dear Sir/Madam

REQUEST TO PARTICIPATE IN RESEARCH STUDY

I am a Doctoral student at the University of South Africa, conducting research in Secondary Schools under Umkhanyakude District. I have great pleasure to inform you that your child is selected to participate in this study. I therefore request you to grant permission by signing the attached concession forms.

The title of my Thesis**: "An Evaluation of the Role of Environmental Education in Promoting Sustainable Living in Secondary schools in Umkhanyakude District, KwaZulu-Natal."**

The research study is for academic purposes only. The study aims to evaluate the role of environmental education in promoting sustainable living in secondary schools. It also aims at developing strategies of promoting sustainable living in secondary schools. The results of this study will not only assist the researcher in obtaining his Doctoral degree but also the Department of Education as to how Environmental Education be incorporated in curriculum to promote sustainable living.

Participation is voluntary. Your child may withdraw from the study for any reason, at any time and no penalty or victimisations may be incurred as a result of your child withdrawal. Your child will not be paid for participating in this study, transport and refreshments may be provided if interviews are organised outside the school hours. Your child will be required to complete a questionnaire and return it to the researcher as soon as possible.

You will be informed of dates, time and venues in due course. Should you have any enquiries regarding this study, never hesitate to contact me at this number: 076 9333 271/082 200 8934 or my promoter, Prof Lebeloane at 012 429 4433/ 083 453 8148.

Your cooperation in this regard will be highly appreciated.

Yours Faithfully

M. S. Mbokazi

Appendix 7 Consent Form for Parent

CONSENT TO PARTICIPATE IN RESEARCH STUDY: PARENT

Title: "**An Evaluation of the Role of Environmental Education in Promoting Sustainable Living in Secondary Schools in Umkhanyakude District, KwaZulu-Natal**

I have been informed that Mr. Mbokazi, a doctoral student at the University of South Africa requested participation of my child in his research study. I wish to give my consent, having understood the following:

1. Participation in this research study is voluntary and participants may decide to withdraw at any time and there will be no penalty or loss of benefits to which I may otherwise be entitled.
2. I understand that my child will be required to complete a questionnaire and be subjected to observation for the duration of the study. I have been informed that their participation requires personal interest in or specific knowledge about sustainability and they may choose not to answer any question if they feel any discomfort with such questions.
3. I understand that the results of this research may be published but the name of my child will be kept confidential. I also understand that my child may be tape recorded and only the researcher will have access to these tapes for the period of the study and will be destroyed thereafter.
4. I agree that my child will not be paid for participating in this research study, however, transport and refreshments may be offered if research is conducted outside school hours.

In signing this consent form, I am not waiving any legal claims, rights or remedies. A copy of this consent form will be offered to me.

Signature of Parents: _____Date: _____/_____/2014

I, **Msawenkosi Sandile Mbokazi**, certify that I have explained to the above individuals the nature and purpose, the potential benefits and possible risks associated with participating in this research study.

Signature of Researcher: _____ Date: ____/____/2014

Appendix 8 Assent to Participate by a Learner

ASSENT TO PARTICIPATE IN RESEARCH STUDY**: LEARNER**

Title: "**An Evaluation of the Role of Environmental Education in Promoting Sustainable Living in Secondary Schools in Umkhanyakude District, KwaZulu-Natal**

Having received your letter requesting my participation in your research study, I hereby assent to participate in your study. I have been informed that:

1. Participation is voluntarily and that I may withdraw at any time with or without notice and my withdrawal will not be used against or to discriminate me.
2. My participation will involve completing a questionnaire and being observed for the duration of the study.
3. I understand that the results of this study may be published but my name or identity will be kept anonymous and confidential.
4. I also note that I may be tap recorded during the course of the study and those transcripts and tape records will be kept in a safe place. No other person will have access to it other than the researcher and that it will be discarded after the completion of the study.
5. I will not be paid for my participation, however, transport and refreshments may be provided if interviews are conducted outside the school times.
6. I am free to ask any question I have concerning the research study or my participation in it, before or after my consent. If I feel humiliated, my life is put at risk or threaten I can lodge a complaint with the researcher or the University of South Africa.

I have read the above informed assent form thoroughly and I understand that all information obtained from me will remain confidential. In signing this consent form I am not waiving any legal claims against the researcher or the University of South Africa and I consent to participate in this study. A copy of this consent form will be afforded to me.

Signature of Learner: _____ Date: _____

I, **Msawenkosi Sandile Mbokazi**, certify that I have explained to the above individuals the nature and purpose, the potential benefits and possible risks associated with participating in this research study.

Signature of Researcher: _____ Date: _____

Appendix 9 Consent form by Admin Clerk

CONSENT TO PARTICIPATE IN RESEARCH STUDY: EDUCATOR/ADMIN CLERK

Title: "**An Evaluation of the Role of Environmental Education in Promoting Sustainable Living in Secondary Schools in Umkhanyakude District, KwaZulu-Natal**

Having received your letter requesting my participation in your research study, I hereby assent to participate in your study. I have been informed that:

1. Participation is voluntarily and that I may withdraw at any time with or without notice and my withdrawal will not be used against or to discriminate me.
2. My participation will involve completing a questionnaire and being observed for the duration of the study.
3. I understand that the results of this study may be published but my name or identity will be kept anonymous and confidential.
4. I also note that I may be tap recorded during the course of the study and those transcripts and tape records will be kept in a safe place. No other person will have access to it other than the researcher and that it will be discarded after the completion of the study.
5. I will not be paid for my participation, however, transport and refreshments may be
6. I am free to ask any question I have concerning the research study or my participation in it, before or after my consent. If I feel humiliated, my life is put at risk or threaten I can lodge a complaint with the researcher or the University of South Africa.

I have read the above informed consent form thoroughly and I understand that all information obtained from me will remain confidential. In signing this consent form I am not waiving any legal claims against the researcher or the University of South Africa and I consent to participate in this study. A copy of this consent form will be afforded to me.

Clerk/Educator's Signature: _____ Date: _____

I, **Msawenkosi Sandile Mbokazi**, certify that I have explained to the above individuals the nature and purpose, the potential benefits and possible risks associated with participating in this research study.

Signature of Researcher: _____Date: _____

Appendix 10: Learner Questionnaire

QUESTIONNAIRE

AN EVALUATION OFTHE ROLE OF EE IN PROMOTING SUSTAINABLE LIVING IN SECONSARY SCHOOLS IN UMKHANYAKUDE DISTRICT-KWAZULU-NATAL

LEARNER PERSONAL INFORMATION

DEMOGRAPHIC INFORMATION

SCHOOL CODE		**LEARNER CODE**	
GENDER		**AGE**	

This questionnaire is designed to enable you to measure your knowledge, understanding and attitude towards the environment and sustainable living. Please respond truthfully, so that your answers actually describe your knowledge, understanding and attitude. Please note that there is no wrong or right answer. Respond sincerely with what you know and feel not with what the answer is supposed to be. Put a **tick (√)** over the answer you think is the most appropriate one.

SECTION A

1. SOCIO-ECONOMIC SITUATION

1.1 What is your household `monthly income?

A. Under R3000 B. R3000-5000 C. R5000- +10000

1.2 What is your household source of income?

A. Agriculture B. State grant C. Employed

1.3 What type of water supply you have at school?

A. Tank B. borehole C. pipe water

1.4 What is the source of light at school?

A. Generator B Nura C Eskom

1.5 What type of toilets system you have at school?

A. pit toilet B. movable toilets C. flush toilets

SECTION B

Answer the following questions by stating whether you: **STRONGLY AGREE = 4; AGREE = 3; DISAGRE = 2; and STRONGLY DISAGREE = 1,** only put a **tick** (√) on the answer you think is the appropriate one. There are no wrong or correct answers. Be honest in answering these questions.

2. ENVIRONMENTAL AWARENESS

NO	DESCRIPTION	1	2	3	4
2.1	Celebrating environmental Days such as World environmental Days, Arbor days and, etc. increases environmental awareness?				
2.2	I have more interest in reading about environment.				

2.3	I enjoy viewing TV programmes such as 50/50, Focus and National Geographic Wild.				
2.4	I am aware of our local environmental problems.				
2.5	Deforestation contributes to climate change.				
2.6	We can control air pollution by ourselves				
2.7	Planting of many trees will help promote environmental sustainability				
2.8	Littering pollutes environment				

RESOURCE UTILIZATION

3.1 TRANSPORT

NO	DESCRIPTION	1	2	3	4
3.1.1	I prefer to walk most of the time in order to protect the environment				
3.1.2	I prefer to ride a bicycle to and from school than travelling by vans				

3.2 ENERGY SAVINGS

NO	DESCRIPTION	1	2	3	4
3.2.1	I turn off the lights when they are not in use.				
3.2.2	The burning of fossil fuels such as coal, oil, petrol and wood releases huge amounts of CO_2 into the earth's atmosphere which increase the greenhouse effect and global warming.				
3.2.3	Turning off your electric appliances like your stereo, computer or charger instead of leaving them on standby saves energy for future generations.				
3.2.4	I wash my clothes with cold water.				
3.2.5	I wash my clothes when they are too dirt.				

3.3 GARDENING & SCHOOL GROUNDS

No	DESCRIPTION	1	2	3	4
3.3.1	Greening the school grounds protect the environment.				
3.3.2	Deforestation contributes to climate change				
3.3.3	All trees must be removed from the school premises as they invite dangerous animals such as snakes to the school				
3.3.4	One school one garden/one home one garden is a good initiative				
3.3.5	I use compost and kraal manure than artificial fertilizers				
3.3.6	Removing weeds saves water and plant nutrients				

3.4 WATER SAVINGS

NO	DESCRIPTION	1	2	3	4
3.4.1	Fixing leaking taps promptly saves water				
3.4.2	Switching taps off while brushing the teeth saves lot of water				
3.4.3	I use a cup or glass to drink water from the tap				
3.4.4	I use a watering can to water the garden				
3.4.5	I collect rain water when it is raining				
3.4.6	I water the garden in the morning and afternoon				
3.4.7	There is too much water in the world				

3.5 PURCHASING & CONSUMPTION

NO	DESCRIPTION	1	2	3	4
3.5.1	Writing on both sides of a page of an exercise book creates an ugly work				
3.5.2	I use environmental or eco-friendly products most of the times				
3.5.3	Damage to ozone layer can be reduced by avoiding goods containing CFC.				
3.5.4	I am concerned about how much waste is produced in our school.				
3.5.5	Over packaged products should not be purchased				
3.5.6	I buy cheap snacks				
3.5.7	I eat muffins during break time.				
3.5.8	I prepare my lunch at home and bring it along to school				

3.6 WASTE MANAGEMENT

NO	DESCRIPTION	1	2	3	4
3.6.1	Re-using shoe boxes to keep small items reduce waste				
3.6.2	Recycling paper, plastic, bottles reduce waste produced				
3.6.3	I throw papers on the dust bin placed on the school yard				

3.7 BEHAVIOUR AND ATTITUDE

NO	DESCRIPTION	1	2	3	4
3.7.1	I am responsible for the sustainability of my school, home and community				
3.7.2	Biodiversity indicates the beauty and heath of the planet, Earth				
3.7.3	Man must live in harmony with his environment				
3.7.4	Sustainability is a responsibility to be shared by all individuals, professionals, non-professional, experts and non-experts				
3.7.5	We need to acknowledge that environmental problems will only be solved when people change the way they live.				
3.7.6	Burning of waste pollutes our environment				
3.7.7	I treat all living things with respect				
3.7.8	Pouching is destructive to our nature				

SECTION C

1. What it the meaning of the concept “sustainable living’?_____

_____

2. What are the characteristics of a person who leads a sustainably livelihood?

_____

_____

Appendix 11: Educator Questionnaire

QUESTIONNAIRE

AN EVALUATION OF THE ROLE OF ENVIRONMENTAL EDUCATION IN PROMOTING SUSTAINABLE LIVING IN SECONSARY SCHOOLS IN UMKHANYAKUDE DICTRICT KWAZULU-NATAL

DEMOGRAPHIC FACTORS

EDUCATOR INFORMATION

SCHOOL CODE		**EDUCATOR CODE**	
GENDER		AGE	

This questionnaire is designed to enable you to measure your knowledge, understanding and attitude towards environment and sustainable living. Please respond truthfully, so that your answers actually describe your knowledge, understanding and attitude. Please note that there is no wrong or correct answer. Respond sincerely with what you know and feel not with what the answer is supposed to be.

SECTION A

1.1. How is water supplied to your school?

A. Dam B. Rain water C. Borehole water D. Pipe water

1.2. What is your school annual water bill?

A. –R4 000 B. R6 000 C. R9 000. D. +R15 000

1.3. What is your school source of electricity supply?

A. None B. Generator C. Nura D .Eskom

1.4. What is your school annual electricity bill?

A. –R10 000 B. R20 000 C. R30 000 D. +R40 000

1.5. What type of toilets you have at school?

A. None B. Pit toilets C. Movable D. Flush toilets

1.6 How is Your School constructed?

A. Mud & Zink B. Blocks & asbestos C. Blocks & zinc D. Blocks & Tiles

1.7 What is the status of your school?

A. Sec 21 No Fee B. Sec 21 Fee C. Sec 20 No Fee D. Sec 20 Fee

SECTION B

This questionnaire is designed to enable you to measure your knowledge, understanding and attitude towards the environment and sustainable living. Please respond truthfully, so that your answers actually describe your knowledge, understanding and attitude. Please note that there is no wrong or right answer. Respond sincerely with what you know and feel not with what the answer is supposed to be. Answer the following questions by stating whether you: **STRONGLY AGREE = 4; AGREE 2; DISAGREE and STRONGLY DISAGREE = 1,** only put a **tick** (√) over the answer you think is the appropriate one. There are no wrong or correct answers. Be honest in answering these questions

2. ENVIRONMENTAL AWARENESS

NO	DESCRIPTION	1	2	3	4
2.1	Celebrating environmental Days such as World environmental Days, Arbor days and Water week increases environmental awareness?				
2.2	I have more interest in reading about environment.				
2.3	I enjoy viewing TV programmes such as 50/50, Focus and National Geographic Wild.				
2.4	I am aware of our local environmental issues.				
2.5	I teach my learners about local environmental issues				
2.6	Deforestation contributes to climate change.				
2.7	We can control air pollution by ourselves				
2.8	Planting of trees will help promote environmental sustainability				
2.9	Littering pollutes environment				

3. RESOURCE UTILIZATION

3.1 TRANSPORT

NO	DESCRIPTION	1	2	3	4
3.1.1	I use public transport most of the time in order to limit air pollution.				
3.1.2	I prefer to travel by car pool (club) than using my own car				

3.2 ENERGY SAVINGS

NO	DESCRIPTION	1	2	3	4
3.2.1	I turn off the lights and other appliances when they are not in use.				
3.2.2	The burning of fossil fuels such as coal, oil, petrol and wood releases huge amounts of CO_2 into the earth's atmosphere which increase the greenhouse effect and global warming				
3.2.3	Turning off your electric appliances like your stereo, computer or charger instead of leaving them on standby saves energy for future generations.				
3.2.4	I iron my clothes in the ironing once a week saves electricity				
3.2.5	I want energy saver bulbs because they save energy				

3.3. GARDENING & SCHOOL GROUNDS

NO	DESCRIPTION	1	2	3	4
3.3.1	Greening the school grounds protect the environment.				
3.3.2	Planting of trees in school premises is essential as they provide shade, shelter and for many organisms..				
3.3.3	One school one garden/one home one garden is a good initiative				
3.3.4	I use compost, kraal manure or organic waste as fertilizer in my garden				
3.3.5	Having a school garden is essential for promoting sustainable living				

3.4 WATER SAVINGS

NO	DESCRIPTION	1	2	3	4
3.4.1	Fixing leaking taps promptly saves water				
3.4.2	Switching taps off while brushing the teeth saves lot of water				
3.4.3	I encourage my learners to use cups or glasses to drink water from the taps				
3.4.4	Each learner washes his or her plate after eating				

3.5 PURCHASING & CONSUMPTION

NO	DESCRIPTION	1	2	3	4
3.5.1	I prefer to write on one side of the page than writing on both sides because it becomes very neat.				
3.5.2	I use environmental or eco-friendly products most of the times				
3.5.3	Damage to ozone layer can be reduced by avoiding goods containing CFC.				
3.5.4	I am concerned about how much waste is produced in our school.				
3.5.5	Over packaged products should not be purchased				
3.5.6	I buy less packaged products most of the time				
3.5.7	I use biodegradable products most of the time				

3.6 WASTE MANAGEMENT

NO	DESCRIPTION	1	2	3	4
3.6.1	I make an effort to reduce the amount of goods I consumed				
3.6.2	I am involved in recycling and encourage my learners and my family to do the same.				
3.6.3	Burning of used examination papers must be encouraged to prevent littering.				
3.6.4	Recycling bins are placed on all corners of the school.				
3.6.5	I re-use plastic bags, cardboards, and bottles for shopping.				

3.7 BEHAVIOUR AND ATTITUDE

NO	DESCRIPTION	1	2	3	4
3.7.1	I am responsible for the sustainability of my school, home and community				
3.7.2	In order to live a sustainable life one has to realign his or her lifestyle choices.				
3.7.3	Biodiversity indicates the beauty and heath of the planet, Earth				
3.7.4	Man must live in harmony with his environment				

3.7.5	Sustainability is a responsibility to be shared by all individuals, professionals, non-professional, experts and non-experts				
3.7.6	We need to acknowledge that environmental problems will only be solved when people change the way they live				
3.7.7	Schools are required to adopt effective environmental friendly management practices such as water saving, recycling and reuse.				
3.7.8	I treat all living things with respect				
3.7.9	Pouching is destructive to our nature				
3.7.10	The amount of waste produced and disposed depends on the lifestyles of people				
3.7.11	Teachers are prepared to provide learners with meaningful experience-based school learning activities that promote sustainable use of resources.				
3.7.12	Teachers promote behavioural change in their learners that result in a culture of environmental sustainability.				

SECTION C

1. What do you understand about the concept "sustainable living?"

_____

_____

_____

2. What are the characteristics of a person who leads a sustainably livelihood?

_____

_____

_____

Appendix 12: Administrative Staff Questionnaire

QUESTIONNAIRE

AN EVALUATION OF THE ROLE OF ENVIRONMENTAL EDUCATION IN PROMOTING SUSTAINABLE LIVING IN SECONSARY SCHOOLS IN UMKHANYAKUDE DISTIRICT-KWAZULU-NATAL

ADMINISTRATIN CLERK PERSONAL INFORMATION

SCHOOL CODE		**ADMIN CODE**	
GENDER		**AGE**	

This questionnaire is designed to enable you to measure your knowledge, understanding and attitude towards the environment and sustainable living. Please respond truthfully, so that your answers actually describe your knowledge, understanding and attitude. Please note that there is no wrong or right answer. Respond sincerely with what you know and feel not with what the answer is supposed to be. Answer the following questions by stating whether you: **STRONGLY AGREE (1), AGREE (2), STRONGLY DISAGREE (3) DISAGREE (4),** only put a **tick** (√) over the answer you think is the appropriate one. There are no wrong or correct answers. Be honest in answering these questions.

SECTION A

3. ENVIRONMENTAL AWARENESS

NO	DESCRIPTION	1	2	3	4
1.1	Celebrating environmental Days such as World environmental Days, Arbor Days and, etc. increases environmental awareness?				
1.2	I have more interest in reading about environment.				
1.3	I enjoy viewing TV programmes such as 50/50, focus and National Geographic Wild.				
1.4	I am aware of our local environmental problems.				
1.5	I make others aware of local environmental problems				
1.6	Deforestation contributes to climate change.				
1.7	We can control air pollution by ourselves				
1.8	Planting of many trees will help promote environmental sustainability				
1.9	I am involved in solving local environmental problems				

2 ENERGY SAVINGS

NO	DESCRIPTION	1	2	3	4
2.1	I turn off the lights when I leave the room.				
2.2	I remove plugs from sockets used for office electronic equipment				
2.3	I turn off my electric appliances like photocopiers, printers, radio, computer or charger instead of leaving them on standby at the end of the day.				
2.4	I set my computer to go to sleep automatically during short breaks				
2.5	I boil just enough water to make a cup of tea				

3. WATER SAVINGS

NO	DESCRIPTION	1	2	3	4
3.1	Fixing leaking taps promptly saves water				
3.2	Switching taps off while brushing the teeth saves lot of water				
3.3	I use a cup or glass to drink water from the tap				
3.4	I use a watering can to water the garden				
3.5	I collect rain water when it rains				
3.6	I water the garden in the morning and afternoon				
3.7	Water is scarce in the world				

4. PURCHASING & CONSUMPTION

NO	DESCRIPTION	1	2	3	4
4.1	I use environmental or eco-friendly products most of the times				
4.2	I proof read my writings before printing to eliminate paper and ink wastage				
4.3	I use colour printing only when it's necessary.				
4.4	I buy chlorine free paper				
4.5	I print on both sides of a paper				
4.6	I buy remanufactured ink				
4.7	I purchase 100% recycled or at least partially recycled paper.				
4.8	I purchase products with less packaging				
4.9	I use a duplicator even to print for one page				

5. WASTE MANAGEMENT

NO	DESCRIPTION	1	2	3	4
5.1	I make an effort to reduce the amount of goods I consumed				
5.2	I recycle tonner and ink cartridges.				
5.3	I throw papers on the dust bin placed on the school yard.				
5.4	I reuse all old envelops, plastic bags and bottles.				
5.5	I make money out of waste.				

6. BEHAVIOUR AND ATTITUDE

NO	DESCRIPTION	1	2	3	4
6.1	I am responsible for the sustainability of my school, home and community.				
6.2	Biodiversity indicates the beauty and health of the planet, Earth.				
6.3	Man must live in harmony with his environment				
6.4	Sustainability is a responsibility to be shared by all individuals, professionals, non-professional, experts and non-experts.				
6.5	We need to acknowledge that environmental problems will only be solved when people change the way they live.				
6.6	Burning of waste pollutes our environment				
6.7	I treat all living things with respect				
6.8	Pouching is destructive to our nature				

SECTION C

1. ‘What do you understand by the concept sustainable living’?

_____
_____
_____

2. What are the characteristics of a person who leads a sustainably livelihood?

_____
_____
_____

Appendix 13: Observation Schedule

OBSERVATION SCHEDULE

Make a comment about each of the following environmental issue as it occurs at school:

SCHOOL NAME/CODE	

1.ENVIRONMENTAL AWARENESS	
2. TRANSPORT	
3.ENEGY SAVINGS	
4.GARDEN & SCHOOL GROUNDS	
5.WATER SAVINGS	
6.PURCHASING & CONSUMPTION	
7.WASTE MANAGEMENT	
8.ADDITIONAL INFORMATION WHICH MAY BE NECCESSARY	